Original Article

Parental Awareness of Thalassemia Transmission and the Impact of Consanguineous Marriages: A Cross-Sectional Survey

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Abstract

Objective: To determine the frequency and relationship between consanguineous marriages and the awareness of thalassemia transmission among parents of thalassemic children.

Methodology: A cross-sectional study was conducted from Oct 2019 to Feb 2020 in Hyderabad, Sindh, Pakistan. Three hundred and eleven thalassemic children families were included in the study using a convenient purposive sampling technique. After informed consent, the parents were interviewed and a proforma was filled out. Performa had questions about personal information, family information, and thalassemia awareness. Data was entered in SPSS version 21. Qualitative data was measured in frequencies.

Results: Among Three hundred and eleven thalassemic families, 26.4% didn't know consanguineous marriage causes thalassemia; 72.3% of participants weren't tested for thalassemia; 98.7% didn't consult a doctor before marriage; only 1 % of participants did prenatal genetic testing after pregnancy; 86.8% of the parents' marriages were consanguineous. In 31.5% of these 311 children, the mother was her husband's first cousin (daughter of spouse's father's sister). 16.4% of mothers were daughters of their spouse's father's brother, 15.8% of the spouse's mother's brother, and 23.5% of the spouse's mother's sister. Most couple who had thalassemic children don't consult with a doctor nor do they go for genetic testing before marriage.

Conclusion: Consanguineous marriage is common among parents having a thalassemic child. Urgent policies should be advised and implemented for the proper education of thalassemic families at the earliest.

Keywords: Consanguinity, Consanguineous Marriages, Thalassemia.

Introduction

The name Thalassemia stems from two Greek words, "Thalassa," meaning floating sea, and "Emia," meaning blood.[1] Thalassemia is a monogenic hereditary disorder that is almost spread all over the globe.[1] Thalassemia is solely a genetically transmitted disease caused by the mutation or damaging hemoglobin synthesis on the alpha or beta globin chain. Researchers have calculated that 2.5 billion people have the variant gene for B-thalassemia and that around seventy thousand affected homozygous are born yearly.[2] About 3 to 10 percent of the global population has the variant gene associated with B-thalassemia.[3] Many nations are heavily impacted by Thalassemia, major or mild.[4]

Several circumstances can influence the rate at which beta-thalassemia worsens. Consanguinity, increased birthrate, lack of education, resources and awareness, all play a role in the increase in the incidence of Thalassemia.[5] The most significant risk factor for this rise in the rate is consanguinity.[5] The Latin prefix "con" means "common," and the noun "sanguine" refers to "blood," hence the word "consanguinity" is derived from these two concepts. In a consanguineous marriage, both partners share a common ancestor. It has to do with their biological and genetic forebears. First-cousin, second-cousin, and third-cousin marriages are all examples of consanguineous unions. Consanguineous marriages can arise for several causes, some of which are more stable than others. Consanguineous marriages are widely encouraged on both the local and national levels. There are more elements at play, such as social pressure for intracast marriage, illiteracy rate, poor socioeconomic condition, and lack of awareness. Consanguineous weddings are on the rise, and this may be attributed to families wanting to preserve their traditions by marrying within the same immediate family.[6]

Consanguineous marriages are the most serious concern internationally. Around 80-90 million beta-thalassemia carriers are prevalent owing to intermarriages. Thalassemia is more frequent in nations where consanguineous marriages occur.[7] There is a significant disparity in the rates of consanguineous marriages that occur between distinct communities or networks throughout the world, and there is also a significant

disparity in the rates of consanguineous marriages that occur between various groups and ethnic communities that reside inside the same country. The rate of consanguineous marriage may vary greatly from one generation to the next, depending on factors such as religion, customs, race, and geology. Among significantly impacted locations where this genetic condition is found include the Middle East, North Africa, Asia, Pakistan, and India.[8] About 4,000 to 5,000 children with Thalassemia are born in thalassemic carrier families in Pakistan every year.[9]

Pre-marital screening has decreased the birth prevalence of Thalassemia patients.[10] Comprehensive screening programs, accurate recognition and mentoring of at-risk couples, and pre-birth detection of the parents are all promising strategies for reducing mortality and spreading Thalassemia in countries where it is prevalent. Although testing for carrier status and parental diagnosis of beta-thalassemia has been available in Pakistan for over ten years, its usage has been limited due to low rates of awareness and high costs.[11] Despite the Sindh Provincial Assembly passing the Thalassemia Prevention and Control Bill 2013 on Sept 19, 2013, there is still a lack of parental education contributing to this disease's spread.[12] No extensive study on Consanguinity and Thalassemia has been done in Sindh, the second most populous province of Pakistan. We have conducted our study intending to determine the Parental Awareness of Thalassemia Transmission and the Role of Consanguineous Marriages in the district of Hyderabad, Sindh, Pakistan.

Methodology

This descriptive cross-sectional study was conducted from Oct 2019 to Feb 2020 at thalassemic center in Hyderabad, Sindh, Pakistan, after getting approval from the institutional ethical committee via letter no DRGS/3613. A total of Three hundred and eleven thalassemic children's parents were included in the study using a convenient purposive sampling technique. The sample size of 202 families was calculated using openEpi software, keeping a 95% confidence interval. Our sample size exceeded the required sample size. All parents who gave consent for the study were included, those who didn't give consent or children accompanied by their guardians were excluded from the study.

A self-structured Proforma having questions related to personal information, family information, and thalassemia awareness was made and checked by two subject experts. The performa was initially pilot-tested on parents of ten thalassemic children. The cronbach's alpha was 0.74. The validated performa was then distributed among the three hundred and eleven thalassemic children's parents. After getting informed consent, the questionnaire was filled out by interviewing parents of every registered thalassemic child. In order to ensure the confidentiality of the participants, the interview of the parents were done in a separate room furthermore the provided data was accessible only to the principal investigator. SPSS version 23.0 was used for both analysis and data entry. Qualitative data such as gender, relationship, and consanguineous marital history, were expressed in terms of frequencies and percentages.

Results

A total of 311 different families eligible for the study registered at the two thalassemic centers in Hyderabad were initially approached. All agreed to participate in the study so the response rate was 100%. The mean age of the children was 131.75 + 63.97 months. A higher prevalence of β-thalassemia was found in male children (n = 177, 56.9%) than in female children (n =

Table I: Distribution of ß-thalassemia children according to gender and number of thalassemic children born from thalassemia carrier families

Gender	Frequency	Percentage (%)
Female child	134	43.1
Male child	177	56.9
Number of Total Children in family	Frequency	Percentage (%)
≤2	90	28.9
>2	221	71.1
No of Thalassemic children in family	Frequency	Percentage (%)
≤2	273	87.8
>2	38	12.2

134, 43.1%). Seventy-one percent of all thalassemic children belonged to families with more than two children. 87.8% of the thalassemic children have either no sibling or one other thalassemic sibling. At the same time, 12.2% of thalassemic children have more than two other thalassemic siblings (Table I). Forty percent of the parents had a thalassemic sibling. Seventy percent of the parents said that they knew consanguinity has a role in Thalassemia., but only one percent of the parents consulted their doctors for Thalassemia before marriage, and twenty-seven percent of the parents tested themselves for thalassemia carrier status. Eighty-seven percent of the parents had a consanguineous wedding. Of 311 families, 149 had paternal consanguineous marriages, while 121 had maternal consanguineous marriages (Table 2) (Fig 1,2,3).

Table 2: Awareness regarding Thalassemia and Consanguinity among parents of Thalassemic patients

Variable	Yes		No	
	Frequency	Percent (%)	Frequency	Percent %
1. Any of your Siblings have Thalassemia?	126	40.5	185	59.5
2. Do you know that consanguinity has role in Thalassemia?	219	70.4	92	29.6
3. Do you have a Consin marriages	270	86.8	41	13.2
4. Have you consulted with doctor before marriage?	4	1.3	307	98.7
5. Have you tested yourself for the Thalassemia trait?	86	27.7	225	72.3
6. After pregnancy did you go for prenatal genetic testing	3	1	308	99
Frequency of Thalasemmia among paternal, maternal, and no direct relation				
	Frequency	**Percent (%)**		
Paternal	149	47.9		
Maternal	121	38.9		
No direct relation	41	13.2		
Frequency among direct relatives of paternal, maternal, and no direct relations				
Father's sister (Phupho)	98	31.5		
Father's brother (Chacha)	51	16.4		
Mother's brother (Mamoo)	49	15.8		
Mother's sister (Khala)	73	23.5		
No relation	40	12.9		

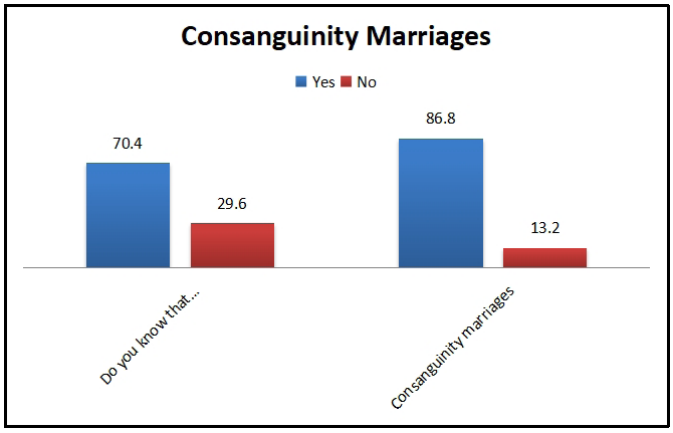

Figure 1: Frequency of Consanguinuous Marriages among families

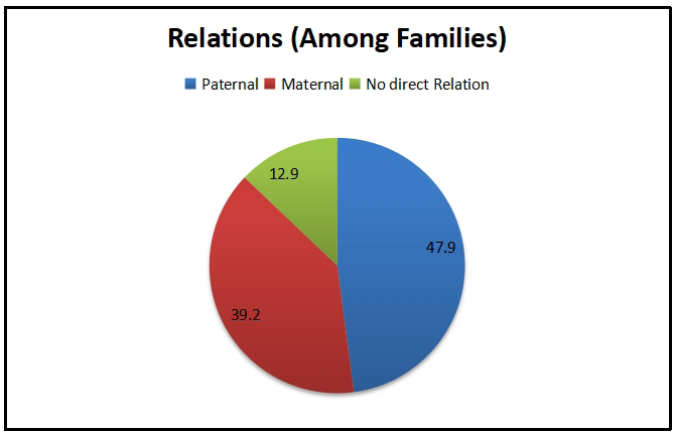

Figure 2: Distribution of Relationship among Families (paternal and maternal)

Discussion

Thalassemia is a global issue, and Consanguinuous marriages are the most severe concern internationally. The increase in consanguineous marriages in underdeveloped countries is worrisome. It is associated with an increase in the prevalence of Thalassemia. Despite advancements in health sciences, thalassemic families are still unaware. Our study showed that the incidence of Thalassemia in consanguineous marriages has increased, and families still lack awareness.

Among Three hundred and eleven thalassemic children families, 29.6% didn't know consanguineous marriage causes thalassemia (Table 2; Figure 1). 72.3% of participants weren't tested for thalassemia, and 98.7% didn't consult a doctor before marriage. only 1 % of participants did prenatal genetic testing after pregnancy(Table 2). 86.8% of the parents' marriages were consanguineous (Figure 1). In 31.5% of these 311 children, the mother was her husband's first cousin (daughter of spouse's Father's sister). 16.4% of mothers were daughters of their

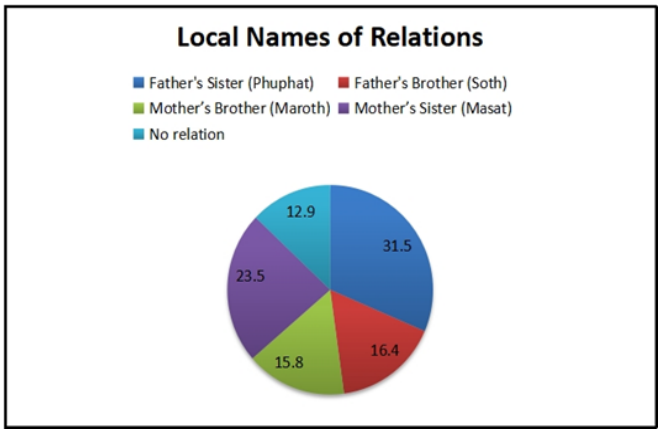

Figure 3: Distribution of Relatio ship among Families with local Names

spouse's Father's brother, 15.8% of the spouse's mother's brother, and 23.5% of the spouse's mother's sister(Table 2; Figure 3).

Our data represents that 86.8% of the β-thalassemia carrier are born with consanguineous marriages(Figure 1). It is in accordance with literature.It has been reported that 25%–60% of all marriages from Arab Regions are consanguineous.[13] According to statistics, first-cousin marriages make up about 31% of all consanguineous marriages, which have a 42 percent overall prevalence in Lebanon.[14] According to a study by Khan et al, 74% of thalassemic parents in the KPK province of Pakistan had consanguineous marriages.[15] A study by Ishaq et al showed that consanguineous marriages are associated with Thalassemia in 81.7% of the cases.[16]

Our study shows that Thalassemia is more prevalent in males than females. A study conducted t in district Dadu, Sindh, which showed the prevalence of Thalassemia as 54.76% in males.[17] Our current study showed the prevalence of Thalassemia as 56.7 % in males and 43.1% among females(Table 1). Several studies have reported that the male gender is more affected by Thalassemia than the female gender.[15, 17-18] Why males are at higher risk of getting Thalassemia needs to be investigated.

Our study showed that despite having a thalassemic child almost 30 % of the parents don't know that consanguineous marriage is associated with Thalassemia which is quite worrisome. Moreover, only about 1 % of the parents consulted their doctor for Thalassemia before marriage and after marriage during pregnancy for prenatal screening. This lack of awareness is a burning issue in our locality. Previous studies have shown that the main non-biomedical reason that causes families to experience severe social, economic, and psychological issues is a lack of knowledge and awareness regarding Thalassemia.[19] The amount of knowledge and education of the families affected by the disease determines awareness of and attitudes

toward screening procedures for the treatment of the disease.[20] Failure to recognize the inheritance patterns has a significant negative physical and social impact on the affected patients and their families in the form of Thalassemia.[21]

This lack of awareness dates back to ancient times, a sufficient degree of public education and awareness combined with a trained general society attitude regarding these thalassemia concerns has shown to be an effective countermeasure to the spread of Thalassemia.[22] Abu shosha et al concluded that to effectively manage and prevent Thalassemia, one must have a thorough understanding of beta thalassemia major.[23]

Surprisingly, in our study 71.1% of families have more than two children, and of those families, 87.8% suffer from thalassemia after the disease was diagnosed in their first kid. However, among families with thalassemia patients, there is still a significant risk of the presence of asymptomatic carriers and the transmission of the disease to new generations of susceptible children. It will take a significant amount of work to eradicate this genetic condition since the overall number of people suffering from thalassemia is dramatically on the rise in our population. In these kinds of situations, increasing knowledge and encouraging premarital testing may be a great assist in reducing the risk of thalassemia being passed down from parent to child. It was also a concerning finding of this investigation that just a few people, 27.7 percent, had an understanding of the relevance of prenatal screening in cases when the two guardians are carriers.

Lack of understanding about the causes and treatment of beta thalassemia major not only makes the condition worse but also negatively affects the social and psychological well-being of parents of sick children.[24,25]

Several nations, like Greece, Italy, Cyprus, and Iran had a considerably larger burden of thalassemia than Pakistan had, yet they were able to effectively remove it from their society. For a considerable amount of time, these nations have not reported any new cases of thalassemia major among their newborns. At the same time, these nations have created great healthcare services to effectively manage thalassemia patients who are already a part of their populations.[26-29] On the other hand prevalence of thalassemia in Pakistan is still increasing. One of the reasons for this increase is the lack of awareness regarding Thalassemia and consanguinity. Education regarding these issues is the need of the hour among thalassemic families in specific and in public in general. Moreover, our higher authorities should take strict and prompt measures for thalassemia awareness.

Conclusion

Most couples who had thalassemic children don't consult with a doctor nor do they go for genetic testing before marriage. Consanguinary marriage is common among parents having a thalassemic child. Further, the paternal relation is at high risk as compared to the maternal. Prevalence of thalassemia in Sindh region of Pakistan is alarmingly high. One of the reasons for this increase is the lack of awareness regarding Thalassemia and consanguinity. Education regarding these issues is the need of the hour among thalassemic families in specific and in public in general. Moreover, our higher authorities should take strict and prompt measures for thalassemia awareness.

Limitations

Our study has a few limitations. We recruited the families who were visiting the two thalassemia centers presently working in Hyderabad city only. All those families who were not visiting these centers or were not having any treatment or staying at their homes were not included in the study.

Conflict of Interest: The authors declare no conflict of interest.

Author contributions: AMM: Conception & design,acquisition of data, analysis & interpretation of data, Final approval of the version to be published; ZAL, JW,FI, NS & RKA: Drafting the article and revising it critically, Final approval of the version to be published. All authors agree to to be accounTable for all aspects of the work related to the precision or reliability of the article.

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