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Sociodemographic Determinants Enhancing Overweight/Obesity Among Higher Educated Adults in Bangladesh

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ABSTRACT

The study was conducted to identify the socioeconomic variables enhancing overweight /obesity among Bangladeshi higher educated adults. The number of investigated adults was 995; among them 572 were higher educated adults. The rural higher educated adults were 248. The number of overweight/obese adults were 724; among them 432 were higher educated people. The objective of the study was to identify the risk factors for the prevalence of overweight/obesity among these 432 adults. The analysis showed that the risk of prevalence was more among urban people, Muslim adults, males, married persons, servicepersons, upper medium economic group of people, smokers, physically inactive adults, adults having high normal blood pressure, kidney patients, and diabetic adults of longer duration. Among these characters, economic status was the most responsible variable to discriminate 432 overweight/obese higher educated adults. The other important variables were physical activity, gender, residence, smoking habit, occupation, hypertension, and duration of diabetes. This was noted from the results of discriminant analysis.

Keywords

Discriminant analysis, Higher education, Overweight, Obesity, Sociodemographic variables.

Introduction

The problem of overweight/obesity is in increasing trend among the people throughout the world. World Health Organization reported that around 2.5 billion adults of age 18 years and above worldwide were overweight, and 890 million of these were living with obesity [1-3]. The problem of obesity is a health hazard in the society, especially it is the problem for adults of age 18 years and above. In different studies in Bangladesh, it was noted that obesity is significantly associated with some of the socio-demographic characteristics [3–9]. The significant characteristics were age, education, residence, occupation, economic status, smoking habit, and physical activities. The impacts of overweight/obesity were prevalence of diabetes, cardiovascular diseases, hypertension, kidney diseases, disability, and other health hazards. In some studies coexistence of obesity and diabetes, obesity and hypertension, obesity and neuropathy, obesity and kidney diseases, and obesity and retinopathy were noted. In every case some of the sociodemographic variables were found responsible for the simultaneous prevalence of obesity and other noncommunicable diseases. The most responsible sociodemographic variables were rural residence, religion, old age, higher education, housewife, higher economic status, physical inactivity, and longer duration of diabetes [10–16]. In other developed and developing countries the identified variables responsible for coexistence of obesity and non-communicable diseases were almost similar [17,18]. The recent studies in Bangladesh, India, and in other countries also identified the similar sociodemographic characteristics responsible for overweight/obesity [19–24]. It was also noted that overweight/obesity prevailed among secondary and higher educated adults in Bangladesh [3,4,5,7].

In this paper an attempt was made to identify the sociodemographic characteristics responsible for the prevalence of coexistence of overweight/obesity and higher education among Bangladeshi Adults.

Methodology

The study was based on data collected by conducting a survey using the quota sampling plan. The plan of the survey was to cover male and female adults in the ratio 50.1: 49.9 as it was the sex ratio of the country during the survey session 2018 – 19 [25]. The data were recorded from adults of 18 years and above in the month of June and July. The adults were investigated from two diagnostic centres; one was in an urban area, and another one was in a semi urban area. The respondents were the residence of the localities nearby the centres. Thus, some of them were rural people and some were urban people. They attended the centres for their blood and urine screening test. Investigation was done by some nurses and medical assistants working in those centres. The investigators were trained to collect information from the visiting adults willing to provide the information on sociodemographic characteristics including the current health problems and treatment status and about their monthly family income and expenditure . The data of each adult was recorded through a pre-designed and pre-tested questionnaire.

Number of investigated male and female adults were 498 and 497, respectively, totalling 995 sample respondents. The collected information from each adult were residence, gender, age (in years), education, occupation, marital status, monthly family income and expenditure (in 000 Tk.), smoking habit, physical activity, food habit, sedentary activity, prevalence of diseases, duration of suffering from diabetes (in years), and the stage of treatment by the registered medical practitioner. The collected information was mostly qualitative in nature and each one of these was transformed to nominal scale to do the analysis easier. The quantitative variables were age, monthly family income and family expenditure ,and duration of diabetes . Each of the quantitative variables was noted in classes also. For age the classes were < 25, 25 - < 40, 40 - < 50 , and 50+. The classified durations of diabetes were < 5, 5 - < 10, 10 - < 15, and 15+. Family economic status was evaluated as lower (if monthly income of a family was < Tk.50 and expenditure was < Tk. 40), medium (if income was Tk. 50 - 100 and expenditure was Tk.40 - < 80), upper medium (if income was 50 – 100 and expenditure was Tk. 80 - < 100) and higher (if income was Tk. 150 and above and expenditure was Tk.120 and above). The level of obesity of any respondent was evaluated by body mass index(BMI, weight in kg divided by height in meter 2). Any one of the respondents was identified as underweight (if BMI < 18.5), normal (if 18.5 < BMI < 23.0), overweight (if 23.0 < BMI < 27.5) and obese (if BMI ≥ 27.5) [26, 27]. The respondents were divided into 4 groups according to their level of blood pressure (BP, mmHg). Any of the adults belonged to either in optimal group (if BP < 120/80), or in normal group (if BP < 130/85),or in high normal group (if BP < 140/90), or in hypertensive group (BP ≥140/90 [27,28].

The study variable was prevalence of overweight/obesity among higher educated adults. This characteristic was found in 432 adults. Simultaneous prevalence of overweight/obesity and higher education was not noted in the remaining 563 respondents. Thus, there were two groups of adults. The analysis was planned in such a way that the two groups of adults were discriminated well identifying the responsible variables for discrimination. According to the process of analysis the most responsible variable was identified based on the significantly highest absolute value of correlation coefficient of the variable with discriminant function score [29-32]. The analysis also included the investigation of association of the study variable with other socio-demographic characteristics. The risk ratio of a particular level of a variable was calculated if the prevalence rate of that level was significantly higher [33,34].

Results

The analytical results presented in this paper were based on data collected from 995 Bangladeshi adults of 18 years and above; some of them were males (498) and some were females (497). Rural and urban adults were in the ratio 53.4: 46.6. Number of higher educated adults was 572 and number of overweight/ obese people was 724. Coexistence of overweight/obesity was noted among 432 (75.5%) higher educated respondents [Table 1]. The research interest was to identify the sociodemographic characteristics responsible for this coexistence and to identify the most responsible variable to distinguish these 432 adults from the remaining 563 respondents.

Coexistence of higher education and overweight/obesity was noted in 43.4% sample respondents [Table 2]. The corresponding percentage in urban adults was 51.3, where total urban respondents in the sample was 46.6%. This phenomenon was noted in 36.5% rural people. The proportions of respondents having this coexistence characteristic was significantly different and urban adults had 40% more risk of facing this problem [χ^2= 21.954, p-value=0.000; R.R.= 1.40, C.I. (1.21, 1.62)]. The percentage of male respondents was 50.1, and coexistence problem existed among 53.4% of them. This percentage was significantly higher than the corresponding percentage (33.4%) in females. Male

Table 1: Distribution of respondents of different levels of education and body mass index.

Level of education	Level of body mass index						Total	
	Underweight		Normal		Overweight/Obese			
	Number	%	Number	%	Number	%	Number	%
Illiterate	4	6.2	23	35.4	38	58.4	65	6.5
Primary	7	5.8	27	22.3	77	63.6	121	12.2
Secondary	14	5.9	46	19.4	177	74.7	237	23.8
Higher	13	2.3	127	22.2	432	75.5	572	57.5
Total	38	3.8	233	23.4	724	72.8	995	100.0

persons had 60% more risk of the problem of coexistence [χ^2= 40.556, p-value = 0.000; R.R.= 1.60, C.I.(1.38, 1.86)]. Muslim respondents were 85.2%; coexistence problem was noted among 44.0 of them. The corresponding percentage in non-Muslim adults was 40.1%. These two percentages were statistically similar; however, Muslim respondents had 10.0% more risk of the problem under consideration [χ^2= 0.756, p-value= 0.335; R.R.= 1.10, C.I.(0.89, 1.36)]. Married and single adults were in the ratio 0.931: 0.069; coexistence of overweight/obesity and higher education was noted in 43.6% and 40.6% of them, respectively. These two percentages were not significantly different, though married persons had 8.0 % more risk of facing the problem [χ2= 0.242, p-value= 0.622; R.R.=1.08, C.I.(0.80, 1.46)].

There were 30.7% service persons in the sample: coexistence problem noted in 55.4% of them. This was the highest percentage of adults facing the problem. The lowest percentage (27.4%) was noted in housewives. Significantly differential proportions of problem among different occupational groups of adults were observed [χ2= 55.333, p-value= 0.000]. The service persons had 45.0% more risk of the problem compared to the risk of other adults [R.R.=1.45, C.I.(1.26, 1.59)]. The percentage of respondents

Table 2: Distribution of adults according to sociodemographic characteristics and coexistence of overweight/obesity among higher educated respondents.

Sociodemographic Characteristics		Coexistence of overweight/obesity among higher educated adults				Total	
		Yes		No			
		Number	%	Number	%	Number	%
Residence	Rural	194	36.5	337	63.5	531	53.4
	Urban	238	51.3	226	48.7	464	46.6
	Total	432	43.4	563	56.6	995	100.0
Gender	Male	266	53.4	232	46.6	498	50.1
	Female	166	33.4	331	66.6	497	49.9
Religion	Muslim	373	44.0	475	56.0	848	85.2
	Non-Muslim	59	40.1	88	59.9	147	14.8
Marital status	Married	404	43.6	522	56.4	926	93.1
	Single	28	40.6	41	59.4	69	6.9
Age (in years)	< 25	81	41.3	115	58.7	196	19.7
	25 – 40	162	40.4	239	59.6	401	40.3
	40 – 50	94	46.3	109	53.7	203	20.4
	50+	95	48.7	100	51.3	195	19.6
Occupation	Farming	29	27.9	75	72.1	104	10.5
	Business	114	48.7	120	51.3	234	23.5
	Service	169	55.4	136	44.6	305	30.7
	Retired	57	46.7	65	53.3	122	12.3
	Housewife	63	27.4	167	72.6	230	23.1
Economic status	Low	86	22.3	299	77.7	385	38.7
	Medium	245	57.8	179	42.2	424	42.6
	Upper medium	40	65.6	21	34.4	61	6.1
	High	61	48.8	64	51.2	125	12.6
Prevalence of disease	None except diabetes	245	40.4	361	59.6	606	60.9
	Heart	62	49.2	64	50.8	126	12.7
	Eye	56	45.5	67	54.5	123	12.4
	Kidney	47	51.1	45	48.9	92	9.2
	Disability	22	45.8	26	54.2	48	4.8
Level of blood pressure (mmHg)	Optimum	214	39.6	326	40.4	540	54.3
	Normal	133	47.5	147	52.5	280	28.1
	High normal	57	49.1	59	50.9	116	11.7
	Hypertensive	28	47.9	31	52.1	59	5.9
Duration of diabetes (in years)	Did not arise	142	43.3	186	56.7	328	33.0
	< 5	107	36.8	184	63.2	291	29.2
	5 – 10	97	47.1	109	52.9	206	20.7
	10 – 15	46	46.5	53	53.5	99	9.9
	15+	40	56.3	31	43.7	71	7.1
Smoking habit	Yes	170	51.7	159	48.3	329	33.1
	No	262	39.3	404	60.7	666	66.9
Habit of doing physical work	Yes	154	32.0	327	68.0	481	48.3
	No	278	54.1	236	45.9	514	51.7
Involvement in sedentary activity	Yes	187	42.3	255	57.7	442	44.4
	No	245	44.3	308	55.7	553	55.6
	Total	432	43.4	563	56.6	995	100.0

of upper medium economic status was only 6.1 and 65.6% of them were facing the problem of coexistence. The percentages of adults of other economic status were significantly lower than the percentage prevailed in adults of upper medium economic status, and these adults had 56% more risk of the problem [χ^2=118.919, p-value = 0.000; R.R.=1.56, C.I.(1.28, 1.90)].

The percentage of adults free of noncommunicable diseases except diabetes was 60.9 and coexistence of health problem under consideration prevailed in 40.4% of them. This proportion was lowest. Highest proportion (51.1%) was noted among kidney patients, and they were only 9.2% in the sample. This group had 20.0% more risk of affecting by this health hazard [R.R,=1.20, C.I.(0.97, 1.49)]. However, the prevalence rates of the problem among different groups of adults suffering from different diseases were not statistically significant [χ2= 6.462, p-value= 0.167]. Most of the adults (60.9%) were of optimum blood pressure and 39.6% of them were facing the problem of coexistence of health hazard. This percentage was lowest among the adults of other levels of blood pressure. Highest percentage (49.1%) was noted among adults of high normal blood pressure. This group of respondents was only 11.7% in the sample and they had 20.0% more risk of affecting by the problem [R.R.=1.20, C.I.(0.94, 1.40)] though the percentages of prevalence of coexistence among adults of different levels of blood pressure were not significantly different [χ2= 6.991, p-value= 0.072]. There were 67.0% diabetic patients in the sample, and they were suffering for different periods. But only 7.1% were suffering for 15 years and above and 56.3% of them were experienced of this health hazard. For them the risk of facing the problem was 33.0% more than the risk of others [R.R.= 1.33, C.I.(1.07, 1.65)].

The prevalence rates of coexistence in diabetic patients of different periods were significantly different [χ^2= 11.565, p-value= 0.021].

Smoking habit was observed in 33.1% respondents and 51.7% of them were higher educated but facing the problem of overweight/ obesity. This rate of coexistence was significantly higher than the rate prevailed among non-smokers [χ^2= 13.633, p-value = 0.000]. For the smokers the risk of suffering was 32.0% more compared to the risk of non-smokers [R.R.=1.32, C.I. (1.15, 1.52]. Non-involvement in physical activities was the risk factor for the coexistence of overweight/obesity among higher educated adults; the risk was 69.0% more than the risk prevailed for adults doing physical work [R.R. = 1.69,C.I.(1.45, 2.28)]. Majority (51.7%) of the respondents were not involved in physical activities, and 54.1% of them were facing the problem of the health hazard under consideration. The rate was 32.0% among adults involved in physical work. These two proportions were significantly different [χ^2= 49.261, p-value = 0.0000]. The percentage of adults involved in sedentary activity was 44.4%. Among them 42.3% were facing the problem of coexistence. The corresponding percentage among adults not involved in sedentary activity was 42.3. These two proportions were not statistically different [χ^2= 0.398, p-value = 0.528].

Results of Discriminant Analysis

It had already been mentioned that the respondents were divided into two groups; in one group there were 432 adults facing the problem of coexistence of overweight/ obesity and higher education. In another group there were 563 people free of the problem of coexistence. The former group of adults were to be discriminated from the remaining 563 adults. The process of discrimination usually helps in identifying the responsible variables for discrimination. In this case the variables included for the analysis were residence, religion, gender, marital status, occupation, economic status, prevalence of diseases, duration of diabetes, smoking habit, habit of doing physical work, involvement in sedentary activity, etc. Initial result of the analysis [Box's M = 188.942, F= 2.47, p-value = 0.000] indicated that the two groups of respondents were significantly different in respect of the variability of sociodemographic characteristics. The detail results were presented in Table 3.

The analysis was satisfactory as was noted from the test result [χ^2=137.997, p-value=0.000]. The result indicated that the most responsible variable for the discrimination of two groups of adults was economic status as the absolute value of correlation coefficient of economic status with discriminant function score was highest [31,32]. In a similar way, it could be concluded that the other responsible variables were physical activity, gender, residence, smoking habit, occupation, and duration of diabetes.

Table 3: Results of discriminant analysis.

Sociodemographic characteristics	Correlation coefficient, r	Discriminant function coefficient	Wilks Lambda	F=statistic	p-value
Economic status	-0.597	-0.329	0.949	53.208	0.000
Involvement in physical work	0.589	0.465	0.950	51.723	0.000
Gender	0.532	0.535	0.959	42.144	0.000
Residence	-0.388	-0.363	0.978	22.404	0.000
Smoking habit	0.304	0.083	0.986	13.795	0.000
Occupation	0.202	0.126	0.994	6.057	0.014
Duration of diabetes (in years)	-0.178	-0.145	0.995	4.739	0.030
Prevalence of disease	-0.151	-0.184	0.997	3.419	0.065
Blood pressure (mmHg)	-0.144	-0.908	0.997	3.094	0.079
Age (in years	0.103	0.167	0.998	1.599	0.206
Religion	0.071	0.043	0.999	0.755	0.385
Involvement in sedentary activity	0.052	0.039	1.000	0.398	0.526
Marital status	0.042	0.009	1.000	0.243	0.622

Discussion

Association of overweight/ obesity with education was noted in some studies [4,5,35,36]. Usually, it can be expected that among office staffs and university students there may be higher educated persons. Again, coexistence of overweight/obesity and education was observed among office staffs and university students. The significant responsible factors for the prevalence of this coexistence were age, occupation, income, smoking habit, physical inactivity, and hypertension [37-39]. The present analysis was an attempt to identify the responsible factors for this coexistence.

The data utilized in this analysis was recorded from 995 Bangladeshi adults of 18 years and above. Out of these 995 respondents, overweight/obesity was observed among 432 higher educated adults. This coexistence of overweight/obesity and higher education significantly prevailed among urban people and males. Significant coexistence was also noted among service persons, adults from upper medium economic group of families, smokers, physically inactive adults, and among diabetic patients suffering for longer periods. Among these factors most responsible enhancing variable was economic status followed by physical activity, gender, residence, smoking habit, and occupation.

Conclusion

The study was planned to identify the responsible variables for the coexistence of overweight/obesity and higher education among the adults of Bangladesh. For this, 995 respondents were investigated. Among them 46.6% were urban people and the prevalence rate in them was 51.3%. They had 40.0% more risk of prevalence. The sample males were 50.1%; prevalence rate in them was 53.4% and they had 60.0% more risk of prevalence. There were 30.7% service persons; prevalence rate in them was 55.4%. Their risk of prevalence was 1.45 times compared to the risk of others. Only 6.1% respondents were from families of upper medium economic status. Prevalence rate in them was 65.6% and their risk of prevalence was 56.0% more compared to the risk of adults of other economic status. Smoker respondents were 33.1% in the sample. Coexistence was noted in 51.7% of them and their risk of prevalence of coexistence was 1.32 times compared to the risk of non-smokers. Physical inactivity was a risk factor for coexistence of overweight/obesity and higher education; the risk was 1.69 times than it was for adults doing physical work. Physically inactive adults were 51.7% and prevalence rate in them was 54.1%. Suffering from diabetes for 15 years and above was the risk level for coexistence of overweight/ obesity and higher education. For this group the risk of coexistence was 33.0% more than the risk of other diabetic patients. Among them the rate of prevalence of coexistence was 56.3%.

Incidence of overweight/obesity is a global health hazard, and it is in increasing trend in both developed and developing countries due to the change in lifestyle. People are more prone in taking fast/process food, more involvement in sedentary activity, and they have a general tendency to avoid physical work. These are the most responsible factors for the prevalence of increased body mass index (BMI). It was noticed that level of BMI was associated with educational attainment. Number of literate people in every society are increasing day by day and hence obesity problem is also increasing. The problem cannot be avoided but can be tried to halt the rise of BMI. For this, there should be plan and action to encourage the people to be involved in works associated with physical labour, after or before, the office works. Even they should walk whenever they find time. People should be motivated to take homemade food as per as possible. Public heath authority can play a decisive role to motivate the people so that they can understand the danger of increased BMI and its adverse effects on health.

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