NATIONAL DIETARY AND PHYSICAL ACTIVITY GUIDELINES FOR SELECTED NON COMMUNICABE DISEASES

Ministry of Health
Sri Lanka

Directorate of Non Communicable Diseases

Sri Lanka Sports Medicine Association

Sri Lanka Medical Nutrition Association

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Directorate of Non-Communicable Diseases
Ministry of Health

The National dietary and physical activity guidelines

For selected Non-communicable diseases

Prepared by the Directorate for Non-Communicable Diseases in collaboration with, Sri Lanka Sports Medicine Association, Sri Lanka Medical Nutrition Association, Department of Nutrition - Medical Research Institute of the Ministry of Health, Professional colleges including Sri Lanka College of Cardiology, Sri Lanka College of Endocrinologists, Sri Lanka College of Internal Medicine, Ceylon College of Physicians, College of Pulmonologists of Sri Lanka, College of Community Physicians of Sri Lanka, College of Specialists in Rheumatology and Rehabilitation - Sri Lanka, Sri Lanka Society of Nephrology, Association of Sri Lankan Neurologists, Nutrition Division-Ministry of Health , Health Promotion Bureau-Ministry of Health ,National Institute of Sports and Exercise Medicine - Ministry of Sports and Youth Affairs, and the World Health Organization (WHO).

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Lifestyle modification, including a healthy diet and increased physical activity levels, are essential aspects of managing patients with Non communicable diseases. This guideline includes dietary and physical activity recommendations for the patients diagnosed with overweight and obesity, hypertension, coronary heart disease, cerebrovascular accidents, diabetes mellitus, chronic respiratory diseases, chronic kidney disease and arthritis

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Abbreviations

aRR	Attributable Relative Risk
AV	Atrio-Ventricular
BMI	Body Mass Index
BP	Blood Pressure
CABG	Coronary Artery Bypass Graft
CAT	COPD Assessment Test
CCD	Clinical Cardiovascular Disease
CHD	Coronary Heart Disease
CHF	Congestive Heart Failure
CI	Confidence Interval
CKD	Chronic Kidney Disease
COPD	Chronic Obstructive Pulmonary Diseases
CRD	Chronic Respiratory Diseases
CVD	Cardiovascular Diseases
DALY	Disability Adjusted Life Years
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood Pressure
DH	Divisional Hospital
DM	Diabetes Mellitus
ECG	Electrocardogram
EF	Ejection Fraction
FEV_1	Forced Expiratory Volume in one second
GP	General Practitioners
ICD	Implantable Cardioverter Defibrillator
ILDs	Interstitial Lung Diseases
LED	Low Energy Diet
LMIC	Lower Middle Income Countries
LVH	Left Ventricular Hypertrophy

MET	Metabolic Equivalent
mMRC	Modified Medical Research Council
MNT	Medical Nutrition Therapy
MO-HLC	Medical Officer, Healthy Lifestyle Center
MO-NCD	Medical Officer, Non Communicable Diseases
MO-OPD	Medical Officer, OutPatient Department
MO-PMCI	Medical Officer, Primary Medical Care Institute
6MWT	6-Minute Walk Test
NASH	Nonalcoholic Steatohepatitis
NCD	Non Communicable Diseases
ONS	Oral Nutrition Supplements
PAF	Population Attributable risk Fraction
PARQ	Physical Activity Readiness Questionnaire
PCI	Percutaneous Coronary Interventions
PEP	Positive Expiratory Pressure
PMCU	Primary Medical Care Unit
PNF	Proprioceptive Neuro-muscular Facilitation
PPE	Pre Participatory Medical Evaluation
PUFA	Polyunsaturated Fatty Acids
RED	Reduced Energy Diet
RR	Relative Risk
RPE	Rate of Perceived Exertion
SBP	Systolic Blood Pressure
TIA	Transient Ischaemic Attack
TOD	Target Organ Damage
TOT	Training of Trainers
WHO	World Health Organization
WHR	Waist to Hip Ratio

Chapter 1

Introduction to the guideline

1.1 Burden of Non communicable diseases

The rising burden of Non communicable diseases (NCDs) is a major public health challenge that undermines the social and economic development of the countries across the globe, with major effects on lower- and middle-income countries (LMIC) like Sri Lanka. The NCDs including cardiac diseases, cerebrovascular accidents, diabetes mellitus, hypertension, cancer, chronic respiratory diseases and chronic kidney diseases, account for more than 50% of the global burden of diseases and are the major causes for premature deaths (death between 30-70 years) worldwide. Over 80% of these premature deaths occur in LMIC including Sri Lanka (1). The demographic transition across the world makes this matter worse.

In Sri Lanka, NCDs accounted for 83% of total deaths and 17% of premature deaths, in the year 2016 (2). With the fast-growing aging population in Sri Lanka, this burden is estimated to be worse in the future. In the year 2016, of the total current health expenditure (LKR 464 billion), the majority (73%) was spent on the curative care, and on management of NCDs (36%) (3). According to the national NCD risk factor survey (STEPs survey) 2015 conducted among Sri Lankan adults (18-69 years) prevalence of hypertension was 26.1%, diabetes mellitus 7.4%, history of cardiovascular disease4.4%, dyslipidaemia 24% and overweight and obese 29.3% (4).

1.2 Burden of NCD risk factors

The NCDs are caused by four major lifestyle related, and therefore, highly preventable behavioural risk factors namely, physical inactivity, unhealthy diet, tobacco use and use of alcohol (Figure 1.1). The STEPs survey 2015 further reported that 72.5% of the Sri Lankan adult population do not consume the recommended 5 servings of fruits and vegetables per day, 18% were current alcohol users (with 35% of males being current alcohol users) and 25.8% were current tobacco users (both smoked or smokeless tobacco); with 15% of males being current smokers and 26% of males being current users of smokeless tobacco. The survey also reported that 30.4% of the Sri Lankan adult population do not engage in the recommended 150 minutes of moderate intensity physical activity level per week, making them more vulnerable for NCDs,with females (38.4%) being more inactive compared to males (22.5%) (4).

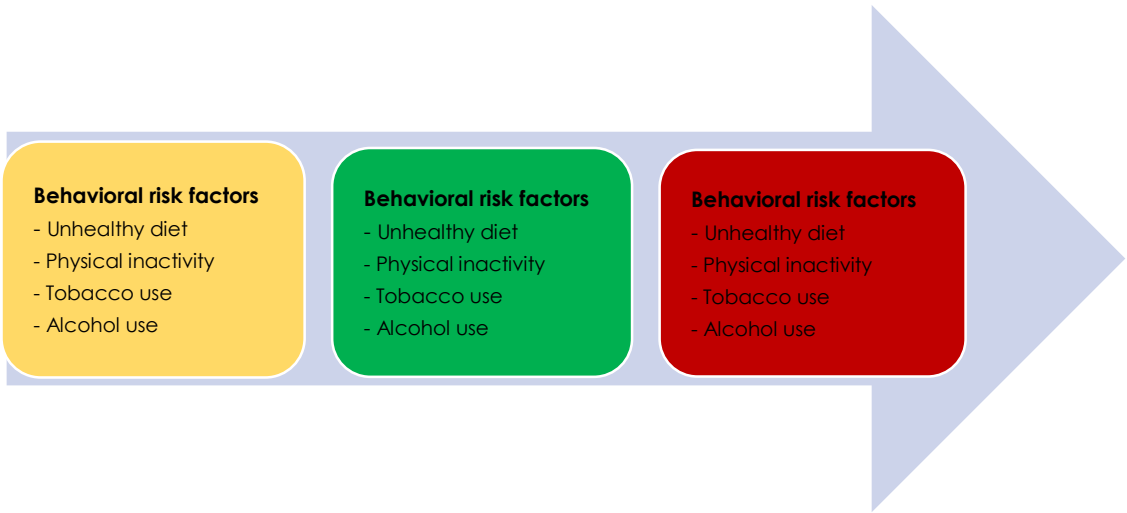


Figure 1. 1: Burden of NCD

There is ample evidence in the literature indicating that unhealthy diet leads to NCDs. Dietary risks (including consumption of high salt, fat and sugar, low fruit and vegetables consumption) have been the 2nd and 3rd leading risk factor attributable to global deaths (resulting in cardiovascular diseases, diabetes and cancers) among females and males respectively in the year 2019 (5). In addition, dietary risks are reportedly the 6th and 5th leading cause attributable for global Disability-Adjusted Life Years (DALYs) among females and males respectively in the year 2019 (5).

It has been reported that the consumption of processed meats (RR = 1.37; 95%; CI: 1.11-1.68), food containing trans-fat (RR = 1.23; 95%; CI: 1.11-1.37), food with higher glycaemic index and refined sugars (RR = 1.23; 95%; CI: 1.06-1.42), sodium (RR = 1.12; 95% CI: 1.06-1.19) and sugar-sweetened beverages (RR = 1.17; 95%; CI: 1.10-1.24) increase the risk of coronary heart disease (CHD) (6). On the other hand, it is reported that the consumption of fruits (RR = 0.94; 95% CI: 0.91-0.98), vegetables (RR= 0.95; 95% CI: 0.92-0.98), beans/legumes (RR= 0.77; 95% CI: 0.65-0.90), nuts/seeds (RR= 0.76; 95% CI: 0.69-0.84), fish/seafood (RR = 0.94; 95%; CI: 0.90-0.98), whole grain (RR= 0.91; 95% CI: 0.86-0.97), and food containing poly unsaturated fatty acids (PUFA) (RR = 0.90; 95% CI: 0.85, 0.94), omega-3 fats (RR = 0.85; 95% CI: 0.79-0.92) and dietary fiber (RR = 0.76; 95% CI: 0.68-0.85) reduce the risk of CHD (6).

Consumption of red meat (RR = 1.19; 95%; CI: 1.04-1.37), processed meat (RR = 1.51; 95%; CI: 1.25-1.83) and sugar-sweetened beverages (RR = 1.27; 95%; CI: 1.10-1.24) and food with higher glycaemic index and refined sugars (RR = 1.13; 95% CI: 1.08-1.17) is reported to increase the risk of diabetes. In contrary, consumption of nuts/seeds (RR = 0.87; 95%; CI: 0.81-0.94), whole grains (RR = 0.88; 95%; CI: 0.83-0.93), yoghurt (RR = 0.82; 95%; CI: 0.70-0.96) and dietary fiber (RR = 0.76; 95% CI: 0.65-0.88) is protective against diabetes (6).

The risk of developing a stroke increases with the consumption of food with higher glycaemic index and refined sugars (RR = 1.19; 95% CI: 1.05-1.36), while, consumption of fruits (ischemic stroke: RR = 0.88; 95%; CI: 0.83-0.93; and haemorrhagic stroke: RR= 0.73; 95% CI: 0.62-0.87), vegetables (ischemic stroke: RR = 0.83; 95%; CI: 0.75-0.93; and haemorrhagic stroke: RR= 0.83; 95% CI: 0.72-0.96) and dietary fiber (RR = 0.81; 95% CI: 0.70-0.95) was found to be protective (6). Thus, it is evident that consumption of a healthy diet is essential to prevent NCDs as well as an essential aspect of the management plan of NCDs.

1.3 Physical inactivity as a risk factor for NCDs

Physical inactivity is well known to contribute to NCDs in the world, including Sri Lanka. It is the 4th leading behavioural risk factor for global burden of diseases (7). It is shown that improving physical activity would prevent 6% - 10% of the major NCDs including CHD (aRR = 1.16; 95% CI: 1.04-1.30), diabetes (aRR = 1.2; 95% CI: 1.10- 1.33), breast cancer (aRR = 1.33; 95% CI: 1.26-1.42) and colon cancer (aRR = 1.32; 95% CI: 1.23-1.39), thereby, improving the life expectancy (8). It is also shown that if not eliminated, even a mere reduction of physical inactivity by 10% would prevent more than 533,000 deaths and a reduction of inactivity by 25% would prevent more than 1.3 million deaths globally (6).

Considering Sri Lanka, physical inactivity accounts for CHD [population attributable risk fraction (PAF) = 4.3; 95% CI: 1.6 – 7.1); diabetes (PAF= 5.3; 95% CI: 2.7-8.3); breast cancer (PAF=8.7; 95% CI:4.2-13.5); colon cancer (PAF=7.7; 95% CI: 4.2-11.1); and all-cause mortality (PAF=6.9; 95% CI: 5.5-8.3) (8). Thus, improving physical activity among the Sri Lankan population would support in combating the NCD burden of the country and improve life expectancy. In addition, it is evident that being physically active has psychosocial benefits as well, including reduction in anxiety,

depression and negative mood; improves self-esteem, social withdrawal and cognitive function (9).

Thus, it is evident that leading an active life is essential to prevent NCDs as well as an essential part of the management plan of NCDs. However, despite its importance, it is reported that Sri Lankans do not engage in the recommended levels of physical activity. It is shown that personal factors such as health issues (e.g. joint disorders), time and lifestyle related factors, lack of knowledge; unavailability of facilities or dedicated areas for exercise; and environmental, social and cultural factors (e.g. myths related to physical activity, physical activity being a novel concept, security reasons etc.) prevent Sri Lankans from being physically active (10). Therefore, implementing this guideline would support changing this resistant environment towards physical activity.

1.4 Importance of the dietary and physical activity guidelines for selected non communicable diseases

Healthcare service providers are one of the main points of contact for health services for patients diagnosed with NCDs. And it is the best level of care for the provision of behavioural change communication leading to promotion of healthy lifestyles. Therefore, it is of utmost importance that the healthcare providers be competent in prescribing, advising and promoting the dietary and physical activity modifications for patients diagnosed with NCDs according to their disease status.

Therefore, development of the dietary and physical activity guidelines specific to common NCDs in order to guide the healthcare providers and to make them knowledgeable about the recommendations was a felt need.

As a part of the Government of Sri Lankas' commitment to achieve the sustainable development goals, efforts are underway to reorient the country's health system to best meet the population needs. Primary healthcare restructuring has been placed as the cornerstone of these efforts to ensure that NCDs are better managed by, all Sri Lankans being guaranteed access to quality health services, improving the service utilization and repositioning, implementing proper referral pathways and streamlining the patient management and care. It is therefore expected that this guideline will play a pivotal role in promoting healthy lifestyles among patients as a treatment method for the diagnosed disease condition and also to prevent the development of other NCDs.

1.5 How to use this guideline

Modification of the lifestyle is an essential treatment pathway in the prevention as well as the management of NCDs. Thus, limiting the use of tobacco and alcohol, consumption of a healthy meal and being physically active cumulatively play a major role in controlling and preventing these chronic debilitating diseases.

1.5.1 Objective of this guideline

The objective of this book is to build capacities of the healthcare providers to advise, promote and prescribe dietary and exercise prescriptions for patients diagnosed with coronary heart disease, cardiovascular accidents, hypertension, diabetes mellitus, chronic respiratory disease, arthritis, chronic kidney disease and overweight and obesity, under their care.

1.5.2 The target audience and expected outcome

This guideline is designed to be utilized by: Medical Officers conducting medical clinics

Adherence to this guideline will allow a patient diagnosed with NCD(s) to be prescribed with an individualized diet plan and a physical activity schedule, taking into consideration the disease condition(s) that he/she is suffering from. This will support the control of the current disease condition as an essential part of the management plan and also will support in the prevention of developing other NCDs. Thus, usage of this guideline will promote healthy lifestyles of the patients which would ultimately support in combating the burden of NCDs in the country and improve the quality of life of patients diagnosed with NCDs.

1.6 Dietary recommendations

Good nutrition during all stages of life is needed to maintain healthy tissues, normal body functions and activities. It is important to obtain all the nutrients (carbohydrates, fats, proteins, vitamins & minerals) from the diet. Even in a healthy adult, nutrient requirement varies with activity level. Sedentary lifestyle with the least requirement and highly active lifestyle with the most requirement. The total of daily energy intake should be distributed as follows. 50 – 60% carbohydrate, 25-30% fat and 15-20% protein. **Annexure 1 provides the daily dietary recommendation for an apparently healthy sedentary individual with an average weight of 50kg.**

In each disease condition the requirement varies. It depends on the staging of the disease, severity of the disease and also the nutritional status of an individual. When an individual is having multiple comorbidities it is needed to consider all the aspects when recommending his/her diet. The main changes in the daily recommendations of the nutrient requirements in selected non-communicable diseases are explained in the next few chapters.

1.7 Physical activity recommendations

The physical activity recommendations provided in each chapter of this guideline gives the recommendation relevant for each disease condition.

It is important to note that the physical activity recommendation for each disease condition differs from the physical activity recommendation for an apparently healthy sedentary individual.

If the patient presents with several comorbidities, the relevant exercise recommendations should be considered prior to prescribing an exercise schedule for a certain disease condition.

The physical activity recommendation for an apparently healthy adult of aged 20 years or more are given in **Annexure 2** .Images of recommended exercises are given in **Annexure 3.**

1.7.1 How to measure the intensity of an activity

To achieve physical fitness (refer to "Promotion of physical activity in primary healthcare", the Training Of Trainers (TOT) module published by the Directorate of Non-communicable diseases for further details), it is necessary that a physical activity is performed at a certain intensity level. Physical activities are classified as light, moderate and vigorous, based on the intensity that the

activity is performed. There are several ways of assessing the intensity of an activity. However, the easiest two subjective measurements of the intensity discussed in the guideline are described below.

1.7.1.1 Talk test

The easiest method of subjective assessment of the intensity of an activity is by the talk test. It is important to explain to the patient on how to measure the intensity of an activity utilizing the talk test.

If he/she is able to talk and sing while doing a certain activity, that indicates that the particular activity is of light intensity.

If he/she is able to talk but finds it difficult to sing while doing a certain activity which indicates that the activity is of moderate intensity.

If he/she finds difficulty in talking while doing a certain activity, it indicates that the activity is of vigorous intensity.

1.7.1.2 Borg scale

The Borg scale is a simple subjective method of rating the perceived exertion (RPE) and can be used to assess an individuals' rate of exercise intensity (11). It takes into account the fitness level of the individual; it matches how hard the individual feels that he/she is doing an activity with numbers. There are several RPE scales, most common being the 15-point scale and the 10-point scale. In this guideline, a 10 point RPE scale is used. In the 10-point scale (Figure 1.2), the scale starts with "no feeling of exertion" (very light intensity) which rates 1-3 and ends with "very, very hard" which rates 9-10 (maximum intensity). Moderate intensity activities register to 4-6 on the Borg scale (11).

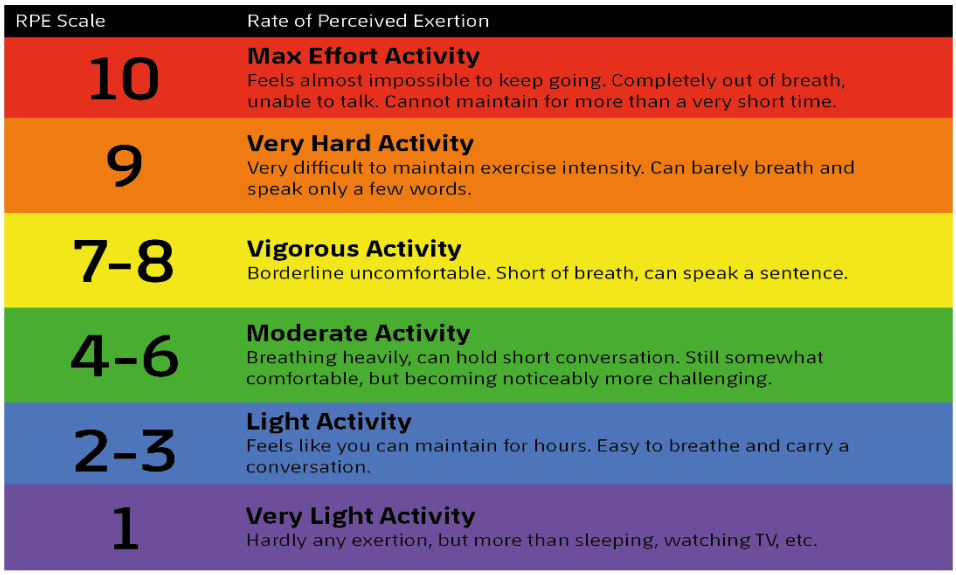


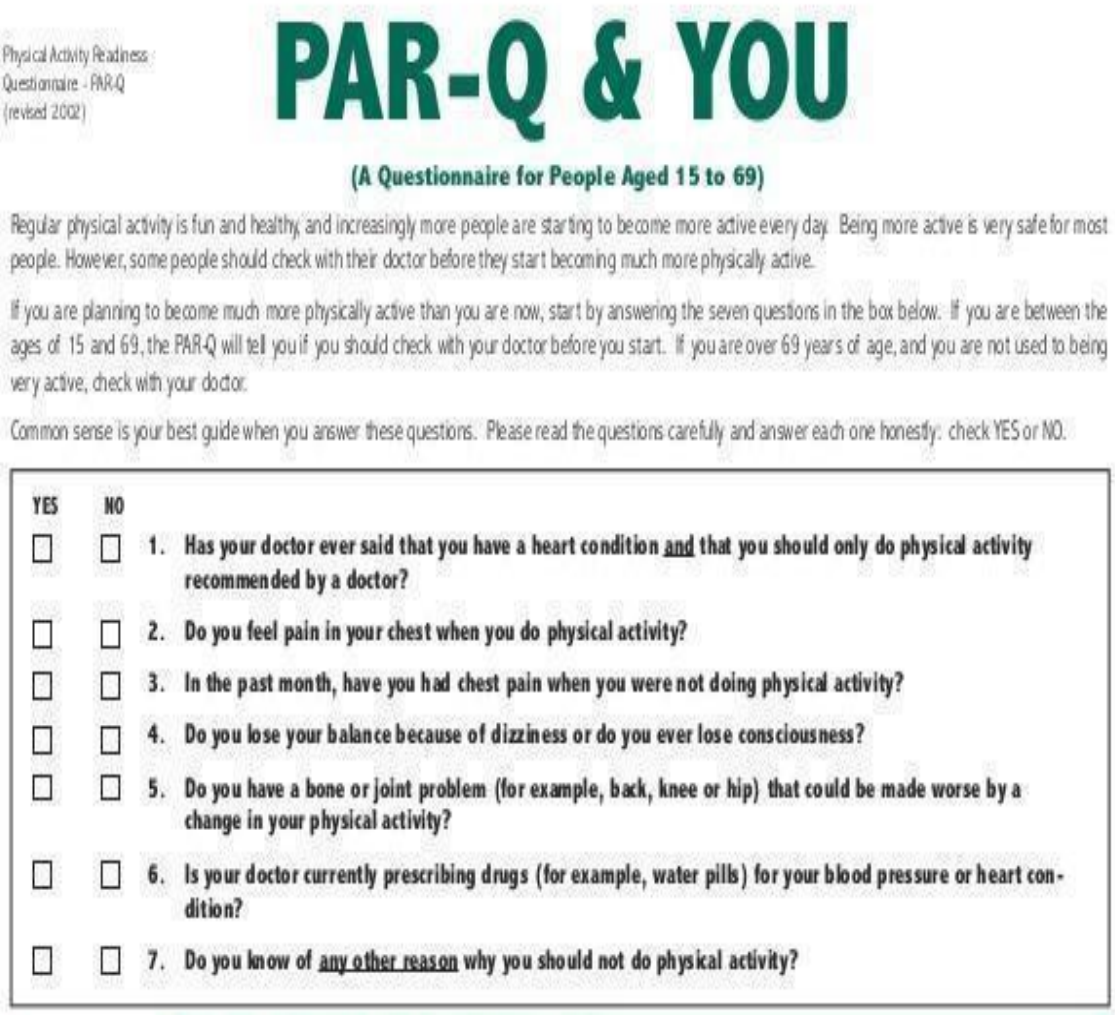
Figure 1.2: 10 POINT Borg Scale

1.7.2 Assessing the functional capacity of the patient to engage in exercises

Once a patient diagnosed with a NCD visits the medical clinic, it is always better to evaluate the functional capacity of the individual to perform the exercises and decide whether to prescribe the relevant exercise schedule or to refer the patient to a specialist for further management and advice accordingly. Two easy methods of assessing the functional capacity of the individual to engage in exercises namely, the physical activity readiness questionnaire (PAR-Q) and the 6-minute walk test, are discussed in this guideline and are described below.

1.7.2.1 Physical Activity Readiness Questionnaire PAR-Q

It is essential to assess the readiness of the patients to do exercise, therefore before we begin an exercise routine we apply the PAR-Q (Figure 1.3) prior to the session for medical clearance.



Physical Activity Readiness Questionnaire - PAR-Q (revised 2002)

PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
☐	☐	1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
☐	☐	2. Do you feel pain in your chest when you do physical activity?
☐	☐	3. In the past month, have you had chest pain when you were not doing physical activity?
☐	☐	4. Do you lose your balance because of dizziness or do you ever lose consciousness?
☐	☐	5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
☐	☐	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
☐	☐	7. Do you know of any other reason why you should not do physical activity?

Figure 1. 3 : Physical Activity Readiness Questionnaire

https://www.slideshare.net/lorettaking1/par-q-29060520

1.7.2.2 The 6-minute walk test (6MWT)

The 6-minute walk test is a simple, cost effective, sub-maximal exercise test that assesses the exercise capacity, response to therapy and prognosis across a broad range of chronic cardio-pulmonary conditions (12). It assesses the distance that an individual can quickly walk on a flat, hard surface over a span of 6 minutes. It therefore evaluates the responses of all the systems involved during exercise including the circulatory system, respiratory system and neuromuscular systems. (Figure 1.4)

Contraindications for 6MWT

Absolute contraindications:

- Unstable angina during the previous month
- Myocardial infarction during the previous month

Relative contraindications:

- Resting heart rate of >120 beats per minute
- Systolic Blood Pressure ≥180 mmHg
- Diastolic Blood Pressure ≥100 mmHg

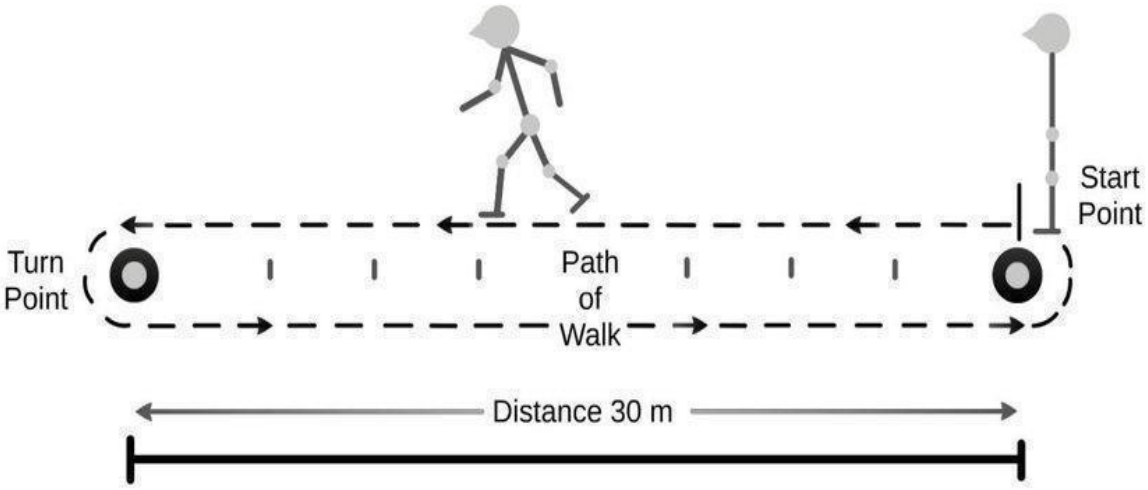


Figure 1.4: Six- Minute Walk Test

Method

- The testing should be performed in a location where a rapid emergency response is possible (Oxygen, sublingual nitroglycerine, aspirin, metered dose inhaler or nebulizer should be available)
- The 6MWT should be performed along a flat, straight, enclosed corridor with a hard surface (the test can be performed outdoors as well).
- Walking course should be 30m in length
- The starting line, turn around points should be marked on the floor (or with a cone) using bright coloured tape.
- A warm up period before the test **should not** be performed.
- The patient should sit at rest for at least 10 minutes before the test starts.
- Measure the total distance that the patient can walk over 6 minute's duration without being symptomatic.

Interpretation: If the individual is able to walk 350m in 6 minutes without being symptomatic (dyspnoea, chest pain, dizziness, faintishness), with stable heart rate, blood pressure and O_2 saturation in pulse oximetry, he/ she can be enrolled into mild intensity exercises and can progress gradually to moderate intensity.

If the patient becomes symptomatic while performing the 6MWT including chest pain, intolerable dyspnea, leg cramps, staggering, diaphoresis and pale, immediately stop the 6MWT.

Chapter 2

Overweight and Obesity

2.1 Introduction

Overweight and obesity are characterized by the excessive or abnormal level of fat accumulation in the body leading to adverse effects on an individual's health. Overweight and obesity contribute to several comorbidities such as ischemic heart disease, diabetes, hypertension, osteoarthritis, cancers (uterus, breast and colon), psychosocial problems, obstructive sleep apnoea and dyslipidaemia. Table 2.1 shows the World health organization (WHO) classification for obesity based on the body mass index (BMI) for Asians.

Classification for obesity based on the BMI for Asians.

Table 2. 1 Classification for obesity based

Category	BMI (Kg/m^2)	Comorbidity Risk
Underweight	< 18.5	Low* but other problems
Optimal	18.5 – 24.9	Average
Overweight	≥25.0	Increased
Pre obese	25- 29.9	Increased
Obesity	≥ 30.0	
Obesity class I	30.0 - 34.9	Moderate
Obesity class II	35.0– 39.9	Severe
Obesity class III	≥40	Very severe

Source: WHO. https://www.who.int/dietphysicalactivity/childhood_what/en

*Other problems are anemia, subfertility, weak immune system and fragile bones

BMI 23-24.9kg/m^2 is considered an increased risk for being overweight and considered a trigger point for lifestyle modification for Asians. Asians have a higher body fat percentage compared to Caucasians with the same BMI. Therefore, they are at a higher risk of type 2 diabetes mellitus and cardiovascular disease at a similar BMI than to Caucasians.

There is evidence that body weight and fat loss results in improved cardiovascular risk factors, including reduced blood pressure, improved lipid profiles, improved glucose tolerance and lowered C-reactive protein levels.

Management of body weight depends on energy balance. Hence, to reduce body weight, energy expenditure must exceed the energy intake. Even 5%-10% weight loss has shown improvements in cardiovascular risk factors. One difficulty in weight management is the maintenance of long-term essentials.

2.2 Dietary modifications in the management of overweight and obesity

Medical Nutrition therapy is one of the key management strategies for weight reduction. This plan should last for at least six months or until the individual reaches their goal, at which a weight maintenance plan should be implemented.

2.2.1 Goals of Medical nutrition therapy in weight reduction

- Achieve 5%-10% weight loss at the beginning, and then achieve a satisfactory weight loss according to the initial BMI.
- Prevention of obesity- related metabolic complications such as hypertension, dyslipidemia, cardiovascular disease, diabetes and mechanical complications
- Improving overall health through optimal nutrition
- Weight maintenance once the weight reduction goal is achieved

2.2.2 Nutrition screening of a patient with overweight and obesity

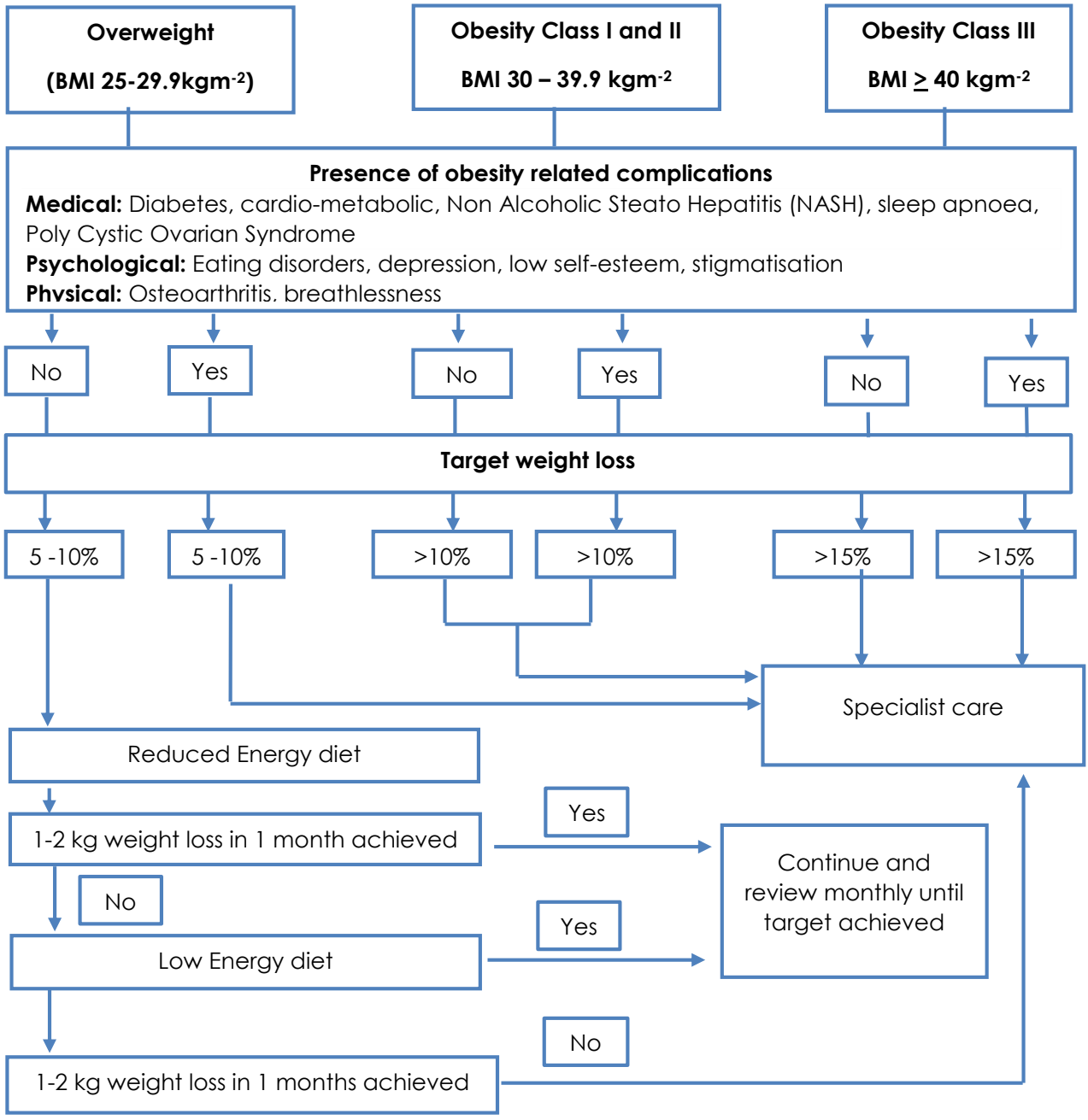


Figure 2. 1: Nutrition screening for a patient with Overweight and Obesity

2.2.3 Reduced Energy Diet (RED)

- The aim is to produce a modest energy deficit of 500 – 1000kcal/day
- Take a detailed 24-hour dietary recall of the patients' normal day and modify the diet by cutting down or altering the food items they consume to achieve the energy deficit (refer to Table 2.2 and Table 2.3 as a guide).
- Identify energy- dense, processed food and advise to eliminate or minimize them. (eg: biscuits, cakes, confectionery, pastries, processed meats, commercial burgers, fried foods and chips)
- Advice on calorie values of food items as guidance to cut down 500 - 1000 kcal/day (Table 2.2). Make them aware of food group exchanges to enhance the diversity of meals

Table 2. 2 : Guide to RED

Food group	Targeted amount of energy to be reduced (500kcal)	Number of servings to cut down from ongoing diet	1 serving size	1 serving size equals to
Starchy foods/yams/ cereals	160 kcal	2	½ cup	½ cup rice /½ cup of cooked noodles or pasta / ½ cup of boiled sweet potato / Manioc / Raja ala / other yams/ 1 slice of bread (50g) /2 - 3 string hoppers (10g x2) / 1 hopper (25g) ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Parata or Chapathi (15 cm diameter)/1 dosai (about 10cm in diameter) / ¾ cup of boiled corn / ½ cup jack or breadfruit /3 cm height "5cm diameter"pittu
Sugar	120 kcal	6	1 tsp	1 tsp sugar / 1 tsp honey / 1 tsp treacle or thumb size piece of Jaggery
Coconut	50 – 60 kcal	½	2tbs Grated coconut Or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs polsambol / 3 tbs gravy
Oil*	65-70 kcal	½	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Extra foods/junk foods	100 kcal			1-2 scoops of Ice cream/ 1 small donut / 1 matchbox size musket/ 1 tbs boondhi / 1 – 2 sweet biscuits/1 thin slice (5cm square) cake/ 1 sweetmeat (Kevum, athirasa, Aluva, pani walalu, etc)
Fizzy drinks and sweetened beverages	100 kcal			330 ml sweetened beverages

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon* When choosing an oil, take only 5 ml from coconut oil and the rest from other oil

Table 2. 3: Calorie values of some commonly consumed food products

Food Category	Average Energy (kcal)
3 tbs full of vegetables (50g)	25-40
3 tbs full of leafy vegetables (50g)	25-40
1 tbs (10g) of pol sambol	30 -40
Egg omelette	120
1 tbs of cooked dhal	25
1 tea cup of cooked rice	140-160
1 tea cup of boiled green gram (150g)	150-170
1 tea cup of boiled kadala (150g)	150-200
2 slices of bread (50gx2)	140-160
1 slice of pittu (50g)	141
6 string hoppers (60g)	160
1 dosai (50g)	80
1 pizza (100g)	271
Medium size rotti (50g)	171
1 hopper (25g)	70
1 cup of tea (3 tsp of milk powder + 1 teaspoon of sugar)	90
Plain tea (2 tsp of sugar)	32
Chinese roll	150 – 200
Dhal wade (50g)	100 – 150
1 plain bun (50g)	155
Curd (100g)	100
1 apple (100g)	50
2 slices of pineapple (100g)	46
Papaya (100g)	32
Cola 330ml	140
Chocolate cake (40g)	143
Cashew nut (28g)	165

(Source-FBDG 2021 & Canteen guidelines, nutrition division)

Table 2. 4: Sample Menu of RED

Meal	Usual diet	RED (500-1000kcal deficit) sample menu
Morning tea	Full cream milk tea 1 cup with sugar 3 tsp	Non-fat milk tea 1 cup without sugar
Breakfast	Bread 4 slices, dhal curry 1 cup, coconut sambol ½ cup	2 slices of bread 3 tbs of dhal curry 3 tbs of kunisso mallum Tomato salad
Mid-morning snack	Full cream milk tea 1 cup	1 medium mango/ small banana (e.g ambul) Plain tea without sugar
Lunch	Rice 2 ½ cups, curries 1 tbs from each, fish piece	Rice 1 ½ cups 60g of fish (size of 2 boxes of matches) 3 tbs of kohila curry 3 tbs of mukunuwenna mallum
Mid afternoo snack	1 fish bun/ roll/ patty and a full cream milk tea 1 cup	2 tbs peanuts/thalaguli 1 cup of soup/plain tea without sugar
Dinner	Rice 2 ½ cups, curries 1 tbs from each, fish/ chicken 1 piece	Rice 1 ½ cup 1 egg 3 tbs of Beans curry Carrot/cucumber salad 1 cup

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon

2.2.4 Low Energy Diet (LED)

- If the patients do not achieve the targeted weight reduction with RED, shift to the LED.
- The aim of LED is to reduce total daily energy intake to 1000-1200kcal.

Follow the dietary guide in table 2.5 for LED

Table 2. 5: Guide to LED

Food group	Recommended energy intake (1000-1200kcal)	Number of servings per day	1 serving size	1 serving size equal to:
Cereal/Yam and starchy food	350-450kcal	5-6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta / ½ cup of boiled sweet potato / Manioc / Raja ala / other yams / 1 slice of bread /2 - 3 string hoppers,1 hopper /½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Parata or Chapati (15 cm diameter) / 1 dosai (about 10cm in diameter) / ¾ cup of boiled corn / ½ cup jack or breadfruit / 3 cm height ,5cm diameter pittu
Pulses	100kcal	1	1/2 cup / 3 tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu / ½ cup chickpeas,½ cup cowpea / ½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	150-200kcal	3-4	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken / 1 matchbox size dry fish/ 10 - 20 sprats / 1 egg
Dairy products	80 kcal	1	1/2 cup	1/2 cup nonfat or full cream fresh milk /1 tbs nonfat milk powder
Nuts and seeds	80-90kcal	1	1 full tbs	1 full tbs Peanut / 5 full Cashew / 1 full tbs pumpkin or Sunflower seeds/1Thalaguli or 10 Kottang

Root vegetables/starchy vegetables	40-80kcal	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ Manioc/ other yams/ Carrot/ Beet/ Radish/ Knol kohl / Kohila/ Lotus roots
Green Vegetables	20-40kcal	1	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal
Leafy vegetables	10-20 kcalx2	2	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ Beet leaves/ Radish leaves/ Knol Kohl leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves
Other vegetables	20 kcal	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Polos/ Cauliflower/ Ambarella/ Green mangoes
Fruits	50-100kcal	2	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya /1 small banana / ½ large guava /1 medium pomegranate / 1 medium mango / ½ small jambola (grapefruit) / ½ cup fresh pineapple / 5 large or 10 small grapes / 1 cup cubed watermelon /5-6 pieces of jackfruit / 1 medium wood apple/ 1 small belli fruit / 2 medium ambarella / 10 – 15 jambu / 7-9 rambuttan / ½ cup anoda / 2 pieces of durian / 2 medium passion fruits / 10 fruits of nelli or lovi or veralu /2 small mandarin / 1 small orange (6 cm across) /1 small apple (5 cm across) / 5 strawberries / ½ cup mulberry / ½ medium avocado
Coconut	50-60kcal	½	2 tbs Grated coconut or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut scraping / 3 tbs gravy

Oil*	90	2/3 (10 ml)	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Water	-	6 – 8	1 cup	Water
Other Beverages	-	2 -3	1 cup	1 cup light plain tea/ coffee / herbal drinks (Belimal, Ranawara) /Coriander water/King coconut / Coconut water

Cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon

*When choosing an oil, take only 5 ml from coconut oil and use 5 ml from other oil to improve the fat composition

➢ **Salt intake:**

Keep an eye on the salt intake:

- Try to keep the daily sodium intake below 2300 mg/day, equal to 5g (1 tsp) of salt. If the blood pressure is high, reducing the sodium intake to 1500 mg/day is beneficial.
- Dietary tips to reduce consumption of salt:
  - Do not add salt while cooking rice
  - Use more herbs, spices, black pepper, chilli, lemon etc. and reduce the amount of added salt
  - Minimize intake of high salty food e.g. soup cubes, sauce, processed meat (sausages, bacon, meatballs, etc.), salted nuts and French fries (salted potato chips)
  - Packaged food – Look for the traffic light guide for low sodium food.

Table 2.6 provides a sample menu for low energy diet

Table 2. 6: Sample menu of LED

Breakfast	5 string hoppers 3 tbs Polos/keselmuwa curry 3 tbs Kunissan mallum
Mid-morning snack	½ guava
Lunch	1 cup of rice 1 egg 3 tbs of beans curry 3 tbs of gotukola mallum
Mid- afternoon snack	½ cup of non-fat fresh milk
Dinner	1 cup of noodles with mixed vegetables ½ cup Chicken (60g= size of 2 boxes of matches) 2 tbs of dhal curry

2.2.5 General Advice

- The weight loss target should be 0.5-1kg per week (rapid weight loss may lead to complications)
- Encourage the intake of vegetables, fruits, whole grains, pulses, fish, lean meat, poultry and low- fat dairy
- The intake of sugar-sweetened drinks, such as fruit juices with added sugar, soft drinks, energy drinks, and alcoholic drinks, should be avoided. When purchasing bottled or packaged beverages, always advise to look for the traffic light label guide.
- Advice patients to reduce unnecessary snacking and large portion sizes
- Energy expenditure can be increased by increasing physical activity (refer to the physical activity guideline, Section 2.3)
- Encourage clients to choose fibre -rich whole grains / less polished grains for most of the grain servings.
- Encourage to include fish containing omega 3 fatty acids such as Sardines, Salaya, Hurulla, Kumbalawa, Salmon, Mackerel and Tuna
- Restrict foods containing saturated fat such as red meat, cheese and whole fat dairy.

- Include foods containing unsaturated fats such as fish, nuts, seeds, avocado and olive oil.
- Use healthy cooking methods
- Prepare more fresh salads/mallum with vegetables to minimize the loss of nutrients
- Reduce the amount of thick coconut milk used for cooking
- Use alternative cooking methods such as steaming, mirisata, ambulata etc.
- Restrict deep frying / heating oil to very high temperatures
- If deep frying is needed, encourage to use other options such as baking and using an air fryer
- Unstructured and unsupervised ad-hoc diet plans will result in more risks than benefits (e.g. keto diet)

2.2.6 Follow up and Re-assessment

- Patients should be followed up one month after and re-evaluated at regular intervals of three months to assess the progress in the weight loss and to detect possible complications (e.g. dyspepsia, gallstones, etc. due to vigorous weight loss during a short period)
- Achieving the target weight and the rate of weight loss helps to assess the effectiveness of interventions.
- Set weight loss targets for three months
- Re-evaluate at three months and set new targets for the next three months
- Encourage self-monitoring of weight

Table 2. 7: Weight targets

E.g. If the patients' starting weight is 70kg

1st month	2nd month	3rd month
68 kg	66 kg	64 kg

After three months - set new weight targets

4th month	5th month	6th month
62 kg	60 kg	58 kg

- In the early stages of obesity and especially in young adults, people may not lose weight even with an excellent physical activity program due to increased bone and muscle mass.
- While following up, if there is no continuous weight loss, reasons for failure should be identified and remedial measures should be taken in reinforcing the patients' motivation for change. e.g. assess the level of adherence to the prescribed diet, identify failure points
- Counsel and self-empower the patient again to follow the proposed lifestyle modifications and self-monitor the progress of weight and behaviors. Get involved with the patient in preparing diet plans and exercise schedules according to personal preference.
- If the patient does not have a continuous weight loss, refer to the next level of care to exclude a possible underlying pathological cause.

2.2.7 Other useful interventions

2.2.7.1 Psychological therapies

- When combined with lifestyle interventions, psychological therapies like behavior therapy and cognitive behavior therapy have shown to be more beneficial.
- Behavior therapy is vital in controlling weight in obese individuals to help them modify their unhealthy eating habits, daily activity, and thinking habits that contribute to their excess weight.
- Teaching the patients on various methods for reducing stress and tension is crucial. Tension reduction techniques (e.g.diaphragmatic breathing, progressive muscle relaxation and meditation) should be introduced to the patients.

Behavioral change techniques:

1. Self-monitoring of behavior and progress
2. Goal setting
3. Stimulus control (e.g. recognizing and avoiding triggers that prompt unplanned eating)
4. Cognitive restructuring (modifying unhelpful thoughts or thinking patterns)
5. Problem solving

Refer to the Medical Nutrition Unit for individualized nutrition counselling and follow-up whenever necessary

2.3 Physical activity and exercise recommendations for patients with Overweight and Obesity

2.3.1 Pre-exercise evaluation

It is important to ensure that individuals have no contraindications to exercise before commencing a physical activity programme. The presence of other comorbidities (e.g. dyslipidaemia, hypertension, diabetes etc.) may increase the risk classification for overweight and obese individuals, resulting in the need for additional medical screening before exercise testing. The presence of musculoskeletal and/or orthopaedic conditions and limitations of exercise capacity may require further assessment before starting the exercise programme.

2.3.2 General advice

- Weight loss programmes should aim for negative energy balance by decreasing intake while increasing the energy output via increased physical activity.
- Clients should aim to increase daily activities (Daily step count of 10000 steps equates to 300-400 kcal energy expenditure).
- Advice given to patients to increase daily activities:
    - Get off the bus one or two bus stops early and walk to the destination
    - Skip the elevators and take the stairs
    - Go for a walk at lunch or after work
    - Play outside with children
    - Gardening
    - Turn on some music and dance
    - Park the vehicle farther away from the front door and walk
    - Mop the floor and wash the vehicle
    - Use hand weights or resistance bands while watching the television
    - Do sit ups, push-ups or simply get up and walk around during TV commercials

❖ After the initial weight loss, continuous communication between the sports and exercise medicine unit and the medical nutrition unit is necessary for further management.

2.3.3 Screening of patients with overweight and obesity for exercise prescription

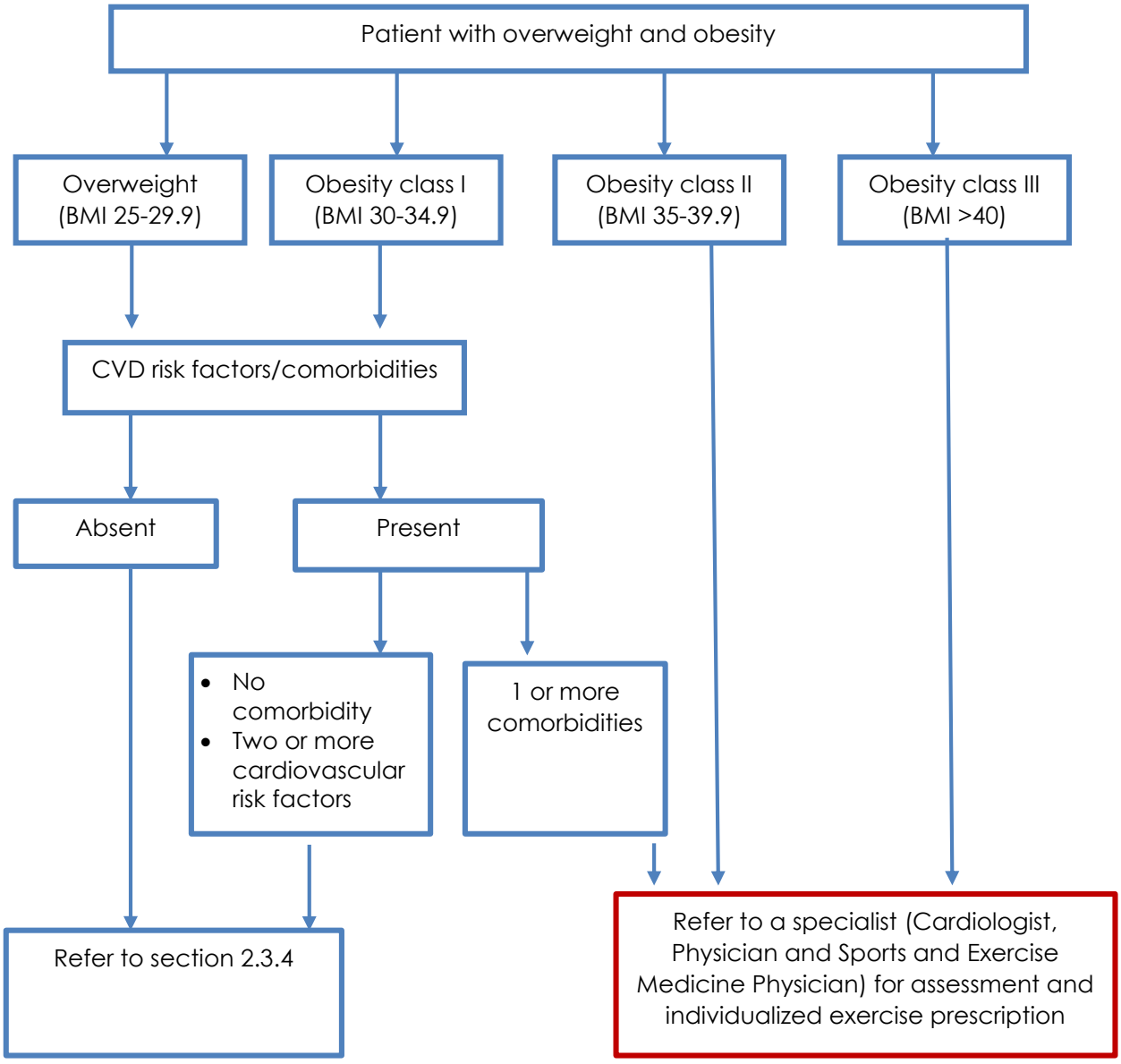


Figure 2. 2: Screening of Overweight and Obesity for exercise prescription

2.3.4 Recommendations for exercises for patients diagnosed with overweight and obesity

Table 2. 8: Recommendations for exercise for patients diagnosed with overweight and obesity

❖ **Warm up**: warm up session of 5 minutes; low to moderate intensity cardiovascular and muscular endurance activity (e.g. walking, jogging) should be done prior to initiation of the exercise schedule

Type of exercise	Recommendation	Examples
Aerobic Exercises	**Frequency**: at least 3-5 days per week. **Intensity**: Initially moderate intensity exercises for those who have had a sedentary lifestyle. Over time patients should gradually progress to vigorous intensity exercises. **Duration**: at least 30 minutes per day. (150 minutes per week) The aim is to progress to 300 minutes per week of moderate physical activity or 150 minutes of vigorous physical activity. A Mixture of these intensities can be performed as well (one minute of vigorous activity equivalent to two minutes of moderate activity). Estimated energy expenditure through exercise is around 2000 kcal per week. For untrained persons or conditions that limit prolonged exercises, can prescribe multiple bouts of intermittent exercise of at least 10 to 15 minutes duration rather than doing continuous exercises.	Brisk walking, cycling, jogging, swimming, dancing, stationary cycling, use of treadmill, cross trainer machine and upper body ergometer.
Strengthening exercises *Strengthening exercises have not been consistently useful in long term weight management.	**Frequency:** at least 2 or more days per week, focusing on the major muscle groups *Plan a day of rest between sessions.	**Exercises using own bodyweight:** Wall push-ups, half squat, lunges, knee push-ups

Strengthening exercises do not show a drastic improvement in fat free mass and metabolic rate. However, strengthening exercises improve muscular strength and function and decrease the cardiovascular disease risk. Therefore, incorporation of strengthening exercises into the exercise programme is beneficial.	**Intensity and frequency:** 2-4 sets each of 8-12 repetitions for each muscle group, with 2 to 3 minutes rest in between the sets If the patients are using free weights/machines other than body weight, they have to be supervised initially by a fitness professional. No Valsalva manoeuvres (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights.*Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights
Flexibility exercises	**Frequency:** more than 2-3 days per week **Intensity**: stretching up to the point of feeling mild discomfort or tightness (point of stretch) **Duration:** Hold each stretch for 15-30 sec and stretch to the point of mild discomfort	Static stretching focusing major joints, spine and Yoga
Balance exercises	**Frequency :**at least 3 days per week **Duration:** at least 10-15minutes per session	Single-leg stance with support, single leg stance without support, tandem walking, heel walking, tip toe walking, ball throwing in a single leg, clock reach and Yoga

- **Cool-down session:** Cool down session of 5 minutes with static stretching exercises (not moving the body part while performing the stretch) should be done after the exercise schedule.

2.3.5 Follow up care

Follow up care is the same as given in section 2.2.6

Chapter 3

Hypertension

3.1 Introduction

Hypertension is one of the most common medical disorders associated with increased risk of cardiovascular disease and all-cause mortality. It is the leading risk factor for the global burden of diseases (1). Hypertension is diagnosed if the systolic blood pressure (SBP) is equal to or more than 140mmHg or diastolic blood pressure (DBP) is equal or more than 90mmHg to or the blood pressure (BP) is equal or more than 140/90mmHg.

The national non-communicable diseases risk factor survey (STEPS survey), 2015 reported that 26% of the Sri Lankan population is hypertensive, with higher risk among females (26.7% among females vs 25.4% among males) (2).

Table 3.1 : Classification of Blood Pressure levels

Category	Systolic (mmHg		Diastolic (mmHg)
Normal BP	<130	and	<85
High-normal BP	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	≥160	and/or	≥100
Isolated systolic hypertension	≥ 140	and	<90

Source: The 2020 ISH Guideline

Note: When an individual's systolic and diastolic BP falls into different categories, the patient is categorized according to the higher BP reading.

3.2 Dietary recommendations for patients with hypertension: Dietary Approaches to Stop Hypertension (DASH diet)

The DASH diet is based on the research, DASH trial -Dietary Approaches to Stop Hypertension, and has been proven to lower blood pressure, reduce cholesterol, and improve insulin sensitivity. DASH Diet is a modified Mediterranean diet, and blood pressure control with the DASH diet involves more than just the traditional low salt or low sodium diet advice.

It is based on a plan rich in fruits, vegetables, and low-fat or nonfat dairy. When compared to a typical diet, the DASH diet emphasizes whole grains and contains less refined grains. It is rich in potassium, magnesium, calcium, and fiber. It also includes mostly whole grains; lean meats, fish and poultry; pulses and nuts. It is high in fiber and low to moderate in fat. It is a plan that follows US guidelines for sodium content, along with vitamins and minerals. In addition to lowering blood pressure, the DASH eating plan lowers cholesterol and makes it easy to lose weight. It is a healthy way of eating, designed to be flexible enough to meet most people's lifestyle and food preferences.

3.2.1 Goals of Medical Nutrition Therapy

- Control Hypertension
- Prevention of complications
- Support in maintaining healthy body weight

3.2.2 Nutrition screening of a hypertensive patient

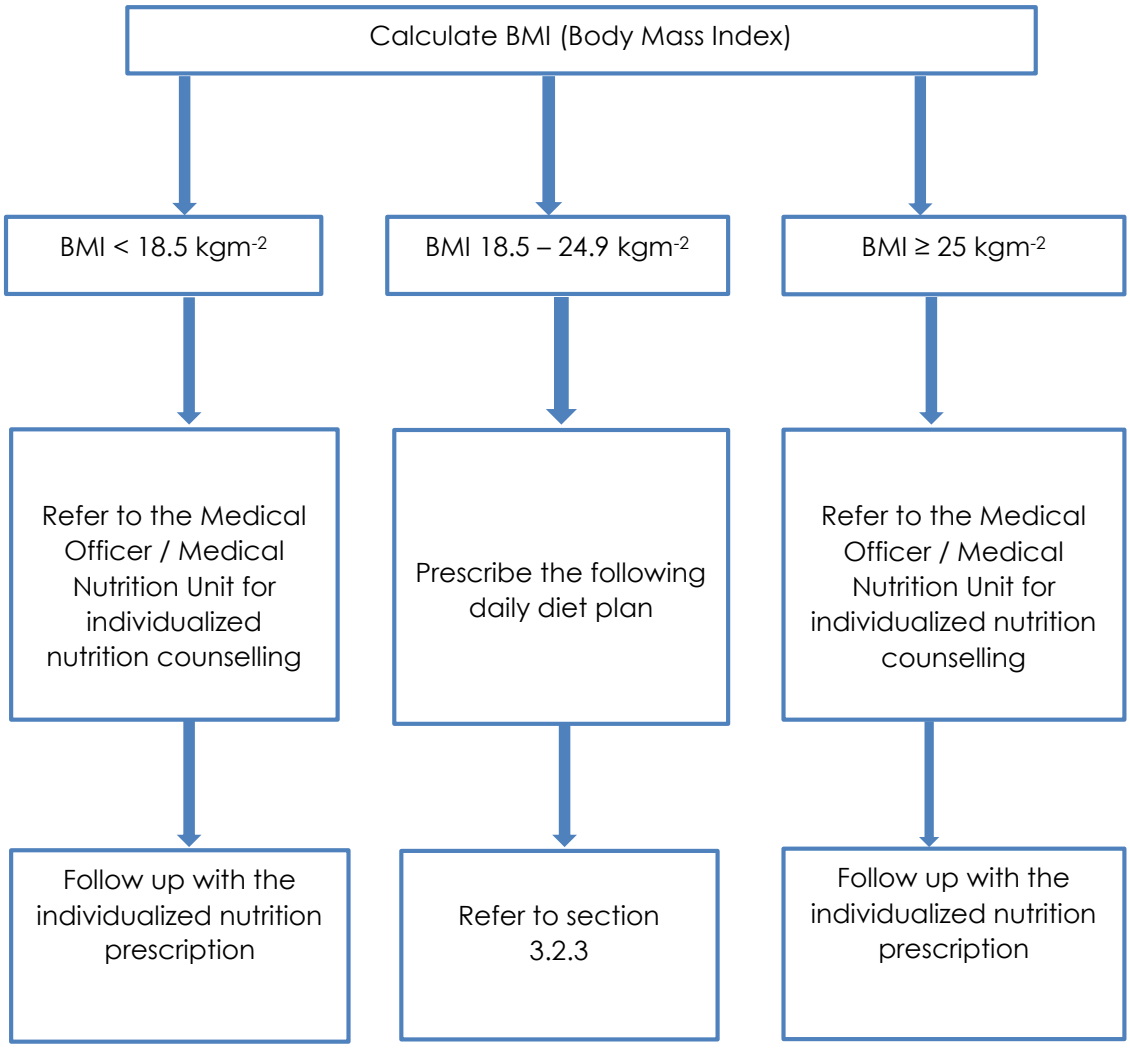


Figure 3. 1: Nutrition screening of a hypertension patient

3.2.3 Daily recommended diet for a patient with hypertension with sedentary lifestyle

Table 3. 2 : Daily recommended diet for a patient with hypertension with sedentary lifestyle

Food group	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equal to:
Cereal/Yam/Starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta/ ½ cup of boiled sweet potato / Manioc / Raja ala / other yams/ 1 slice of bread(50g) / 2 - 3 string hoppers /3 cm height 5cm diameter pittu / 1 hopper/ ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Paratha or Chapati (15 cm diameter) /1 dosai (about 10cm in diameter / ½ cup jack or breadfruit / ¾ cup of boiled corn
Pulses	2	1/2 cup / tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu / ½ cup chickpeas / ½ cup cowpea / ½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	2	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken / 1 matchbox size dry fish / 10 - 20 sprats / 1 egg
Dairy products	1	1/2 cup	½ cup nonfat or full cream fresh milk /1 tbs nonfat milk powder / 1 yoghurt / 1 yoghurt cup size curd, not regularly or 1 thin slice /1 wedge Cheddar cheese, not regularly
Nuts and seeds	2	1 full tbs	1 full tbs Peanut /5 full Cashew / 1 full tbs pumpkin or sunflower seeds / 1 Thala guli or 10 Kottang
Root vegetables and starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ Manioc/ other yams/ Carrot/ Beet/ Radish/ Nokol/ Kohila/ Lotus roots
Green Vegetables	1	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal
Leafy vegetables	2	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kungkun/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ Beet leaves/ Radish leaves/ Knol kohl leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves

Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Cauliflower/ Ambarella/ Green mangoes
Fruits	4	1small (100g) Or ½ cup of fresh cut fruit, ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya / 1 small banana / ½ large guava / 1 medium pomegranate / 1 medium mango/ ½ small jambola (grapefruit) / ½ cup fresh pineapple / 5 large or 10 small grapes / 1 cup cubed watermelon / 5-6 pieces of jackfruit / 1 medium wood apple / 1 small belli fruit / 2 medium ambarella / 10 – 15 jambu / 7-9 rambuttan / ½ cup anoda / 2 pieces of durian / 2 medium passion fruits / 10 fruits of nelli or lovi or veralu / 2 small mandarin /1 small orange (6 cm across) / 1 small apple (5 cm across) /5 strawberries / ½ cup mulberry / ½ medium avocado
Coconut	1	2 tbs Grated coconut Or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut / 3 tbs gravy
Oil*	1	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Salt	½tsp - 2/3 tsp	1 levelled tsp	
Sugar	1	1 tsp	1 tsp Honey / 1 tsp Treacle or thumb size piece of Jaggery
Water	6 – 8	1 cup/glass	
Other Beverages	2 -3	1 cup	1 cup light plain tea/ coffee/ herbal drinks (Belimal, Ranawara) /Coriander water/ King coconut / Coconut water

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon
All given food is in edible portions, otherwise specified
*When choosing an oil, take only 5 ml from coconut oil and use 10 ml from other oil to improve the fat composition

3.2.4 General advice for prevention and treatment of hypertension

- Encourage patients to eat various nutritious foods from all the food groups and appropriate amounts to maintain optimal body weight.
- A variety of non-starchy vegetables, including green leaves (mallum) or salads and 4-5 servings of vegetables per day. These should preferably be local and seasonal vegetables of different colours and prepared to avoid excess salt.
- Eat a variety of fresh or frozen fruits, preferably local and seasonal fruits, without added salt, sugar or sauces.
- Choose fibre rich whole grains (parboiled or unpolished rice) for most of the grain servings
- Include pulses and skinless poultry
- Eat fish at least twice a week, especially the fish containing omega 3 fatty acids (eg: Sardines, Salaya, Hurulla, Kumbalawa, Salmon, Mackerel and Tuna)
- Include nuts and seeds (e.g. thala, peanuts etc.) regularly to include more mono and polyunsaturated fats
- Limit sweets and sugar-sweetened beverages

Tips to reduce salt intake:

- Do not add salt while cooking rice
- Use more herbs, spices, black pepper, chilli, lemon etc. and reduce the amount of added salt
- Packaged food – Look for traffic light guide for the selection of low sodium food
- Avoid food with high sodium content e.g. Soup cubes, sauce, processed meat (sausages, bacon, meatballs, etc.), salted nuts, French fries (salted potato chips)
- Do not serve salt and salty seasonings at the table
- Dry fish should be soaked with boiled water or coconut water for ½ an hour, drain the water, wash again and then cook as desired.

3.2.5 Follow up and re-assessment

- ❖ Patients who cannot maintain a healthy weight need to refer to the medical nutrition clinic annually for comprehensive nutritional assessment and further plan.
- ❖ Remember the nutrition counseling should be individualized

Refer to the Medical Nutrition Unit for individualized nutrition counseling and follow-up whenever necessary

3.3 Physical activity and Exercise recommendations for patients with hypertension

3.3.1 Benefits of exercise in hypertension

- Reduces the incidence of heart disease and high blood pressure approximately by 40%
- Lowers the risk of stroke by 27 %
- Lowers the risk of type 2 diabetes mellitus by 58%
- Improves lipid profile (reduce LDL and increase HDL)
- Improves weight management
- Lowers the risk of metabolic syndrome
- Reduces depression
- Improves quality of sleep
- Lowers the BP following isolated exercise session which lasts up to 22 hours
- Normal individuals - SBP by 2-5 mmHg & DBP 1-4 mmHg
- Hypertensive patients- SBP by 7.4 mmHg and DBP 5.8 mmHg
- Long-standing strengthening exercises reduce BP by 3 mmHg

3.3.2 Pre-exercise evaluation and risk stratification for exercise prescription

- All patients must be carefully screened for the presence of secondary cause(s) of hypertension (e.g. renal artery stenosis, chronic renal failure, Cushing's syndrome, pheochromocytoma etc.).
- Risk stratification for prescribing exercise depends on the patients' symptoms, signs and overall cardiovascular disease (CVD) risk
- Overall CVD risk is based on the patient's level of BP, history of cardiovascular risk factors, target organ damage (TOD) and clinical cardiovascular disease (CCD)
- CCD and TOD include: left ventricular hypertrophy (LVH), angina, previous Myocardial Infarction, coronary artery bypass graft (CABG), valvular heart disease, balloon angioplasty, stenting, heart failure, stroke, transient ischemic attack (TIA), neuropathy, peripheral arterial disease and retinopathy

❖ **Patients with hypertension can be categorized into Risk Groups A, B and C based on overall CVD risk.**

Table 3. 3: Cardiovascular risk groups

Risk Group A	Risk Group B	Risk Group C
No risk factor No TOD and CCD	At least 1 risk factor (excluding Diabetes) No TOD and CCD	TOD and CCD and/ or Diabetes with or without risk factors

Table 3. 4 : Cardiovascular risk factors

Cardiovascular risk factors	
Family history	MI/CHD/Percutaneous Coronary Intervention/sudden death of the father or a first-degree male before 55 years and sudden death of the mother or first-degree female before 65 years
Smoking	Current smoker or quit within 6 months
Sedentary lifestyle	No regular exercise of minimum 30 min at least 3 days per week within last 3 months
Obesity	BMI $\geq$27.5 kgm^{-2} or waist to hip ratio (WHR) 0.85 or less for women and 0.9 or less for men
Hypercholesterolemia	Total cholesterol $\geq$5.2 mmol/l or 200 mg/dl, LDL $\geq$3.4 mmol/l or 130 mg/dl, HDL $\leq$ 1.0 mmol/l or 40 mg/dl or on lipid lowering drug
Pre-diabetic	FBS $\geq$ 100 mg/dl on 2 separate occasions or HbA1C 6-6.4% or on blood glucose lowering drug

3.3.3 Screening of patients with hypertension for exercise prescription

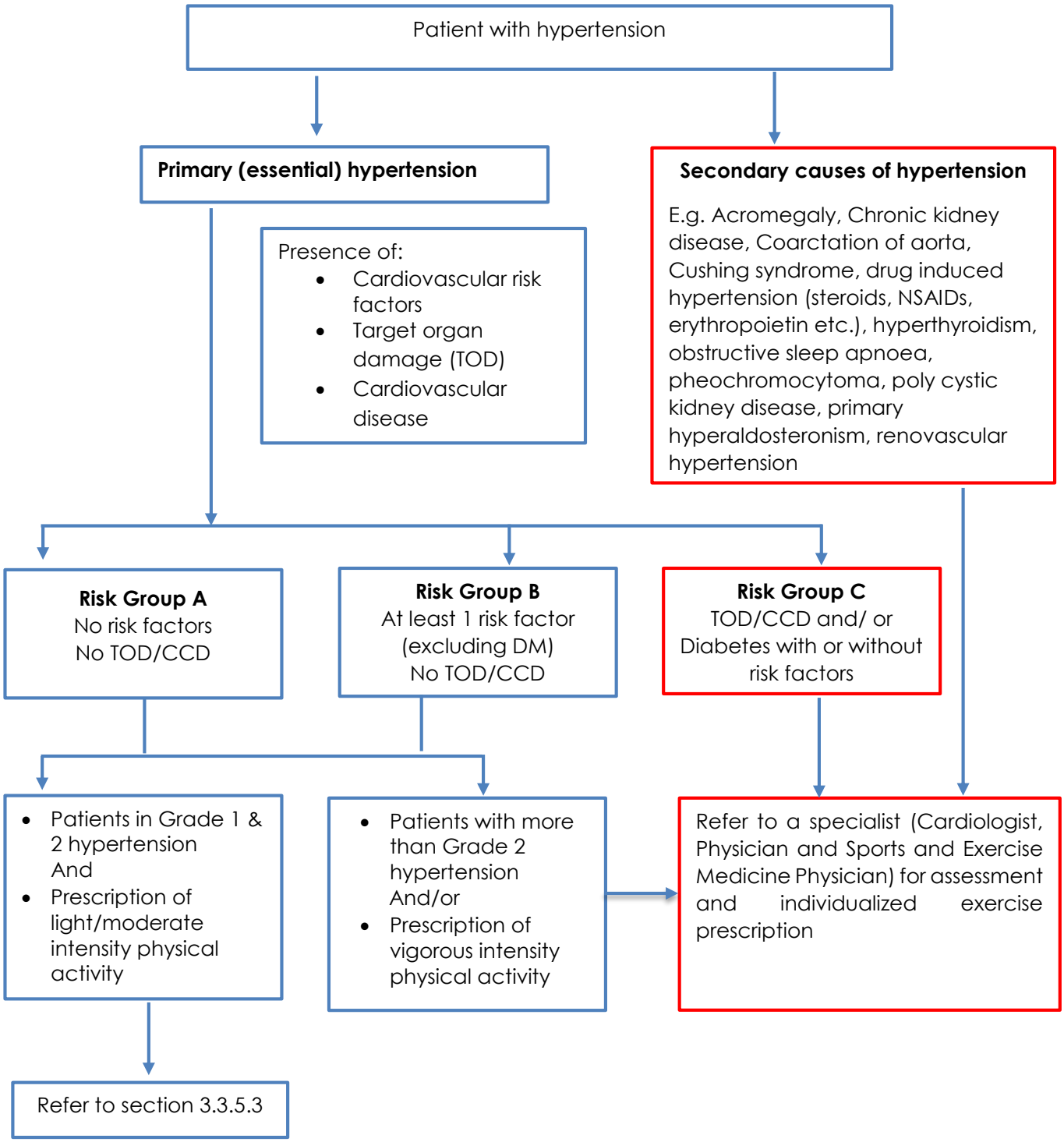


Figure 3. 2: Screening of patients with hypertension for exercise prescription

3.3.4 Contraindications for exercise prescription in patients with hypertension

Hypertensive patients with:

- Unstable angina
- Severe valvular heart disease - high grade aortic stenosis
- Left ventricular outflow tract obstruction
- Decompensated heart failure
- High grade A-V block (Grade 2 & 3)
- Ventricular arrhythmias
- Myocarditis or pericarditis
- Aortic dissection
- Acute thrombophlebitis
- Recent vascular embolism
- Psychological issues restricting exercise

3.3.5 Exercise recommendation for patients with hypertension

3.3.5.1 Goals

- Control hypertension
- Prevent complications related to hypertension
- Enhance the cardiorespiratory fitness

3.3.5.2 Special considerations

- Advice patients to exercises when feeling well only
- Patients should not exercise at least within 2 hours of a meal
- Exercises should be adjusted to the environmental conditions. e.g. During hot weather conditions, it may be necessary to lower the exercise intensity and maintain good hydration.
- Patients who are on diuretics may feel dizzy due to orthostatic hypotension after a bout of exercise.
- Attire should be comfortable clothing and shoes preferred
- Be alert for cardiac symptoms:
    - A discomfort in the chest including burning, aching, tightness or sensation of fullness
    - Faintishness during or post exercises
    - Shortness of breath or palpitation during or post exercises
- Observe for the following signs of **overexertion:**
    - Inability to complete the exercise session comfortably
    - Prolonged fatigue. If the fatigue persists during the day, the intensity and duration of the workout should be decreased
- Medications such as calcium channel blockers, β-blockers and vasodilators may lead to sudden reductions in post-exercise blood pressure. Therefore, an extended cool-down is recommended rather than an abrupt stop of an exercise session.
- Increase daily physical activity level (e.g. household chores, home gardening, reduced sitting screen time, climbing stairs, increase walking at work setting/ during transport etc.)
- Start with low intensity exercises and gradually progress to moderate to vigorous intensity exercises
- Increase the duration and the frequency first, and then the intensity as the patient tolerates
- Advice the patients on symptoms of hypoglycaemia, as beta blockers may mask the symptoms of hypoglycaemia.
- Patients should seek medical attention if deterioration of exercise capacity occurs

3.3.5.3 Exercise Recommendations for patients with Hypertension

Table 3. 5 : Exercise recommendations for patients with hypertension

- **Warm up**: warm up session of 5 min with dynamic stretching (moving the body part while performing the stretch) before starting to exercise

Exercise type	Recommendations	Examples
Aerobic exercises	**Frequency**: at least 5 days per week Daily exercising is recommended **Intensity**: Moderate intensity (Figure 1.2) **Duration**: Starting with 5-10 minutes sessions. Gradually increasing up to 30 minutes sessions to achieve 150 minutes per week	Walking, jogging, cycling, aerobic dancing and swimming
Strengthening exercises	**Frequency:** at least 2-3 non-consecutive days per week **Intensity** and **duration**: 2-3 sets each of 8-12 repetitions, involving major muscle groups (2 minutes rest between sets) Initiate with less number of repetitions and gradually increase up to the recommended level as the patient tolerates No Valsalva manoeuvres (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Exercises using own bodyweight:** wall push-ups, half squat, lunges, knee push-ups exercises **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights
Flexibility	**Frequency**: more than 2-3 days per week Daily exercising is recommended **Intensity**: stretch to the point of feeling mild discomfort or tightness (point of stretch) **Duration:** hold each stretch for 10-30 sec, 2-4 repetition of each exercise	Static and dynamic stretching focusing major joints and spine and Yoga
Balance exercises	**Frequency**: at least 1-3 days per week **Duration:** at least 10-15 minutes session	Single-leg stance with support, single leg stance without support, tandem walking, heel walking, tip toe walking, ball throwing in a single leg, clock reach and Yoga

- **Cool down:** Cool down session of 5 min with static stretching exercises (not moving the body part while performing the stretch).

Examples for aerobic activities at different intensity levels of exercises

Table 3.6 : Examples of aerobic activities at different intensity exercise level

Intensity level	METs	Activity	Subjective measurement of intensity level	
			Talk test	RPE
Low intensity	≤ 3	Walking 3 Km/ hr (1km in 20 min) Cycling 12 km/ hr (1km in 5 min) Household chores (e.g. sweeping, cleaning and cooking)	Able to speak and sing while performing the activity	<3
Moderate intensity	3-6	Brisk walking 5km/hr (1km in 12 minutes) Cycling 16 km/hr (1km in 3 ½ minutes) Low impact aerobic dancing Gardening, raking and washing cloths	Able to speak but, cannot sing while performing the activity	3-4
High intensity	>6	Running 7Km / hr (1 km in 8 min) Cycling 24 Km / hr (1km in 2 ½ min) High impact aerobic dancing	Difficulty in speaking while performing the activity	≥5

Examples of resistance exercises using own body weight and Thera band

Table 3.7: Examples of resistance exercises using own body weight and Thera band

Body part	Exercises (body weight/Thera band)	Frequency (up to tolerance of reps and sets)
Chest	Push-ups/wall push	Start with 5, progress up to 25 per day, 20 seconds rest in between
Shoulders	Seated Thera band shoulder press/ front raise / lateral raise	6-12 repetitions, 20 seconds rest in between
Arm	Bench triceps / Thera band biceps curl	2- 4 sets each of 6-12 repetitions, with 20 seconds rest in between sets
Back	Contralateral limb raises, Thera band reverse fly	2- 4 sets each of 6-12 repetitions, with 20 seconds rest in between sets
Abdomen	Crunch/ leg pull-in / bird dog / front plank	12-15 repetitions, 20 seconds rest in between
Hip	Wall squat / butt lift bridge / side lying hip abduction	Hold the position for 15-30 seconds, 6-12 repetitions with 20 seconds rest in between
Thigh	Lunge / Thera band squat / seated elastic band leg press	8-12 repetitions, 20 seconds rest in between
Calf	Thera band leg curl / Thera band calf raise	6-12 repetitions x 2-4 sets in between sets

The images of exercise are given in Annexure III for your reference

Examples of balance exercises for hypertensive individuals given in table 3.8

Table 3. 8: Examples of balance exercise in hypertension

Exercise	Frequency
Single leg stance	Hold for 1 min, 10-15 repetitions
Single leg stance with arm elevation	Hold for 10 seconds
Heel to toe walk	20 steps
Clock reach	2 times per side
Marching in place	20 seconds
Toe lifts	Hold for 20 seconds
Calf stretch	Hold each stretch for 20-30 seconds, 2-4 repetitions

The images of exercises are given in Annexure III for your reference

3.3.6 Follow up care

Assess the Motivation in exercise, life- style modifications, cardio-respiratory symptoms in relation to exercise and make a note of any alterations in the anti-hypertensive medication. Provide affirmations for the subject's effort for action and maintenance of exercise. If the patient doesn't achieve the target exercise prescription, assess the subject's state of change and empathize distress with appropriate intervention. Identify triggers for relapses, potential barriers and coping strategies, and provide social support for the challenges.

If the exercise prescription is successful with good compliance and in the absence of cardio-respiratory symptoms, exercises can be progressed along the duration or intensity pathway according to the guideline.

Chapter 4

Coronary Heart Disease

4.1 Introduction

Coronary Heart Disease (CHD) is caused by the narrowing or blockage of the arteries that provide Oxygen and nutrients to the heart. Atherosclerosis is the most typical reason for the narrowing of arteries which results in the gradual buildup of fibro-fatty plaque in the inner linings of the arteries, limiting the blood flow to the heart muscles. This could be a long-standing narrowing of the coronary artery over time (Chronic Coronary Syndrome) or, it could be acute, resulting from a sudden rupture of a plaque and formation of a thrombus or blood clot (Acute Coronary Syndrome), limiting the blood supply to a part of the muscle.

Coronary Heart Disease is the commonest cause of death in Sri Lanka. It could manifest as:

- Stable angina (Chronic Coronary Syndrome)
- Unstable angina/ Myocardial Infarction (Acute Coronary Syndrome)
- Heart Failure
- Sudden death

Multifactorial risk assessment and management is the best approach for reducing the risk of CHD and related events, as correcting one risk factor alone may have only a minor impact.

4.2 Dietary guidelines for patients with Coronary Heart Disease

The dietary advice given to individuals for the prevention of CHD should be individualized depending on the relevant risk factors to the individual. This advice should be extended to their families to make it sustainable.

4.2.1 Goals of medical nutrition therapy in CHD patients

To support in achieving and maintaining individualized targeted;

- A healthy eating pattern including food from each of the major food groups,
- Glycemic control
- Healthy body weight
- Lipoprotein profile
- Blood pressure

4.2.2 Nutrition screening of a patient with CHD

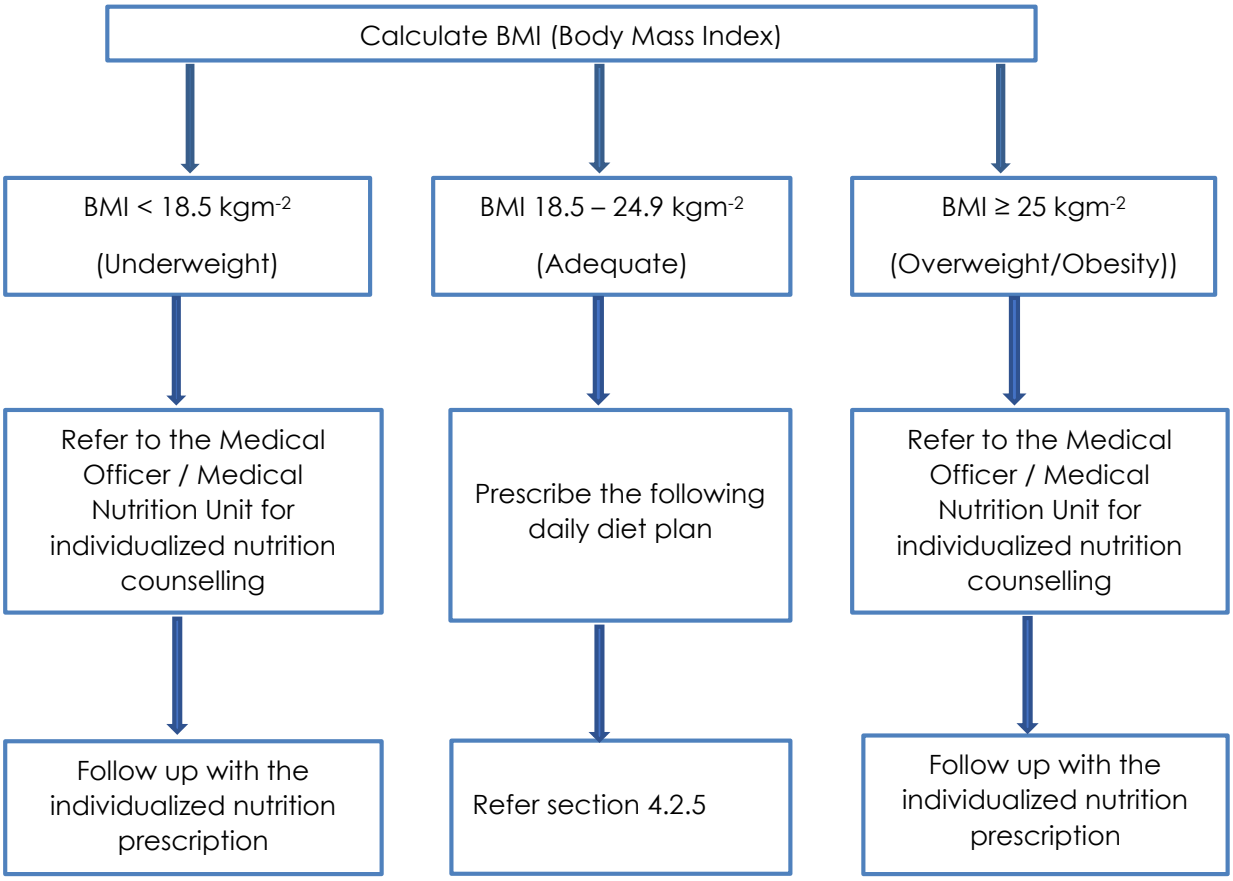


Figure 4. 1: Nutrition screening of a patient with CHD

4.2.3 Dietary Principles

1. Carbohydrates – 50 to 60% of the total calories
2. Protein – 15 to 20% of the total calories
3. Total fat - 20 to 35% of the total calories
4. Saturated fat – less than 7% of total calories
5. Trans Fat – less than 1% of total calories
6. Polyunsaturated fat up to 10% of total calories
7. Monounsaturated fat up to 20% of total calories
8. Dietary cholesterol – less than 200 mg each day
9. 14 g of fibre per 1000 kcal of energy consumed
10. Salt – less than 5g (1 teaspoon) per day

4.2.4 General advise

- To eat a variety of nutritious foods from all the food groups, appropriate amounts as given above, to maintain optimal body weight and get all the nutrients.
- Encourage patients to choose fiber rich whole grains / less polished grains for most of the grain servings.
- Encourage to including fish containing omega 3 fatty acids such as Sardines, Salaya, Hurulla, Kumbalawa, Salmon, Mackerel and Tuna
- To restrict foods containing saturated fat such as red-meat, cheese and whole fat dairy products.
- To consume lean meat (remove visible fat)
- Include foods containing unsaturated fats such as fish, nuts, seeds, avocado and olive oil.
- Keep an eye on the salt intake:
  - Try to keep the daily sodium intake below 2300 mg / day, equal to 5 g (1 tsp) of salt. If the blood pressure is high, reducing the sodium intake to 1500 mg / day is beneficial.
  - Dietary tips to reduce the consumption of salt:
    - Do not add salt while cooking rice
    - Use more herbs, spices, black pepper, chilli, lemon etc. and reduce the amount of added salt
    - Minimize intake of high salty food – e.g. soup cubes, sauce, processed meat (sausages, bacon, meatballs, etc.), salted nuts, French fries (salted potato chips)
    - Packaged food – Look for the traffic light guide for low sodium food.
- Use healthy cooking methods
  - Prepare more fresh salads with vegetables to minimize the loss of nutrients
  - Reduce the amount of coconut milk used for cooking
  - Use alternative cooking methods such as steaming, *mirisata*, *ambulata* etc.
  - Restrict deep frying / heating oil to very high temperatures (use other options such as air frying).
  - Avoid reusing oil.
- Consume home-grown vegetables and fruits as much as possible to minimize agrochemical contaminants.
- Avoid alcoholic beverages

4.2.5 Daily recommended optimal diet for a CHD patient with a sedentary lifestyle

Table 4. 1 : Daily recommended optimal diet for a CHD patient with sedentary lifestyle

Food group	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equals to:
Cereal/Yam/Starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta/ ½ cup of boiled Sweet potato / Manioc / Raja ala / other yams/ 1 slice of bread (50g)/ 2 - 3 string hoppers / 1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Parata/Chapathi (15cm diameter) / 1 dosai (about 10cm in diameter) / ¾ cup of boiled corn / ½cup jack or breadfruit / 3 cm height 5cm diameter pittu
Pulses	3	½ cup / 3 tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu /½ cup chickpeas / ½ cup cowpea / ½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	2	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken / 1 matchbox size dry fish / 10 - 20 sprats or 1 egg
Dairy products	1	½ cup	½ cup non-fat fresh milk / 1 tbs full non-fat milk powder / 1 yoghurt/ 1 yoghurt cup size curd, not regularly or 1 thin slice/1 wedge Cheddar cheese, not regularly
Nuts and seeds	1	1 tbs full	1 tbs full Peanut /5 full Cashew / 1 tbs full Pumpkin or Sunflower seeds / 1 Thala guli / 10 Kottang
Root vegetables/Starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ manioc/ other yams/ Carrot/ Beet/ Radish/ Knol khol/ Kohila/ Lotus roots
Green Vegetables	1 ½	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal

Leafy vegetables	3	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ beet leaves/ Radish leaves/ Knol khol leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves
Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Cauliflower/ Ambarella/ Green mangoes
Fruits	2	1 small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya / 1 small banana / ½ large guava /1 medium pomegranate / 1 medium mango / ½ small jambola (grapefruit) / ½ cup fresh pineapple / 5 large or 10 small grapes / 1 cup cubed watermelon / 5-6 jackfruit pieces /1 medium wood apple / 1 small belli fruit / 2 medium ambarella / 10 – 15 jambu / 7-9 rambuttan / ½ cup anoda / 2 pieces of durian / 2 medium passion fruits / 10 fruits of nelli or lovi or veralu/ 2 small mandarin /1 small orange (6 cm across) / 1 small apple (5 cm across) / 5 strawberries / ½ cup mulberry /½ medium avocado
Coconut	½	2 tbs Grated coconut or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut or 3 tbs gravy
Oil*	1	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Sugar	3	1 tsp	1 tsp Honey / 1 tsp Treacle or Thumb size piece of Jaggery
Water	6 - 8	1 cup/glass	
Other Beverages	2 -3	1 cup	1 cup light plain tea/ coffee/ herbal drinks (Belimal, Ranawara) /Coriander water/ King coconut / Coconut water

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon
All given food is edible portions, otherwise specified
*When choosing an oil, take only 5 ml from coconut oil and use 10 ml from other oil to improve the fat composition

4.2.6 When to refer to other relevant dietary guidelines

Refer to the relevant dietary guidelines to:

- Keep diabetes under control
- Control blood pressure
- Maintain blood lipids within optimum levels
- Maintain healthy BMI and waist circumference
- If the BMI is within the normal range, maintain that weight and avoid weight gain.
- If overweight /obese, losing even a small percentage (5 to 10%) of the body weight will reduce the risk of coronary heart disease. This should be achieved through appropriate calorie intake and physical activity

4.2.7 Re-assessment and follow up

- Following the acute coronary attack, the inward patient should be referred to a medical nutrition team for a tailor-made post-MI dietary plan according to the patient's hemodynamic stability. After discharge, nutritional re-assessment requires one month and three months after an acute attack
- Patients with risk factors can regularly refer for comprehensive dietary re-assessment at least annually, especially with lipid profile reports, blood sugar reports and haemoglobin reports.

Refer to the Medical Nutrition Unit for individualized nutrition counselling and follow-up whenever necessary

4.3 Physical activity and exercise recommendations for patients with Coronary Heart Disease

There are well-proven benefits of regular physical activity and exercises for patients who are already diagnosed with CHD.
A graded exercise program for outpatients with CHD can be started after 3-6 weeks from hospital discharge.

However, before enrolling the patient into an exercise program, please assess the following:

1. Do a detailed pre-participation examination which includes: medical and surgical history with an emphasis on current cardiovascular symptoms such as (dyspnea, dizziness, chest pain, palpitation), including the most recent cardiovascular event, comorbidities and other pertinent medical histories.
2. Detailed physical examination with an emphasis on the cardiopulmonary and musculoskeletal systems.
3. Review of recent cardiovascular tests and procedures including 12-lead Electrocardiogram (ECG), echocardiogram, stress exercise test, coronary angiogram, cardiac surgeries or percutaneous interventions and pacemaker/implantable defibrillator implantation.
4. The current list of medications.

Preferably, an exercise program for patients with post-cardiac events should be initiated following the recommendations of a Consultant Cardiologist / Physician or a Sports and Exercise Medicine Physician. Ideally it will be based on the results of the **echocardiogram and exercise stress test**. However, due to limitation of resources, availability of results of either test can be utilized to decide on the cardiac risk level.

If there is no exercise prescription from the Consultant Cardiologist/ Physician/Sports and Exercise Medicine Physician available, consider initiating low-intensity exercises to the patient based on the results of the 6 min walk test: Figure 1.4.

4.3.1. Clinical Indications and Contraindications for exercise programme

Indications:

- Medically stable post-MI
- Stable angina
- Post coronary artery bypass graft surgery
- Post - percutaneous coronary interventions (PCI) or other trans-catheter procedures
- Compensated congestive heart failure (CHF)
- Other cardiac surgeries such as valvular and pacemaker insertion including implantable cardioverter-defibrillator (ICD)
- High-risk CVD ineligible for surgical intervention

Contraindications:

1. Unstable angina (new-onset angina, worsening angina, angina at rest, angina during activities of daily living)
2. Grade 3 hypertension (systolic blood pressure $\geq$180 mmHg and/or diastolic blood pressure $\geq$110 mmHg)
3. Orthostatic BP drop (postural drop) of >20 mmHg with symptoms (e.g. dizziness, faintishness, syncope)
4. Critical aortic stenosis (i.e. mean pressure gradient of >40 mmHg with an aortic valve orifice area of < 0.75 cm^2 on echocardiogram, in an average size adult)
5. Acute systemic illness or fever
6. Uncontrolled atrial or ventricular dysrhythmias
7. Uncontrolled sinus tachycardia (> 120 beats/min)
8. Uncompensated Congestive Heart Failure
9. Third-degree atrioventricular (AV) block without pacemaker
10. Active pericarditis or myocarditis
11. Recent pulmonary and cerebral embolism
12. Thrombophlebitis
13. Resting ST-segment depression or elevation (>2mm)
14. Uncontrolled diabetes mellitus (FBS >240 mg/dl)
15. Severe orthopaedic conditions that preclude exercises.

4.3.2 Cardiac risk stratification of patients with CHD before enrolment for exercises

Table 4.2: Cardiac risk stratification of patients with CHD before enrollment for exercise

Risk level	Clinical symptoms	Non-exercise stress test criteria (Echocardiogram findings)	Exercise stress test Criteria (Exercise ECG findings)
Low risk	Absence of angina and other significant symptoms (dizziness, lightheadedness, unusual shortness of breath during or recovery of the exercise testing)	Resting Ejection fraction (EF) >50%	1. Negative exercise stress test 2. Functional capacity ≥7 metabolic equivalents (METs)
Moderate risk	Presence of angina and other significant symptoms only at a high level of exertion > 7 METs	Resting EF 40%–49%	1. Stage II positive exercise stress test 2. Functional capacity < 5 -7 METs
High risk	Presence of angina and other significant symptoms at a low level of exertion < 5METS	Resting EF <40%	1. Stage I positive exercise stress test 2. Functional capacity ≤5 METs

Special considerations

- Low risk patients: can progress from low to moderate intensity exercises adopting a transitional phase of 2-3 months during which, the duration and intensity of the exercise can be gradually increased.
- Moderate risk patients: can engage in low to moderate intensity exercises.
- However, low and moderate risk individuals can proceed to vigorous-intensity exercises and for those who are categorized under high risk, essentially need to be **evaluated by exercise stress test**.
- METs can be correlated to the intensity level of the physical activity and exercise as shown in the table below:

4.3.3 Examples for aerobic activities at different intensity levels of exercises

Table 4. 3: Examples for aerobic activities at different intensity levels of exercise

Intensity level	METs	Activity	Subjective measurement of intensity level	
			Talk test	RPE (Figure 1.2
Low intensity	≤ 3	o Walking 3 Km/ hr (1km in 20 min) o Cycling 12 km/ hr (1km in 5 min) o Household chores (e.g. sweeping, cleaning, cooking)	Able to speak and sing while performing the activity	<3
Moderate intensity	3-6	o Brisk walking 5km/hr (1km in 12 minutes) o Cycling 16 km/hr (1km in 3 ½ minutes) o Low impact aerobic dancing o Gardening, raking, washing cloths	Able to speak but, cannot sing while performing the activity	3-4
High intensity	>6	o Running 7Km / hr (1 km in 8 min) o Cycling 24 Km / hr (1km in 2 ½ min) o High impact aerobic dancing	Difficulty In speaking while performing the activity	≥5

4.3.4 Screening of patients with CHD for exercise prescription

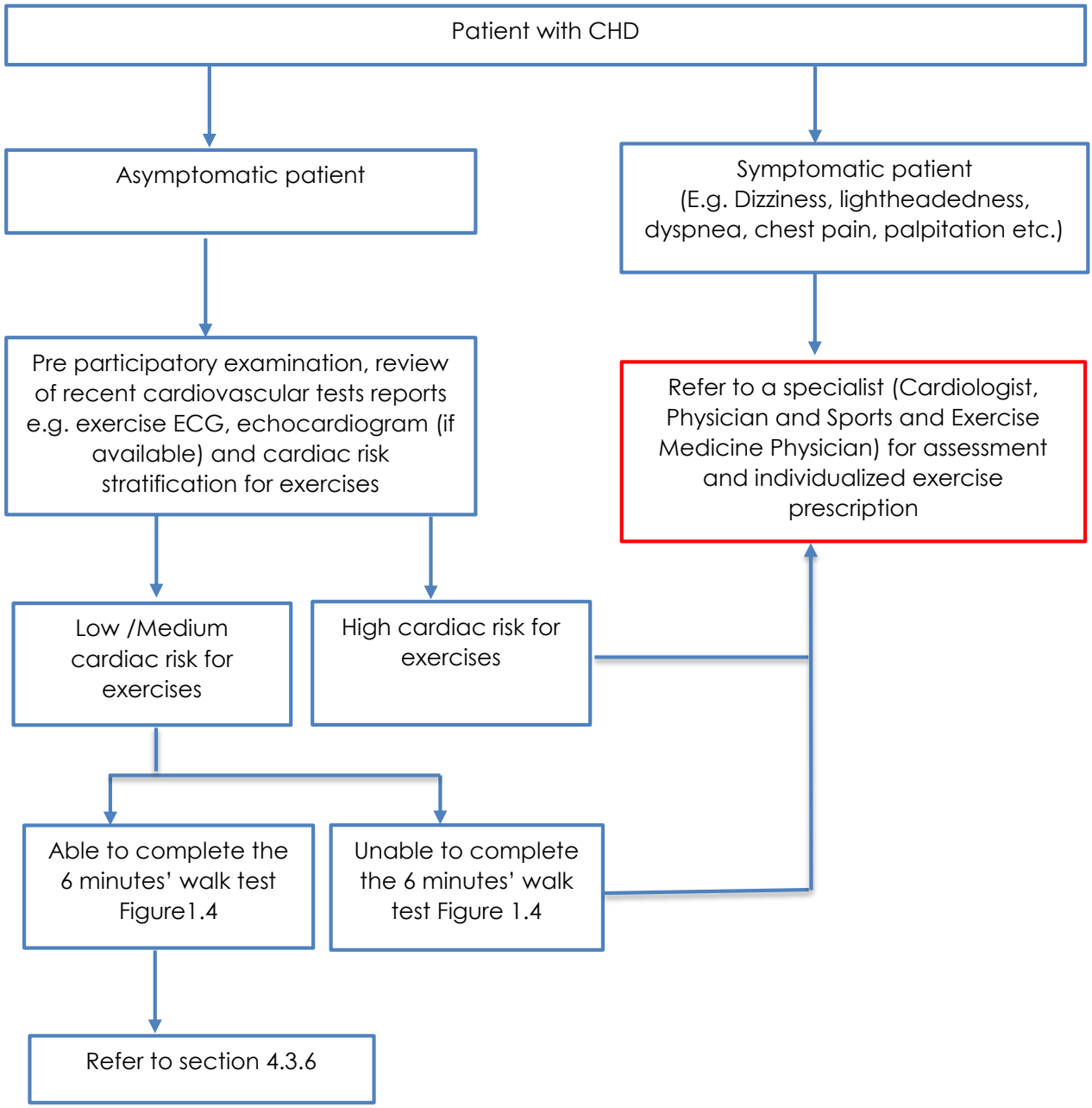


Figure 4. 2: Screening of patients with CVD for Exercise prescription

- **Exercise prescriptions to patients with CVD are not uniform and it should be individualized based on the tolerance level.**

4.3.5 Special considerations

- Advice patient to exercises when feeling well only
- Advice not to exercise at least within 2 hours of a meal
- Exercises should be adjusted to the environmental conditions. E.g. during hot weather conditions, it may be necessary to lower the exercise intensity and maintain good hydration.
- Patients who are on diuretics may feel dizzy due to orthostatic hypotension after a bout of exercise.
- Attire should be comfortable clothing and shoes preferred
- Prolonged warm-up and cool-down sessions are required to avoid sudden initiation and cessation of exercises, to prevent metabolic and electrolyte derangements
- Educate them to be alert for cardiac symptoms
    - A discomfort in the chest including burning, aching, tightness or sensation of fullness
    - Faintishness during or post exercises
    - Shortness of breath or palpitation during or post exercises
- Observe for the following signs of **overexertion:**

  Inability to complete the exercise session comfortably

  Prolonged fatigue. If the fatigue persists during the day, the intensity and duration of the workout should be decreased
- Encourage to start slowly and progress gradually
- Advice to avoid bathing in hot or cold water soon after the exercise session as it may lead to fluctuations of the blood pressure
- If there is an interruption of the exercise session for more than 2 weeks, initiate the exercise session from the baseline due to deconditioning.

4.3.6 Exercise recommendations for patients diagnosed with CHD

Table 4. 4: Exercise recommendations for patients diagnosed with CHD

- **Warm-up session:** prolonged warm up session of 5-10 min with dynamic stretching (moving the body part while performing the stretch) before starting to exercise

Type	Recommendation	Examples
Aerobic exercises	**Frequency:** 3-5 days per week **Intensity:** start with mild to moderate intensity (Intensity can be assessed using Talk test (section :1.7.1.1)or RPE (Figure 1.2) **Duration:** 20- 40 mins. As the patient tolerates, initially increase the duration up to the recommended level and then consider increasing the intensity of the exercise	Walking, swimming, cycling, dancing, gardening and stationary cycling.
Strengthening exercises	**Frequency:** at least 2-3 non-consecutive days per week **Intensity and duration**: 8-10 different exercises focusing on major muscle groups. 2-3 sets of each exercise to be performed, each set comprising of 8-10 repetitions Initiate with less number of repetitions and gradually increase up to the recommended level as the patient tolerates No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Exercises using own bodyweight:** Wall push-ups, half squat, lunges and knee push-ups **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights
Flexibility exercises	**Frequency**: more than 2-3 days per week **Intensity**: stretching up to the point of feeling mild discomfort or tightness (point of stretch) **Duration:** holding each stretch for 10-30 sec, 2-4 repetitions of each exercise	Static stretching focusing major joints and spine and Yoga

Balance exercises	**Frequency:** 1-2 days per week *Balance training exercises are done to improve posture, balance, joint position sensation and coordination.	Single-leg stance with support, single leg stance without support, tandem walking, heel walking, tip toe walking, ball throwing in a single leg, clock reach and Yoga

- **Cool-down session:** prolonged cool down session of 5-10 min with static stretching exercises (not moving the body part while performing the stretch)

4.3.7 Follow up care

Following initiating a successful exercise program, maintaining physical activity needs to be addressed with patients to decrease the risk of adverse health events and the possibility of a repeat cardiac event. Follow up should be done periodically to increase exercise intensity, to change the exercise schedule, assess the fitness level and limitations and maintain motivation. Vigorous intensity exercise should not be performed without getting proper assessment and supervision.

Chapter 5

Cerebrovascular Accidents

5.1 Introduction

Cerebrovascular accident (CVA) or acute stroke is defined as the "acute onset of focal neurological findings in a vascular territory as a result of underlying cerebrovascular disease" (41). There are two main types of strokes. Ischaemic stroke – the most common type - is caused by interruption of blood flow to a specific area of the brain, while haemorrhagic strokes are caused by the bursting of a blood vessel (acute heamorrhage). There are two types of heamorrhagic strokes namely, intracranial heamorrhage and subarachnoid heamorrhage. The main types of ischaemic strokes are large vessel atherosclerosis, small vessel diseases (lacunar infarcts) and cardioembolic strokes.

Causes of strokes:

- Prolonged hypertension
- Atherosclerosis (e.g. risk factors are diabetes mellitus, dyslipidaemia etc.)
- Cardiac emboli formed as a result of atrial fibrillation or rheumatic heart disease
- Clotting disorders
- Cervical arterial dissection
- Vasculitis

5.2 Dietary recommendations for patients with Cerebrovascular Accidents

Cerebrovascular accidents lead to altered oro-pharyngeal and gastrointestinal function. Hence a modified diet is needed to achieve optimum nutrition, according to the functional status and comorbidities of the patient, with alterations to match the sequence of the disease.

5.2.1 Goals of Medical nutrition therapy in Cerebrovascular accidents

- Maintain optimum nutritional status
- Support to minimize complications
- Support to achieve rehabilitation

5.2.2 Nutrition screening for cerebrovascular disease

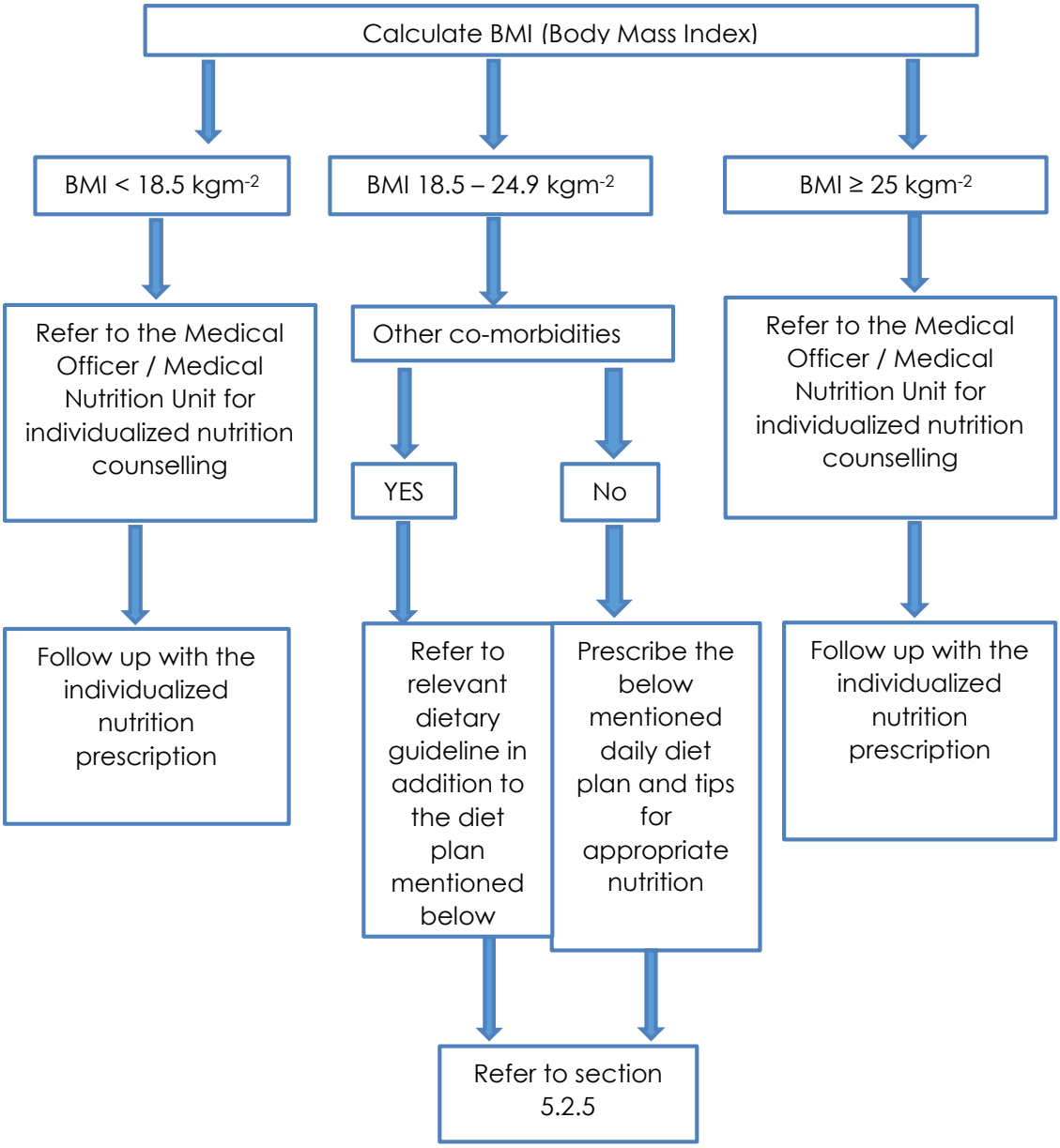


Figure 5. 1: Nutrition screening for cerebrovascular diseases

*__If the patient has swallowing difficulties (dysphagia) and/or risk of aspiration, refer to a Medical Nutrition Unit for an individualized plan and follow up__.

If the patient is already on a nasogastric/ percutaneous endoscopic gastrostomy tube feed, the daily diet plan can be liquefied with a powerful blender to achieve the same nutritional values, using suitable exchanges provided in Table 5.1.

5.2.3 A blenderized meal plan for a day for a patient with a cerebrovascular accident on enteral tube feeding

Table 5. 1 : Blenderized meal plan for a day for a patient with CVA on enteral tube feeding

Meal	Ingredients for each blenderized meal
Breakfast	Rice 1 cup, Dhal 3tbs tempered with 1tsp of olive oil* Cooked Carrot 3tbs with coconut gravy 1tbs 1 egg boiled
Morning snack	1 cup cubed papaya 1 small banana 1 medium pomegranate 1 medium mango ½ small jambola (grapefruit) 5 large / 10 small grapes 1 cup cubed watermelon 1 medium wood apple 1 small belli fruit 2 small mandarin 1 small orange (6 cm across) 1 small apple (5 cm across) 5 strawberries ½ medium avocado } Fruit juice made with one of these brought up to 200ml with water
Lunch	Rice 1 cup 1 piece of fish(30g) fried with 1 tsp of olive oil* Cooked cucumber /Cauliflower 3tbs with 1tbs of gravy Elabatu cooked and skin removed 1 ½ tbs
Evening snack	1 cup cubed papaya 1 small banana 1 medium pomegranate 1 medium mango ½ small jambola (grapefruit) 5 large / 10 small grapes 1 cup cubed watermelon 1 medium wood apple 1 small belli fruit 2 small mandarin 1 small orange (6 cm across) 1 small apple (5 cm across) 5 strawberries ½ medium avocado } Fruit juice made with one of these brought up to 200ml with water
Dinner	1 cup rice Dhal 6tbs tempered with 1 tsp of olive oil* Pathola cooked 3tbs with coconut gravy 1tbs
Late night snack	Nonfat milk ¼ cup

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon. All given food are edible portions, otherwise specified.*Other alternatives could be coconut oil/ / sesame oil/ soya oil/ sunflower oil/rice bran oil

Patients with stroke/CVA may have swallowing difficulties (dysphagia) due to paralysis and will need modifications to the consistency of the feeds. Patients Improve tolerability to feed with time. The above table provides a menu for the blenderized tube feeds. The same feed plan could be made into pureed, mashed, or overcooked consistencies by reducing the amount of water added in the preparation to suit the patient's tolerability.

5.2.4 Dietary Principles

- Increase the consumption of food that contain vitamins such as vitamin B complex, E and carotenoids, which are essential for neural health.
- Increase the consumption of food with flavonoids and antioxidant properties which delays oxidative stress. Flavonoids are compounds with varied chemical structures present in fruits, vegetables, nuts and seeds. The major flavonoid categories are flavonols, flavones, catechins, flavanones and anthocyanins.E.g. grapes, berries, cherries, apples, cantaloupe, watermelon, pomegranate, tea, barley, soy, onion, wine etc
  Antioxidants are rich in colorful fruits and vegetables (Rainbow diet)
- Consume lean proteins rather than ones with high fat
- Consume healthy fats such as monounsaturated fatty acids in place of saturated and trans fat to prevent further cerebrovascular accidents

5.2.5 Daily recommended diet for a patient with a cerebrovascular accident

Table 5. 2 : Daily recommended diet for a patient with CVA

Food group	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equal to:
Cereal/Yam/Starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta/ ½ cup of boiled sweet potato / Manioc / Raja ala / other yams/ 1 slice of bread (50g) / 2 - 3 string hoppers / 1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Parata/Chapathi (15 cm diameter) / 1 dosai (about 10cm in diameter) ¾ cup of boiled corn / ½ cup jack/ breadfruit or 3 cm height 5cm diameter pittu
Pulses	3	1/2 cup / 3 tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu / ½ cup chickpeas / ½ cup cowpea / ½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	2	30 g (Size of Two matchboxes)	2 matchbox size fish /2 matchbox size chicken /1 matchbox size dry fish/ 10 - 20 sprats / 1 egg
Dairy products	1	1/2 cup	½ cup nonfat or full cream fresh milk/ 1 tbs nonfat milk powder / 1 yoghurt /1 yoghurt cup size curd, not regularly or 1 thin slice/1 wedge Cheddar cheese, not regularly
Nuts and seeds	1	1 full tbs	1 full tbs Peanut / 5 full Cashew /1 full tbs pumpkin / Sunflower seeds / 1 Thala guli / 10 Kottang
Root vegetables/starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ Manioc/ other yams/ Carrot/ Beet/ Radish/Knol kohl/ Kohila/ Lotus roots
Green Vegetables	1 ½	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal/

Leafy vegetables	3	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ beet leaves/ Radish leaves/ Knol kohl leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves
Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Cauliflower/ Ambarella/ Green mangoes
Fruits	2	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya / 1 small banana / ½ large guava / 1 medium pomegranate / 1 medium mango / ½ small jambola (grapefruit) / ½ cup fresh pineapple / 5 large or 10 small grapes / 1 cup cubed watermelon / 5-6 pieces of jackfruit / 1 medium wood apple / 1 small belli fruit /2 medium ambarella,10 – 15 jambu / 7-9 rambuttan / ½ cup anoda /2 pieces of durian / 2 medium passion fruits / 10 fruits of nelli or lovi or veralu/ 2 small mandarin / 1 small orange (6 cm across) / 1 small apple (5 cm across)/ 5 strawberries / ½ cup mulberry / ½ medium avocado
Coconut	½	2 tbs Grated coconut Or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut / 3 tbs gravy
Oil*	1	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/
Sugar	3	1 tsp	1 tsp honey /1 tsp treacle / thumb size piece of Jaggery
Water	6 – 8	1 cup	
Other Beverages	2 -3	1 cup	1 cup light plain tea/ coffee/ herbal drinks (Belimal, Ranawara) /Coriander water/King coconut / Coconut water

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon

All given food are edible portions, otherwise specified.

*When choosing oil, take only 5 ml from coconut oil and use 10 ml from other oil to improve the fat composition

5.2.6 General Advice

- Reduce food that can induce flatulence e.g. cruciferous vegetables such as cabbages, pulses with the husk, onions, garlic
- Green leafy vegetables and all other vegetables should be consumed daily
- Berries – encourage to consume the seasonal berries if available (e.g. Jamson, Dan, Lovi, Ugurassa, Himbutu, Maadam, Palu, Strawberries)
- Nuts - include daily as a source of healthy fat
- Choose healthier oils in place of saturated oil whenever possible e.g. olive oil, rice bran oil
- Choose whole grains for daily consumption
- Regular consumption of fish
- Choose lean meat such as poultry in place of pork and beef
- Keep the daily sodium intake below 1500 mg / day, which is equal to ½ teaspoon

Food to limit in daily diet

- Butter /margarine
- Cheese
- Red meat (e.g. beef, pork, mutton, lamb)
- Fried food
- Sweets

5.2.7 Re-assessment and follow up

- All stroke patients should be screened and referred for a detailed evaluation of malnutrition within 48 hours of hospital admission, then every week during the acute stage. Also, the patient should be directed to a language and speech therapist for dysphagia screening and decide on a texture-modified diet accordingly.
- Re-screen and monitor nutrition intake throughout the recovery as malnutrition can go undetected. Therefore, timely re-adjust the nutrition care plan
- Stable patients with chronic stroke, and long-term tube feeding refer to medical nutrition clinics at least once in six months for dietary re-assessment concerning minimizing sarcopenia, disuse muscle atrophy and pressure ulcers, etc.

Refer to the Medical Nutrition Unit for individualized nutrition counselling and follow-up whenever necessary

5.3 Physical activity and exercise recommendations for patients with Cerebrovascular Accidents

When blood flow to a region of the brain is obstructed, brain function deteriorates quickly and leads to neuronal cell death. This can result in motor, sensory, emotional and cognitive impairments, the extent of which are greatly influenced by the size and location of the affected area and presence or absence of collateral blood flow. Physical and occupation therapy are typically utilized following a stroke to improve/restore functional mobility, balance and return to an active daily life.
The American Stroke Association recommends physical activity and exercise for stroke survivors across all stages of recovery (1). Loss of physical stamina, mood disturbances and sedentary behavior are common in stroke survivors. Although the exercise prescription is often adapted to functional abilities of the patients, exercise improves physical and psychological well-being, quality of life and helps to minimize the risk of a secondary event.

5.3.1 General advice

- Mobilize the patient and minimize the sitting time as much as possible.
- Start improving the physical activity level with day to day household work (e.g. gardening, sweeping, washing), and then gradually promote complex physical activities like dancing and games.
- For a patient to be prescribed a physical exercise regime following a CVA, the patient should be:
    - Conscious
    - With satisfactory mental status (e.g. can understand and follow instructions)
    - Barthel index level (>60) :**Annexure 1V**
    - Ambulatory: Patient should be at-least:
        - On a self-propelling wheelchair
        - Walking with assistance
        - Walking with an aid (stick, crutches, walker)
        - Walking without support.
- The exercise programme should be designed based on the patients' mobility, muscle strength, muscle endurance, balance, flexibility and coordination levels, which determine the capacity to perform and tolerate the exercise programme.
- Pre-morbid physical inactivity level contributes to the low physical fitness observed after the event.

Physical fitness of the patient is generally impaired after stroke. That is;

- Cardiorespiratory fitness is ≈50% of that of a healthy individual of the same age and sex.
- Muscle strength and endurance show substantial and variable impairment due to disuse
    - E.g. In a patient with hemiparesis, the muscle strength of the affected side, as well as the unaffected side, would be weak due to disuse.
- The patient may experience premature muscular or overall fatigue and will often be working at a higher percentage of their maximum Oxygen capacity than expected for a given activity. Therefore, adjust the intensity of the activity as the patient tolerates and progresses gradually, appropriately.
- Be aware of balance disruptions and early onset of fatigue and muscle soreness, which may affect the safety of the patient following certain movements. Therefore, utilize assistive devices, equipment or training accommodations to prevent falls.

- Be alert on affective issues such as mood, motivation, frustration and confusion, as these would affect how well the patient conducts, adheres to and responds to the exercise programme.
- Whether the patient is ambulatory or not, continue physiotherapy and occupational therapy under supervision of the treating specialist (e.g. Physician, Neurologist, Rehabilitation physician and Sports and Exercise Medicine Physician).

5.3.2 Screening of patients with a cerebrovascular accident for exercise prescription

- Assess the general mental status of the patient.
- Check the level of pre-morbid physical activity
    - Trained (engaged in exercises regularly or occasionally) **or**
    - Untrained (never engaged in exercises).
- Assess for underlying comorbidities like hypertension, diabetes, ischemic heart disease, joint disease and deformities.
- If the patient has any underlying comorbidities, the exercise prescription must be adjusted accordingly by referring to the physical activity recommendations for the relevant comorbidity.
- Assess the cardiac status, respiratory fitness level (based on the 6 minutes' walk test or exercise stress test) and neurological status (balance and coordination) whenever necessary

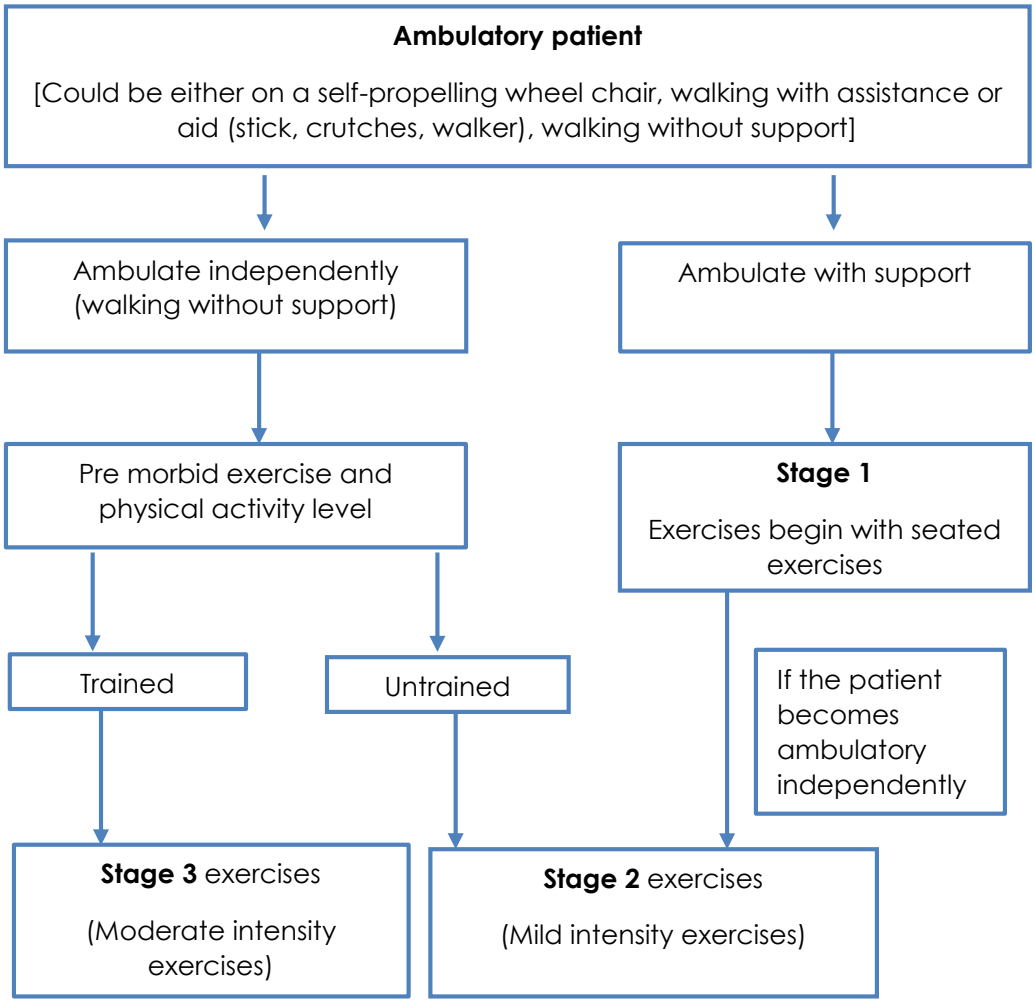


Figure 5. 2: Screening of patients with a CVA for exercise prescription

5.3.3 Exercise recommendations for patients diagnosed with CVA

Conditioning or exercise sessions can be categorized to three stages

Stage 1 Exercises: Seated exercises

Getting started

- For these exercises, a chair is required
- The chair should be stable, solid and without wheels. Avoid chairs with arm rests as this will restrict the movements.
- Patients should be seated with feet flat on the floor and knees bent at 90^0 angles.
- They should wear loose, comfortable clothing and keep a water bottle.
- Initiate these exercises at least twice a week and then gradually increase the frequency up to 3-5 days per week
- This will help to improve endurance, muscle strength, balance and coordination. Build up slowly and aim to increase the repetitions of each exercise over time.
- Even though a patient may find it more difficult to perform exercises on the affected side when compared with the unaffected side, encourage them to do their best. Exercising both sides of the body is important.

❖ **Warm up session:** Start with a prolonged 5-10 mins of light to moderate intensity cardiorespiratory and muscular endurance activities e.g. seated cycling, seated stationary marching, seated dynamic stretching, and treadmill walking with support.

1. Ankle Rotations

- Ankle flexibility exercises for stroke patients are important to maintain balance and stability. Ankle stretches are a vital part of lower body flexibility.
- They have to sit in a chair with feet flat on the floor.
- Then extend the right knee and rotate the foot in a circle for 5-10 times. Then move in the other direction for 5-10 times; gradually increase up to 20 times. Repeat the same with the other ankle. You may also ask the patient to "write their name" or "write the alphabet" with their foot. (Image 1,2,3 of figure 5.3)
- If full extension of the knee is hard, advice to lift the leg just above the floor and rotate the ankle (Image 4 of figure 5.3)
- If the ankle is painful when making circles, advise to do smaller circles or just move the foot up (dorsiflexion) and down (plantar flexion). (Image 5,6 of figure 5.3)

2. Toe Tap

- Patient has to sit up straight with feet flat on the ground.
- Then they have to bend toes toward the ceiling and back to the floor (dorsiflexion while heels on the floor). To increase the difficulty of this exercise, they have to sit on the edge of the seat with legs straight. Instruct to keep heels on the ground as the patient bends toes upward and then back down. This variation increases the range of motion.
- Perform 8-10 repetitions

3. **Knee Lifts**

- Patient has to sit up straight with your feet flat on the floor. Slowly lift the right knee towards the chest, and then lower the foot back to the floor. Repeat with the left leg.
- Perform 10 repetitions for each leg.
- For an added challenge, lift the knee and keep for 5 seconds.

4. Hip marching

- This will strengthen hips and thighs and improve flexibility.
- Advice to sit upright and away from the back of the chair.
- Hold on to the sides of the chair. Lift each leg as far as comfortable. Place the foot down with control.
- Do 8-10 lifts for each leg.

5. Arm raises

- This builds shoulder strength.
- Sit upright, arms by sides.
- With palms forwards, raise both arms to the side and up as far as comfortable. Do not shrug the shoulders and bend elbows
- Repeat 8-10 times.

6. Chest stretches

- This is to improve the patient's posture.
- Sit upright and away from the back of the chair.
- The patient has to pull their shoulders back with extended arms out to the side.
- Gently push chest forwards and up until they feel a stretch across the chest.
- Hold each stretch for 5-10 seconds and repeat for 8-10 times

7. Upper body twists

- This will develop and maintain the flexibility of the upper back.
- Sit upright with feet flat on the floor,
- Cross their arms and reach for the shoulders.
- Without moving the hips, they should twist their upper body to left and right as far as comfortable.
- Hold each twist for 5 seconds.
- Repeat 5 times to each side

8. Neck rotations and Neck Stretch

- This stretch is good for improving neck mobility and flexibility.
- First they should sit upright.
- Then look straight ahead.
- Advice to slowly turn head towards left and right shoulders as far as comfortable.
- Hold each side for 5 seconds and return to the starting position. Repeat the same to the other side.
- Do 3-5 rotations for each side
- Neck stretch : Slowly bend the head towards the left and right shoulders as fas as comfortable

❖ **Cool down:** At least 5-10 min light to moderate intensity cardiorespiratory and muscle endurance activities e.g. static cycle, seated static stretching

Following pictures illustrate the exercises described above

Figure 5.3: Ankle Rotation

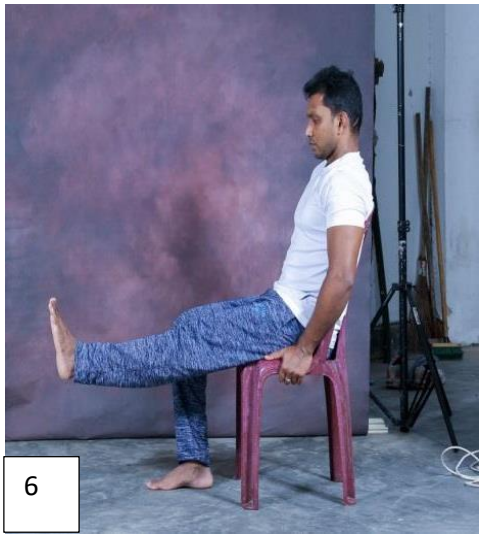


Figure 5.4: Toe tap

Figure 5. 5: Knee Lifts

Figure 5.6: Hip Marching

Figure 5.7: Arm raises

Figure 5.8: Chest stretch

Figure 5.9: Upper body twists

Figure 5.10: Neck Rotation

Figure 5.11: Neck stretch

Stage 2 Exercises (Mild intensity exercises)

Table 5. 3 : Stage 2 mild intensity exercise recommendations for patients diagnosed with CVA

- **Warm up session:** Start with 5-10 mins of light to moderate intensity cardiorespiratory and muscular endurance activities e.g. stationary marching, walking, dynamic stretching and treadmill walking with support.

Type of exercise	Recommendations	Examples
Aerobic exercises	**Frequency:** At least 3-5 days per week. Exercising daily is recommended. **Intensity:** Start with mild intensity (Assess the intensity by the Talk test Refer to Section 1.7.1.1 **Duration:** Start with multiple sessions of short duration (3-5 minutes). Progressively increase the duration as the patient tolerates. Ultimate goal should be 30-60 minutes per day.	Water walking, slow walking, static cycle, yoga and tai-chi.
Strengthening exercises	**Frequency:** At least non-consecutive days per week **Intensity:** Start with low weights then increase gradually as the patient tolerates **Duration:** At least 1-3 sets each of 8-15 repetitions per day Avoid the Valsalva maneuver (forced expiration against a closed glottis) or straining during strengthening exercises to avoid excessive elevations in BP.	**Exercises using own bodyweight:** Half squats, wall pushups, lunges, shoulder raise, planks, bridges and leg raise **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 0.25kg, 0.5kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights
Flexibility exercises (To be done hand in hand with aerobics exercises)	**Frequency:** At least 2-3 days per week. Most effective if done daily. **Intensity:** Stretch to the point of feeling tightness or slight pain. **Duration:** Hold each stretch for 10-30 seconds	Static stretching focusing on major joints and spine, Yoga and Tai –chi
Balance exercises (To be done hand in hand with aerobics exercises)	**Frequency:** At least 2-3 days per week; most effective if done daily.	Single leg stance (with or without support), single leg stance with arm elevation, heel to toe walk.

- **Cool down:** At least 5 min light to moderate intensity cardiorespiratory and muscle endurance activities e.g. slow walking, static stretching

Stage 3 exercises (Moderate intensity exercises)

Table 5. 4: Stage 3 moderate intensity exercise recommendations for patients diagnosed with CVA

Warm up session: Start with 5 mins of light to moderate intensity cardiorespiratory and muscular endurance activities e.g. walking, stationary marching, dynamic stretching, treadmill walking with support.

Types of Exercise	Recommendations	Examples
Aerobic exercise	**Frequency:** At least 3-5 days per week. Daily exercising is recommended **Intensity:** Moderate intensity (Assess the intensity by the Talk test: Section 1.7.1.1) **Duration:** Start with multiple sessions of 10 minutes. Progressively increase with time as the patient tolerates. Ultimate goal should be 30-60 minutes per day.	Brisk walking (5km per hour), cleaning heavy (washing windows, vacuuming, mopping), cycling (16km per hour), badminton (recreational play), stair climbing, swimming, treadmill machine, elliptical trainer, and rowing machine
Strengthening exercise .	**Frequency:** 2 non-consecutive days per week **Intensity:** Start with low weight (1-2 Kg) then increase gradually as the patient tolerates **Duration:** 1-3 sets, each of 8-15 repetitions per day Avoid the Valsalva maneuver (forced expiration against a closed glottis) or straining during strengthening exercises to avoid excessive elevations in BP.	**Exercises using own bodyweight:** half squats, wall push-ups, knee pushups, lunges, shoulder raise, modified planks, bridges, crunches **With resistance bands, free-light weights and weight machines:** start with light weights such as dumb bells weighing 1kg, 2kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights
Flexibility exercise (To be done hand in hand with aerobics exercises)	**Frequency:** At least 2-3 days per week, most effective if done daily **Intensity:** Stretch to the point of feeling mild discomfort/pain or tightness **Duration:** Hold each stretch for 10-30 seconds	Static stretching focusing on major joints and spine, Yoga and Tai –chi.
Balance exercise (To be done hand in hand with aerobics exercises)	**Frequency:** At least 2-3 days per week, most effective if done daily	Single leg stance (with or without support), single leg stance with arm elevation and heel to toe walk

- **Cool down:** At least 5 min light to moderate intensity cardiorespiratory and muscle endurance activities e.g. slow walking, static stretching

Images of exercises that can be done in stage 3 are given in Annexure III

5.3.4 Follow up care

The health care worker must always monitor progress and motivation to exercise. Promote non exercise activity of thermogenesis. Cardio-respiratory and neurological symptoms in relation to exercise have to be noted and always note any alterations in medication. Try to make positive comments for the effort and for actions to maintain physical activity and exercise. If the target exercise prescription cannot be achieved, assess the patient's motivation and fitness level. Triggers for relapses must be identified with potential barriers and strategies, and provide psychosocial support for the challenges.

When exercise prescription is successful with good compliance and in the absence of symptoms, exercises can be progressed into the next stage according to the guideline.

Chapter 6

Diabetes Mellitus

6.1 Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder of multiple causes characterized by chronic hyperglycemia (high blood sugar) with disturbances of carbohydrate, fat and protein metabolism, resulting from defects in insulin secretion, insulin action or both.

Diabetes mellitus is classified into four main types: Type I, Type II, diabetes mellitus due to other specific mutations and diseases, and gestational diabetes.

The appropriate control of diabetes mellitus can be achieved with adequate lifestyle modifications, including a recommended medical nutrition therapy and adequate exercises which are considered non-pharmacological measures and pharmacological measures.

6.2 Dietary recommendations for patients with Diabetes Mellitus

Medical Nutrition Therapy is important in preventing diabetes, managing existing diabetes, and preventing or delaying diabetes complications. It is, therefore, important at all levels of the management of diabetes. Furthermore, medical nutrition therapy is an integral component of diabetes self-management education.

The recommendations below aim to make the health care providers aware of beneficial nutrition interventions.

6.2.1 Goals of medical nutrition therapy for Prevention and Treatment of Diabetes and associated complications

a) Goals of MNT that apply to individuals at risk for diabetes or with pre-diabetes:

To decrease the risk of diabetes and cardiovascular disease (CVD) by promoting healthy food choices.

b) To support in achieving and maintaining individualized targeted:

- Blood glucose levels
- Lipoprotein profile
- Blood pressure levels

To prevent or at least slow the rate of development of the chronic complications of diabetes by modifying nutrient intake and lifestyle.

To address individual nutrition needs, taking into account personal and cultural preferences and willingness to change.

6.2.2 Nutrition screening of a patient with Diabetes Mellitus

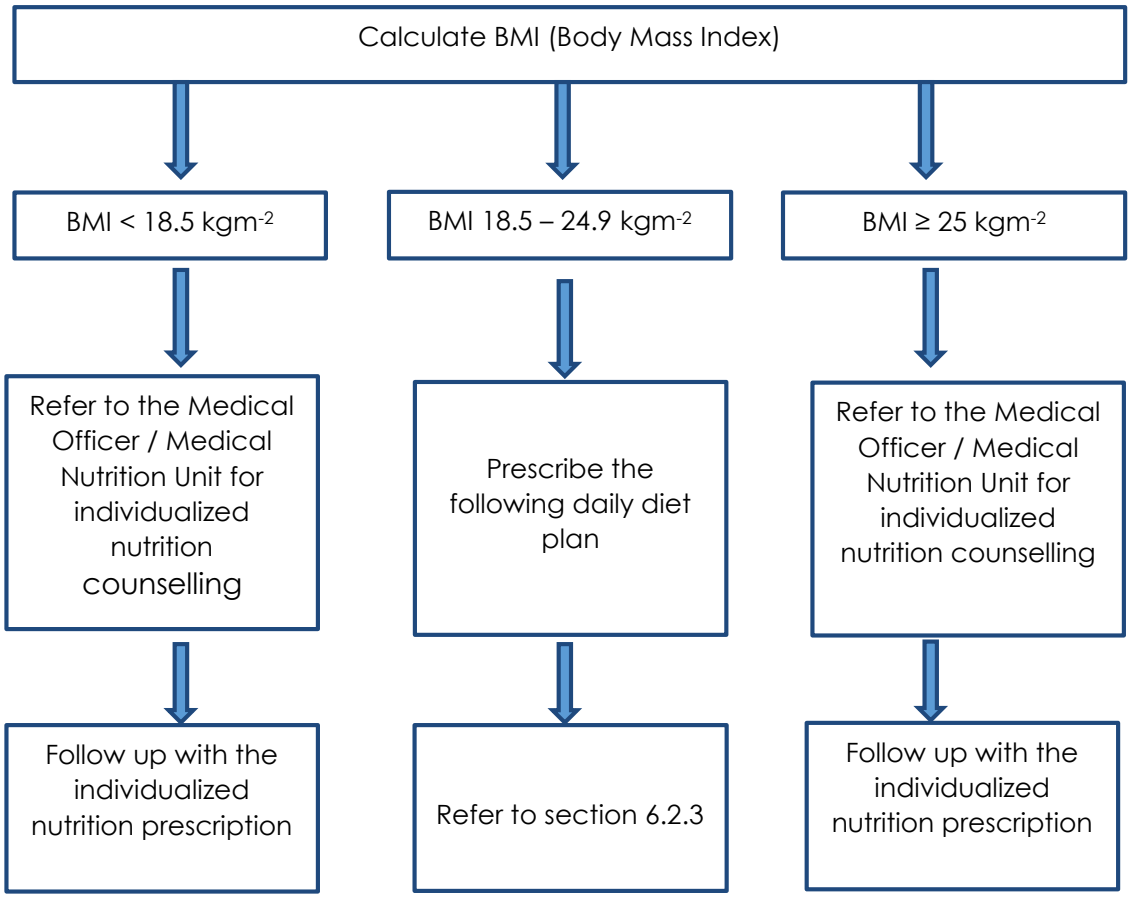


Figure 6. 1 Nutrition screening for patients with Diabetes Mellitus

6.2.3 Daily recommended diet for a patient with diabetes with a sedentary lifestyle

The daily recommended diet for a patient with diabetes with a sedentary lifestyle is given in Table 6.1.

Table 6. 1: Daily recommendation for diabetes patients with a sedentary life

Food group	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equal to:
Cereal, yam and starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta/ ½ cup of boiled sweet potato / Manioc / Raja ala / other yams/ 1 slice of bread (50g) / 2 - 3 string hoppers / 1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Paratha or Chapati (15 cm diameter) /1 dosai (about 10cm in diameter / ¾ cup of boiled corn / ½ cup jack or breadfruit / 3 cm height 5cm diameter pittu
Pulses	1	1/2 cup/3 tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu / ½ cup chickpeas / ½ cup cowpea / ½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	3 – 4	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken / 1 matchbox size dry fish / 10 - 20 sprats/ 1 egg
Dairy products	1	1/2 cup	½ cup nonfat or full cream fresh milk /1 tbs nonfat milk powder /1 yoghurt/1 yoghurt cup size curd, not regularly or 1 thin slice/1 wedge Cheddar cheese, not regularly
Nuts and seeds	1	1 full tbs	1 full tbs Peanut/5 full Cashew/ 1 full tbs pumpkin or sunflower seeds/1 Thala guli/10 Kottang
Root vegetables and starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ Manioc/ other yams/ Carrot/ Beet/ Radish/ Knol khol / Kohila/ Lotus roots
Green Vegetables	1 ½	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal

Leafy vegetables	3	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ Beet leaves/ Radish leaves/ Knol khol leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves
Other vegetables	1	3 tbs	3tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/Cauliflower/ Ambarella/Green mangoes
Fruits	2	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya / 1 small banana / ½ large guava / 1 medium pomegranate/ 1 medium mango / ½ small jambola (grapefruit) / ½ cup fresh pineapple / 5 large or 10 small grapes / 1 cup cubed watermelon / 5-6 pieces of jackfruit / 1 medium wood apple / 1 small belli fruit / 2 medium ambarella / 10 – 15 jambu / 7-9 rambuttan / ½ cup anoda / 2 pieces of durian / 2 medium passion fruits / 10 fruits of nelli or lovi or veralu / 2 small mandarin / 1 small orange (6 cm across)/ 1 small apple (5 cm across) / 5 strawberries / ½ cup mulberry / ½ medium avocado
Coconut	½	2 tbs Grated coconut or ½ cup Coconut milk	½ cup of coconut milk/ 2 tbs coconut /3 tbs gravy
Oil*	1	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ sesame oil/ Soya oil/ Sunflower oil/ rice bran oil
Water	6 – 8	1 cup/glass	
Other Beverages	2 -3	1 cup	1 cup light plain tea/ coffee/ herbal drinks (Belimal, Ranawara) /Coriander water/King coconut/ Coconut water

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon.All given food is edible portions, otherwise specified

*When choosing an oil, take only 5 ml from coconut oil and use 10 ml from other oil to improve the fat composition

6.2.4 General Advice

- Food groups providing carbohydrates are a starchy food, fruits, milk and sugar. Table 6.2 shows the exchange list for 15g of carbohydrates.

Table 6. 2 : Exchange list for 15g of carbohydrates

Starchy food	½ cup cooked rice/ noodles/ pasta
	1 slice of bread (1/9th of a 450g loaf of bread)
	2-3 string hoppers
	1 hopper
	½ rotti (about 10cm diameter and 0.5cm thick)
	1 dosai (about 10cm in diameter)
	¾ cup of boiled corn
	½ cup jack/ breadfruit
	3 cm height 5cm diameter pittu
Pulses	3 tbs dhal 3 tbs kadala parippu 3 tbs mung parippu ½ cup chickpeas ½ cup cowpea ½ cup green gram 2 tbs soya meat
Fruits	½ cup fresh fruit or unsweetened fresh fruit juice
	1 ½ tbs dried fruit
	1 small fresh fruit (eg: apple, banana, orange, guava)
	¾ cup lovi/ ugurassa
Milk	1 cup

- The amount of carbohydrates can be distributed among 3 main meals, with each meal consisting of 3-5 carbohydrate exchanges (15 g of carbohydrate = 1 carbohydrate exchange).
- The diet is a consistent carbohydrate diet. Therefore, it is important not to include more food items in the above groups to the same meal. (eg: Have the fruit as the snack, not as a dessert to the main meal)
- If the patient is on Insulin, including a late night snack with one of the carbohydrate exchanges is essential.
- Encourage to choose fibre rich whole grains / less polished grains for most of the grain servings
- Advice to take adequate but not excessive proteins for each main meal.
- Encourage patients to take meals on time and not to skip meals.

- Promote eating more boiled or roasted foods rather than fried and tempered foods.
- Encourage to include the fish containing omega 3 fatty acids such as Sardines, Salaya, Hurulla, Kumbalawa, Salmon, Mackerel and Tuna

- Restrict foods containing saturated fat such as red-meat, cheese and whole fat dairy products.
- Advice to consume lean meat (remove visible fat)
- Include food containing unsaturated fats such as fish, nuts, seeds, avocado and olive oil.
- Keep an eye on the salt intake:
    - Try to keep the daily sodium intake below 2300 mg / day, which is equal to 5 g (1 tsp) of salt. If the blood pressure is high, reducing the sodium intake to 1500 mg / day is beneficial.
    - Dietary tips to reduce consumption of salt:
        - Advice to not add salt while cooking rice
        - To use more herbs, spices, black pepper, chilli, lemon etc. and reduce the amount of added salt
        - To minimize intake of high salty food – e.g. soup cubes, sauce, processed meat (sausages, bacon, meatballs, etc.), salted nuts, French fries (salted potato chips)
        - Packaged food – to look for the traffic light guide for low sodium food.

Advice to use healthy cooking methods

- Prepare more fresh salads with vegetables to minimize the loss of nutrients and reduce the amount of coconut milk used for cooking
- Use alternative cooking methods such as steaming, *mirisata*, *ambulate* etc.
- Restrict deep frying / heating oil to very high temperatures.(can use other options such as air frying)
- Avoid reusing oil.

- Advice patients to consume home-grown vegetables and fruits as much as possible to minimize agrochemical contaminants.
- Special diets (e.g. keto diet) should be avoided
- The use of non-nutritive sweeteners is not recommended
- Avoid alcoholic beverages

6.2.5 Re-assessment and follow up

- The patient should be followed up at a medical nutrition clinic according to their sugar control.
- Patients with satisfactory control, once in six months follow up is reasonable.
- For patients with persistent erratic blood sugar or poor dietary control, frequent hypo or hyperglycemic episodes, and long-standing diabetes vascular complications, periodic follow-up is recommended accordingly. Suggest referring these patients to a consultant medical nutrition physician for a tailored carbohydrate consistent diet.
- Patients with long-standing metformin treatment (more than five years) need micro-nutrient assessment, including vitamin B12 levels.

6.2.6 When should refer to the other relevant dietary guidelines to:

- Control blood pressure
- Maintain blood lipids within optimum levels
- Maintain healthy BMI and waist circumference

Refer to the Medical Nutrition Unit for individualized nutrition counseling and follow-up whenever necessary

6.3 Physical activity and exercise prescription guidelines for patients with diabetes mellitus

The implementation and maintenance of physical activity and exercise are important in management of blood glucose level and overall health in those who are diagnosed with diabetes mellitus and in pre-diabetic condition.

6.3.1 The overall benefits of physical activity and exercise for patients with diabetes

- Helps to control the blood glucose level by increasing insulin sensitivity
- Helps in reduction of weight in overweight and obese individuals, thus controlling type II diabetes mellitus.
- Exercise and its benefits on the cardiovascular system, helps to minimize the occurrence of cardiovascular diseases by improving heart function, endothelial function and lowering the blood pressure.
- Exercise improves dyslipidaemia. It has positive effects on minimizing cardiac events in diabetes.
- Prevents diabetic amyotrophy
- Increases the flexibility of the joint and prevention of hyperglycemia-associated joint stiffness.
- Increases energy and endurance throughout the day.
- Helps in lowering the stress, anxiety, boredom, frustration and depression.
- Improves sleep.
- Improvement of blood glucose control by effective exercises may lead to change of dosage or regime of antidiabetic medications.
- Exercise boosts immunity.

6.3.2 Screening of patients with diabetes for exercise prescription

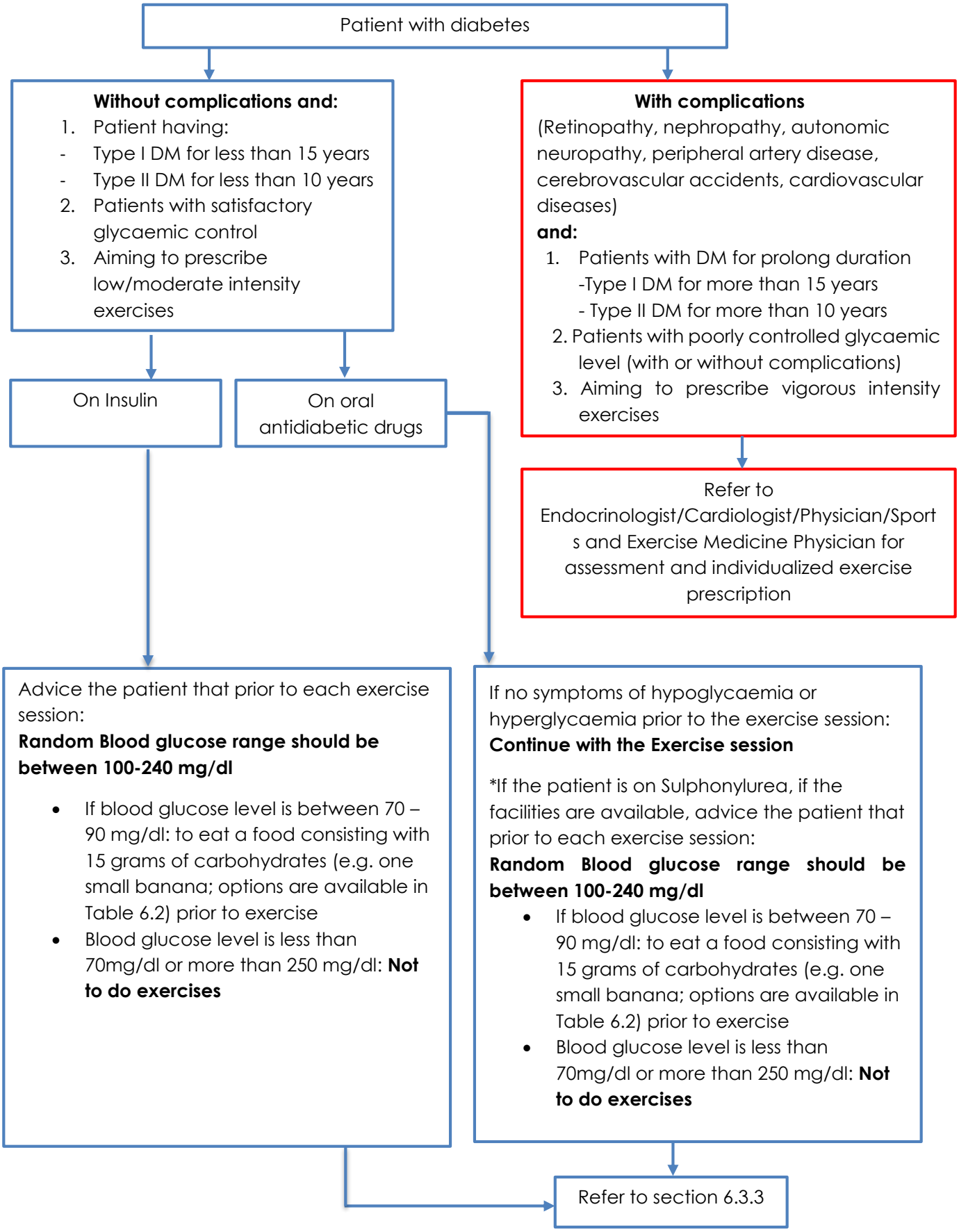


Figure 6. 2: Screening of patients with diabetes for exercise prescription

Other considerations:

- Pre exercise medical clearance is not mandatory for asymptomatic individuals receiving diabetic care according to the recommended guidelines, who wish to begin low intensity physical activity or daily living physical activity (e.g. walking, gardening, general house cleaning).
- For patients willing to engage in moderate or vigorous intensity physical activity and exercise, the readiness for physical activity has to be assessed through the physical activity readiness questionnaire (PAR-Q).
- Based on the PAR-Q, if further needed they should be cleared with Pre-Participation Medical Evaluation (PPE) which includes: medical and surgical history with an emphasis on current cardiovascular symptoms such as (dyspnea, dizziness, chest pain, and palpitation), comorbidities and other pertinent medical histories.

6.3.3 Recommendation of Exercises for patients with diabetes

Table 6.3: Recommendations of exercise for patients with Diabetes

- **Warm up session:** prolonged warm up session of 5-10 minutes [e.g. light jogging, dynamic stretching (moving the body part while performing the stretch)

Aerobic exercises	**Frequency and Duration:** Total of minimum 150 minutes of moderate aerobic exercises should be done at least 3-5 days per week. Recommended duration is minimum of 30 minutes per day, either continuous or as 10 minutes short bouts of exercise sessions to cover the total time per day of 30 minutes **Or** Vigorous intensity exercises should be done a minimum of 15 minutes per day for 5-7 days to achieve a total 75 minutes per week. There **should not be** more than 2 consecutive rest days * The reason for not skipping more than two days is that the blood glucose level improvement induced by acute exercise bout lasts only for about 72 hours. **Intensity:** **Intensity of the exercise will depend on the capacity of the individual patient** *Talk test or Rate of Perceived Exertion (RPE) chart (Section 1.7.1.1 and Figure 1.2) can be used to assess the intensity. Initiate with mild to moderate intensity and increase up to vigorous intensity.	**Low to moderate intensity aerobic exercises**: Walking, jogging, cycling (flat), swimming (RPE 3-5; figure 1.2)treadmill (low: < 3km /hr, moderate: 5km/hr) **High intensity/ vigorous aerobic exercises:** Running, cycling (uphill), swimming (RPE > 5 Figure 1.2), Treadmill (7 km/hr)
Strengthening Exercises	**Frequency and duration:** At least 2-3 non-consecutive days per week Start with 2-3 sets each of 8-12 repetitions. In a single schedule do 5-10 different exercises on different muscle groups. **Intensity:** **Moderate intensity** – Tolerable weight that allows to perform 15 repetitions without fatigue. **Vigorous intensity -** higher weight that allows to perform 6-8 repetitions Progressive resistance training (PRT), that is gradual increase of resistant weight over the time warrants optimal insulin action and better glucose control. Ideally, involve all major muscle groups and combine with aerobic exercises	**Using own body weight** (Calisthenics): squats, push-ups, lunges, calf raises **Free weights, resistance bands and machines**: Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights.

	No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	
Flexibility exercises	**Frequency and duration:** At least 2-3 days per week, stretching up to the point of mild discomfort (point of stretch), hold the stretch for 15-30 sec, more than 3 repetitions per each stretch	Static and dynamic stretching focusing major joints and spine
Balance exercises	**Frequency:** 1-2 days per week *Balance training exercises are done to improve posture, balance, joint position sensation and coordination	Single-leg stance with support, single leg stance without support, tandem walking, heel walking, tip toe walking, ball throwing in a single leg, clock reach and yoga

- **Cool down session:** prolonged cool down session of 5-10 minutes. E.g. light jogging and static stretching (not moving the body part while performing the stretch).

6.3.4 General advice for individuals with diabetes mellitus for exercise

- Overall activities of daily living should be increased, including lowering the sitting time and increasing the number of step count per day (10,000 steps per day).
- Assess the patients' exercise capacity with the RPE chart regularly Figure 1.2 (at least once a week).
- Individuals with diabetes should ideally perform both aerobic and strengthening exercise training for optimal glycaemic control and other health outcomes.
- It is better to do the blood glucose monitoring before and after the exercise session for the first few sessions until a stable control is achieved, if glucometer is available or facilities to check the blood glucose level are available.
- Educating the patient about the signs and symptoms of hypoglycemia should be done.
- (Lightheadedness or dizziness, feeling of faintishness, rapid heartbeat, chest discomfort, jaw-arm-upper back discomfort, nausea, unusual shortness of breath, sudden weakness, unusual fatigue or sleepiness, severe discomfort of any kind)
- Advice the patient to keep records of hypoglycemic symptoms/low blood glucose values to learn the glycaemic response to different exercise conditions such as aerobics and strengthening exercises.
- Strengthening exercise lowers the risk of developing exercise-induced hypoglycemia. When strengthening and aerobic exercises are performed at one session, performing strengthening exercise prior to aerobic exercises results in less hypoglycaemia.
- It is advisable that the patient engages in exercise with a responsible adult.
- Advice the patient to always carry 15-20g of a rapid acting carbohydrate source (e.g. one small bottle/carton of fruit juice, 2-3 teaspoons of glucose; options are available in Table 6.2), and consume it in case of a hypoglycaemic event (develops symptoms of hypoglycaemia or random capillary blood glucose value (RBS) <70mg/dl)
- During prolonged exercises (more than 60 minutes), patients need to consume 15-20g of carbohydrate source intermittently.
- Advice the patients to perform prolonged warm-up and cool-down for 5-10 minutes and drink enough water to prevent dehydration.
- Foot care protocol of the diabetic patient should be advised with regular inspection for ulcers, keep feet clean and dry, regular cutting and cleaning of nails. The shoes used for exercises should be properly dried and ventilated after use, and socks should be washed after every exercise schedule.
- Always ask patients to try to choose relatively soft terrains while performing exercises. (e.g. grass ground surfaces are preferable to hard tar-roads), or can use shoes with better shock-absorbable cushioning insoles and soles.

6.3.5 Special Considerations: Exercise with complications of diabetes mellitus

Patients with poorly controlled blood glucose levels, and with diabetes related complications such as diabetes induced retinopathy, nephropathy, autonomic neuropathy, peripheral artery disease, cerebrovascular accidents and cardiac diseases should be referred to the relevant specialist (Endocrinologist, Physicians, Cardiologist, Ophthalmologists, Nephrologists) and Sports and Exercise Medicine Physician for assessment and recommendation of individualized exercise prescription.

The amputees following diabetic leg complication, should be referred to Sports and Exercise Medicine Physician or sports medicine unit and physiotherapy unit for specific exercises designed to address their specific needs, health and fitness.

6.3.6 Consideration of exercise in patients on antidiabetic medicines

6.3.6.1. Exercise and oral antidiabetic agents

Most of the oral antidiabetic agents can be used safely with exercises without complications.

6.3.6.2. Exercise and Insulin

- Regular exercises can be carried out by patients whose blood glucose control is satisfactory with Insulin therapy.
- Even without facilities for checking the blood glucose levels, in the absence of hypoglycaemic symptoms, they can continue with low intensity exercises.
- Blood glucose response to insulin will vary according to the type of exercise and type of insulin, and they may need individualized care.
- Long acting insulins and isophane insulin are less likely to cause hypoglyceamia. However, Basal Insulin dose following exercise may need to be reduced.
- Exercise can increase the rate of absorption of insulin into exercising limbs, especially when it is started immediately after the insulin injection. Therefore, inject insulin into a non-exercising area, such as the abdomen, to minimize the effect of exercise on insulin absorption.
- It is advisable to do the blood glucose monitoring before and after exercise, and during the exercise session, if it is prolonged (more than 60 minutes) or if experiencing symptoms of hypoglycaemia.
- In the event of hypoglycaemia, 15-20g of rapid acting carbohydrate sources (e.g. one small bottle/carton of fruit juice, 2-3 teaspoons of glucose) should be consumed. These should always be readily available.

6.3.7 Follow up

The effectiveness of the exercise and physical activity should be assessed at least in three months intervals. These include glycaemic control, weight and body composition, complication of diabetes and any changing pattern of dosage or regime of antidiabetic medications.

Chapter 7

Chronic Respiratory Diseases

7.1 Introduction

Chronic respiratory diseases (CRD) are significant causes of morbidity and mortality and are diseases of the airways and other structures of the lung. Common chronic respiratory diseases include chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases, bronchiectasis, chronic lung disease following Tuberculosis infection and interstitial lung diseases.

7.2 Dietary recommendations for patients with chronic respiratory diseases

Pulmonary cachexia is a frequently occurring and partly reversible complication in patients with COPD, which also acts as a major determinant of morbidity and mortality in chronic respiratory diseases. Increased energy requirement with chronic inflammation and reduced intake leads to muscle wasting and sarcopenia, worsening respiratory functions, creating a vicious cycle.

Medical nutritional therapy has been proven effective for maintaining and improving muscle strength and exercise tolerance in poorly nourished patients with CRD.

7.2.1 Goals of Medical Nutrition Therapy in CRD patients

- Maintain optimal nutritional status
- Prevent the loss of lean body mass
- Support to improve the pulmonary status

7.2.2 Nutrition screening of a patient with CRD

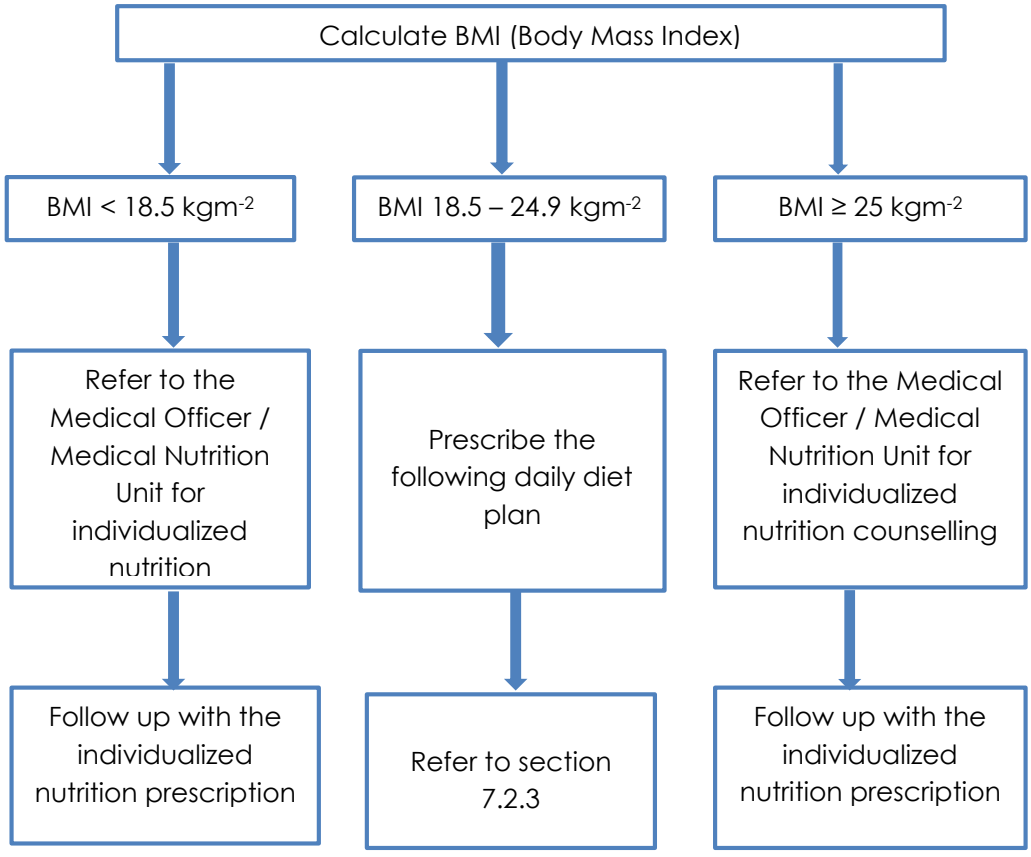


Figure 7. 1 Nutrition screening of a patient with CRD

7.2.3 Daily recommended diet for a CRD patient

Table 7. 1 : Daily recommended diet for a CRD patient

Food groups	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equal to:
Cereal/Yam/Starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta / ½ cup of boiled sweet potato / Manioc / Raja ala / other yams 1 slice of bread (50g) / 2 - 3 string hoppers / 3 cm height 5cm diameter pittu /1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Parata or Chapathi (15 cm diameter)/ 1 dosai (about 10cm in diameter) c/ ½ cup jac or / breadfruit/ ¾ cup of boiled corn
Pulses	2	1/2 cup / 3 tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu / ½ cup chickpeas / ½ cup cowpea ½ cup green gram /2 tbs soya meat
Fish / Poultry /meat / Eg	3 - 4	30 g (Size of Two matchboxes)	2 matchbox size of fish / 2 matchbox size of chicken / 1 matchbox size of dry fish/ 10 - 20 sprats or 1 egg
Dairy products	1	1/2 cup	½ cup nonfat or full cream fresh milk/ 1 tbs Milk powder /1 cup Yoghurt / ½ cup Curd, not regularly or 1 thin slice/wedge of Cheddar cheese, not regularly
Nuts and seeds	1	1 full tbs	1 full tbs Peanut/ 5 full Cashew/ 1 full tbs pumpkin / sunflower seeds/ 1 Thala guli / 10 Kottang
Root vegetables/starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ manioc/ other yams/ Carrot/ Beet/ Radish/ Knol khol/ Kohila/ Lotus roots
Green Vegetables	1	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal/
Leafy vegetables	2	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ Beet leaves/ Radish leaves/ Knol khol leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves

Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Cauliflower/ Ambarella/ Green mangoes
Fruits	2	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya / 1 small banana / ½ large guava /1 medium pomegranate / 1 medium mango / ½ small jambola (grapefruit)/ ½ cup fresh pineapple / 5 large or 10 small grapes/ 1 cup cubed watermelon /5-6 pieces of jackfruit /1 medium wood apple / 1 small belli fruit / 2 medium ambarella/ 10 – 15 jambu / 7-9 rambuttan /½ cup anoda / 2 pieces of durian /2 medium passion fruits /10 fruits of nelli or lovi or veralu / 2 small mandarin / 1 small orange (6 cm across)/ 1 small apple (5 cm across) / 5 strawberries / ½ cup mulberry / ½ medium avocado
Coconut	1	2 tbs Grated coconut or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut / 3 tbs gravy
Oil*	2	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Sugar	3	1 tsp	1 tsp honey / 1 tsp treacle / thumb size piece of Jaggery
Water	6 - 8	1 cup/glass	
Other Beverages	2 -3	1 cup	1 cup light plain tea/ herbal drinks (Belimal, Ranawara) /Coriander water/King coconut / Coconut water

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon
All given food are in edible portions, otherwise specified
*When choosing oil, take less than 10 ml from coconut oil and use the rest from other oil to improve the fat composition

General Advice

- Individual food allergies to be considered.
- Frequent, small, energy-dense meals are preferred over large meals. This will avoid postprandial dyspnea, early satiety and will improve compliance.
- Each main meal should contain a protein source
- The number of main meals and snacks can be spaced out according to the patients' convenience
- There are no additional benefits on a disease specific formula (high fat, high protein, low carbohydrate) over routine formula in stable patients (Thriposha can be a good source in our set-up).
- Malnourished patients should be considered about Oral Nutrition Supplements (ONS)/ enteral feeds
- Loss of 5% of the actual weight within 3 months or 10% within 6 months is considered significant
- These patients should be in a respiratory rehabilitation programme, and a weight gain of 2kg after 8 weeks is considered a significant improvement.
- Food related myths should be alleviated (eg: egg, milk, banana etc.)
- During an exacerbation, resting before meals, symptom control, and nutrient dense small meals are beneficial.
- Slow eating, adequate chewing, upright posture while feeding, avoiding gas forming foods (e.g. cabbage, broccoli etc.) will help reduce bloating.
- Fluids should be given well apart from meals.
- Dehydration should be avoided
- Easy chewing of food to reduce fatigability while feeding

7.2.6 Re-assessment and follow up

The energy requirement in breathing in a healthy person is around 100kcal per day. But an individual with CRD could use between 400-700kcal per day for the work of breathing. Therefore, unexpected weight loss is a challenge in these patients, including pulmonary cachexia syndrome characterized by muscle loss with or without fat mass loss. Patients with low BMI (<18.5kg/m2) need to be referred for periodic nutritional assessment at least once in six months.

Appropriate micro-nutrient assessment should be done during these follow-ups, including Vitamin D, Zn, Vitamin C, Vitamin B, etc.

Refer to the Medical Nutrition Unit for individualized nutrition counselling and follow-up whenever necessary

7.3 Physical activity and Exercise recommendations for patients with Chronic Respiratory Diseases

Mainly focused diseases in this guideline are:

- Asthma
- Chronic obstructive pulmonary disease (COPD)
- Interstitial lung disease (ILD)
- Bronchiectasis

There is strong evidence of reduced symptoms and improved quality of life in pulmonary rehabilitation programs for certain Chronic Respiratory Diseases (ie: COPD, Bronchiectasis, ILD)

7.3.1 Exercise recommendations for patients with Asthma

Exercise helps to control the frequency and severity of asthma episodes.

7.3.1.1 Exercise goals

- Prevents acute exacerbation of asthma
- Maintains general health benefits

Exercise cautions

- Asthma patients with the history of exercise induced bronchospasm (EIB)

7.3.1.2 General advice

- Normal airway functions are essential to do exercises. Therefore, advise patients to refrain from commencing exercises if symptoms are persistent.
- If exercises aggravate respiratory symptoms, patients should stop exercising immediately and inhale the reliever and seek medical advice.
- It is advised to patients to refrain from outdoor exercises, if the environment is dusty, cold or high humidity. Long term commitment is required to the exercise program for improved health. It may take at least six weeks to get useful results.
- Patients should be active in day to day life rather than having a sedentary lifestyle
- Advise them to do nasal breathing during exercises depending on individual tolerability
- Patients should take an adequate amount of water before, during and after the exercises to prevent dehydration.
- For patients with the history of exercise induced bronchospasm, advise them to take a short acting bronchodilator inhaler, 15 minutes prior to starting of exercises as directed by the treating physician.
- Focus more on strengthening exercises for patients with prolonged use of corticosteroids, as it may cause proximal muscle wasting.

7.3.1.3 Screening of patients with Asthma for exercise prescription

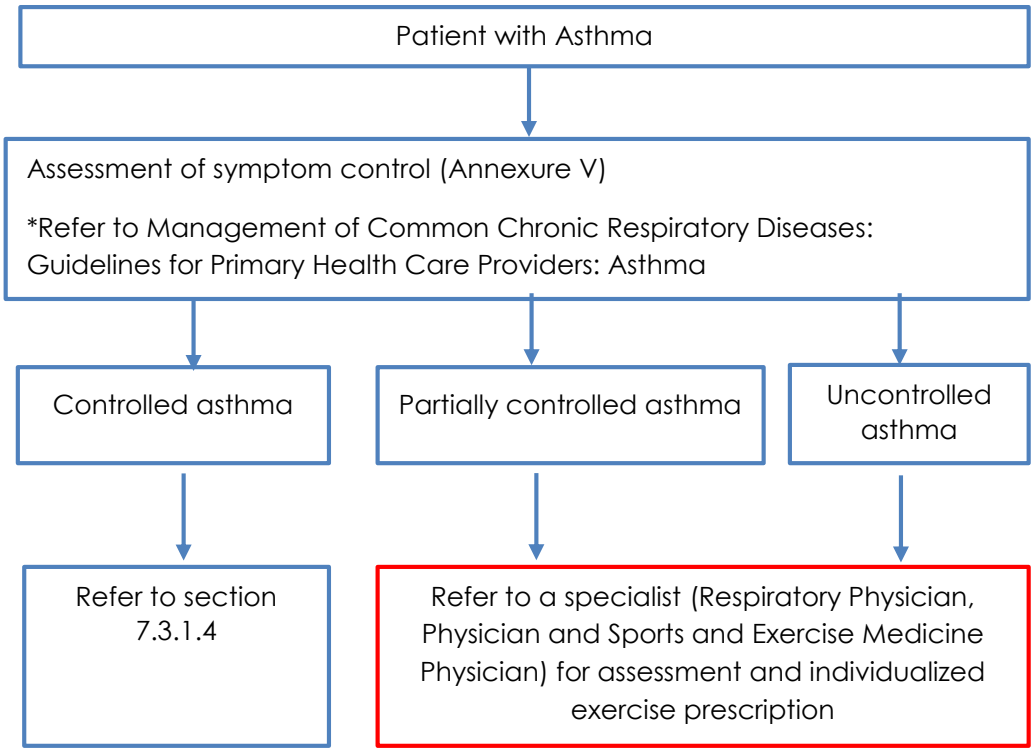


Figure 7. 2: Screening of patients with Asthma for exercise

7.3.1.4 Exercise recommendation for patients with Asthma (Untrained and Trained)

Trained- patients: Patients who have already engaged in physical activity at moderate intensity or above
Untrained- Patients: Patients who have not engaged in physical activity recently

Table 7. 2: Exercise recommendation for patients with Asthma (Untrained)

- **Warm up session:** Prolong warm up of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, dynamic stretching.

Types	Recommendation	Examples
Aerobics exercise	**Frequency:** At least 3-5 days per week **Intensity:** Moderate intensity (Measured by talk test; Section 1.7.1.1) Start with low intensity exercises and gradually progress to moderate to vigorous intensity exercises Increase the duration and the frequency first and then the intensity as the patient tolerates **Time:** Start with 10 minutes per day, add 5 minutes per session every 2 weeks until the recommended 30 minutes per day is achieved	Walking, cycling, swimming, dancing, use of treadmill, cross trainer machine, upper body ergometer. (avoid swimming in extreme temperatures and in polluted water to prevent exercise induced bronchospasm)
Strengthening exercises	**Frequency**: At least 2-3 days per week focusing on major muscle groups. Need rest of at least 24 hours in between the sessions **Intensity**: Muscle endurance exercises (Focusing on respiratory muscles): Achieve 2-3 sets each of 15- 20 repetitions Muscle strengthening exercises: Achieve 2-4 sets each of 8-10 repetitions **Time**: Usually limit each exercise session to 10-20 minutes (5-6 exercise types per session) No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Exercises using own bodyweight:** Wall push-ups, half squat, lunges and knee push-ups **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights Same exercise can be used as muscle strengthening or endurance exercise by changing the weight and repetitions.

Flexibility	**Frequency**: At least 2-3 days per week. **Intensity:** Stretch to the point of feeling tightness or mild discomfort. **Time:** hold each static stretch for 10-30 seconds, 2-4 repetitions.	Static, dynamic, Proprioceptive neuromuscular facilitation (PNF) stretching (stretching of the muscle during an isometric contraction).
Balance and coordination exercises	**Frequency**: At least 2-3 days per week.	Single leg stance with arm elevation, heel to toe walk, marching in place, toe lift etc.

- **Cool down session:** Prolonged cool down of 10 minutes e.g. stationary walking, static stretching

Table 7. 3 : Exercise recommendation for patients with Asthma (Trained)

- **Warm up session:** Prolong warm up of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, dynamic stretching.

Types	Recommendation	Examples
Aerobics exercise	**Frequency:** At least 3-5 days per week **Intensity:** Moderate intensity **(**Measured by talk test; Section 1.7.1.1) Continue with same intensity and gradual progression/ continue to do vigorous intensity exercises Achieve recommended exercise duration first, then increase in the intensity. **Time:** 150 minutes of moderate intensity exercises per week. Or 75 minutes of vigorous intensity exercises per week. Or Can do a combination of moderate and vigorous exercises.	Walking, cycling, swimming, dancing, use of treadmill, cross trainer machines. Upper body ergometer. (avoid swimming in extreme temperatures and in polluted water to prevent exercise induced bronchospasm)
Strengthening exercises	**Frequency**: At least 2-3 days per week focusing on major muscle groups. Need a rest of at least 24 hours in between the sessions **Intensity**:	**Exercises using own bodyweight:** Push-ups, squats, lunges With free weights, resistance bands and weight machines.

	Muscle endurance exercises (Focusing on respiratory muscles): Achieve 2-3 sets each of 15- 20 repetitions Muscle strengthening exercises: Achieve 2-4 sets each of 8-10 repetitions **Time**: Each exercise session for 10-20 minutes (5-6 exercise types per session) No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	*Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights Same exercise can be used as muscle strengthening/ endurance exercise by changing the weight and repetition.
Flexibility	**Frequency**: At least 2-3 days per week. **Intensity:** stretch to the point of feeling tightness or mild discomfort. **Time:** Hold each static stretch for 10-30 seconds, 2-4 repetitions.	Static, dynamic, PNF stretching (stretching of the muscle during an isometric contraction).
Balance and coordination exercises	**Frequency**: At least 2-3 days per week.	Single leg stance with arm elevation, heel to toe walk, marching in place, toe lift etc.

- **Cool down session:** Prolonged cool down of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, static stretching.

7.3.2 Exercise recommendations for patients with chronic obstructive pulmonary disease (COPD)

One of the main problems in COPD is shortness of breath during the day to day activities and/or during exercises, which further reduces their fitness level. As a result, shortness of breath occurs even at a lower level of physical activity. Graded physical exercise will improve the exercise tolerance and the quality of life of patients with COPD.

In order to assess the severity of airflow obstruction for patients with COPD, the patient should first undergo spirometry to determine the severity of airflow limitation (spirometric grade; GOLD 1-4). The patient should then undergo the assessment of the level of dyspnea either by using the Modified Medical Research Council Dyspnoea Scale (mMRC; **Annexure VI** or by the symptoms using COPD assessment test (CAT; **Annexure VII)** Then, their history of moderate and severe exacerbations including prior hospitalizations should be recorded.

ABCD classification of severity of airflow obstruction for patients with COPD (Gold classification, 2019)

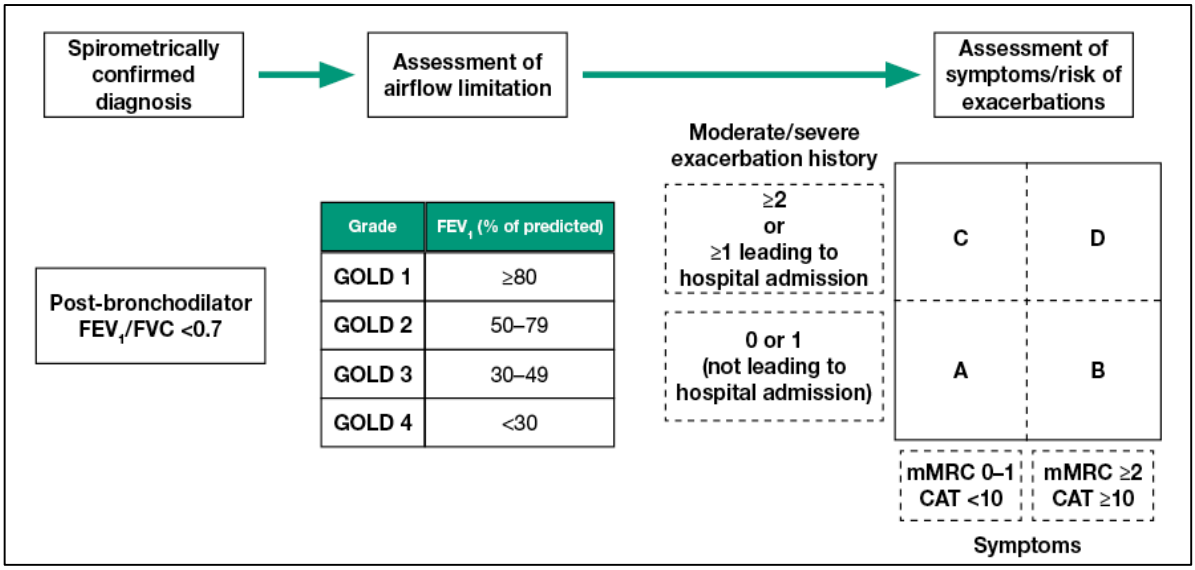


Figure 7. 3: ABCD classification of severity of airflow obstruction for patients with COPD

7.3.2.1 Exercise goals

- To prevent muscle atrophy
- To improve cardiorespiratory fitness
- To increase quality of life
- To improve dyspnea
-

7.3.2.2 General Advice

1. Patients should adjust the workout for variations in weather and changes in the symptoms.
2. Patients should consider indoor exercises if the outside is dusty or low humid.
3. Advice patients to use bronchodilators before starting exercise to reduce dyspnoea and increase exercise tolerance.
4. Advice to take an adequate amount of water before, during and after the exercise to prevent dehydration.
5. Encourage them to achieve moderate intensity which gives more physiological benefits.
6. If patients are planning to do aerobics and strengthening exercises on the same day, encourage them to do strengthening exercises initially followed by aerobic exercises.

7. Advice to do prolonged warm up and cool down sessions before and after the exercise session respectively (10 minutes for a 30 minutes exercise session).
8. If the oxygen saturation SpO_2 < 88% at rest, it is an indication for ambulatory oxygen supplementation.
9. If the patient is experiencing acute exacerbation of symptoms, they should not engage in exercise until the condition is settled.

7.3.2.3 Screening of patients with COPD for exercise prescription

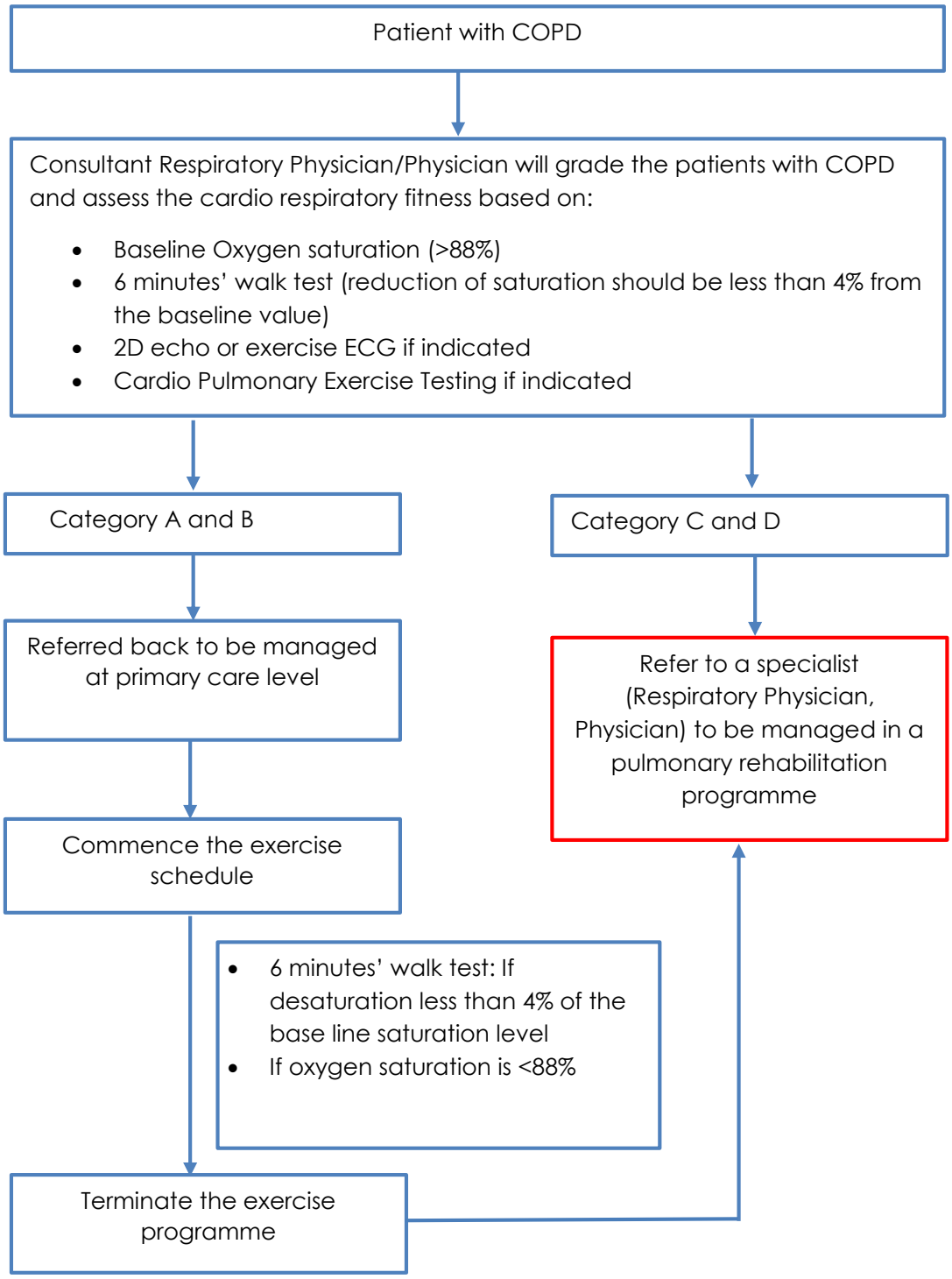


Figure 7. 4: Screening of patients with COPD for exercise prescription

7.3.2.4 Exercise recommendation for patients with COPD (Untrained and Trained)

Table 7. 4: Exercise recommendation for patients with COPD (Untrained patients)

❖ **Warm up session:** Prolong warm up of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, dynamic stretching.

Exercise type	Recommendation	Examples
Aerobic exercises	**Frequency:** At least 3-5 days per week **Intensity:** Mild to Moderate intensity. *Intensity measured according to the **Borg scale** Figure1.2 Beginners can initiate with 10 minutes per day sessions and add 5 minutes per session every 2 weeks until they achieve at least 20 minutes per day of moderate intensity exercise level. Can take any number of breaks during the exercise. **It may take about 12 weeks to get useful results** **Time:** 20-30 minutes per day	Walking, cycling, swimming, running, dancing, aerobic exercises, use of treadmill and upper body ergometer. Chair aerobics.
Strengthening exercises	**Frequency:** At least 2-3 days per week. Need at least 24 hours rest in between. **Intensity:** Muscle endurance exercises (Focusing on respiratory muscles): Achieve 2-3 sets each of 15-20 repetitions Muscle strengthening exercises: Achieve 2-4 sets each of 8-10 repetitions **Time:** 10-20 minutes (However, will depend on the individuals' tolerance) No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Exercises using own bodyweight:** wall push-ups, knee push-ups, half squat, lunges **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water/sand, resistance bands, and weight machines. Same exercise can be used as muscle strengthening/ endurance exercise by changing the weight and repetition.
Flexibility	**Frequency**: at least 2-3 days per week. **Intensity:** stretch to the point of feeling tightness or mild discomfort. **Time:** hold each static stretch for 10-30 seconds, 2-4 repetitions.	Static, dynamic, PNF stretching (stretching of the muscle during an isometric contraction).
Balance and coordination exercises	**Frequency**: at least 2-3 days per week.	Single leg stance with arm elevation, heel to toe walk, marching in place, toe lift etc.

Respiratory muscle therapy	**Frequency:** Daily exercise is better **Intensity:** Respiratory muscle endurance: 30% - 60% of maximal inspiratory pressure for 30 breaths for 2-3 minutes. Respiratory muscle strength-60%- 80% of maximal inspiratory pressure for 8-10 breaths. **Time:** twice per day for every day	Breathing exercises without machines controlling the breathing pressure Pursed lip breathing with machines (if available): Bubble Positive Expiratory Pressure (PEP) machine, spirometer.

- **Cool down session:** Prolonged cool down of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, static stretching

Table 7. 5 : Recommendation for patients with COPD (trained patients)

- **Warm up session:** Prolong warm up of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, dynamic stretching.

Exercise type	Recommendation	Examples
Aerobic exercises	**Frequency:** At least 3-5 days per week **Intensity:** Moderate intensity *Intensity measured according to the **Borg scale** (Figure 1.2) Can take any number of breaks during the exercise Moderate level exercise for 30 minutes per day or vigorous level exercise for 15 minutes per day. **Time:** 20-30 minutes per day	Brisk walking, cycling, swimming, running, dancing, aerobic exercises, use of treadmill and upper body ergometer. Chair aerobics.
Strengthening exercises	**Frequency:** At least 2-3 days per week. Need at least 24 hours rest in between. **Intensity:** Muscle endurance exercises (Focusing on respiratory muscles): Achieve 2-3 sets each of 15- 20 repetitions Muscle strengthening exercises: Achieve 2-4 sets each of 8-10 repetitions **Time:** 10-20 minutes (However, will depend on the individuals' tolerance; perform 5-6 exercises per session).	Exercises using own bodyweight: push-ups, squats, lunges With free weights, resistance bands and weight machines. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights.Same exercise can be used as muscle strengthening/ endurance exercise by changing the weight and repetition.
Flexibility	**Frequency**: at least 2-3 days per week. **Intensity:** stretch to the point of feeling tightness or mild discomfort. **Time:** hold each static stretch for 10-30 seconds, 2-4 repetitions.	Static, dynamic, PNF stretching (stretching of the muscle during an isometric contraction).

Balance and coordination exercises	**Frequency**: at least 2-3 days per week.	Single leg stance with arm elevation, heel to toe walk, marching in place, toe lift etc.
Respiratory muscle therapy	**Frequency:** Daily exercise is better **Intensity:** Respiratory muscle endurance: 30% - 60% of maximal inspiratory pressure for 30 breaths or 2-3 minutes.Respiratory muscle strength:60%- 80% of maximal inspiratory pressure for 8-10 breaths. **Time:** twice per day for every day	Breathing exercises Without machines controlling the breathing pressure Pursed Lip breathing With machines: Bubble PEP machine, spirometer.

- **Cool down session:** Prolonged cool down of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, static stretching.

❖ **Pursed lip breathing technique**

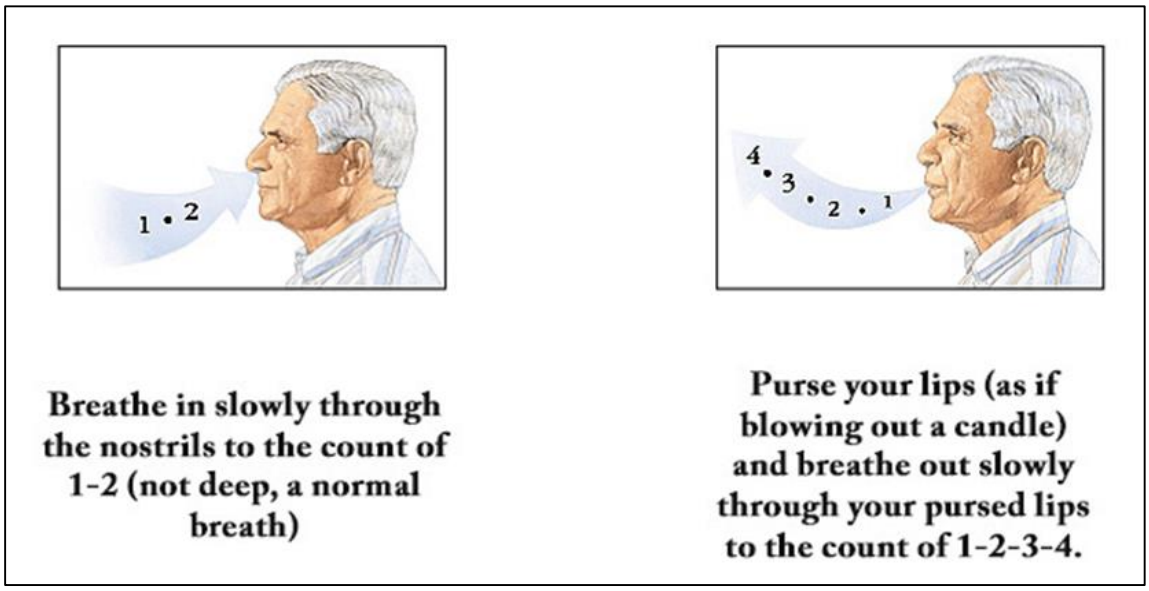


Figure 7.5 : Pursed lip breathing technique

- During this technique patients should relax neck and shoulder muscle
- Patients should breathe in slowly through the nose for two counts, keeping mouth closed. They shouldn't take a deep breath as a normal breath will do. It may help to count to oneself, inhale, one, two ...
- Pucker or "purse" the lips as if one were going to whistle or gently flicker the flame of the candle
- Breathe out slowly and gently through the pursed lips while counting to four .It may help to count to oneself : exhale one ,two ,three and four
- With regular practice this technique will come natural to the patient

7.3.3 Exercise recommendations for patients with interstitial lung diseases

- Interstitial lung diseases (ILDs) are a diverse group of chronic lung conditions that are characterized by scarring of the interstitium and a restrictive ventilatory pattern. A rapid, shallow breathing pattern is common in ILDs, which worsens on exercise and as the disease progresses.
- Pulmonary hypertension is more commonly seen in ILDs and further impacts on exercise tolerance.
- Functional exercise tolerance is often markedly reduced, and those with the greatest impairment in exercise tolerance have the worst quality of life.

7.3.3.1 General advice

- Check the patient's oxygen saturation prior to the commencement of exercises.
- Main exercise component is the aerobic exercise schedule.
- Commence strengthening exercise only if the patient tolerates aerobic exercises.

7.3.3.2 Screening of patients with Interstitial Lung Diseases (ILD) for exercise prescription

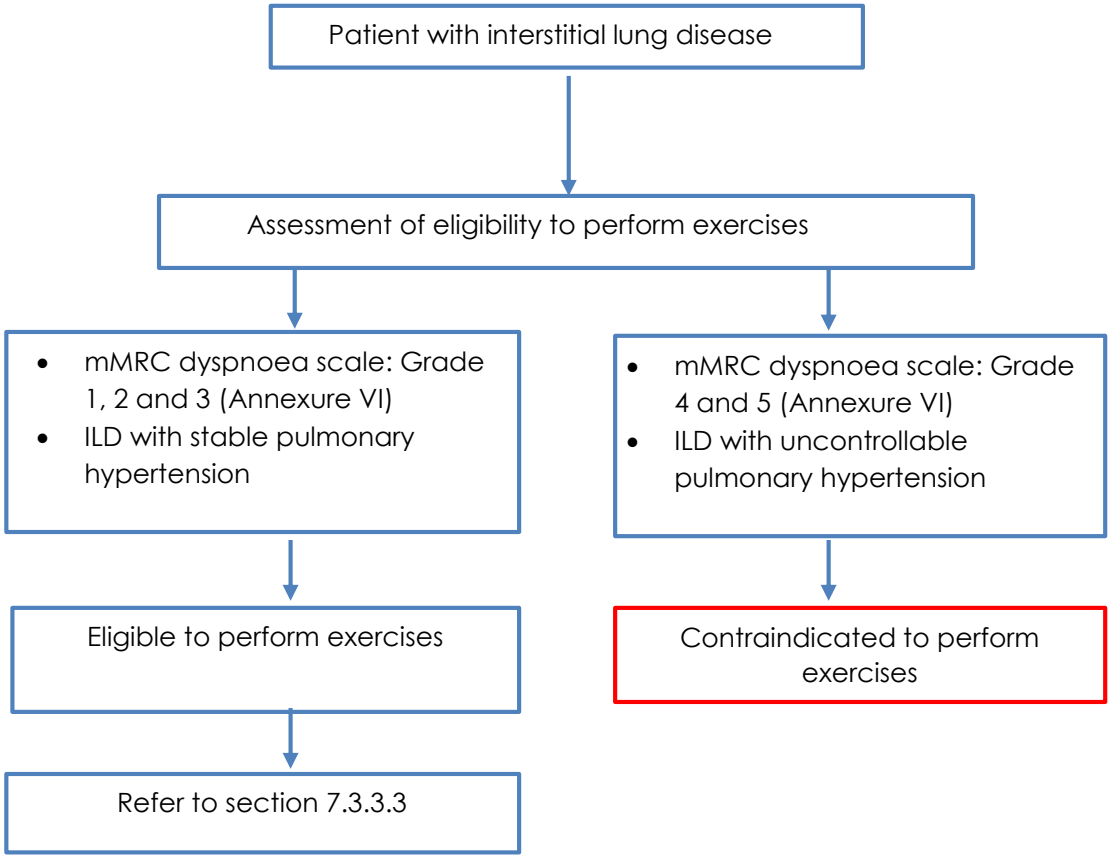


Figure 7.6: Screening of patients with ILD for exercise prescription

7.3.3.3 Exercise recommendations for patients with ILD

Table 7. 6 : Exercise recommendations for patients with ILD

- **Warm up session:** Prolong warm up of 3-5 minutes for a 10 minutes exercise session e.g. stationary walking, dynamic stretching.

Type of exercise	Recommendation	Examples
Aerobic exercises	**Frequency:** Better to exercise at least five days per week. **Intensity**: Initially start with mild intensity exercises and progress to moderate intensity exercises if possible. **Do not engage in vigorous exercises in the presence of pulmonary hypertension.** Advice to stop if worsening of symptoms occurs **Time:** Recommendation is to 30-60 minutes per day of mild intensity exercises or 30 minutes of moderate intensity exercises Based on the tolerability, several bouts of exercises can be done throughout the day to achieve the recommended 30-60 minutes of exercises Beginners can initiate with 10 minutes per day, add 5 minutes per session every 2 weeks till achieving at least 30 minutes per day of moderate intensity exercise level.	Walking, cycling, swimming, treadmill dancing, aerobic exercises and chair base aerobics.
Strengthening exercises	**Frequency:** At least 2-3 days per week. Need 24 hours rest in between. **Intensity:** For muscle endurance: 1-3 sets each of 15- 20 repetitions focusing on major muscles For muscle strengthening: 1-4 sets each 8 to 10 repetitions	**Exercises using own bodyweight:** Wall push-ups, knee push-ups, half squat, lunges, **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 0.25kg, 0.5kg, 1kg, 2kg and progress to higher free weights or machine assisted weights.

	Time: 10-20 minutes (However, will depend on the individuals' tolerance; perform 5-6 exercises per session)	*Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights Same exercise can be used as muscle strengthening/ endurance exercise by changing the weight and repetition.
Flexibility	**Frequency**: At least 2-3 days per week. **Intensity:** stretch to the point of feeling tightness or mild discomfort **Time:** hold each static stretch for 10-30 seconds, 2-4 repetitions	Static, dynamic, PNF stretching (stretching of the muscle during an isometric contraction).
Balance and coordination exercises	**Frequency**: at least 2-3 days per week.	Single leg stance with arm elevation, heel to toe walk, marching in place, toe lift etc.
Respiratory muscle therapy	**Frequency:** Daily exercise is better **Intensity:** Respiratory muscle endurance: 30% - 60% of maximal inspiratory pressure for 30 breaths for 2-3 minutes. Respiratory muscle strength:60%- 80% of maximal inspiratory pressure for 8-10 breaths **Time:** Twice per day for every day	Breathing exercises: Without machines controlling the breathing pressure

❖**Cool down session:** Prolonged cool down of 3-5 minutes for a 10 minutes exercise session e.g. stationary walking, static stretching.

7.3.4 Exercise recommendations for patients with Bronchiectasis

The pathophysiology of bronchiectasis may result in the development of dyspnoea and decreased exercise tolerance, both of which can have an impact on a patients' quality of life and ability to perform activities of daily living.

7.3.4.1 Exercise goals

- Preventing disease progression
- Improve respiratory symptoms
- Prevent infection by preventing stagnation of sputum through improved bronchial hygiene

7.3.4.2 Screening of patients with Bronchiectasis for exercise prescription

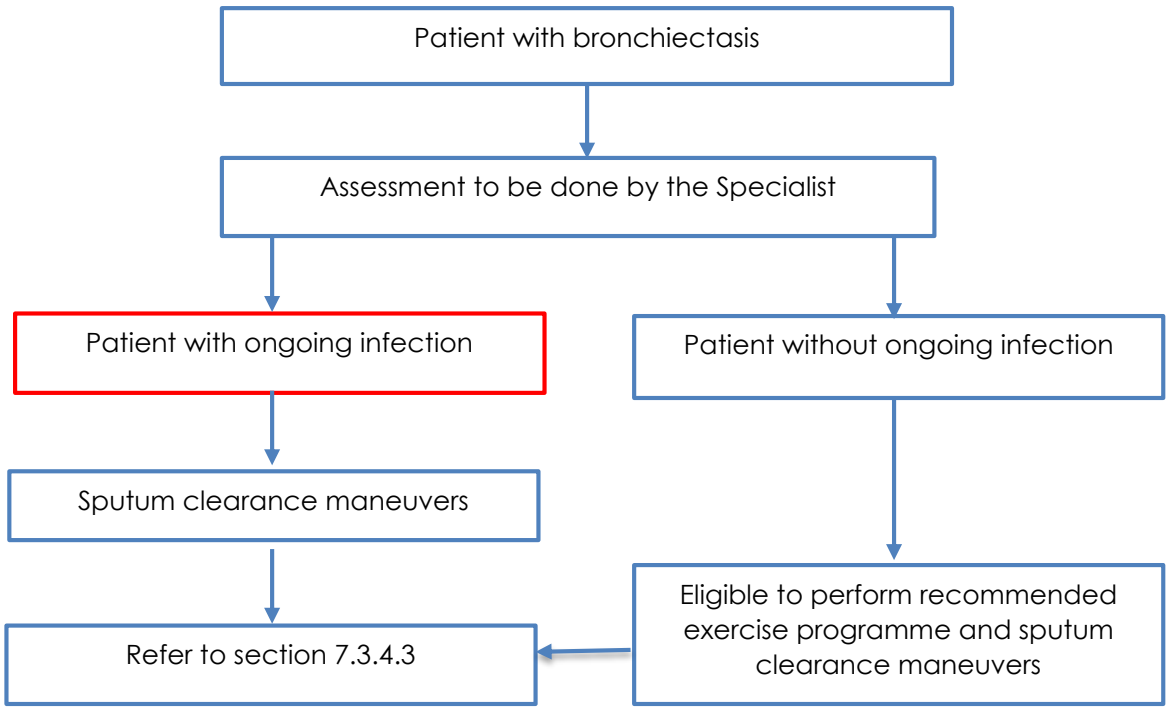


Figure 7. 7: Screening of patients with Bronchiectasis for exercise prescription

7.3.4.3 Exercise recommendation for patients with Bronchiectasis

Table 7. 7 : Exercise recommendation for patients with Bronchiectasis

- **Warm up session:** Prolonged warm up of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, dynamic stretching

Type of exercise	Recommendation	Examples
Aerobic exercises	**Frequency:** At least 3-5 days per week. **Intensity:** Initially start with mild intensity exercises and progress to moderate intensity exercises. **Time:** 20-60 minutes per day of light intensity exercises or 30 minutes of moderate intensity exercises Beginners can initiate with 10 minutes per day, add 5 minutes per session every 2 weeks till achieving at least 30 minutes per day of moderate intensity exercises.Can take any number of breaks during the exercise.	Walking, cycling, swimming, treadmill, dancing, aerobic exercises. Chair aerobics
Strengthening exercises	**Frequency**: At least 2-3 days per week. Need 24 hours rest in between. **Intensity:** Muscle endurance exercises (Focusing on respiratory muscles): Achieve 2-3 sets, each of 15- 20 repetitions Muscle strengthening exercises: Achieve 2-4 sets, each of 8-10 repetitions **Time:** 10-20 minutes (However, will depend on the individuals' tolerance; perform 5-6 exercises per session). No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Exercises using own bodyweight:** wall push-ups, half squat, lunges, knee push-ups **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights Same exercise can be used as muscle strengthening/ endurance exercise by changing the weight and repetition.

Flexibility	**Frequency**: At least 2-3 days per week. **Intensity:** stretch to the point of feeling tightness or mild discomfort. **Time:** hold each static stretch for 10-30 seconds, 2-4 repetitions.	Static, dynamic, PNF stretching (stretching of the muscle during an isometric contraction).
Balance and coordination exercises	**Frequency**: At least 2-3 days per week.	Single leg stance with arm elevation, heel to toe walk, marching in place, toe lift etc.

- **Cool down session:** Prolonged cool down of 10 minutes for 30 minutes of exercise bout e.g. stationary walking, static stretching.

7.3.5. The sputum clearance exercises

(Bubble Positive Expiratory Pressure (Bubble PEP)

Bubble PEP (Bubble Positive Expiratory Pressure) is a technique used to help patients who have a build-up of phlegm in their lungs and struggle to clear them.

What equipment is needed?

Figure 7. 8 : Bubble positive expiratory pressure

Technique

1. Take a deep breath in (without the tube in the mouth)
2. Blow out through the tube (creating bubbles in the water) for as long as possible.
3. Repeat this 10 times, making sure that they catch their breath between each blow out. This is one cycle.
4. Then huff (forced expiratory technique) or cough to try and clear your phlegm
5. Then they should have a short rest to catch their breath and repeat the cycle 3 times or until the chest feels clearer.
6. Carry out this technique 3 times a day
7. (After using the equipment it should be washed and left to dry until it is next used. The bottle and the tube should be changed at least once a week to reduce the risk of infection. For clarifications, contact your physiotherapist)

First be familiar with following breathing techniques

1. Breathing control

Breathing control helps to relax the airway. Patients should be in a relaxed position and try to keep their chest and shoulders relaxed. They should breathe in through their nose and breathe out through their mouth (better to breathe gently).

2. Deep Breathing exercises

Deep breathing exercises help to loosen secretions on the lungs. Clients have to take a long, slow and deep breath in through their nose and hold the air in their lungs for 3 seconds. Then, breathe out gently and relaxed, like a sigh.

3. Huffing

This is a maneuver used to move secretions. A huff is forced through an open mouth and throat instead of coughing. There are two types of huff.

•Medium Volume Huff - This helps to move secretions that are lower down in the airways. Take a normal-sized breath in and then an active, long breath out until one's lungs feel quite empty.

•High Volume Huff - This helps to move secretions in the upper airways. Take a deep breath in, open one's mouth wide and huff out quickly.

Now follow above techniques according to the order given below:

- Breathing control x 6 times
- Deep Breathing exercises x 3 times
- Breathing control x 6 times
- Deep Breathing exercises x 3 times
- Breathing control x 6 times
- Huff x 2times (Start with medium volume and then advice to try high volume)
- Cough out their sputum
- Repeat the whole cycle for about 10 minutes or until the chest feels clearer.

For further clarifications, the patient should contact his/her physiotherapist

7.3.6 Follow up care

If a patient's symptoms have not improved despite proper exercises, seek specialist opinion on further management.

Chapter 8

Chronic Kidney Diseases

8.1 Introduction

Chronic Kidney Disease (CKD) is a progressive disease with direct or indirect complications, where the glomerular filtration rate is less than 60ml/min/1.73m^2 and/or presence of evidence of kidney damage over at least three months. There is a severe reduction in nephron mass over a period resulting in uraemia. The early stages of the disease are asymptomatic, and usually, patients present in the late stages of the disease when symptoms appear. The typical early presenting symptoms (e.g. anorexia, nausea, vomiting, tiredness, lethargy) are generally non-specific and referable to the gastro-intestinal system, presumably due to the accumulation of uraemic toxins.

Table 8. 1 : Stages of chronic kidney disease

CKD stage	e-GFR
Stage 1	≥90*
Stage 2	60-89*
Stage 3a	45-59
Stage 3b	30-44
Stage 4	15-29
Stage 5	<15
Stage 5d	On renal replacement therapy (either haemodialysis or chronic ambulatory Peritoneal dialysis(CAPD))

*Proteinuria or histological evidence of kidney damage is required

8.2 Dietary recommendations for patients with Chronic Kidney Disease

Chronic kidney disease (CKD) causes a range of nutritional and metabolic abnormalities, and the severity of renal dysfunction determines the extent of these derangements. It is essential to understand the dietary principles, the available methods for assessing nutritional status, establishing patient-specific dietary needs and the prevention and treatment of potential or existing nutritional deficiencies. **The medical nutritional therapy should be individualized depending on the nutritional status and comorbid conditions of individual patients.**

Patients with CKD need a modified diet to reduce the burden on the impaired kidney to avoid fluid and electrolyte imbalance. Diet is modified depending on the clinical status, the stage of kidney disease and other comorbidities. They may need diet adjustments from time to time, under medical guidance.

It is reasonable to conduct a routine nutrition screening at least biannually with the intent of identifying patients at risk of malnutrition since low BMI has been identified as a predictor of higher mortality. The patient's appetite, history of dietary intake, body weight and body mass index, changes in body weight/BMI, biochemical data, and anthropometric measurements should be recorded. It is reasonable to assess factors beyond dietary intake such as medication use, knowledge, beliefs and attitudes for optimal dietary interventions.

Goals of Medical nutrition therapy in patients with CKD

- Maintain optimal nutritional status and prevent the loss of lean body mass
- Reduce the progression of chronic kidney disease and delay the need for renal replacement therapy.
- Reduce the toxic effects of excess ureamic toxins in the blood
- Reduce the risk of cardiovascular disease
- Minimize the risk of fluid overload and electrolyte disturbances.
- Reduce uremic symptoms in patients with end stage kidney disease who are only on medical management (conservative treatment)

8.2.1 Nutrition screening for Chronic Kidney Disease patients

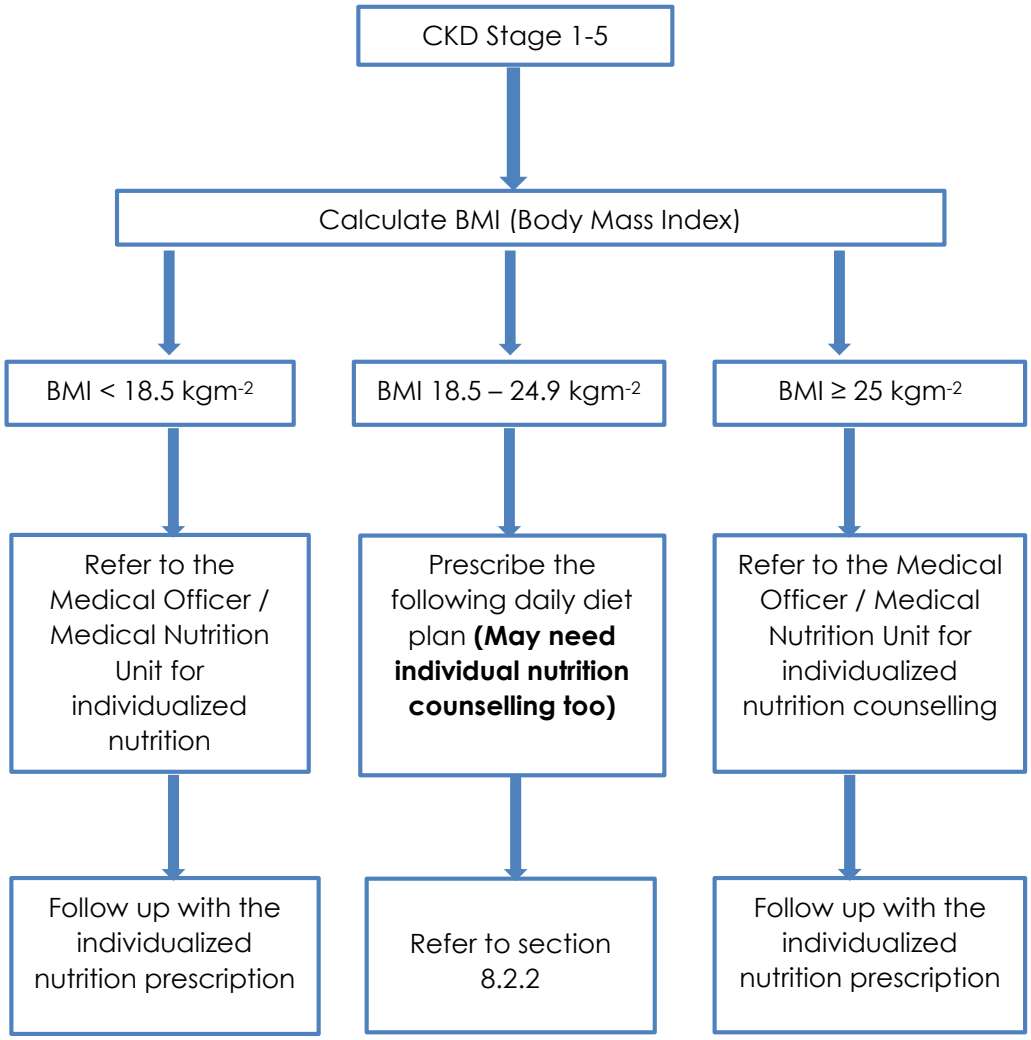


Figure 8. 1: Nutrition screening for patients with CKD

8.2.2 Dietary recommendations for patients with CKD stage 1, 2 and 3

- Patients with CKD stages 1, 2 and 3 can adapt the recommended regular diet for the adults (Table 8.2) unless specified by the Consultant Nephrologist
- **CKD Stage 4, 5 and 5d – dietary guideline:** These patients should preferably be managed by the specialist Clinical Nutritionist or a Medical Officer / Medical Nutrition Unit for individualized management plans and follow ups.

8.2.2 Dietary recommendation for patients with CKD stage 1, 2 and 3

Patients with CKD stages 1, 2 and 3 can adapt the recommended regular diet for the adults (Table 8.2) unless specified by the Consultant Nephrologist.

Table 8. 2: Daily recommended diet for an adult patient with CKD Stage 1-3 with normal nutritional status

Food group	Number of standard measures per day (To be distributed throughout the day)	1 serving	Choice of foods for 1 serving
Cereal/yam/starchy food	8 - 9	½ cup	½ cup parboiled rice / ½ cup of cooked noodles or pasta/1 slice of bread (50g)/ 2 – 3 string hoppers / 1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) 1 dosai (about 10cm in diameter) / ¾ cup of boiled corn / ½ cup jack or breadfruit/ 3 cm height 5cm diameter pittu / ½ cob of 15 cm size corn / ¾ cup corn
Pulses	2	1/2 cup or 3 tbs	3 tbs dhal / 3 tbs kadala parippu /3 tbs mung parippu/ ½ cup chickpeas / ½ cup cowpea / ½ cup green gram or 2 tbs soya meat
Fish / Poultry /meat	2-3 servings	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken /2 matchbox size beef /pork /mutton /1 matchbox size dry fish/10 – 20 sprats or 1 egg
Dairy products	1	1/2 cup	½ cup nonfat or full cream fresh milk /1 tbs milk powder / 1 cup yoghurt / ½ cup curd
Nuts and seeds	1	1 full tbs	1 full tbs Peanut / 5 full Cashew / 1 full tbs Pumpkin or Sunflower seeds / 1 Thala guli or 10 Kottang
Root vegetables/starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ sweet potato/ manioc/ other yams/ Carrot/ Beet/ Radish/ Nokol/ Kohila/ Lotus roots
Green Vegetables	1 ½	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd(Karavila)/ Thibbatu / Elabatu/ Lunu mal
Leafy vegetables	3	3 tbs	3tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ beet leaves/ Radish leaves/ Nokol leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves

Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/Cauliflower/ Ambarella/ Green mangoes
Fruits	1	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit)	Refer the table 3 below to select the fruits on medical advice
Coconut	1	2 tbs Grated coconut Or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut or 3 tbs gravy
Oil*	3	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Sugar	6	1 tsp	1 tsp Honey /1 tsp Treacle or thumb size piece of Jaggery
Water**	6-8	1 cup	
Other Beverages	2 -3	1 cup	1 cup Light plain tea/ coffee/ Herbal drinks (Belimal, Ranawara) /Coriander water
Salt***	½	level 1 tsp	

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon

All given food are edible portions, otherwise specified

*When choosing an oil, limit coconut oil and use more from choices provided in the table to improve the fat composition

**Restriction of fluid is not required. Fluid restrictions are implemented only in advanced CKD. If in doubt, refer to the specialized care to obtain advice on fluid intake.

*** 50% reduction of salt in this diet, compared to the normal diet

Dietary protein intake

In adults with non-diabetic CKD 3-5 who are metabolically stable, protein restriction (0.60 g /kg /day) with or without keto acid analogs, is recommended to reduce the risk of progression to end-stage renal disease (ESRD) or death. In diabetic CKD patients, a dietary protein intake of 0.6-0.8 g/kg body weight per day is recommended to maintain a stable nutritional status. Protein restriction has to be done under close medical supervision to prevent protein energy malnutrition.Because **of the high prevalence of protein energy malnutrition in diabetic and non-diabetic CKD patients in Sri Lanka, dietary protein restriction is generally not advised.**

Meanwhile, patients on regular haemodialysis or CAPD should be prescribed a higher dietary protein intake of 1.0-1.2 g/kg body weight per day to maintain a stable nutrition status and good glycemic control.

8.2.3 Categorization of food based on the Phosphate content

- Hyperphosphetaemia is generally uncommon and usually occurs in CKD stages 5 and 5d. Therefore, dietary phosphorus restriction should be implemented only if there is bio-chemical evidence of hyperphosphetaemia.
- If hyperphosphetaemia is observed, the total intake of phosphates should be limited to 800mg/day. Therefore select mainly from Low phosphate and Medium phosphate containing food items.

Table 8. 3 : Categorization of food according to the phosphate content

High phosphate containing food (> 100 mg/serving) e.g.	Medium phosphate containing food (50-100mg/serving) e.g.	Low phosphate containing food (<50mg/serving) e.g.
½ cup of cowpea/green gram	1 tbs of peanut	2 matchboxes size fish/ chicken
1 egg	½ cup of milk	1 egg white
1 egg Yolk	½ cup of red rice	3 tbs vegetables
1 tbs of sesame	2 matchboxes size tuna	½ cup white rice
2 tbs of soya meat	2 matchboxes size beef/pork	½ cup parboiled rice
3 tbs of thriposha		

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon
All given food are edible portions, otherwise specified

Foods with inorganic phosphates must be avoided. (Contains high phosphate level)
Eg: Processed meat (Sausages, meatballs, etc), carbonated beverages, cheese spreads, instant puddings and sauces.

8.2.4 Categorization of food based on the Potassium content and daily recommendation for patients with CKD

In adults with CKD 1-4, increasing fruit and vegetable intake may decrease body weight, blood pressure, and net acid production. These in turn may reduce the rate of decline of residual renal function. Hyperkalemia is mostly seen in advanced CKD (CKD5, CKD5d). Therefore, potassium restriction should only be done when there is biochemical evidence of hyperkalemia. The normal serum potassium is 3.5 to 5.5 mEq/L. When serum potassium is more than 5.5 mEq/L, dietary potassium restriction should be implemented. Persistent hyperkalemia needs urgent medical review.

Categorization of food based on the Potassium content is given in Table 8.4

Table 8. 4 : Potassium content of fruits and vegetables

High potassium (>200mg/100g of food) containing food e.g.	**Medium potassium (100-200mg/100g of food) containing food e.g.**	**Low potassium (<100mg/100g of food) containing food e.g.**
Vegetables		
½ cup beet	½ cup cabbage	½ cup eggplant (brinjal) 49.5g
½ cup broccoli	½ cup carrot	½ cup drumstick leaves 21g
½ cup potatoes	1 cup cucumber salad	½ cup leaks- bulb and lower
½ cup lotus root	½ cup okra	1 cup lettuce
½ cup pumpkin	½ cup onion	½ cup mushrooms
½ cup spinach	½ cup tomatoes	1 tbs chopped onion
½ cup sweet potatoes	½ cup bitter gourd	1 tbs garlic
½ cup radish		½ cup green beans
½ cup breadfruit		
Fruits		
1 small banana	1 medium apple	100 g jambola
2 - 3 Dates	100g of grapes	1 lime
1 small guava	½ cup mango	8 – 9 rambutan
½ cup jackfruit (*waraka*)	1 small pears	
½ cup cubed melon	1 slice pineapple	
½ Avocado		
1 orange		
1 piece of papaya		
1 cup passion fruit juice		
½ cup strawberry		

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon

All given food is edible portions, otherwise specified

8.2.5 Daily recommended intake of fruits and vegetables

Daily recommended intake of fruits and vegetables according to Table 8.4

Hyperkalaemia is generally uncommon in CKD stages 1-3. The chance of hyperkalemia is high in stages 5 and 5d. When there is biochemical evidence of hyperkaleaemia, the possible causes (e.g. drugs, diet, and constipation) should be explored.A low potassium diet should be implemented until hyperkalaemia resolves. After adjustment of contributory factors, patients may resume the usual diet.

Box 8.1: Options on choosing potassium containing food groups

Option 01	1. 1 serving from high potassium containing food group *and* 2. 1 serving from medium potassium containing food group *and* 3. 2 servings from low potassium containing food group
Option 02	1. 1 serving from medium potassium containing food group *and* 2. 3 servings from low potassium containing food group
Option 03	1. 3 – 4 servings from low potassium containing food group

General advice on how to reduce potassium from vegetables

- Peel and cut vegetables into small pieces.
- Wash vegetables with drinking water and put them in a large pot.
- Fill the pot with hot water (the quantity of water must be four to five times the volume of vegetables) and soak the vegetables for at least one hour.
- After soaking the vegetables, rinse them three times with warm water.
- Subsequently, boil the vegetables with extra water. Discard the water.
- Cook the boiled vegetables as desired.

8.2.5-Sodium intake, Blood pressure and volume status

Dietary sodium intake should be restricted to less than 100 mmol/d (or <2.3 g/d) to reduce proteinuria, achieve better volume control, blood pressure and more desirable body weight.

- ❖ Avoid food with high sodium content

Box 8.2 Common food items with high salt

Common food items with high salt
o Sauces o Sausages o Pickle / Chutney o Bacon/Ham o Meatballs o Dry fish o Salted nuts o Salted savories and chips o Salted biscuits o Soup Cubes o Fermented fish (Jaadi)

- Cottage cheese

- Do not serve salt and salty seasonings at the table
- Packaged food – Look for a traffic light guide for the selection of low sodium food. Get used to identify salt colour coding (high sodium-red, medium- amber and low sodium- green). Now color coding of food and beverages are mandatory in Sri Lanka.
- As a general guide, less than 5% DV of sodium per serving is considered low; 20% or more DV per serving is high.
- We need to compare various brands of the same food item until finding the one with the lowest sodium content since this varies from brand to brand.
- Dry fish should be soaked with boiled water or coconut water for ½ an hour, drain the water, wash again and then cook as desired.
- Use fresh meat rather than processed meat. Usually extra sodium is added during processing in products like Ham or Bacon.
- Use fresh fruits rather than canned and frozen fruits.
- We need to limit takeaway meals. Before dining out, contact the restaurant and request the dish be served without salt.
- Use herbs, garlic and pepper as seasonings as they are naturally low in salt and make the dishes delicious even without salt

8.2.6 Re-assessment and follow up

- Nutritional follow up should be individualized depending on the nutritional status, presence of dialysis or not, according to serum electrolyte levels, etc.
- In CKD patients, protein restriction starts after CKD stage 3b. Therefore, periodic medical nutrition follows up is recommended in these patients at least once in six months.
- ESKD patients with regular dialysis are more prone to both macro and micro-nutrient deficiency. So, frequent nutrition follows up is recommended accordingly.

Refer to the Medical Nutrition Unit for individualized nutrition counselling and follow-up whenever necessary

8.3 Physical activity and exercise recommendations for patients with Chronic Kidney Disease

The activity levels of CKD patients are markedly lower than those of healthy individuals. Anaemia, uremic myopathy, neuropathy, ongoing inflammatory response and other associated comorbidities like diabetes mellitus associated with CKD may lead to excessive fatigue among CKD patients, compared to individuals without CKD. Also, sarcopenia among these patients may lead to impaired proprioception and balance, resulting in falls. Therefore, engaging in physical activity will be beneficial for patients with CKD in several ways.

Benefits of physical activity on CKD patients are

- Delays in disease progression
- Helps to improve underlying comorbidities (e.g. diabetes, hypertension, overweight and obesity)
- Improves exercise capacities and activities of daily living
- Improves muscle strength and function
- Improves inflammation and oxidative stress

All CKD patients must be physically active and should be encouraged to engage in activities like walking, gardening, leisure activities, daily routines and cycling as they wish. They are also encouraged to make physical activities more pleasurable, practical and avoid a monotonous exercise schedule. Patients' tolerance for physical activity would depend on his/her previous state of physical activity level, and should be gradually increased according to tolerability. Refer to the 6 minutes' walk test (Figure 1.4) to assess the physical fitness of patients with CKD, if in doubt of fitness for exercises

8.3.1 Screening of patients with CKD for exercise prescription

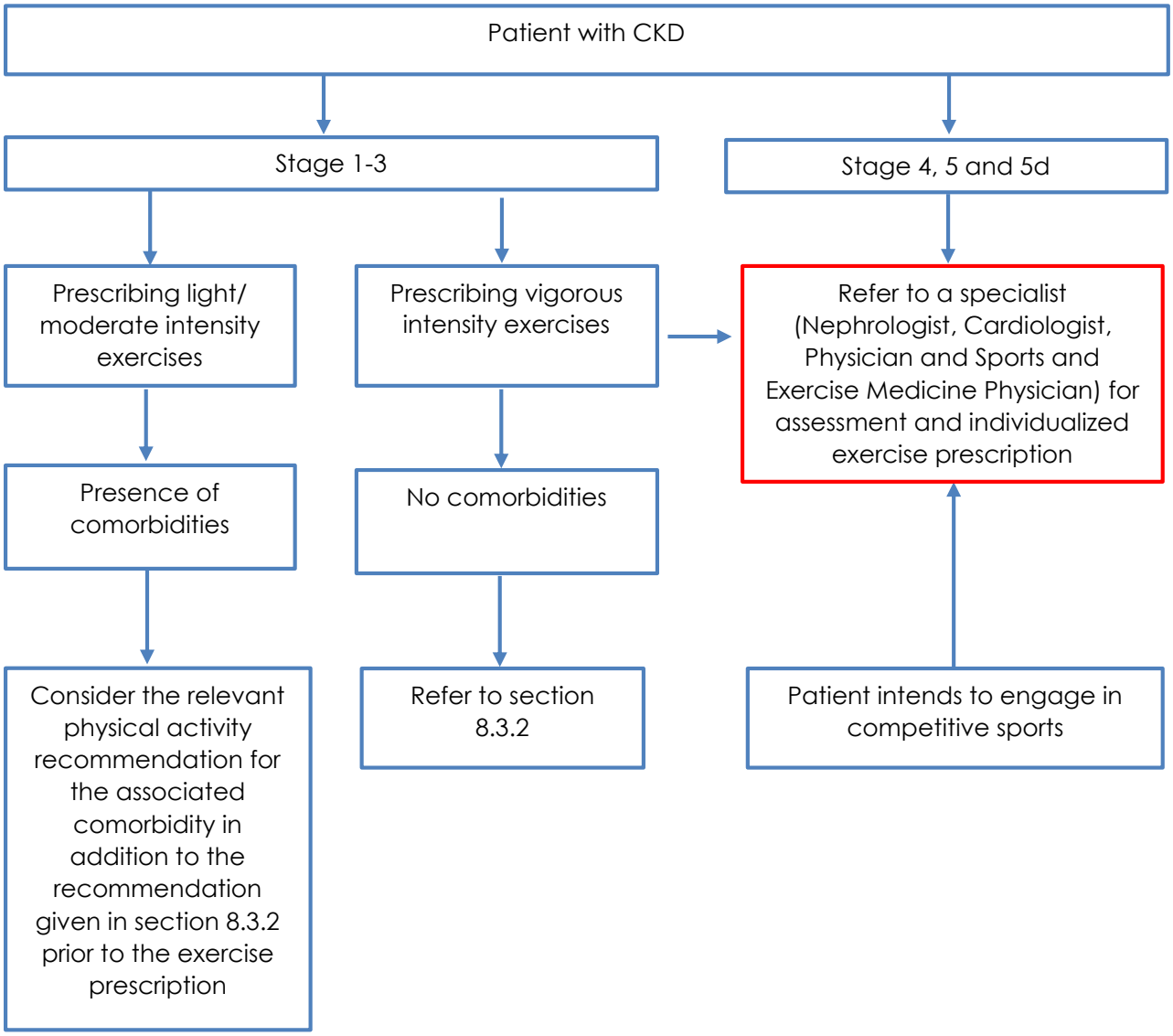


Figure 8. 2: Screening of patients with CKD for exercise prescription

Patient intends to engage in competitive sports should be referred to a specialist (Nephrologist, Cardiologist, Physician and Sports and exercise medicine physician) for assessment and individualized exercise prescription

Other considerations:

- **Fluid intake** should be according to the patients' thirst level unless any fluid restriction has been advised by the Consultant Nephrologist.
- Dietary supplements are **not** indicated unless specified
- Pre-physical activity **counselling is required** as patients with CKD may experience excessive fatigue, muscle soreness and joint pain at the beginning of the physical activity programme, which are usually short lived.
- **Home based** physical activity is recommended except in special cases opted by the specialist
- Patient should be advised to perform physical activities/exercises in **safe environment** and weather conditions preferably with an adult companion

8.3.2. Exercise recommendations

Table 8. 5 : Exercise recommendations for patients with CKD

❖ **Warm-up session:** warm up session of at least 5 minutes (e.g. stationery walking, dynamic stretching) before starting to exercise

Type of Exercise	Recommendation	Examples
Aerobic exercises	**Frequency:** At least 3 to 5 days per week. Recommendation is for a total of at least 150 minutes per week, which has to be achieved gradually, as tolerated. **Intensity:** Mild to moderate intensity Section 1.7.1.1 **Duration:** 20-40 mins. Start with low intensity depending on previous exercise tolerance. Depending on the recovery of muscle soreness, space out the days of exercise.	Walking, cycling, swimming, aquatic exercises, ball games (cricket, elle, volleyball) **Machine assisted:** Treadmill, stationary cycling, elliptical trainer
Strengthening exercises	**Frequency:** At least 2-3 sessions per week at least 48 hours apart to avoid excess muscle soreness. **Intensity and duration:** 20-30 min 1-4 sets, each of 8-12 repetitions. Should be done for 8-10 major muscles groups involving upper body, lower body, back, abdomen and core muscles Initiate with less number of repetitions and gradually increase up to the recommended level as the patient tolerates No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Exercises using own bodyweight:** Push-ups, half squat, lunges, wall/knee push-ups **With resistance bands, free-light weights and weight machines:** Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights
Flexibility exercises	**Frequency:** more than 2-3 days per week, can be combined with aerobic and strengthening exercises **Intensity:** To the point of mild discomfort or tightness **Time:** Hold for 10-30 seconds and release per stretch, repeat 3-4 times	Static stretching focusing on major joints and spine, yoga
Balance exercises *Balance training exercises are done to improve posture,	**Frequency -** 1-2 days a week	Single-leg stance with support, single leg stance without support, tandem walking, heel walking, tip toe walking, ball throwing in a single leg, clock reach and yoga.

balance, joint position sensation and coordination.		

- **Cool down:** cool down session of at least 5 min with static stretching exercises (not moving the body part while performing the stretch) should be done after each exercise session

8.3.3 Follow up care

Patients should be followed up closely for their compliance and need frequent motivational support. Volume and progression may need to be reviewed and reduced if the patient is not tolerating the current schedule. Specialist consultation may be needed with progressive disease and any complications or interventions done for CKD and need gradual escalating the frequency and time of exercises rather than intensity.

Chapter 9

Arthritis

9.1 Introduction

Arthritis is one of the leading causes of disability worldwide. Arthritis is characterized by pain, impaired physical function, fatigue and adverse changes in body composition including muscle loss and increased adiposity. There are over 100 rheumatological disorders. Arthritis is the most common manifestation of rheumatological diseases. There are two main types of arthritis, namely, osteoarthritis and inflammatory arthritis, however the most common two types of arthritis are osteoarthritis and rheumatoid arthritis.

Following are the commonly seen Rheumatological conditions.

1. Osteoarthritis
2. Inflammatory arthritis - Rheumatoid arthritis, Spondyloarthritis (including Ankylosing Spondylitis, Psoriatic arthritis) and JIA
3. Crystal arthritis- Gout
4. Connective tissue disorders - Lupus (SLE), Scleroderma, Sjogren Syndrome
5. Vasculitis - ANCA vasculitis, Takayasu arteritis, Giant cell arteritis (GCA)
6. Soft tissue Rheumatism - Frozen shoulder, Rotator cuff tendonitis, plantar fasciitis, Achilles Tendonitis
7. Pain Syndromes - Fibromyalgia, Chronic back pain & neck pain
8. Other less common conditions -Sarcoidosis, Behcet's disease

Although Sri Lankan statistics on arthritis are not available, it is well observed that the disease burden is gradually expanding with time in clinical practice. Optimal treatment of arthritis involves a multidisciplinary approach including pharmacological and non-pharmacological management. This guideline mainly focuses on dietary modifications and exercises as non-pharmacological measures, which will play a central role in arthritis treatment plan.

9.2 Dietary recommendations for patients with Arthritis

Proper nutrition and weight loss have been shown to be beneficial in the management of patients with arthritis.

9.2.1 Goals of Medical Nutrition Therapy

- Achieve and maintain optimum weight
- Support to prevent complications and exacerbations

9.2.2 Nutrition screening of a patient with arthritis

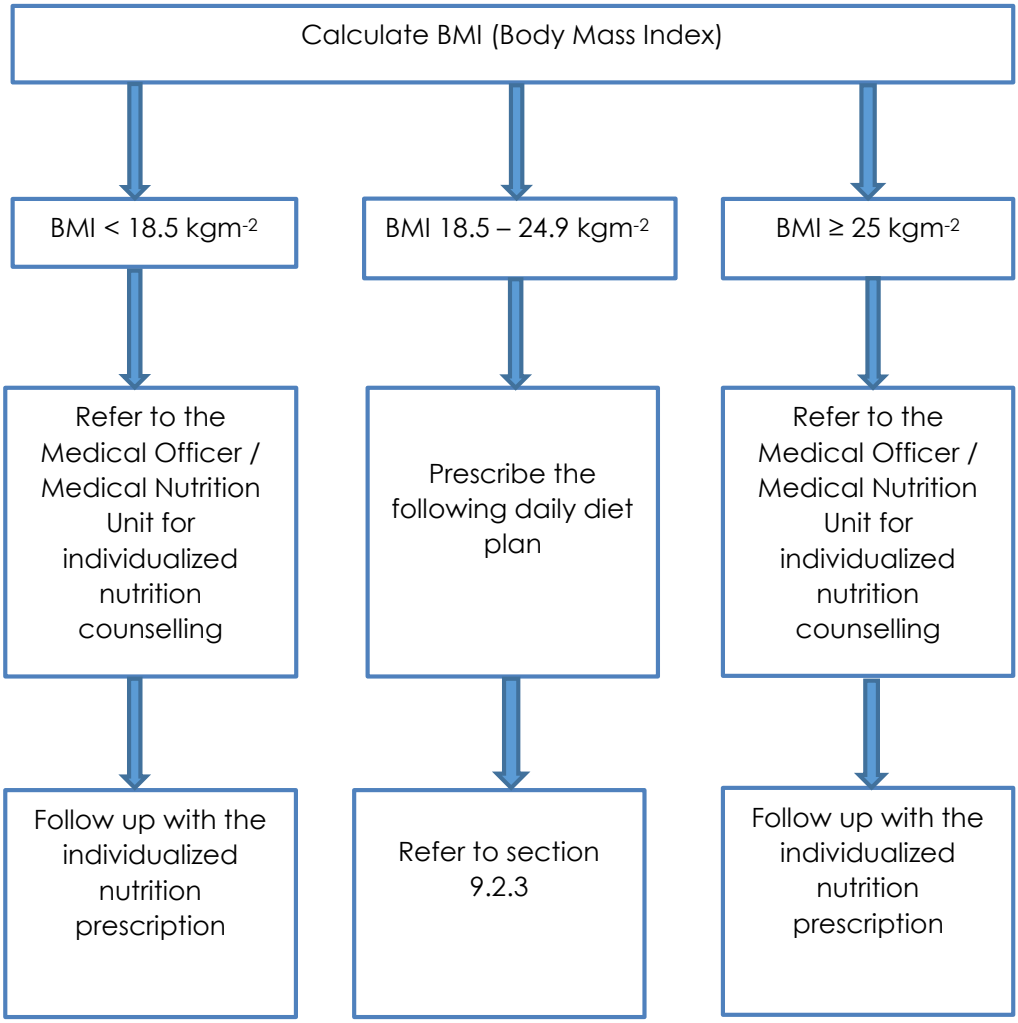


Figure 9. 1: Nutrition screening for a patient with arthritis

9.2.3 Daily recommended diet for a patient with arthritis

Table 9. 1: Daily recommended diet for a patient with arthritis

Food group	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equal to:
Cereal, yam and starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta ½ cup of boiled sweet potato / Manioc / Raja ala / other yams 1 slice of bread (50g) / 2 - 3 string hoppers/ 1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Paratha/Chapati (15cm diameter)/ 1 dosai (about 10cm in diameter)/ 3cm height 5cm diameter pittu / ¾ cup of boiled corn / ½ cup jack or breadfruit
Pulses	2	1/2 cup / 3 tbs	3 tbs dhal /3 tbs kadala parippu/ 3 tbs mung parippu/ ½ cup chickpeas / ½ cup cowpea / ½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	2 – 3	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken / 1 matchbox size dry fish/10 - 20 sprats /1 egg
Dairy/ sunflower seeds products	1	1/2 cup	½ cup nonfat or full cream fresh milk/ 1 tbs nonfat milk powder /1 yoghurt/1 yoghurt cup size curd, not regularly or 1 thin slice/1 wedge Cheddar cheese, not regularly
Nuts and seeds	½	1 full tbs	1 full tbs Peanut/ 5 full Cashew/1 full tbs pumpkin /1 Thala guli or 10 Kottang
Root vegetables/starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ sweet potato/ manioc/ other yams/ Carrot/ Beet/ Radish/ Knol Kohl / Kohila/ Lotus roots
Green Vegetables	1	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd (Karavila)/ Thibbatu / Elabatu/ Lunu mal/
Leafy vegetables	2	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kungkun/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/

			beet leaves/ Radish leaves/ Knol Kohl leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender Kohila leaves/ Onion leaves
Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Cauliflower/ Ambaralla/ Green mangoes
Fruits	2	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya / 1 small banana / ½ large guava / 1 medium pomegranate/ 1 medium mango/ ½ small jambola (grapefruit)/ ½ cup fresh pineapple/ 5 large or 10 small grapes / 1 cup cubed watermelon / 5-6 pieces of jackfruit (*waraka*)/ 1 medium wood apple / 1 small belli fruit / 10 – 15 jambu / 7-9 rambuttan / ½ cup anoda / 2 pieces of durian/ 2 medium passion fruits /10 fruits of nelli or lovi or veralu / 2 small mandarin / 1 small orange (6 cm across)/1 small apple (5 cm across) 5 strawberries / ½ cup mulberry or ½ medium avocado
Coconut	½	2 tbs Grated Coconut or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut or 3 tbs gravy
Oil*	1	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/ Rice bran oil
Water	6 – 8	1 cup/glass	
Other Beverages	2 -3	1 cup	1 cup Light plain tea/ Herbal drinks (Belimal, Ranawara) /Coriander water/King coconut / Coconut water

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon
All given food are edible portions, otherwise specified
*When choosing oil, take only 5 ml from coconut oil and use 10 ml from other oils to improve the fat composition

9.2.4 General Advice:

- Eat a variety of nutritious foods from all the food groups in appropriate amounts as given above to maintain optimal body weight and get all the nutrients.
- Cut down refined sugars (soft drinks, sweets with added sugar, etc.)
- Include less polished cereals.
- Adhering to the above pattern will enable us to get proteins from both animal and plant sources. Animal proteins – should include more from fish and reduce red meat.
- Include fish containing omega 3 fatty acids such as Sardines, Salaya, Hurulla, Kumbalawa, Salmon, Mackerel and Tuna
- Include a variety of vegetables and fruits to improve anti-inflammatory and antioxidant function

Carotene rich food:

1. Dark green leafy vegetables
   Spinach, carrot leaves, pumpkin leaves, sweet potato leaves, curry leaves, drumstick leaves (*murunga*), beet leaves, kathurumurunga, gendakola, kankun, mukunuwenna and any other dark green edible leaves

2. Fruits
   Mango, passion fruit, orange, papaya, and ambarella.

3. Other vegetables
   Carrot, tomato, yellow sweet potato, pumpkin

Vitamin C rich food:

- Foods rich in Vitamin C (100mg per portion)
- e.g. 1 small guava, 1 medium orange, ½ medium papaya, ½ medium jambola, ¼ cup raw drumstick leaves, ½ cup raw carrot leaves

Other food items:

- Turmeric
- Ginger
- Black/ Green tea
- Lovi/ Uguressa (Consume with the peel)

Consume calcium rich food and get the optimum Vitamin D

1. **Vitamin D**

   - Adequate exposure to sunlight (10 minutes per day between 11 am and 2 pm)
   - Oily fish (Sardines, Salaya, Hurulla, Kumbalawa, Salmon, Mackerel and Tuna)
   - Egg yolk

2. **Calcium rich food 250mg/portion**

Table 9. 2: Calcium rich food 250mg/portion

Food item	Portion size
Full cream milk	1 glass (200ml)
Yoghurt/ curd	200ml
Cheddar cheese	1 piece (30g)
Dried Kunissan	1 tablespoon
Gingerly seed	1 tablespoon
Soya beans	1 cup boiled (100g raw)

- Alcohol beverages and Tobacco smoking should be avoided

These are general guidelines. However, each patient may need alterations according to their other clinical conditions and nutritional status. Therefore, individualized nutrition management is essential.

9.2.5 Nutritional re-assessment and follow up

- After general dietary advice, patients who fail to maintain desirable BMI refer to the medical nutrition unit for a tailored low-calorie nutrition plan and follow-up.
- Patients diagnosed with Gout should need to continue with a low purine diet according to their acute attacks. Therefore, periodic follow up is required accordingly.

Refer to the Medical Nutrition Unit for individualized nutrition counselling and follow-up whenever necessary

9.3 Physical activity and exercise recommendations for a patient with arthritis

9.3.1 Benefits of regular exercises in arthritis

- Improves and maintains cardio-respiratory fitness
- Improves strength and endurance of muscles around joints
- Reduces pain and stiffness while improving the functional outcome
- Helps in weight control and achieving healthy body composition
- Reduces associated comorbidities such as cardiovascular disease, type 2 diabetes, metabolic syndrome and osteoporosis
- Improves mental health and quality of life

9.3.2 Screening of patients with arthritis for exercise prescription

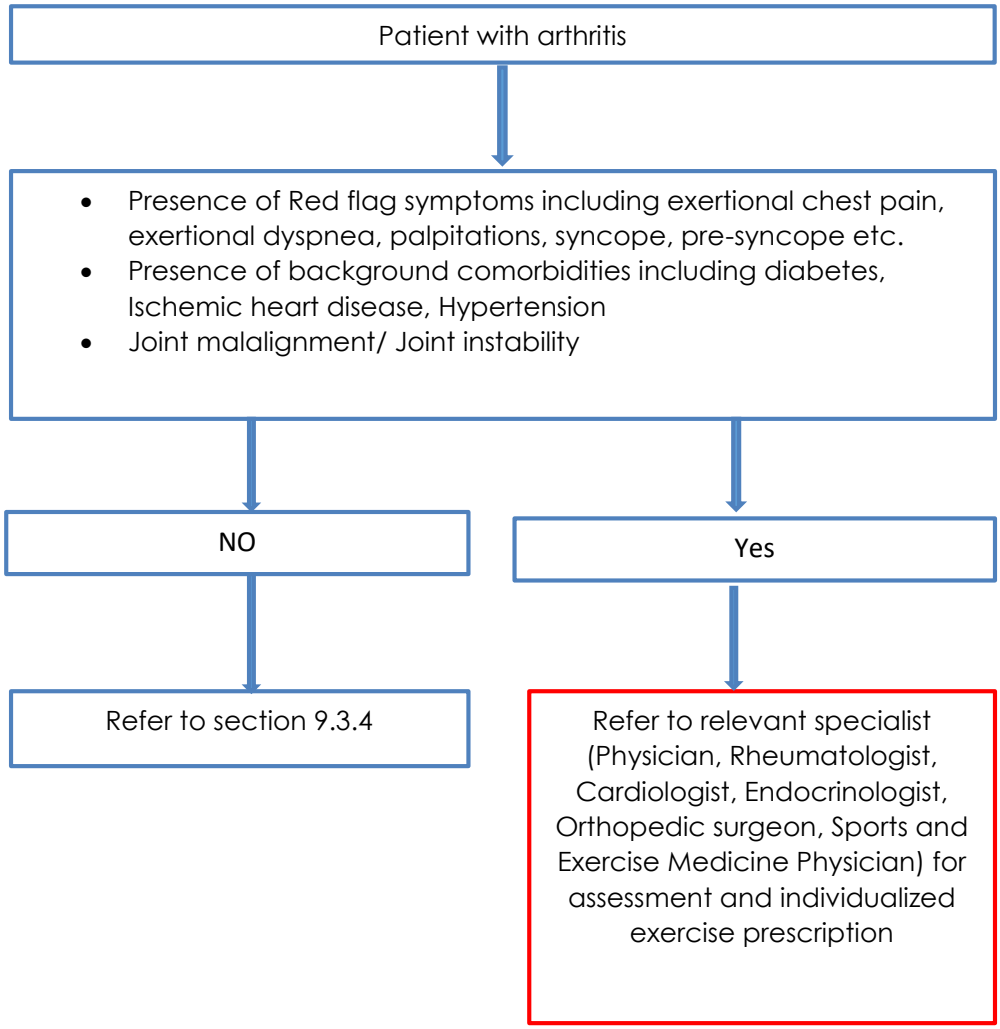


Figure 9.2: Screening of patients with arthritis for exercise prescription

9.3.3 General advice for individuals with arthritis for exercise

- Arthritic patients should be advised not to limit activities of daily living and to increase the same as much as possible.
- Non-structured daily physical activities should also be continued along with the exercises. e.g: gardening, sweeping, washing, cleaning etc.
- Exercise prescription should be tailor-made according to the disability and tolerance of the individual.
- Prolong warm-up and cool-down for 10 minutes is recommended.
- Exercise prescription should include all four types of exercises including aerobic, muscle strengthening, flexibility and balance exercises.
- Correct technique of all exercises should be adopted at all times.
- Exercises should be started with low intensity and progress slowly within the limits of tolerance.
- Exercises should be progressed in frequency and duration rather than increasing the intensity.
- All exercises should be done on flat, softer surfaces (e.g. grassed grounds) and avoid hard surfaces (e.g. cemented floors, tarred roads, pavements and treadmill). Wear well cushioned shoes if exercising on hard surfaces.
- Strenuous exercise activities to the affected joint should be avoided in acute flares, but gentle range of motion exercises can be continued.
- Some discomfort during and within two hours after the exercise is normal. However, if the pain and discomfort persist beyond two hours, stop the exercise regime temporarily and refer the patients to the specialist/ sports medicine unit to review the diagnosis and to modify the exercise regime.
- Individuals are encouraged to exercise during the time when the pain is least severe corresponding to the peak effects of pain relief medications.
- Do not limit exercises to affected joints. Do exercises to all the joints.
- For healthy weight reduction refer to obesity guidelines.

9.3.4 Exercise recommendations for patients diagnosed with arthritis

Table 9. 3: Exercise recommendations for patients diagnosed with arthritis

- **Warm-up session**: Engage in the same aerobic exercise in low intensity over 10 min for a prolonged warm-up.

Exercise type	Recommendations	Examples
Aerobic exercises	**Frequency**: At least 3-5 days/ week **Intensity**: Moderate intensity limited by symptoms **Duration**: Starting with 5-10 minutes per session. As the patient tolerates, gradually increase up to 20-30 min, targeting the recommended 150 min per week	**Individual/Group based**: walking, water aerobics, chair aerobics, walking in the water and aerobic dancing
Strengthening exercises	**Frequency**: At least 2-3 days per week, focusing on the major muscle groups. *Keep 24-48 hours gap for the same muscle group **Intensity**: Start with mild intensity and progress slowly within the level of individual tolerance **Duration**: Start with 1-2 sets, each of 6-10 repetitions, targeting 2-3 sets, each of 8-10 repetitions, involving all major muscle groups. No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises Individuals with high pain levels may comfortably begin with simple exercises such as contracting the muscle without joint movements (isometric exercises) and may progress to exercises of muscle contractions with joint movements (isotonic exercises), as they become stronger and comfortable. Isometric exercises: hold each contraction for 10-30 sec; 1-3 sets each of 6 to 10 repetitions Isotonic exercises: 1-3 sets each of 10-15 repetitions.	**Lower limb muscle strengthening exercises:** Isometric quadriceps strengthening, seated leg extension, calf raises, Vastus medialis oblique strengthening, Side lying leg raises **Core strengthening muscle exercise:** modified planking, both leg glute bridges, back extensions, superman stretch
Flexibility exercises **(**To reduce stiffness and avoid negative effects of arthritis on the joints)	**Frequency**: Preferably daily **Intensity**: Move through the range of motion (ROM) of the joint until you feel tightness / stretch without pain.Progress ROM of each exercise when there is a very little or no joint pain. **Duration**: Hold each static stretch for 10-30 sec. and/or dynamic stretching; up to 6-10 repetitions. Include flexibility exercises for 10 min per each exercise session	Static neck stretches, Quadriceps stretch, Hamstring stretch, Low back extension, Cat-cow pose and Superman stretch, Yoga, Tai chi. **For shoulder adhesive capsulitis:** pendulum exercise, wand exercise, wall climbing, towel stretch, finger walking

Balance exercises (To improve posture, balance, joint position sensation and coordination)	**Frequency:** At least 3 days per week **Intensity:** To challenge balance safety **Duration:** At least 10 min per session	Single leg stance with support, single leg stance without support, tandem walking, heel walking, yoga, clock reach exercise and ball throwing on a single leg

- **Cool-down session:** prolonged cool down session of 10 min with static stretching exercises (not moving the body part while performing the stretch) and/or with low intensity aerobic exercises.

9.3.5 Issues associated with arthritis challenging regular exercises

- Altered joint anatomy and biomechanics
- Joint instability
- Impaired strength and endurance of muscles around affected joints
- Increased truncal adiposity
- Adverse changes in body composition
- Risk of accelerated atherosclerosis
- Impaired cardio-respiratory fitness (CRF)
- Low mood due to chronic pain and disability

9.3.6 Possible exercise modalities

9.3.6.1 Group based activities

Walking

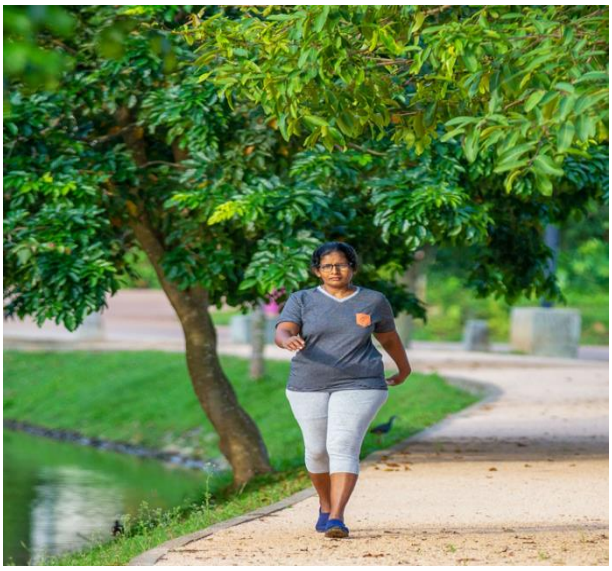


Figure 9. 3: Walking

Walking in the water

Figure 9. 4: Walking in the water

https://creakyjoints.org/diet-exercise/water-exercises-for-arthritis/

Water in the water

- In water that's about waist-high, walk across the pool swinging your arms as you do when walking on land. Avoid walking on your tiptoes, and keep your back straight. Tighten your abdominal muscles to avoid leaning too far forward or to the side.
- Walk with a long stride

- Press into your heel first before rolling your weight onto your toes.https://www.mayoclinic.org/healthy-lifestyle/fitness/multimedia/aquatic-exercise/sls-2007673

Chair aerobic

Figure 9. 5: Chair aerobics

Aerobic dancing

Figure 9. 6: Aerobic dancing

Water aerobics

- Best done in a group fitness class setting with a trained professional teaching for about 30min to an hour.
- Water aerobics usually focus on aerobic endurance, resistance training, and creating an enjoyable atmosphere with background music.
- Immerse in the water up to waist height.
- Move body parts rhythmically with the music. Start low and progress slowly to warm up the body for about 5minutes.
- Perform 6-8 repetitions of one exercise.
- Focus main muscles in the upper limbs, lower limbs and the core.
- Resistance of the water and buoyancy also add resistance to the exercise.
- Once the individual is comfortable with exercises, low weight dumbbells also can be used.
- Slow down the exercise intensity during the last 5-10 min.
- Finish the workout with stretching exercises for another 5 min

Chair aerobics, water aerobics and aerobic dancing need to be taught by an experienced person and then the individuals can continue on their own.

9.3.6.2 Individual based activities

Following exercises need to be taught by an experienced individual and initial few sessions should be done under supervision and thereafter the individual can perform on his/ her own even at home.

9.3.6.2.1 For knee OA

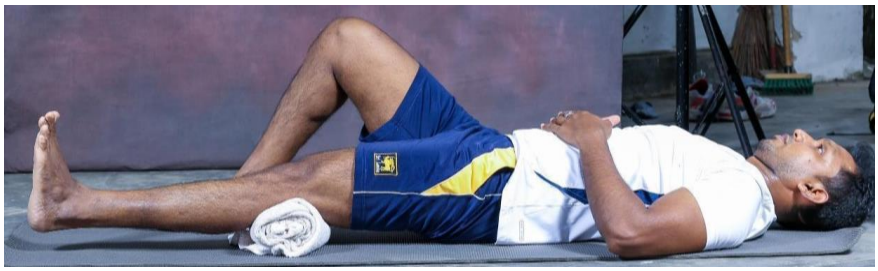


Figure 9.7: Isometric quadriceps strengthening

Keep a rolled towel under the knee and press the knee against the floor for about 10 sec and then relax, repeat for 6-10 reps. Increase the duration according to the tolerance level up to maximum of 30 sec

Figure 9. 8: Calf raises

Raise heels, hold for 10-30 sec and slowly lower the legs. Perform 6-10 reps.

Figure 9. 9: Seated leg extension

Raise the leg off the ground. Hold for 10-30 sec and then slowly put it down. Perform 6-10 reps to each leg. (Gradually you can apply a resistance with a 500g sand bag at the ankle and repeat the exercise.

Supine leg raises with the foot in external rotation (Vastus Medialis Oblique strengthening)

Figure 9. 10: Supine leg raises with the foot in external rotation (Vastus Medialis Oblique strengthening)

Raise the leg 10-20 degrees off the ground with the foot in external rotation. Hold for 10-30 sec and then slowly lower the leg. Perform 6-10 reps to each leg.

Figure 9. 11: Side lying leg raises

Figure 9.12: Both leg glute bridges

Side lying raises: Raise the leg off the ground and then slowly put it down. No need to hold. Perform 10-12 reps to each leg.

Both leg gluteal bridges: Hold this position for10- 30sec and then lower the body down. Repeat 4-5 times. Gradually increase the holding duration to 1 min.

9.3.6.2.2 For mechanical lower back pain (Core strengthening exercises)

Figure 9.13: Modified plank

Hold this position for10- 30sec and then lower the body down. Repeat 4-5 times.

Figure 9.14 : Back extension

Lift the torso up by keeping extended elbow on the floor. Hold the position for 10-30 sec and slowly come down. Repeat 4-5 times

Figure 9.15: Superman stretch

Lift the torso and lower body together off the ground, hold for 10-30 sec and slowly relax. Repeat 4-5 times.

9.3.6.2.3 For shoulder adhesive capsulitis

Figure 9.16: Pendulum exercise

Swing the arm in a small circle about a foot in diameter. Perform 10 revolutions in each direction, once a day. The diameter of the swing can be increased gradually within the comfortable range. When the patient is ready for more, the stretch can be increased by holding a light weight (water filled 500ml bottle) in the swinging arm.

Figure 9. 17: Towel stretch

Perform this exercise 10-20 times daily

Figure 9.18: Finger walking

Finger walking height can be increases gradually without forcing. Perform 10-20 times a day.

Finger walking

9.3.5.2.4 Balance training exercises

Figure 9. 19: Single leg stance with support

Hold this position for 10-30 sec. Repeat with the other leg. Repeat 5-6 times in each leg.

Figure 9. 20: Single leg stance without support

Hold this position for 10-30 sec. Repeat with the other leg. Repeat 5-6 times in each leg

Figure 9. 21: Clock reach exercise

Stand on the left leg holding a chair with the left hand. Visualize a clock in front. Bring the right arm to the 12, 3 and 6 O' clock positions. Again, come back to the 3 and 12 O' clock position. Perform this 5-6 times. Repeat with the other leg.

Figure 9. 22: Ball throwing on a single leg

Stand on one leg and throw the ball 5-6 times. Repeat with the other leg

9.3.7 Follow up care

Follow the patient up for one month. Assess the compliance of the exercise schedule, barriers and for any flare up of the disease. Direct the patient for the Consultant Rheumatologist for any flare ups. Identify and address barriers to continue the schedule. If the patient has returned to the old stage of the behavior cycle, counsel and motivate him for a behavior change.

If the patient is successfully continuing the recommended exercise schedule, reward him and help gradual progression of the exercise regimen.

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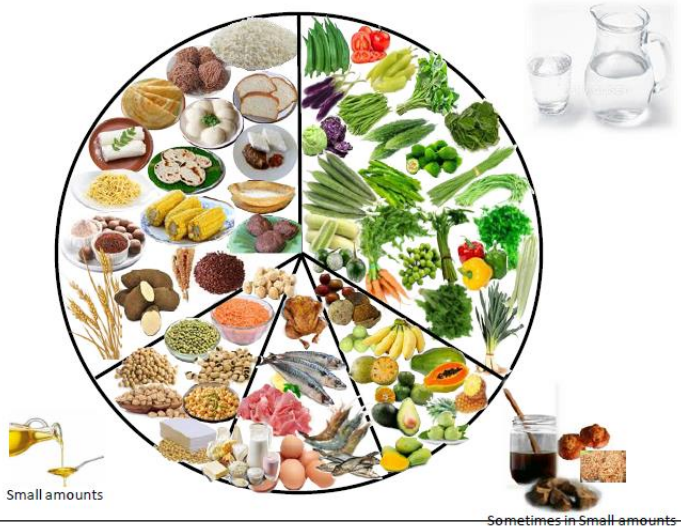
Annexures

Annexure 1

Dietary recommendation for a healthy sedentary person



Pictorial representation of the daily dietary recommendation for a healthy sedentary individual

The food model shown as the plate food model in the figure provides basic nutritional information and the healthy eating concept of the daily dietary recommendation for a healthy sedentary individual.

Carbohydrate intake should come predominantly from rice, bread, rice and wheat flour preparations, cereals, pulses, fruits, vegetables and dairy foods. Protein intake should come from fish, eggs, dried fish, dairy products, poultry, meat and pulses. Vitamins and minerals should come predominantly from vegetables and fruits. Fat intake should come from coconut, coconut milk, and oil used in food preparations and small quantities from meat and dairy. Sugar and sweets are used only sometimes and in small quantities as discretionary calories, not exceeding 6 teaspoons full per day. Drinking a minimum of 1500 – 2000ml of water is a part of the food guide.

The table given below provides the daily dietary recommendation for an apparently healthy sedentary individual with an average weight of 50kg

Daily dietary recommendation for a healthy sedentary person with an average weight of 50kg.

Food group	Number of servings per day (To be distributed throughout the day)	1 serving size	1 serving size equal to:
Cereal/yam/Starchy food	6	½ cup	½ cup rice / ½ cup of cooked noodles or pasta /½ cup of boiled sweet potato / Manioc / Raja ala / other yam/1 slice of bread (50g)/ 2 - 3 string hoppers / 1 hopper / ½ pol roti (about 10cm diameter and 0.5cm thick) / ½ Parata/Chapati (15 cm diameter)/ 1 dosai (about 10cm in diameter)/¾ cup of boiled corn / ½ cup jack or breadfruit / 3 cm height 5cm diameter pittu
Pulses	2	1/2 cup / 3 tbs	3 tbs dhal / 3 tbs kadala parippu / 3 tbs mung parippu / ½ cup chickpeas/½ cup cowpea /½ cup green gram / 2 tbs soya meat
Fish / Poultry /meat / Egg	2 – 3	30 g (Size of Two matchboxes)	2 matchbox size fish / 2 matchbox size chicken / 2 matchbox size beef or pork or mutton /1 matchbox size dry fish or 10 - 20 sprats / 1 egg
Milk and dairy products	1	1/2 cup	½ cup nonfat or full cream fresh milk/ 1 tbs Milk powder /1 cup Yoghurt/ ½ cup Curd
Nuts and seeds	1	1 full tbs	1 full tbs Peanut / 5 full Cashew / 1 full tbs pumpkin seeds or sunflower seeds/ 1 Thalaguli / 10 Kottang
Root vegetables / starchy vegetables	1	3 tbs	3 tbs Ash plantain / Pumpkin/ Breadfruit/ Jackfruit/ Potato/ Sweet potato/ Manioc/ other yams/ Carrot/ Beet/ Radish/ Knol khol/ Kohila/ Lotus roots
Green Vegetables	1	3 tbs	3 tbs Beans/ Murunga/ Wetakolu/ Pathola/ Dambala/ Bitter gourd(Karavila)/ Thibbatu / Elabatu/ Lunu mal
Leafy vegetables	2	3 tbs	3 tbs Gotukola/ Kathurumurunga/ Mukunuwenna/ Spinach/ Kangkung/ Anguna/ Thembu/ Sarana/ Thampala/ Murunga leaves/ Pumpkin leaves/ Carrot leaves/ Beet

			leaves/ Radish leaves/ Knol khol leaves/ Cabbage leaves/ Passion leaves/ Manioc leaves/ Tender kohila leaves/ Onion leaves
Other vegetables	1	3 tbs	3 tbs Brinjal/ Cucumber/ Capsicum/ Tomato/ Keselmuwa/ Cauliflower/ Ambarella/ Green mangoes
Fruits	2	1small (100g) or ½ cup of fresh cut fruit ½ cup unsweetened fruit juice 1 ½ tbs of dried fruit	1 cup cubed papaya /1 small banana / ½ large guava/ 1 medium pomegranate/ 1 medium mango / ½ small jambola (grapefruit)/½ cup fresh pineapple/5 large or 10 small grapes / 1 cup cubed watermelon /5-6 pieces of jackfruit /1 medium wood apple/1 small belli fruit /2 medium ambarella / 10 – 15 jambu/7-9 rambutan /½ cup anoda /2 pieces of durian / 2 medium passion fruits / 10 fruits of nelli or lovi or veralu 2 small mandarin /1 small orange (6 cm across)/ 1 small apple (5 cm across) / 5 strawberries / ½ cup mulberry / medium avocado
Coconut	1	2 tbs Grated coconut Or ½ cup Coconut milk	½ cup of coconut milk / 2 tbs coconut /3 tbs gravy
Oil*	1	1 tbs (15 ml)	1 tbs Coconut oil/ Olive oil/ Sesame oil/ Soya oil/ Sunflower oil/ Rice Bran oil
Sugar	6	1 tsp	1 tsp Honey / 1 tsp Treacle or thumb size piece of Jaggery
Water	6 – 8	1 cup	
Other Beverages	2 -3	1 cup	1 cup Light plain tea/ Herbal drinks (Belimal, Ranawara) /Coriander water/ King coconut / Coconut water
Miscellaneous	1		1 -2 scoops of Ice cream / 1 small donut / 1 matchbox size musket / 1 tbs boondi / 1 – 2 sweet biscuits / 1 thin slice (5cm square) cake /1 sweetmeat (Kevum, athirasa, Aluva, pani walalu etc.)
Salt	1 level tsp per day		

1 cup – 200 ml cup, tbs = tablespoon, tsp = teaspoon
All given food is edible portions, otherwise specified
*When choosing an oil, limit coconut oil and use more from other oil to improve the fat composition

Annexure 11

Physical Activity Recommendations for apparently healthy sedentary adult

- **Warm up session:** warm up session of 5 minutes [e.g. light jogging, dynamic stretching (moving the body part while performing the stretch)

Aerobic exercises*	**Frequency, duration and intensity:** Total of minimum **150 minutes of moderate-intensity** aerobic exercises should be done **throughout the week**. Or At least **75 minutes vigorous-intensity** exercises should be done **throughout the week**. Or An **equivalent combination** of moderate and vigorous intensity activity **throughout the week**. There **should not be** more than 2 consecutive rest days * The reason for not skipping more than two days is that the health benefits induced by the acute exercise bout lasts only for about 72 hours.	Walking, jogging, cycling (flat), swimming [rate of perceived exertion (RPE 3-5)], treadmill (moderate: 5km/hr) **Vigorous intensity aerobic exercises:** Running, cycling (uphill), swimming (RPE > 5), Treadmill (7 km/hr)
Strengthening Exercises*	**Frequency and duration:** Should be done focusing on **major muscle groups;** on **at least 2-3 non-consecutive days per week**; of **moderate intensity** **Intensity:** **Moderate intensity** – Tolerable weight that allows to perform 12-15 repetitions without fatigue. **Vigorous intensity -** higher weight that allows to perform 6-8 repetitions No Valsalva manoeuver (forced expiration against a closed glottis) or straining should be done while performing strengthening exercises	**Using own body weight**: squats, push-ups, lunges, calf raises, planks, bridges **Free weights, resistance bands and machines**: Start with light weights such as small dumb bells weighing 1kg, 2kg, 5kg, 10kg and progress to higher free weights or machine assisted weights. *Improvised weights such as bottles filled with water or sand, sand bags also can be used if facilities are not available to use standard free weights.
Flexibility exercises*	**Frequency and duration:** At least **2-3 days per week**, preferably on daily basis; stretching up to the point of mild discomfort (point of stretch), hold the stretch for 15-30 sec, 4 or more repetitions per each stretch	Static and dynamic stretching focusing major joints and spine
Balance exercises* (Balance exercises are done to improve posture, balance, joint position sensation and coordination)	**Frequency:** 3 or more days per week	Single-leg stance with support, single leg stance without support, tandem walking, heel walking, tip toe walking, ball throwing in a single leg, clock reach and yoga

*Images of common types of exercises are given in Annex III

- **Cool down session:** cool down session of 5 minutes. E.g. light jogging and static stretching (not moving the body part while performing the stretch).

Annexure III

Demonstration of various type of exercises

Neck stretching

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Shoulder stretching


Chest Stretch



Core muscle stretch


Leg stretching

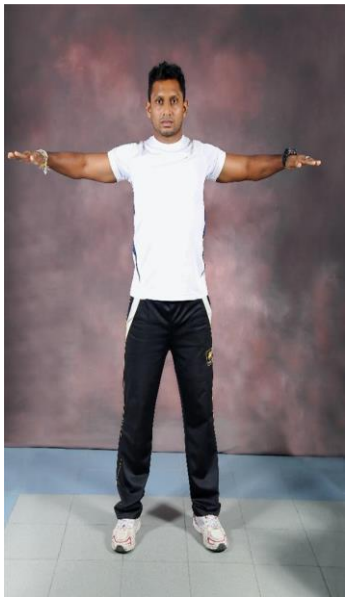



Proprioceptive neuromuscular facilitation (PNF) stretch




Dynamic stretching exercise

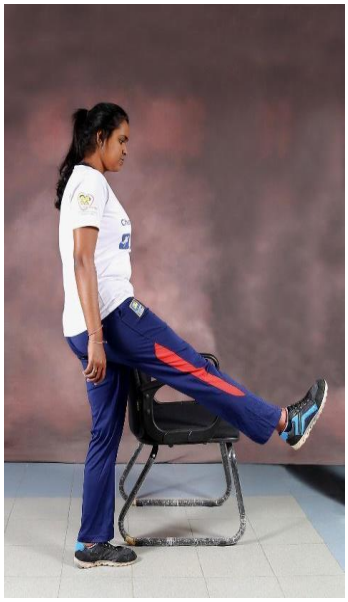
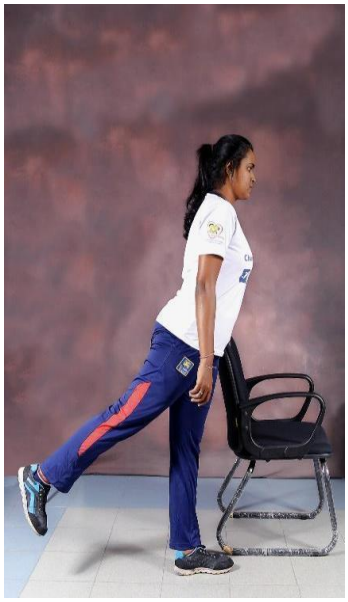
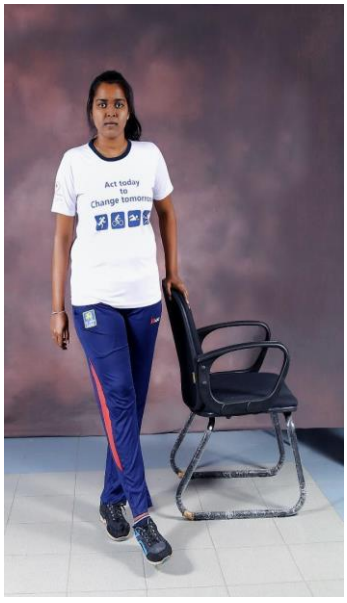
Upper Body



Core Muscle

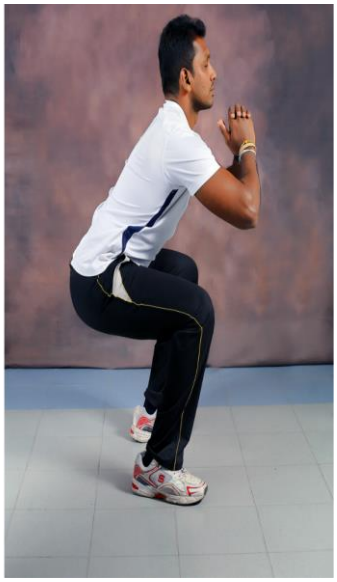



Lower body

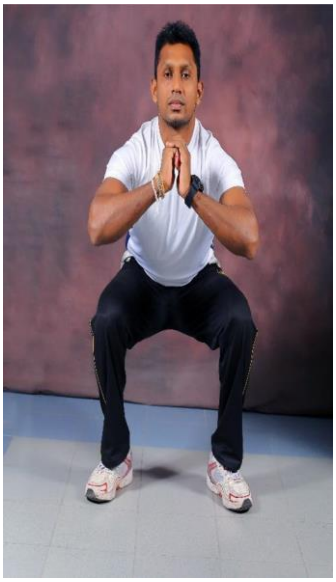






Strengthening or Resistance Exercise images

Half squat lateral view



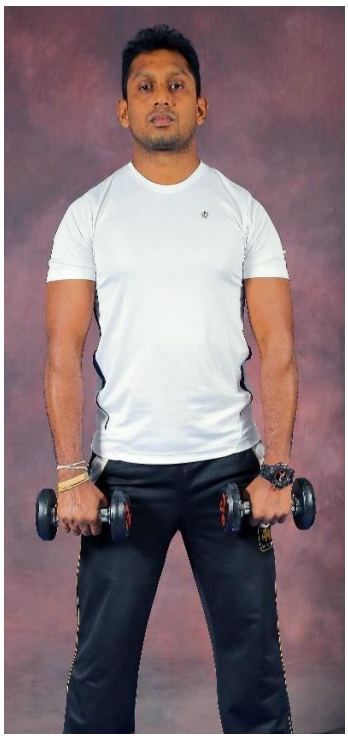
Half squat front



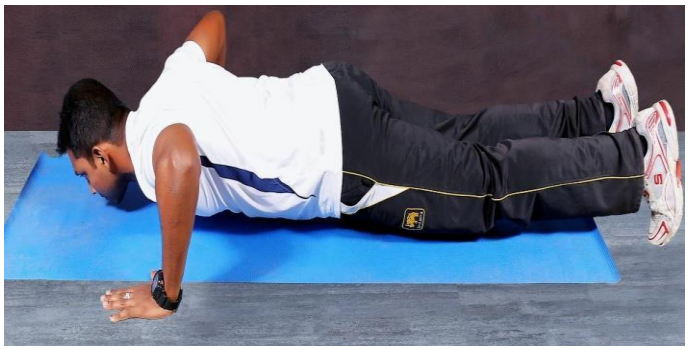
Seated squat

Front lunges

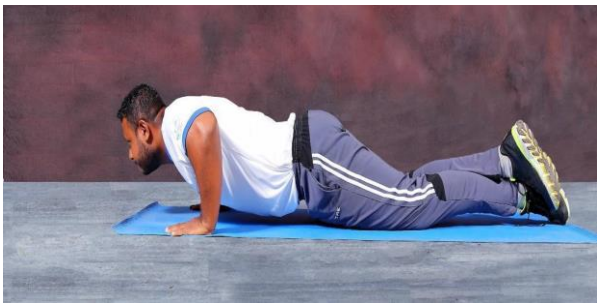
Dead lift

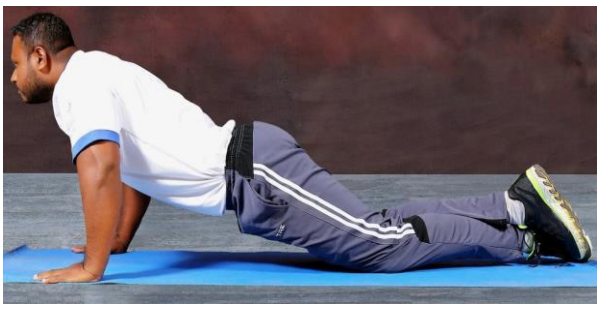


Push Up

Knee Push Up





Shoulder



Wall push up

Front raises

Lateral raises

One arm rowing

Bent over rowing

Plank

Side plank

Bird dog

Superman

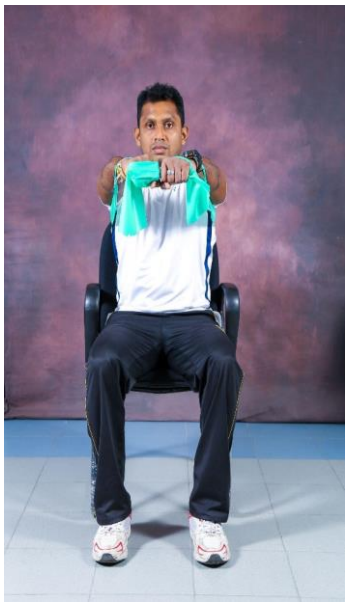
Crunches

Sit up

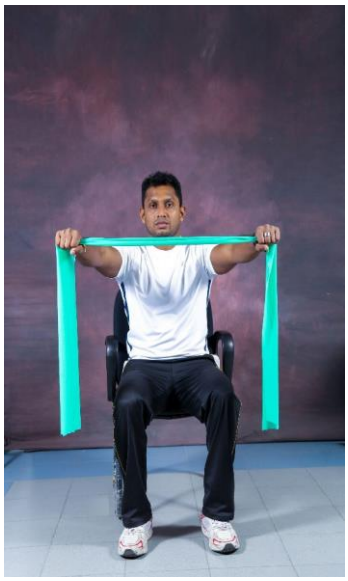
Straight leg raise

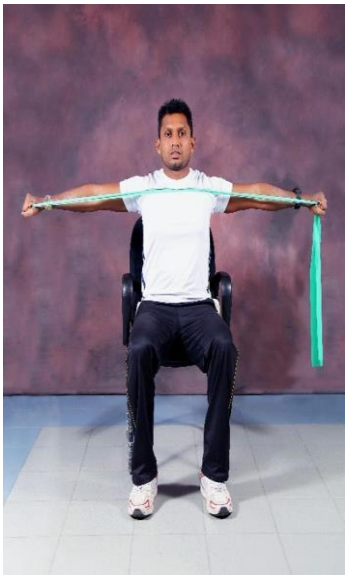
Thera band exercises

Seated chest press

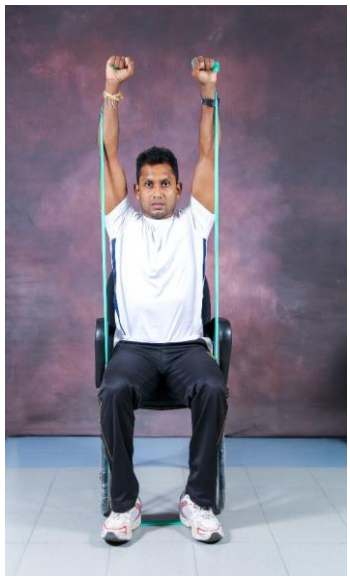


Seated shoulder pull back





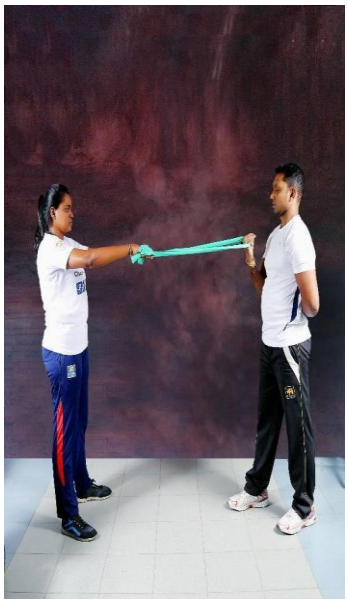
Seated shoulder press



Seated lateral raise

Standing- lateral pull down






Standing shoulder shrug

Leg extension

Hip abduction

Hip adduction

Hip extension

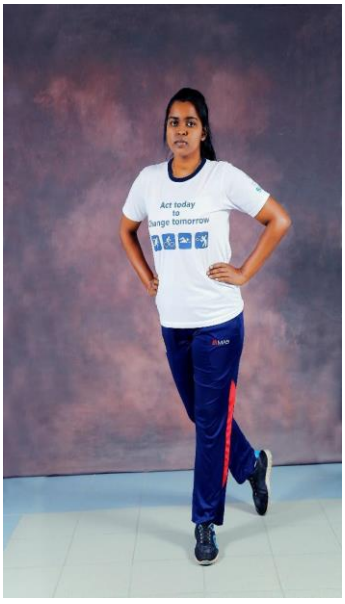
Ankle dorsi/plantar flexion

Balance and coordination exercises image

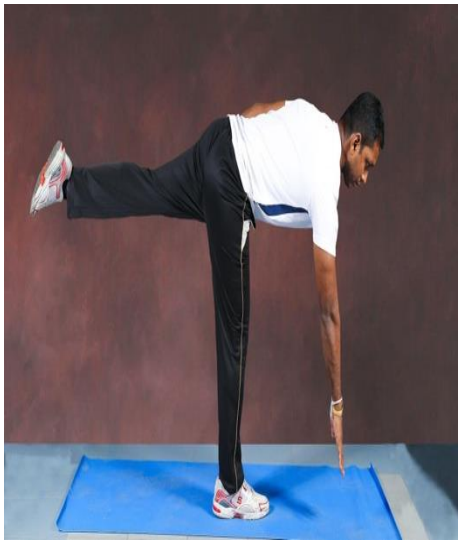
Chair base- knee/hip flexion

Without chair- knee/hip flexion

Clock reach



Single leg arabesque



Type of resistant exercises to the different body parts

Chest

- Modified push up
- Wall push-ups
- Push-up

Shoulder and arm

- Bodyweight shoulder press
- Seated Thera band
- Bench triceps

Back

- Contra-lateral limb raise
- Bird-dog exercises
- Thera band reverse fly

Abdomen

- Basic crunch
- Leg pull-in
- Front plank

Hip

- Butt-lift bridge
- Side lying hip abduction
- Hold 15-30 seconds 6-12 reps with 20 seconds rest

Thigh

- Lunge
- Theraband squat
- Sated elastic band leg press

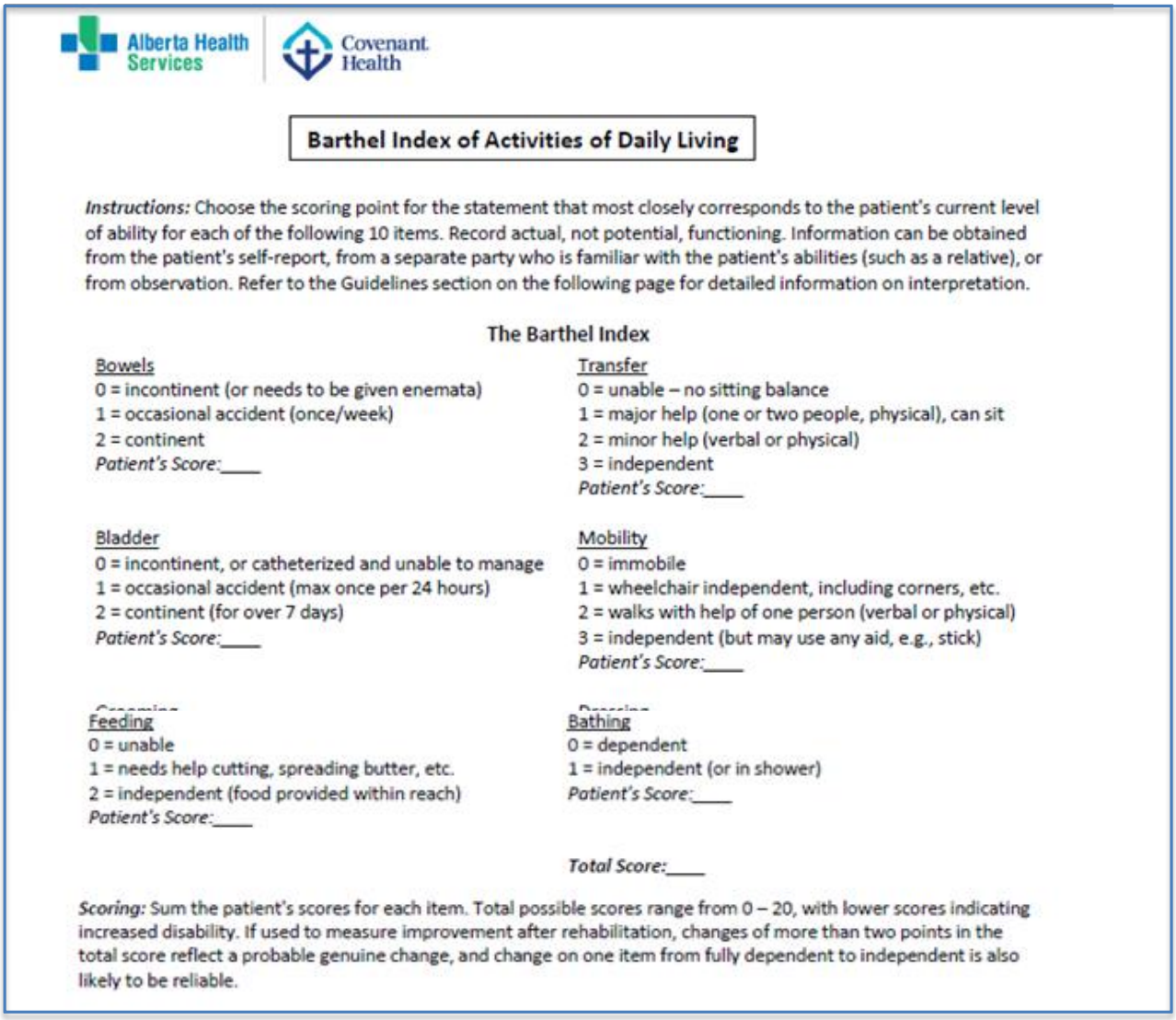
Balance training exercises

- Single leg stance
- Single leg stance with arm elevation
- Heel to toe walk
- Clock reach
- Marching in place
- Toe lifts

Calf stretch

Annexure IV

Barthel index



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Barthel Index of Activities of Daily Living

Instructions: Choose the scoring point for the statement that most closely corresponds to the patient's current level of ability for each of the following 10 items. Record actual, not potential, functioning. Information can be obtained from the patient's self-report, from a separate party who is familiar with the patient's abilities (such as a relative), or from observation. Refer to the Guidelines section on the following page for detailed information on interpretation.

The Barthel Index

Bowels
0 = incontinent (or needs to be given enemata)
1 = occasional accident (once/week)
2 = continent
*Patient's Score:*____

Bladder
0 = incontinent, or catheterized and unable to manage
1 = occasional accident (max once per 24 hours)
2 = continent (for over 7 days)
*Patient's Score:*____

Feeding
0 = unable
1 = needs help cutting, spreading butter, etc.
2 = independent (food provided within reach)
*Patient's Score:*____

Transfer
0 = unable – no sitting balance
1 = major help (one or two people, physical), can sit
2 = minor help (verbal or physical)
3 = independent
*Patient's Score:*____

Mobility
0 = immobile
1 = wheelchair independent, including corners, etc.
2 = walks with help of one person (verbal or physical)
3 = independent (but may use any aid, e.g., stick)
*Patient's Score:*____

Bathing
0 = dependent
1 = independent (or in shower)
*Patient's Score:*____

Total Score:____

Scoring: Sum the patient's scores for each item. Total possible scores range from 0 – 20, with lower scores indicating increased disability. If used to measure improvement after rehabilitation, changes of more than two points in the total score reflect a probable genuine change, and change on one item from fully dependent to independent is also likely to be reliable.

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Guidelines for the Barthel Index of Activities of Daily Living

General

- The index should be used as a record of what a patient *does*, NOT as a record of what a patient *could do*.
- The main aim is to establish degree of independence from any help, physical or verbal, however minor and for whatever reason.
- The need for supervision renders the patient not independent.
- A patient's performance should be established using the best available evidence. Asking the patient, friends/relatives, and nurses will be the usual source, but direct observation and common sense are also important. However, direct testing is not needed.
- Usually the performance over the preceding 24 – 48 hours is important, but occasionally longer periods will be relevant.
- Unconscious patients should score '0' throughout, even if not yet incontinent.
- Middle categories imply that the patient supplies over 50% of the effort.
- Use of aids to be independent is allowed.

Bowels (preceding week)

- If needs enema from nurse, then 'incontinent.'
- 'Occasional' = once a week.

Bladder (preceding week)

- 'Occasional' = less than once a day.
- A catheterized patient who can completely manage the catheter alone is registered as 'continent.'

Grooming (preceding 24 – 48 hours)

- Refers to personal hygiene: doing teeth, fitting false teeth, doing hair, shaving, washing face. Implements can be provided by helper.

Toilet Use

- Should be able to reach toilet/commode, undress sufficiently, clean self, dress, and leave.
- 'With help' = can wipe self and do some other of above.

Feeding

- Able to eat any normal food (not only soft food). Food cooked and served by others, but not cut up.
- 'Help' = food cut up, patient feeds self.

Transfer

- From bed to chair and back.
- 'Dependent' = NO sitting balance (unable to sit); two people to lift.
- 'Major help' = one strong/skilled, or two normal people. Can sit up.
- 'Minor help' = one person easily, OR needs any supervision for safety.

Mobility

- Refers to mobility about house or ward, indoors. May use aid. If in wheelchair, must negotiate corners/doors unaided.
- 'Help' = by one untrained person, including supervision/moral support.

Dressing

- Should be able to select and put on all clothes, which may be adapted.
- 'Half' = help with buttons, zips, etc. (*check!*), but can put on some garments alone.

Stairs

- Must carry any walking aid used to be independent.

Bathing

- Usually the most difficult activity.
- Must get in and out unsupervised, and wash self.
- Independent in shower = 'independent' if unsupervised/unaided.

Collin C, Wade DT, Davies S, Horne V. The Barthel ADL Index: a reliability study. *Int Disabil Stud*. 1988;10(2):61-63.
Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. *Md State Med J*. 1965;14:61-65.
Wade DT, Collin C. The Barthel ADL Index: a standard measure of physical disability? *Int Disabil Stud*. 1988;10(2):64-67.
Approved for Use for Hip Fracture Care Pathway by Bone & Joint Health Strategic Clinical Network, Alberta Health Services, April 2015

https://www.google.com/url?q=https://www.albertahealthservices.ca/assets/about/scn/ahs-scn-bjh-hf-barthel-index-of-adls.pdf&sa=D&source=docs&ust=1635914620361000&usg=AOvVaw2S5wdO6Jjm1mx1N9Sbx6zn

Annexure V

Assessment of symptom control

Symptom Control	**Response**	
In the past four weeks, has the patient had	**YES (1)**	**NO (0)**
Day time asthma symptoms more than twice a week		
Any night waking due to asthma		
Reliever needed for symptoms* more than twice a week		
Any activity limitation due to asthma		
Total		

Level of asthma control	**Score**
Well controlled	0
Well controlled	1-2
Uncontrolled	3-4

Annex VI

Modified Medical Research Council Dyspnoea Scale (mMRC Dyspnoea scale)

The mMRC dyspnea scale quantifies the disability attributable to breathlessness, and is useful for characterizing baseline dyspnea in patients with respiratory diseases.

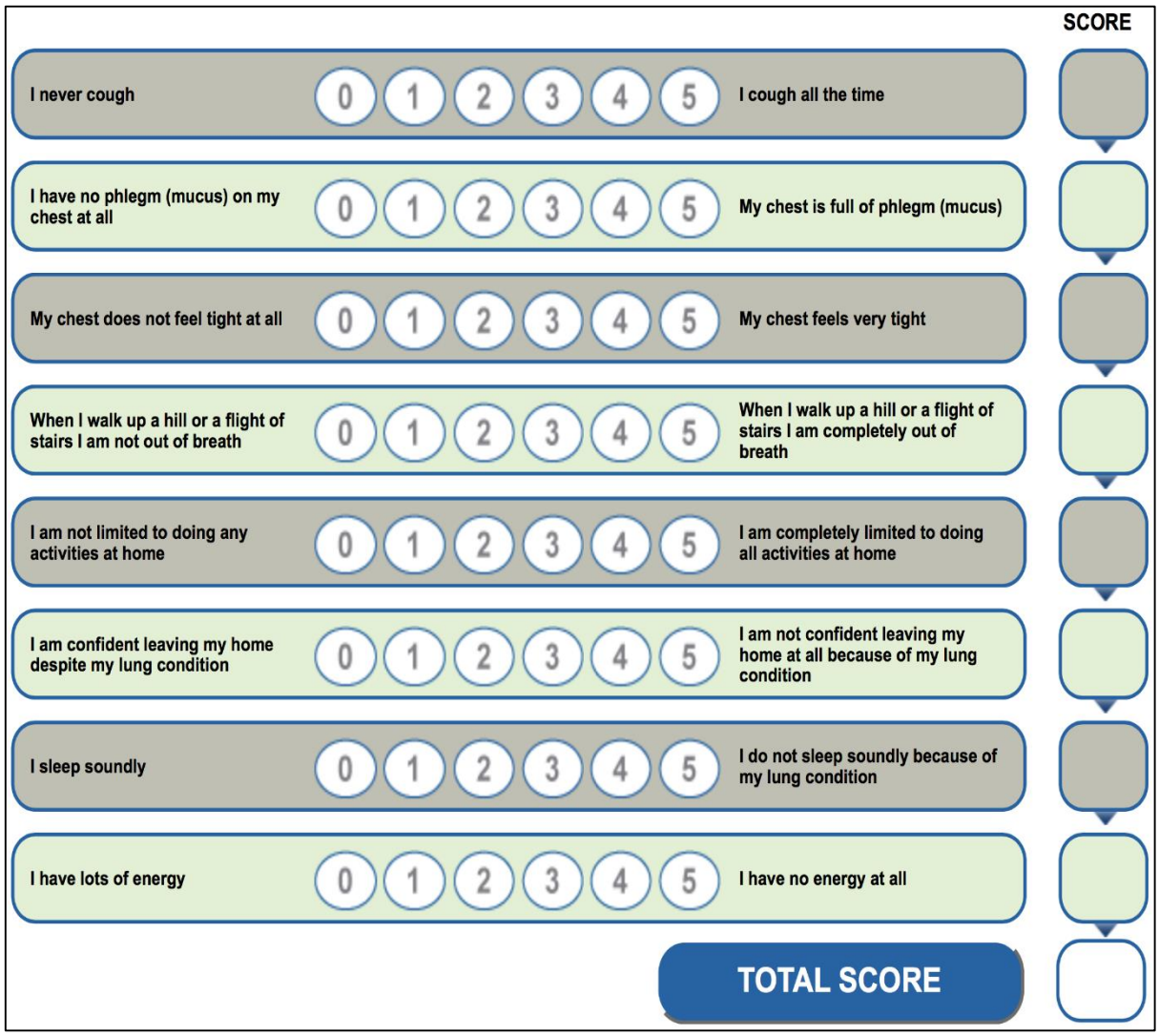
The mMRC Dyspnoea Scale

0	I only get breathless with strenuous exercise
1	I get short of breath when hurrying on the level or walking up a slight hill
2	I walk slower than people of the same age on the level because of breathlessness or have to stop for breath when walking at my own pace on the level
3	I stop for breath after walking about 100 yards or after a few minutes on the level
4	I am too breathless to leave the house or I am breathless when dressing

Annexure VII

COPD Assessment Test[1]

This questionnaire will help the patient with COPD and the healthcare professional to measure the impact that COPD is having on the patients' quality of life and how this impact changes over time. The CAT is not a diagnostic tool for COPD. The total test score of CAT can be used by the healthcare professionals to help improve the management of COPD and gain benefit from the treatment.



[1] COPD assessment test: Healthcare Professional User Guide. 2018. https://www.catestonline.org/hcp-homepage/clinical-practice.html

The total CAT score ranges from 0 to 40. Since, COPD is a progressive disease, it is difficult to set a fixed target score for all patients. However, a difference or change of 2 or more units over 2 to 3 months in a patient suggests a clinically significant difference or change in health status.

Broad clinical picture of the impact of COPD based on the CAT score

CAT score	Impact level	Broad clinical picture of the impact of COPD by CAT score
>30	Very high	Their condition stops them doing everything they want to do and they never have any good days. If they can manage to take a bath or shower, it takes them a long time. They cannot go out of the house for shopping or recreation, or do their house work. Often, they cannot go far from their bed or chair. They feel as if they have become an invalid
>20	High	COPD stops them doing most things that they want to do. They are breathless walking around the home and when getting washed or dressed. They may be breathless when they talk. Their cough makes them tired and their chest symptoms disturb their sleep on most nights. They feel that exercise is not safe for them and everything they do seems too much effort. They are afraid and panic and do not feel in control of their chest problem.
10-20	Medium	COPD is one of the most important problems that they have. They have a few good days a week, but cough up sputum on most days and have one or two exacerbations a year. They are breathless on most days and usually wake up with chest tightness or wheeze. They get breathless on bending over and can only walk up a flight of stairs slowly. They either do their housework slowly or have to stop for rests.
<10	Low	Most days are good, but COPD causes a few problems and stops people doing one or two things that they would like to do. They usually cough several days a week and get breathless when playing sports and games and when carrying heavy loads. They have to slow down or stop when walking up hills or if they hurry when walking on level ground. They get exhausted easily.
5		Upper limit of normal in healthy non-smokers

Definitions

1. Relative Risk (RR): ratio of the probability of an outcome in an exposed group to the probability of an outcome in an unexposed group. Together with risk difference and odds ratio, relative risk measures the association between the exposure and the outcome

2. Attributable Relative Risk (ARR): helps measure the excess risk associated with the risk factor

3. Population Attributable risk Fraction (PAF): gives the added risk in relation to the total population.