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FREQUENCY OF DYSLIPIDEMIA IN YOUNG OVERWEIGHT AND OBESE STUDENTS (AGE 10-16 YEARS) IN PRIVATE SCHOOLS OF SWAT.

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ABSTRACT… : The objective of the current study was to estimate the frequency of pediatric dyslipidemia in overweight and obese students of private schools in Swat. **Study Design:** Questionnaire based cross-sectional study. **Setting:** Three private schools of district Swat. **Period:** 6 months. **Materials and Methods:** Study analysis was done in Research laboratories of Biochemistry Department, Institute of Basic medical Sciences (IBMS), Khyber Medical University Peshawar. Well-designed questionnaires were used for screening of 99 out of 1374 students, including both girls and boys. Anthropometric measurements were taken. Blood samples were collected for the analysis of serum lipids using an Automated Cobas Analyzer. SPSS version 20, Student's t test and Logistic regression method was used for statistical analysis. **Results:** The prevalence of dyslipidemia was measured to be 42.4%. A significantly direct association was found between the rate of dyslipidemia and BMI. Highly significant P values were found for serum lipids in obese children as compared to overweight children thus showing strong association between the biochemical Parameters and BMI. Even though rate of dyslipidemia was measured to be a little higher in boys as compared to girls, no statistically significant gender differences were found in serum lipid levels. **Conclusion:** Reduce long-term complications in adulthood is possible through controlling the serum lipid levels of children and adolescents.

Key words: Children, Dyslipidemia, Obese, Overweight, Private Schools, Serum Lipid Levels.

INTRODUCTION

Obesity is one of the most serious health problems which can manifest itself before adulthood.[1,2] It is necessary to control obesity in early childhood because it is the stage when particular dietary habits and sedentary behavior patterns become established.[3] In recent years, a rapid rise in the prevalence of childhood obesity has been seen in the western countries.[1,2] This has led to the increased risk of Non communicable diseases (NCDs) which are being emerged as a major health issue in South Asian countries like Pakistan, Srilanka, Bangladesh, Bhutan, Nepal, India and Maldives, constituting 24% of the population of world.[4] WHO has also reported that NCDs will account for approximately 72% of total mortality by 2030 in South Asia.[5] It was noted that the prevalence of childhood obesity had particularly increased in the private school students (due

to high socio-economic status) 29% vs. 11% respectively.[6,7] Studies reported that obesity leads to change in serum lipids in blood leading to dyslipidemia.[8,9] The typical dyslipidemia of obesity consists of increased triglycerides (TG) and free fatty acids (FFA), decreased HDL-C with HDL dysfunction and normal or slightly increased LDL-C with increased small dense LDL.[10] Among other NCDs, dyslipidemia is detected in almost one third of the population of developed countries.[11,12] Therefore, it has become essential to assess the lipid profile in obese and overweight children to avoid future complications. Moreover, further studies and researches are definitely needed to diagnose obesity by using standard methodology and uniform criteria and the populations from all areas and regions of the South Asian countries must be included in the studies in order to generate valid prevalence data.

METHODOLOGY

It was a questionnaire based cross-sectional survey conducted in three private schools of district Swat over a period of 6 months. Study analysis was done at Research laboratories of Biochemistry Department, Institute of Basic medical Sciences (IBMS), Khyber Medical University, Peshawar. A Total of 99 obese and overweight children including 31 female and 68 male students were selected whose ages ranged from 10-16 years while those with any medical complications were excluded. The pre-recorded demographic data included age, gender, socio-demographic characters, dietary habits, hobbies, family history of diabetes, hypertension, kidney diseases and dyslipidemia. Structured and pre-tested questionnaires were used to collect data on dyslipidemia. Height and weight measurements were taken. Participants with BMI > 85th Percentile and < 95th Percentile were considered overweight whereas those BMI > 95th Percentile were considered obese. Blood samples were taken for the analysis of serum Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoprotein Cholesterol (LDL-C), Very Low Density Lipoprotein Cholesterol (VLDL-C) and High Density Lipoprotein Cholesterol (HDL-C) using an Automated Cobas Analyzer. Statistical analysis of data was done using SPSS version 20. Student's t test was used as test of significance. Logistic regression method was applied to determine the relative association of lipid profile with age, obesity, BMI, diet, family history, lipids and lipoprotein concentrations.

RESULTS

Out of 99 participants, 42 (42.4%) were dyslipidemic while 57 (57.6%) were normal. Among the 42 (42.4%) dyslipidemic subjects, 25 were obese and 17 were overweight while the normal 57 (57.6%) had 16 obese and 41 overweight subjects. The association between dyslipidemia and BMI was statistically significant (p= 0.002).

However, the association between dyslipidemia and gender was found insignificant. Similarly, no association was found between serum cholesterol levels and BMI. On the other hand, there is a significant association between TG and BMI while no association was found between HDL and BMI and between LDL and BMI (Table-II).

DISCUSSION

The main finding in this study was that about 42.4% of children and adolescents in the age group of 10 to 16 years had at least one abnormal lipid level i.e. dyslipidemia. This result is comparable to the studies conducted in Turkey on obese children and adolescents that showed prevalence of dyslipidemia to be 43% and 42.9% respectively.[13,14] Another study conducted by Korsten-Reck, et al, 2005[15] showed abnormal lipid profile with 45.8% prevalence in the overweight adolescents and children, which is only little higher than our study report. The studies from Brazil (30% prevalence) and Bahia (25.5% prevalence)[16,17] showed lower prevalence of dyslipidemia compared to our results.

Parameters	Minimum	Maximum	Mean	Std. Deviation
Age	10	16	13.86	1.53
Weight	25.00	115.00	65.88	16.92
Height (cm)	102.00	225.00	174.45	27.06
BMI	20.06	36.81	26.16	3.22
Cholesterol	80.0	236.0	122.43	29.96
TG	27.0	353.0	109.38	58.94
HDL	19.0	49.0	37.87	6.97
VLDL	5.4	70.6	21.86	11.78
LDL	28.0	164.6	62.68	24.63

Table-I. General characteristics and biomedical parameters

Dyslipidemia	Obese	Overweight	Frequency	Percent	Chi.sq	P-value
Cholesterol						
Desirable level (<170 mg/dL)	37	56	93	93.9	Referral	
Borderline level (170-200mg/dL)	2	2	4	4.0	0.17	0.683
Undesirable level (>200 mg/dL)	2	0	2	2.0		
Total	41	58	99	100.0		
TG						
Desirable level (<125 mg/dL)	22	46	68	68.7	7.35	0.006
Borderline level (mg/dL)	--	--	--	--		
Undesirable level (>125 mg/dL)	19	12	31	31.3		
Total	41	58	99	100.0		
HDL						
Desirable level (>45 mg/dL)	2	2	4	4.0	Referral	
Borderline level (35-45 mg/dL)	21	47	68	68.7	0.64	0.425
Undesirable level (<35 mg/dL)	18	9	27	27.3	0.42	0.515
Total	41	58	99	100.0		
LDL						
Desirable level (<110 mg/dL)	38	56	94	94.9	Referral	
Borderline level (110-129mg/dL)	2	2	4	4.0	0.15	0.702
Undesirable level (>130 mg/dL)	1	0	1	1.0		
Total	41	58	99	100.0		

Table-II. Cholesterol, TG, HDL, LDL vs. BMI; Cut-off points for lipid concentrations in children and adolescents

While a study conducted in Iran showed higher dyslipidemia prevalence (69.5%) than our result.[18] Thus change in the prevalence of dyslipidemia was observed to be between 10.7% and 69.9% among obese children from different populations.[15]

The most common dyslipidemia in this study were the high TG levels (31.3%), 114mg/dl and 99.2mg/dl for boys and girls respectively. These results strongly agree with the results of Korsten-Reck, et al, 2005[15] and Maria del Mar Bibiloni, et al, 2015.[19]

No significant gender differences were found in this study though dyslipidemia was a bit higher in boys as compared to girls. These observations are comparable to those found in Northern Mexican children and adolescents.[19] However, gender differences results have been very controversial in the literature regarding TC, TG, HDL-C, LDC-C levels.[20]

The other most common findings of our study were that the highest rate of abnormal lipid levels as well as increased TG and low levels of HDL-C in obese children as compared to overweight.

These findings are very consistent with those observed in the study conducted in Northern Mexican children.[19]

The direct relation of dyslipidemia and BMI as observed in our study is in accordance with the study done on 10-19 years old students from 1999-2006.[21]

In our study, elevated concentrations of triglyceride (TG) were seen with increasing obesity (92.1± 43.72 mg/dl in overweight vs. 133.7± 68.89 mg/dl) (p<0.0001), which is consistent with the findings of Lima and colleagues.[22]

The second most common component of the lipid abnormality in our study was related to the low levels of HDL-C. Mean HDL-C levels in our study (37.6s±) were slightly lower than those found in the study conducted by Webber and colleagues.[23] A very significant (P < 0.001) negative correlation was found in our study between the BMI and HDL-C levels. It means as the BMI increased more and more, the level of HDL-C decreased accordingly. Many epidemiological studies have demonstrated that decreased levels of HDL-C are an independent risk factor for cardiovascular

disease.[24]

The other findings in our study were that of the prevalence of increased TC (2.02%) and LDL-C (1.01%). These levels were considerably low as compared to western and several other countries.[25] It has also been reported that coronary heart disease occurs at much lower levels of TC and LDL-C in Asians.[26]

In our study, Mean LDL-C levels of girls (60.7 ± 22.28) were found slightly lower than the boys (63.5 ± 25.74) in contrast to the levels of HDL-C, which were found a little higher in girls (38.3 ± 7.02) than the boys (37.6 ± 7.00) of the same age group i.e. 10-16 years. It could be because in teenager girls the hormonal changes act as a safety factor against the changes in lipid profile.[27]

Thus maintaining a balanced lipid profile is a key factor for health in young age and to keep oneself away from early morbidity in later life. Thus lipid profile should be screened in adolescents and children as early as possible to find out any imbalances. Moreover, the data which is available on characterization of lipid profiles in children is very limited especially in South Asian countries. It needs to be investigated further.

CONCLUSION
South Asian residents are facing serious problem of increasing obesity and dyslipidemia. Major contributory factors include demographic changes, faulty diets, rapid urbanization, sedentary lifestyle, social and cultural factors along with genetic predisposition as well as increased consumption of poor diets rich in saturated fats and cholesterol. It is possible to correct and control the serum lipid levels of children and adolescents thus reducing long-term complications in adulthood.

RECOMMENDATIONS
Consumption of diets which are high in saturated fats, cholesterol and refined carbohydrates while low in fibers and polyunsaturated fatty acids should be reduced. Children with high risk of obesity should be identified and referred to weight management clinics/programs, so as to minimize the chances of cardio-vascular diseases and other co-morbidities.

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