



Research Journal of Pharmaceutical, Biological and Chemical Sciences

Clinical and Demographical Studies of Beta (β) – Thalassemia in Tamilnadu

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ABSTRACT

The clinical examination of 122 β -thalassemia children has shown that in majority of the cases the manifestation of the genetic disorder occurred within 6 months of age. Symptoms like severe anaemia, pallor, hepatosplenomegaly, bouts of fever, stunted growth, jaundice were observed in β -thalassemia major and in β -thalassemia intermedia. In β -thalassemia trait symptoms were not overt. The demographical profile has shown that the frequency of β -thalassemia children born to consanguineous parents was higher than children born to non-consanguineous parents. Even among consanguineous families, the marriage between first cousins has shown a higher percentage.

Keywords: Demography, Clinical manifestation, β -thalassemia, Tamil Nadu.

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INTRODUCTION

Thalassemia is present almost in every community. However, it is found to be more prevalent in Mediterranean countries, Middle East, Gulf regions, Northern parts of Africa, Central Asian Countries, and Indian subcontinent. Certain types of thalassemia are most common in particular parts of the world. The most common type of β -thalassemia is prevalent in the tropical and sub-tropical regions (Weatherall and Clegg, 1996).

About 4.5% of world population carries the defective globin gene for thalassemia. In the world about 250 million people are carriers for β -thalassemia and nearly 100,000 lethally affected homozygotes are born annually in the world. In India alone 30 million people carry the defective gene and nearly 10,000 lethally affected homozygotes are born annually comprising 10.0% of the children born in the world annually. The carrier frequency varies from 3.0 to 20.0% in India (Pirastu et al., 1990). The greater frequency of carriers for thalassemia has been reported in Northern, Western and Eastern parts of India. The highest frequency of β -thalassemia trait is reported in Gujarat (10.0 to 15.0%) followed by Calcutta (10.2%), Punjab (6.5%), Delhi (5.5%), Tamil Nadu (4.0%), Bengal (3.5%), Mumbai (2.6%), Maharashtra (1.9%) and Kerala (0.6%) (Verma , 2000). India with a diverse racial origin, numerous tribal pockets and high inbred frequency in certain communities represent an extremely heterogenous population. Population screening has revealed that certain communities in India have the risk of thalassemia and the prevalence of carrier status in some being as high as 17% (Vaz et al., 2000). Based on the population distribution, the higher frequency of β -thalassemia is seen in the people of Bhanishali (15.0%), Lohana (13.6%), Sindh (8.0%), Assam (5.0%), Sarasweli North West (4.4%), Sarasweli West (3.5%), Bangalen (3.7%) and Ahom (1.0%) (Kiss et al., 2000). In the case of genetic diseases, treatments are expensive, time consuming and it may not be possible to cure the defect permanently. Thus the prevention of β -thalassemia is an important health issue as more and more number of children are born every year in India with β -thalassemia and they need treatment, which is expensive (Choudhry et al., 1998). Prevention can be done by public awareness, carrier screening, genetic counselling, prenatal diagnosis and selective termination of affected foetuses. Though there is a definite need for carrier screening in the population, it is hard to draw a consensus regarding time of screening, due to lack of education and public awareness about the disease. The prevention of β -thalassemia major, which has a high incidence in certain populations, is possible by antenatal diagnosis and termination of affected pregnancies. This study provides a clinical and demographic profile of β -thalassemia in Tamilnadu.

MATERIALS AND METHODS

Information regarding the fertility and mortality variables was collected from the family members of the patients during their visit to the hospital. Details such as the outcome of each pregnancy, abortion, still births, post-natal deaths and juvenile deaths and sex of all children born, dead or alive were collected from the patients' parents. Information about the marriage type (consanguineous or non- consanguineous) was also recorded. In consanguineous cases, the relationship was traced by further probing. Occurrence of twinning, congenital malformation and other observations if any, were recorded. These

studies were done from the patients of the Institute of child Health and Children Hospital, Egmore, Chennai – 600 008, Tamilnadu.

RESULTS

In this study 122 β -thalassemia children from 104 families have been screened for clinical examination and demographical profile. The onset of clinical symptoms among the β -thalassemia children varied widely from age group of 0 to 36 months (Table 1). Of the total 122 patients, 74 (60.66%) were diagnosed for β -thalassemia within 6 months, 28 (22.95%) between 6 to 12 months, 9 (7.38%) between 12 to 18 months, 5 (4.10%) between 18 to 24 months. In the remaining 6 patients 3 (2.46%) were diagnosed between 24 and 30 months and 3 (2.46%) between 30 and 36 months (Table 1). Initially the β -thalassemia major children showed symptoms of anaemia, pallor, loss of appetite, bouts of fever, difficulty to breath, jaundice followed by abdominal distension. The most prominent clinical features observed among the β -thalassemia children include growth retardation, haemolytic facies with an enlargement of frontal, parietal and maxillary bones, bossing of skull, depressed bridge of nose, hepatosplenomegaly, cardiomegaly and notched ribs. Hepatosplenomegaly was observed in transfused, irregularly transfused and untransfused cases. But, the severity was less in those who undergoes regular blood transfusion with iron chelating agent. In β -thalassemia intermedia children the clinical symptoms such as pallor, weakness, splenomegaly, growth retardation, jaundice and significant facial changes were observed. Out of 122 patients, one patient was found to have $S\beta$ -thalassemia diagnosed at 14 months with symptoms of anaemia, fever, pallor and mild splenomegaly. The total number of children born to the 104 families was 243; out of which 130 (53.50%) were males and 113 (46.50%) were females and 122 (50.21%) were affected with β -thalassemia and 27 (11.1%) were dead. Of the total affected children, 74 (60.66%) were males, while 48 (39.34%) were females. Among the β -thalassemia families, in 13 families two siblings were affected and similarly in one family, first cousin was affected. The β -thalassemia children born to consanguineous parents were 84 (68.58%) and remaining 38 (31.15%) were born to non- consanguineous parents. In the consanguineous marriages 21 (25.00%) were born to uncle niece parents, 45 (53.57%) were born to I cousins, 12 (14.29%) were born to II cousins and 6 (7.14%) were born to III cousins (Table 2).

Table 1: Percent Incidence Of B-Thalassemia In Different Age Groups

| Sl. No. | Age Groups (In months) | Number of Cases | Percentage |
|---------|------------------------|-----------------|------------|
| 1 | 0-6 | 74 | 60.66 |
| 2 | 6-12 | 28 | 22.95 |
| 3 | 12-18 | 9 | 7.38 |
| 4 | 18-24 | 5 | 4.10 |
| 5 | 24-30 | 3 | 2.46 |
| 6 | 30-36 | 3 | 2.46 |

Table 2: Percent Incidence Of Degrees Of Consanguinity Among B-Thalassemia Children

| Marriage Type | Number of Cases | Percentage |
|---------------------|-----------------|------------|
| Consanguinity | 84 | 68.85 |
| Uncle Niece | 21 | 25.00 |
| I Cousin | 45 | 53.57 |
| II Cousin | 12 | 14.29 |
| III Cousin | 6 | 7.14 |
| Non - Consanguinity | 38 | 31.15 |

DISCUSSION

The results of the incidence of β -thalassemia in relation to age groups have shown that clinical symptoms manifest at different ages and correspond with the reports of Weatherall and Clegg (1981). Even though, the symptoms manifested at varying age groups, the highest percentage of incidence (60.66%) falls within 0-6 months (Table 1). The incidence of β -thalassemia was higher in 0-6 months of age (Modell and Berdoukas 1981). Similarly Agarwal (2001) reported a higher percentage of β -thalassemia (60.66%) within 6 months of age. It is expected that the failure of switch over, from γ - chain to β - chain at the 3rd month results in the expression of clinical symptoms attributed to β -thalassemia. In this study, children with severe β -thalassemia intermedia are detected within 17 months of age, except in one case. Phadke and Agarwal (2003) in their study also indicated the same period for the expression of β -thalassemia intermedia among children. Symptoms of anaemia, pallor, bouts of fever, enlargement of frontal, parietal and maxillary bones, hepatosplenomegaly associated with jaundice and notched ribs are observed for β -thalassemia major and intermedia. Similar clinical features for β -thalassemia major were observed by Weatherall and Clegg (1981) and for β -thalassemia intermedia by Weatherall and Clegg (2001), and Dedye et al., (2003). The wide range of clinical conditions observed in the present investigation has been in agreement with Weatherall and Clegg (1981) who reported that an extremely wide range of clinical symptoms resulted due to interaction of many different molecular forms of the β -thalassemia and structural haemoglobin variants. Earlier Kumar et al., (1967) and RadhaRamaDevi et al., (1982) concluded that consanguineous marriages are strongly favoured in the Dravidian population, while Rao and Inbaraj, (1977) and Rao, (1983) reported that in South India the level of consanguinity will vary considerably from 4.5 to 6.1% depending upon the factors such as religion, caste and socio-economic status. The β -thalassemia children born to consanguineous parents (68.85%) was higher than non- consanguineous parents, clearly indicates that consanguinity, which is prevalent from time immemorial in Tamil Nadu, has a greater role to play in the expression of various forms of β -thalassemia. The autosomal recessive traits will be more common in the progeny of consanguineous parents since they have a greater chance of inheriting identical copies of a mutant gene or genes from common ancestors (Radha Rama Devi et al., 1982). Ponnazhagan (1988) and Vedhaprakash (1997) in their earlier studies indicated the significant role of consanguineous marriages in the expression of β -thalassemia in Tamil Nadu. Of the β -thalassemia children born to consanguineous parents, 53.57% were born to the first cousins, which is higher when compared with other degrees of consanguinity. Al-Riyami and Ebrahim (2003) stated that 34.28 percent among the genetically affected children were born to first cousins. In Western Maharashtra the role of consanguinity in the incidence of β -thalassemia has been reported by Ambeker et al.,

(2000). Similarly, in Pakistan consanguinity played a significant role on the incidence of β -thalassemia with a frequency of 61.0% (Khateeb et al., 2000).

ACKNOWLEDGEMENT

The authors are thankful to the Department of Health and Family Welfare, State Government of Tamil Nadu and the Director, Institute of Child Health and Hospital, Chennai-8 for granting permission to collect required data and materials for the study.

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