# MANAGEMENT OF OBESITY

## in Bangladesh

## Position Statement of Bangladesh Endocrine Society

# Management of Obesity in Bangladesh –
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## Preamble

Obesity is a complex, multifactorial, chronic, relapsing disease with variable clinical phenotypes defined by abnormal or excessive adiposity which impairs physical and mental health. Though Bangladesh is experiencing a rise in the prevalence of obesity, it is still undermanaged. The metabolic phenotype of the people of our country is different from Caucasians. Therefore, there is an urgent need for a structured, customized and evidence-based clinical practice guideline for the management of obesity in Bangladesh. The Bangladesh Endocrine Society (BES) Obesity Taskforce undertook to develop a position statement for managing obesity in Bangladesh. The task force created a committee of 19 members to write the statement based on international obesity guidelines, randomized controlled trials, national observational studies, and expert opinion. Several consultative meetings were arranged to discuss the position statement until it was ratified unanimously by the committee. The position statement includes recommendations on the overall management of obesity including its diagnosis, assessment, treatment, monitoring and prevention of obesity in adults of Bangladesh. This is a position statement for the people of Bangladesh who are suffering from obesity. We hope it provides knowledge to primary care physicians and endocrinologists to improve the assessment and treatment of obesity. Through this position statement, BES hopes to improve the management of obesity in Bangladesh, and make it structured and uniform.

## INTRODUCTION

Obesity is a complex, multifactorial, chronic, relapsing disease with variable clinical phenotypes defined by abnormal or excessive adiposity which impairs physical and mental health. It is a disorder of energy homeostasis due to central neurological dysregulation that affects behavior. In addition, the disease is associated with constant stigmatization, which results in a vicious cycle of emotional eating. [1] American Association of Clinical Endocrinologists (AACE) has coined a new term for obesity, i.e., ABCD or Adiposity-Based Chronic Disease, to highlight the need to recognize it as a systemic chronic disease. [2] The cause of obesity is multifactorial. It is due to an interplay of epigenetic, genetic and environmental factors. Genetic factors contribute to 50-70% of the cause of obesity. Small for gestational age (SGA), formula milk, and early introduction of protein in an infant's diet are associated with future weight gain. [3] Both general and central obesity are associated with metabolic abnormalities. [4] In developing countries, obesity and its consequences create a burden not only on the individual, but also on the nation. [5]

Bangladesh is a densely populated developing nation of South Asia. It is experiencing economic and cultural change. [6] Over the past two decades, Bangladesh has gone through a rapid epidemiological transition from communicable diseases to non-communicable diseases. [7] According to the Bangladesh demographic and health survey (BDHS) 2017-18 report, approximately 18 % of men aged 18 years and older, and more than 32 % married, divorced or widowed women aged 15-49 years were overweight or obese, respectively. In 2014, a school-based countrywide study demonstrated that 9.6% and 3.5% children were overweight and obese. [8] A higher prevalence of overweight/obesity was observed among boys (67.1%) compared to girls, and the mean age was 11.6 years. Overweight and obesity were prevalent among girls (35.7% and 17.9%, respectively) in public schools and boys (38.8% and 32.7%, respectively) in private schools. [9] The increasing prevalence of overweight and obesity among adults in Bangladesh contributes to the alarming burden of non-communicable diseases such as hypertension, diabetes, and associated comorbidities. [10] In 2022, over 890 million adults were living with obesity worldwide. [11] The projected estimates for obesity in adults is nearly 3.3 billion in the next 10 years. This reflects an increase of more than 50% by 2035. [12]

Several studies have demonstrated a rising prevalence of overweight and obesity in our country over the last one or two decades. [8-10] In addition, we are a high risk ethnicity, with increased cardiovascular risk at lower BMI. [13] Obesity management in our country has been a neglected area and has remained unrecognized and undertreated. It is therefore largely unsuccessful and frustrating to the patient and the physician alike. Clearly, there is an urgent need for concerted efforts to tackle obesity in our country, if we are to significantly halt the rising burden of cardiometabolic disorders. There is also an urgent need for structured and evidence-based clinical practice guidelines for the management of obesity that addresses the specific needs of the Bangladeshi people with distinct phenotype, as we have different genetic makeup and culture.

## METHODOLOGY

The Bangladesh Endocrine Society (BES) Obesity Taskforce undertook to develop a position statement for the management of obesity in Bangladesh. At first, the taskforce appointed a chair. The chair created a committee of 19 members consisting of 2 groups - a working group and an advisory group. The chair and advisory group members were endocrinologists with vast experience in the management of obesity. Before starting the work, all task force members declared no competing interest to prepare the guideline, and the draft was continually follow up by the chief patron of Bangladesh Endocrine Society. Necessary input was also taken from specialists with complementary expertise, for example, pediatrics, cardiology, hepatology, pulmonology and psychiatry.

A number of consultative meetings were arranged to formulate the outline and discuss the position statement. In the first meeting of the Obesity Taskforce, the consensus statement was divided into 7 sections, and each section was designated to one member from each group. An outline was formulated for each section to address relevant information. The zero draft was written from international, regional and national guidelines and studies on obesity. Randomized controlled trials were prioritized. Due to the lack of a sufficient number of trials in Bangladesh, observational studies, case studies, and expert opinions were considered to formulate the draft. Literature search was done from PubMed using the keywords diagnosis, assessment of comorbidities, nonpharmacological treatment, pharmacotherapy. Opinion from all endocrinologists across Bangladesh using Google form was taken to decide on topics where unanimous decision was not possible by the taskforce.

The working and advisory groups were responsible for writing and supervising each section, respectively. The zero draft was then discussed by the committee members in a daylong consultation. The first draft was written after feedback from the consultation and reviewed again by the committee. The reviewed second draft was then edited by the chair and sent to all members of the advisory group. The edited draft was ratified unanimously by the Obesity Taskforce. This consensus statement is a combination of expert opinions and narrative summary of the available evidence regarding the diagnosis and management of people with obesity.

## DIAGNOSIS OF OBESITY

BMI and WC may be proposed to assess adiposity and classify individuals as overweight and obese. BMI is the first line measurement in the diagnosis of adiposity. WC can be measured when BMI is between 23 and 35 kg/$m^2$ to assess central obesity. [14]

BMI is an easy and reliable measure of adiposity, and is better than weight alone. It correlates well with body fat percentage. [15] However, it has some limitations. It overestimates the degree of adiposity in individuals who are muscular, pregnant or have fluid retention; and underestimates obesity in elderly individuals with muscle wasting. BMI does not give us information about the distribution of fat and cannot distinguish between subcutaneous and visceral fat. It is also subject to ethnic variability. Therefore, these factors must be taken into consideration when interpreting BMI. [14]

BMI classifications are based upon risk of cardiovascular disease (CVD). [16] Compared to Caucasians, Asians have higher morbidity at a relatively lower BMI. This may be explained by the difference in body fat distribution. Asians have higher percentage of body fat at any given BMI compared to Caucasians. In addition, they have relatively more central and visceral adiposity, which is associated with insulin resistance. [13] Therefore, it is understandable that the BMI criteria of obesity in Caucasians underestimate the risk in Asians. Accordingly, in 2000, the Regional Office for the Western Pacific of the World Health Organization (WHO) proposed cutoffs of 23 and 25 kg/$m^2$ for overweight and obesity in Asians, respectively. [17] Later, in 2004, WHO consultation group stated that risk of obesity related diseases increased across a spectrum of BMI ranging from 23 to 27.5 kg/$m^2$. They did not identify an exact cut point. Instead they suggested that each country define its own criteria based on risk studies of its population. [18] In 2017, a study included 35 articles looking at the prevalence of diabetes and hypertension in relation to BMI in Bangladesh. This study also included data from the Bangladesh Demographic and Health Survey 2011. They found that a BMI of $\geq$ 22.5 kg/$m^2$ was a risk factor for developing diabetes and hypertension among Bangladeshi adults. [19] Cut points of 23 and 25 kg/$m^2$ for overweight and obesity, respectively, were also recommended for Bangladesh in a consensus report on obesity in South Asia. [20] Though national longitudinal studies on risk

assessment are lacking, based on the evidence so far, BES proposes cut points of 23 and 25 $kg/m^2$ to define overweight and obesity, respectively in Bangladesh (Table 1). [16-18]

WC is a measure of abdominal obesity, and is directly associated with increased metabolic risk. It provides independent risk information that is not accounted for by BMI. [21] However, it too is subject to ethnic variation. WC of ≥ 80 cm in females and ≥ 90 cm in males is considered abnormal in South Asians. [17] It is used in conjunction with BMI to identify individuals with additional risk of morbidity and mortality. It is unnecessary with BMI ≥35 $kg/m^2$. [14] The procedure for anthropometric measurements are described in detail in Table 2 and Figure 1. [22-26]

There is limited role of other measures such as waist height ratio and waist hip ratio in the clinical setting. [22] Bioelectric impedance, air/water displacement plethysmography and DEXA are gold standard methods of measuring adiposity. They also give information of body fat distribution. However, they are expensive, not always available and therefore not recommended in routine clinical practice, but can be used for research purpose in Bangladesh. [14]

Table 1. Obesity classification by BMI

| | Organization | Overweight | Obese |
|---|---|---|---|
| Caucasians | WHO | 25 | 30 |
| Asians | WPRO 2000 | 23 | 25 (class I)<br>30 (class II) |
| | WHO expert consultation 2004 | 23 – 27.4 (increased risk) | 27.5 – 32.4 (high risk)<br>32.5 – 37.5 (very high risk)<br>≥ 37.5 (extremely high risk) |
| | Bangladesh | 23 | 25 (class I)<br>30 (class II) |

Values are in (kg/m2 ). WHO: World Health Organization, WPRO: World Health Organization Western Pacific Region

Table 2. Procedure of performing anthropometry

| Body Weight | Height | BMI | WC |
|---|---|---|---|
| Body weight is measured to the nearest 0.1 kg, wearing light clothes and without shoes, using an electronic digital weighing machine. | Height is measured to the nearest 0.1cm by a portable wall-mounted stadiometer with the subject without shoes in the erect position, back against the wall with his/her head held in Frankfurt horizontal plane with a right-angled triangle resting on the scalp and against the wall. | BMI is calculated by the following formula: weight in kg / height in meters squared | WC is measured midway between the lowest rib and the superior border of the iliac crest by using a non-extensible and non-elastic measuring tape in mid respiration. |

BMI: Body mass index, WC: Waist circumference

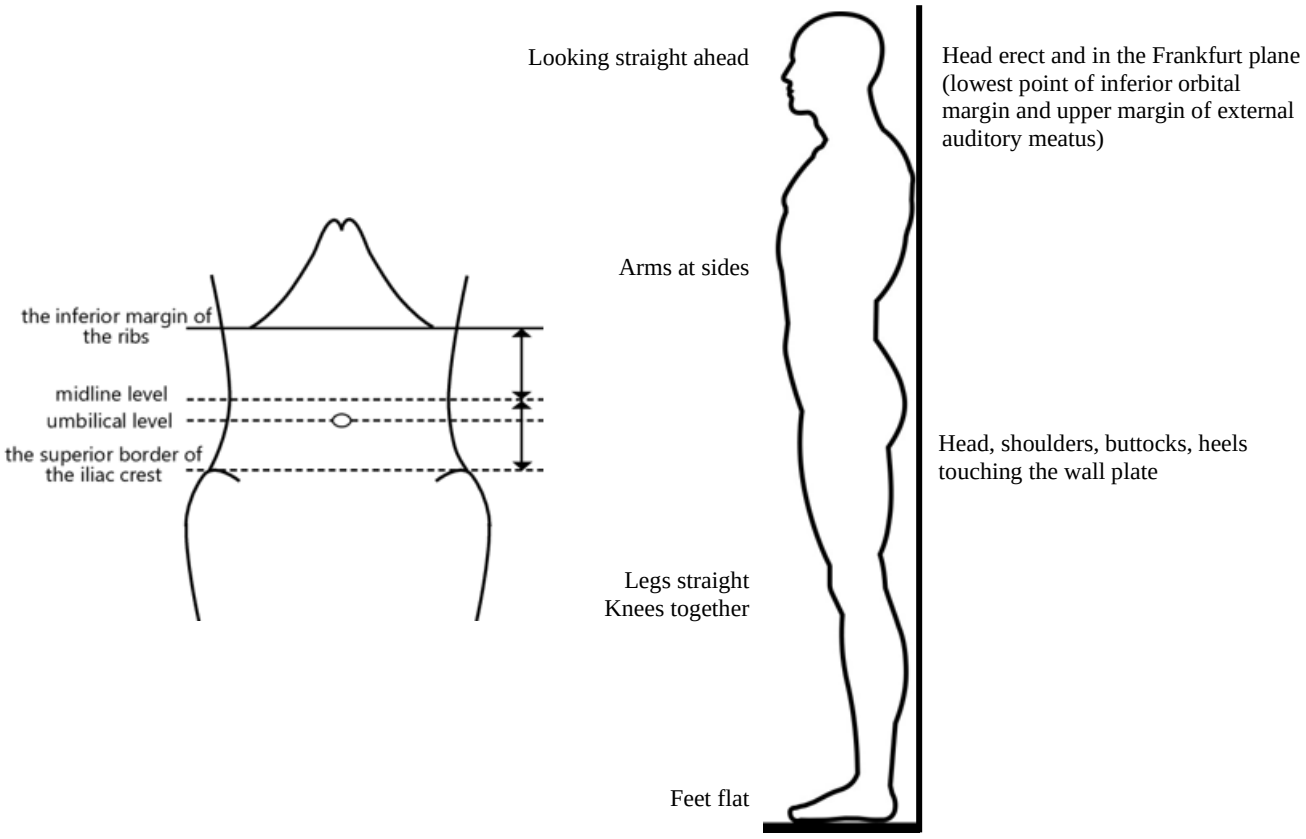


Figure 1. Measurement of height and waist circumference

## CLINICAL ASSESSMENT RELATED TO OBESITY

The evaluation of a patient with overweight and obesity should encompass three domains – degree of obesity, risk factors and cause of obesity and consequences of obesity. [27] The degree of obesity can be assessed from measurements of BMI and WC. Table 3 shows the causes and consequences of obesity. [19, 24]

After a thorough assessment of obesity, it is necessary to classify patients according to the severity of adiposity and risks associated with it. This is important for understanding the impact of obesity on a person's health and quality of life. It also guides the clinician on the type and urgency of obesity management. There are several recognized clinical staging systems such as the Edmonton Obesity Staging System (EOSS) and the American Association of Clinical Endocrinologists/ American College of Endocrinology (AACE/ACE) framework. The EOSS stages correlate with risk of all-cause mortality and with incident CVD and cancer. [27, 28] It classifies patients into 5 stages depending on obesity-related risk factors, physical and psychological symptoms, functional limitations and guide treatment options (Table 5). [29] BES proposes using EOSS in staging obesity as well. History, clinical examination and investigations should be aimed to address the three domains and staging (Table 4). [13, 19, 30]

Table 3. Causes and consequences of obesity

| Risk factor / cause of obesity | Consequences of obesity |
|---|---|
| Lifestyle | Psychosocial |
| Poor diet and dietary habits | Eating disorders |
| Sedentary lifestyle | Poor self-esteem |
| Excess screen time | Body image disorder |
| Poor sleep hygiene | Social isolation and stigmatization |
| | Depression |
| Endocrine | Neurological |
| Hypothyroidism | Idiopathic intracranial hypertension |
| Cushing syndrome | Stroke |
| Insulinoma | |
| Hypothalamic disorders | |
| Drugs | Endocrine |
| Atypical antipsychotics | Glucose intolerance. Type 2 diabetes |
| Antidepressants | Precocious puberty |
| Gabapentin, pregabalin | Menstrual irregularities |
| Sodium valproate | Subfertility |
| Glucocorticoids | Polycystic ovary syndrome (PCOS) |
| ß-blockers | Hormone-related cancers (breast, |
| Pizotifen | endometrium, prostate) |
| Anti-diabetics (sulfonylurea, insulin, thiazolidinedione) | |
| Implantable contraceptives | |
| Genetic | Pulmonary |
| Monogenic (Prader Willi syndrome) | Exercise intolerance |
| Polygenic | Obstructive sleep apnea (OSA) |
| | Obesity related hypoventilation (OHS) |
| | Asthma |
| | Cardiovascular |
| | Hypertension |

| | |
|---|---|
| | Dyslipidemia |
| | Ischemic heart disease (IHD) |
| | Peripheral vascular disease |
| | Coagulopathy |
| Gastrointestinal | |
| | Gallstones |
| | Gastro-esophageal reflux |
| | metabolic-associated fatty liver disease, Colon, hepatic and pancreas cancer |
| Renal | |
| | Stress incontinence |
| | Glomerulosclerosis |
| | Renal cancer |
| Musculoskeletal | |
| | Ankle sprains |
| | Flat feet |
| | Tibia vara |
| | Osteoarthritis |
| | Back pain |
| | Gout |
| Cutaneous | |
| | Intertrigo |
| | Hidradenitis suppurativa |

IHD: Ischemic heart disease, OSA: Obstructive sleep apnea, OHS: Obesity-related hypoventilation, PCOS: Polycystic ovary syndrome

Table 4. Assessment of obesity

| Component | Details |
|---|---|
| **History** | |
| Weight history | Duration of weight gain |
| | Previous weight loss efforts |
| Risk factors | Energy intake and dietary habits |
| | Physical activity – type, duration and barriers |
| | Screen time |
| | Sleep hygiene - duration and quality of sleep |
| Secondary cause | Medications causing weight gain |
| | Genetic disorders |
| | Endocrine disorders |
| Family | Relatives with obesity |
| Social | Smoking cessation |
| | Alcohol or substance abuse |
| | Family support |
| | Occupation and work schedule |
| | Education |
| | Socioeconomic status |
| Mental health | Body image, self-esteem, depression, anxiety, stress, stigma, eating disorder |
| **Examination** | |
| Anthropometry | Weight |
| | Height |
| | BMI |
| | Waist Circumference |
| Head and Neck | *Neck circumference |
| | Thyroid exam |
| | Signs of hypothyroidism, Cushing syndrome, dysmorphism, hypogonadism, androgen excess in females |
| Cardiorespiratory | †Blood pressure (use appropriate size cuff) |

| | |
|---|---|
| | Heart rate, rhythm, quality |
| | ‡STOPBANG questionnaire |
| | Cyanosis (Obesity related hypoventilation) |
| | Flapping tremor (Obesity related hypoventilation) |
| Gastrointestinal | Liver span |
| | Umbilical, incisional hernias |
| | Signs of chronic liver disease |
| Musculoskeletal | Osteoarthistis |
| | Gout |
| Skin | Acanthosis nigricans, skin tags |
| | Hidradenitis suppurativa |
| | Candida, intertrigo, tinea |
| | Striae |
| | Hirsutism |
| Lower limb | Lymphedema |
| | Lipedema |
| | Venous insufficiency, ulcers, stasis, thrombophlebitis |
| **Investigations** | |
| Routine | Oral glucose tolerance test |
| | HbA1c |
| | Lipid profile |
| | Alanine aminotransferase |
| | CBC |
| | Creatinine, eGFR |
| | Uric acid level |
| Special tests | ECG, ECHO, stress test (Ischemic heart disease) |
| (if indicated) | Polysomnography (Obstructive sleep apnea) |
| | Liver function test, abdominal ultrasound, FibroScan or biopsy (Metabolic associated fatty liver disease) |
| | Urinalysis for proteinuria (Glomerulosclerosis) |
| | Overnight dexamethasone suppression test (Cushing syndrome) |

| | |
|---|---|
| | FT4, TSH (Hypothyroidism)<br>LH, FSH, testosterone, DHEAS, 17hydroxyprogesterone (menstrual irregularity)<br>Chromosomal tests and genetic studies (Syndromic obesity)<br>Vitamin D, iron studies, serum B12 (nutritional deficiency) |

BMI: body mass index, eGFR: estimated glomerular filtration rate, FT4: free thyroxine, TSH: thyroid stimulating hormone, LH: leutinising hormone, FSH: follicle stimulating hormone, DHEAS: dehydroepiandosterone sulphate

*measured in the midway of the neck, between mid-cervical spine and mid anterior neck, to within 1 mm, using non-stretchable plastic tape with the subjects standing upright and shoulders relaxed.

†The width and length of the bladder of the blood pressure cuff should be 40% and 80-100% of the circumference of the upper arm midway between the olecranon and acromion, respectively.

‡Snoring, Tiredness, Observed you stopped breathing, Blood Pressure, BMI > 35 kg/$m^2$, Age > 50 years, Neck circumference > 40 cm, Gender male. 1 point for each component. Score of ≥3 needs sleep testing for OSA.

Table 5. EOSS: Edmonton Obesity Staging System

| Stage | Criteria | Treatment |
|---|---|---|
| 0 | No obesity-related risk factors<br>No physical symptoms<br>No psychological symptoms<br>No functional limitations | Avoid further weight gain, weight loss may not be required. |
| 1 | Subclinical obesity-related risk factors<br>(borderline hypertension, prediabetes, elevated liver enzymes)<br>OR<br>Mild physical symptoms<br>(dyspnea on moderate exertion, occasional aches, fatigue)<br>OR<br>Mild psychological symptoms | |
| 2 | Established obesity-related comorbidities<br>(hypertension, diabetes, OSA, PCOS, osteoarthritis, reflux)<br>OR<br>Moderate psychological symptoms<br>(depression, eating disorder, anxiety disorder)<br>OR<br>Moderate functional limitations | Weight loss is a clinical priority. Lifestyle, pharmacological, and surgical interventions should be considered. |
| 3 | Significant obesity-related end-organ damage<br>(ischemic heart disease, heart failure, diabetes complications, incapacitating osteoarthritis)<br>OR<br>Significant psychological symptoms<br>(major depression, suicide ideation)<br>OR<br>Significant functional limitations<br>(unable to work or complete routine activities, reduced mobility)<br>Significant impairment of well being | |
| 4 | Severe obesity-related comorbidities<br>OR<br>Severe psychological symptoms<br>OR<br>Severe functional limitations | Palliative care |

OSA: obstructive sleep apnea, PCOS: polycystic ovary syndrome

## TREATMENT OF OBESITY

Obesity is a complex, chronic, relapsing disease that requires continued treatment. Obesity management consists of addressing all the comorbidities associated with weight gain, and is not just about weight loss. The management of all patients who have overweight or obesity requires a combination of diet, exercise, and behavioral modification. BES proposes lifestyle measures for all patients with BMI 23 $kg/m^2$. Pharmacotherapy and bariatric surgery may be required for some patients. International guidelines recommend bariatric surgery when BMI is $\geq$ 35 and 40 $kg/m^2$ with and without comorbidity, respectively. BES proposes surgery when BMI is $\geq$ 27 and 35 $kg/m^2$ with and without comorbidity, respectively (Figure 2). Ideally, obesity management should be delivered through a multidisciplinary team consisting of endocrinologist, nutritionist, obesity educator, psychiatrist, hepatologist and pulmonologist. [14]

### Behavioral Intervention

Behavioral intervention of lifestyle therapy is the cornerstone of obesity management. It increases adherence to low calorie balanced diet and increased physical activity. Behavioral therapy includes self-monitoring of weight, food intake, and physical activity; sensible and practical goal; ongoing education on lifestyle modification; repeated face-to-face consults; provocation control; problem solving; rewarding; and avoidance of stigmatization. It should be provided by a multidisciplinary team of dietitians, nurses, educators, physical activity trainers or coaches, and clinical psychologists. Repeated face to face contact with the obesity team and early weight reduction are key predictors of success. If a patient does not achieve a 2.5% weight loss within the first month of treatment, lifestyle interventions should be intensified. However, we should remember that therapy should be tailored to the patient's cultural, socioeconomic, and educational background. [14]

### Nutrition

The main determining factors of a successful weight loss diet are calorie content and adherence to the diet. Food choices are individualized and depend on personal preference, culture,

availability and cost. Flexibility in food choice helps patients maintain a long term weight reducing dietary plan. Nutrient composition and eating pattern do not affect weight. [31, 32] Hence these factors should be taken into consideration when formulating a diet plan for obesity.

Planning a diet requires selecting a caloric intake goal and choosing foods to meet that calorie goal. The daily energy requirement can be calculated from the basal metabolic rate and physical activity coefficients. The basal metabolic rate can be calculated from age, sex, height, weight. There are several formulas to calculate daily calorie needs. A simple formula is 15 kcal/day/lb for men, and 13 kcal/day/lb for women. [33] More accurate calculations can be made from online calculators. An overall reduction of 500 kcal/day from the calculated daily calorie requirement will lead to sustained weight loss. [34]

There is no fixed nutrient composition for obesity. However, there are some general and basic guidelines on macronutrient distribution of a balanced diet (Table 6). [31, 35] There are several dietary patterns suggested for weight loss, such as low-fat, low-carbohydrate, high protein and very low calorie diets. However, since dietary adherence and not nutrient composition is the main determinant of weight loss, a dietary pattern that is acceptable to the patient must be chosen. It is also important to avoid nutritional deficiency during weight loss. Therefore, a balanced low-calorie diet is recommended for weight loss. [36]

Other dietary approaches that help reduce weight are portion control, self-monitoring (by maintaining food diaries, activity records, and self-weighing) and setting up a healthy food environment. A healthy eating habit is to eat at the dining table with the family. Snacking, emotional eating, eating out or ordering in, skipping meals especially breakfast, and media during meals, eating hidden carbohydrate and fast food are unhealthy habits and should be avoided. Adopting a healthy long term eating habit increases adherence for maintenance of weight loss. [37]

Table 6. Nutritional composition of diet

| Element | Nutritional Goal | Recommendation |
|---|---|---|
| Fat | <30% of total calorie | Include mono and polyunsaturated fats. |
| Monounsaturated | No limit | Avoid saturated and trans fat. |
| Saturated fat | <10% of total calorie | |
| Transfat | <1% of total calorie | |
| Cholesterol | 300 mg/day | |
| Protein | 10-35% of total calorie | Include protein to meet nutrient needs.<br>Eg. Lean meat, poultry without skin, fish, eggs, legumes, tofu, and low fat dairy products |
| Carbohydrate | 45-65% of total calorie | Switch to whole instead of refined grains.<br>Eg Wheat, brown rice, oats, barley, corn |
| Fiber | 20-35 grams/day | Include fiber to help increase satiety.<br>Include 5 portions of fruits and vegetables daily.<br>Eg. Legumes, fruits, vegetables, and whole grains |
| Added Sugar | < 10% of total calorie | |
| Salt | < 6g/day | |
| Beverages | | Limit beverages containing added sugars.<br>Select low-calorie beverages.<br>Water is the best choice.<br>Limit intake of alcoholic beverages. |

## Physical Activity

Physical activity is an essential component of lifestyle modification for patients with obesity. Physical activity should be individualized to include exercise regimens within the capabilities and preferences of the patient, taking into account health-related limitations and availability of facilities. The minimum requirement is 150 min/week of moderate intensity aerobic or endurance exercise. This means 30 minutes sessions, 5 days a week. [14] Some experts recommend 200-300 minutes of moderate intensity aerobic per week (Figure 3). [38] Examples of endurance/aerobic exercise are brisk walking or jogging, yard work (mowing, raking), dancing, swimming, biking, playing tennis or basketball. Moderate intensity exercise increases the heart rate by 56-70% and burns 3-5.9 METS. In simple terms, it is the degree of exercise that will make it somewhat difficult to carry out a full conversation. [39] Resistance training 2 to 3 times per week is helpful in preserving lean muscle mass during weight loss therapy. Lifting weights, carrying groceries, gripping a tennis ball, wall push-ups, lifting your body weight, using a resistance band are some resistance exercises. [14] Adults with disabilities should avoid inactivity and engage in regular physical activity to the best of their ability. Chair exercises (exercising by moving arms and upper body) are an option. [40] Moreover, patients should be encouraged to increase their general activity levels, break up prolong sitting and decrease sedentary behavior. [14]

## Screen time and sleep

An overall healthy lifestyle is important for weight loss and reducing metabolic risk. With the advent of the internet and devices, it is easy to succumb to prolong periods of screen based sedentary behavior. Prolonged screen time encourages sedentary behavior and snacking. Experts recommend less than 2 hours a day of screen time (Figure 3). Table 7 shows some tips to reduce screen time. [41]

Studies have shown that short sleep duration (< 6 hours) and unconventional sleep habits (sleeping late, waking late) are associated with weight gain. Sleep duration, quality and chronotype are all important factors influencing weight and metabolic disorders. Accordingly,

experts recommend not less than 6 and not more than 8 hours of good quality sleep (Figure 3). It is also encouraged to go to bed early at night and wake up early in the morning (morning chronotype). [42]

Table 7. Tips to reduce screen time

| |
|---|
| Have discussions in the family about healthy behavior |
| (eg. sitting less and doing household chores). |
| Set a good example for your children by limiting your own screen time. |
| Start logging how much time you and your family spend in front of a screen. |
| Do something active while you watch TV. |
| Set screen time limits. |
| Don’t put a TV or computer in the bedroom or dining room. |
| Avoid media during meals. Eat together as a family. |
| Think of alternative activities to do. |
| Don't Use screen time as a reward or punishment for your children. |
| Try not to be influenced by commercials encouraging fast food consumption. |

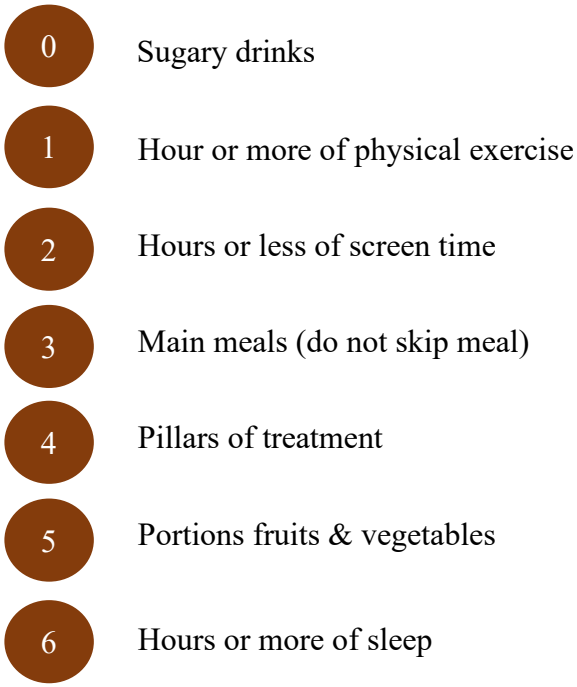


Figure 3. A simple way to remember the behavioral treatment of obesity, proposed by BES. Here, 0 stands for drink zero sugary drinks, 1 stands for exercise at least 1 hour a day, 2 stands for limit screen time to no more than 2 hours a day, 3 stands for take 3 meals, 4 stands for the 4 pillars of obesity treatment (diet, exercise, screen time and sleep), 5 stands for eat fruits and vegetables 5 times a day, and 6 stands for sleep at least 6 hours at night.

**Pharmacotherapy**

Maintaining weight loss is difficult due to the body's natural tendency to conserve energy. Addition of pharmacotherapy produces greater weight loss and helps to maintain it. However, there is variable response to weight loss medication, which means not everyone benefits uniformly. Weight loss therapy should be individualized, and patients should be assessed for the need and risks of treatment. Pharmacotherapy should not be prescribed without adequate advice on lifestyle modification.

Indication

International obesity societies and guidelines recommend initiating pharmacotherapy in adults with BMI ≥ 30 kg/ $m^2$ without comorbidities, and with BMI ≥ 27 kg/$m^2$ with at least one weight-related condition (such as hypertension, dyslipidemia, type 2 diabetes mellitus, obstructive sleep apnea, or cardiovascular disease) who have failed to achieve ≥ 5% weight loss after 6 months of lifestyle interventions. [43, 44] However, anti-obesity medication can be started concurrently with lifestyle measures if a person has weight-related complications that can be reduced by weight loss. [14]

The BMI criteria for initiation of pharmacotherapy in South Asians may not be the same as Caucasians, as the former have different pattern of body fat distribution and increased cardiometabolic risk at lower BMI. [13] Currently there is no guideline defining BMI criteria for starting pharmacotherapy in South Asian population due to the paucity of evidence regarding this. A 2009 consensus statement proposed a BMI of > 25 kg/$m^2$ with comorbidity, and > 27 kg/$m^2$ without comorbidity for initiation of pharmacotherapy. This was based on an expert meet of over 100 specialists from all over India. [45] The ADA recommends commencing anti-obesity pharmacotherapy at a BMI cutoff of 25 kg/$m^2$ in Asian Americans with type 2 diabetes mellitus. [46]

Considering the South Asian phenotype, BES proposes initiating pharmacotherapy concurrently with lifestyle measures at a BMI cut-off of 25 kg/$m^2$ if there are coexistent weight related comorbidities (Figure 2). Those with BMI ≥ 25 kg/$m^2$ without comorbidities may be advised

pharmacotherapy if lifestyle measures fail to reduce weight by at least 5% in 3 months. BES also proposes commencing pharmacotherapy if BMI is ≥ 27 kg/m$^2$ in the absence of comorbidities. Weight related comorbidities include type 2 diabetes mellitus, hypertension, dyslipidemia, metabolic associated steatotic liver disease, obstructive sleep apnea, polycystic ovary syndrome, cardiovascular disease, and osteoarthritis (Figure 2).

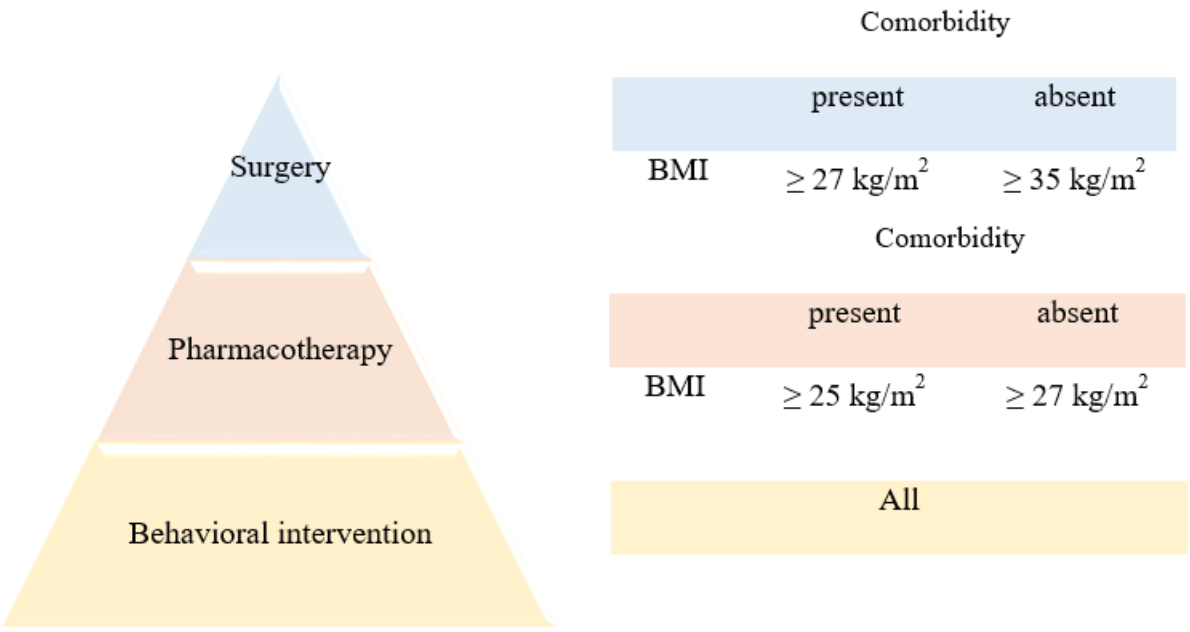


Figure 2. Management of obesity in Bangladeshi population proposed by BES.
Comorbidities are type 2 diabetes mellitus, hypertension, dyslipidemia, metabolic associated steatotic liver disease, obstructive sleep apnea, polycystic ovary syndrome, cardiovascular disease, osteoarthritis. BMI: Body mass index

Medication

The United States Food and Drug Administration (USFDA) approved long term anti-obesity medications available in Bangladesh are orlistat, liraglutide, semaglutide (GLP-1 receptor agonists) and tirzepatide (glucose-dependent insulinotropic polypeptide receptor agonist and GLP-1 receptor agonist ). [47] GLP-1 receptor agonists and dual agonists are currently the most efficacious anti-obesity medications. 2.4 mg semaglutide provided substantial weight loss of 14.9% in a 68 week trial in 2539 obese patients without diabetes mellitus. [48] A similar trial with 15 mg tirzepatide showed 21% weight loss at 72 weeks. [49] There is no consensus on the duration of treatment. Regain of weight occurs after discontinuation of the drug. Treatment should be stopped if weight loss is < 5% of body weight after 12 weeks on the maximum tolerated dose. [14]

The dosing schedule of the anti-obesity drugs are shown in Figure 4. [46] Adverse effects of GLP-1 receptor agonists and dual agonists include nausea, vomiting, diarrhea, constipation, hypoglycemia in patients with T2DM (more common if used in conjunction with diabetes medications known to cause hypoglycemia), injection site reactions, increased lipase, and increased heart rate. Since pre-clinical studies of GLP-1 receptor agonists showed an increase in medullary thyroid carcinoma in rodents, there may be a possible increased risk of thyroid cancer. Pancreatitis, gallbladder disease, acute kidney injury, suicidal thoughts, serious hypersensitivity reactions (eg, anaphylaxis, angioedema) are rarely reported. Therefore we should be cautious when prescribing in conditions that increase risk of pancreatitis (eg. cholelithiasis, hypertriglyceridemia, alcohol use). We should also advise patients to avoid dehydration. Patients should be monitored for diabetic retinopathy. Since it causes a modest delay of gastric emptying, patients undergoing elective surgery or procedures involving anesthesia should hold the drug 7 days prior to surgery. [46] Table 8 gives advice on how to minimize gastrointestinal effects of GLP1 receptor agonists. [50] It is contraindicated in pregnancy, lactation, allergy to GLP-1 receptor agonists, patients with history of pancreatitis, and in patients with a personal or family history of medullary thyroid cancer or multiple endocrine neoplasia 2A or 2B. No dosage adjustment is necessary in mild to severe impairment renal impairment and dialysis for GLP-1

receptor agonists. There is limited data on tirzepatide in patients with eGFR <30 mL/min/1.73 $m^2$ . [46]

Orlistat causes 3% greater weight loss compared to placebo at a dose of 120 mg three times daily [51]. It has poor adherence due to substantial gastrointestinal adverse events. Considering this and its small effect on weight loss, orlistat is discouraged as a good treatment option for obesity [52].

Monitoring and treatment goals

Weight loss usually occurs in 3 steps. At least 5 to 10% weight loss is expected in the first 6 months. This is followed by another 6 month period of weight maintenance. Then weight loss resumes. A weight loss of 5 to 10% causes reduction of blood pressure, improvement of serum cholesterol and HbA1c. A greater reduction of weight, 10-15% is required for diabetes remission and improvement in steatohepatitis, OSA, subfertility, osteoarthritis and gastroeosophageal reflux**Error! Bookmark not defined.**. Patients should monitor their weight weekly with a weight machine at home. Follow up should be every 3 months to monitor weight, other vital signs (heart rate, blood pressure) and address side effects. Patients who are tolerating a therapeutic dose of medication and are losing weight can have less frequent follow-up. [42]

Challenges

Obesity is a relapsing disease with the body's tendency to conserve energy with weight loss. Hence, three challenges are faced in the long term management of obesity – response followed by a plateau, failure to respond, and weight regain. The STEP 5 trial is the longest available efficacy data for semaglutide as an anti-obesity drug. The trial showed that weight loss reached a plateau after 60 weeks and was sustained with its continued use for another year. [53] In case of failure to respond to treatment (weight loss is < 5% of body weight after 12 weeks on the maximum tolerated dose), we should reassess for poor compliance and secondary causes of weight gain, and strengthen lifestyle measures before trying a dual agonist. [14] Weight regain was seen after discontinuation of semaglutide in the STEP 1 extension trial. Weight regain can be minimized by enrolling people in specific lifestyle programs 2-3 months before

discontinuation and down titration of GLP1 receptor agonist dose. [54] Patients should follow lifestyle measures and may need to be treated with anti-obesity drugs again.

**Weight related complications and referral**

Whenever possible, it is better to minimize medications that promote weight gain (Table 9). [43] The complications of obesity such as hypertension, dyslipidemia, glucose intolerance, obstructive sleep apnea, metabolic dysfunction-associated fatty liver disease, joint problems etc should be referred to respective specialists and treated as well. Primary care physicians should be able to evaluate the patient for the degree of obesity and weight related complications. They should refer the patient if they deem there is an indication of starting pharmacotherapy or if the patient has established weight related complications. Patients should be referred to a pulmonologist if the STOPBANG score is ≥ 3 (when they need sleep testing to determine the need for continuous positive airway pressure). They should be referred to a hepatologist if the platelet count is low or transaminases are ≥ 3 times elevated or F2 score on fibroscan is ≥ 7.6. Psychiatry referral is required for behavioral counselling, if there is major psychiatric disorder and if the patient is on weight gaining anti-psychotics.

**Administration**: injections should be on the same day each week. The time of day and injection site may vary.

**Dose initiation and escalation schedule**

**Tirzepatide**

2.5 mg ⇨ 5 mg ⇨ 7.5 mg ⇨ 10 mg ⇨ 12.5 mg ⇨ 15 mg Maximum dose

SC weekly dose, escalate every 4 weeks

**Semaglutide**

0.25 mg ⇨ 0.5 mg ⇨ 1 mg ⇨ 1.7 mg ⇨ 2.4 mg Maximum dose

SC weekly dose, escalate every 4 weeks

**Liraglutide**

0.6 mg ⇨ 1.2 mg ⇨ 1.8 mg ⇨ 3 mg Maximum dose

SC daily dose, escalate every 4 weeks

Continue on the maximum tolerated dose if goal weight loss is achieved.
If increased dose is not tolerated, down titrate and delay dose escalation.
Patients who cannot tolerate maximum dose, maintain on a lower dose.

**Missed doses**: If a dose is missed and the next scheduled dose is more than 2 days away, the dose should be administered as soon as possible. If more than 5 days have passed, the dose should be skipped, and dosing resumed on the scheduled day.

Figure 4. Administration and dosing schedule of GLP1 receptor agonists and dual agonist

Table 8. Advice on how to minimize gastrointestinal adverse events with GLP-1 receptor agonists

| |
|---|
| Slow escalation of dose or reduction of dose. |
| Improve eating habits<br>• Smaller portions<br>• Eat slowly<br>• Eat more frequently<br>• Avoid lying down after a meal<br>• Avoid being too active after eating<br>• Avoid eating unnecessarily<br>• Avoid eating too close to bedtime<br>• Stop eating when full |
| Change food composition<br>• Easy-to-digest low fat food<br>• Clear drinks (in small sips). Hydration is very important in cases of vomiting, diarrhea and constipation.<br>• Water-rich foods (soups, liquid yogurt)<br>• Avoid sweet and spicy food |
| Improve lifestyle<br>• Fresh air<br>• Light exercise<br>• Keep a food diary to identify food and meal timings that make symptoms worse |
| Specific treatment<br>• Vomiting - an anti-emetic or prokinetic (domperidone)<br>• Diarrhea – loperamide<br>• Constipation - stool softeners |
| Switching to another GLP-1 receptor agonists. |

GLP-1: glucagon like polypeptide 1

Table 9. Categorization of certain medications that cause weight gain

| Medication classes | Specific agents |
|---|---|
| Antidepressants | ▪ Monoamine oxidase inhibitors (eg, phenelzine)<br>▪ Some tricyclic antidepressants (nortriptyline, amitriptyline, doxepin, imipramine)<br>▪ Some SSRIs (paroxetine, citalopram, escitalopram)<br>▪ Mirtazapine |
| Antipsychotics | ▪ Thioridazine<br>▪ Olanzapine<br>▪ Risperidone<br>▪ Clozapine<br>▪ Quetiapine<br>▪ Haloperidol<br>▪ Aripiprazole |
| Diabetes medications | ▪ Insulin<br>▪ Sulfonylureas (eg, glipizide)<br>▪ Thiazolidinediones (eg, pioglitazone)<br>▪ Meglitinides (eg, repaglinide) |
| Glucocorticoids | ▪ All agents (eg, prednisone, dexamathasone) |
| Progestins | ▪ All agents (eg, medroxyprogesterone) |
| Antiseizure medications | ▪ Carbamazepine<br>▪ Gabapentin<br>▪ Pregabalin<br>▪ Valproate<br>▪ Vigabatrin |
| Mood-stabilizing agents | ▪ Lithium |
| Antihistamines | ▪ Cyproheptadine |
| Alpha blockers | ▪ Terazosin |
| Beta blockers | ▪ Propranolol |

SSRI: selective serotonin receptor inhibitor

**PREVENTION**

Prevention of obesity is a social challenge. Hand-to-hand and collaborative partnership is needed between the government, physicians, businesses and the public. The obesogenic environment has a much more powerful impact on eating than the attempts at self-control to evade obesity. Prevention occurs along a continuum, and in the context of this strategies includes - primordial prevention, including the creation of enabling environments, such as access to healthy food; primary prevention, to reduce risk factors such as low physical activity levels; secondary prevention, or early identification of unhealthy weight gain and management; and tertiary prevention, to increase health and reduce harms for people living with obesity through support and treatment. The only strategy that offers a real chance of ending the obesity epidemic is the implementation of policies that neutralize the obesogenic environment.

An approach that aims to counter the obesity epidemic must make schools a priority area. Unhealthy lifestyle that leads to obesity starts in childhood. Schools should implement programs that help to prevent excessive weight gain. Teachers have a confined audience who are likely to believe what they told, making the classroom the perfect setting for health promotion. Health education must be included in the curriculum from the very beginning of school. Overweight and obesity knowledge must be contained in the curriculum. Healthy and unhealthy food habit, behavior that leads to obesity, complication of obesity, consequence of high calorie junk food consumption all must be included in the program. Facilities for playground in school and other educational institutes should be created where possible, or at least space for indoor sports. Labor-saving devices are widespread. Smart phones, laptops, and smart TVs are extremely common, acting as strong “push factors” toward a sedentary lifestyle. As a result, the scope for physical activity has been reduced. There is a need for diverse policies directed at the younger generation that go beyond schools. Healthy foods must be made more affordable, and unhealthy food more expensive and difficult to attain. This is best achieved by adding subsidies to healthier foods and taxes to unhealthy foods. Advertisements for unhealthy foods (including fast-food restaurants) should be banned, especially when the target audience is children and adolescents. It makes sense to extend such a ban to a complete ban of promoting unhealthy foods. It is highly anticipated that food corporations and their lobbyists will use their considerable resources to

obstruct the implementation of the type of policies being advocated here. [55] There is evidence that such bans can be of value in reducing the consumption of unhealthy food. [56] It will require determination and sustained effort by individuals, families and the government to overcome this obesogenic environment. While health promotion campaigns are considerably less effective than government policy approaches, they are still of much value and should be expanded.

## BANGLADESH PERSPECTIVE

The traditional diet of the people of Bangladesh is a healthy one consisting of rice, leafy vegetables and fish. However, recent urbanization has led to a decline in open spaces, and an increase in fast food places, buffet restaurants, and food delivery services. Some cultural practices such as providing an excess of food during festivals and family programs, and regarding refusal of food as rude also hamper weight loss. The people of Bangladesh are typically less physically active and do not usually participate in recreational physical activities. Common barriers to physical activity in this country include limited time owing to long working hours and cultural obligations to family, the absence of appropriate facilities and infrastructure, limited safe areas, and an unfavorable climate. The practice of private tuition in addition to schooling increases sedentary and screen time.

A study in 200 Bangladeshi children showed that 75% children were in the habit of snacking and 40% did no extra physical activity. The mean screen time was 3.3 hours/day, and 19% children did not have access to a playground. Private tuition, screen time, maternal obesity and snacking were risk factors of severe obesity in children. [57] Another study in Bangladeshi patients with type 2 diabetes mellitus showed that only 32.8% did moderate physical activity, and spent most of the day sitting. [58] These studies reflect the actual scenario in the country, emphasizing the need for national obesity prevention strategies.

## CONCLUSION

This is a position statement for the adult people of Bangladesh who are suffering from obesity. The summary of the recommendations are given in Table 10. We hope it provides knowledge to primary care physicians and endocrinologists to facilitate the assessment and treatment of obesity. Through this position statement, BES hopes to improve the management of obesity in Bangladesh, and make it structured and uniform.

**Table 10. BES Summary recommendations**

| |
|---|
| • Obesity is a heterogeneous, chronic, relapsing disease of energy homeostasis.<br>• Stigmatization due to obesity is highly discouraged at home, at school and in the workplace. |
| Diagnosis of obesity |
| • BMI and WC (when BMI is 23 to 35 kg/m$^2$) should be used to assess adiposity and classify individuals as overweight and obese.<br>• The cut points for excess adiposity in Asians is lower than those for Caucasians due to different body composition and health risk.<br>• In Bangladesh BMI cut points for overweight and obesity are 23 and 25 kg/m$^2$, respectively.<br>• WC of ≥ 80 cm in females and ≥ 90 cm in males is considered abnormal.<br>• Certain factors such as muscularity, fluid retention, pregnancy and ethnicity should be taken into consideration when interpreting BMI. |
| Assessment of obesity |
| • The evaluation of a patient with obesity includes assessing the degree of obesity, risk factors and cause of obesity and consequences of obesity<br>• Clinical staging systems (such as the Edmonton clinical staging system) classify patients according to the severity and obesity related complications to guide treatment. |
| Behavioral interventions |
| • Behavioral therapy is an essential component of managing patients with obesity.<br>• A combination of diet, exercise and behavioral modification is needed for weight loss.<br>• The main determinants of a successful weight loss diet plan are calorie content and dietary adherence, not nutrient composition or eating pattern.<br>• The recommendation is to consume a balanced low-calorie diet (500 kcal/d less).<br>• The diet should include 5 portions of fruits and vegetables daily.<br>• All high calorie or sugar containing beverages should be avoided.<br>• Unhealthy eating habits are strongly discouraged.<br>• Physical activity should be gradually increased, and if possible, 60 minutes of physical activity per day is recommended for weight loss. |

| |
|---|
| • Screen time should be minimized to less than 2 hours.<br>• Adults should get between 6 to 8 hours of sleep at night. |
| Pharmacotherapy |
| • Pharmacotherapy should be accompanied by lifestyle measures.<br>• Proposed BMI cut off for pharmacotherapy of obesity in Bangladesh is 25 kg/$m^2$ with weight related comorbidity, and 27 kg/$m^2$ in the absence of complications.<br>• GLP-1 receptor agonists (liraglutide, semaglutide and tirzepatide) are first line drugs recommended for the treatment of obesity.<br>• Treatment should be individualized. Weight related complications should be treated as well, preferably by a multidisciplinary team. |
| Treatment goals and follow up |
| • The minimum weight loss target is 5% in 3 months.<br>• Patients should come for follow up every 3 months to monitor weight and any adverse effects. |

BMI: Body mass index, WC: Waist circumference, BES: Bangladesh Endocrine Society, GLP-1: Glucagon-like peptide 1

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# Management of Obesity in Bangladesh – Position Statement of Bangladesh Endocrine Society

## Diagnosis

| | |
|---|---|
| Overweight | BMI ≥ 23 kg/m$^2$ |
| Obese | BMI ≥ 25 kg/m$^2$ |
| Central obese | WC ≥ 80 cm (female), ≥ 90 cm (male) |

Assess for weight related complications

## Behavioral advice for all

0. Sugary drinks
1. Hour or more of physical exercise
2. Hours or less of screen time
3. Main meals (do not skip meal)
4. Pillars of treatment
5. Portions fruits & vegetables
6. Hours or more of sleep

## Medication

Start when BMI ≥ 25 kg/m$^2$ with comorbidity

Tirzepatide, semaglutide and liraglutide are recommended