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**Declaration**

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## Awareness of Causes, Consequences and Preventive Measures of Obesity among Adolescents in India

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### Abstract

**Background:** The burden of obesity is rapidly increasing worldwide. Obesity is associated with wide range of diseases, including cardio respiratory disease such as chronic obstructive pulmonary disease and coronary heart disease. **Aims:** This study aimed to assess the awareness of the adolescents towards the causes, consequences and preventive measures of obesity. **Methods:** The present study was based on primary data. The study included 200 adolescents surveyed as per convenience sampling. The analysis was made with descriptive statistics and multivariate logistic regression. **Results:** The study identified that 64.0 percent of the respondents suffered from obesity at the time of survey. The logistic regression shows that obesity was associated with gender, age, education of the mother, income and eating habits of the breakfast. Thus, logistic regression clearly highlighted that obesity was associated with changing lifestyle. But, the awareness of the risk factors and the preventive measures of obesity was not clear among the adolescents. **Conclusion:** The present study provides sufficient evidence on the awareness of the causes, risk factors and preventive measures of obesity and calls for an immediate action to scale up cost-effective interventions for it both through private and public hospitals. Thus, study indicates a need for creating awareness among adolescents towards the consequences and preventive measures through mass media and campaigns at the schools.

**Key words:** *Adolescents, Consequences, Preventive Measures, Obesity.*

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## **I. Introduction**

The epidemic of childhood obesity is substantial health burden worldwide [1,2] and its impact is being observed in developing countries as well [3,4,]. However, problem is of a larger magnitude in developing countries like India where a significant proportion of the population belongs to younger age groups [5]. During adolescence, teenagers start to make individual choices and develop a personalized lifestyle [6,20]. Rising prevalence of obesity in India may be attributed to various factors, like sedentary life-style, unhealthy food habits, cultural practices and increasing affluence of middle class population [7,8,9]. According to various studies the current prevalence of childhood overweight in India could range from 4.0 percent to 22.0 percent [10]. Obesity in children increases the risk of subsequent morbidity, whether or not obesity persists into adulthood [11,12]. Outcomes related to childhood obesity includes hypertension, type 2 diabetes mellitus, dyslipidaemia, left ventricular hypertrophy, non-alcoholic steatohepatitis, obstructive sleep apnoea, and orthopaedic and psychosocial problems [13, 14]. According to the WHO, overweight and obesity contribute to 44.0 percent of the world's diabetes burden and 23.0 percent of the ischaemic heart disease burden [15]. The negative consequences of obesity during the early years of life are both physiological and psychosocial. Probably, the most widespread consequences of childhood obesity are psychosocial. Obese children become targets of early and systematic discrimination and tend to develop a negative self-image that appears to persist into adulthood [10, 11].

Obesity among adolescents increased dramatically in recent years. The last two decades of the previous century witnessed a dramatic increase in health care costs due to obesity and related issues among the children and adolescents [16]. It has adverse consequences and calls for

population based interventions aimed at prevention of obesity [15, 23]. According to Schneider et al. (2009) the burden of obesity might become difficult to manage with future socio-economic development in the country [17, 24]. The identification of risk factors is the key to prevention [18, 19]. However, limited literature is available on prevalence of adolescent obesity in India [21, 22]. Keeping this in mind, present paper examines the awareness of the causes, consequences and preventive measures of obesity among the adolescents. To accomplish this objective, the paper has been divided into six broad sections. Section I, introduces the implications of obesity. Section II, describes the research methodology to work out the objectives. Section III, shows the analysis and interpretation of the data. Section VI, concludes the discussion along with policy implications.

## **II. Materials and Methods:**

### **(a) Sample size and sampling technique**

The study was based on primary data collected from urban Punjab. The sample size for the present study was 200 adolescents selected from Jalandhar. Adolescents of age groups 8-18 years were surveyed. The respondents have been included on the basis of convenience sampling.

### **(b) Study Instrument**

For the collection of data, a structured questionnaire was prepared. The first part of the questionnaire deals with basic information of the respondent, second part of the questionnaire consists of awareness, risks and preventive measures of obesity. The data was collected by the researcher by face to face interviews from January 2016 to March 2016.

### **(c) Statistical Analysis**

The analysis of data was made with the help of frequencies, percentages and weighted average score (WAS). Multivariate logistic regression was performed to examine the determinants of obesity. The dependent variable in the logistic regression was adolescent suffered from obesity =1, whereas 0 otherwise. Data were analyzed using SPSS 16 and STATA 11.1.

## **III. Findings**

### **(a) Demographic Characteristics of the Respondents**

Table 1 demonstrates that 30.0 percent of the respondents were male and 70.0 percent were female. However, 20.0 percent and 80.0 percent of the respondents were of age groups up to 14 years and 14-18 years respectively. Majority of the adolescent's mother were postgraduate followed by senior secondary school, graduate, above primary, up-to secondary, up to primary and illiterate. It was found that majority of the respondents had an annual income of ₹1,00,001-₹1,50,000 followed by ₹1,50,001-₹2,00,000, up to ₹100001 and ₹2,00,001-₹2,50,000.

**Table: 1**  
**Demographic Characteristics of the Respondents**

<b>Characteristics (N=200)</b>	<b>Percentage</b>
<b>Gender</b>	
Male	30.0
Female	70.0
<b>Total</b>	<b>100.0</b>
<b>Age</b>	
Up to 14 years	20.0
14-18 years	80.0
<b>Total</b>	<b>100.0</b>
<b>Education of the mother</b>	
Illiterate	10.0
Up to Primary	12.0
Above Primary, Up-to Secondary	13.0
Senior Secondary School	20.0
Graduate	15.0
Postgraduate	30.0
<b>Total</b>	<b>100.0</b>
<b>Annual family income</b>	
Up to ₹1,00,000	7.5
₹1,00,001-₹1,50,000	59.7
₹1,50,001-₹2,00,000	24.0

₹1,50,001-₹2,00,000	5.9
₹2,00,001-₹2,50,000	2.9
<b>Total</b>	<b>100.0</b>

*Source: Author's Calculation Based on Primary Data*

### **(b) Incidence and Implications of Obesity**

Table 2 identifies that 64.0 percent of the respondents suffered from obesity at the time of survey. Whereas, it was 23.0 percent, 27.0 percent and 50.0 percent of the respondents who considered themselves underweight, normal weight and overweight. It was also noticed that 52.0 percent of the respondents eat breakfast sometimes, 30.0 percent always, 13.0 percent rarely and 5.0 percent never. 41.0 percent of the adolescents have family history of obesity, 48.0 percent perceived they know the harmful effects of obesity, 31.0 percent knows that obesity leads to chronic diseases. It was the opinion of majority of the respondents that obesity can be best treated by the individual actions followed by prescription of medicines, dieticians, general practitioners and hospital and clinics/specialists.



**Table: 2  
Incidence and Implications of Obesity**

<b>Characteristics (N=200)</b>	<b>Percentage</b>
<b>Have you suffered from obesity? (N=630)</b>	
Yes	64.0
No	36.0
<b>Total</b>	<b>100.0</b>
<b>Do you consider yourself underweight, normal weight or overweight?</b>	
Underweight	23.0
Normal weight	27.0
Overweight	50.0
<b>Total</b>	<b>100.0</b>
<b>How often do you eat breakfast?</b>	
Always	30.0
Sometimes	52.0
Rarely	13.0
Never	5.0
<b>Total</b>	<b>100.0</b>
<b>Do you have a family history of obesity?</b>	
Yes	41.0
No	59.0
<b>Total</b>	<b>100.0</b>

<b>Do you have the knowledge about harmful effects of obesity?</b>	
Yes	48.0
No	52.0
<b>Total</b>	<b>100.0</b>
<b>Do you have knowledge about the association of obesity with chronic diseases?</b>	
Yes	31.0
No	69.0
<b>Total</b>	<b>100.0</b>
<b>Do you believe that overweight and obesity may be best treated?</b>	
By hospital, clinics or specialists	5.0
By general practitioners	12.0
By dieticians	15.0
By social workers	8.0
By the individual	26.0
By prescription medication	16.0
Others	18.0
<b>Total</b>	<b>100.0</b>

*Source: Author's Calculations Based on Primary Data*

### **(c) Determinants of Obesity among Adolescents**

Table 3, shows the various determinants of obesity with the help of logistic regression analysis.

It was found that there exists a significant association ( $p < 0.10$ ) between gender and obesity. The

coefficient of logistic regression shows that female respondents were more prone to obesity than of male. There exists a direct relation between the age ( $p < 0.01$ ) and obesity. As respondents of 14-18 years ( $p < 0.01$ ) were more obese than of up to 14 years. This clearly shows the probability of obesity increases with age. Education of the mother was associated with the obesity. The children of the educated mothers were more obese than of illiterate. The educational groups of the mothers such as senior secondary school ( $p < 0.05$ ), graduate ( $p < 0.01$ ) and postgraduate ( $p < 0.01$ ) were significantly more prone to obesity. However, all of the income groups were significant and the coefficient of logistic regression shows that higher income increases the risk of obesity. Income groups such as ₹1,00,001-1,50,000 ( $p < 0.10$ ), ₹1,50,001-2,00,000 ( $p < 0.01$ ) and ₹2,00,001-2,50,000 ( $p < 0.10$ ) were significantly more prone to obesity. Those who always eat ( $p < 0.01$ ) the breakfast were less prone to obesity and who never eat breakfast ( $p < 0.01$ ) were less prone to obesity. However, family history of the diabetes was not linked with obesity of adolescents. Thus, logistic regression clearly highlights that obesity is associated with lifestyle related disease.

**Table: 3****Multivariate Analysis of Determinants of Obesity among Adolescents**

<b>Variable</b> <i>(Reference values in parentheses)</i>	<b>Coefficient</b>	<b>Std. Error</b>	<b>p-value</b>	<b>Marginal Effects</b>
<b>Gender</b> (Female)	1.334*	0.744	0.073	0.190
<b>Age</b> (Up to 14 years)				
14-18 years	1.619***	0.618	0.009	0.209
<b>Education of the Mother</b> (Illiterate)				
Up to primary	0.154	0.573	0.788	0.025
Above primary, up-to secondary	0.621	0.776	0.424	0.093
Senior secondary school	1.083**	0.726	0.056	0.153
Graduate	1.298***	0.638	0.042	0.177
Postgraduate	1.702***	0.627	0.007	0.171
<b>Income</b> (Up to ₹1,00,000)				
₹1,00,001-₹1,50,000	1.144*	0.691	0.098	0.168
₹1,50,001-₹2,00,000	1.109***	1.331	0.005	0.164
₹2,00,001-₹2,50,000	1.008*	1.409	0.095	0.001
<b>Eating of breakfast</b>				
Always	0.954***	0.432	0.027	0.161
Sometimes	1.151	0.786	0.143	0.158
Rarely	1.178	1.184	0.320	0.161
Never	2.382***	0.706	0.001	0.306

<b>Family history of obesity</b>	0.822	0.570	0.149	0.119
<b>Constant</b>	3.967***	1.178	0.001	-
<i>Model Summary</i>				
<b>No of observations</b>	200			
<b>Prob&gt;chi2</b>	63.12			
<b>Pseudo R2</b>	0.2453			

*Source: Author's Calculation Based on Primary Data*

*\*\*\* Significant at 1 percent, \*\* Significant at 5 percent, \* Significant at 10 percent*

#### **(d) Awareness of Consequences of Obesity among Adolescents**

Table 4 shows the awareness of the various consequences of obesity among the adolescents. It was found that the adolescents assumed that obesity causes reduction of consumption of fried foods (WAS=4.52) followed by running problem (WAS=4.51), problem in standing and sitting (WAS=4.17), feeling of tiredness (WAS=4.10), laziness (WAS=4.02), breathlessness (WAS=3.94), problem in walking (WAS=3.87), leads to high blood pressure (WAS=3.80), loss of self confidence (WAS=3.73), bad figure (WAS=3.70), joint pain (WAS=3.61), diabetes (WAS=3.60), leads to many chronic diseases (WAS=3.59), sleeping problem (WAS=3.50), mental tension (WAS=3.36), body pain (WAS=3.15) and dizziness (WAS=3.09).

**Table: 4**  
**Weighted Average Score of Consequences of Obesity**

<b>S. No.</b>	<b>Items</b>	<b>Weight Average Score (WAS)</b>	<b>Rank</b>
1	Cannot eat fried foods	4.52	1.0
2	Running problem	4.51	2.0
3	Problem in standing and sitting	4.17	3.0
4	Feeling of tiredness	4.10	4.0
5	Leads to laziness	4.02	5.0
6	Breathlessness	3.94	6.0
7	Problem in walking	3.87	7.0
8	Leads to high blood pressure	3.80	8.0
9	Loss of self confidence	3.73	9.0
10	Bad figure	3.70	10.0
11	Joint pain	3.61	11.0
12	Diabetes	3.60	12.0
13	Leads to many chronic diseases	3.59	13.0
14	Sleeping problem	3.50	14.0
15	Mental tension	3.36	15.0
16	Body pain	3.15	16.0
17	Dizziness	3.09	17.0

*Source: Author's Calculation Based on Primary Data*

**(e) Awareness of Preventive Measures of Obesity among Adolescents**

Table 5, demonstrates the awareness of the preventive measures of obesity among the adolescents. It was found that respondents perceived that obesity can be prevented firstly by running (WAS=4.53) followed by exercise (WAS=4.50), jogging (WAS=4.49), walking (WAS=4.20), intake of lemon water (WAS=3.82), intake of balanced diet (WAS=3.58), dieting (WAS=3.20), yoga (WAS=3.10), fasting (WAS=3.07), intake of boiled food (WAS=2.87), doing household work (WAS=2.76), less consumption of rice (WAS=2.74) and no fried food (WAS=2.45).

**Table: 5**  
**Weighted Average Score of Preventive Measures of Obesity**

<b>S. No.</b>	<b>Items</b>	<b>Weight Average Score (WAS)</b>	<b>Rank</b>
1	Running	4.53	1.0
2	Exercise	4.50	2.0
3	Jogging	4.49	3.0
4	Walking	4.20	4.0
5	Intake of lemon water	3.82	5.0
6	Intake of balanced diet	3.58	6.0
7	Dieting	3.20	7.0
8	Yoga	3.10	8.0

9	Fasting	3.07	9.0
10	Intake of boiled food	2.87	10.0
11	Doing household work	2.76	11.0
12	Less consumption of rice	2.74	12.0
13	No fried food	2.45	13.0

*Source: Author's Calculation Based on Primary Data*

#### **IV. Discussion**

In the present study an attempt was made to examine the awareness of obesity, causes, determinates and preventive measures among the adolescents. The result of the study shows that 64.0 percent of the adolescents suffered from obesity. The result of the logistic regression shows that a significant association exists between gender and obesity. Thus, female respondents were more prone to obesity than of male. Age-wise analysis shows that respondents of 14-18 years ( $p < 0.01$ ) were more obese than of up to 14 years. This clearly shows the probability of obesity increases with age. An association between obesity and the education of the mother shows that children of the educated mothers were more obese than of illiterate. However, all of the income groups were significant and the coefficient of logistic regression shows that higher income increases the risk of obesity. Those who always eat the breakfast were less prone to obesity and who never eat breakfast was more prone to obesity. However, family history of the obesity was not linked with obesity of adolescents. This indicates a high prevalence of overweight and obesity and it was found that more than half of the obese participants did not perceive themselves as being obese, poses a challenge for healthcare providers. Thereby, people should be made more



aware of their weight status, as an increased distortion in weight perception could prevent individuals from making the lifestyle changes required for weight loss and subsequently from enjoying the associated health benefits. Over the past few decades, rapid globalization had a huge impact on the incidence of obesity and its associated morbidities in numerous countries. Although, globalization has improved the quality of life for many individuals and created access to low-cost foods that are low in nutritional value and high in energy which increased the consumption of processed and convenience foods. These changes are driving the global obesity epidemic. Action is needed to abate this epidemic, as rapidly rising rates of obesity were associated with chronic diseases and have detrimental effects on the health and welfare of population. Effective strategies to address obesity on a global scale are needed to improve diet and increase levels of physical activity. Population-based approaches have the potential to shift the distribution of risk factors of an entire population in a favorable direction, making them a cost-effective approach. Policy changes, in particular, have the potential to improve physical and social environments with long-lasting benefits for public health and quality of life. Such efforts required strategies across multiple sectors, from high-level policy changes to individual-level behavioral changes. Continued surveillance of obesity and national health outcomes is also necessary to monitor and evaluate the programs and maintain awareness among the public and within governments. Positive aspects of globalization, such as increased information flow, improved technology and innovation via international collaboration, should be harnessed to facilitate global efforts for the prevention of obesity. Actions to prevent childhood obesity need to be taken in multiple settings and incorporate a variety of approaches and involve a wide range of stakeholders. Sustained interventions are likely to be required at several levels at an individual

level in schools and community settings to effect behavioral change and in sector changes within agriculture, food manufacturing, education, transportation, and urban planning.

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