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PREVALENCE OF OBESITY IN HINDU PRIESTS BY USING BODY MASS INDEX AND WAIST HIP RATIO

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Abstract: Major risk factors for lifestyle diseases are present with priest's lifestyle. Daily responsibility of priests includes, sitting mostly for long working hours & taking high calorie diet in form of Prasad. Predisposition to these may give rise to lifestyle diseases. The need of study is find prevalence of obesity in Hindu Priests who endure long hours of duty while seated cross-legged and motionless so that a best exercise schedule can be followed by them regularly to prevent the onset of all the mentioned diseases at an early age.

Method – – The study consist of 101 participants chosen according to inclusion and exclusion criteria ,BMI and WHR was measured and finding was noted, Acquired data was entered into statistical software.

Result – There is high risk of CVD in this population.

Conclusion - This study concluded that there is high prevalence of obesity that is 55% among these population by using BMI and 90% were having risk of developing lifestyle diseases by using WHR.

Index Terms – Obesity, Hindu Priests, BMI, WHR.

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I. INTRODUCTION

People are predisposed to various diseases based on their way of living and occupational habits. They are preventable, and can be lowered with changes in diet, lifestyle, and environment. Lifestyle diseases characterize those diseases whose occurrence is primarily based on daily habits of people and are a result of an inappropriate relationship of people with their environment. The onset of these lifestyle diseases is insidious, they take years to develop, and once encountered do not lend themselves easily to cure. The main factors contributing to the lifestyle diseases include bad food habits, physical inactivity, wrong body posture, and disturbed biological clock. The diet [or lifestyle] of different populations might partly determine their rates of cancer, and the basis for this hypothesis was strengthened by results of studies showing that people who migrate from one country to another generally acquire the cancer rates of the new host country, suggesting that environmental [or lifestyle factors] rather than genetic factors are the key determinants of the international variation in cancer rates. (1)

Occupational lifestyle diseases include those caused by the factors present in the vicinity like heat, sound, dust, fumes, smoke, cold, and other pollutants. These factors are responsible for allergy, respiratory and hearing problems, and heat or cold shock. Those occupations, in which there is a huge temperature or pressure difference, cause a disturbed homeostasis leading to disease. Astronauts and divers have to spend time in a closed box to minimize the risk developed by the pressure difference. (1)

The rising rate of overweight and obesity among young people is a growing concern. The prevalence of overweight children and adolescents has tripled since 1980, and the severity of obesity has increased in the past 10 years. Complications of youth overweight and obesity are well documented and include metabolic health risk, chronic diseases, psychosocial problems, and an increased risk of cardiovascular diseases in adulthood.(2)

It is well established that excess body fat, particularly when located centrally around the abdomen, is associated with hypertension, metabolic syndrome, Type 2 diabetes mellitus, stroke, cardiovascular disease (CVD), and dyslipidemia (95). Approximately two-thirds of American adults are classified as overweight (body mass index [BMI] 25 $kg.m^{-2}$), and about 33% of these are classified as obese (BMI 30$Kg.m^{-2}$). Although the prevalence of obesity has steadily risen over the last three decades, recent data indicate a plateau in obesity trends, particularly in women (3)

Basic body composition can be expressed as the relative percentage of body mass that is fat and fat-free tissue using a two-compartment model. Body composition can be estimated with laboratory and field techniques that vary in terms of complexity, cost, and accuracy. (3)

ANTHROPOMETRIC METHODS

A) BODY MASS INDEX

BMI or the Quetelet index is used to assess weight relative to height and is calculated by dividing body weight in kilograms by height in meters squared (kg/M^{-2}). For most individuals, obesity-related health problems increase beyond a BMI of 25.0 kg/M^{-2}. The Expert Panel on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults defines a BMI of 25.0–29.9 kg/M^{-2} as overweight and BMI of 30.0 kg/M^{-2} as obese. BMI fails to distinguish between body fat, muscle mass, or bone. Nevertheless, an increased risk of hypertension, sleep apnea, Type 2 diabetes mellitus, certain cancers, CVD, and mortality are associated with a BMI 30.0 kg/M^{-2} (Table 1). Interestingly, there is compelling evidence to indicate patients diagnosed with congestive heart failure (CHF) actually have improved survival when BMI is 30.0 kg/M^{-2}, a phenomenon known as the "obesity paradox" , for reasons that are not clear . Compared to individuals classified as obese, the link between a BMI in the overweight range (25.0–29.9 kg/M^{-2}) and higher mortality risk is less clear. However, a BMI of 25.0–29.9 kg/M^{-2}, similar to a BMI30.0 kg/M^{-2}, is more convincingly linked to an increased risk for other health issues such as Type 2 diabetes mellitus, dyslipidemia, hypertension, and certain cancers . A BMI of 18.5 kg/M^{-2} also increases mortality risk and is responsible for the lower portion of the J-shaped curve when plotting risk on the y-axis and BMI on the x-axis . The use of specific BMI values to predict percent body fat and health risk can be found in Table 2 . Because of the relatively large standard error of estimating percent body fat from BMI (5% fat) , other methods of body composition assessment should be used to estimate percent body fat during a physical fitness assessment. (3)

TABLE:1 Classification of Disease Risk Based on Body Mass Index (BMI) and Waist Circumference

		Disease Risk[a] Relative to Normal Weight and Waist Circumference	
	BMI ($kg \cdot m^{-2}$)	Men, ≤102 cm Women, ≤88 cm	Men, >102 cm Women, >88 cm
Underweight	<18.5	—	—
Normal	18.5–24.9	—	—
Overweight	25.0–29.9	Increased	High
Obesity, class			
I	30.0–34.9	High	Very high
II	35.0–39.9	Very high	Very high
III	≥40.0	Extremely high	Extremely high

[a]Disease risk for Type 2 diabetes, hypertension, and cardiovascular disease. Dashes (—) indicate that no additional risk at these levels of BMI was assigned. Increased waist circumference can also be a marker for increased risk even in individuals of normal weight.

B) WAIST-TO-HIP RATIO (WHR)

The waist-to-hip ratio is a comparison between the circumference of the waist to the circumference of the hip. This ratio best represents the distribution of body weight, and perhaps body fat, on an individual. The pattern of body weight distribution is recognized as an important predictor of health risks of obesity. Individuals with more weight or circumference on the trunk are at increased risk of hypertension, type 2 diabetes, hyperlipidemia, and CAD compared to individuals who are of equal weight but have more of their weight distributed on the extremities. Some experts suggest that the waist circumference alone may be used as an indicator of health risk.

- Waist: The waist circumference is frequently defined as the smallest waist circumference usually above the umbilicus or navel (1 inch above umbilicus; below the xiphoid process) (Fig. 1)
- Hip: In this studies that have assessed WHR, the hip circumference is defined as the largest circumference around the buttocks, above the gluteal fold (posterior extension) (Fig. 2)

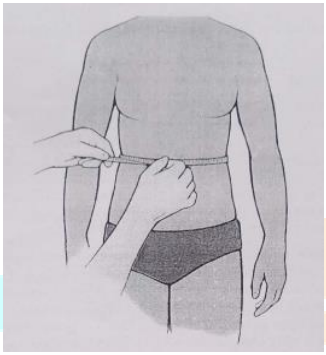


Fig. 1: Waist circumference

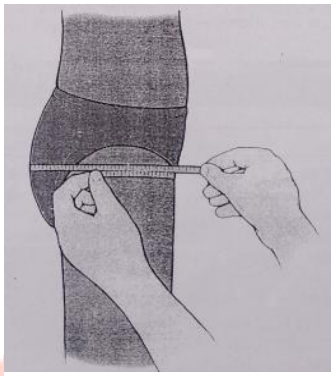


Fig. 2: Hip circumference

The WHR also may be expressed, or used interchangeably, as the A:G ratio. The A:G ratio stands for abdominal to gluteal ratio. WHR is expressed as a ratio (there are no units).

$$\text{WHR} = \frac{\text{Waist Circumference}}{\text{Hip Circumference}}$$

Measure the waist and hip circumference in either inches or centimeters (1 in = 2.54 cm). Take multiple measurements until each is within ½ inch of each other.

TABLE:2 Classification of Waist-to-Hip Circumference Ratio (WHR)

WAIST-TO-HIP CIRCUMFERENCE RATIO (WHR)				
STANDARD FOR MEN				
	Risk			
Age	Low	Moderate	High	Very High
20-29	<0.83	0.83-0.88	0.89-0.94	>0.94
30-39	<0.84	0.84-0.91	0.92-0.96	>0.96
40-49	<0.88	0.88-0.95	0.96-1.00	>1.00
50-59	<0.90	0.90-0.96	0.97-1.02	>1.02
60-69	<0.91	0.91-0.98	0.99-1.03	>1.03

An increased risk of overall mortality is associated with upper body obesity. A person with upper body obesity is carrying more weight on trunk compared to the buttocks and has a higher WHR than lower body obesity.

The waist circumference may also be used alone as an indicator of abdominal obesity. [4]

As an Indian Nakul Uppal et al., have had a lifelong opportunity to observe the unique professional hazards that befall many Brahmin Hindu priests. Hindu priests are required by ancient Vedic rites to endure long hours of duty while seated cross-legged and motionless, inevitably damaging the knees. Pain from osteoarthritis further limits their mobility. [6]

The Hindu priest community consists of group of people who do rituals of saying rhymes (pooja) at times before the fire and they are exposed to the fumes and have to sit for 5 to 6 hours at a stretch together. This type of sedentary lifestyle is since many years from childhood to adult. After completing the rituals of rhymes they are served food rich in fats (Ghee) and carbohydrate. Excess consumption of ghee has been contributing to an increased risk of cardiovascular disease since it contains a high percentage of saturated fatty acids, leading to increased synthesis of cholesterol. The American Heart Association recommends limiting the consumption of saturated fats to less than 7% of energy to reduce the risk of cardiovascular disease. So this ritual of sitting daily at hours together followed by consumption of such type of food may cause alterations in the levels of blood lipids and lead to obesity and cardiovascular disease. The coincidence of obesity, insulin resistance, hypertension and dyslipidemia is commonly referred to as the 'metabolic syndrome'. High cholesterol diet is regarded as an important factor in the development of cardiac diseases as it leads to the development of hyperlipidemia, atherosclerosis and ischemic heart diseases. [7]

II. METHODOLOGY

This prevalence study is conducted on 101 subjects of age 20-40 years old at urban area. Ethical committee clearance was obtained and permission was taken from the department. Written consent was taken from the subjects who fulfil the inclusion criteria and exclusion criteria. The subjects were informed about the study. Subjects height weight was measured for BMI and waist hip ratio assessment was done. Post intervention outcome measure values were noted and statistical analysis and interpretation was done.

II.A INCLUSION CRITERIA

- Priests in nearby temples.
- Priests who have to sit for 5 to 6 hours cross-legged and motionless.[6],[7]
- Only Males.
- Age: 20-40 years.[8]

II.B EXCLUSION CRITERIA

- Any congenital disease.
- Individuals involved in any other kind of job.
- Neuromuscular disorders.
- Any other systemic illness.

II.C OUTCOME MEASURES

1) BMI:-

BMI is used to assess weight relative to height and is calculated by dividing body weight in kilograms by height in meters squared (kg m).[3] (fig 3,fig 4)

Fig 3: shows that subject 1 standing straight on weighing scale to measure his weight for BMI.

Fig 4: shows that subject 2 standing straight on weighing scale to measure his weight for BMI.

2) WHR:

The waist-to-hip Ratio (WHR) is a comparison between the circumference of waist to the circumference of the hip. [4] (fig. 5)

$$\text{WHR} = \frac{\text{Waist Circumference}}{\text{Hip Circumference}}$$

Figure 5: shows that subject 3 measuring waist circumference for WHR.

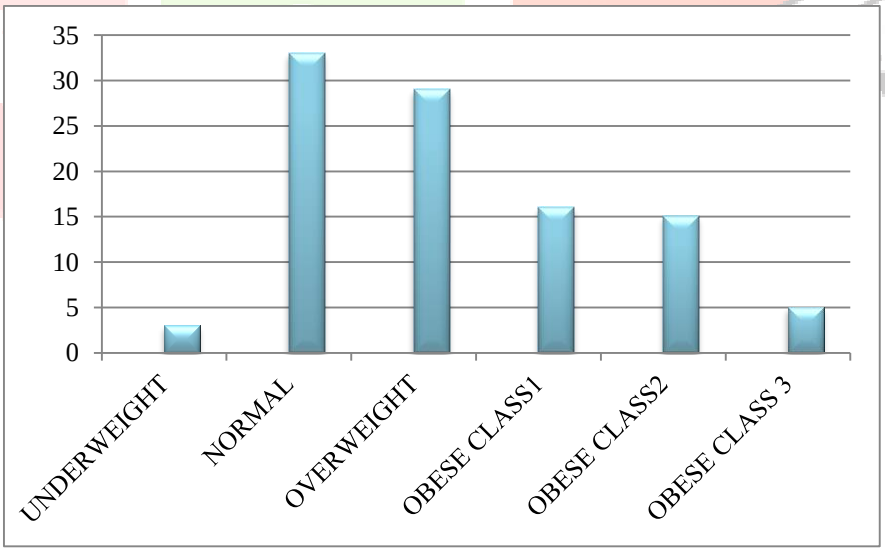
III. STATISTICAL ANALYSIS

Data was collected and analysed by appropriate statistical groups

IV. RESULTS

BMI	NO. OF PARTICIPANTS
UNDERWEIGHT	3
NORMAL	43
OVERWEIGHT	19
OBESE CLASS1	16
OBESE CLASS2	15
OBESE CLASS 3	5

Table 3 **Distribution of chart according to BMI**



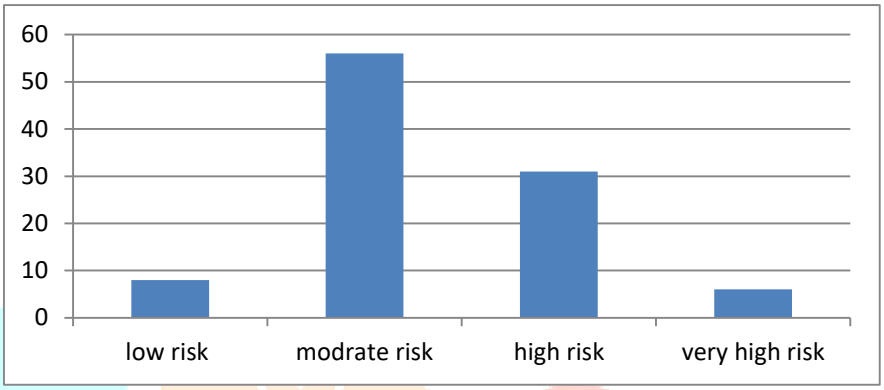
Graph 1 Distribution of chart according to BMI

Interpretation:

According to BMI, 3% of population comes under underweight, 43% of population are normal, 19% comes under overweight, 16% comes under obese class 1, 15% comes under obese class 2 and 5% comes under obese class 3 .

Table 4:Distribution of graph according to Waist Hip Ratio

WHR	NO OF PARTICIPANTS
Low risk	8
Moderate risk	56
High risk	31
Very high risk	6



Graph 2:Distribution of graph according to Waist Hip Ratio

INTERPRITATION:

This graph shows chances of development of risk of diseases is 8% of low risk, 56% of moderate, 31% of high and 06% of very high risk.

V. DISCUSSION

People are predisposed to various diseases based on their way of living and occupational habits. They are preventable, and can be lowered with changes in diet, lifestyle, and environment. Lifestyle diseases characterize those diseases whose occurrence is primarily based on daily habits of people and are a result of an inappropriate relationship of people with their environment. The onset of these lifestyle diseases is insidious, they take years to develop, and once encountered do not lend themselves easily to cure.[(1)]

The epidemiology of cardiovascular disease risk factors is changing rapidly with the obesity pandemic. Obesity is independently associated with the risks for coronary heart disease, atrial fibrillation, and heart failure. Intra-abdominal obesity is also unique as a cardiovascular risk state in that it contributes to or directly causes most other modifiable risk factors, namely, hypertension, dysmetabolic syndrome, and type 2 diabetes mellitus. Obesity can also exacerbate cardiovascular disease through a variety of mechanisms including systemic inflammation, hyper coagulability, and activation of the sympathetic and renin-angiotensin systems. [(5)]

In the present study the maximum number of participants have more than 5-6 hours of sitting due to which there is increased in the obesity due to prolong sitting hours. The rising rate of overweight and obesity among young people is a growing concern. The deleterious effects of sedentary behavior on metabolic health appear to be at least partially mediated by changes in lipoprotein lipase (LPL) activity. LPL is an enzyme that facilitates the uptake of free fatty acids into skeletal muscle and adipose tissue.[(10)] Complications of youth overweight and obesity are well documented and include metabolic health risk, chronic diseases, psychosocial problems and an increased risk of cardiovascular diseases in adulthood.[(2)] The study done by Hue and colleagues using data from the Nurses' Health Study provides key evidence regarding the relationship between sitting and health outcomes, including obesity. Importantly, this study also examined other sedentary behaviors, where increase in sitting at work was associated with a 5% increased risk of obesity. [(15)]

. The result of BMI shows that mostly participants were under overweight and obese category with 55% due to Cholesterol which is one of the greatest mediators for cardiovascular risk in visceral obesity. Also Increasing BMI levels mediate a common pattern of dyslipidemia which is characterized by higher triglycerides, lower HDL-C, and increased small, dense LDL particles, which are all independent risk factors for coronary disease. [(23)]The study done by Hamburg et al. (2007) suggest that an extended

dose of sedentary behavior can result in dramatically increased metabolic risk. Similar results have been reported by Yanagibori et al., who found that 20 days of bed rest resulted in a significant increase in plasma triglycerides and a significant decrease in HDL cholesterol levels. (16)

The result of WHR showed that mostly participants were having risk of Lifestyle diseases with 93% because the association of visceral obesity and cardiovascular risks stems from the clustering of metabolic conditions (including hypertension, dyslipidemia, and type 2 DM) that are mediated through insulin resistance, leading to the metabolic syndrome. The purpose of this unique designation was to identify those at higher metabolic risk for cardiovascular disease and the development of diabetes and to respond with more aggressive strategies for prevention.(21)The study done by Atilla Engin MD and colleagues states that Abdominal obesity is the most frequently observed component of metabolic syndrome. The metabolic syndrome; clustering of abdominal obesity, dyslipidemia, hyperglycemia and hypertension, is a major public health challenge.

A recent study elegantly demonstrated that transplantation of visceral adipose tissue from genetically obese mice into Apoe-deficient mice increased atherosclerosis in the recipient animals, suggesting that inflamed adipose tissue exerts distinct vascular effects, presumably through inflammatory cells such as macrophages within the visceral adipose tissue. Macrophages within visceral adipose tissue are known to express and release cytokines. These cytokines reach the liver though the portal circulation, where they can stimulate hepatic inflammation , thereby inducing a chronic systemic inflammatory response.(23)

Cardiovascular disease continues to be a leading cause of morbidity and mortality throughout the world. In 2008 alone, 770,000 population will experience an acute myocardial infarction (AMI) and an additional 430,000 will have a recurrent event. There are strong associations between cardiovascular disease risks and obesity.(22) These findings suggest the need for specific attention to control the disease prevalence. Hence, It is important to observe the prevalence of diabetes, hypertension, and obesity individually and also the combination of risk factors as metabolic syndrome to predict the risk of cardiovascular disease. Any association between lifestyle factors and these risk factors would provide the opportunity to encourage a change in lifestyle to promote lower levels of subsequent CVD. (5)

VI. CONCLUSION

This study concluded that there is high prevalence of obesity that is 55% among these population by using BMI and 90% were having risk of developing lifestyle diseases by using WHR.

VII. CLINICAL IMPLICATION

The result can be used as a baseline for the further interventional studies

VIII. LIMITATION OF STUDY

Skin fold measurement was not considered.

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IX. RECOMENDATION AND FUTURE SCOPE OF STUDY

- The priests are need to be made aware about physical activity to prevent further complications like CVD, DM etc
- Correct lifestyle modification and ergonomic advices can prevent further complications.

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