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SERUM LIPID PROFILES IN PATIENTS WITH B-THALASSEMIA MAJOR

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ABSTRACT

Objective: Beta-thalassemia is considered to be the most frequent hereditary blood disorder worldwide. Lipid abnormalities have been detected in different types of beta- thalassemia. The aim of this study is to assess the lipid profiles in patient with beta- thalassemia major. **Methods:** In this cross sectional study, 30 children (case) previously diagnosed as beta thalassemia major were evaluated for serum lipid levels who were admitted at the Department of Pediatrics in DMCH & Thalassemia center of Dhaka Shishu Hospital from January 2012 to December 2012. The control group included 30 ages & sex matched healthy participants. Serum lipids profiles (total cholesterol, triglycerides, LDL- cholesterol, and HDL cholesterol) as well as hemoglobin, MCV, MCH & MCHC were compared between the two groups. P value < 0.05 was considered statistically significant. Serum total cholesterol (TC), Triglycerides (TG) and HDL cholesterol concentrations were measured by using Photoelectric Colorimeter (ERMA INC, model no AE-30F, made in Japan) in clinical biochemistry department of Dhaka Medical College. **Results:** Hematological tests showed the mean haemoglobin level in thalassemia group was 7.23 gm/dl with standard deviation of 1.23 whereas in control group the mean haemoglobin level was 10.37 gm/dl with standard deviation of 1.22. There was significant differences between two groups (p=.001). Mean MCV, MCH and MCHC in thalassemic group were significantly lower [69.83 fl (SD 8.34), 23.10 pgm (SD 3.57) and 28.03% (SD-2.58)] than those in their control counterpart [8323 fl (SD 4.97), 29.23 pgm (SD 2.43) and 31.20% (SD-1.83)] respectively (p = 0.001 in all parameters). Beta thalassemia major patients had significantly lower high-density lipoprotein (HDL) and low-density lipoprotein (LDL) compare with controls (p < 0.001). However, serum triglyceride levels of beta thalassemic males and females patients (203 ± 37.23, 221.21·± 36.13 gm/di respectively) were significantly higher than in control males and females (129.33 ± 13.88, -124.53 ± 15.23 gm/dl respectively) [p value < 0.001]. But total cholesterol level was not statistically significant between case & control groups. (P value 0.428). **Conclusions:** β Thalassemic children are at risk of developing disturbed lipid profile patterns that could place them at risk for atherosclerosis and thromboembolic events. From the findings of the study it can be concluded that there is significant difference of various lipid levels between children with beta thalassemia major and normal healthy control which may help physicians to design the therapeutic module in the treatment of such patients. It should be a motive· for concern of better evaluation of the cardiovascular risk factors in these patients.

KEYWORDS: Beta thalassaemia major, Total Cholesterol (TC), Triglyceride (TG), High density lipoprotein (HDL), Low density lipoprotein (LDL).

INTRODUCTION

Thalassemia is the most common heterogeneous group of genetic disorders in which the production of normal hemoglobin (Hb) is partly or completely suppressed because of defective synthesis of one or more globin chains that vary widely in severity from asymptomatic forms to severe or even fatal entities. Thalassaemia occurs throughout the world and is one of the major public health problems in the endemic regions such as Mediterranean countries, Middle East, North Africa and Asia. Beta thalassaemia is considered to be the most frequent blood disorder worldwide.[1]

Beta thalassaemia major is a very serious condition where individuals with it are unable to make enough healthy red blood cells and depend on blood transfusions all their life.

However, quality and duration of life of transfusion-dependent thalassaemic patients has been transformed over the last few years, with their life expectancy increasing well into the third decade and beyond, with a good quality of life. Nevertheless, cardiac symptoms and premature death from cardiac causes are still major problems since in the absence of effective iron chelation therapy, many patients develop evidence of iron-induced myocardial damage with cardiac failure, cardiac arrhythmia, sudden death, or a distressing lingering death from progressive congestive cardiac failure.[2] During the past years many scientific evidences have raised the adverse effect of abnormal blood lipid levels, like total cholesterol and other lipids and lipoproteins on atherosclerotic disease.[3,4]

Thalassemia is an inherited hemoglobin disorder resulting in chronic hemolytic anaemia. In this disease, β globulin chains are not enough (β^+) or do not exist (β°). More than 200 mutations can cause β - thalassemia but 20% incident alleles bring 80% of thalassemia in the world.[5] The gene prevalence of thalassemia has been reported all over the world in average of 3%.[6] WHO has estimated that about 1.5% the world's population might be carrier of β thalassemia (β/β^t) and that about 60000 severely affected infants are born every year. These individuals mostly originate from the Mediterranean, Middle East. Central Asia, India & Southern China.[1] Maldives has the highest incidence of thalassemia in the world with a carrier state of 18% of the population.[1] The estimated prevalence is 3-8% in populations from Bangladesh, China, India, Malaysia & Pakistan.[7] A very low prevalence has been reported from people in Northern Europe (0.1%) and Africa (0.9%).[8] Beta thalassemia is commonly associated with the shortened erythrocyte life span & excessive destruction of erythrocytes. Therefore blood transfusion is needed every 2-5 weeks to maintain a pre- transfusion Hb level above 10g/dl.[9] However, the combination of transfusion and chelation therapy has dramatically extended the life expectancy of thalassemic patients who can now survive into their 4th and 5th decade of life.[10] Frequent blood transfusion in tum can result in iron overload in key organs such as liver, heart & endocrine glands, resulting in heart failure, arrhythmia, hypothyroidism, hypoparathyroidism, diabetes mellitus, delayed puberty, growth retardation and so on. Most of these complications occur slowly and appear in the 2nd decade of the patient's life.[10] Patients with beta thalassemia major may go through several complications of the transfusion-related infections like HBV, HCV, HIV and bacterial infections.[11] Thalassemic patients are also subjected to peroxidative tissue injury. It has been documented that circulating low density lipoprotein-C (LDL-C) in thalassemic patients show marked oxidative modification that could represent an event leading to pathogenesis. Free-radical production is increased in patients with iron overload. Iron-loaded patients have elevated plasma levels of thiobarbituric acid reactants and increased hepatic levels of aldehyde-protein adducts, indicating lipid peroxidation.[12] During the past years many Scientific evidences have raised the adverse effect of abnormal blood lipid levels, like total cholesterol and other lipids and lipoproteins, on atherosclerotic disease.[13] At this point it should be mentioned that the relationships between blood lipids and a otosclerosis s might be influenced by several other lifestyle-related factors like glucose intolerant, blood p11essure levels, dietary habits.[14] It was suggested that both serum iron and triglycerides are involve in the pathogenesis of LDL-C oxidation.[15] However, blood lipids in these patients have rarely been investigated.

OBJECTIVE

General Objective

To determine serum lipids profile in patients with β-thalassemia major

Specific objective

- To evaluate the serum triglyceride level in patient with β - thalassemia major
- To evaluate the serum HDL (high density lipoprotein) level in patient with β- thalassemia major
- To evaluate the serum LDL (low density lipoprotein) level in patient with β – thalassemia major
- To compare various lipid levels in patient with β-thalassemia major with that of normal. individuals.

METHODOLOGY

Type of study

Analytical cross sectional comparative study.

Study population

Both male and-female child from 5 to 15 years and fulfilling the definition of thalassemia.

Study Duration

From January to December 2012.

Sample size

Thirty (30) age- and sex-matched healthy children from outpatient department who had the same socioeconomic status were selected as control.

Sampling method

Purposive sampling

Inclusion and exclusion criteria

Inclusion criteria

- Children suffering from thalassemia, diagnosed by Hbelectrophoresis

- Age in between 5-I5 years
- Received at least 10 times blood transfusion

Exclusion criteria

- Age less than 5 years and more than 15 years
- Patients who received, less than 10 times of blood transfusion
- Seriously ill patients
- Children having diabetes mellitus, hypothyroidism, hyperthyroidism, renal failure and hereditary hyperlipidemia
- Patients with other co morbid conditions (stroke, acute abdomen, peritonitis, etc.)

Procedure of data analysis

After collection all the data were checked and edited. Then data were entered into computer with the help of software SPSS for windows programmed version 17 & double checked before analysis. After frequency run, data were cleaned and frequencies were checked. An analysis plan was developed keeping in view with the objectives of the study. Descriptive statistical analysis was carried out in this study. Results on continuous measurements are presented on Mean±SD (Min-Max) and results on categorical measurements are presented in number (%). Student t test has been used to find out the significance of the study parameters on continuous scale. Chi-squre and one way ANOVA test has been used to find the significance of the study parameters on categorical scale between two or more groups.

RESULTS

The demographic characteristics of the respondents are shown in figure 1 to 3. Figure 1 shows distribution of age of the study population (n=60), from where we can see that the mean age was 100.85 months with standard deviation of 24.16 months. Out of 60 children, 48.33% were female where as 51.67% were male (figure 2), total 14 (23.33%) had come from a family of consanguineous marriage while 46 (76.66%) children had come from family of non-consanguineous parents. In beta thalassemia major group 09 (30%) children came from family of consanguinity where it were only 5(16.6%) in the control group (figure 3).

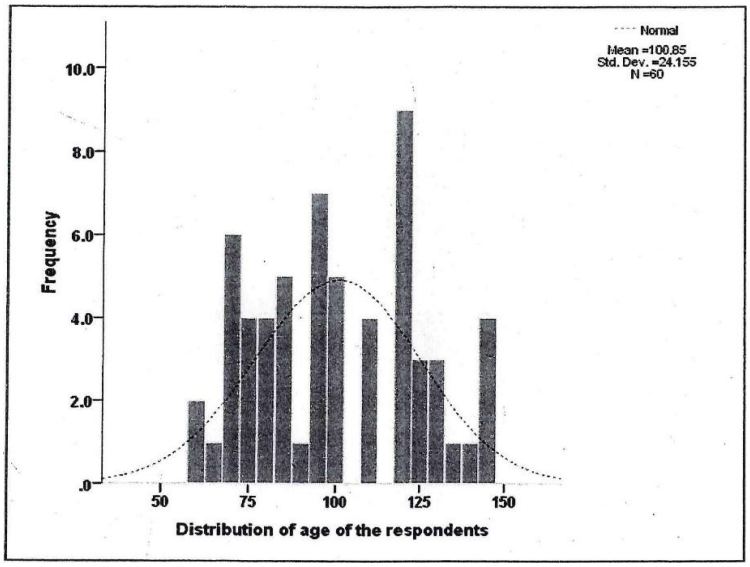

Figure 1: Distribution of age (in months) of the study population (n=60).

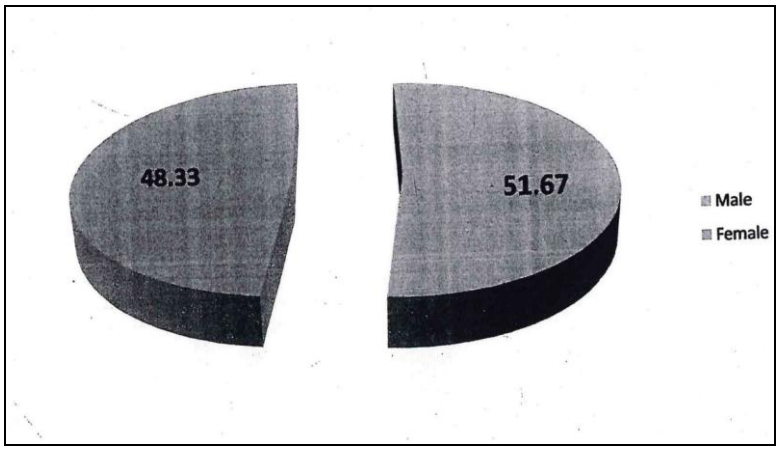

Figure 2: Distribution of Gender among the study population (n=60).

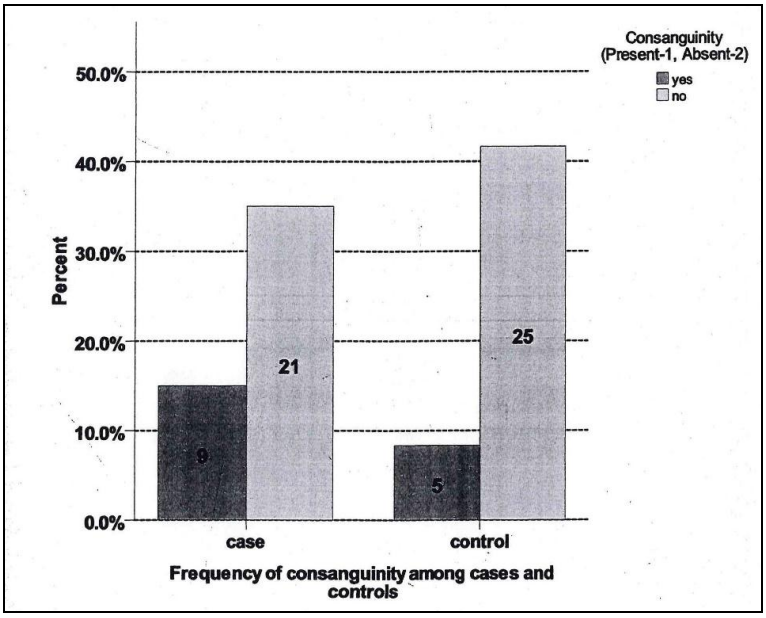

Figure 3: Status of consanguinity of the study population.

Table 01 explains the status of family involvement where we can see 07 (.33%) of 30 children (case) had affected family member & 10(33.33%) had carriers of thalassemia in family. Table 2 shows weight for age of the respondent & here was no significant difference between two groups (p=0.41) but significant difference of height for age between two groups (p=0.01) were seen in table 3. Among 30 thalassemia patients 2 patients were severely wasted and 5 patients (16.6%) were moderately wasted. In control group n-o children were severely wasted, 2 (6.6%) child were moderately wasted and rests are normal (table 4). Six patients (20%) were severely stunted and 14 patients (46.6%) were moderately stunted in thalassemia group. Whereas no chil4 was severely stunted & only 2 (6.6%) child were moderately stunted in control group (table 5).

Table 1: Status of thalassemia in family (n 30).

Parameters	Case (n=30)	
	Present	Absent
Thalassemia in family	07 (23.33%)	23 (76.66%)
Carriers of thalassemia in family	10 (33.33%)	20(66.66%)

Table 2: Nutritional status of the cases (weight for age).

Group	Weight for age (%)				p (t - test)
	Mean	SD	Mini	Max	
β thalassemia group	77.1%	7.85	60%	92%	0.41
Control group	81.2%	4.2	75.5%	89.5%	

Table 3: Nutritional status of the cases (Height for age).

Group	Height for age (%)				p (t- test)
	Mean (%)	SD	Mini	Max	
Thalassemia group	88%	5.7	73%	96%	0.01
Control group	91%	4.5	87%	97%	

Table 4: Nutritional status of the cases (Weight for Height-wasting).

Grading of wasting WHO Classification	Thalassemia group N=30'	Control group N=30	P value
Normal	23(76%)	28(93.3%)	NS
Moderate (-2.0 to -3.0SD)	5(16.6%)	2(6.6%)	
Severe (>-3.0)	2 (6.6%)	-	

Table 5: Nutritional status of the cases (Height for age - stunting).

Grading of stunting WHO classification	Thalassemia group N=30	Control group N=30	P value
Normal	10(33.3%)	28(93.3%)	<0.05
Moderate (-2.0 to -3.0SD)	14(46.6%)	2(6.6%)	
Severe (> -3.0SD)	6(2%)	-	

DISCUSSION

Among thalassemias, B-thalassemia gene has a widespread prevalence extending from Mediterranean zone, Middle East, Indian sub-continent including Bengal and parts of Southeast Asia.[16] The present study focused on the serum lipid status in 6 thalassemia major encountered in pediatric department in Dhaka medical college and Dhaka Shishu Hospital. In this study a total of 60 children were included. Of them 30 (thirty) children were patients and 30 were healthy control. Age and sex matched population who had no thalassemia or no major illness was taken as control population.

In this study, total 51.67% children were male while 48.33% children were female. In thalassemia patients the male: female ratio was roughly 1:1, which is consistent with the study conducted in Bangladesh by Rahman & Jamal[23] where the same ratio was roughly 1:1. Mean age in the study group was approximately 100.85 months with standard deviation 24.1 months. The youngest and the oldest children were of 60 and 144 months respectively. These findings are almost consistent previous studies.

Consanguinity seems to play an essential role in increasing the size of the problem in Mosul where 71.4% of the patients studied were the product of marriages between first and second cousins. Al-Haj[20] found higher results (88%) whereas a lower result (7%) was reported by Morshed. In our study out of 60 children, 23.33% children had come from a family with consanguinity of marriage while 76.66% had come from family of non-consanguinity of marriage. In β thalassemia group 30% children were from family of consanguinity while it was only in 16.66% in the control group. In the absence of local data about consanguinity of marriage & small sample size of our study, we cannot make any conclusion about it.

In our study out of 30 cases, twenty-five had palpable liver and in *5* cases had not any palpable liver. In case of spleen, 100% cases were presented with palpable spleen. But in a local study nearly all patients had enlarged liver and spleen and 3 patients presented with previous splenectomy (n =126).

No significant difference were observed between β thalassemia patients and control group in respect to weight for age (p=.41). Mean weight for age in thalassemic group was 77.1% ± 7.84. In previous study (Thailand) showed that mean weight for age was 85%±10.[68]

Mean height for age of p thalassemia group in our study was 88±5.7 and that in control group was 91±4.5. There was significant intergroup difference. In Bangladeshi, Iranian and Thai studies mean height for age were 89±4%, 96.2±4.7% and 96±4.0% respectively.[21,22,23] Apparently it seem that Iranian and Thai children with thalassemia were in a better position than there counterpart in Bangladesh.

CONCLUSION

β Thalassemic children are at risk of developing disturbed lipid profile patterns that could place them at risk for atherosclerosis and thromboembolic events. In conclusion, our study revealed that there was significant difference of various lipid levels between children with beta thalassemia major and normal healthy control which may help physicians to design the therapeutic module in the treatment of such patients. Awareness to these findings is helpful to avoid unnecessary evaluation in patients with beta-thalassemia. It should be a motive· for concern of better evaluation of the cardiovascular risk factors in these patients.

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