A PROFILE OF PLASMA CONCENTRATION OF ADIPONECTIN IN PRIMARY SCHOOL CHILDREN IN DERA ISMAIL KHAN

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ABSTRACT

Objective: The objective of the present study was to determine the plasma Adiponectin concentration in primary school children 6-11 years and to evaluate negative association of Adiponectin in obese children.

Methodology: This cross sectional study was carried out in the Department of Chemistry, Gomal University, Dera Ismail Khan from June 2007 to August 2010. A total number of 1336 primary school children were examined in the Municipality area of Dera Ismail Khan and excluding those suffering from chronic health problems. Height (m), weight (kg) of each child was taken and BMI was calculated according to Quatelet's Index. Body mass Status was also calculated through CDCs' Growth Charts 2002, 2-20years for children to have percentile for each school child. School children with ≥5th percentile were declared normal weight and the ones having ≥95th percentile as obese. 83 school children were randomly selected among 1336 children with 23 (27.71%) normal weight and 60 (72.28%) as obese ones. Gender wise distribution of the sample was 48 (57.83%) boys and 35 (42.16%) as girls. Fasting plasma adiponectin concentration was determined by ELIZA method.

Results: Mean plasma adiponectin concentration in normal weight children was noted as 21.38µg/ml (P = 0.013) and 20.89µg/ml (P = 0.011) in boys and girls respectively. The observed, mean plasma adiponectin level in obese children was 20.38µg/ml (P =0.0130) and 25.56µg/ml (P = 0.0016) in boys and girls respectively.

Conclusion: Significant difference in plasma adiponectin concentration was observed between normal weight and obese girls

Key words: School children, Obesity, Adiponectin

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INTRODUCTION

Adiponectin is a hormone secreted by adipose tissue, circulates at high concentration in blood, i.e., between 5-30µg/ml[1]. Adiponectin plays an important role in the pathogenesis of metabolic and cardiovascular diseases including obesity, type 2 diabetes and coronary artery disease[2, 3].

Adiponectin is insulin sensitizing; anti diabetic, anti atherogenic, anti-inflammatory and have antioxidant effects[4, 5]. Adiponectin level is variable in children and depends upon the age, gender and central fat mass. In newborn, adiponectin levels are around two fold higher and show positive association with birth weight and BMI[6, 7]. Adiponectin levels decrease during early childhood, and this is related to rate of postnatal weight gain[8]. The relationship between adiponectin and adiposity becomes negative sometimes during childhood. Girls have higher adiponectin levels than boys, reflecting the stimulatory effects of estrogens and inhibitory effect of androgens.

Girls have a larger central fat mass than boys, despite similar waist circumference[9]. Low levels of adiponectin (hypoadiponectninemia), appear to play an important

role in the pathophysiology of obesity, type 2 diabetes and coronary artery disease[10, 11]. Low levels of adiponectin are also associated with high risk of myocardial infarction[12]. Several studies have showed the anti-inflammatory and anti atherogenic effects of adiponectin[3, 13].

METHODOLOGY

This cross sectional study was undertaken in the Department of Chemistry, Gomal University, Dera Ismail Khan from June 2007 - 2010. This study involved 1336 primary school children (6-11 years) from eight primary schools located in the Municipal area of Dera Ismail Khan City. These school children had variable ethnic background (FATA; South and North Waziristan and adjoining area of Punjab and Baluchistan). Their Financial background was also variable. Written consent was obtained from children; their parents/ legal guardians and heads of the Institutions. Children were thoroughly examined in the presence of their teachers to exclude those suffering from chronic health problems. The study was approved by the Gomal University Board of Advanced Studies and Research and carried out according to the Guide lines of the Ethical Committee of the said University.

Height (m) and weight (kg) of each child was taken and Body Mass Index (BMI) was calculated according to the Quatelet's Index. BMI number was put against the CDC Growth Charts 2 - 20 years for children to have the BMI-for-age percentile. Body Mass Status was calculated according to the WHO, 1995 criteria. A child was declared as normal weight if his BMI-for-age percentile is ≥5th percentile to <85th percentile and obese if his percentile is ≥95th.

Fasting blood samples were collected from the children using disposable sterile syringes. Serum was separated through centrifugation at 1600×g and was used for the assessment adiponectin concentration in µg/ml, using highly sensitive Human Adiponectin ELISA, Gen-Way Biotech, Inc, San Diego, CA according to manufacturer's instructions. Inter-assay and intra-assay coefficients of variation were less than 10%.

RESULTS

For the adiponectin, mean plasma concentration in normal weight children was noted as 21.50µg/ml and 20.89µg/ml in boys and girls respectively reflecting non significant gender difference. Plasma adiponectin concentration in normal weight children was with in laboratory range (5-30µg/ml) except a boy with 37.650µg/ml (Table 2).

The observed; plasma concentration of adiponectin in obese children was noted as 20.38µg/ml and 25.56µg/ml in boys and girls respectively, showing significant gender difference. There is no significant difference between the plasma adiponectin concentration of normal weight and obese boys. However, obese girls have significantly higher adiponectin level compared with normal weight girls (Table 3).

It is important to note that11/83 children (1 normal weight and 10 obese children), had higher concentration of adiponectin compared with normal concentra-

Table 1: Sample Distribution of School Children (6 - 11 years)

Body Mass Status	Normal Weight				Obese			
Gender	Boys		Girls		Boys		Girls	
	N	%	N	%	N	%	N	%
No. of Children	14	16.86	9	10.84	34	40.96	26	31.32
Total	23 (29.06%)				60 (70.94%)			

Table 2: Adiponectin Profile of Normal Weight School Children (Boys =14; Girls =9)

Variable	Mean ± S.D	SE Mean	Range	p-Value
Adiponectin (Boys)	21.50 ± 5.94	1.50	11.60-37.65	0.013 (17)
Adiponectin (Girls)	20.89 ± 3.11	0.932	15.60-27.17	0.011 (18)

Table 3: Adiponectin Profile of Obese School Children (Boys = 34; Girls = 26)

Variable	Mean ± S.D	SE Mean	Range	p-Value
Adiponectin (Boys)	20.38 ± 9.71	1.67	12.69-59.45	0.0130
Adiponectin (Girls)	25.56 ± 10.31	2.23	12.31-55.24	0.0016

tion (5-30µg/ml). This finding is in contrast with the usual finding that obese children have lower plasma adiponectin concentration as compared to the normal subjects. Adiponectin concentration in these cases with altered plasma level, ranged from 37.00µg/ml in normal weight children to 59.452µg/ml in obese boys, 40.136µg/ml in obese girls and is referred to as sex-discordant associations with adiponectin and is seen both in boys and girls separately and in opposite direction (Table 2 & 3).

DISCUSSION

A number of studies have revealed the serum adiponectin level in normal weight and obese school children. These have expressed the serum concentration of adiponectin within normal laboratory limits in normal weight children and reduced in obese ones. Hassan et al[14], have verified the impact of obesity on adiponectin level in primary school children. They have found that adiponectin level in both the sexes was found to be lower in their whole sample of 98 obese school children, thus showing the negative correlation between adiponectin and body weight in boys. Similar observations were noted in Korean study by Park et al[15]. They have arranged to compare the levels of adipocytokines in obesity group with those in control group and found that adiponectin was expressed lower in obese than normal weight children. No gender difference was quoted.

The Indonesian study by Regina et al[16] have presented the identical results. They have assessed and compared the adiponectin and highly sensitive C – reactive protein levels in normal weight and obese school children. Fasting blood sample revealed the mean adiponectin level to be lower in obese children as compared to normal weight ones.

CONCLUSION

Plasma adiponectin concentration in normal weight children was found to be within normal limits. However, Mean adiponectin concentration in obese girls was positively associated with obesity. This is in contrast to the usual negatively association of adiponectin with obesity and is rarely observed (sex- discordant association with adiponectin) in children. Adiponectin level in children may be used as risk marker for cardiovascular disease in children.

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Competing Interests

The authors have no conflict of interest of intellectual or financial nature with any individual or institution.

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CONTRIBUTORS

MR designed the study, conducted the work and drafted the manuscript. IA supervised the study. MHR contributed to drafting of manuscript. FR and FR contributed to the data analysis. All authors read and authorized the final script.