



Diagnosis and management of obesity (Sthaulya) - yesterday and today

Dr.Mamta Tiwari¹,Dr.Anurag Pandey²,Dr. Arvind Kumar Gupta³,Dr. B. K. Sevatkar⁴,Dr. Pawankumar Godatwar⁵

1. PG Scholar of deptt of Swasthavritta and Yoga NIA Jaipur
2. PG Scholar of deptt of Roga & Vikriti Vijnana NIA Jaipur
3. Ph.D. Scholar, Deptt. of Basic Principles, NIA, Jaipur
4. Lecturer, Deptt of Roga & Vikriti Vijnana NIA Jaipur.
5. Associate Prof., Deptt of Roga & Vikriti Vijnana NIA Jaipur

Corresponding Author: -Dr.Mamta Tiwari PG Scholar of deptt of Swasthavritta and Yoga NIA Jaipur

Sthaulya Roga (Obesity) contributes too much morbidity in the patients because it has been named the mother of Diabetes; Hypertension; Cerebro-vascular disease, Joint-disorders, Hyperlipidaemias & other problems. Sthaulya Roga strikingly resembles with disease entity termed as obesity in Modern system of medicine. The basic principles of treatment of Sthaulya Roga(Obesity) as described in Āyurvedic classics & modern text's of medicine are Nidāna parivarjana & Apatarpaṇa cikitsā in the form of consumption of low caloric diet & increase in exercise. Diet & modified life styles are also advised to the patients of Sthaulya Roga for correction of their body weight & Lipid profile.

Key words- Obesity, Sthaulya Roga, Nidāna parivarjana.

Introduction:

Today in the era of modernization there is need to check our life style that is very much influence from the western world. Our changing food habits like junk food, fast food, are a major cause to produce Obesity which in turn produces many health hazards like Hypertension, DM & Life style disorders etc. To prevent these hazards there is need of time to return with our old roots which are very much healthier. Ayurveda has a unique concept about preventing these hazards with the theories of *Nidana Parivaejana & Pathyapathya*.

Review-

The concept of Obesity in Ayurveda describes in details as follows-

Definition

Maharshi Charaka was the first person to give the appropriate and precise definition of *Sthaulya*.

Medomāmsātivṛddhatoāccalaspigudarastanaḥ |

*ayathopacayotsāho naro'tisthūla ucyate ||*ⁱ

1. Excessive adipose tissue deposition in the body is known as Obesity.
2. If the body weight is more than 20% of ideal body weight, we concerned the patient as obese.
3. A better index of Obesity is the Body Mass Index (BMI). Few year back National Institute of Health Consensus conference defined Obesity as BMI greater than 27kg. /m². But now a day Obesity is defined as BMI \geq 25kg/m².
4. Park defined Obesity as an abnormal growth of adipose tissue which is in three ways :-
 - (a) Hypertrophic Obesity – Enlargement of fat cell in size.
 - (b) Hyperplastic Obesity – Increase the no. of fat cells.
 - (c) Combination of both.
5. This is a condition of excessive accumulation of fat in fat depots. This is an important nutritional disorder in the rich communities of the world and is not a problem in our country.ⁱⁱ

Although not a direct measure of adiposity, the most widely used method to gauge obesity is the *body mass index* (BMI), which is equal to weight/height² (in kg/m²).ⁱⁱⁱ Other approaches to quantifying obesity include anthropometry (skin-fold thickness), densitometry (underwater weighing), CT or MRI, and electrical impedance. Based on data of substantial morbidity, a BMI of 30 is most commonly used as a threshold for obesity in both men and women. Large-scale epidemiologic studies suggest that all-cause, metabolic, cancer, and cardiovascular morbidity begin to rise (albeit at a slow rate) when BMIs are >25, suggesting that the cut-off for obesity should be lowered. Most authorities use the term *overweight* (rather than obese) to describe individuals with BMIs between 25 and 30. A BMI between 25 and 30 should be viewed as medically significant and worthy of therapeutic intervention,

especially in the presence of risk factors that are influenced by adiposity, such as hypertension and glucose intolerance.

In *Āyurveda* there is no term described like *Hyperlipidaemia* but *Acharaya* widely describe the knowledge about “*Sthaulya Roga (Obesity)* in the context of *Astonindtiya Purusa* as well as *Prameha*.”

In *Charak Samhita Sutra Sthana*^{iv} *Acharaya* counted *Sthaulya* under the eight varieties reduce of impediments which are designated as *Nindita Purusha - Ati Sthaulya*. As described in modern medical science possess properties which very closely resemble with the properties of “*Sneha Dravayas*” i.e. *Meda*; *Vasa* & *Majja* etc. Any increase in their levels above their physiological range in the body is considered as pathological as these factors are capable of producing various lipid disorders in human body. In *Āyurvedic* classics, in reference to “*Sthaulya Roga*” two types of *Meda* (fat) is described viz.

Baddha Meda – The fat which is not mobile and is stored in the form of fat at various places [fat depots/muscles] in the body is termed as “*Baddha Meda*”.

Abaddha Meda – The fat, which is mobile & circulates in the body along with blood in the form of lipids [Cholesterol, Triglycerides, LDL, HDL and VLDL etc.] is termed as “*Abaddha Meda*”.

Excessive *Abaddha Meda* is stored as fat [*Baddha meda*] in the body in the form of serum triglycerides in adipose tissues, resulting in accumulation of more adipose tissues & increased adiposity in the body which is termed as Obesity.

Classification

For the purpose of Diagnosis, Prognosis and easy management disease should be classified as per severity as well as chronicity. Hence classification of *Sthaulya* is essential. But there is no such clear classification was found in Ancient Classics. *Astanga Samgraha*, *Astanga Hridaya* and *Sharangadhara* have thrown little light regarding classification of *Sthaulya* as mentioned In *A.S.Su.* & *A.H.Su.* three types of *Sthaulya* i.e. *Adhika*, *Madhya* and *Hina* have been mentioned for better management while narrating the indication *Langhana Upakrama*.

According to *Charaka*^v, *Sushruta*^{vi} and *Sharangadhara* also accepted the view of *Sushruta*, Considering all these references *Sthaulya* may be classified as:-

(1) HINA STHAULYA (OVER WEIGHT)

- A. BMI 25 to 29.9 kg/m²
- B. Without any complication or secondary disease with less than four undesirable effects.
- C. Duration of less than 1 year obese.

(2) MADHYA STHAULYA (OBESITY CLASS 1 & 2) :-

- A. BMI 30-34.9 kg/m² and 35-39.9 kg/m²
- B. With less complication without any secondary disease
- C. With less than & desirable effects
- D. Within duration of 1 to 5 yrs.

(3) ATI STHAULYA (OBESITY CLASS 3 / SEVERE OR MORBID)

- A. BMI > 40 kg/m²
- B. With systemic complication and or secondary disease
- C. With all eight undesirable effects
- D. With more than 5 years duration.

Obesity is classified using BMI, which is equal to weight/height² (in kg/m²).^{vii}

Table 1: classification of obesity according to BMI

BMI	Classification
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< 18.5	Underweight
18.5–24.9	normal weight
25.0–29.9	Overweight
30.0–34.9	class I obesity
35.0–39.9	class II obesity
≥ 40.0	class III obesity

Excess abdominal fat, assessed by measurement of waist circumference or waist-to-hip ratio, is independently associated with higher risk for diabetes mellitus and cardiovascular disease. Measurement of the waist circumference is a surrogate for visceral adipose tissue and should be performed in the horizontal plane above the iliac crest. Cut points that define higher risk for men and women based on ethnicity have been proposed by the International Diabetes Federation (Table 2).

Table 2: Ethnic-Specific Values for Waist Circumference ^{viii}	
Ethnic Group	Waist Circumference
Europeans	
Men	>94 cm (37 in)
Women	>80 cm (31.5 in)
South Asians and Chinese	
Men	>90 cm (35 in)
Women	>80 cm (31.5 in)
Japanese	
Men	>85 cm (33.5 in)
Women	>90 cm (35 in)
Ethnic south and central Americans	Use south Asian recommendations until more specific data are available.
Sub-Saharan Africans	Use European data until more specific data are available.
Eastern Mediterranean and Middle East (Arab) populations	Use European data until more specific data are available.

Some modifications to the WHO definitions have been made by particular bodies. The surgical literature further breaks down "class III" obesity into super obesity when BMI is more than 45.^{ix} As Asian populations develop negative health consequences at a lower BMI than Caucasians, some nations have redefined obesity; the Japanese have defined obesity as any BMI greater than 25^x while China uses a BMI of greater than 28.^{xi}

Epidemiology

Before the 20th century, obesity was rare; in 1997 the WHO formally recognized obesity as a global epidemic. As of 2005 the WHO estimates that at least 400 million adults (9.8%) are obese, with higher rates

among women than men. Once considered a problem only of high-income countries, obesity rates are rising worldwide and affecting both the developed and developing world.^{xii} These increases have been felt most dramatically in urban settings. The only remaining region of the world where obesity is not common is sub-Saharan Africa.^{xiii}

Data from the National Health and Nutrition Examination Surveys (NHANES) show that the percent of the American adult population with obesity (BMI > 30) has increased from 14.5% (between 1976 and 1980) to 30.5% (between 1999 and 2000). Extreme obesity (BMI >40) has also increased and affects 4.7% of the population. The increasing prevalence of medically significant obesity raises great concern. Obesity is more common among women and in the poor; the prevalence in children is also rising at a worrisome rate.^{xiv}

Obesity in India

Obesity has reached epidemic proportions in India in the 21st century, with morbid obesity affecting 5% of the country's population.^{xv} India is following a trend of other developing countries that are steadily becoming more obese. Unhealthy, processed food has become much more accessible following India's continued integration in global food markets. Indians are genetically susceptible to weight accumulation especially around the waist.

NFHS data

This is a list of the states of India ranked in order of percentage of people who are overweight or obese, based on data from the 2007 National Family Health Survey.^{xvi}

Table 3: State wise prevalence of obesity in India (NFHS data)

States	Males (%)	Males rank	Females (%)	Females rank
Punjab	30.3	1	37.5	1
Kerala	24.3	2	34	2
Goa	20.8	3	27	3
Tamil Nadu	19.8	4	24.4	4
Andhra Pradesh	17.6	5	22.7	10
Sikkim	17.3	6	21	8
Mizoram	16.9	7	20.3	17
Himachal Pradesh	16	8	19.5	12
Maharashtra	15.9	9	18.1	13
Gujarat	15.4	10	17.7	7
Haryana	14.4	11	17.6	6
Karnataka	14	12	17.3	9
Manipur	13.4	13	17.1	11
Uttarakhand	11.4	15	14.8	14
Arunachal Pradesh	10.6	16	12.5	19
Uttar Pradesh	9.9	17	12	18
Jammu and Kashmir	8.7	18	11.1	5
Bihar	8.5	19	10.5	29
Nagaland	8.4	20	10.2	22
Rajasthan	8.4	20	9	20
Meghalaya	8.2	22	8.9	26
Orissa	6.9	23	8.6	25

Assam	6.7	24	7.8	21
Chattisgarh	6.5	25	7.6	27
West Bengal	6.1	26	7.1	16
Madhya Pradesh	5.4	27	6.7	23
Jharkhand	5.3	28	5.9	28
Tripura	5.2	29	5.3	24
India	12.1	14	16	15

Consequences of obesity

A. Morbidity

Excessive body weight is associated with various diseases, particularly cardiovascular diseases, diabetes mellitus type 2, obstructive sleep apnea, certain types of cancer, and osteoarthritis, Non alcoholic fatty liver disease, cholelithiasis, depression and other psychiatric disturbances^{xvii} As a result, obesity has been found to reduce life expectancy.^{xviii} Increases in body fat alter the body's response to insulin, potentially leading to insulin resistance. Increased fat also creates a proinflammatory state, and a prothrombotic state.^{xix xx}

Symptoms and diseases that are directly or indirectly related to obesity are listed in Table 4.

Table 4: Obesity-Related Organ Systems Review

Cardiovascular	Respiratory
Hypertension	Dyspnea
Congestive heart failure	Obstructive sleep apnea
Cor pulmonale	Hypoventilation syndrome
Varicose veins	Pickwickian syndrome
Pulmonary embolism	Asthma
Coronary artery disease	Gastrointestinal
Endocrine	Gastroesophageal reflux disease
Metabolic syndrome	Nonalcoholic fatty liver disease
Type 2 diabetes	Cholelithiasis
Dyslipidemia	Hernias
Polycystic ovarian syndrome	Colon cancer
Musculoskeletal	Genitourinary
Hyperuricemia and gout	Urinary stress incontinence

Immobility	Obesity-related glomerulopathy
Osteoarthritis (knees and hips)	Hypogonadism (male)
Low back pain	Breast and uterine cancer
Carpal tunnel syndrome	Pregnancy complications
Psychological	Neurologic
Depression/low self-esteem	Stroke
Body image disturbance	Idiopathic intracranial hypertension
Social stigmatization	Meralgia paresthetica
Integument	Dementia
Striae distensae	
Stasis pigmentation of legs	
Lymphedema	
Cellulitis	

B. Mortality

Obesity is associated with an increase in mortality, with a 50–100% increased risk of death from all causes compared to normal-weight individuals, mostly due to cardiovascular causes. Obesity and overweight together are the second leading cause of preventable death in the United States, accounting for 300,000 deaths per year. Mortality rates rise as obesity increases, particularly when obesity is associated with increased intraabdominal fat. Life expectancy of a moderately obese individual could be shortened by 2–5 years, and a 20- to 30-year-old male with a BMI > 45 may lose 13 years of life. It is also apparent that the degree to which obesity affects particular organ systems is influenced by susceptibility genes that vary in the population.

C. Economic impact

Services must accommodate obese people with specialist equipment such as much wider chairs. In addition to its health impacts, obesity leads to many problems including disadvantages in employment^{xxi} and increased business costs. These effects are felt by all levels of society from individuals, to corporations, to governments. The estimate range for annual expenditures on diet products is \$40 billion to \$100 billion in the US alone.^{xxiii} In 1998, the medical costs attributable to obesity in the US were \$78.5 billion or 9.1% of all medical expenditures.^{xxivxxv}

Etiology of Obesity as per Ayurveda-

Acharya Charaka has mentioned the *Nidana* of *Sthaulya* analytically in most of them is exogenous types of causes. Endogenous types of causes have been mentioned by *Acharya Sushruta & Vagbhata*. *Vagbhata* also mentioned *Ama* as causative factor. Only *Charaka* has defined *Beejdosha* as one of the cause of *Sthaulya*. In context with *Sthaulya*, exogenous causes are *Meda* stimulating diet & regimens where as *Dosha, Dhatu, Mala & Srotas* etc. come under endogenous causes^{xxvi}

All the *Nidana* (causative factors) mentioned in Ayurvedic classics can be classified into 4 groups – *Aharatmaka nidana, Viharatmaka Nidana, Manas Nidana, Anya Nidana*

Aharatmaka nidana - *Anupa Rasa Sevan, Atisampurana* (over eating), *Guru Ahara Sevan* (excessive consumption of food), *Mamsa Sevan* (Excessive use of meat), *Ikshu Vicar Sevan* (sugarcane preparations), *Payas Vikara Sevan* (milk & its preparations), *Shleshmala Ahara Sevan* (*Kapha* increasing food)

Viharatmaka Nidana - Ayayama (Lack of physical exercise), *Sukha Shayya* (Luxurious sitting), *Bhojanottar idra* (sleep after meal), *Alpavyavaya* (Reduced sex life), *Gandhamalyanusevan* (use of perfumes & garlands).

At an individual level, a combination of excessive caloric intake and a lack of physical activity is thought to explain most cases of obesity.^{xxvii} A limited number of cases are due primarily to genetics, medical reasons, or psychiatric illness.^{xxviii} In contrast, increasing rates of obesity at a societal level are felt to be due to an easily accessible and palatable diet,^[23] increased reliance on cars, and mechanized manufacturing.

Apart from several rare genetic syndromes (listed above) other Medical illnesses that increase obesity risk include: hypothyroidism, Cushing's syndrome, growth hormone deficiency, and the eating disorders: binge eating disorder and night eating syndrome. Certain medications may cause weight gain or changes in body composition; these include insulin, sulfonylureas, thiazolidinediones, atypical antipsychotics, antidepressants, steroids, certain anticonvulsants (phenytoin and valproate), pizotifen, and some forms of hormonal contraception.^{xxix}

OBESITY: TREATMENT

A. The Goal of Therapy

The primary goal of treatment is to improve obesity-related comorbid conditions and reduce the risk of developing future co morbidities. Information obtained from the history, physical examination, and diagnostic tests is used to determine risk and develop a treatment plan. The decision of how aggressively to treat the patient, and which modalities to use, is determined by the patient's risk status, expectations, and available resources. Therapy for obesity always begins with lifestyle management and may include pharmacotherapy or surgery, depending on BMI risk category. Setting an initial weight-loss goal of 10% over 6 months is a realistic target.

B. Lifestyle Management

In Ayurveda various plant based drugs are advocated for the prevention and management of obesity, diabetes and dyslipidemia. In Ayurveda metabolic syndrome and its association with diabetes (prameha) can be correlated with obesity (medo-roga). Various pharmacologic and non-pharmacologic methods has been prescribed in Ayurveda for treatment of Obesity

In obesity (medo-roga), those drugs which have Rasāyana, Balya and Jivaniya action, as well as Pramehaghna properties like 'Silajatu, Amalaki, Haridra, Guduchi, Pippali etc. are useful. Sushruta has indicated 'Silajatu (naimittika rasayana) together with decoction of Salasaradigana dravyas for the treatment of Madhumeha, these all Drugs having Rasāyana and Jivaniya properties along with Pramehaghna properties such as Amalaki, Haridra, Silajatu, Guduchi etc. are given as an adjuvant to known (conventional) hypoglycemic agents effective in Obesity (medo-roga). Such kinds of drugs help to, reduce insulin requirement, prevent or delay long-term complications, generate sense of well being and maintain healthy life.

Lifestyle modification such as weight control, increased physical exercise, and smoking cessation are potentially beneficial in preventing obesity (medo-roga) and its complications (**Leung and Lam, 2000**). People should be encouraged to adopt the preventive interventions of obesity like maintaining normal body weight (BMI 18.5-24.9 kg/m²), engage in regular aerobic physical activity such as brisk walking (at least 30-min per day, most days of the week), limit consumption of alcohol, and consume a diet rich in fruits, vegetables, and low fat dairy products. Several studies of community-based non-communicable disease prevention projects attempted to prevent the onset of obesity through life style modification, reduction in obesity or through pharmacological mean and clearly demonstrated risk factors reduction by healthy life style bring a huge benefit to the public (**Integrated community-based prevention, 2003**).

Obesity care involves attention to three essential elements of lifestyle: dietary habits, physical activity, and behavior modification. Because obesity is fundamentally a disease of energy imbalance, all patients must learn how and when energy is consumed (diet), how and when energy is expended (physical activity), and how to incorporate this information into their daily life (behavior therapy). Lifestyle management has been shown to result in a modest (typically 3–5 kg) weight loss compared to no treatment or usual care.

C. Diet Therapy^{xxx, xxxi, xxxii}

The primary focus of diet therapy is to reduce overall calorie consumption. The NHLBI guidelines recommend initiating treatment with a calorie deficit of 500–1000 kcal/d compared to the patient's habitual diet. This reduction is consistent with a goal of losing approximately 1–2 lb per week. This calorie deficit can be accomplished by suggesting substitutions or alternatives to the diet. Examples include choosing smaller portion sizes, eating more fruits and vegetables, consuming more whole-grain cereals, selecting leaner cuts of meat and skimmed dairy products, reducing fried foods and other added fats and oils, and drinking water instead of caloric beverages. It is important that the dietary counseling remains patient-centered and that the goals are practical, realistic, and achievable.

The macronutrient composition of the diet will vary depending on the patient's preference and medical condition. The 2005 U.S. Department of Agriculture Dietary Guidelines for Americans, which focus on health promotion and risk reduction, can be applied to treatment of the overweight or obese patient. The recommendations include maintaining a diet rich in whole grains, fruits, vegetables, and dietary fiber; consuming two servings (8 oz) of fish high in omega 3 fatty acids per week; decreasing sodium to <2300 mg/d; consuming 3 cups of milk (or equivalent low-fat or fat-free dairy products) per day; limiting cholesterol to <300 mg/d; and keeping total fat between 20 and 35% of daily calories and saturated fats to <10% of daily calories. Application of these guidelines to specific calorie goals can be found on the website www.mypyramid.gov. The revised Dietary Reference Intakes for Macronutrients released by the Institute of Medicine recommends 45–65% of calories from carbohydrates, 20–35% from fat, and 10–35% from protein. The guidelines also recommend daily fiber intake of 38 g (men) and 25 g (women) for persons over 50 years of age and 30 g (men) and 21 g (women) for those under 50.

A current area of controversy is the use of low-carbohydrate, high-protein diets for weight loss. These diets are based on the concept that carbohydrates are the primary cause of obesity and lead to insulin resistance. Most low-carbohydrate diets (e.g., South Beach, Zone, and Sugar Busters!) recommend a carbohydrate level of approximately 40–46% of energy. The Atkins diet contains 5–15% carbohydrate, depending on the phase of the diet. Several randomized, controlled trials of these low-carbohydrate diets have demonstrated greater weight loss at 6 months with improvement in coronary heart disease risk factors, including an increase in HDL cholesterol and a decrease in triglyceride levels. Weight loss between groups did not remain statistically significant at 1 year; however, low-carbohydrate diets appear to be at least as effective as low-fat diets in inducing weight loss for up to 1 year.

Another dietary approach to consider is the concept of energy density, which refers to the number of calories (energy) a food contains per unit of weight. People tend to ingest a constant volume of food, regardless of caloric or macronutrient content. Adding water or fiber to a food decreases its energy density by increasing weight without affecting caloric content. Examples of foods with low-energy density include soups, fruits, vegetables, oatmeal, and lean meats. Dry foods and high-fat foods such as pretzels, cheese, egg yolks, potato chips, and red meat have a high-energy density. Diets containing low-energy dense foods have been shown to control hunger and result in decreased caloric intake and weight loss.

Occasionally, very-low-calorie diets (VLCDs) are prescribed as a form of aggressive dietary therapy. The primary purpose of a VLCD is to promote a rapid and significant (13–23 kg) short-term weight loss over a

3–6 month period. These propriety formulas typically supply ≤ 800 kcal, 50–80 g protein, and 100% of the recommended daily intake for vitamins and minerals. According to a review by the National Task Force on the Prevention and Treatment of Obesity, indications for initiating a VLCD include well-motivated individuals who are moderately to severely obese (BMI >30), have failed at more conservative approaches to weight loss, and have a medical condition that would be immediately improved with rapid weight loss. These conditions include poorly controlled type 2 diabetes, hypertriglyceridemia, obstructive sleep apnea, and symptomatic peripheral edema. The risk for gallstone formation increases exponentially at rates of weight loss >1.5 kg/week (3.3 lb/week). Prophylaxis against gallstone formation with ursodeoxycholic acid, 600 mg/d, is effective in reducing this risk. Because of the need for close metabolic monitoring, these diets are usually prescribed by physicians specializing in obesity care.

(D) Physical Activity Therapy^{xxxiii}

Although exercise alone is only moderately effective for weight loss, the combination of dietary modification and exercise is the most effective behavioral approach for the treatment of obesity. The most important role of exercise appears to be in the maintenance of the weight loss. Currently, the *minimum* public health recommendation for physical activity is 30 min of moderate intensity physical activity on most, and preferably all, days of the week. Focusing on simple ways to add physical activity into the normal daily routine through leisure activities, travel, and domestic work should be suggested. Examples include walking, using the stairs, doing home and yard work, and engaging in sport activities. Asking the patient to wear a pedometer to monitor total accumulation of steps as part of the activities of daily living is a useful strategy. Step counts are highly correlated with activity level. Studies have demonstrated that lifestyle activities are as effective as structured exercise programs for improving cardiorespiratory fitness and weight loss. The Dietary Guidelines for Americans 2005 summarizes compelling evidence that at least 60–90 min of daily moderate-intensity physical activity (420–630 min per week) is needed to sustain weight loss. These recommendations are daunting to most patients and need to be implemented gradually. Consultation with an exercise physiologist or personal trainer may be helpful.

(E) Behavioral Therapy

Cognitive behavioral therapy is used to help change and reinforce new dietary and physical activity behaviors. Strategies include self-monitoring techniques (e.g., journaling, weighing, and measuring food and activity); stress management; stimulus control (e.g., using smaller plates, not eating in front of the television or in the car); social support; problem solving; and cognitive restructuring to help patients develop more positive and realistic thoughts about themselves. When recommending any behavioral lifestyle change, have the patient identify what, when, where, and how the behavioral change will be performed. The patient should keep a record of the anticipated behavioral change so that progress can be reviewed at the next office visit. Because these techniques are time-consuming to implement, they are often provided by ancillary office staff such as a nurse clinician or registered dietitian.

Summary and Conclusion

Obesity is major health problem in today's era. Initially thought to be problem limited to rich nations only, prevalence of obesity is now rapidly increasing in developing countries including India. It has significant effect on overall morbidity as well as mortality; also very huge amount of money is spent every year. Although BMI is still considered as standard marker of obesity, more focus is being paid on distribution of obesity like waist: hip ratio. In management of obesity diet and life style modification constitute most important measures.

References

- ⁱ Charak Samhita With Ayurveda Dipika Commentary Of Chakrapani Datta,Ed. Yadavji Trikarma Ji Acharya, Chaukhambha Surbharti Prakashan, Varanasi.Edition 7th, 2002, *Sutra Sthana* Chapter 21 Verse 9, Page-279
- ⁱⁱ Metabolic Disease P.C.Das 1993 Reprint 3rd Edi-Page 762
- ⁱⁱⁱ WHO Consultation On Obesity 2000. Obesity: Preventing And Managing The Global Epidemic: Report Of A WHO Consultation. (WHO Technical Series Report 894). Page 9.
- ^{iv} Charak Samhita With Ayurveda Dipika Commentary Of Chakrapani Datta,Ed. Yadavji Trikarma Ji Acharya, Chaukhambha Surbharti Prakashan, Varanasi. Edition 7th, 2002, *Sutra Sthana* Chapter 21 Verse 3, page- 278
- ^v Charak Samhita With Ayurveda Dipika Commentary Of Chakrapani Datta,Ed. Yadavji Trikarma Ji Acharya, Chaukhambha Surbharti Prakashan, Varanasi. *Charaka.Siddhi Sthan Chapter 2* Verse 8, Page- 895
- ^{vi} Sushruta Samhita Comentary Of Dalhana, Ed. Acharya Y.T. Chaukhambha Surbharti Prakashan, Varanasi, Reprint 2008, *Chikitsa Sthana Chapter 33* Verse 14-18, page- 517
- ^{vii} WHO Consultation On Obesity 2000. Obesity: Preventing And Managing The Global Epidemic: Report Of A WHO Consultation. (WHO Technical Series Report 894), Page 9.
- ^{viii} Alberti Et Al For The IDF Epidemiology Task Force Consensus Group: The Metabolic Syndrome—A New Worldwide Definition. *Lancet*. 2005; 366:1059-1062.
- ^{ix} Sturm R. "Increases In Morbid Obesity In The USA: 2000–2005". *Public Health*. 2007; 121 (7): 492–496.
- ^x Kanazawa M, Yoshiike N, Osaka T, Numba Y, Zimmet P, Inoue S. "Criteria And Classification Of Obesity In Japan And Asia-Oceania". *Asia Pac J Clin Nutr*. 2002; 11 Suppl 8: S732–S737.
- ^{xi} Bei-Fan Z; Cooperative Meta-Analysis Group Of Working Group On Obesity In China. "Predictive Values Of Body Mass Index And Waist Circumference For Risk Factors Of Certain Related Diseases In Chinese Adults: Study On Optimal Cut-Off Points Of Body Mass Index And Waist Circumference In Chinese Adults". *Asia Pac J Clin Nutr*. 2002. 11 Suppl 8: S685–693.
- ^{xii} Constantine T; Hainer, Vojtech; Basdevant, Arnaud' Maximo Et Al. "Management Of Obesity In Adults: European Clinical Practice Guidelines". *The European Journal Of Obesity*. 2008; 1 (2): 106–116.
- ^{xiii} Haslam DW, James WP. "Obesity". *Lancet*. 2005; 366 (9492): 1197–1209.
- ^{xiv} Ogden CL Et Al: Prevalence Of Overweight And Obesity In The United States, 1999–2004. *JAMA*. 2006; 295:1549-1555.
- ^{xv} "India Facing Obesity Epidemic: Experts". *The Hindu*. 2007-10-12. [Http://Hindu.Com./2007/10/12/Stories/2007101260940600.Htm](http://Hindu.Com./2007/10/12/Stories/2007101260940600.Htm).
- ^{xvi} Third National Family Health Survey. Mumbai: International Institute For Population Sciences. 2006. [Http://Nfhsindia.Org/Nfhs3 National Report.Html](http://Nfhsindia.Org/Nfhs3 National Report.Html).
- ^{xvii} Bray GA. "Medical Consequences Of Obesity". *J. Clin. Endocrinol. Metab.*2004; 89 (6): 2583–2589.
- ^{xviii} Bray GA. "Medical Consequences Of Obesity". *J. Clin. Endocrinol. Metab.*2004; 89 (6): 2583–2589.

^{xix} Shoelson SE, Herrero L, Naaz A. "Obesity, Inflammation, And Insulin Resistance". *Gastroenterology* 2007; 132 (6): 2169–2180.

^{xx} . Shoelson SE, Lee J, Goldfine A. "Inflammation And Insulin Resistance". *J. Clin. Invest.* 2006; 116 (7): 1793–1801.

^{xxi} Johansson E, Bockerman P, Kiiskinen U, Heliovaara M. "Obesity And Labour Market Success In Finland: The Difference Between Having A High BMI And Being Fat.". *Economics And Human Biology.* 2009; 7 (1): 36–45.

^{xxii} Cummings, Laura (5 February 2003). "The Diet Business: Banking On Failure". *BBC News*. [Http://News.Bbc.Co.Uk/2/Hi/Business/2725943.Stm.152](http://News.Bbc.Co.Uk/2/Hi/Business/2725943.Stm.152)

^{xxiii} . Cummings, Laura (5 February 2003). "The Diet Business: Banking On Failure". *BBC News*. [Http://News.Bbc.Co.Uk/2/Hi/Business/2725943.Stm.152](http://News.Bbc.Co.Uk/2/Hi/Business/2725943.Stm.152)

^{xxiv} "Obesity And Overweight: Economic Consequences". *Centers For Disease Control And Prevention*. [Http://Www.Cdc.Gov/Nccdphp/Dnpa/Obesity/Economic_Consequences.Htm](http://Www.Cdc.Gov/Nccdphp/Dnpa/Obesity/Economic_Consequences.Htm).

^{xxv} Van Baal PH, Polder JJ, De Wit GA, Et Al. "Lifetime Medical Costs Of Obesity: Prevention No Cure For Increasing Health Expenditure". *Plos Med.* 2008; 5 (2): E29.

^{xxvi} (Cha.Su.21)

^{xxvii} Lau DC, Douketis JD, Morrison KM, Hramiak IM, Sharma AM, Ur E. "2006 Canadian Clinical Practice Guidelines On The Management And Prevention Of Obesity In Adults And Children [Summary]". *CMAJ.* 2007; 176 (8): S1–13.

^{xxviii} . Bleich S, Cutler D, Murray C, Adams A. "Why Is The Developed World Obese?". *Annu Rev Public Health.* 2008; 29: 273–295.

^{xxix} . Haslam DW, James WP. "Obesity". *Lancet.* 2005; 366 (9492): 1197–1209.

^{xxx} . Strychar I. "Diet In The Management Of Weight Loss". *CMAJ.* 2004; 174 (1): 56–63.

^{xxxi} . Shick SM, Wing RR, Klem ML, Mcguire MT, Hill JO, Seagle H. "Persons Successful At Long-Term Weight Loss And Maintenance Continue To Consume A Low-Energy, Low-Fat Diet". *J Am Diet Assoc.* 1998; 98 (4): 408–413

^{xxxii} Tate DF, Jeffery RW, Sherwood NE, Wing RR. "Long-Term Weight Losses Associated With Prescription Of Higher Physical Activity Goals. Are Higher Levels Of Physical Activity Protective Against Weight Regain?". *Am. J. Clin. Nutr.* 2007; 85 (4): 954–959.

^{xxxiii} Tate DF, Jeffery RW, Sherwood NE, Wing RR. "Long-Term Weight Losses Associated With Prescription Of Higher Physical Activity Goals. Are Higher Levels Of Physical Activity Protective Against Weight Regain?". *Am. J. Clin. Nutr.* 2007; 85 (4): 954–959.