

## Research Article

# Frequency of $\beta$ -Thalassemia Trait among Pregnant Women Presenting at Pakistan Institute of Medical Sciences

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**Abstract: Introduction:** Thalassemia is a common inherited disorder in Pakistan with around 5000 new cases diagnosed every year. Despite various preventive measures taken at the national level, the disease burden is still not declining. In this study the incidence of  $\beta$  Thalassemia trait among pregnant females presenting to a tertiary care hospital is measured.

**Methods:** This study was conducted at Pakistan Institute of Medical sciences. 102 Pregnant females who were referred to us for hemoglobin electrophoresis from July 2017-June 2018 were included. Complete blood count, peripheral film, reticulocyte count and hemoglobin electrophoresis was performed for each patient.

**Results:** The mean age was 25 years and the mean period of gestation was 30.30 weeks. Out of 102 patients, 5 (4.9%) were diagnosed as  $\beta$  Thalassemia trait. Of these, 2 (40%) did not have a positive family history of Thalassemia. We compared the results of our study with those done at different regions of Pakistan and found variable incidence of carrier state in different regions of the country.

**Conclusion:** Antenatal screening is a forward step towards minimizing incidence of Thalassemia in Pakistan however clinicians should be directed to refer these patients in early pregnancy.

**Keywords:**  $\beta$ -Thalassemia, Thalassemia trait, Antenatal screening, Anemia, Iron deficiency, Thalassemia prevention.

## INTRODUCTION

$\beta$  Thalassemia is an inherited genetic disorder resulting in defective hemoglobin synthesis. The heterozygous state is called Thalassemia trait while the homozygous state is called Thalassemia major. Individuals suffering from later require lifelong blood transfusions. They eventually go into iron overload causing multi organ damage. This increases the morbidity and mortality rate of these patients.

Thalassemia is prevalent worldwide. It is estimated that around 3% of the whole world population carries the mutation for Thalassemia. Each year 60,000 babies are born with Thalassemia of which 80% burden is mainly on the Asian countries [1]. In Pakistan, 5000 cases are diagnosed with Thalassemia every year. The carrier rate in our country is 5-8% [2, 3].

The antenatal screening of Thalassemia has effectively reduced the incidence of Thalassemia in Taiwan. After seven years, the incidence of Thalassemia decreased from 20 cases per year to 3. Similar program was run in Guangdong province of China for 11 years. In many other countries of the world, such as Cyprus, Greece, Italy, Bahrain, India, Iran, Saudi Arabia, United Arab Emirates, Malaysia, Indonesia, Maldives, Singapore, Thailand and United Kingdom prenatal Thalassemia diagnosis is being practiced [4].

In Pakistan, Punjab Thalassemia Prevention Program (PTPP)

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has also taken several steps to minimize the incidence of the disease. Among these, antenatal screening of pregnant females has been initiated. We therefore analyzed the data of all pregnant females who presented to our tertiary care hospital.

## MATERIALS AND METHODS

A cross sectional study was conducted at Pathology department of Pakistan Institute of Medical Sciences (PIMS) from July 2017 till June 2018. All pregnant women who were referred to us for hemoglobin electrophoresis were included in the study. Complete history was taken from the patients regarding their symptoms, comorbidities, parity, and consanguinity of marriage, previous history of Thalassemia in family and current use of medications. Patients who had recent history of transfusion were deferred.

Complete blood count, reticulocyte count and peripheral smear were also prepared in addition to hemoglobin electrophoresis.

## RESULTS

A total of 102 pregnant women were included in the study. The average age was 25 years (18-39 years). The average period of gestation at which they presented to us was 30.30 weeks (10-40 weeks). All patients had symptomatic pallor and anemia (Table 1). Two patients had a history of pregnancy induced hypertension (PIH), two had previous miscarriages and one patient had a twin pregnancy. 65 (63.7%) patients were primary gravida while the remaining 37

(36.4%) were multiparous. Only 8 (7.8 %) patients gave a positive family history of  $\beta$  Thalassemia in first and second degree relatives. 35 (34.3%) patients were product of consanguineous marriage. The results are tabulated in Table 2.

Out of 102 patients, 5 (4.9%) were diagnosed as  $\beta$  Thalassemia trait, 38 (37.2%) had normal electrophoresis but peripheral film and reticulocyte count were suggestive of severe iron deficiency. These included microcytic

hypochromic picture with pencil cells and target cells. The remaining 59 (57.8%) were normal results (Table 3). Only 21 (20.5%) patients were taking antenatal supplements which included iron complex, folic acid, calcium and multivitamin complex.

Among the 5 patients who were diagnosed as  $\beta$  Thalassemia trait, only 3 (60%) had a positive family history of Thalassemia as shown in Table 4.

**Table 1.** Shows Complete Blood Picture Findings.

Parameters		Mean $\pm$ SD	Range (min-max)
1	Age (Years)	25 $\pm$ 4.4	18-39
2	Period of Gestation (weeks)	30.30 $\pm$ 6.05	10-39
3	Total Leucocyte Count ( $\times 10^3/\mu\text{L}$ )	9.63 $\pm$ 2.15	4.6-18.6
4	Erythrocyte Count ( $\times 10^6/\mu\text{L}$ )	3.96 $\pm$ 0.57	2.62-5.53
5	Hemoglobin (g/dL)	8.98 $\pm$ 1.5	4.0-12.6
6	Hematocrit (%)	37 $\pm$ 4.8	23-49
7	Mean Corpuscular Volume (fL)	75.2 $\pm$ 9.7	49.5-109
8	Mean Corpuscular Hemoglobin (pg)	23 $\pm$ 4.06	13.4-34
9	Mean Corpuscular Hemoglobin Concentration (g/dL)	30.08 $\pm$ 2.3	20.8-35
10	Platelet Count ( $\times 10^3/\mu\text{L}$ )	297 $\pm$ 80	150-560
11	DLC: 1. Neutrophil (%)	70.92 $\pm$ 8.9	38-86
	2. Lymphocyte (%)	23.1 $\pm$ 7.8	11-54
	3. Monocyte (%)	4.08 $\pm$ 3	0-18
	4. Eosinophil (%)	2.1 $\pm$ 2	0-16
12	Reticulocyte Count (%)	2.64 $\pm$ 1.4	0.3-7.4

**Table 2.** Shows Details of the Clinical History and Result of Hemoglobin Electrophoresis.

Parameters		No (%)
1	Age	< 20 years 20-30 years 31-40 years 6.7% 82.3 % 11.0%
2	Period Of Gestation	< 20 weeks 20-30 weeks > 31 weeks 4.9% 50.9% 44.2%
3	Parity	Primary Gravida Multiparous 65 (63.7) 37 (36.4)
4	Family History of Thalassemia	Positive Negative 8 (7.8) 94 ( 92.2)
5	Consanguinity	Positive Negative 35 (37.2) 67 (62.8)
6	Antenatal Supplements	Yes No 21 (20.5) 81 (79.5)

**Table 3.** Hemoglobin Electrophoresis Pattern.

<b>Electrophoresis Pattern</b>	Normal	107 (95.1)
	Trait	5 (4.9)

**Table 4.** The Details of 5 Thalassemia Trait Patients is Given Below.

Patient no.	Age (year)	Period of Gestation (weeks)	Parity	Comorbids	Family History of Thalassemia
1	23	21	Multigravida	Hypertension	Positive
2	20	39	Primary gravida	Nil	Negative
3	23	34	Primary gravida	Nil	Positive
4	23	31	Multigravida	Nil	Negative
5	25	14	Multigravida	Nil	Positive

## DISCUSSION

Our study showed that the incidence of  $\beta$ -Thalassemia trait was 4.9%. Although this is a small number when compared to the frequencies mentioned in other ante natal screening studies. The alarming sign in our study was that out of these 5 patients, 2 of them did not have a positive family history of Thalassemia. They had the carrier genes in the family but none of the family members were aware or had their Hemoglobin electrophoresis been done.

The results of our study were similar to those observed by Khan, *et al.* who reported presence of  $\beta$  Thalassemia trait in 3.2% of the cases (n=56). However hemoglobin electrophoresis was performed in only 7 cases that had

erythrocyte count i.e  $> 4600000/\text{cmm}^3$  [5]. Similarly Nisa, *et al.* found 8.7% (n = 200) of the patients to be carrier out of which 59% had first cousin marriage and 24% had a positive family history for thalassemia [6]. A slightly higher frequency was stated by Lone, *et al.* who found 18.41% (n = 315) pregnant women to be positive for Thalassemia trait [7].

Qadir and Amir evaluated 194 pregnant women who presented to the gynecology and obstetrics Unit of Khyber teaching hospital, Peshawar. 56.7% of the patients were diagnosed  $\beta$  Thalassemia trait. This number is quite high compared to our study [8].

Hafiz M, *et al.* conducted a study in Lahore and also found 53.1% of the patients to be  $\beta$ -Thalassemia trait [9].

**Table 5.** A Comparison of Our and Other Local Studies is Given Below.

Study (Year)	Place of Study	Population	Sample Size	Thalassemia Trait (%)	Family History (%)	Consanguinity of Marriage (%)
Our Study (2018)	PIMS, Islamabad	Pregnant females	102	4.9	7.8	34.3
Khan <i>et al.</i> (2017)	PGMI, Peshawar	Pregnant females	56	3.5	-	-
Qadir and Amir (2017)	KTH, Peshawar	Pregnant females	194	56.7	-	-
Lone <i>et al.</i> (2017)	UHS, Lahore	Females of reproductive age	315	18.41	-	-
Nisa, <i>et al.</i> (2011)	Liaqat University hospital, Hyderabad	Pregnant females	200	8.5	24	59

Table 5 shows the tabulated form of comparison between studies done in our local population. The differences in the results of our and other local population studies could be explained with the consanguinity of marriages and knowledge of Thalassemia. It is also quite possible that Thalassemia carrier state is more prevalent in those areas of Pakistan.

Other studies done in other Asian region countries also found a higher incidence of  $\beta$  Thalassemia trait. According to Sinha, *et al.* 50% (n = 120) of the patients were  $\beta$  Thalassemia trait in an Indian province [10]. Similarly, Mohanty D, *et al.* found 55.9% of the pregnant females to be carriers of the disease [11].

Baxi, *et al.* found only 2.78% of pregnant women ( $n = 1006$ ) to be the carrier in Indore, India [12]. Wanapirak, *et al.* found 25.4% of the pregnant females to be the carriers of Thalassemia [13]. Similarly, Sarda H, *et al.* found 51.6% of the anemic pregnant females to be the carrier [14]. The variable values is suggestive of uneven distribution of the carrier state in different regions of the country.

It is also recommended that antenatal screening should be done before 11 weeks of gestation and screening of the partner should be completed by 12 weeks of pregnancy [15]. However, in our study the mean period of gestation at which the females were referred was 30.30 weeks. A report by Haq, *et al.* stated that 92% of the parents with cousin marriage had no knowledge of Thalassemia before their Thalassemic child [16]. Therefore, if antenatal screening of the couple is done in early pregnancy, they can be counseled about the termination of pregnancy if Chorionic villous sampling showing Thalassemia Major fetus.

## CONCLUSION

Antenatal Thalassemia screening is an effective step towards reducing the incidence of Thalassemia in our population. Considering the low literacy rate of our population, it is essential to include such screening programs in the legislation. The financial burden imposed on families of Thalassemia sufferers is far greater than early detection of the carrier state. Moreover, it is essential that clinicians know the ideal time for the screening of Thalassemia so that further management regarding termination of pregnancy, if required can be done.

## CONFLICT OF INTEREST

Declared none.

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