

Frequency of Decreased Pancreatic Size in Thalassemic Major Patients with Diabetes Mellitus

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ABSTRACT

Aim: To measure the frequency of diabetes mellitus in thalassemic major children and to measure the frequency of decreased pancreatic size in thalassemic major patients with diabetes mellitus.

Methodology: This cross sectional study was conducted in Thalassemia Centre of Sir Ganga Ram Hospital, a tertiary care hospital in Lahore. The data was collected in duration of 6 months and from 150 patients, who fulfilled the inclusion criteria were enrolled for this study. Their blood sugar level profile was done. The size of pancreas was labeled as decreased if any of the measurement (head, body and tail) is decreased.

Results: The mean age of the patients was 12.2 ± 1.2 years. There were 94(62.7%) male and 56(37.3%) female patients. There were 13(8.7%) patients had diabetes mellitus and 137(91.3%) patients had not diabetes mellitus. The mean head size of the pancreas was 2.1 ± 0.2 cm. The mean body size of the pancreas was 1.2 ± 0.2 cm. The mean tail size of the pancreas was 2.0 ± 0.2 cm. In the distribution of patients by decreased pancreatic size, there were 10(76.9%) patients had decreased pancreatic size and 3(23.1%) patients had not decreased pancreatic size.

Conclusion: It is concluded from this study that the iron overload functionally damaged the pancreas in thalassemic patients and frequency of diabetes mellitus is alarming sign and in diabetic patients, the decreased pancreatic size was found in majority of the patients. It is suggested that further studies will be conducted with larger sample size, so that strategy may be made for the early management of these patients.

Keywords: Thalassemia, diabetes mellitus, decreased pancreatic size, head size, body size, tail size.

INTRODUCTION

The condition in which there is deficiency of haemoglobin in body due to less synthesis of β -globin chain is commonly known as β -Thalassemia. It is an inherited disease. It has been noted that patients of this disease can be treated well by giving transfusions on regular basis. But there is also an increased range of complications including increased concentration of iron in body which may be hazardous for patients of thalassemia major¹.

There is also possibility of increased iron due to inability of body to excrete this excess iron received in blood transfusions. Hence iron is accumulated in different organs of body like liver, pancreas, thyroid, parathyroid, adrenal zonaglomerulosa, renal medulla, heart, bone marrow and spleen, which can cause deterioration².

This chronic state of disease is directly related to unbalanced tolerance of body for substances like glucose. That is why it may cause diabetes in thalassemic patients of older age. It has been observed that glucose tolerance unbalanced in 12.5% patients. Similarly diabetes is present in 19.5% of thalassemic patients. Hence in thalassemic patients there is usually high iron level and pancreas is smaller than usual size and also echogenicity of some glands increases by 76.5% which depends on age of patient and treatment duration^{2,3,4,5}. Major thalassemia

complications can be controlled giving proper counseling to people⁶. So many dangerous complications can be present in patients affected by multi-transfused thalassemia major because of excess iron in body. The presence of glucose intolerance in thalassemic patients is because of sensitivity of anterior pituitary gland to excess iron consequently unbalancing hormonal secretions causing diabetes⁷.

The aim of this study to measure the frequency of diabetes mellitus and decreased pancreatic size in thalassemic major patients. In a country like Pakistan, where the cost of any medication interferes with compliance the high cost of iron chelators results in patients developing severe iron overload. This severe iron overload results in excessive iron being deposited into the pancreas and thus putting these patients at a significant risk of diabetes mellitus, if we are able to screen these patients with simple noninvasive technique like ultrasound and detect changes earlier, our management for prevention of diabetes mellitus will significantly improve and thus result in a better quality of life for our patients.

MATERIAL AND METHODS

This study was conducted in Thalassemia Centre of Sir Ganga Ram Hospital, a tertiary care hospital in Lahore. Using cross sectional survey 150 children were taken with 95% confidence interval, 6.5% margin of error and taking expected percentage of diabetes mellitus i.e. 19.5% (least among both) in patients of thalassemia major.

Received on 19-04-2019

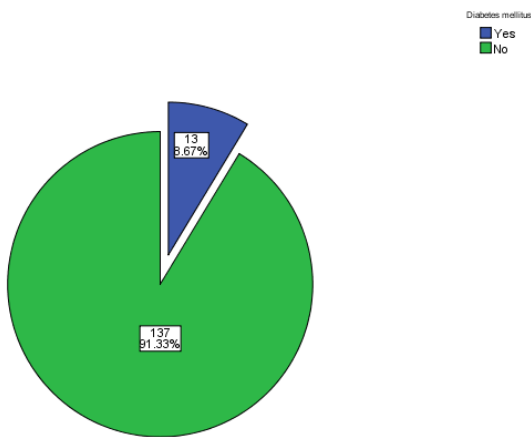
Accepted on 05-08-2019

The study was completed in six months from 05-05-2011 to 04-11-2011. We used non-probability purposive sampling. All thalassemia major patients aged more than 10 years of age of both gender and patients with history of multi-transfusions (twice a month) were taken in this study. Patients admitted to hospital, patients with blood transfusion reactions (patients vitally no stable), patients suffering from any acute infection (with C-reactive protein positive i.e. >0.5mg/dl and with increased total leucocyte count i.e. >11000/cmm) or patients with significant family history of type 1 diabetes mellitus in first degree relatives were excluded from study. Informed consent regarding inclusion in the study was taken from parents or guardian. They were explained about procedure of the study. Blood sugar level profile was done from major laboratory of Sir Ganga Ram Hospital in thalassemia major patients. Patients were labeled as having diabetes as per operational definition. Diabetes mellitus was defined according to WHO criteria fasting blood sugar level >126mg/dl whereas pancreatic size was considered if decreased in any of this measurement from mean result in decrease size of pancreas. The normal anteroposterior size of pancreas is head 2.0±0.5cm, body 1.1±0.3cm and tail 2.0±0.4cm. USG abdomen was done by an Assistant Professor of Radiology Department of Sir Ganga Ram Hospital in patients with diabetes to measure the size of pancreas. All this information was collected through a proforma. Data was entered into SPSS version 10 and analyzed accordingly. Age was presented by calculating mean and standard deviation. Gender was presented by calculating frequency and percentage. Presence of diabetes mellitus and decreased pancreatic size in diabetic patients were also presented as frequency and percentages.

RESULTS

The mean age of the patients was 12.2±1.2 years. There were 82(54.7%) patients in the age range of 11-12 years and 68(45.3%) patients in the age range of 13-14 years.

Fig-1: Frequency of diabetes mellitus in thalassemic major children



In the distribution of patients by sex, there were 94 (62.7%) male and 56 (37.3%) female patients. In the distribution of patients by frequency of diabetes mellitus, there were 13

(8.7%) patients had diabetes mellitus and 137 (91.3%) patients had not diabetes mellitus. The mean head size of the pancreas was 2.1±0.2 cm. There were 6 (46.2%) patients had head size of less than or equal to 2.0 cm and 7 (53.8%) patients had head size of more than 2.0 cm. The mean body size of the pancreas was 1.2±0.2 cm. There were 5(38.5%) patients had body size of less than or equal to 1.10cm and 8(61.5%) patients had body size of more than 1.10cm. The mean tail size of the pancreas was 2.0±0.2cm. There were 6(46.2%) patients had tail size of less than or equal to 2.0cm and 7(53.8%) patients had tail size of more than 2.0cm. In the distribution of patients by decreased pancreatic size with diabetes mellitus, there were 10(76.9%) patients had decreased pancreatic size and 3(23.1%) patients had not decreased pancreatic size.

Table 1: Frequency distribution and descriptive statistics of different variables

		n	%age
Age (years) [n=150]	11-12	82	54.7
	13-14	68	45.3
Sex [n=150]	Male	94	62.7
	Female	56	37.3
	Total	150	100.0
Head size (cm) [n=13]	<2.0	6	46.2
	>2.0	7	53.8
	Mean ± SD	2.1±0.2	
Body size (cm) [n=13]	<1.10	5	38.5
	>1.10	8	61.5
	Mean ± SD	1.2±0.2	
Tail size (cm) [n=13]	<2.0	6	46.2
	>2.0	7	53.8
	Mean ± SD	2.0±0.2	
Decreased pancreatic size [n=13]	Yes	10	76.9
	No	3	23.1
	Total	13	100.0

DISCUSSION

Beta-thalassemia in history was first explained by Cooley and Lee as less synthesis of β-globin chain in body and it basically indicates a group of diseases that are frequently passed on to generations of patients. Another important characteristic of this disease is iron-overload due to regular blood transfusions leading to complications like hypogonadism, diabetes mellitus, hypothyroidism, hypoparathyroidism and other endocrine abnormalities. Several recent studies show that young and elder patients of Thalassemia major have high frequency of abnormal endocrine functions. But due to presence of some other factors this abnormal endocrine function cannot be considered same for all patients. Also there is excess iron present in body of a thalassemic patients because of several blood transfusions and inability of body to remove this excess iron. This may lead to multiorgan dysfunction such as in liver, pancreas, thyroid, parathyroid, adrenal zonaglomerulosa, renal medulla, heart, bone marrow and spleen.

Average age of the patients in our research was 12.2±1.2 years. When contrasted with the research study of Ahmadzadeh et al the average age of the thalassemic patients was 11.5 years, which is similar to our research study. Gamberini et al carried out a research study in which the average age of the thalassemic patients was

13.9±1.4 years, which is also similar to our study. In our study there were 62.7% male and 37.3% female patients. Similarly in the study of Ahmadzadeh et al¹¹ 51.4% male and 48.6% female of total patients were present. In research study carried out by Shamshirsaz et al¹³ 61.1% male and 38.9% female of total patients were present, which is similar to our study. In our study the frequency of diabetes mellitus was found in 8.7% patients. As compared with the study of Shamshirsaz et al¹³ the frequency of diabetes mellitus in thalassemia patients was found in 8.7% patients, which is same and comparable with our study.

8.7% of the patients were diabetic in our study. 4.9% of patients developed diabetes mellitus in research conducted by Italian Working Group.¹⁴ This observation is less than our study. It may be that diabetes in β -thalassemia can be due to some genetic factors.^{14, 15} It is possible that our diabetic patients were young at the time of diagnosis in contrast with other studies^{14, 16}.

In a research work conducted by Toumba et al⁷ 9.4% patients had diabetes. Whereas 8.7% of patients were diabetic in our research study, which is similar to previous mentioned study. 76.9% diabetic patients in our study had reduced pancreatic size. As contrasted with the study of Theochari et al⁵ the frequency of reduced pancreatic size in diabetic patients was found in 76.5% patients, which is similar to our study. It was also observed in other study that reduced pancreatic size in diabetic patients was present in 85% patients¹⁷, while in our study the frequency of reduced pancreatic size in diabetic patients was found in 76.9% patients, which is similar to the above study. Another important research work tried to describe frequency of different complications in thalassemia major patients and diabetes mellitus was present in 5.4% patients¹⁸ that is similar to our observation of 8.7%. Based on above discussion it can easily be concluded that iron deposition and diabetes are complications that are alarmingly increasing in thallemic patients that causes majority of patients to have reduced pancreas size. To conduct a proper and early management for thallemic patient further studies on larger sample size must be conducted.

CONCLUSION

It is concluded that the iron overload functionally damaged the pancreas in thallemic patients and frequency of diabetes mellitus is alarming sign and in diabetic patients, the decreased pancreatic size was found in majority of the patients. It is suggested that further studies will be conducted with larger sample size, so that strategy may be made for the early management of these patients.

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