Research Article

Integrative Diabetes and Cardiovascular Diseases

Obesity in Children and Adolescents and the Factors Responsible for it: A Case Study among Children of Some Affluent Families

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Abstract

The present analysis is based on data regarding the level of obesity amongst 662 children and adolescents of 560 families. These were the families of students of American International University – Bangladesh. The children and adolescents were classified by the level of obesity which was measured by percentiles of BMI. It was observed, that among 662 children and adolescents 465 were in the underweight group. Obesity and severe obesity were observed among 9.1% children and adolescents. Among the obese and severe obesity group, 53.3% killed their time while watching television, which is not a scheduled healthy activity and another 26.7% utilized the time playing sports and games, which is a planned and scheduled healthy activity. Obesity and severe obesity were associated with killing time in doing unhealthy activity. Among the obese and severe obesity group of children 31.7% were diabetic patients. Diabetes and level of obesity were significantly associated [$\chi^2 = 8.75$, p -value = 0.033]. Among obese and severe obese groups, around 42% were habituated in taking restaurant food and these two characteristics were also significantly associated with food habit of the children [$\chi^2 = 94$, p -value = 0.000]. Some socioeconomic factors of parents, viz. parent's education, father's occupation, and income of the families were also associated with level of obesity. The logistic regression analysis showed that all the variables, except the variable mother's occupation, were significantly related to the variation of the level of obesity of children. For underweight children family income had a significant impact on their level of obesity.

Keywords: Children and adolescents, Affluent families, BMI, Obesity, Logistic regression

Introduction

Child obesity is a condition where excess body fats negatively affects a child's health or well-being and create a chronic calorie imbalance situation [1]. A global epidemic obesity occurred in recent years, and prevalence of obesity is continuing to rise. In the developed world obesity is now the most common disease of childhood and adolescence [2][3]. Due to the rising prevalence of obesity in children and its many adverse health effects, it is being recognized as a serious public health concern.

In Bangladesh, the prevalence rates of overweight and obesity among children and adolescents varied from 1.0% to 20.6% and 0.3% to 25.6% [4]. These were the information for children and adolescents in all types of families in Bangladesh. Among Bangladeshi urban children across different age groups and sexes there were higher [17.9%] prevalence of overweight and obesity [5]. Approximately, 43 million pre-school children throughout the world have been estimated to be overweight and obese and 92 million are considered to be at risk of being

overweight [6].

Thus it needs to decide the level of obesity among children and adolescents and to identify the causes of obesity and overweight. As methods of direct determination of body fat are difficult, the diagnosis of obesity is often based on body mass index [BMI], the BMI is a measure used to classify children as overweight or obese. Among children aged 2-19 years the obesity is measured by BMI <5th percentile = underweight, BMI is between 85th to 95th percentile = overweight, BMI >95th percentile is obese and BMI 120% of 95th percentile = severe obesity [2][3][4][5]. The above measurement of obesity and overweight was presented in 2017 [5] also.

Children who are obese are at a significantly elevated risk for adverse health outcomes including both medical and psychological problems [7]. The most common medical co-morbidities associated with obesity include metabolic risk factors for type II diabetes (T2D) including high blood pressure, high cholesterol, impaired glucose tolerance and metabolic syndrome [8][9]. Orthopedic problems, sleep apnea, dental problems and fatty liver disease are also common co-morbidities of obese children and adolescents. Behavioral factors have significant effects on metabolic risk. It has been observed in some research findings that youth who do not meet guidelines for dietary behavior, physical activity and sedentary lifestyle have greater insulin resistance than those who do meet guidelines [10].

Psychological correlates of obesity creates problem both in the family and in the society. The problems include reduced quality of life, low self-esteem social isolation and discrimination [7][11][12]. Depressed mood has been associated with greater risk of obesity and higher BMI [11]. The short and long term medical and psychological effects of childhood obesity have adverse consequences including increased morbidities and early mortality in adulthood [11][13]. A prospective study on adolescents revealed that as young adults, particularly women, had an increased risk of social and economic difficulties [14]. Obesity has been attributed to various factors including genetics, environment, metabolism, behavior, culture and socio economic status [10]. The origins of obesity can be traced to early adiposity rebound, which refers to the time at which BMI of young children begins to increase after reaching their lowest level of fat. Children in whom adiposity rebound begins at age of three years, tend to have an increased mean BMI from age 3 to adolescence, which often extends into adulthood [14][15]. Children

born to overweight or obese mothers are more likely to be overweight by the age of four years old even if their BMI is within the average range at the age of two years [16]. Other aspects of family environment are also highly influential [1]. Parents' knowledge about nutrition and physical activity has also been found to be very strong predictors of children's weight status [17]. In a study [18], among school-aged children it was observed that parental behavior and BMI have a strong impact on children's BMI. Features of the built environment, including access to parks and supermarkets, and convenient store hours, have been found to have moderate treatment effects on obesity intervention [19]. Proximity of a person's home to fast food restaurants has been associated with increased obesity rates [20].

Living in low-income neighborhoods has also been associated with more sedentary behaviour and less physical activity [21]. School activity affects physical activity in youth. It has observed that children in higher socioeconomic schools have more access to regular physical education classes than children attending low socioeconomic schools [22]. Therefore, it can be concluded that environmental factors are associated with physical activity and indirectly are associated with overweight and obesity. Besides, family and school-based interventions, medical treatment, etc. can prevent overweight and obesity among children and youth and ultimately the diseases like diabetes, non-alcoholic fatty liver disease, cardiovascular disease risk, osteoarthritis and cancer.

Considering all of the associations of childhood obesity as discussed above, the objective of the present study was to identify the socioeconomic factors associated with overweight and obesity among children and youth under the age of 18 years who belonged to privileged families. The specific objectives were:

- i) To estimate the proportions of overweight and obese groups of children and youth,
- ii) To identify the factors associated with overweight and obesity in children and youth and to test the significance of the identified associations,
- iii) To estimate the impact of different socioeconomic factors on the levels of BMI and to test the significance of those factors on levels of BMI.

Methodology

The present analysis was based on 662 responses which are observed from 560 randomly selected affluent [23]

families of students of American International University - Bangladesh during Summer 2016-17 semester. During the semester there were 9488 students in the university. Our objective is to study the level of obesity among the children and adolescents of affluent families. We have decided to have an estimate of around 7% [4][24] overweight and obese children through our study.

To have around 7 percent overweight children and youth with 2 percent margin of error at 95% confidence, it was decided to select a random sample of size

$$n = \frac{z^2 pqz^2 pq}{d^2 d^2} = 625$$
 [proportion of overweight children, $p = 0.07$, Normal ordinate for 95% confidence interval, $z = 1.96$, Margin of error of proportion, $d = 0.02$].

Student's so that the minimum response was available from 5% families under study. However, the information had been collected from 560 families of students covering the data of 662 children through pre designed and pre tested printed questionnaire under the supervision of the authors. The randomly selected students were instructed and requested to help in collecting information from their parents who were very much concerned about the health hazard of their offsprings. The children's fathers/ mothers filled in the questionnaires as they were under age 18 years and even some of them were of age below 10 years. The questionnaire contained questions related to age, height, weight, sex, food habit, time spent, involvement in co-curricular activities, if it is feasible, of the children. To study the socioeconomic background of the children the information regarding parent's level of education, occupation and income were collected. For youth having diabetes, the latest blood sugar levels measured by registered practitioner or measured in a registered clinic were also recorded. Association of level of obesity of offsprings with families' socioeconomic background were examined using chi-square test, where significant association was concluded with a p -value of ≤ 0.05 .

Logistic regression analysis was done using 4 categories of level of obesity as dependent variables. The explanatory variables were age, sex, time spent by the children, food habit of the children, parent's education, occupation and family income. Some of the explanatory variables were transformed to nominal scale by assigning numbers.

Results

The data of the present analysis included different social, medical and economic aspects of 662 children

aged 18 years or below belonging to 560 randomly selected families of students of American International University-Bangladesh. Amongst the studied children 58.2% were males and 41.8% were females. The children were classified by their gender and level of obesity. The classified results are shown in table 1. It was seen that 77.4% of males were underweight in terms of their level of BMI. The corresponding figure among females was 60.3 percent. For all the investigated children the mean BMI was 17.67 with a standard deviation 10.58. The underweight group of children and adolescents had BMI (kg/m^2) <23 . The BMI for other three groups were 23 - <30 , 30 - <45 and 45+. These BMI levels were decided according to the percentiles values. Obese and severe obese group of children and adolescents were observed 9.1%. This finding is almost similar to that observed in another study [5]. The differences in obesity by gender were significant [$\chi^2 = 44.03$, p -value = 0.00]

72.5% children with varied levels of obesity were reported from the urban area. The corresponding percentages of rural and semi-urban children were 18 and 9.5, respectively. The classified information of number of children with different levels of obesity belonging to different residential areas presented in table 2. It was seen that maximum village children (76.5%) are underweight compared to urban and semi-urban children. Again, among the village children, numbers of obese and severely obese groups were lower compared to other groups of children. The differences in proportions of level of obesity and residence of children were significantly different [$\chi^2 = 12.45$, p -value = 0.04]

The investigated children and youth were classified into three classes by their age levels. These three groups of children were again classified by their level of obesity. The classified results are shown in table 3. It was seen that 72.5% children and youth of the age group 10 years and above] were underweight. The proportions of underweight children of other two age groups were lesser than the percentages of overall underweight group of children. The children less than 5 years of age had the highest percentage of the overweight group. This differential in proportions of level of obesity according to age groups was highly significant as calculated $\chi^2 = 38.94$ with p -value = 0.00. Amongst the investigated children and youth 22.8% had diabetes (Table 4). The corresponding percentage among obese and severely obese group together was 31.7%. Diabetes was less prevalent among overweight group (16.8%). The differences in proportions of diabetic group among children with different levels of

Table 1: Distribution of children according to their gender and level of obesity.

Sex	Level of obesity								Total	
	Underweight		Overweight		Obese		Sever obesity		No.	%
	No.	%	No.	%	No.	%	No.	%		
Male	298	77.4	46	11.9	28	7.3	13	3.4	385	58.2
Female	167	60.3	91	32.8	14	5.1	5	1.8	277	41.8
Total	465	70.2	137	20.7	42	6.3	18	2.8	662	

Table 2: Distribution of children according to their residence and level of obesity.

Level of obesity	Residence						Total	
	Urban		Rural		Semi-urban		No	%
	No.	%	No.	%	No.	%		
Underweight	341	73.3	91	19.6	33	7.1	465	70.2
%	71		76.5		52.4			
Overweight	97	70.8	18	13.1	22	16.1	137	20.7
%	20.2		15.1		34.9			
Obese	29	69	7	16.7	6	14.3	42	6.3
%	6		5.9		9.5			
Severe obesity	13	72.2	3	16.7	2	2.8	18	2.8
%	2.8		2.5		3.2			
Total	480	72.5	119	18	63	9.5	662	100

Table 3: Distribution of children and youth according to their age and level of obesity.

Level of obesity	Age group (in years)						Total	
	<5		5 to 10		10+		No	%
	No.	%	No.	%	No.	%		
Underweight	26	61.9	64	62.1	375	72.5	465	70.2
Overweight	12	28.6	19	18.4	106	20.5	137	20.7
Obese	1	2.4	9	8.7	32	6.2	42	6.3
Severe obesity	3	7.1	11	10.8	4	0.8	18	2.8
Total	42	6.3	103	15.6	517	78.1	662	100

Table 4: Distribution of students according to their level of obesity and prevalence of diabetes.

Level of obesity	Prevalence of diabetes				Total	
	Yes		No		No.	%
	No.	%	No.	%		
Underweight	109	23.4	356	76.6	465	70.21
Overweight	23	16.8	114	83.2	137	20.7
Obese	16	38.1	26	61.9	42	6.3
Severe obesity	3	16.7	15	83.3	18	2.8
Total	151	22.8	511	77.2	662	100

obesity were significant [$\chi^2 = 8.75$ with p -value = 0.033].

The present study group of children was mostly living in city center (72.5%) and they have enough scope to be involved in physical activity like games and sports. Still majority of the children (39.9%) spent their time by watching television and 16.8% slept after or before their academic activities. One-fourth (26.4%) of the investigated children mentioned that they were involved in some other activities including games and sports (Table 5). Around 72% of severe obese group killed their time by watching television. The corresponding percentage among obese group was 45.2%. The differences in proportions of utilization of time by the children of different obese groups were significantly different as [$\chi^2 = 54.12$ with p -value = 0.00].

Let us now observe the food habits of investigated children and adolescents. As the investigating units were mostly from affluent residents of city, they had the scope to get sufficient foods, with proper hygienic measures. Among the investigating units 47.9% were habituated in taking food from restaurants. Among the obese children 54.7% were habituated in taking restaurant food (Table 6).

Of course, higher proportions of underweight (46.9%) and overweight group of children (53.3%) were habituated in taking restaurant food. However, the differentials in proportions of children taking restaurant food according to different levels of obesity were significant [$\chi^2 = 94.63$ with p -value = 0.00]. Usually the children of affluent families were more likely to be stay back in the house and to kill time by watching television. These children also had more chances to frequently visit fast food shops. Their parents could afford the cost of fast foods and they are also fulfilled the demand of their children if they had sufficient family income. It was observed that the monthly family income of 38.2% families was 70 thousand take [Bangladesh currency] and above but 79.1% children of these families were in underweight group (Table 7).

It is seen that prevalence of obesity was higher among the children of low income group of families. This relationship was significant in the lower income group of families [$\chi^2 = 53.06$ with p -value = 0.00]. Family environment was one of the correlates of obesity among children [19]. It seemed that the food habit of the children was influenced by family income. The investigated result showed that the monthly family income of 38.2% children and adolescents had income 70 thousands taka and

above. Among these children 53.8% were habituated in taking restaurant food. The differences in proportions of food habit and family income were significant [$\chi^2 = 94.76$, p -value = 0.00]. It seemed that family environment was influenced by parents' education and occupation. Let us investigate how fathers' and mothers' education were associated with children and adolescents obesity. It was seen that in table 9, the fathers of 77.9% children were highly educated and 75% children of them were underweight. The percentage of illiterate fathers was 3.5 and 91% children of these fathers were underweight. Both obesity and severe obesity among children of illiterate and primary educated fathers was more (8.7% and 17.4% respectively) compared to the children of secondary educated (2.1%) fathers. The differential in proportions of level of obesity and fathers' educational level were highly significant (Table 8) (Table 9).

[$\chi^2 = 111.70$ with p -value = 0.00]. Similarly, significant differentials in proportions of obesity of children according to the differences of mothers' level of education were also observed in table 10, [$\chi^2 = 39.23$ with p -value = 0.00].

Significant differences in the level of obesity according to the variations in the levels of occupation of fathers table 11 were also observed [$\chi^2 = 186.02$ with p -value = 0.00]. But mothers occupation was not an influencing factor for the changes in the levels of obesity of children [Table 11, $\chi^2 = 10.50$ with p -value = 0.572] (Table 11) (Table 12).

From the regression analysis it was found that the variables except mother's occupation were significantly associated with the levels of obesity. From the fitted model the likelihood ratio tests for effects of different variables are shown in Table 13.

*This is the result of the reduced model, but it is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

From the model fitted result, apart from mother's occupation, all the variables were significantly related to the variation in the levels of obesity among the children and adolescents. Here the value of Nagelkerke $R^2 = 0.599$. However, the family income 60000 - 70000 taka per month and 70000+ had a significant effect on the underweight group of children. The results are shown in table 14.

The effect of variables on children's other levels of obesity are not provided because all other effects were

Table 5: Distribution of children according to their utilization of time and level of obesity.

Level of obesity	Utilization of time								Total	
	Study		Watch T.V.		Sleep		Others		No.	%
	No.	%	No.	%	No.	%	No	%		
Underweight	72	64.3	174	65.9	98	88.3	121	69.1	465	70.2
%	15.5		37.4		21.1		26			
Overweight	34	30.4	58	22	7	6.3	38	21.7	137	20.7
%	24.8		42.3	16.1	5.1		27.7			
Obese	4	3.6	19	7.2	3	2.7	16	9.2	42	6.3
%	9.5		45.2		7.1		38.1			
Severe obesity	2	1.7	13	4.9	3	2.7	0	0	18	2.8
	11.1		72.2		16.7		0			
Total	112	16.9	264	39.9	111	16.8	175	26.4	662	100

Table 6: Distribution of children and adolescents according to their food habit and level of obesity.

Level of obesity	Food habit						Total	
	Much more rice		More rice/fish& meat		Restaurant food		No.	%
	No.	%	No.	%	No.	%		
Underweight	56	12	191	41.1	218	46.9	465	70.2
Overweight	14	10.2	50	36.5	73	53.3	137	20.7
Obese	6	14.3	13	31	23	54.7	42	6.3
Severe obesity	2	11.1	13	72.2	3	16.7	18	2.8
Total	78	11.8	267	40.3	317	47.9	662	100

Table 7: Distribution of children and adolescents according to their level of obesity and monthly family income.

Level of obesity	Monthly family income (in 000 taka)								Total	
	<40		40-60		60-70		70+		No	%
	No.	%	No.	%	No.	%	No	%		
Underweight	107	54.3	40	58.8	118	81.9	200	79.1	465	70.24
Overweight	62	31.5	13	19.1	15	10.4	47	18.6	137	20.69
Obese	24	12.2	3	4.4	11	7.7	4	1.6	42	6.3
Severe obesity	4	2	12	17.7	0	0	2	0.7	18	2.72
Total	197	29.8	68	10.2	144	21.8	253	38.2	662	100

Table 8: Distribution of children and adolescents according to their food habit and Monthly family income(in thousand taka)

Family income	Food habit						Total	
	Much more ice		More rice/Fish & Meat		Restaurant Food		No.	%
	No.	%	No.	%	No.	%		
<40	50	25.4	59	29.9	88	44.7	197	29.8
40-60	3	4.4	34	50	31	45.6	68	10.2
60-70	9	6.1	73	49.7	62	44.2	144	21.8
70+	16	6.3	101	39.9	136	53.8	253	38.2
Total	78	11.8	267	40.3	317	47.9	662	100

Table 9: Distribution of children and adolescents according to their level of obesity and their father's education.

Level of obesity	Father's education								Total	
	Illiterate		Primary		Secondary		Higher		No.	%
	No.	%	No.	%	No.	%	No	%		
Underweight	21	91.3	17	73.9	40	40	387	75	465	70.2
Overweight	-	-	2	8.7	56	56	78	15	137	20.7
Obese	-	-	4	17.4	2	2	36	7	42	6.3
Severe obesity	2	8.7	-		2	2	15	2.9	18	2.8
Total	23	3.5	23	3.5	100	15.1	516	77.9	662	100

Table 10: Distribution of children and adolescents according to their level of obesity and level of mother's education.

Level of obesity	Mother's education								Total	
	Illiterate		Primary		Secondary		Higher		No	%
	No.	%	No.	%	No.	%	No	%		
Underweight	34	87.2	28	71.8	140	65.4	263	71.1	465	70.2
Overweight	1	2.6	8	20.5	65	30.4	63	17	137	20.7
Obese	2	5.1	3	7.7	6	2.8	31	8.4	42	6.3
Severe obesity	2	5.1	-	-	3	1.4	13	3.5	18	2.8
Total	39	5.9	39	5.9	214	32.3	370	55.9	662	100

Table 11: Distribution of children and adolescents according to their level of obesity and levels of father's occupation.

Level of obesity	Father's occupation								Total	
	Agriculture		Business		Service		Others		No	%
	No.	%	No.	%	No.	%	No	%		
Underweight	27	79.4	165	55.9	253	85.8	20	52.6	465	70.2
Overweight	2	5.9	100	33.9	31	10.5	4	10.5	137	20.7
Obese	3	8.8	27	9.2	9	3	3	7.9	42	6.3
Severe obesity	2	5.9	3	1	2	0.7	11	29	18	2.8
Total	34	5.1	295	44.6	295	44.6	38	5.7	662	100

Table 12: Distribution of children according to their level of obesity and level of mother's occupation.

Level of obesity	Mother's occupation						Total	
	Housewife		Service		Others		No	%
	No.	%	No.	%	No.	%		
Underweight	396	68.9	65	80.2	4	66.7	465	70.2
Overweight	123	21.4	12	14.8	2	33.3	137	20.7
Obese	40	7	2	2.5	0	0	42	6.3
Severe obesity	16	2.7	2	2.5	0	0	18	2.8
Total	575	86.9	81	12.2	6	0.9	662	100

Table 13: Likelihood Ratio Tests for The Effects of Different Variables of the Fitted Model

Variable	Modelfitting criteria -2log likelihood of reduced model	Test results	
		χ^2 -test statistics	p-value
Intercept	607.459	10	*
Age	629.174	21.715	0.001
Sex	641.118	33.66	0.001
Food habit	634.699	27.2	0.001
Utilization of time	640.122	32.663	0.001
Father's education	681.955	74.496	0
Mother's education	654.407	46.948	0
Father's occupation	665.271	57.813	0
Mother's occupation	619.081	11.622	0.476
Family income	5463.27	4855.812	0

found insignificant.

Discussion

Majority of the investigated children were males and higher proportion of them were underweight compared to the underweight female group. The percentage of obese children and adolescents were 6.3. Similar finding was reported in a study conducted for the children of Indian subcontinent [Bangladesh, India and Pakistan] [4]. Previously the percentage of obese children was reported 7 in Bangladesh [5]. The families of the students of American International University – Bangladesh were affluent and most of these families were resident of the city [23]. Most of the children for whom data were recorded for the present study were from the city center and were from families of higher income groups. These children had the scope to go to high socioeconomic school in which the expected facilities of physical education exist. But majority of the children were engaged in watching T.V. Very few children were involved in games and sports. Among the urban children, the risk of obesity was more compared to rural children. The percentage of obese children was less in rural areas. This is an environmental effect on obesity as urban children spent less time on physical activity. Similar findings were observed in other studies [18][21]. This study also indicated that the overweight and obesity have a rising trend as rates of overweight were lesser in 2014 [4].

In a separate study [20] it was reported that the increasing trend of obesity was associated with fast foods served in restaurant. The present study findings were also conform the association of obesity and fast food

from restaurants and that visiting the fast food shops is associated with parent's social status and family income. The offspring from affluent families visit fast food restaurants every now and then and obesity and severe obesity were particularly observed among them. Upward trend in parent's education and family incomes are responsible factors for the children's physical inactivity and their tendencies to watch T.V. and for visiting fast food shops. As a result, children are becoming obese and are ultimately affected by diabetes. These are grave the health hazards with significantly elevated risks of medical and psychological problems [9]. Thus, obesity and diabetes are interrelated phenomena, which can start at any time of life. In many instances obesity starts during childhood, unless proper care is not taken for the health of the children.

Conclusion

The present study was conducted in some randomly selected affluent families of the students of American International University – Bangladesh. Most of these families were the city dwellers. Socially and economically, these families were in better position [23] compared to the general people of Bangladesh. However, the obesity and severe obesity among children were similar to that of the general people of the country. Obesity and severe obesity were associated with the parents' social and economic status.

Obesity and severe obesity are related to diabetes and diabetes is a component of non-communicable diseases [NCDs] and these diseases are the major health burden in both developed and developing countries [25]. In a

Table 14: Effects of socioeconomic variables for the children of underweight group.

Effect of	Effect(B)	s.e.(B)	Wald Statistics	Significance
Intercept	-6.254	740.111	0	0.993
Father's education:				
Upto primary	-49.544	4824.664	0	0.992
Secondary	13.162	2428.494	0	0.996
Higher	7.698	225.344	0.001	0.976
Mother's education:				
Upto primary level	6.467	2239.806	0.001	0.082
Secondary	9.841	273.951	0.001	0.971
Higher	3.883	2.233	3.023	0.082
Father's occupation:				
Business	8.282	2830.144	0	0.998
Service	16.186	70.403	0.053	0.818
Others	17.212	70.42	0.06	0.807
Mother's occupation				
Housewife	-5.409	743.395	0	0.994
Business	-151.56	13110.039	0	0.991
Service	-30.961	8081.001	0	0.014
Others	-5.377	743.403	0	0.97
Family income [in taka]				
Less than 40000	64.295	744.809	0.007	0.931
40000-60000	-4.206	1.931	4.746	0.029
60000-70000	4.282	1.739	6.066	0.014
70000+	11.807	311.511	0.001	0.97
Age of children:				
Below 5 years	27.622	216.81	0.016	0.899
Above 5 years	-0.047	2.035	0.001	0.982
Food habit of children				
Takes more rice	-2.41	2.52	0.914	0.339
Takes more fish & meat	-2.328	1.982	1.38	0.24
Habituated to take more food from restaurants	26.261	203.084	0.017	0.896
Utilization of time				
Spent time in reading& writing	-0.746	3.005	0.062	0.804
Very fond o T.V.	0.888	2.719	0.107	0.744
Sleeping	-2.212	3.668	0.364	0.547
Others	28.102	167.357	0.028	0.867
Sex				
Male	14.053	70.361	0.04	0.842
Female	-	-	-	-

separate study [23] it was reported that most of the urban NCDs affected people were suffering from diabetes. This is true for both children and adults. In the present study also the prevalence rate of diabetes among the obese

and severe obese group of children were higher [31.7%]. This percentage was 21.9 among the underweight and overweight groups of children.

The issue of obesity and overweight is the problem for both parents and health planners. Parents can take care of foods of their offspring and motivate to take home made foods as per as possible. They can motivate their kids to spend their time in academic and extracurricular activities. The children can be sent to those schools where there are enough facilities for child's physical education. Government can introduce some regulations so that physical education is a compulsory co-curricular activity of the school. Urban parents should find time to accompany their kids to parks and play grounds at least for some hours in a week. The urban children should be advised to go to the nearby school on foot accompanied by either of the parents or any of the family members. The school authority can encourage the children to take healthy foods which are available nearby school or they may be advised to bring healthy foods to take it during school hours. There should be prohibited regulations not to advertise fast food and candy for their children. Fresh and healthy foods along with physical activities may decrease the rate of obese children. This would also help to prevent the development of chronic non-communicable diseases in adulthood.

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