FREQUENCY OF PULMONARY HYPERTENSION IN THALASSEMIA PATIENTS

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ABSTRACT

Background: Pulmonary hypertension is one of the complications of thalassemia. **Objective:** To determine the frequency of pulmonary hypertension in cases of thalassemia. **Methodology:** This was a cross sectional study, conducted at Department of Cardiology, Sheikh Zayed Hospital, Rahim Yar Khan from 1st July to 31st December 2017. In this study, cases of thalassemia of age 5 years or more were included. The diagnosed cases of thalassemia irrespective of its type and for at least 1 year in duration were included. They were assessed for echocardiography at same institute and pulmonary hypertension was labelled as yes when pulmonary arterial pressure was more than 35 mmHg. Data was analyzed by using SPSS version 23. **Results:** In this study there were total 105 cases of thalassemia, out of which 63 (60%) were males and 42 (40%) were females. The mean age of the patients was 9.43±3.89 years. The mean ALT was 23.78±7.13 (U/L), mean AST and ALP were 26.54±8.08 and 75.43±21.08(U/L). Mean serum urea and serum creatinine were13.23±3.48 and 0.89±0.05(mg/dl). Pulmonary hypertension was seen in 57 (54.29%) of the cases; observed more in females affecting 24 (57.14%) cases with p value of 0.78. It high in age group more than 12 years where it was seen in 15 (83.33%) out of 18 cases with p value of 0.18. This was also more common in cases with haemoglobin of 7 g/dl or less where it was seen in 20 (66.67%) out of 30 cases with p value of 0.46. **Conclusion:** Pulmonary hypertension is very common among cases of thalassemia and it is more common among patients of age more than 12 years.

Key Words: Thalassemia, Pulmonary Hypertension, Risk factors.

INTRODUCTION

Thalassemia is one of the leading causes of inherited causes of hemolytic anemia. This is caused by the genetic mutation of the hemoglobin chain synthesis and leads to abnormal ratio of alpha to beta globin in the hemoglobin.[1] This predisposes to increased destruction of the red blood cells not only in the bone marrow but also in the circulatory system, called as hemolysis leading to anemia.[2] Alternation in Nitrous Oxide level is another entity leading to increased resistance to its flow leading to increased pulmonary vascular resistance (PVR) and subsequently to elevated pulmonary arterial pressures (PAP).[1,2]

Thalassemia can lead to various complications and among them pulmonary hypertension is of a great concern. The other contributing factors for its development include deformed chest shape, hemosiderosis, and extramedullary hematopoiesis.[3] Elevated PAP produces right ventricular strain, which can eventually progress to right ventricular failure and death.[4] There is no significant association with particular type of thalassemia with pulmonary hypertension and data has revealed the maximum cases in the age range of 6 to 10 years.[3,4,5]

Echocardiography is one of the most widely used screening as well as diagnostic tool to label pulmonary hypertension.[6] Different cut off values and marker have been used to label it. The flow of retrograde blood across the tricuspid valve measures the mean Pulmonary Arterial Pressure (PAP) and its value more than 35 mm Hg is labelled as pulmonary HTN.[5] The objective of this study was to determine the frequency of pulmonary hypertension in cases of thalassemia.

METHODOLOGY

Setting: Department of Cardiology, Sheikh Zayed Hospital, Rahim Yar Khan. Study design: Cross sectional study. Duration: 1st July to 31st December 2017. Sampling technique: Non-probability, consecutive sampling. Sample Selection.

Inclusion Criteria: All diagnosed cases of thalassemia, Age 5 years or more, Both genders.

Exclusion Criteria: Cases with known previous history of pulmonary hypertension, Cases of valvular heart disease.

After taking an informed consent, detailed socio demographic and clinical data was collected. The diagnosed cases of thalassemia, irrespective of its type and for at least 1 year in duration were included. Comprehensive general physical and systemic examination was performed. Blood samples were taken and CBC, ALT, AST, alkaline phosphatatase, blood urea and serum creatinine were determined in biochemistry labortory. Patients were assessed for

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echocardiography at same institute and pulmonary hypertension was labelled as "yes" when pulmonary arterial pressure was more than 35 mmHg. The data was analysed by using SPSS version 23.0 and chi square test was used to see for significance and p value of 0.05 or less was considered as significant.

RESULTS

In this study, there were total 105 cases of thalassemia, out of which 63 (60%) were males and 42 (40%) were females. The mean age of the patients was 9.43±3.89 years. The mean ALT was 23.78±7.13(U/L), mean AST and ALP were 26.54±8.08 and 75.43±21.08(U/L). Mean serum urea and serum creatinine were 13.23±3.48 and 0.89±0.05(mg/dl). Pulmonary hypertension was seen in 57 (54.29%) of the cases as shown in figure I.

Figure I: Pulmonary hypertension in study subjects

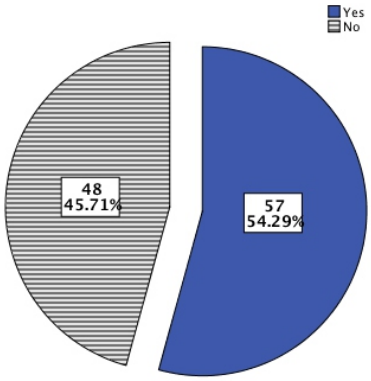

Table I: Pulmonary hypertension with respect to Gender, Age and Haemoglobin.

Gender	Pulmonary Hypertension		Total	P value
	Yes No (%)	No No (%)		
Gender				
Male	33 (52.38%)	30(47.62%)	63(100%)	0.78
Female	24 (57.14%)	18 (42.86%)	42 (100%)	
Total	**57 (54.29%)**	**48 (45.71%)**	**105 (100%)**	
Age groups				
12 years or less	42 (48.27%)	45(51.73%)	87 (100%)	0.18
>12 years	15 (83.33%)	3 (16.67%)	18(100%)	
Total	**57 (54.29%)**	**48 (45.71%)**	**105 (100%)**	
Hemoglobin (g/dl)				0.46
7 or less	20 (66.67%)	10(33.33%)	30 (100%)	
>7	37 (49.33%)	38 (51.67%)	75 (100%)	
Total	**57 (54.29%)**	**48 (45.71%)**	**105 (100%)**	

Pulmonary hypertension was observed more in females affecting 24 (57.14%) cases with p value of 0.78. It was nearly significantly high in age group more than 12 years where it was seen in 15 (83.33%) out of 18 cases with p value of 0.18. This was also more common in cases with haemoglobin of 7 g/dl or less where it was seen in 20 (66.67%) out of 30 cases with p value of 0.46. (Table I).

DISCUSSION

Normal structure of haemoglobin is necessary for physiological functions of red blood cells in whole body. Haemolytic disorders are frequently seen in hospitals and increase the likelihood of morbidity and mortality by various ways. Thalassemia is the most common among these disorders. It can result in various complication and pulmonary hypertension is of the leading ones contributing to heart failure. The underling pathophysiology comprise ongoing chronic hemolysis and anemia leading to heart failure.[6]

In the present study pulmonary hypertension in cases of thalassemia was seen in 47 (54.29%) out of 105 cases. This finding was higher as compared to the other studies done in the past. According to a study done by Al-Allawi et al, in Iraq pulmonary arterial hypertension was seen in 24% of the cases.[7] Our findings were consistent with Vlahos AP et al, the study where they found this in 52.5% of the cases.[8] The other studies have also shown variable results. In the past he prevalence of this complication was seen ranging from 18% to 60% of the cases.[9,10] This variation can be explained by multiple factors. The difference in inclusion criteria is one of the major one as we included all the cases of thalassemia irrespective of its type as minor, major or intermedia. The age factor is another confounder along with the duration of the disease. The different diagnostic cut off values can also influence such studies. Moreover, majority of these studies have a very small sample size and hence the results were dramatically variable. In this study, pulmonary hypertension was nearly significantly high in age group more than 12 years where it was seen in 15 (83.33%) out of 18 cases with p value of 0.18. This finding was similar to the study done by Atichartakarn et al and Machado et al where they also found that increasing age is one of the risk factor to show its association with pulmonary hypertension.[10,11] This can be explained by the factor that the higher the age and longer is the duration of the disease which can lead the heart to face the longer duration of haemolysis and anaemia.

Pulmonary hypertension was also more common in cases with haemoglobin 7 g/dl or less as compared to more than this, where it was seen in 20 (66.67%) out of 30 cases with p value of 0.46. This finding was similar to studies done by Fonseca GH et al and Anthi A et al who also found the association of anaemia withlikelihood of pulmonary hypertension; although they did not use this type of cut off value. However, this difference again was not found statistically significant in their studies as well.[12,13]

CONCLUSION

Pulmonary hypertension is very common among cases of thalassemia and it is high among thalassemia in cases with age more than 12 years.

REFERENCES

1. Benza RL, Miller DP, Barst-RJ, Badesch DB et al. An evaluation of long-term survival from time of diagnosis in pulmonary arterial hypertension from the Reveal Registry. Chest. 2012;142:448–456.
2. Hall JE. Thalassemia. Guyton and Hall Textbook of Medical Physiology. 12th Edition. New Delhi, India: Elsevier, 2001.
3. Rund D, Rachmilewitz E. Beta-thalassemia. The New England journal of medicine 2005;353:1135–1146.
4. Farmabis D, karagiorga M, et al. Aessopos A, et al. Pulmonary hypertension and right heart failure in patients with beta-thalassemia intermedia. Chest 1995;107:50–53.
5. Beiil, Hillmen P, et al. Rother RP, et al. The clinical sequelae of intravascular hemolysis and extracellular plasma hemoglobin: a novel mechanism of human disease. JAMA 2005;293:1653–1662.
6. Aessopos A, Kati M, Farmakis D. Heart disease in thalassemia intermedia: a review of the underlying pathophysiology. Haematologica 2007;92(5):658–65.
7. Al-Allawi NA, Jalal SD, Mohammad AM, Omer SQ, Markous RS. Beta-thalassemia intermedia in Northern Iraq: a single center experience. Biomed Res Int 2014:262-67
8. Vlahos AP, Koutsouka FP, Papamichael ND, Makis A, Baltogiannis GG, Athanasiou E, et al. Determinants of pulmonary hypertension in patients with Beta-thalassemia major and normal ventricular function. Acta haematologica 2011;128(2):124–9.
9. Rafsanjani KA, Mafi N, Tafreshi RI. Complications of β-thalassemia intermedia in Iran during 1996–2010 (single-center study) Pediatr Hematol Oncol 2011; 28(6):497–508.
10. Atichartakarn V, Chuncharunee S, Archararit N, Udomsubpayakul U, Lee R, Tunhasiriwet A, et al. Prevalence and risk factors for pulmonary hypertension in patients with hemoglobin E/β-thalassemia disease. Eur J Haematol 2014;92(4):346–53.
11. Machado RF, Farber HW. Pulmonary hypertension associated with chronic hemolytic anemia and other blood disorders. Clin Chest Med 2013;34(4):739–52.
12. Fonseca GH, Souza R, Salemi VM, et al. Pulmonary hypertension diagnosed by right heart catheterisation in sickle cell disease. EurRespir J 2012; 39:112-15.
13. Anthi A, Machado RF, Jison ML, et al. Hemodynamic and functional assessment of patients with sickle cell disease and pulmonary hypertension. Am J RespirCrit Care Med 2007; 175:1272-6.

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