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Frequency of consanguineous marriage among the thalassaemia major patients in Bangabandhu Sheikh Mujib Medical University

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Article Info

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Abstract

Thalassaemia is a commonly occurring hereditary disorder. There is a high prevalence of thalassaemia disease in South-East Asia as well as Bangladesh. It is an autosomal recessive disorder, so consanguineous marriage is a very important factor for this disease. Mutated beta globin gene of haemoglobin from both parents is responsible for this disease to occur. But when the number of thalassaemia carriers is miserably high, then only avoidance of consanguineous marriage can't prevent the birth of children with thalassaemia major. So, this cross sectional study was conducted among 120 diagnosed (by haemoglobin electrophoresis or high performance liquid chromatography) thalassaemia major patients in the Department of Haematology, Bangabandhu Sheikh Mujib Medical University, Dhaka from July 2019 to May 2020. History from each patient was taken and blood samples were collected from their parents to confirm carrier state by haemoglobin electrophoresis. Blood samples were also collected from patients and their parents toperform complete blood count and peripheral Blood Film. This study showed the mean age of the participants was 15±9.34 and 73 (60.8%) patients were male and 47 (39.2%) were female. About, 71% of the study population lived in urban area, 81 (67%) patients were transfusion dependent thalassaemia patients. 15% thalassaemia major patients had the history of consanguinity of their parents. Among the parents of the thalassaemia major patients, 62.5% were Beta thalassaemia trait (heterozygous state), 25.83% parents were Hb E trait (heterozygous state), 7.08% parents were suffering from Beta Thalassaemia Major(homozygous state) and 11 (4.58%) parents were suffering from Hb E/Beta Thalassaemia which is a compound heterozygous state. Though consanguinity is a very influential factor, but the most important causative factor is the presence of high number of thalassaemia carrier in the population. So, it's a burning issue for the nation to perform a routine carrier screening for all rather than focusing on consanguinity only, to lessen the burden of thalassaemia disease in Bangladesh.

Introduction

Thalassaemia is one of the most common monogenic hereditary disorders worldwide.[1] It is an autosomal recessive disorder and offspring inherits this disorder from their parents.[2] This is a chronic haemolytic anaemia where there is abnormal production of haemoglobinresulted from partial or complete deficiency in the synthesis of Alpha and Beta globin chain, followed by excessive destruction of red blood cells.[3,4] On the basis of clinical expression it is subdivided into thalassaemia major, thalassaemia intermedia, thalassaemia minor.[5] Thalassaemia major includes Beta Thalassaemia Major and Hb E/Beta Thalassaemia where thalassaemia minor is the carrier state.[4-6] Worldwide 4.5% population is affected by thalassaemia disease and 3-17% of the populations are carrier of thalassaemia.[7, 8] As this is a genetic disorder and inherited from parents, consanguineous marriage is one of the important influencing factors for thalassaemia.[7] When both parents are carrier there is 25% chance of production of thalassaemia major child in each pregnancy, and when one carrier got married with a major patient there is 50% chance of production of thalassaemia major child in each pregnancy.[8,9] So, consanguineous marriage should be avoided to reduce this autosomal recessive disease, but this is a deep rooted norm in many communities and rate of consanguineous marriage is 10.4% worldwide.[8-11] So, proper prenatal screening should be recommended and at the same time

awareness should be created among the people for the avoidance of consanguinity with great importance.[10] But, it is a matter of great concern that, besides consanguineous of marriage, the number of thalassaemia carrier is too much high in Bangladesh. Consanguinity has been always addressed as a major factor, but there is not much study related to this factor in our country. Only avoidance of consanguinity can't prevent thalassaemia. It is a significant public health concern because of high physical, mental and financial burden for the patient, family and the society.[12] The government should take proper steps to arrange awareness and screening programme such as prenatal, pre-marital and even universal screening programme for all.[12-14] So, the aim of the study was to show the importance of carrier detection which is crucial for thalassaemia disease reduction in our country.

Methods

This study was an out-patient-department-based, cross sectional study, was conducted in the Department of Haematology, Bangabandhu Sheikh Mujib Medical University, Dhaka, from July 2019 to May 2020. The study was approved by the institutional Review Board of Bangabandhu Sheikh Mujib Medical Universityand all patients gave their informed consent to take part in this study. The duration of the study was 12 months and included total 120 thalasasemia major patients attending the Haematology department of Bangabandhu Sheikh Mujib Medical University. We had included patients and carriers, meeting the inclusion criteria which were – 1) Diagnosed case of Beta thalassaemia major, Hb E/Beta thalassaemia who had both parents alive (diagnosis was confirmed by capillary Hb electrophorersis or HPLC) 2) Who were interested to participate willingly. Those who had Hb E Disease and any chronic disease that interfere with measurement of haemoglobin (Hb) level like Systemic Lupus Erythematosus, Rheumatoid arthritis, Aplastic anaemia, pregnancy etc were excluded. A complete history and physical examination of all patients and their parents were undertaken. The information regarding Hb level, requirements of blood transfusion, splenomegaly, growth retardation etc and the entire documents necessary to confirm the diagnosis and carrier detection were collected. Then from each patient and parents, 5 ml blood was taken (15-20 days apart from blood transfusion) for assessment of Complete Blood Count (CBC), Peripheral blood film (PBF) and Hb electrophoresis except those who had Hb electrophoresis done previously. All the investigations were done from the renowned and standard laboratory of Department of Haematology, Bangabandhu Sheikh Mujib Medical University. Quality assurance measurements were recorded with a semi structured questionnaire. All data were checked after collection and entered computer software. Statistical analysis was done using Statistical Packages for Social Science (SPSS-24).

Results

Amongst 120 diagnosed Thalassaemia Major Patients, 58(48.33%) patients were suffering from Beta Thalassaemia Major and 62(51.67%) patients were suffering from Hb E/Beta Thalassaemia. The mean age was 15±9.34 years with range from 2-30 years. 73(60.8%) patients were male and 47(39.2%) patients were female. 86(71.67%) patients were from urban area where as 34(28.33%) patients were the inhabitants of rural area (Table-I).

Table-I

Socio-demographic characteristics of the study population (N=120)

Age (Mean±SD)	15±9.34	
	Number of patients (n=120)	Percentage %
Male	73	60.8%
Female	47	39.2%
Urban	86	71.67%
Rural	34	28.33%

In this study, 81 (67%) patients were transfusion dependant thalassaemia patient sand 39 (33%) patients were non transfusion dependant thalassaemia patients. Only 18(15%) patients had the history of consanguineous marriage of their parents (Figure-1). Among them, 13(10.33%) patients of Beta Thalassaemia Major and only 5(4.17%) patients of Hb E/Beta Thalassaemia patients had the history of consanguinity among their parents. (Figure-2).

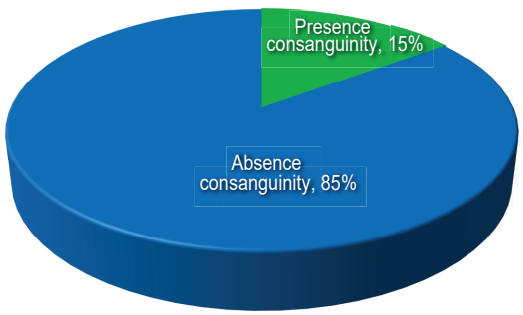

Figure-1: Pie chart showing parents with consanguineous marriage of thalassaemia major patients found in this study (n=120).

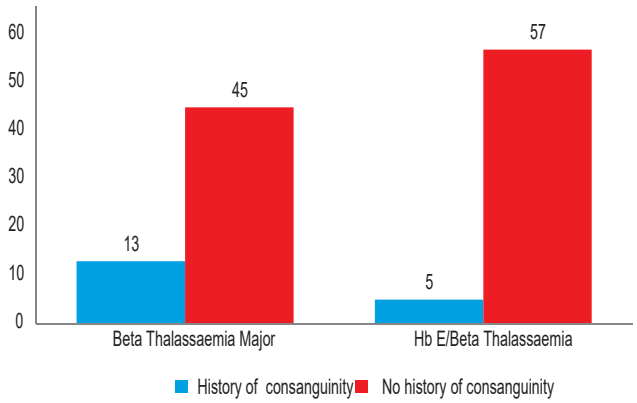

Figure-2: Bar chart showing distribution of H/O consanguineous marriage of parents found in this study (n=120)

Among 240 parents of 120 Thalassaemia Major Patients, 150 (62.5%) parents were Beta thalassaemia trait (heterozygous state), 62 (25.83%) parents were Hb E trait which is also a heterozygous state, 17 (7.08%) parents were suffering from Beta Thalassaemia Major which is a homozygous state and 11 (4.58%) parents were suffering from Hb E/Beta Thalassaemia which is a compound heterozygous state (Figure-3).

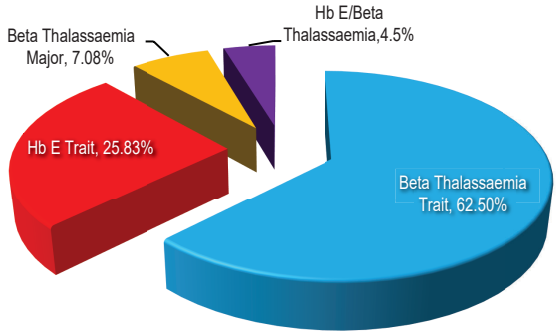

Figure-3: Pie chart showing heterozygous (carrier) and homozygous (disease) state of parents of thalassaemia major patients found in this study (n=240).

Discussion

Among the study population, the maximum number of patients was male. 73 (60.8%) patients were male and 47 (39.2%) were female in this study. A study conducted in 2011 showed that 65.66% of the study population was male.[4] Another study conducted in 2020 expressed 53.3% was male.[15] Again, a study conducted in 2013 showed that 53% of the study population was male and 47% was female.[16] So, all of these studies results are consistent with our study. In our study, 71% of the study population lived in urban area. A study conducted in 2011 showed that 80% of the patients were from urban area which is consistent with our study.[4] In our study 67% of the study population was suffering from transfusion dependant thalassaemia. A study conducted in 2020 expressed 54.5% was on regular blood transfusion.[15] We found another study held in 2017which showed that 62% of the study population was TDT (transfusion dependent thalassaemia) and rest of the study population was NTDT(non-transfusion dependent thalassaemia).[17] A study held in 2020 showed that 56.73% of the study population requires regular blood transfusion which is consistent with our study too.[18] Among the study population 18 (15%) patients had the history of consanguineous marriage of their parents. Rests of the 102 (85%) patient's parents were carriers who were not relatives. In this study, screening tests were done among the parents of all the patients. In Abudhabia study was held actually to see the conditions of tribals where people get married within their own communities. Among 5672 subjects screened, 2262 subjects were couple and the carrier frequencies varied from 0-13 to 6%.[19] Another study which was conducted to screen the parents of thalassaemia major patients in District Bannu showed that 74% parents were cousins and 26% were unrelated, so they were asymptomatic carrier.[20] These studies were done where there are strong tribe systems and most of the marriages occurred in between relatives. So most the marriages are consanguineous and one of the main factor of thalassaemia major, hence not consistent with our study. A study done in 2016 showed that the thalassaemia carrier rate was extremely high in Indian subcontinent and China which is 1-40%, where in Arab region it's only 3%.[21] So, in our study we found that as we have a large number of thalassaemia carrier in our population who are not relatives, so, carrier state is also very much important as well as the consanguinity. The study could have been more accurate with higher number of samples. There are some limitations of the study, firstly, the samples were collected from a tertiary care hospital, hence it may not represent the whole population of the community, secondly, Hb E disease was excluded as it is not Thalassaemia Major, otherwise more Hb E trait could have been detected.

Conclusion

It can be concluded that, among the thalassaemia major patients there was a male predominance. Urban people were more affected than rural people, most of the patients were transfusion dependant thalassaemia patient and a very small percentage (15%) of the patients had the history of consanguineous marriage of their parents. Though consanguineous marriage is an influential factor for thalassaemia disease, but presence of high number of carrier is the triggering factor in Bangladesh. So, necessary awareness and screening program for thalassaemia should be carried out nationwide with highest emphasis to alleviate the unbearable

physical and mental sufferings as well as the social and financial burden.

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Conflict of interest : None

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