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Urban adult overweight and obesity prevalence in North Dum Dum, West Bengal, India

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Abstract: Obesity impacts most of the population, and many countries are predicted to raise the prevalence of adults affected by obesity (OB) and related disorders during the recent decades. OB is uninterruptedly increasing at a shocking proportion throughout the globe and scattering as an epidemic threatening world health. It is currently projected that more than 250 million population worldwide are obese, comparable to 7% of the adult population. By 2030, it is projected that 1 out of 7 men and 1 out of 5 women will be alive with an obesity problem, equating to more than one billion population worldwide. Overweight and obesity is the most common malnutritional condition in industrialized and developing countries. However, data on OB prevalence among diverse Indian ethnic groups is limited. The present study has been initiated to understand the OB problems among the urban adult population of the North Dum Dum area, West Bengal, India. The present study also intended to compare the proportion of overweight and OB among urban adult men and women in comparison to other Indian studies and other regions of the world. Results exposed that the occurrence of OB (Body Mass Index ≥30.00) is moderately high (men=11.89% and women=17.45%), but the incidence of overweight (Body Mass Index 25.00-29.99) is very high (men=30.88%, women=37.24%) among the Bengalee population. The present research concluded that OB is a rising burden in India. It is more common among women than men.

Introduction

International Classification of Disease (ICD) defines obesity (OB) as a chronic, relapsing, multifactorial disease. It is a significant non-communicable illness risk factor such as cancers, heart-related problems, diabetes, hypertension etc. OB frequently commences at early stages in life (Guo et al., 1989; Sarkar et al., 2022). Juvenile OB is a rising health problem concern in LMICs where prevention at an early age is a serious issue.

Global occurrence of OB is lower amongst men than women, indicating that comprehensive health policies are needed (WOF, 2022). Overweight and OB is a composite disease that harms overall health-related issues (Gutierrez-Fisac et al., 2004; Roy et al., 2016a & 2016b; Sarkar et al., 2021). OB is the most widespread nutritional disease in progressive countries (Stunkard and Wadden, 1993; Thomas and Krishnaswami, 1995). It is the consequence of an inappropriate energy balance prompting increased fat loading. The frequency of obesity is growing in most human groups, distressing mostly teenagers, young people and adults. Nowadays, OB is a very common disease on the global health map, and it is starting to substitute malnutrition and infectious diseases as the most noteworthy contributor to human health-related conditions. Therefore, OB should be regarded merely as a serious disorder that alarms worldwide human welfare.

According to Kopelman (2000) the term 'obesity' is synonymous with "extra fatness" or fatness which can be led to pathology. The amount and distribution of abundance fat within different body parts and its impacts on health vary among obese persons. Obesity may occur

in individuals irrespective of age and sex. With time, OB can be developed, and once it develops, it could be burdensome to deal. In particular, males are more prone to accumulation of excess fat in their upper abdomen. But in the case of females, most of the fat deposition may be observed in the upper leg region and hip. The region of fat deposition in the body is an important matter for OB-related metabolic issues (Van Gaal et al., 1988). Still, prevalence rate of being obese has been found to be high in females rather than males (Pi - Sunyer, 1994; Asthana et al., 1998).

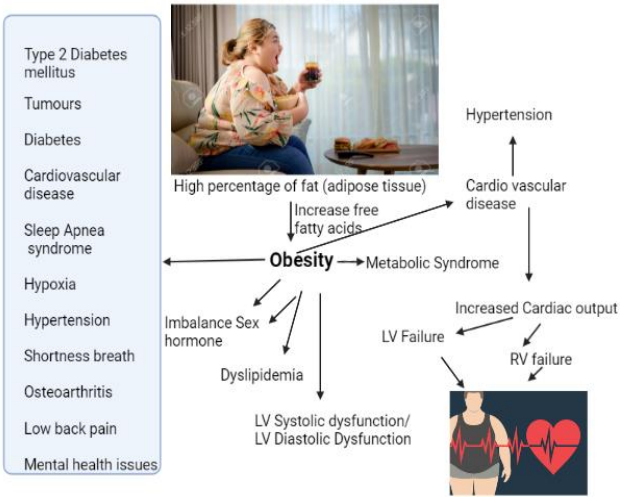

Figure 1. The dangers of obesity to one's health are increasingly being recognized (Sarkar et al., 2022).

A number of causes are behind the development of OB in individuals. It is considered to be a heterogeneous set of conditions with numerous causes. Nowadays it is found that the causes of universal OB oriented complications are as much associated with environmental and behavioural changes. Mueller and Reid (1979) revealed the cumulative impact of stress, nutrition and exercise on subcutaneous fatness. There is an important role of cultural and social influences behind the distribution of fat deposition in the body.

Origin of OB is a multifactorial phenomenon. It was exposed that the occurrence of obesity was greater in lower socio-economic classes in developed countries all over the world (Georges et al., 1991; Ghosh et al., 2022). In contrast, a reverse trend was also found in developing countries (Sobol and Stunkard, 1989). Most of the complications related to OB can be considered as an outcome of the effective social, cultural and economic changes currently observed in the countries which are developing and technologically advanced. Among Indians, OB levels gradually increase with the conversion of lifestyle from rural to urban. However, this phenomenon prevails on a larger scale among urban populations than rural ones(Abdul Rahim et al., 2001; Venkatramana and Reddy, 2002). Besides such causes, OB may be associated with different risk factors. OB may result in several health complications, independently or in connotation with other health problems (Roberts and Mayer, 2000). It is also associated with the chance of developing high blood pressure, diabetes mellitus and heart disease (Smith et al., 2001; Kim et al., 2004). It also generates an abundant emotional problems. Thus, a series of morbidity, as well as mortality, can occur due to OB.

Anthropometrics plays a crucial role in assessing OB and other sophisticated techniques as bioelectrical impedance analysis (BIA), isotope dilution, magnetic resonance imaging (MRI), computed tomography (CT), dual-energy x-ray absorptiometry (DEXA), hygrometry and ultrasound. In anthropometry, body mass index (BMI) is one of the most commonly used indicators for measuring overall OB (generalized OB) while circumferences and skinfolds are for central OB (Heitmann, 1990; Lean et al., 1996; Segal et al., 1998; Johnston et al., 2004). According to WHO (1995), "BMI can be considered to provide the most useful, albeit crude, population-level measure of obesity". Through a cross-sectional study, it can be possible to estimate the prevalence of OB within a population and its associated risk through BMI values of the individuals of the particular population (Houtkoope et al., 1996; Ismail et al., 2002). Additionally, it enables accurate weight status comparisons within and between populations as well as the identification of people and groups at risk of morbidity and mortality (Bose, 1995; Bose and Mascie-Taylor, 1998). WHO (2000) suggested BMI cut-off points in this regard. Nowadays, it's widely believed that a BMI of 25 and 30 correspond to being overweight and obese, respectively. It provides a solid basis for evaluating interventions. Based on BMI cut-offs, WHO suggested categorizing adults as overweight or obese regardless of their gender or age (Dudeja et al., 2001). The increased risk of health problems from infectious diseases associated with larger body weight has been made public by COVID-19. People who are overweight or obese, in particular, are more likely to contract infections and experience major difficulties due to infections, according to reviews of the public health literature (WOF, 2022).

According to research, OB has a stronger link to COVID-19-related mortality, with death rates ten times higher in nations where more than 50% of people are overweight or obese (Lobstein, 2021). Despite the broad implementation of immunization programs, particularly in wealthier nations, it has been determined that OB is a

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significant risk factor for serious COVID-19-related illness.

Many studies worldwide have dealt with OB and its related issues (Dasgupta and Hazra, 1999; WHO, 2000; Griffiths and Bentley, 2001). However, there is a dearth of information available on the Indian situation. Documenting the patterns and trends in overweight, OB, and related concerns in various Indian ethnic groups is of major status when considering the socioeconomic load and the status of these conditions. But it is important to note that just a few trustworthy studies are available on the prevalence of overweight and OB among urban adults in West Bengal. Therefore, the current study aims to understand how adult Bengalee men and women are affected by OB. In addition, it contrasts these frequencies with the Indian and global contexts.

Materials and Methods

Location and Population

The information were obtained from adult urban Bengalees who live within the North Dum Dum Municipal Area. They belonged to the Bengalee Hindu Caste Population (BHCP). The area is under the jurisdiction of the Kolkata Metropolitan Development Authority (KMDA), West Bengal, India. The study population of the present study included 1670 adults (816 men and 854 women) aged from 20 to 50 years.

Methods of Data Collection

The present study involved a cross-sectional household survey. Necessary data on socio-demographic outline was obtained by questionnaire and interview method. An appointment was set for data collection at the house of the subjects. Separate sheet of the questionnaire was used for each individual. The questionnaire comprises a set of definite open and close-ended questions. The current research investigation also gathered socio-demographic and behavioural data.

Anthropometry

Fourteen metric measurements, including anthropometric, bioelectrical, and physiological variables, were taken from each subject to collect data on them. The anthropometric measurements that were taken from each participant were - body weight, height, three circumferences viz., mid-upper arm, maximum hip and minimum waist, and four skinfold measurements viz., triceps, biceps, suprailiac and subscapular. But in the present investigation, the range of overweight and OB was ascertained by a universally derived indicator (body mass index) based on two basic anthropometric variables (height and weight) as recommended by WHO (1995). In addition, the anthropometric measurements protocol was followed as Lohman et al. (1988) recommended.

Data Entry and Analysis

Necessary information was obtained through a pre-tested schedule, compiled on an excel data sheet, and exported from the data sheet onto a computer package. Required statistical analyses were done by the SPSS software (SPSSV-16.0). Errors of anthropometric measurements (EAM) were checked, and the results were found within the reference tables recommended by Ulijaszek and Kerr (1999). Thus, EAM was not considered in further statistical analysis.

Result and Discussion

The prevalence of overweight and obese participants is presented in Table 1. The overall prevalence percentage of obese individuals (BMI ≥ 30.00) was quite high in the studied sample (men=11.89%, women=17.45%), but the frequency of overweight individuals (BMI 25.00 - 29.99) was found to be even higher (men=30.88%, women=37.24%). It may be noticed that this estimation is based on an indirect technique, i.e., anthropometry and the Internationally accepted Classification of Adult Overweight and OB (WHO, 2000). This BMI classification is used to predict the severity of the OB problem in the future, to compare OB rates between countries for adults, and to track and assess the efficacy of various intervention strategies.

To make a relative assessment simpler, the current study's findings are contrasted with those of various adult populations from various regions of India (Table 2). Studies from various regions of India indicated a variable situation, although there are few empirical data on overweight and OB in India. The prevalence of OB was higher in recent research from the North and North West Indian regions, as reported by Asthana et al. (1998) (women=30.24%), Zargar et al. (2000) (men=7.01%, women=23.69%), and Misra et al. (2001) (men=13.30%, women=15.60%). However, the present study among adult Bengalees revealed a moderate prevalence rate of OB (men=11.89%, women=17.45%). The estimated prevalence rate of OB among adults in India by 2030 is presented in Table 3, whereas the future perspective on OB prevalence prediction of the adult population in South East Asia by 2030 is presented in

Table 1. Based on BMI, North Dum Dum's adult population has a high rate of overweight and obesity.

Population	Sample Size	Overweight (BMI 25.00-29.99)	Obesity (BMI ≥ 30.00)
Men	816	252 (30.88%)	97

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			(11.89%)
Women	854	318 (37.24%)	149 (17.45%)

Table 2. Prevalence of obesity (BMI ≥30.0) in various Indian areas

State / Region	Location	Prevalence of obesity (%) (BMI ≥ 30.00)		Source
		Men	Women	
Jammu & Kashmir	Kashmir valley	7.01	23.69	Zargar et al. (2000)
Northern India	Urban slum	13.30	15.60	Misra et al. (2001)
Uttar Pradesh	Varanasi city	-	30.24	Asthana et al. (1998)
West Bengal	North Dum Dum	11.89	17.45	Present study

These data indicate that the WHO BMI cut-off point for assessing OB (BMI 30.0) may not be suitable for usage among all types of ethnic populations since it may result in an inaccurate calculation of the true prevalence of OB. Since BMI is the most widely used indicator of OB globally, we propose that ethnic population-specific BMI cut-off points be utilized in various scenarios in various regions. To find the most precise and sensitive BMI cut-off point among these ethnic groups, cross-sectional studies utilizing ROC curves may be used as an alternative. Considering that cross-sectional data may be used to study these curves, doing so may be more advantageous than doing expensive and time-consuming prospective research. The appropriate cut-off points were determined using the results of ROC studies in a recent study on Bengalee girls aged 5 to 10 (Ghosh, 2004). Independent of gender, similar investigations are needed on various Indian populations.

Table 3.Estimated prevalence of adult obesity in India by 2030.

		BMI ≥ 30	BMI ≥ 35	BMI ≥ 40
Men	Prevalence %	4.48	0.58	0.18
	Total Number	24079855	3096811	956099
Women	Prevalence %	7.88	1.83	0.42
	Total Number	39671923	9237461	2131329

Data Source : World Obesity Federation (2022).

OB has already overtaken all other public health concerns, as seen worldwide (Fig. 2), regardless of sex (WHO, 2018, 2000, 2022). Males from Nauru (Micronesia) and Samoa (Polynesia) are the two populations with the highest prevalence of OB, whereas Chinese people (0.36%) have the lowest prevalence. Germany (20.50%), the United States (19.90%), Cyprus (19.00%), Kuwait (32.0%), Palestine (30.00%), and Melanesia (36.30%) all have moderately high OB prevalence rates. On the other hand, Japan (1.80%), Iran (2.50%), and Tanzania (0.60%) have negligible OB prevalence rates.

Exploring the international OB trend, it is evident that OB prevalence is higher among females than males worldwide (WHO, 2000), including India (Ministry of Health and Family Welfare, Government of India, 2016). In terms of OB prevalence among females, Samoans (Polynesia) have the highest rate (76.80%), followed by Nauruans (Micronesia), with Chinese people having the lowest rate (0.86%). Melanesia (54.30%), Palestine (49.00%), South Africa (44.00%), Kuwait (41.00%), Spain (40.80), UAE (38.00%), Bahrain (30.30%), Saudi Arabia (28.00%), Germany (27.00%), USA (24.90%), and Cyprus (24.00%) all have moderately high OB prevalence percentages. In contrast, countries with low OB prevalence include Iran (7.70%), Malaysia (5.80%), Tanzania (3.60%), South Korea (3.20%), Japan (2.60%), and the Netherlands (8.00%).

Table 4. Adult obesity rates are anticipated to rise in South East Asia by 2030.

Country	Prevalence in women %	Country	Prevalence in men %
Thailand	20	Thailand	11
Maldives	18	Maldives	10
Indonesia	14	Indonesia	8
Bhutan	13	Hutan	8
Myanmar	11	Myanmar	6
Sri Lanka	11	Sri Lanka	5
Nepal	8	India	5
India	8	Timor-Leste	4
Bangladesh	8	Nepal	4
Timor-Leste	8	Bangladesh	4

Data Source: World Obesity Federation (2022).

Generally, the prevalence of OB in the present study (men=11.89%, women=17.45%) was found to be very

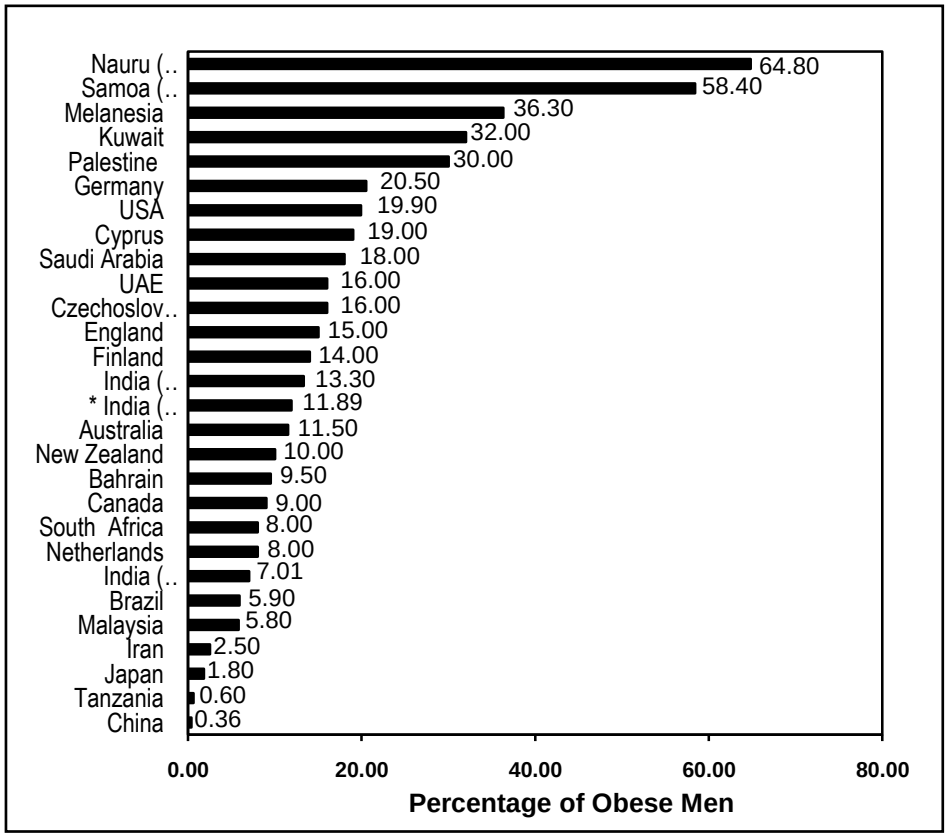

Figure 3. Prevalence of obese adult men in selected countries and territories

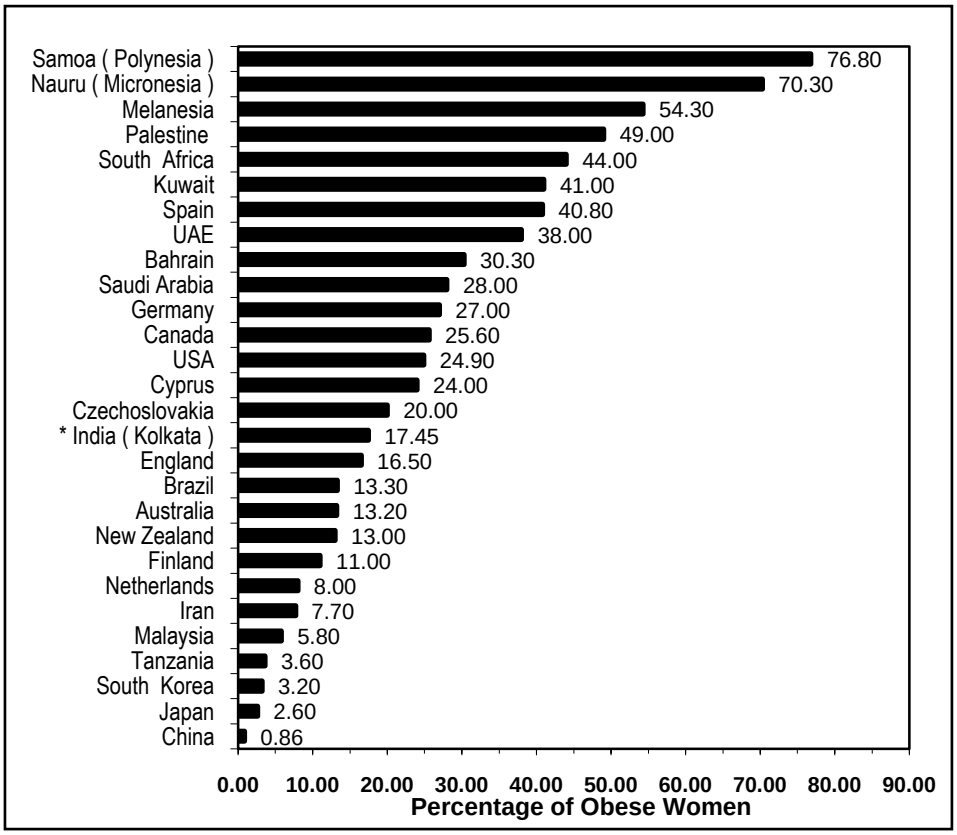

Figure 2. Prevalence of obese adult women in selected countries and territories

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close to Australia and New Zealand populations for men and Czechoslovakia and England for women. Over and above, the results of the present study were in resemblance to two recent Indian studies, one among North Indians studied by Misra et al. (2001) and another from the Kashmiri population revealed by Zargar et al. (2000) for both sexes.

Conclusion

The status of the North Dum Dum area, West Bengal, is being investigated to ascertain its physical dimensions and nutritional quality. All of the data was acquired through numerous household field surveys conducted in North Dum Dum area of West Bengal. Numerous groups were gathered, including Bengalee Muslims, Hindus, tribal people, and others with gender. As a result, West Bengalis are more likely to be overweight and obese, which increases their chance of developing health issues. The purpose of the study is to better understand, identify, and monitor the prevalence of urban adult population obesity in the West Bengal community. By decreasing your adipose tissue mass, increasing your overall energy expenditure may aid in weight loss and help you become less fat. The latest ACSM recommendations include both aerobic and anaerobic activity. Aerobic exercise (such as running, cycling, rowing, etc.) depletes the muscles' oxygen supply. However, during aerobic exercise, enough oxygen is utilized to supply the muscles' energy requirements without the use of additional energy (Bateman et al., 2011). Contrarily, anaerobic exercise is resistance training (i.e., weight lifting) in which the oxygen intake is insufficient to meet the energy demands placed on the muscles. As a result, the muscles break down additional energy sources ('such as carbohydrates') to produce lactic acid and energy (Bateman et al., 2011). Exercise is physical activity (PA), however it is not always part of a structured exercise program or session. Mets measure how much energy is spent during "metabolic equivalent tasks," roughly equivalent to how much effort and energy a person spends while sitting quietly. This emphasizes the value of daily physical activity and includes it in other lifestyle regimens. Problem-solving, leisure-time physical activity, and transportation are all included in the concept of active living. The outcomes to look at include muscle fitness, body composition, and cardiorespiratory fitness. Numerous studies have emerged recently demonstrating the advantages of exercise for people of all ages, including their physical, cognitive, and emotional well-being (Bechara and Kelly, 2013). Numerous researchers in West Bengal examined the effects of obesity on regular exercise, physiological health indicators like heart rate, blood pressure, VO_2 Max, and menstrual cycle, as well as maximum oxygen uptake and respiratory rate (Basak, 2019; Basak and Biswas, 2016; Pramanik, 2018).Sexual dimorphism in body adiposity has important implications for epidemiological and clinical studies, and the variations may raise the risk of obesity and other illnesses. The health risks associated with increasing body mass are ongoing, and the interpretation of a BMI grade as a risk factor might vary based on the demography being taken into account. This was partly attributed to the fact that these people have become more dependent on market economies. Their duties and activity levels have changed from those associated with a subsistence-based economy to those more dependent on industrial commodities and wage labour. Obesity has been observed to be more common in underprivileged people and affects women in West Bengal more frequently than men. The study's findings indicate that the problem of obesity and overweight is more common in urban regions. An early preventative approach would lessen the strain on the healthcare system in West Bengal and the rest of India caused by some chronic comorbidities, including diabetes, hypertension, cardiovascular disease, and infertility. This can be done either by implementing a unique urban health program or by incorporating a particular clause in the proposed NUHP that emphasizes the importance of a healthy diet and frequent exercise. In summary, the key findings of the present study may be concise as follows: according to BMI, the overall occurrence of OB in men was 11.89% and in women, 17.45%. The present study concluded that OB is a growing worldwide health problem, even in developing countries like India. Furthermore, OB is more common in women than men.

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Conflict of interest

None

References

Abdul Rahim, H. F., Abu-Rmeileh, N. M., Husseini, A., Ottensen, G. O., Jervell, J., &Bjertness, E. (2001).Obesity and selected co-morbidities in an urban Palestine population.*Int. J. Obes. RelatMetab. Disord.*,25,1736-1740.

https://doi.org/10.1038/sj.ijo.0801799

Asthana, S., Gupta, V. M., & Mishra, R. N. (1998). Screening for obesity in affluent females: body mass index and its comparison with skin fold thickness. *Indian J. Public Health*, *42*, 37-41.

Basak, S. (2019).The Relationship between Core Muscle Stability and Balance in Yoga.*International Journal of Experimental Research and Review*,*19*, 49-52.

Basak, S. and Biswas, K. (2016).A study of selective physiological parameters in physical training college students.*International Journal of Experimental Research and Review*, *3*, 1-6

Bateman, L. A., Slentz, C. A., Willis, LH., Shields, A. T., Piner, L. W., Bales, C. W., Houmard, J. A. and Kraus, W. E. (2011). Comparison of aerobic versus resistance exercise training effects on metabolic syndrome (from the Studies of a Targeted Risk Reduction Intervention Through Defined Exercise-STRRIDE-AT/RT). *Am.J. Cardiol. 108*(6), 838-844.

Bechara, R. G. and Kelly, Á. M. (2013). Exercise improves object recognition memory and induces BDNF expression and cell proliferation in cognitively enriched rats. *Behav, Brain Res., 245*, 96-100

Bose, K. (1995). A comparative study of generalised obesity and anatomical distribution of subcutaneous fat in adult White and Pakistani migrant males in Peterborough. *J. Roy. Soc. Hlth.,115*, 90-95.

https://doi.org/10.1177/146642409511500206

Bose, K., &Mascie-Taylor, C. G. N. (1998).Conicity index and waist-hip ratio and their relationship with total cholesterol and blood pressure in middle-aged European and migrant Pakistani men.*Ann. Hum. Biol.,25*,11-16.

https://doi.org/10.1080/03014469800005392

Dasgupta, S., &Hazra, S. C. (1999).The utility of waist circumference in assessment of obesity.*Ind. J. Pub. Health, 43*,132-135.

Dudeja, V, Misra, A., Pandey, R. M., Devina, G., Kumar, G., &Vikram, N. K. (2001). BMI does not predict overweight in Asian Indians in Northern India. *British J. Nutr.,86*, 105-112.

https://doi.org/10.1079/BJN2001382

Georges, E., William, M. H., & Wear, M. L. (1991). Body fat distribution: Association with Socioeconomic status in the Hispanic Health and Nutrition Examination Survey. *Am. J. Hum. Biol., 3*, 489-501.https://doi.org/10.1002/ajhb.1310030509

Ghosh, A. (2004). Receiver operating characteristic (ROC) curve analysis in 5-10 year old Bengalee girls from Calcutta, India.*Ann. Hum. Biol.,31*,364-369.

https://doi.org/10.1080/03014460410001670139

Ghosh, S., Nahar, N., Dasgupta, D., Sarkar, B., Biswas, P., Chakraborty, R., Acharya, C.K., Jana, S. K., &Madhu, N. R. (2022). Socioeconomic Disparity in Health of Rural Communities in the Himalayan Foothills: Mahananda Wildlife Sanctuary, West Bengal. *Chettinad Health City Medical Journal*, *11*(2), 9-18.

https://doi.org/10.24321/2278.2044.202215

Griffiths, P. L., & Bentley, M. E. (2001). The nutrition transition is underway in India. *J. Nutr., 131*, 2692-2700. https://doi.org/10.1093/jn/131.10.2692

Guo, S., Roche, A. F., &Houtkooper, L. (1989). Fat-free mass in children and young adults predicted from bioelectrical impedance and anthropometric variables. *Am. J. Clin. Nutr.,50*, 435-443. https://doi.org/10.1093/ajcn/50.3.435

Gutierrez-Fisac, J. L., Lopez, E., Banegas, J. R., Graciani, A., & Rodriguez-Artalejo, F. (2004).Prevalence of overweight and obesity in elderly people in Spain.*Obes.Res., 12*,710-715.

https://doi.org/10.1038/oby.2004.83

Heitmann, B. L. (1990). Evaluation of body fat estimated from body mass index, skinfolds and impedance: A Comparative Study. *Eur. J. Clin. Nutr.,44*, 831-837.

Houtkooper, L. B., Lohman, T. G., Going, S. B., & Howell, W. H. (1996). Why bioelectrical impedance analysis should be used for estimating adiposity. *Am. J. Clin. Nutr.,64*, 436S - 448S. https://doi.org/10.1093/ajcn/64.3.436S

Ismail, M. N., Chee, S. S., Nawawi, H., Yusoff, K., Lim, T. O., & James, W. P. (2002).Obesity in Malaysia.*Obes. Rev.,3*, 203-208.

https://doi.org/10.1046/j.1467-789X.2002.00074.x

Johnston, E., Johnson, S., McLeod, P., & Johnston, M. (2004).The relation of body mass index to depressive symptoms.*Can. J. Public Health,95*, 179-183.https://doi.org/10.1007/BF03403643

Kim, Y., Suh, Y. K., & Choi, H. (2004). BMI and metabolic disorders in South Korean adults: 1998

Korea National Health and Nutrition Survey. *Obes. Res.*, *12*, 445-453.
https://doi.org/10.1038/oby.2004.50

Kopelman, P. G. (2000). Obesity as a medical problem.*Nature*,*404*, 635-643.
https://doi.org/10.1038/35007508

Lean, M. E. J., Han T. S., &Deurenberg, P. (1996).Predicting body composition by densitometry from simple anthropometric measurements.*Am. J. Clin. Nutr.*,*63*, 4-14. https://doi.org/10.1093/ajcn/63.1.4

Lobstein T. (2021). COVID-19 and Obesity.The 2021 Atlas. London; Available at: www.worldobesityday.org/assets/downloads/COVID-19-and-Obesity-The-2021-Atlas.pdf

Lohman, T. G., Roche, A. F., &Martorell, R. (1988).*Anthropometric Standardization Reference Manual*.Human Kinetics Books, Chicago.

Ministry of Health and Family Welfare, Government of India (2016). Comprehensive National Nutrition Survey 2016–2018.

Misra, A., Pandey, R. M., Devi, J. R., Sharma, R., Vikram N. K., &Khanna, N. (2001). High prevalence of diabetes, obesity and dyslipidaemia in urban slum population in northern India.*Int. J. Obes. Relat.Metab.Disord.*,*25*, 1722-1729. https://doi.org/10.1038/sj.ijo.0801748

Muller, W. H., & Reid, R. M. (1979).A multivariate analysis of fatness and relative fat patterning.*Am. J. Phys. Anthrop.*,*50*, 199-208.
https://doi.org/10.1002/ajpa.1330500208

Pramanik, B. (2018). A comparative study on the knowledge, attitude and risk perception regarding complications of type-2 diabetes mellitus between male and female diabetic patients attending diabetic clinics in selected hospital of West Bengal, India.*International Journalof Experimental Research and Review*, *15*, 16-27.

Sarkar, B., Biswas, P., Acharya, C. K., Jana, S. K., Nahar, N., Ghosh, S., Dasgupta, D., Ghorai, S. K., Madhu, N. R. (2022). Obesity Epidemiology: A Serious Public Health Concern in India. *Chettinad Health City Medical Journal*, *11*(1), 21-28. https://doi.org/10.24321/2278.2044.202205

Sarkar, B., Ghorai, S. K., Jana, S. K., Dasgupta, D., Acharya, C. K., Nahar, N., Ghosh, S. and Madhu, N. R. (2021). Overweight and obesity in West Bengal: A Serious Public Health Issue. *VEETHIKA-An International Interdisciplinary Research Journal*, *7*(4), 9-14.
https://doi.org/10.48001/veethika.2021.07.04.002

Pi – Sunyer, F. X. (1994).*Obesity*.In :Modern Nutrition in Health and Disease. Shils M. E., Olson, J.A. and Shike, M. (eds). Lea &Febiger, London. pp. 984-1006.

Roberts, S. B., & Mayer, J. (2000). Holiday wait gain : Fact or Fiction ? *Nutrition Reviews*,*58*, 378-379. https://doi.org/10.1111/j.1753-4887.2000.tb01839.x

Roy, C. S., Mukhopadhyay, A. and Bhadra, M. (2016a). Prevalence of overweight and obesity among Bengalee urban adult men of North 24 Parganas, West Bengal, India.*International Journal of Experimental Research and Review*, *4*, 45-50.

Roy, C.S., Mukhopadhyay, A. and Bhadra, M. (2016b). Age variations in obesity, adiposity and central body fat distribution among Bengalee urban adult male of North 24 Parganas, West Bengal, India. *International Journal of Experimental Research and Review*, *5*, 74-83.

Segal, K. R., Van Loan, M., Fitzgerald, P. I., Hogdon J. A., & Van Itallie, B. (1988). Lean body mass estimation by bioelectrical impedance analysis : A four-site cross validation study. *Am. J. Clin. Nutr.*,*47*, 7-14. https://doi.org/10.1093/ajcn/47.1.7

Smith, S. R., Lovejoy, J. C., Greenway, F., Ryan, D., deJonge, L., Bretonne, J de la., Volafova J., & Bray, G. A. (2001). Contributions of total body fat, abdominal subcutaneous adipose tissue compartments, and visceral adipose tissue to the metabolic complications of obesity. *Metabolism*,*50*, 425-35.
https://doi.org/10.1053/meta.2001.21693

Sobol, J., &Stunkard, A.J. (1989). Socioeconomic status and obesity: A review of the literature. *Psychol Bull*., *105*, 260-275. https://doi.org/10.1037/0033-2909.105.2.260

Stunkard, A. J., &Wadden, T. A. (1993).*Obesity: theory and therapy*. Second edition, Raven Press, New York.

Thomas, C. S., &Krishnaswami, S. (1995). Distribution of Body Mass Index in Indian patients with coronary artery disease.*Indian Heart J.*, *47*, 134-137.

Ulijaszek, S.J., & Kerr, D.A. (1999).Anthropometric measurement error and the assessment of nutritional status.*Brit. J. Nutr., 82*, 165-177.https://doi.org/10.1017/S0007114599001348

Van Gaal, L., Rillaerts, E., Creten, W., & De Leeuw, I. (1988). Relationship of body fat distribution pattern to atherogenic risk factors in NIDDM :Preliminary Results. *Diabetes Care,11*, 103-106. https://doi.org/10.2337/diacare.11.2.103

Venkatramana, P., &Chengal Reddy, P. (2002). Association of overall and abdominal obesity with coronary heart disease risk factors: Comparison between urban and rural Indian men. *Asia Pacific. J. Clin. Nutr.,11*, 66-71.
https://doi.org/10.1046/j.1440-6047.2002.00250.x

World Health Organization. (1995). *Physical Status: The Use and Interpretation of Anthropometry*, Report of the WHO Expert Committee, Technical Report Series, No. 854., World Health Organization, Geneva.

World Health Organization. (2000). *Obesity, Preventing and Managing the Global Epidemic*, Report of a WHO Consultation, Technical Report Series, No. 894., World Health Organization, Geneva.

World Health Organization, World Obesity Federation (2018).Taking Action on Childhood Obesity.

World Health Organization (2022). Draft recommendations for the prevention and management of obesity over the lifecourse, including considering the potential development of targets in this regard. See Annex 9: apps.who.int/gb/ebwha/pdf_files/EB150/B150_7-en.pdf

World Obesity Federation (WOF).(2022). World Obesity Atlas 2022. World Obesity Federation, London.

Zargar, A. H., Masoodi, S. R., Laway, B. A., Khan, A. K., Wani, A. I., Bashir, M. I., &Akhtar, S. (2000). Prevalence of obesity in adults--an epidemiological study from Kashmir Valley of Indian Subcontinent.*J. Assoc. Physicians India,48*, 1170-1174.

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