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Original Research Article

Association between predisposing factors and adults obesity from rural field practice area of a tertiary care centre, an experience from rural Bihar: a case control study

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ABSTRACT

Background: World Health Organization (WHO) defined obesity and overweight as abnormal or excessive accumulation of fat that may impair health. Obesity is a serious health issue and predisposes individuals to an increased risk of morbidity and mortality from conditions such as diabetes and hypertension. The aims and objective of this study was to identify predisposing factors associated with obesity among adults.
Methods: The present case-control study was conducted among adults between 20 to 60 years of age group. The cases of obesity were identified during this study. Multi-stage sampling was done. Thus a total of 1200 subjects were studied in study setting. Pretested semi-structured proforma was used for data collection from cases and controls which involved personal interview with the respondents and clinical examination. Data was entered in Microsoft Excel 2010 after coding. Statistical analysis was done by using SPSS software. The statistical significance was evaluated at 95% confidence interval level.
Results: In this study 110 obese cases and equal number of controls were compared. It is seen that the difference between cases and controls was statistically significant with regard to age (p=0.001), sex (p=0.004), occupation (p=0.000), socioeconomic status (p=0.000), education (p=0.000), tobacco use (for males only, p=0.003), physical activity (p=0.001), duration of watching TV (p=0.000) and family history of obesity (p=0.000).
Conclusions: There is necessary need to health education among adults on the aspects of healthy food habits and desired lifestyles to prevent obesity/overweight and its other associated ill effects.

Keywords: Body mass index, Obesity, Overweight, Predisposing factors (adults)

INTRODUCTION

World Health Organization (WHO) defined obesity and overweight as abnormal or excessive accumulation of fat that may impair health.[1] Thus, obesity has become one of the most common health problems of the 21st century, as it will contribute significantly to the high prevalence of cardiovascular disease in developing countries.[2] Obesity is a serious health issue and predisposes individuals to an increased risk of morbidity and mortality from conditions such as diabetes and hypertension.[3, 4]

Obesity is defined as having a body mass index (BMI, weight in kg/height in m^2) of 30 or more. Morbid obesity is defined as having a BMI of 40 or more (35 to 40 with medical problems related to obesity). Overweight is defined as having a BMI of 25 to 29.9 (a 5'5" woman who weighs 150 pounds or more or a 5'11" man who weighs 180 pounds or more).[5] Obesity is the second leading cause of preventable deaths; smoking is the first. Obesity is Associated with many significant health problems, including high blood pressure, heart disease, diabetes, stroke, osteoarthritis, sleep apnoea, premature

death, and decreased quality of life. Even modest weight loss can reduce an individual's risk for these diseases and outcomes.[6] Prevalence of obesity in India (BMI>30 kg/m^2) according to state wise are: Delhi urban female 33.4; population of Hyderabad urban female 36.3%; Delhi urban females 48.6%. Nutrition Foundation of India investigated that Punjabi urban females are 25.3%.[7] In India, recent studies show more than 28% of adult males and 47% of adult females in urban Delhi were found to be overweight by WHO standards. In Haryana, rural area the study findings showed 7% of males and 9% of females as overweight. In Chennai 11 among 6 school 22% of children were overweight (including obesity), in Delhi 31% of children were overweight, in Pune, the findings showed 24%.[8] Now in India this obesity problem is increasing at a rapid pace.[9,] Data from the second (1997) and third (2004) NHES show the age-standardised prevalence of overweight at risk increased from 16.2% to 18.2%, class I obesity (25 ≤body mass index (BMI) <30) increased from 19.3 % to 22.8 % and class II obesity (BMI ≥30) from 6.3% to 7.5%.[10] In Northern India obesity was most prevalent in urban populations (male= 5.5%, female= 12.6%), followed by the urban slums (male= 1.9%, female= 7.2%). Obesity rates were the lowest in rural populations (male= 1.6%, female= 3.8%).[11] Socioeconomic class also had an effect on the rate of obesity. Women of high socioeconomic class had rates of 10.4% as opposed to 0.9% in women of low socioeconomic class.[7] The risk of cardiovascular disease is considerably greater among obese people, and this group has an incidence of hypertension that is five times the incidence among people of normal weight. Hence, overweight and obesity are contributing to a global increase in hypertension: one billion people had hypertension in 2000, and 1.56 billion people are expected to have this condition by 2025.[12]

The study was done with the objectives to identify predisposing factors associated with obesity among adults in the rural field practice area of tertiary care centre, Patna and to associate the relations between health related behaviours with selected demographic variables.

METHODS

The present study was carried out in the rural field practice area of IGIMS, (tertiary care centre) Patna. This area is a unit of Department of Community Medicine, IGIMS, Patna, serving as one of the rural field practice area of this institution. Primary Health Centre, Maner is a part of this training center and is under administrative control of Indira Gandhi Institute of Medical Sciences, Patna. This PHC consists of 46 villages, 20 panchayats and covered a population of 3, 16,156.

Study design

The present case-control study was conducted among adults between 20 to 60 years of age group. The cases of obesity were identified during this study. During this phase, case-control methodology was used to identify the factors associated with the obesity and the associated risk was calculated.

Study area

Rural field practice area of IGIMS, Patna and its attached PHC, Maner.

Study period: October 2019 to January 2020.

Inclusion criteria

Patients aged above 20 years and below 60 years, patients who were willing to participate and resident of the village for past 1 year were included.

Exclusion criteria

Patients who were below 20 years or above 60 years, patients who were physically and mentally challenged, patients who were not willing to participate in the study and pregnant/nursing mothers were excluded.

'Case' was defined as the subject who was identified as obese or overweight. BMI ≥23-24.9 was taken as overweight (pre-obese), BMI ≥25 as obese and BMI <23 as non-obese (including normal and underweight individuals). Thus, all the obese/overweight subjects recorded during the study period and the study was taken as 'cases' for case-control study.

The 'controls' were drawn from subjects who were in the non-obese group. 'Controls' were matched for age and sex. All the non-obese were sorted for age and sex. For each 'case', one 'control' matched for age and sex was selected randomly.

Sampling details

Sample size

The findings of NFHS 4 (2015-16) conducted in Bihar indicated the prevalence of obesity to be 10.3%. Considering the relative precision of 25%, the sample size was determined using WHO software size version 2.0 as follows -

The sample size was estimated to be 536. Design effect of 2 was applied to account for multi-stage sampling. To this, a non-response rate of 10% was added based on the previous experience in this area. The final sample size was rounded off to 1200.

Sampling procedure

Multi-stage sampling was done. In the first stage, 40 villages were selected by Simple Random sampling using probability proportional to population size (PPS) technique. In the second stage, 30 households were

selected from each village by systematic sampling with a random start. One study subject was selected randomly from each household. Thus a total of 1200 subjects were studied in study setting. A total of 1148 subjects were studied in the first phase and 110 cases were identified. In the second phase, a total of 110 controls were randomly selected and the study was conducted in case control design. After the initial screening, the cases were identified and detailed Performa was filled for these subjects. Age and sex matched controls were identified for each case and detailed Performa was filled for them also.

Method of data collection

The study was carried out in two phases. In the first phase, study was done to identify the subjects with overweight (pre-obese) and obesity. The medical officer in-charge of RHTC, Maner was informed about the objectives and importance of this study. ASHA workers of the study area were invited and trained in the orientation meeting conducted at the PHC, Maner with their help, mukhiya of the village and AWWs were taken into confidence. All the selected households in the study area were visited and a household folder was prepared. Subjects satisfying the eligibility criteria of the study were interviewed. In the second phase, case-control methodology was adopted. Pretested semi-structured proforma was used for data collection from cases and controls which involved personal interview with the respondents and clinical examination. It contained details to find out the association of obesity with selected factors such as family history, educational status, occupation, history of menopause, tobacco and alcohol use (in males), physical activity, duration of watching TV, habit of taking junk foods/soft drinks and non-communicable diseases like hypertension and diabetes.

Data analysis

Data was entered in Microsoft Excel 2010 after coding. Statistical analysis was done by using SPSS software. The frequency distributions of socio-demographic details of study subjects were presented. To find out the association of overweight and obese with the above factors, appropriate statistical tests were done. The statistical significance was evaluated at 95% confidence interval level.

RESULTS

The Table 1 shows the findings of case control study. 110 obese cases and equal number of controls were compared. It is seen that the difference between cases and controls was statistically significant with regard to age (p=0.001), sex (p=0.004), occupation (p=0.000), socioeconomic status (p=0.000), education (p=0.000), tobacco use (for males only, p=0.003), physical activity (p=0.001), duration of watching TV (p=0.000) and family history of obesity (p=0.000).

Table 1: Case control study.

Factor	Options	Obese (n=110)	Non-obese (n=110)	Odd ratio (OR)	Significance
Age (in years)	20-29	17	42	1	χ^2=16.072 p=0.001
	30-39	30	27	2.74	
	40-49	27	21	3.18	
	50-60	36	20	4.45	
Sex	Male	40	61	1	χ^2=8.072 p=0.004
	Female	70	49	2.17	
Occupation	Moderate	17	49	1	χ^2=22.164 p=0.000
	Sedentary	93	61	4.39	
SES	I	11	4	1	χ^2=32.874 p=0.000
	II	42	13	1.17	
	III	23	21	0.39	
	IV	19	34	0.20	
	V	15	38	0.14	
Education	Illiterate	42	64	1	χ^2=17.376 p = 0.000
	Primary and higher primary	25	30	1.27	
	Secondary and above	43	16	4.09	
Dietary pattern	Vegetarian	87	95	1	χ^2=2.035 p=0.153
	Mixed	23	15	1.67	
Fruits and/or vegetables	<5 servings	102	95	1	χ^2=2.379 p=0.122
	≥5 servings	8	15	0.49	
Junk food	<3 times per week	91	104	1	χ^2=7.626 p=0.005
	>3 times per week	19	6	3.62	
Soft drinks	<3 times per week	102	108	1	χ^2=3.771 p=0.052
	>3 times per week	8	2	4.23	

Continued.

Factor	Options	Obese (n=110)	Non-obese (n=110)	Odd ratio (OR)	Significance
Alcohol use (for males only)	No	32	55	1	χ^2=1.568 p=0.210
	Yes	8	06	2.25	
Tobacco use (for males only)	No	28	23	1	χ^2=8.497 p=0.003
	Yes	12	38	0.26	
Physical activity	Light	49	27	1	χ^2=9.729 p=0.001
	Moderate and above	61	83	0.41	
Watching TV	<60 minutes per day	40	70	1	χ^2=29.610 p=0.000
	60-120 minutes per day	34	34	1.75	
	>120 minutes per day	36	6	10.5	
Family history	No	23	97	1	χ^2=100.393 p=0.000
	Yes	87	13	28.22	

Table 2: Results of binary logistic regression analysis.

Factor	Odd ratio (OR)	95% C.I of OR	Significance
Age	1.537	1.045-2.259	P=0.029
Sex	2.301	0.959-5.518	P=0.062
Occupation	0.194	0.075-0.502	P=0.001
SES	0.619	0.432-0.886	P=0.009
Education	1.256	0.733-2.150	P=0.407
Junk food	4.728	1.110-20.138	P=0.036
Physical activity	0.485	0.195-1.205	P=0.119
Watching TV	2.316	1.242-4.318	P=0.008
Family history	19.603	8.056-47.704	P=0.000
Tobacco use	0.041	0.003-0.521	P=0.014

The regression analysis in Table 2 showed that age (p=0.029), occupation (p=0.001), SES (p=0.009), junk food (p=0.036), watching TV (p=0.008), family history (p=0.000) and tobacco use (p=0.014) were statistically significant.

DISCUSSION

The objective of the study was to identify the predisposing factors associated with obesity among adults and in the relations between health's related behaviours with selected demographic variables in the rural field practice area of tertiary care centre, Patna. A total of 1148 subjects were studied in the first phase and 110 cases were identified. In the second phase, a total of 110 controls were randomly selected and the study was conducted in case control design.

Findings of case control study

Physical activity

It was seen in the present study that the difference between cases and controls was statistically significant with regard to physical activity (p=0.001). The odds ratio was found to be 0.41 for the subjects with physical activity of moderate degree and above. (Table 1) Tripathy et al commented that in their study, nearly 29.2% and 32.6% of respondents reported light levels of physical activity in urban and rural areas respectively (p>0.05).[13] Saha et al found in Bangladesh that duration of physical activity was significantly associated with obesity (p=0.001).[14] Prasad et al found significant difference between cases and controls regarding physical activity and outdoor games (p<0.05).[15]

Duration of watching TV

It was seen in the present study that the difference between cases and controls was statistically significant with regard to watching TV (p=0.000). The odds of obesity were 1.75 times in those watching TV for 60-120 minutes per day and were 10.5 for those watching TV for more than 120 minutes per day (Table 1). Watching television was not associated with obesity in the study conducted by Saha et al.[14]

Intake of junk food/soft drinks

It was seen in the present study that the difference between cases and controls was statistically significant with regard to intake of junk food (p=0.005) while it was not significant with soft drink (p=0.052). Odds ratio was 3.62 for those taking junk food more than three times per week. It was 4.23 for those taking soft drinks more three times per week (Table 1). Rautela et al observed that a total of 92.9% of the study participants reported consumption of junk food. The primary reasons stated were due to taste and convenience. Nearly 51% of the study participants consumed junk food at least once a week and during dinner. Approximately 87% had knowledge that junk food is not good for health.[16] Interestingly, Saha et al did not find association between

consumption of fast food and obesity (p=0.261).[14] Bereket et al found that there was statistically significant difference in mean consumption of juice (p=0.03) in the week preceding the survey between cases and controls.[17] Prasad et al found significant difference between cases and controls regarding consumption of fruits and vegetables (p<0.05).[15]

Dietary pattern

It was seen in the present study that the difference between cases and controls was not significant statistically with regard to dietary pattern (p=0.153). Odds ratio was 1.67 (Table 1). Similarly, Prasad et al did not find any difference between cases and controls regarding type of diet (p>0.05).[15]

Family history

It was seen in the present study that the difference between cases and controls was statistically significant with regard to family history (p=0.000). The odds ratio was 28.22 (Table 1). Karthik et al found significant difference between cases and controls regarding family history of obesity (p=0.0001).[18] This is similar to a study done by Van der Sande in Gambia which reported that family history of obesity was strongly associated with obesity.[19]

Alcohol

It was seen in the present study that among males, the difference between cases and controls was not significant statistically with regard to alcohol (p=0.210). Odds ratio was 2.25 (Table 1). Bereket et al found that there was statistically significant difference in mean consumption of alcoholic beverages (p=0.01) in the week preceding the survey between cases and controls.[17]

Tobacco

It was seen in the present study that the difference between cases and controls was statistically significant with regard to consumption of tobacco (p=0.003). Odds ratio was 0.26 (Table 1). Rengma et al found significant differences among cases and controls regarding consumption of tobacco (p<0.05).[20]

Consumption of fruits and vegetables

It was seen in the present study that the difference between cases and controls was not significant statistically with regard to consumption of fruits and vegetables (p=0.122). Odds ratio was 0.49 for more than five servings of fruits and/or vegetables on an average per day (Table 1). Tripathy et al commented that in their study, mean number of servings of fruits and/or vegetables per day was found to be 2.3 and 2.2 in urban and rural areas respectively. There was no urban rural difference in both sexes. Overall 95.8% (94.6-97.0) of participants took less than five servings of fruits and/or vegetables on an average per day with no significant differences across urban-rural sub groups in both sexes.[13] Bereket et al concluded that the Odds of consuming fruits 1-4 times/week were 2.16 times higher (AOR=2.16, 95% CI: 1.08-4.33) in cases than odds of consuming fruits 1-4 times/week in controls. An odd of consuming vegetables less than 1 time/week was 6 folds higher (AOR=6.0, 95% CI: 1.31-27.58) in cases than control.[17]

Findings of regression analysis

The results of binary logistic regression analysis in the study showed following variables to have significant effect on obesity. It showed that age (p=0.029); occupation (p=0.001); socio-economic status (p=0.009); junk food consumption (p=0.036); watching TV (p=0.008); family history (p=0.000) and tobacco use (p=0.014) had significant effect on obesity. Whereas, factors such as sex, education and physical activity where not significantly associated with prevalence of obesity. Rengma et al fitted the binary logistic regression model to find out the odds for the socio-economic, demographic and lifestyle related variables for being overweight (23.00-24.99 kg/m^2) and obese (≥25.00 kg/m^2). The results indicated that most of the socio-economic variables except marital status (p>0.05) were significantly associated with overweight (p<0.05). The results of the regression analysis further showed significant effects to being overweight among females, age group of 40-49 years, education level of ≥9th standard, tobacco use and alcohol consumption (p<0.05). A two-fold risk was observed in 40-49 years, part-time occupation and monthly income of ≥Rs.10000 categories (p<0.01) with the prevalence of overweight. The results also showed that those adults belonging to the higher monthly income. Category (≥Rs.10000) (Odds: 3.44), age-groups of 30-39 years (Odds: 2.31), education level ≥9th standard (Odds: 2.39) and part-time occupation (Odds: 2.42) exhibited significantly greater odds for being obese (p<0.01). The odds were observed to be greater for being obese among females, married individuals and alcohol consumers and lower in tobacco use (p>0.05).[20]

Chhabra et al conducted regression analysis of overweight and obesity cases and found that for overweight or obesity status, income category, residence, sex, and age were significant determinants. The odds ratio for the high-income category was 5.61 (95% CI 3.08-10.19) and for the middle-income category, it was 3.73 (95% CI 2.05-6.79) compared to the low income category. The adjusted odds ratio for urban residence was 3.62 (95% CI 2.09-6.30) compared to rural residence. The female subjects had odds of 2.52 (95% CI 1.80-3.52) compared to the males subjects.[21]

CONCLUSION

The major conclusion drawn from this study is that low level of education and physical activity watching TV, more intakes of junk foods, less consumption of fruits and vegetables, more intakes of alcohol and tobacco, and also

family history were strongly associated with a higher prevalence of obesity and overweight. Countrywide provide awareness programme and health education to spread healthy messages on good nutrition and good health for the prevention of obesity and its consequences need to be initiated. Public policy can be a powerful tool in challenging the obesity epidemic by defining effective intervention strategies and increasing investment in health promotion. Comprehensive evidence-based and multi-component action against obesity and policy coordination is key for a success of prevention initiatives. Policymakers, health professionals, and society at large need to join forces in tackling the obesity spread. There is necessary need to health education among adults on the aspects of healthy food habits and desired lifestyles to prevent obesity/overweight and its other associated ill effects.

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