Original Article

Knowledge Practice Gap in Prenatal Diagnosis for β Thalassemia An overview from Pakistan.

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Objective: To determine the knowledge-practice gap in Prenatal Diagnosis (PND) for β Thalassemia in Pakistan.

Methodology: A cross sectional study among 750 parents of βThalassemia children attending thalassemia treatment centers was carried out over a period of one year.A self-designed questionnaire was used to collect the data.Logistic Regression was used to find the independent predictors for Practice of Pre-natal diagnosis in thalassemia.

Results: Knowledge about PND for thalassemia was found among 88.6% parents while its practice was seen in 31.5%. Non agreement by spouse (42.86%) and religious beliefs (40.0%) were the two main reasons for not doing PND in future pregnancy. Educated Mothers, parents who thought pregnancy affected by thalassemia should be terminated had sufficient knowledge about the test cost; and family members who thought that PND is a useful test were more likely to practice PND ($p < 0.05$).

Conclusion: Considering the difficult economic, cultural and literacy terrain of this country screening the high-risk families remains foremost. Despite having sufficient knowledge, practice still remains very low, thus calls for focused targeted interventions in order to improve the utilization of this service and to decrease the burden of thalassemia. (Rawal Med J 201;41:415-423)

Key Words: Thalassemia, prenatal diagnosis, knowledge practice gap, genetic counseling.

INTRODUCTION

About 5% of the world's population carries trait genes for hemoglobin disorders, mainly thalassemia and sickle-cell disease.[1] Inherited hemoglobin disorders are currently considered as one of the most important public health challenges especially in developing countries.[2] About 18,000 deaths occurred due to thalassemia in 2010.[3] It is more prevalent in Asia, the Mediterranean basin and the Middle East.[1] Thalassemia is a major health burden in Pakistan; approximately 5000-9000 children with β-thalassemia are born every year in Pakistan.[4] It has an estimated carrier rate of 5-7%.[5]

Thalassemia is a disease spectrum that not only affects the sufferer physically but also adversely impacts socially, spiritually and psychologically.[6] With only limited health practitioners with desired knowledge to deal with such patients, few blood banks and those too at their primitive stages, lack of screening knowledge and practices, people belonging to religious views that are against prenatal diagnosis and termination of the affected pregnancies, and low socioeconomic status of the patients, the disease has become more difficult to control in countries such as Pakistan.[7] The premature health facilities available in the country to cater thalassemia; and an estimated 5000-9000 children diagnosed with it every year, prevention of the disease is the only best option.The objective of this study was to determinethe knowledgepractice gap inPrenatal Diagnosis for β Thalassemia in Pakistan.

METHODOLOGY

A cross sectional study among parents of thalassemia children attending thalassemia treatment centers in the twin cities of Rawalpindi and Islamabad,Pakistan Thalassemia Welfare Society Rawalpindi, Military Hospital, Rawalpindi, Pakistan Institute of Medical Science (PIMS), Islamabad and Shifa International Hospital, Islamabad, Pakistan was conducted from February 2015 to February 2016. Participants were selected through purposive non-probability sampling. A self-designed questionnaire (see appendix) was used to collect the data, which was collected by a group of

three researchers from parents who had another child following the index child suffering from thalassemia major.Cronbach's alpha was used to assess the internal consistency of the questionnaire which was 0.77.McNemar's test was applied to assess for test-retest reliability (p>0.05). Sample size was calculated using WHO sample size calculator keeping percentage of people with sufficient knowledge at 50% [9], absolute precision required 3.7%, confidence interval at 95%, sample size of 702 was calculated.

Confidentiality of respondent identity and data was ensured. Informed consent was obtained from all the participants. Ethical approval was taken from the respective Thalassemia centers. After the forms had been filled, data was entered into SPSS version 21. Logistic Regression was to done to find independent predictors of Practice of Pre-natal diagnosis in thalassemia. P-value <0.05 was considered statistically significant.

RESULTS

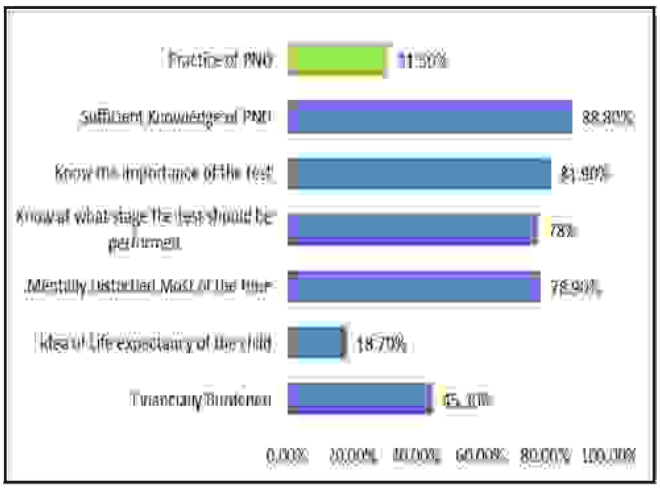
A total of 800 parents of thalassemic children were approached out of which 750 agreed to participate in the study. Out of 750, 504(67.2%) were mothers of the children and 246(32.8%) were fathers of the children.330(44.0%) were male children while 420(56.0%) were female children. Mean age was 79.3±47.3 months. Only 66 (8.8%) parents had one more childregistered with thalassaemiacenter andonly 226(30.1%) parents admitted to having a family history of thalassemia.

Table 1. Logistic Regression analysis of independent predictors of Practice of PND.

Variables		Practice of PND		Odd ratio (95% CI)	P
		Yes	No		
Father Education	No education	60	214	1.277 (0.817-2.878)	>0.05
	Educated	176	300		
Mother Education	No Education	76	290	1.868 (1.213- 2.878)	0.005
	Education	160	224		
Do you think your child will be able to lead a normal life?	Yes	200	458	2.870 (1.445-5.701)	0.003
	No	36	56		
Do you think your child will have a normal life expectancy?	Yes	48	92	2.463 (1.386-4.375)	0.002
	No	188	422		
Do you think pregnancy with thalassemia major should be terminated?	Yes	228	340	0.191 (0.077-0.475)	0.000
	No	8	174		
Do you know the Importance of PND?	Yes	232	382	0.224 (0.070-0.714)	>0.05
	No	4	132		
Is there any family history of thalassemia?	Yes	88	138	0.603 (0.392-0.927)	>0.05
	No	148	376		
Did you know the cost of PND?	Yes	224	294	0.142 (0.070-0.287)	0.000
	No	12	220		
What is the view point of your family about PND?	Useful	216	270	0.315 (0.166-0.595)	0.000
	Not useful	20	244		
Do you know about timing of the test?	Yes	236	348	0	>0.05
	No	0	166		

Majority of the parents(n-456;60.8%) interviewed had average monthly household income less than 100 dollar. Most of the parents (n=650;86.70%) had consanguineous marriage. Only 274 (36.5%) and 366(48.8%) fathers and mother had no education. Ten (1.3%) parents had two children who died due to thalassemia and its complications while 154(20.5%) parents had one child who had died due to thalassemia and its complication. Majority of the parents(n=702; 93.6%) had one child with thalassemia major while 42(5.6%) parents had 2 and 6 (0.8%) had 3 children respectively suffering from thalassemia major. 278(37.1%) parents were of the opinion that their child mental ability was less than as compared to other children while 456(60.8%) parents were of the opinion that their child mental ability was better or same as other children and, 16(2.1%) parents were unsure about it.

Fig. 1. Comparison of practice of PND for thalassemia with various factors related to its knowledge.



410(54.7%) parents had a significant financial burden due to treatment cost for thalassemia. Majority of the parents (n=592; 78.9%)) were mentally disturbed most of the time due to this disease while 158(21.5%) were sometimes disturbed by this disease. Only 140(18.7%) had an idea about life expectancy of their child. Majority of the parents(n=658;87.7%) thought that their child would be able to lead a normal life with average hemoglobin.

Majority of the parents(n=666; 88.6%) had sufficient knowledge about Prenatal Diagnosis of thalassemia. Most of them(n=380;50.7%) got to know about PND from thalassemia Center.584(77.9%) had sufficient knowledge about thetime periodat which the test of PND should be done while 614(81.9%) had sufficient knowledge about the significance of this test and 518(69.1%) were familiar with the cost of the test.

Out of 750, only 236 parents (31.5%) requested for PND. Only 40(5.3%) had complication following PND. Out of the 236 who request PND only 92 had a positive PND and all of these parents requested for pregnancy termination. 126(16.8%) did not request for PND due to the test being expensive, while 100 (13.3%) parents had no idea about PND.

Majority of the parents(n=596;79.5%) agreed to do PND for future pregnancy. Non agreement by spouse(n=30; 42.86%) and Religious beliefs (n=28; 40.0%) were the two main reasons for not doing PND in future pregnancy in 70 parents who planned to have future pregnancy.Majority (n=568;75.7%) agreed to the fact that pregnancy with thalassemia should be terminated. 682(90.9%) agreed to the fact that PND should be done in every carrier. Only 160(21.3%) were of the opinion that PND is not useful. Most of the parents (n=558;74.4%) were of the opinion that PND was religiously acceptable.728(97.1%) were of the opinion that premarital counseling for carriers should be done.

Knowledge Practice gap is presented in Figure 1. Logistic Regression was to done to find independent predictors of Practice of Pre-natal diagnosis in thalassemia as presented in Table 1. P-valuewas found to be statistically significant<0.05 for almost all predictors.

DISCUSSION

The foremost step in the prevention of the disease should be formation of National Directory for thalassemia patients so the exact number of the affectees and carriers can be known and facilities required to deal with the problem can be adequately managed. In our study,only 236 parents (31.5%) requested for PND. This is even lesser than the previously observed 50%.[8] The use of PND should increase as the awareness about it increases.[9]In our study, sufficient knowledge of PND was found to be in 88.80% while practice of PND was found to be in 31.50%.

Previous studies on the subject showed that increase in disease awareness and knowledge regarding possible harms that can escalate interests of couples in taking all possible and available preventive measures greatly.[10] Hence, to cash on knowledge, schools can be used as an important weapon in the disease controlling and prevention process.A from Malaysia found that female, married, middle-age, high education, professional and managerial occupation respondents were more likely to have heard about thalassemia.[11] In our study, 37.1% parents were of the opinion that their child mental ability was less as compared to normal children. A Malaysian study had similar result (36.2%)[13]and practice of PND was found to be more common among parents who thought that children, who had thalassemia won't lead a normal life ($p<0.05$).

Lack of awareness was found to the most common cause (23%) of underutilization of PND in a study from Pakistan.[13]In our study, 13.3% did not ask for PND due to lack of awareness. Over a course of 7 years, there has been significant improvement in awareness of PND.Education about congenital diseases and their prevention should be made part of school courses so that the hurdle of lack of knowledge among people can be overcome. Using media houses and arranging health talks in rural areas to promote mass education on the subject would also benefit in reducing the gaps in knowledge among people. Community based education programs have been found to be a more effective way in disseminating knowledge about thalassemia[12] and have been found to immensely reduce its health impact.[14] Imparting knowledge in children regarding the disease severity and emphasized on how it can easily be prevented from an early age, immense reduction in the number of affectees can be expected.[10,15]

As the amount of awareness would increase and carriers identified, half of the disease control would be achieved as more and more carriers would come out to health professionals seeking for help and further guidance. The current era is considered a power house for all forms of media. With the facility of radio and television present essentially all over the country, the authorities and make good use of them to spread information and awareness among masses who cannot be reached via schools.[10]Lack of thalassemia related knowledge has been highlighted many a times and with covering of the media and the schools a wide gap should be expected to be fulfilled. In our study, practice of PND was found to be more common in educated parents as compared to uneducated parents, as reported from Iran.[10]

The value of extended family screening of the index case cannot be stressed enough. It is now known that carrier rates in the family of index child are as high as 31% as compared to families with no history of thalassemia.Hence, once the directories are formed and cases are registered, their entire family can be brought under use of extensive screening and diagnostic techniques.[16]A study from Pakistan found that 97% of the couples who requested for PND had a family history of thalassemia.[19] In our study, 38.9% of parents who had family history of thalassemia requested for PND as compared to 28.2% of parents who had no family history of thalassemia. Along with that view point of the family about PND played an integral role in practice of PND ($p<0.05$).

Another important step in the disease control process that can be implemented by law is making it compulsory for couples seeking marriage to undergo simple blood testing for MCV and MCH as a primitive premarital screening.[16]High risk couples can then be tested further for carrier-state and if both turn out to be positive, premarital counseling can be provided to them regarding the outcomes. Pre-martial screening in Iran has significantly decreased the birth prevalence of thalassemia.[18]Considering the strong religious, cultural and racial beliefs of people inclining towards consanguineous marriages,[10,14]instead of making attempts to stop inter-family marriages and creating a false image of mingling with people's beliefs, which can hamper prevention programs from reaching the masses; the decision of consanguineous marriage should still be rested entirely upon the couple and their families, even if both turn out to be traits. However, if they opt for marriage, prenatal testing for the disease in future pregnancies should mandatory for the couple.

A study from Sri Lanka introduced the concept of "thalassemia risk-free marriages which advocates promotion of marriage where at least one partner

was a non-carrier.[19] A study from Lebanon also concluded that mandatory premarital screening can play a pivotal role in preventing thalassemia.[20] In our study, 97.1% parents suggested for premarital screening.

Another major barrier faced in the process of control of disease is the views of religious scholars against prenatal diagnosis and early terminations of pregnancies.[21] Religious believes were one of the major causes of not doing PND in our study. One thing health professionals need to understand is that religious views on the subject cannot be ignored or bypassed, if disease control is intended. Religion is an integral part of people's life and ignoring this part of the picture can easily wipe out the effects of all efforts previously talked about. The only way to cater the issue is getting religious scholars on board in the fight for thalassemia prevention.

According to a study, religious involvement is associated with better outcomes in terms of physical and mental health.[22] Having 90% of population in Pakistan as Muslims; it is important to know that Islam allows abortion before 120 days i.e. 4 months of conception.Hence, if prenatal diagnosis of the disease is made within these 120 days, the couple under all religious terms can be advised to undergo abortion of the fetus that's confirmed to carry the disease in its most severe form, if it is born. Having this crucial time limit of 120 days, it is really important that the government ensures that couples from all places are provided all required facilities for early prenatal diagnosis. Another study concluded that although participants generally considered religion and faith as an important factor in decision-making process; perceived severity of the condition can play an important role in decision making.[23]

The use of PND in high risk couples marks as the cornerstone of thalassemia prevention.[24] For better utilization of PND, genetic counseling services should be available to the general public.[25] Efforts should also be made by the government to create specialized clinics providing genetic and premarital counseling to couples seeking marriage and conceptions respectively. Since blood transfusion is an important aspect of the disease,blood banks should also be improved to provide adequate screening against all blood borne diseases. Hence, it is the health ministry to ensure that the affected patients and carriers are provided with proper screening as well and PND facilities free of cost so that those couples who avoid the process solely due to lack of funds are enveloped in the process.

CONCLUSION

Considering the difficult economic, cultural and literacy terrain of this country, screening the high-risk families remains foremost. Despite having sufficient knowledge, practice still remains very low, thus calls for focused targeted interventions in order to improve the utilization of this service and to decrease the burden of thalassemia.

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Appendix

Questionnaire:

1. Name of the parent (optional): …….

2. Sex of the parent: 1 = Male (Father) 2 = Female (Mother)

3. Name of the child bearing the above registration number (optional): ……...

4. Sex of the child: 1 = Male 2 = Female

5. Age: ……Yrs…….Months

6. At what age was your child diagnosed? ……years …….months

7. How would you compare the mental status of this child with other children of his/ her age group?
   1 = Same as others 2 = Better than others
   3 = Less than others 4 = Not sure

8. Any other child / children registered with thalassemia centre: 1= Yes 2 = No

   If yes, specify how many? .....

9. If yes, give registration number (s)…….

10. Do you have a family history of thalassemia?
    1 = Yes 2 = No

11. Religion: 1 = Islam 2 = Christianity 3 = Hinduism 4 = Others

12. Current place of residence: …….

13. Ethnic Group: 1= Punjabi 2 = Sindhi 3 = Baluchi 4 = Pathan
    5 = Mohajir 6 = Kashmiri 7 = Northern areas

14. Average monthly household income:
    1 = <Rs. 5,000 2 = Rs.≥ 5,000 – ≤ 10,000 3 = Rs. > 10,000 < 20, 000
    4 = ≥ Rs. 20,000

15. Consanguineous marriage: 0 = Not related 1 = 1st cousin 2 = 2nd cousin
    3 = 1 ½ cousin

16. Father's education: 0 = Illiterate 1 = Literate 2 = Primary
    3= Matriculation 4 = Above

17. Mother's education: 0 = Illiterate 1 =Literate 2= Primary
    3 = Matriculation 4 = Above

18. Total no of live children in the family: 1 = 1-3 2 = 4-6 3 = > 6

19. No of children deceased due to thalassemia:
    0= None 1= One 2 = Two 3 = Three 4 = Four 5 = More than four

20. No of children living with thalassemia major:
    1 = One 2 = Two 3 = Three 4 = More than three

21. Order of the registered child among the siblings……..

22. To what extent, does thalassemia causes a financial burden to your family?
    0 = Not at all 1= Minor 2 = Significant

23. How often do you feel mentally disturbed by this condition of your child?
    0 = Rarely 1 = Sometimes 2 = All the time

24. Do you have any idea, if thalassemia affects the life expectancy of your child?
    1 = Yes 2 = No

25. Do you think this child will be able to lead a normal life, if his hemoglobin level is adequately maintained?
    1 = Yes 2 = No

26. Do you know prenatal diagnosis is available in Pakistan?
1= Yes 2 = No

27. Who told you about the prenatal diagnosis?
1 = GP 2 = Gynecologist 3 = Pediatrician 4 = Relative / friend
5 =Thalassemia centre 6 = Advertisement 7 = Others 8 = Don't know

28. Do you know at what stage of the pregnancy this test should be done?
1 = Yes 2 = No

29. Are you aware of the importance / advantages of this test?
1 = Yes 2 = No

30. Are you familiar with the cost of this test?
1 = Yes 2 = No

31. Did you have a pregnancy in your family following the birth of this child?
1 = Yes 2 = No

32. Did you request prenatal diagnosis in your pregnancy following this child?
1 = Yes 2 = No

33. If yes, any complication following the test?
1 = Yes 2 = No

34. What was the result of the test?
1 = Positive 2 = Negative 3 = Inconclusive

35. In case of positive result for thalassemia major, did you opt for termination of pregnancy? 1 = Yes 2 = No
3 = Not applicable

36. If not, give reason? 1 = Delay in seeking test 2 = Religious beliefs
3 = Family / Cultural issues 4 = Other reasons
5 = Not Applicable

37. If not requested for prenatal diagnosis in successive pregnancy, give reason?
1 = Did not know about the test
2 = No access to the facility
3 = Test was expensive
4 = Advised against the test (spouse / friend / religious views)
5 = Delay in seeking the test
6 = Other reasons
7 = Not Applicable

38. Would you request prenatal diagnosis in your future pregnancies?
1 = Yes 2 = No

39. If not why?
1 = Expensive 2 = Fear of complications 3 = Not agreed to by spouse
4 = Previous experience of complications 5 = Religious beliefs
6 = Other reasons 7 = Not Applicable

40. Do you agree with termination of pregnancy for thalassemia major?
1 = Yes 2 = No

41. Do you suggest this test should be done in every pregnancy of a carrier couple?
1 = Yes 2 = No

42. What are the views about the usefulness of pre- natal diagnostic tests?
a) Parent's views: 0 = Not useful 1 = Useful
2= Very useful 3 = Don't know
b) Family's views: 0 = Not useful 1 = Useful
2 = Very useful 3 = Don't know

43. As per religious views, do you think it is correct to carry out this test?
1 = Correct 2 = Incorrect

44. Do you suggest pre-marital counseling should be done for carriers of thalassemia? 1 = Yes 2 = No