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OBESITY, ITS SYMPTOMS, RISK FACTORS AND CO-MORBIDITIES

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ABSTRACT

The word obesity has now a day being termed as Globosity by WHO because of its global reach is extending its arena worldwide. Not only in the developed but the developing countries are also having a toll of significant economic burden due to obesity and its co-morbidities. The onset of Obesity is not a single factor but an amulgum as well as association of multiple economic, hormonal, neural, genetic as well as social factors. The present review describes the Global along with the national status of Obesity in concurrence with changing risk factors and co-morbidities in India. The more emphasis on public as well as government initiatives is the need of the hour to control the devastating effects of obesity to make the nation healthy and strong.

Keywords: Obesity, co- morbidities, risk factors, global impact of obesity.

INTRODUCTION

Obesity has always been looked upon as a disease of rich and well off people. The disease is however now budding as one of the global burden disease as it is indicative of word "Globosity" which is used by WHO in 2016 to describe global epidemic of obesity and overweight. The disease itself is not just because of excessive eating but because of imbalance between the consumption of calories and their burning or dislocation which can be multi factorial. This further leads to deposition of the excess fat in subcutaneous tissue or adipose tissue and is one of the important contributors of several co morbidities and causing a huge economic trouble. Among non communicable disorders it is catching interest and is now being considered as global public health issue. Though it is regarded as easily curable disorder the World health organisation has described obesity to be identified as accumulation of excessive fat and causing a risk to the health in multiple manners (WHO 2016, 2022). Obesity is not prevalent in adults only but is quite prevailing in children also.

The level of Obesity is calculated as per different indices for children and adults. The levels of obesity are described as different parameters such as waist to hip ratio, waist circumference as well as BMI in case of adults and as percentile in case of children. Waist to hip ratio or WHR is calculated as ratio of waist to hip circumference as

WHR = Waist circumference/ Hip Circumference.

BMI or body mass index is calculated as per Quetelet index

$$BMI = Weight\ (Kg)/\ Height^2\ (Meter2)$$

Percentiles Boys and Girls graphs are recorded as percentile charts by World Health Organisation (WHO) and Indian Academy of Paediatrics (IAP) as per revised updates.

The levels of obesity have been related to various diseases and morbidities by various health survey reports as well as WHO reports. The relationship of waist circumference and BMI with various morbidities is also elucidated by WHO expert consultation report 2008 as described in table 2.

Table 1: Description of Percentile values in case of children of age 1-18 years (Khadilkar et al 2015)

S. No	BMI Level	Condition
1	BMI below the 5th percentile.	Underweight
2	BMI between the 5th to the 85th percentile	Healthy weight
3	BMI between the 85th percentile and the 95th percentile.	**Overweight**
4	BMI in the 95th percentile or above	**Obesity**

Table 2: The relationship of Obesity to Body mass index and waist circumference (WHO consultation report 2008)

S. No	Category	Body mass index (weight/height^2)	Ranking of Obesity	Waist circumference values relative to risk of co morbidities	
				Men < 102 cm Women < 88 cm	Men >102 cm Women >88 cm
1	Underweigh t	< 18.5	N A	Very less	Very less
2	Normal	18.5-24.9	NA	Very less	Very less
3	Overweight	25.0-29.9	Optimum	Raised risk	Elevated risk
4	Obesity	30.0-34.9 35.0-39.9	I II	Elevated risk Very high risk	Very high risk Very high risk
5	Extreme Obesity	>40	III	Extremely high risk	Extremely high risk

I. Global Impact of obesity

Among non-communicable diseases National Family health Survey is being conducted in periodic manner from 1992 till 2021 as depicted in figure 1 for the strengthening the research capabilities of population research centres of India. In their perspective studies they have revealed astonishing findings for various health and nutritive factors. They have devised increase in obesity nearly ten folds in both male and female cases. NFHS -5 has emphasised obesity as a major metabolic risk factor for the total of 65% of Non Communicable disease (NCD) mortalities. The report of National Family Health Survey (NHFS- 5), 2019-21 has described an increase in WHR from 46% (age group 15 -19 years) to 65 % in females (age group 40-49 years) while the same has represented and increased level from 28% (age group 15 -19 years) to 60 % (age group 40-49 years) in males.

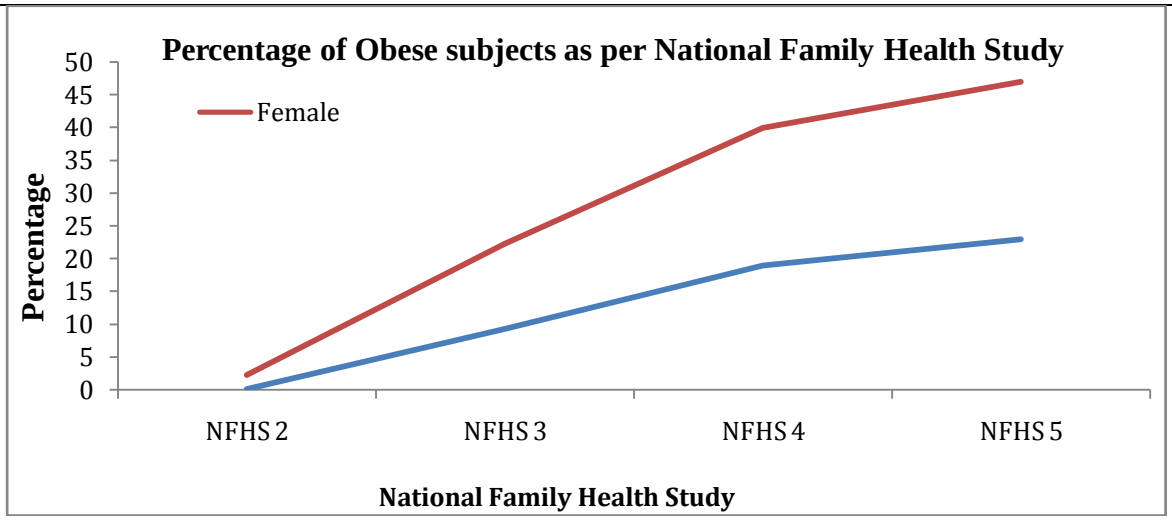

Figure 1: The elevating number of obese male and female subjects over 1998 till 2021 as per NFHS reports.

As per the WHO survey global finding for the burden of disease astonishing results have been showing enormous rise in obese subjects in last 10 years around the globe (NCD 2017) and is expected to raise manifold in future. The Global economic report 2022 reveals that obesity is a cause of economic burden upon the Gross development productivity (GDP) and has caused a loss of nearly 23 billion US $ in India also. The Economic impact of obesity and overweight in India is 0.8% of GDP and its impact is quite prominent as per economic burden in terms of US $ as described in Figure 2.

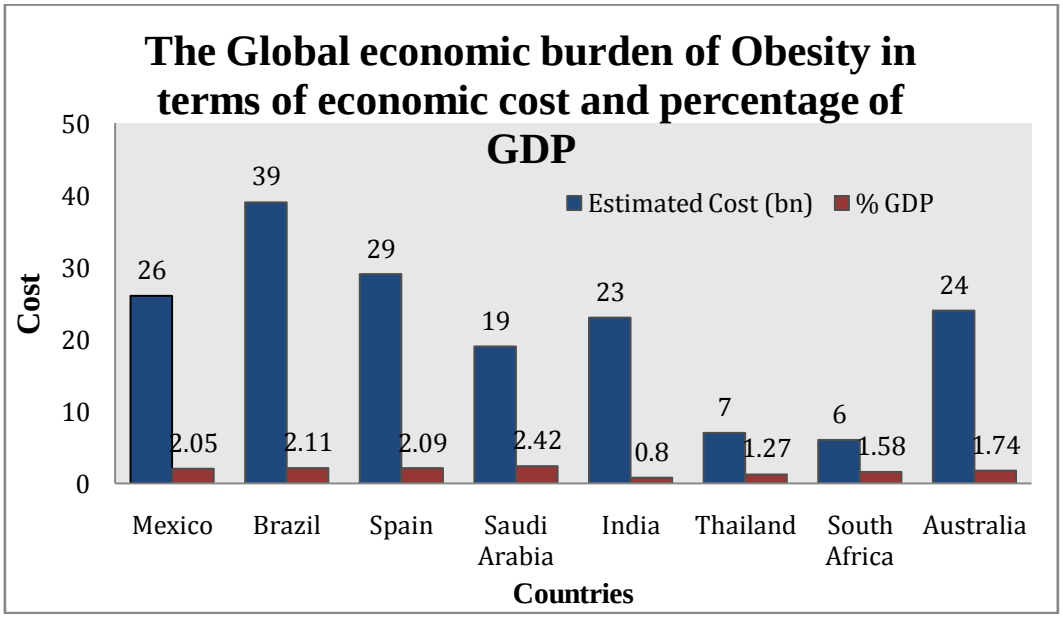

Figure 2: The global burden and economic burden of obesity as per Global Economic of Obesity.

II. Causative factors

The factors disposing one to the put on of obesity is not a single step process but is complex and multi-factorial process comprising a cascade of events with neural and humoral mechanism influenced by various factors such as overeating, lack of physical activity, modified gastro intestinal hormones, enhanced appetite as well. With advancing socioeconomic pressure with technology the misuse of lifestyle advantages are also proving to be a causative of obesity. The acquire of obesity is described as accumulation as well as amalgam of various factors as described in **Figure: 3** such as

Life style changes: The unhealthy lifestyle with most of time spent physically inactive or transition to industrialised world with most of the sitting jobs more involvement in watching TV, playing video games along with much time spent on mobile phone along with pass time munching is considered as one of the major cause of obesity. (Daniels et al, 2005)

High Calorie intake with more of junk food and fast food has added multiple time to more of fat depositions as excessive consumption of unhealthy food deprive one from the nutritional food as well as contributed to declined metabolic rate which add up to obesity. (Eisenmann et al, 2002 and Lowry et al, 2002).

Decline in physical activity: Physical activity helps in increasing the whole body enhanced metabolism which add to dislocate the accumulated fat reserves which is further influencing the obesity rate as reported by Driskell 2008 and Lowry et al 2009. Zhu et al (2019) among Chinese children also elucidated physical in activity and increased screen time as major causative of Obesity.

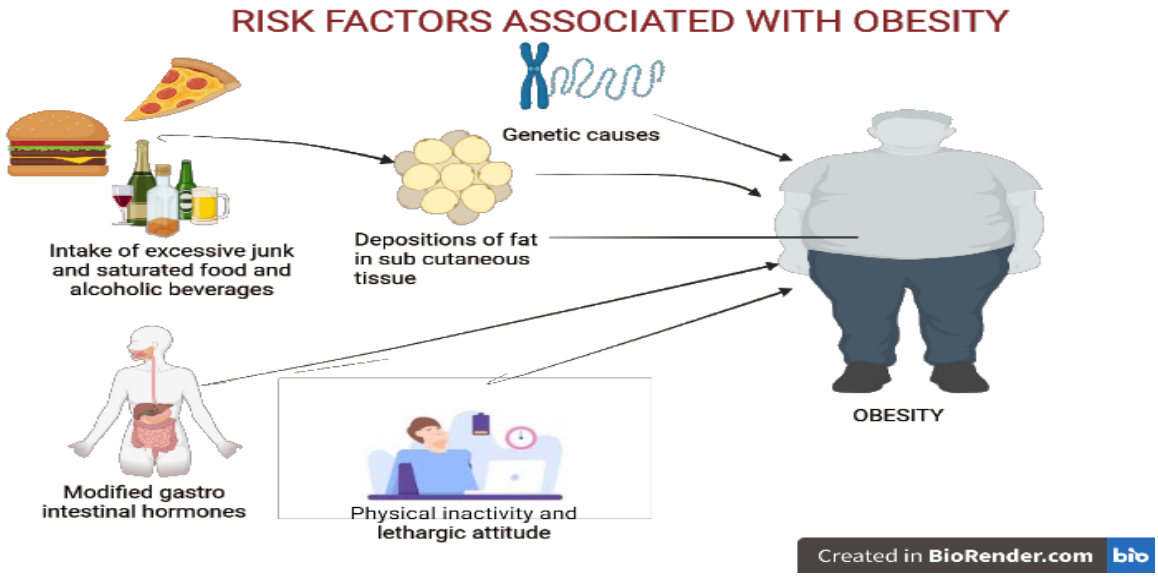

Figure 3: Causative factors for obesity

Genetic basis: The gene MC4R and several other genes with variants have been found to be encoding for melanocortin 4 receptor if modified of have genetic change deprives it of its function to control metabolic rate and causes hyperphagia and leads to consistent overeating causing obesity. Though the disorder is found in very small fraction of obese people (≤5%) of obese people but is an important contributory factor. (Choquet and Meyre 2011)

Gastro intestinal hormones: the gut hormones are also described as important enhancers for increased appetite and induce metabolic activities and are contributor of obesity and improved gut hormones can affect the metabolic effects as well as obesity. (Mona and Inge 2021)

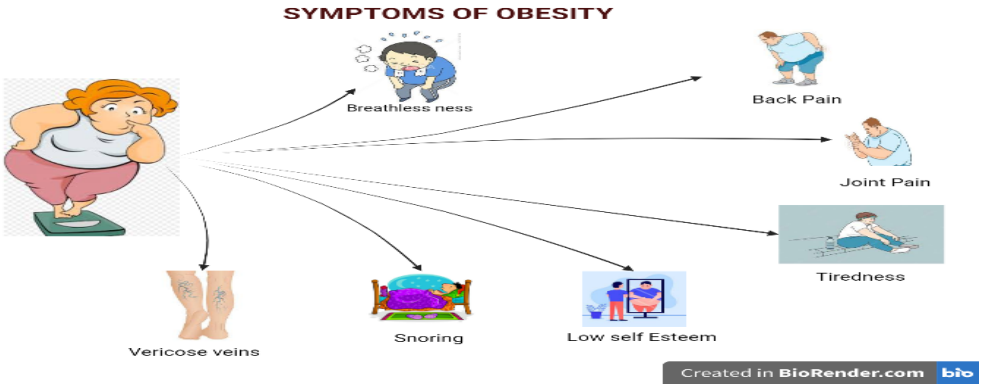

Figure 4: Symptoms associated with the obese subject

III. Symptoms

Obesity is now being regarded as a disease by health agencies like American Medical Association, WHO and NFHS India and the disease is having multiple symptoms associated with as described in Figure: 4 to identify the level of disease including

Joint pain: Pain in lower back, joints is frequently associated with obese and overweight person with having difficulty in bending and folding down of body parts.

Fat deposition around soft body parts especially around abdomen and waist.

Fatigue: Breathlessness, person gets fatigued very soon in even a light activity may lead to breathlessness

Sleeping Disorder: Various workers like Beccuti and Pannain 2011 and Ogilvie and Patel 2017 have described relationship between uncomfortable sleep and increased rate of weight gain leading to obesity.

Dyslipidemia: Having elevated levels of cholesterol and abnormal lipid levels are associated with obesity

Unusual Sweating: Profuse sweating while working as well as at rest.

Skin problems: the obese people are having puffy skin, besides this skin also shows accumulated moisture in the skin folds as well as varicose veins

Low Self Esteem: Along with various symptoms one of the most important is related to psychological implications and is elucidated by Değirmenci et al 2015. They described lowered self esteem, feeling of depression and hesitation to represent itself publically and socially which further leads to social limitation and isolation to be very common. Thus the multi-factorial disease can be assessed by various symptoms and taken care for its onset and remedial measures.

IV. Risk factors and associated co-morbidities:

The inception of malfunctioning of obesity leads to further complications and may lead to be a causative for various co morbidities and is multifactorial implicator of various disorders (Akhtar et al, 2017) complex diseases as summarised in Figure 5.

Mortality: The various workers like Berrington de Gonzalez et al, 2010 and Kuk et al, 2011 have described a decline in life expectancy of obese people by nearly 5 – 10 years.

Cancer: The incidence of elevated level of cancers such as Tumor necrotic factors (TNFs) among obese has been described by Hursting and Dunlap 2012.

Cardio Vascular and related Disorders: the higher BMI is associated with a number of mortality rates by heart disease and its related disorders such as hypertension by Akil and Ahmad 2011, while higher significant association of obesity and risk of dyslipidemia is reported by Musunuru 2010, hemorrhagic stroke, Ischemia at higher rate has been devised by various studies conducted by Centre for disease control and prevention 2011, Lavie et al 2009, Din-Dzietham et al 2007 and many more.

Sleeping disorders: Obesity is significantly related with sleep apnea syndrome , snoring andobstructive sleep like disorders by Xanthopoulos et al, 2018

Type 2 diabetes: Kumar et al 2010 and National Diabetes Statistics report 2017, 2020 have described type 2 diabetes as one of major co-morbidity of obese people and suggested a significant decline in onset of diabetes by controlled body weight and regular physical activity. National Diabetes Survey 2020 reported 89% of subjects suffering from Diabetes to be obese.

Disorders of Alimentary canal and GI system: The higher obesity rates are correlated with quick progress of kidney disorders, Gall stones, Fatty liver disease,

Risk of reproductive disorders like high BP during pregnancy, high risk of gestational diabetes and more incidence of C- section etc (Kuk et al, 2011)

Psychological Disorders : Along with this the emotional and social problems are also associated with the obesity such as low self esteem, shame, fear of guilt, rejection syndrome which may worsen the mental health of the sufferer as Değirmenci et al 2015 also described psychological disorders most common among the obese subjects.

V. Future Remedies and Prospective

It is devised that obesity in itself is a hidden root cause of various co morbidities which can take toll of one's life. As the population diverting towards obese condition is fetching major economic burden in developed as well as developing nations. It should be recognised as an independent disease so that its risk factors and contribution to other diseases can be better understood. Obesity is a multifactorial with genetic, hormonal, environmental, commercial, social as well as metabolic factors lying behind it. The condition can be controlled upto large extent by adapting a physically active life style along with conscious eating habits. The control of the body weight can help in significant decline in related co morbidities. The weight stigma put an emotional as well as depressive pressure on people. Regarding control of obesity, community attentiveness plans concerning direct and indirect consequences of obesity should be conducted. The Government policies for physically active lifestyle are the need of the hour. The healthy weight management with conscious efforts can help in developing a healthy and a strong life as well as contribute to the well being of a nation as well.

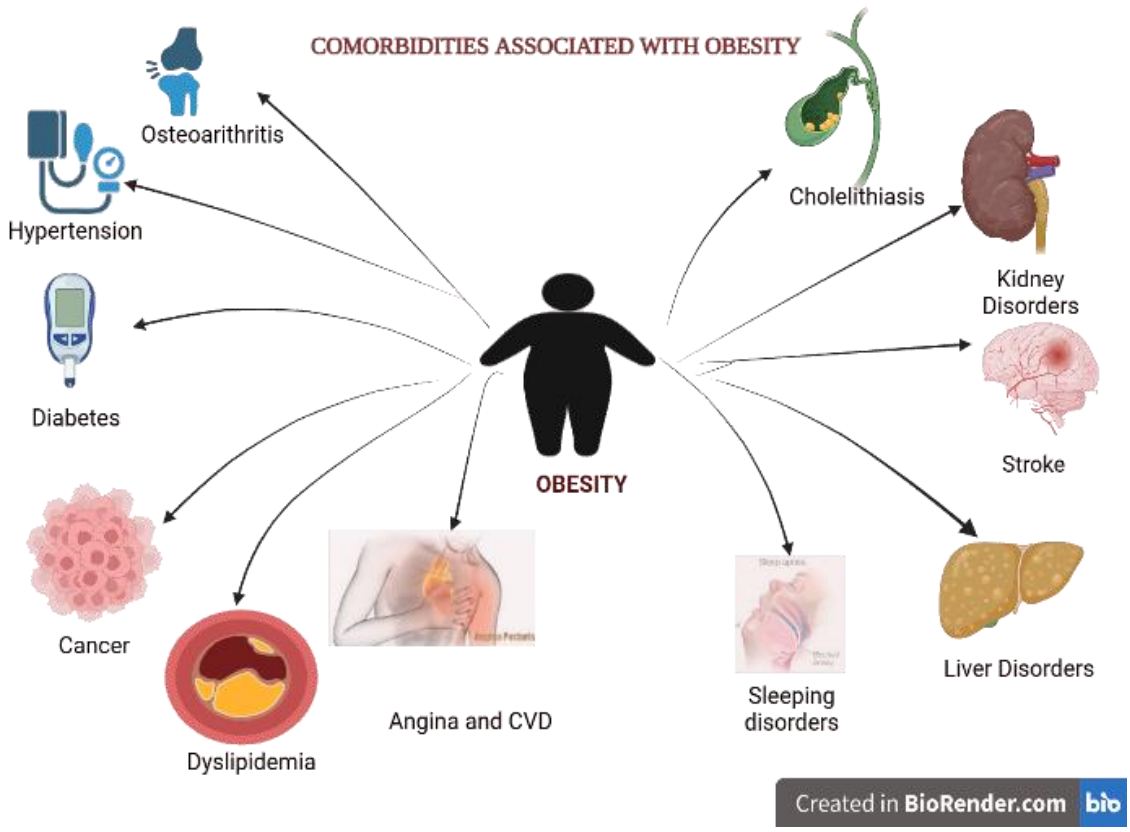

Figure 5: The various co morbidities associated with obesity

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