Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Zoology

Review Based Study on Prevalance of Obesity–An Invited Public Health Problem

Wahied Khawar Balwan[1*], Neelam Saba[2]

[1]Associate Professor, Department of Zoology, Govt. Degree College Doda, Jammu & Kashmir
[2]Assistant Professor, Department of Zoology, Govt. Postgraduate College Bhaderwah, Jammu & Kashmir

DOI: https://doi.org/10.36347/sjmcr.2025.v13i03.018 | **Received:** 04.02.2025 | **Accepted:** 10.03.2025 | **Published:** 12.03.2025

***Corresponding author:** Wahied Khawar Balwan
Associate Professor, Department of Zoology, Govt. Degree College Doda, Jammu & Kashmir

Abstract **Review Article**

Obesity is a medical condition described as excess body weight in the form of fat. When accumulated, this fat can lead to severe health impairments. The prevalence of obesity across the world continues to rise and this is now recognised as one of the most important public health problems facing the world today. Obesity is escalating at an alarming rate worldwide, affecting children and adults in both developed and developing countries. The worldwide prevalence of obesity has more than tripled between 1975 and 2022. Obesity is preventable. Most of the world's population live in countries where overweight and obesity kills more people than underweight. Obesity is becoming a severe public health problem; its epidemiology is increasing rapidly. The exposure factors vary across different geopolitics. Primarily, living in obesogenic environments such as sedentary life style, urbanization, and rural to urban migration, consuming energy dense foods, and physical inactivity were determinants.

Keywords: Obesity, Impairment, Fat, Preventable, Geopolitics, Epidemiology and Osteoarthritis.

INTRODUCTION

Obesity is associated with adverse health outcomes throughout the life course. WHO has adopted definitions of adult obesity based upon the body mass index (BMI weight in kilograms divided by the square of the height in meters (World Health Organization, 1998). Although generally acceptable for epidemiology, this method of defining obesity cannot account for differences in muscle mass between subjects, and it is well known that heavily muscled individuals may fulfil WHO criteria to be labelled obese even though their total and percentage by fat content is low (e.g. most champion heavy weight boxers). This is a limitation with the WHO definition because the co-morbidities of obesity are probably more related to the amount of fat tissue that an individual carries than to their total weight. But for our country Dr. Mandal's formula is more acceptable than BMI [27, 28]. According to this formula maximum weight should be height in cm minus 100cm in kg. (Which means if a person has the height of 165 cm his weight should not exceed 65 kgs. and the lowest weight should be 15% less; here it is 55 kg). The overweight should be expressed in percentage of overweight or by kg of overweight instead of overweight, obese and morbid overweight as an index of overweight. This will give to idea about the overweight to the patient [27, 28]. In Asians, a BMI of 27 Kg/m^2 is equivalent to a value of $30kg/m^2$ in other groups (Table 1).

Table 1: WHO definition of adult obesity by body mass index (BMI) in Caucasians

Category	BMI (Kg/m^2)
Underweight	< 18.5
Healthy, Normal or Acceptable	18.5 – 24.9
Overweight	25.0 – 29.9
Obese	30.0 – 39.0
Morbid Obesity	40.0 (Jones *et al*., 1997)

Source: World Health Organisation (1998)

EPIDEMIOLOGY OF OBESITY

With world becoming more developed, obesity has emerged as a greater public health issue across the globe. The prevalence of people living with either overweight or obesity is increasing worldwide, and since 1975, this has almost tripled with world becoming more developed, obesity has emerged as a greater public health issue across the globe.

The prevalence of people living with either overweight or obesity is increasing worldwide, and since 1975, this has almost tripled with world becoming more developed, obesity has emerged as a greater public health issue across the globe.

The prevalence of people living with either overweight or obesity is increasing worldwide, and since 1975, this has almost tripled with world becoming more developed, obesity has emerged as a greater public health issue across the globe.

The prevalence of people living with either overweight or obesity is increasing worldwide, and since 1975, this has almost tripled with world becoming more developed, obesity has emerged as a greater public health issue across the globe.

The prevalence of people living with either overweight or obesity is increasing worldwide, and since 1975, this has almost tripled [37]. Obesity is a major health problem and rates have risen dramatically in recent years, in fact, it has been estimated that worldwide there are now more-obese individuals than malnourished, with about 22 million obese children under 5 years old. In Europe, the overall prevalence figures are around 20% in men and 15.25% in woman in 2004. The prevalence has increased by around 40% in most extent, a more sedentary lifestyle. In some developing countries there may also have been a concomitant increase in the consumption of energy or fat, but in Western societies, total energy intake has been falling. In the UK, the prevalence of obesity has more than doubled in women and tripled in men since 1980. In 2002, 22% of men and 23% of women in England were clinically obese and a further 43% of men and 34% of women were overweight. The 2017 global nutrition report showed that 2 billion adults are overweight / obese and 41 million children are overweight worldwide (Development Initiative, Global Nutrition Report 2017). In the last three decades, obesity increased globally; unexpectedly, it is also rising in low- and middle-income countries due to uncontrolled urbanization and nutrition transition (shifting dietary habit from traditional to westernized diet) [19-24]. The global prevalence of overweight in children aged less than five years was increased modestly. The trend of overweight was heterogeneous in low- and middle-income countries. Meanwhile, the prevalence of obesity in children aged 2–4 years has increased moderately. In 1975, children with obesity aged 5–19 years were relatively rare, but it becomes highly prevalent in 2016 [11]. In the majority of European countries, the prevalence was increased from 10% to 40% in the last 10 years, and specifically in England, it increased more than threefolds [4]. The prevalence of obesity among reproductive age women was 5.1% in India [5], 15.7% in Palestinian schoolchildren, and 34.8% among adult populations of Saudi Arabia [7]. The prevalence of overweight and obesity was 40.9% in Kuwait among children aged 6–8 years. Amazingly, their mothers' perceive that they had healthy weight; in contrary, those children who have normal weight were also criticized by their mothers to be unhealthy [8].

A systematic review conducted in Africa among primary school educators revealed that the continental figure of obesity increased. In this review, the magnitude of obesity was measured based on three international standards, i.e., World Health Organization (WHO), Center for Disease Control (CDC), and International Obesity Taskforce (IOTF) cut-off points. Based on the criteria mentioned above, the prevalence of obesity was 6.1% (WHO criteria), 4.0% (IOTF criteria), and 6.9% (CDC criteria) [9]. Generally, the prevalence of obesity in Africa among schoolchildren lies between 4.4% and 21.2 percent [2-20]. Another critical issue is currently the emerging sarcopenic obesity. Sarcopenic obesity is defined as loss of skeletal muscle and excess body fat accumulation. Clinically, it can be diagnosed through muscle biopsy, computed tomography or magnetic resonance spectroscopy, bioelectrical impedance analysis (BIA), and dual energy X-ray. Primarily, the consequence of sacopenic obesity end is liver cell damage either carcinogen or any abnormality [13]. It is highly prevalent in elder population even though it did not get emphasis in the majority of countries.

Obesity is a major risk factor for a number of pathological disorders, including Type 2 diabetes, hypertension and atherosclerosis [14-23]. Cardiovascular Disease in obese subjects may have a variety of presentations. These include Atherosclerotic coronary disease, Cardiomyopathies and heart failure, Arrhythmias and sudden death, venous thromboembolic disease and Stroke.

Clearly these presentations are not mutually excluside; many patients may have more than one of these presentations. Atherosclerosis is common in obese subjects and can be shown frequently at post-mortem. However, perhaps because of coexisting cardiomyopathy, or coexisting type 2 diabetes, or perhaps because of low levels of physical exercise, morbidly obese patients often do not present with a classic history of exertional angina. As for the other clinical presentations of heart disease in obesity, the frequent presence of underlying co-morbidities, such as type 2 diabetes, hypertension, and nocturnal hypoventilation, may contribute to the clinical picture. In particular, diabetes may lead to 'silent' ischemia as well as predisposing to arrhythmias, heart failure and stroke (Table 2).

Table 2: Obesity Associated Diseases

Co-morbidities principally causing Morbidity rather than Mortality	• Osteoarthrosis • Gall Stones • Bladder Dysfunction • Psychological Problems including Depression etc. • Polycystic Ovary Syndrome and other reproductive disorder. • Benign Intracranial Hypertension • Asthma, Breathlessness and Non-specific chest pain. • Increased risk with surgical operations. • Lymph Edema • Superficial infections such as intertrigo. • Low social status, Unemployment and Social disadvantage. • Low level of Physical Fitness
Co-morbidities indirectly causing Mortality, mostly via Cardiovascular Disease	• Obstructive sleep apnoea and other nocturnal hypoventilation. • Fatty Liver • Type 2 Diabetes • Dyslipidaemia (Hypertriglyceridemia, Low IIDL-cholesterol, Small Dense LDL). • Hypertension • Thromboemobolic Disease
Co-morbidities directly causing Mortality or Death	• Cardiovascular Disease including cardiomyopathies. • Obesity related cancers such as Colonic, Uterine, Ovarian, Gall bladder etc.

In 2024, the NCD Risk Factor Collaboration (NCD-RisC) published findings that estimate that more than one billion people in the world are now living with obesity, nearly 880 million adults and 159 million children and adolescents aged 5-19 years. The world obesity federation's analysis of this data finds that nearly 3 billion people are living with either overweight or obesity. This evidence suggests that most of the world's population lives in countries where overweight and obesity are a bigger risk to health than underweight [34].

GUT MICROBIOTA AND NUTRITION AS INDICATOR OF OBESITY

Helicobacter pylori is an indicator for development of obesity; even though the exact pathophysiology is unknown, most studies correlate with gastrointestinal hormones such as leptin and ghrelin. In normal physiology, ghrelin facilitates food intake and leptin is involved in reduction of food consumption. It is evidenced that there is low serum leptin and ghrelin levels in *H. pylori*-positive patients. As a result of the level of leptin, food intake will be reduced. So its reduction may be involved in excessive dietary intake and obesity. In contrary, reduction of plasma ghrelin concentration ends with a physiological adaptation to the positive energy balance associated with obesity. High availability of branched-chain amino acids (BCAA), non-esterified fatty acids, organic acids, acylcarnitines, deficient 25(OH) vitamin D serum concentrations, and phospholipids was identified as potential biomarkers for obesity.

CHILDHOOD OBESITY

Childhood obesity, in particular, has received noteworthy attention in recent years. According to UNICEF's estimates, in the year 2000 [34], around 30 million children under the age of 5 years were living with overweight or obesity rising to 37 million children in 2022. The NCD-RisC estimates show the prevalence of overweight and obesity among children and adolescents aged 5-19 years to have risen from just 4% in 1975 to almost 20% in 2022. Over the same time period (1975-2022), obesity rates in 5-19 year olds have increased 10 fold. In 1975, 0.7% of girls were living with obesity compared to 6.9% in 2022 while boys saw an increase from 0.9% to 9.3%. This equates to approximately 65 million girls and 94 million boys living with obesity in 2022 compared to 5 million girls and 6 million boys in 1975. Childhood obesity is linked with a range of adverse physical and mental health outcomes, as well as some negative societal outcomes.

The increasing trend in the global prevalence of childhood overweight and obesity presents a major public health challenge. Currently, obesity is one of the most common health problems among children and adolescents, with documented increases in prevalence in many countries. There is some uncertainty about how best to measure obesity in children. These problems notwithstanding, it appears that early onset obesity is a risk factor for obesity and its comorbidities and mortality later in life. Although the cause of obesity in children is similar to that of adults (i.e. an imbalance between energy intake and energy expenditure). Overweight is increasing in cities of India, but it is very few in villages because of adequate playing facilities in villages [10-16]. Globally, the prevalence of childhood overweight/obesity is increasing, with public health implications in both developed and developing countries. According to the UNICEF, an estimated 41 million children under five were overweight or obese in 2016 with about 25% of this number living in Africa alone,

while among children and adolescents aged 5–19 years, 340 million were overweight or obese. The prevalence may have stabilized in some industrialized countries; however, the trend seems to be on the increase particularly in some low-to-middle income countries [31]. Childhood obesity is associated with early onset of cardiovascular risk factors, including elevated blood pressure, and impaired fasting glucose as well as higher odds of remaining overweight or obese in the adulthood. The growing obesity epidemic with its related health risks has the potential to significantly undermine improvements made in the healthcare delivery systems among populations living in low-to-middle income countries. Childhood obesity is rising in developed and developing countries, while childhood underweight is rising mainly in developing countries. Childhood underweight has been shown to increase a child's risk of rapid weight gain. Overweight and obese children are more likely to become obese adults, which increases the risk of type-II diabetes and cardiovascular diseases [6].

GENETIC FACTORS OF OBESITY

Evidence revealed that a family history of obesity and different genetically arranged genes were a risk for obesity [21-29]. Genome-wide association studies (GWAS) identified that more than 250 genes/loci were associated with obesity. Of these genes, the fat mass and obesity associated gene (FTO) showed an important role for development of the obesity and type 2 diabetes. A study conducted among adults explicitly recognizes the correlation between these genes and a higher body mass index (BMI), fat mass index (FMI), and leptin concentrations [3]. Some studies included in this review use cross-sectional study design, and majority of those studies assess obesity with the WHO standard (Table 3).

Table 3: Descriptive characteristics of studies included in this review

Authors, Country	Study Population (Sample size)	Study Design	Anthropometric used	Criteria	Prevalence of Obesity	Risk Factor
Al Kibria *et al*., (2019), India	Women (N = 647, 168)	Cross-sectional	BMI percentiles	WHO	5.1%	Older age, ever-pregnant, ever married, being muslims, high education level, wealthy and urban residence.
Al Lahhm *et al*., (2019), Palestine	School children (N = 1320)	Cross-sectional	BMI percentiles	CDC	15.7%	Urban residence and high waist circumferences.
Golshevsky *et al*., (2019), Australia	Children (N = 343)	Cross-sectional	BMI percentiles	CDC	No prevalence	Watching television, obstructive sleep and sleep apnea.
Gokosmanoglu *et al*., (2019), Turkey	Adolescent (N = 750)	Cross-sectional	BMI percentiles	WHO	4%	Irregular physical exercise, family history of obesity and consuming pastry foods.
Karki *et al*., (2019), Nepal	School children (N = 575)	Cross-sectional	BMI for age-sex	WHO	7.1%	Children mothers' high education level, having professional mother, consuming energy-dense food, having sedentary behaviors.
Al-Raddadi *et al*., (2019), Saudi Arabia	Adult (N = 1419)	Cross-sectional	BMI percentiles	WHO	34.8%	No factor identified.
Hu *et al*., (2017), China	Adult (N = 15364)	Cross-sectional	BMI percentiles	WHO	7.9%	Urban residence.
Adom *et al*., (2019), Africa	Children (N = 89468)	Systematic review and meta-analysis	-	WHO/ CDC/ IOTF	6.1%, 6.9%, 4%	Urban residence and learning in private school.

MANAGEMENT AND PREVENTION OF OBESITY

Obesity is a rapidly growing public health problem affecting an increasing number of countries worldwide because of its prevalence, costs, and health effects. Obesity is a leading risk factor for global death and disability, and is associated with various non-communicable diseases including hypertension, diabetes, cancer, and cardiovascular disorders. Child overweight measurement is difficult. But when the child becomes 120 cm or more in height Dr. Mandal's formula can be applied to titrate the overweight [27, 28]. Each individual and each doctor should not wait for obesity for the guideline of treatment instead they should start to advise whenever there is slightest overweight according to BMI and Dr. Mandal's formula otherwise there will be difficulty in treatment [27, 28]. Besides, everybody should remember that excess diet only is the cause of overweight or obesity if it is not burnt by exercise or work. Every mother will say that the child is taking nothing but is becoming overweight. But if you take the detailed history of food it will be found that they are taking excess (instead of two meals and two tiffins they are also taking health drinks in between). Besides we want to remind that each bottle of 300ml cold drink contains 50g of sugar which will give equal calories of a tiffin. So, whole awareness of food is essential for diet measurement both in children and adults. The management plan for obesity is shown in Table 4.

Table 4: Management Plan for Obesity

BMI	Assessment	Advice
18.5-24.9	Weight steady in adult the gained – 5 kg in adult life	Healthy eating plan, Weight maintenance with increase exercise
25-29.9	1. No other risk factors 2. Risk factors present 3. Waistline problem	1. Healthy eating plan + weight reduction plan 2. Weight reduction plan + treat risk factor 3. Weight reduction plan
30		Weight reduction plan
Prevention is better than treatment		

BENEFITS OF A SUSTAINED 10% REDUCTION IN WEIGHT FOR THE OBESE

Mortality

- 20–25% fall in total mortality.
- 30–40% fall in diabetes–related deaths.
- 40–50% fall in obesity-related cancer deaths.

Angina

- Reduces symptoms by 90%.
- 33% increase in exercise tolerance.

Blood Pressure

- Fall of 10 mm Hg systolic pressure.
- Fall of 20 mm Hg diastolic pressure Lipids.
- Fall by 10% in total cholesterol.
- Fall by 15% in low-density lipoprotein (LDL) cholesterol.
- Fall by 30% in triglycerides.
- Increase by 8% in high-density lipoprotein (HDL) cholesterol.

Diabetes

- Reduces risk of developing diabetes by > 50%.
- Fall of 30-50% in fasting glucose.
- Fall of 15% in HbA_1C.

Weight Reduction Plan

This aims to provide a three month structured management plan designed to meet the needs of each individual patient [1-32].

1. Support from a trained health-care professional in a group setting since greater weight loss is achieved using groups than with individual consultations. This may reflect the interplay and mutual support of the individuals in the group.
2. Diet consisting of a moderate reduction in energy intake of about 600 Kcal (2.5 MJ) less than expenditure assessed on weight, sex and age (published formulae are used). This produces a greater weight loss than stricter diets (e.g. 1000 Kcal) probably as compliance is better. Most diets aim to reduce fat intake. Starvation diets are potentially dangerous due to a risk of sudden death from heart disease exacerbated by profound loss in muscle and the development of arrhythmias secondary to elevated free fatty acids and deranged electrolytes. The dietary change should involve the patient's entire household. During dietary restriction minerals and vitamins should be supplemented.
3. Behavioural modification therapy which is designed to support a process of change in the individual's attitude, perception and behaviour as regards food intake, lifestyle and physical activity. The information box provides some examples of the topics covered in a structured programme.
4. Promotion of increased physical activity which can be maintained long-term. Walking briskly for 30 minutes each day can contribute 100-200 Kcal (0.4–0.8MJ) of energy expenditure daily, resulting in an additional weight loss of 1 Kg. per month. If he cannot walk briskly he can walk slowly.

Principles of Behavioural Modification

Issues to be discussed in group behavioural therapy are:

- Self-monitoring of daily food intake.
- Need for long-term lifestyle change.
- Need to modify eating habits.
- Need to assess present exercise level and ideas to increase this if necessary.
- Importance of restricting occasions and situations when inappropriate types or amounts of food are eaten.
- Planning of daily food intake.
- Understanding of food labels & adapting recipes with regard to fat, salt, sugar & fibre.
- Possibility of changes to individual cating style.
- Reduce the rice does not mean you are advised bread or biscuits etc.

Weight Maintenance Plan

The weight reduction module is followed by three month structured programme emphasising weight maintenance although continued weight loss may be an option for some. This again emphasises therapy in groups, with continued behavioural therapy, promotion of exercise and diet modification. Exercise in this module is designed to prevent weight regain once weight has been lost by dietary restriction [1-32].

Very Low Calorie Diets Plan

Nutritionists always use the following proverb to explain the effect of diet in our health "what you eat today; they determine your life tomorrow." Dietary habit is a major determinant factor for our health, not merely to obesity.

Very low calorie diets (VLCDs) produce weight losses of 1.5–2.5 kg/week compared to 0.5 kg on conventional diets. VLCDs are mainly used for short-term rapid weight loss. In the UK, the recommendation is that VLCDs should only be considered by those with a BMI>30 and under the supervision of an experienced physician/nutritionist. The composition of the diet should ensure a minimum of 50g protein each day for men and 40g of protein for women to minimise muscle degradation. Energy content should be minimum 400 Kcal (1.65 MJ) for women of height < 1.73 m and 500 Kcal (2.1 MJ) for all men and women taller than 1.73 m. Side-effects tend to be a problem in the early stages of the diet especially orthostatic hypotension, headache, diarrhoea and nausea [1-16].

Healthy Food Subsidization and Taxation of Junk Food

The good news regarding obesity is that the government can reduce obesity by subsidization of healthy foods or increasing taxation of junk foods. This is strongly implemented in the United Kingdom; this scenario shows that an increment of price of high sugar snacks by 20% shows significant reduction in energy intake, BMI, and prevalence of obesity. As a result, increasing taxation or price for unhealthy foods is an effective approach to control obesity and their metabolic disorder [14-30].

Bariatric Surgery Plan

Two procedures now dominate surgical practice, namely vertical banded gastroplasty and gastric bypass. Vertical banded gastroplasty involves the construction of a small stomach pouch fashioned by vertical stapling to restrict both gastric outlet and size. But such treatment is difficult and prolonged observation is necessary [17-28].

Prevalence of Obesity in Jammu and Kashmir

The overall prevalence of diabetes in Jammu is 18.9 per cent, with an alarming 26.5 per cent in urban areas and 14.5 per cent in rural areas, a study had revealed [35]. The Indian Council of Medical Research (ICMR), in collaboration with the Madras Diabetes Research Foundation (MDRF), has released critical data from the ICMR-India Diabetes (ICMR-INDIAB) national study, which includes data for Union Territory of Jammu and Kashmir. This study in the region also revealed that 10.8 per cent of the population in Jammu is affected by prediabetes, with 13.4 per cent and 9.3 per cent in the urban and rural areas respectively, emphasising the urgent need for action against the growing burden of non-communicable diseases (NCDs) in the region [35]. According to the study, 40 per cent of individuals had undiagnosed diabetes and the overall prevalence of hypertension, generalised obesity, and abdominal obesity in Jammu is 27.1 per cent, 41.7 per cent and 62.7 per cent, respectively [35].

A recent study conducted by an expert team from SKIMS Soura under the Indian Council of Medical Research (India B) published in has revealed concerning statistics about the sedentary lifestyles of adults in Kashmir. The study, which measures the prevalence of diabetes, prediabetes, hypertension and obesity in Kashmir and Ladakh, provides a comprehensive insight into the region's health challenges. The study found that a staggering 84.2 percent of adults in Kashmir lead sedentary lives, involving minimal physical activity such as exercise or walking [36]. Only 15.8 percent of the studied population had an active lifestyle. The data revealed that 55.3 percent of people in Kashmir are obese. Obesity, as defined by the World Health Organization (WHO), is having a Body Mass Index (BMI) over 30, while a BMI over 25 is considered overweight. Obesity results from an imbalance between calories consumed and calories burned, leading to excess fat accumulation in the body [36]. The diabetic population in Kashmir was found to be 7.8 percent. The study highlighted a significant gap between rural and urban diabetes burden, with 13.1 percent of the urban population affected compared to 5.6 percent in rural regions. In urban Kashmir, the study found that 32.4 percent of the population had hypertension, which is closely linked to obesity and sendentry lifestyles [36].

As per observational study conducted [38], it was found that highest percentage of females who were obese in 2015–2016 belonged to district Srinagar followed by Jammu and Samba respectively whereas least percentage was found in district Kishtwar, Reasi and Ramban respectively [Table 1]. While in year 2019–2020, the highest percentage of females who were obese in 2019 belonged to district Jammu followed by Kathua and Kishtwar respectively and least percentage was found in district Ramban respectively [Table 1]. It is to be noted that that the many district showed positive and negative relative change in obesity among females during the course of 5 years. Positive relative change was seen in districts such as Kathua, Doda, and Kishtwar respectively, which is alarming whereas the decline is seen in districts Srinagar, Badgam, and Bandipora which is positive sign [38].

Table 1: Percent Distribution of obesity among females in various districts of the union territory of Jammu and Kashmir for the year 2015-16 and 2019-2020 [38].

District	2015-2016 (%)	2019-2020 (%)
Anantnag	33.1	28.6
Badgam	31.4	25.3
Bandipora	34.0	28.2
Baramulla	24.5	31.1
Doda	18.7	31.3
Ganderbal	33.8	34.2
Jammu	36.9	38.3
Kathua	24.6	38.2
Kishtwar	14.5	24.9
Kulgam	31.4	25.9
Kupwara	20.5	21.3
Pulwama	34.0	37.9
Poonch	21.1	16.2
Rajouri	21.0	22.7
Ramban	17.8	15.8
Reasi	16.5	22.7
Samba	35.3	36.5
Shopian	31.3	27.6
Srinagar	40.8	27.8
Udhampur	20.3	29.3

Prevalence of obesity was highest in Jammu District in from 2015 to 2019 which presents a matter of serious concern not only for health professionals and Government but also for the immediate society and environment associated with it. Although the Government is trying its best to reduce the same in any which way, its decline lies in our hands and we as responsible citizens of the country should stop taking excess sugar and encourage and motivate others who do the same so that we can live in clean and healthy environment which is not only safe for us but holds a true promise for coming generations too.

CONCLUSION

Obesity is an abnormal accumulation of body fat (usually 20% above the normal ideal body weight) to the extent that it may have an adverse effect on health. Obesity is becoming a severe public health problem; its epidemiology is increasing rapidly. The exposure factors vary across different geopolitics. Primarily, living in obesogenic environments such as sedentary life style, urbanization, and rural to urban migration, consuming energy-dense foods, and physical inactivity were determinants. There are a lot of biomarkers, of which microRNAs, adipocytes, oxidative stress, and microbiota were promising for determination of obesity. Since the consequences of obesity are vast and interrelated, a multilevel prevention strategy is mandatory. Obesity is a disorder which occurs due to individual behaviors and the living environment. As a result of this, to prevent obesity, both legal and voluntary counseling services are mandatory.

Conflict of Interest: The authors declare that there are no conflicts of interest.

REFERENCES

1. Abiola, S. E., & Mello, M. M. (2019). Multilevel legal approaches to obesity prevention: a conceptual and methodological toolkit. *PloS one*, *14*(10), e0220971.
2. Adom, T., Kengne, A. P., De Villiers, A., & Puoane, T. (2019). Prevalence of overweight and obesity among African primary school learners: a systematic review and meta-analysis. *Obesity Science & Practice*, *5*(5), 487-502.
3. Andonian, C., Langer, F., Beckmann, J., Bischoff, G., Ewert, P., Freilinger, S., ... & Neidenbach, R. C.

(2019). Overweight and obesity: an emerging problem in patients with congenital heart disease. *Cardiovascular diagnosis and therapy*, *9*(Suppl 2), S360.

4. Agha, M., & Agha, R. (2017). The rising prevalence of obesity: part A: impact on public health. *IJS Oncology*, *2*(7), e17.
5. Al Kibria, G. M., Swasey, K., Hasan, M. Z., Sharmeen, A., & Day, B. (2019). Prevalence and factors associated with underweight, overweight and obesity among women of reproductive age in India. *Global health research and policy*, *4*, 1-12.
6. Al-Lahham, S., Jaradat, N., Altamimi, M., Anabtawi, O., Irshid, A., AlQub, M., ... & Al Zabadi, H. (2019). Prevalence of underweight, overweight and obesity among Palestinian school-age children and the associated risk factors: a cross sectional study. *BMC pediatrics*, *19*, 1-13.
7. Al-Raddadi, R., Bahijri, S. M., Jambi, H. A., Ferns, G., & Tuomilehto, J. (2019). The prevalence of obesity and overweight, associated demographic and lifestyle factors, and health status in the adult population of Jeddah, Saudi Arabia. *Therapeutic advances in chronic disease*, *10*, 2040622319878997.
8. Al-Rodhan, Y., Al-Abdeen, Y. E., & Saleh, E. (2019). Obesity and maternal perception: a cross-sectional study of children aged 6 to 8 years in Kuwait. *Eastern Mediterranean Health Journal*, *25*(7), 465–472.
9. Armenta-Guirado, B., Martínez-Contreras, T., Candia-Plata, M. C., Esparza-Romero, J., Martínez-Mir, R., Haby, M. M., ... & Díaz-Zavala, R. G. (2019). Effectiveness of the Diabetes Prevention Program for obesity treatment in real world clinical practice in a middle-income country in Latin America. *Nutrients*, *11*(10), 2324.
10. Arora, M., Barquera, S., Lambert, N. J. F., Hassell, T., Heymsfield, S. B., Oldfield, B., ... & Vicari, M. (2019). Stigma and obesity: the crux of the matter. *The Lancet Public Health*, *4*(11), e549-e550.
11. Assari, S., & Bazargan, M. (2019). Baseline obesity increases 25-year risk of mortality due to cerebrovascular disease: role of race. *International Journal of Environmental Research and Public Health*, *16*(19), 3705.
12. Baalwa, J., Byarugaba, B. B., Kabagambe, E. K., & Otim, A. M. (2010). Prevalence of overweight and obesity in young adults in Uganda. *African health sciences*, *10*(4).
13. Baffy, G. (2019). Sarcopenic obesity in liver cancer: it is SO complicated. *HepatoBiliary Surgery and Nutrition*, *8*(5), 560.
14. Balwan, W. K., & Kour, S. (2021). Lifestyle Diseases: The Link between Modern Lifestyle and threat to public health. *Saudi J Med Pharm Sci*, *7*(4), 179-84.
15. Bartelink, N. H., van Assema, P., Kremers, S. P., Savelberg, H. H., Oosterhoff, M., Willeboordse, M., ... & Jansen, M. W. (2019). Can the Healthy Primary School of the Future offer perspective in the ongoing obesity epidemic in young children? A Dutch quasi-experimental study. *BMJ open*, *9*(10), e030676.
16. Bayoumi, N. S., Helzner, E., Afable, A., Joseph, M. A., & Dhuper, S. (2019). A real-world evaluation of a tertiary care childhood obesity intervention to reduce metabolic risk in a hard-to-reach urban population. *BMC pediatrics*, *19*, 1-9.
17. Bolling, C. F., Armstrong, S. C., Reichard, K. W., Michalsky, M. P., Haemer, M. A., Muth, N. D., ... & Gow, K. W. (2019). Metabolic and bariatric surgery for pediatric patients with severe obesity. *Pediatrics*, *144*(6).
18. Development Initiative, Global Nutrition Report 2017: Nourishing the SDGs, Development Initiatives, Bristol, UK, 2017.
19. Ford, N. D., Patel, S. A., & Narayan, K. V. (2017). Obesity in low-and middle-income countries: burden, drivers, and emerging challenges. *Annual review of public health*, *38*(1), 145-164.
20. Ganle, J. K., Boakye, P. P., & Baatiema, L. (2019). Childhood obesity in urban Ghana: evidence from a cross-sectional survey of in-school children aged 5–16 years. *BMC public health*, *19*, 1-12.
21. Gokosmanoglu, F., Cengiz, H., Varim, C., Yaylaci, S., Nalbant, A., & Karacaer, C. (2019). The prevalence of obesity and the factors affecting obesity in the students of secondary education. *International Journal of Research in Medical Sciences*, *7*(8), 2989-2994.
22. Golshevsky, D. M., Magnussen, C., Juonala, M., Kao, K. T., Harcourt, B. E., & Sabin, M. A. (2019). Time spent watching television impacts on body mass index in youth with obesity, but only in those with shortest sleep duration. *Journal of Paediatrics and Child Health*.
23. Guyton, A. C., & Hall, I. E. (2004). *Medical Physiology*, *Sounders*. New York.
24. Hoffman, D. J. (2001). Obesity in Developing Countries: Causes and Implications, Rutgers University, New Brunswick, NY, USA.
25. Hu, L., Huang, X., You, C., Li, J., Hong, K., Li, P., ... & Cheng, X. (2017). Prevalence of overweight, obesity, abdominal obesity and obesity-related risk factors in southern China. *PloS one*, *12*(9), e0183934.
26. Karki, A., Shrestha, A., & Subedi, N. (2019). Prevalence and associated factors of childhood overweight/obesity among primary school children in urban Nepal. *BMC public health*, *19*, 1-12.
27. Mandal, S. K. (2010). Obesity-An invited Disease. *Everyman's Science, XLV*(3), 161-166.
28. Mandal, S. K. (1997). Obesity. *Indian Journal of Physiology and Pharmacology*, 289-292.
29. Narciso J., Silva, A. J., & Rodrigues, V. (2019). Behavioral, contextual and biological factors associated with obesity during adolescence: a systematic review. *PLoS One*, *14*, 4.
30. Scheelbeek, P. F., Cornelsen, L., Marteau, T. M., Jebb, S. A., & Smith, R. D. (2019). Potential impact

on prevalence of obesity in the UK of a 20% price increase in high sugar snacks: modelling study. *bmj*, *366*.

31. Wabitsch, M., Moss, A., & Kromeyer-Hauschild, K. (2014). Unexpected plateauing of childhood obesity rates in developed countries. *BMC medicine*, *12*, 1-5.
32. Balwan, W. K., Saba, N., & Rasool, N. (2021). A systematic review of Obesity-an Invited disease. *Journal of Natural Remedies*, *21*(1), 2.
33. NCD Risk Factor Collaboration (NCD-RisC) (2017). Worldwide trends in body mass index, underweight, overweight and obesity from 1975 to 2016; a pooled analysis of 2416 population based measurement studies in 128.9 million children, adolescents and adults. Lancet, 390(10113), 2627-2642.
34. NCD Risk Factor Collaboration (NCD-RisC) (2024). Worldwide trends in underweight, overweight and obesity from 1990 to 2022: a pooled analysis of 3663 population representative studies with 222 million children, adolescents and adults. The Lancet. *https://doi.org/10.1016/S0140-6736(23)02750-2*.
35. Greater Kashmir. 18.9 per cent overall prevalence of diabetes in Jammu: Study.
36. Rising Obesity and Diabetes Rates in Kashmir: A Wake-Up Call for Public Health - Kashmir in Focus.
37. World Health Organization. Obesity and Overweight; 2020. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight [Last accessed on 2023 Apr 10].
38. Singh, M., & Jamwal, M. (2023). Comparative Evaluation of Prevalence and Distribution of Obesity in Various Districts of the Union Territory of Jammu and Kashmir in 2015-2016 and 2019-2020: An Observational Study. *Int J Sci Stud*, *11*(4), 54-57.