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Relation Between Family Disease History and Risk for Diabetes and Heart Diseases in Pakistani Children

[1]Rubina Hakeem and [2]A.H. Shaikh
[1]Department of Food and Nutrition, RLAK Government College of Home Economics, Stadium Road, Karachi-74800, Pakistan ,[2] Department of Botany, Federal Government Urdu Science College Gulshan-e-Iqbal Karachi, Pakistan

Abstract: To assess the differences in fasting blood glucose, total blood cholesterol and body-weight of Pakistani children having negative or positive family history of diabetes and heart disease, a total of 240, 10-12 years old school going children (109 males and 131 females) were recruited. Percentage-of-median of BMI-for-age (NCHS reference) was calculated. Differences in means of Body Mass Index (percentage of median), Waist Hip Ratio (WHR), Fasting Blood Glucose (FBG) and Total Blood Cholesterol (TBC) of children were compared in relation to family history for diabetes or heart disease. Seventeen percent and 10% of children had positive family history for diabetes and heart disease respectively; out of this 8% had both. Children having positive family history for diabetes had significantly higher FBG, and those having positive family history for heart disease had significantly higher TBC. Overweight children (> 85th Percentile of BMI for age) had significantly higher mean value for WHR but not for FBG or TBC. Within the family history groups trend of differences in FBG or TBC of overweight and normal weight children was non-consistent and non-significant. Positive family history appear to influence glucose and lipid profile at ages 10-12 irrespective of weight status and this fact needs to be considered in identification of subjects for educational interventions.

Key words: Diabetes, heart disease, family history, FBG, BMI, TBE

Introduction

Diabetes and heart disease are found to be highly prevalent in urban areas of Pakistan (Dodani *et al.*, 1999). Genetic predisposition is considered to be responsible. Family history is found to be associated with the incidence of diabetes (Shera *et al.*, 1999a, b) and heart disease (Williams *et al.*, 2001) among adults. It has been known for several decades now that hypercholesterolemia could be identified at an early age; intervention help in reduction of risk of developing heart disease in later life, and thus screening is often recommended (Szamosi *et al.*, 1999). More recently with the emergence of type 2 diabetes in children, suggestions for screening of children for hyper-insulinemia are also given. (Fagot *et al.*, 2000; Cockram, 2000). In Pakistan also it would be justified to focus on high risk groups like children having family history of diabetes or heart disease if they are found to have higher than average risk for the development of these disorders. This study aims at assessing the possibility of using family history as primary factor for identification of high risk adolescents.

Material and Methods

Subjects : Data was collected from school going children in Punjab during a period of two months. Children were recruited from Lahore and Sheikhupura districts of Punjab, Pakistan. Six urban schools (from Lahore) and one rural school (from Kala-Shah-Kaku) were recruited. All the ten to twelve years old students studying in year 6 and 7 within each school were invited to take part in the study. Seventy-six to ninety-four percent of the eligible children from various schools participated in the study. Differences in diet and cardiovascular risk of these children according to urbanization status have been presented earlier (Hakeem *et al.*, 1999; Hakeem *et al.*, 2001).

Methods: Information about family history of diabetes was obtained from parents through letters sent to homes along with a short questionnaire to be filled and returned. Anthropometric measurement and blood assessment was done at school. Diet and activity habits were assessed on the basis of three-days food and activity record kept by all the recruited children.

Anthropometric measurements: Height was measured with a portable stadiometer following standard procedures (WHO, 1995). SOEHNLE digital personal weighing scale was used for weighing. Body weights were compared with NCHS (CDC, 2001) reference values to determine BMI for age percentage of median and to determine weight status of children (WHO, 1995). Waist circumference was measured by holding the non-stretchable measuring tape around the waist at the midpoint between the bottom rib and tip of hipbone. Hip circumference was measured at the fullest part of the hips.

Blood test: Prior to testing blood, the fasting status confirmation sheet, signed by parents was received and subjects were also asked whether they had eaten or drank anything that morning. Autoclix tool by Boehringer Mannheim was used for the finger skin prick. Accutrend GC meter was used for analyzing blood for fasting glucose and total cholesterol. This small portable instrument analyses the blood for glucose and cholesterol by using disposable strips and is found to be accurate and precise (del Canizo *et al.*, 1996).

Diet records: Data from diet records was used to analyze nutrient intake. Diet analysis software COMP-Eat was used for this purpose.

Activity records: All the participating children kept a three-days record of their activities, for every fifteen- minutes, in specially designed diaries. Activities were grouped according to intensity that was determined on the basis of Physical Activity Ratio (PAR) (James and Schofield, 1990). After calculating the average time spent in a day, in activities of varying intensity, overall Physical Activity Level (PAL) of each subject was calculated by factorial method (Garrow and James, 1994) .

Data entry and analysis: Data was entered and analyzed on SPSS

7.5. It was weighted for sex. ANOVA was used for estimating statistical significance of differences in means of continuous variables. Correlation in continuous variables was assessed by Spearman's regression analysis. Significance of difference in categorical variables was assessed using chi-square test.

Results

Mean value for FBG was significantly higher in children having positive family history for diabetes and mean value for TBC was significantly higher in children having positive family history for heart disease (Table 1).

Mean values for WHR and BMI were higher in children having positive family history for diabetes or heart disease as compared with those having none but the overall difference was statistically non-significant. According to post hoc analysis mean BMI of children having family history for both the diseases was significantly higher as compared with those children who had none (Table 1)

Correlation between BMI and FBG was weak (r= 0.159) but significant (P= 0.014) overall. But when observed separately the correlation was weaker and non-significant among those having positive family history. Scatter diagram of correlation between BMI and glucose is given in Fig. 1. Mean FBG of non-overweight children having positive family history was higher than those who were overweight with family history (Fig. 2)

Correlation between BMI and TBC was positive but weak (r-0.058) and statistically non- significant. Though the difference was statistically non-significant among those having positive family history for heart disease mean TBC was higher among overweight as compared with non-overweight (Fig. 3).

Differences in diet and activity of children having negative or positive family history were in general statistically non-significant. Overall difference in mean values for energy from CHO, fat or protein and PAL was statistically non significant. However according to post hoc analysis mean intake of percentage energy from protein of children having family history for diabetes was significantly higher as compared with those children who had none (P< 0.05) (Table 2).

Table 1: Mean FBG, TBC, BMI & WHR of children according to family history of diabetes or heart disease

	Significance		None	Diabetes	Heart disease	Both
		N	156.00	40.00	24.00	20.00
FBG	P= 0.001	Mean	3.87	4.20	4.07	4.26
		SD	0.56	0.72	0.47	0.47
TBC	P= 0.024	Mean	3.93	4.07	4.25	4.09
		SD	0.42	0.54	0.72	0.53
BMI %	ns*	Mean	93.05	95.72	97.17	101.39
of median		SD	16.50	15.95	24.30	21.09
BMI	ns*	Mean	16.43	16.84	17.24	17.89
		SD	2.97	2.88	4.32	3.76
WHR	ns	Mean	0.78	0.79	0.79	0.79
		SD	0.06	0.05	0.08	0.07

* non significant FBG = fasting blood glucose
TBC = Total blood cholesterol BMI = Body mass index
WhR = Waist hip ratio N= Number of children examined

Table 2: Diet and activity of children according to family history of diabetes or heart disease

	Significance		None	Diabetes	Heart disease	Both
		N	156	40	24	20
Carbohydrates						
% energy	ns	Mean	55.30	55.90	53.71	52.64
		SD	6.63	6.47	9.21	5.93
Protein % energy	ns	Mean	12.19	13.01	12.04	12.54
		SD	1.49	1.90	1.04	1.80
Fat % energy	ns	Mean	36.16	34.76	37.77	38.34
		SD	6.35	5.91	8.61	5.94
PAL	ns	Mean	1.28	1.29	1.26	1.31
		SD	0.07	0.07	0.07	0.09

PAL = Physical activity level ns = Non significant
N= Number of children examined

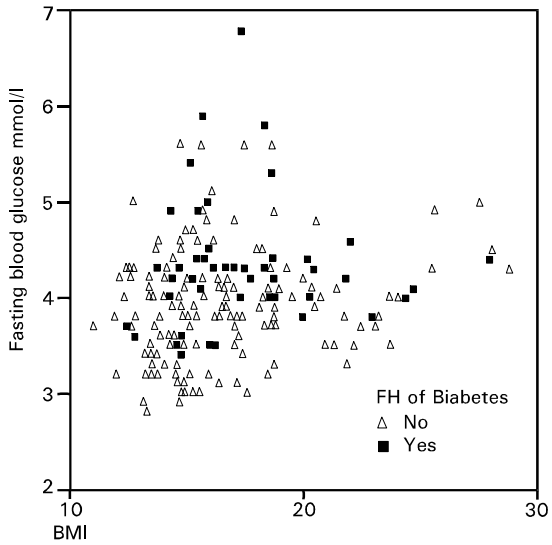

Fig. 1: Scatter is plot of FBG and BMI for age median

Discussion

Differences observed in FBG and TBC of children in relation to family history and BMI in this study indicate the possibility of identifying high-risk groups through knowledge of family history. In this study impact of overweight was non-significant on FBG and TBC. We do not suggest ignoring overweight as a risk factor but it is to be reminded that in UK among South Asians diabetes and heart disease were found to occur much more frequently than in Caucasians but mean BMI was similar or lower (McKeigue *et al.*, 1985). Within Pakistan in one study a large proportion of individuals with diabetes (50%) had average or below average BMI (Haider and Obaidullah, 1981). Pakistanis are found to have higher rates of abdominal obesity at similar ranges of BMI as compared with Caucasians (Bose, 1996), and abdominal obesity is more strongly associated with diabetes than the BMI (Shera *et al.*, 1999a, b). Thus among adults South Asians determination of obesity on the basis of WHR or waist circumference could be suggested. But use of these measures to determine adiposity in children is difficult due to rapid physical changes and differences in growth rates, and the reference values have not yet been standardized. Thus exploring convenient and affordable methods of assessing adiposity, and reference values to identify the risk groups are required. While identifying high risk groups ignoring those children who do not appear to be obese on the basis of BMI that could lead to missing a large proportion of vulnerable children. Further, whatever criterion is used, it also needs to be explored that in what ranges of age and adiposity, association between adiposity and FBG or adiposity and TBC becomes positive, and what cut off points should be used to identify high risk groups. Probably lower cut off points need to be set in the presence of family history.

Though obesity is an established risk factor for several chronic diseases there is some evidence that children from high risk

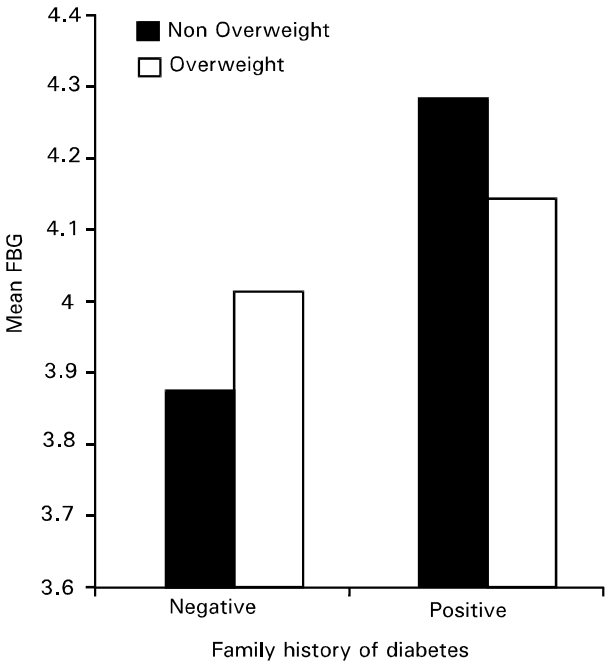

Fig. 2: Mean FBG of overweight (O'W) and non overweight (NW) children having positive or negative family history for diabetes

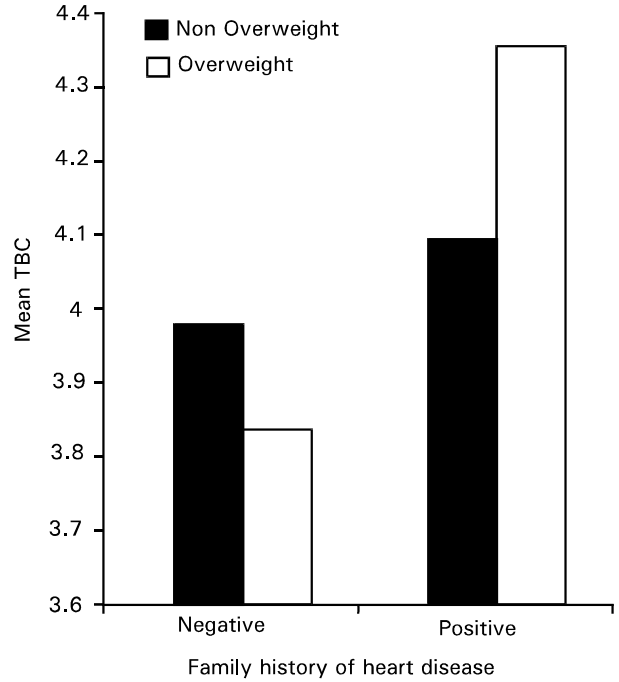

Fig. 3: Mean TBC of overweight (OW) and non overweight (NW) children having positive or negative family history for heart disease

groups are not always overweight. For example in a comparison of characteristics of children from high and low prevalence areas children from high prevalence area were shorter and thinner (Amini *et al.*, 1997). In a retrospective study persons having type 2 diabetes as adults were not found to be overweight during childhood.

The evidence that high risk groups could be identified at an early age and interventions help in preventing and delaying the onset of disease strengthens the case for screening and educating or treating high risk groups. As both diabetes and heart disease are increasing in Pakistan and the rates of incidence are expected to escalate with urbanization there is an immediate need for educating the public in general and the high-risk groups in particular.

In conclusion, the results of this study supports the view that even among Pakistani children high risk groups could be identified at an early age. And in this regard it needs to be noted that family history and obesity should be seen as independent risk factors and both need to be considered in identifying high-risk adolescents. In situations where individual assessments are not feasible, the public should be educated about risk factors in general and about role of family history in particular.

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Reference List

References

Amini, J., A. M. Han, E. Beracochea, G. Bukenya and J. D. Vince, 1997. Anthropometrical antecedents of non-insulin dependent diabetes mellitus: an age and sex matched comparison study of anthropometric indices in schoolchildren from a high prevalence Port Moresby community. Diabetes Res. Clin. Pract., 35: 75-80.

Bose, K., 1996. Generalized obesity and regional adiposity in adult white and migrant Muslim males from Pakistan in Peterborough. J. R. Soc. Health, 116: 161-167.

CDC, (National Center for Chronic Disease Prevention and Health Promotion). BMI for age. 8-2000. CDC Website. 2001, (Generic)

Cockram, C. S., 2000. The epidemiology of diabetes mellitus in the Asia-Pacific region. Hong Kong Med. J., 6: 43-52.

del Canizo, F.J., C. Froilan and M. N. Moreira-Andres, 1996. Precision and accuracy of the measurement of total cholesterol using the refractometer Accutrend GC. Usefulness in primary care for diagnosis of hypercholesterolemia (see comments). Aten. Primaria, 17: 463-466.

Dodani, S., R. Qureshi and B.S. Ali, 1999. Syndrome X and family practitioners. J. Pak. Med. Assoc., 49: 177-180.

Fagot, C., D. J. Pettitt, M. M. Engelgau, N. R. Burrows, L. S. Geiss, R. Valdez, G. L. Beckles, J. Saaddine, E. W. Gregg, D. F. Williamson and K. M. Narayan, 2000. Type 2 diabetes among North American children growth of person who develop type 2 diabetes. Ann. Intern. Med., 133: 176-182.

Garrow, J. S. and P.T. James, 1994. Human Nutrition and Dietetics. 1, London: Churchill Livingstone.

Haider, Z. and S. Obadiullah, 1981. Clinical diabetes mellitus in Pakistan. J. Trop. Med. Hyg., 84: 155-158.

Hakeem, R., J. Thomas and S.H. Badruddin, 1999. Rural-urban differences in food and nutrient intake of Pakistani children. J. Pak. Med. Assoc., 49: 288-294.

Hakeem, R., J. Thomas and S.H. Badruddin, 2001. Urbanization and coronary heart disease risk factors in South Asian children. J. Pak. Med. Assoc., 51: 22-28.

James W.P. and C. Schofield, 1990. Human Energy Requirements, Oxford: Oxford University Press.

McKeigue, P. M., M. G. Marmt, A. M. Adelstein, S. P. Hunt, M. J. Shipley, S. M. Butler, R. A. Riemersma and P. R. Turner, 1985. Diet and risk factors for coronary heart disease in Asians in northwest London. Lancet, 2: 1086-1090.

Shera, A. S., G. Rafique, K. I. Ahmed, S. Baqai, I. A. Khan and H. King, 1999a. Pakistan National Diabetes Survey prevalence of glucose intolerance and associated factors in North west at frontier province (NWFP) of Pakistan (see comments. Jpma. J. Pak. Med. Assoc., 49: , 206-211.

Shera, A. S., G. Rafique, I. A. Khawaja, S. Baqai and H. King, 1999b. Pakistan National diabetes Survey: prevalance of glucose intolerance and associated factors in Baluchistan province. Diabetes Res. Clin. Pract., 44: 49-58.

Szamosi, T., A. Murber, V. Tory, A. Kosztolicz and K. Sztankits, 1999. Atherosclersosi risk factors in children of high risk families. Acta Physiol. Hung., 86: 185-190.

WHO, 1995. Physical status: The use and interpretation of anthropometry. Geneva: World Health Organization.

Williams, R. R., S. C. Hunt, G. Heiss, M.A. Province, J.T. Bensen, M. Higgins, R. M. Chamberlain, J. Ware and P. N. Hopkins, 2001. Usefulness of cardiovascular family history data for population-based preventive medicine and medical research (the Health Family Tree Study and the NHLBI Family Heart Study). Am. J Cardiol., 87: 129-135.