

## FREQUENCY OF BETA THALASSEMIA TRAIT AND CARRIER IN GORGAN, IRAN

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### ABSTRACT

**Objectives:** To determine the frequency of beta-Thalassemia trait and carrier in Gorgan, Iran.

**Methodology:** In this analytic cross sectional study conducted from March 20, 2003 until March 20, 2004, two thousands six hundred prospective grooms and brides referred to the health center of Gorgan city were studied. Globular criteria included mean corpuscular hemoglobin (MCH) and mean corpuscular volume (MCV) were determined. Hemoglobin A<sub>2</sub> (Hb A<sub>2</sub>) was measured by column chromatography method.

**Results:** The range of MCH was 13.8-35.5 pg. %15.9 of men and %27.6 of women had MCV<80fl. The frequency of beta-thalassemia trait was 9.8%. The range of HbA<sub>2</sub> was 1.2-12% with the mean 3.06±1.5%. The frequency of beta-Thalassemia carrier (minor) was 21.4 %.

**Conclusion:** This high frequency of beta-Thalassemia trait and carrier in Gorgan constitutes a real health problem and it necessitates more diligent effort in health care specially education and counseling. Further studies should examine the value of counseling and the prevalence of beta-Thalassemia in the children of those married.

**KEY WORDS:** Beta-Thalassemia trait, Beta-Thalassemia carrier, Frequency.

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## INTRODUCTION

The thalassemias are a heterogeneous group of inherited anemias caused by mutations affecting the synthesis of hemoglobin. Mild forms of thalassemia are the most frequent genetic disorders in humans, where as less frequent, yet sever forms of them lead to significant morbidity and mortality world wide.<sup>1</sup>

The word 'Thalassemia' owes its name to an attempt, mistaken as it turned out later, to relate the disease to Mediterranean populations; Thalassa is Greek for 'sea'. It is now apparent that the Thalassemias are the commonest monogenic disease and they are widespread among races ranging from Mediterranean region, through the Middle East and Indian sub-continent, to South-east Asia.<sup>2</sup>

Table-I: The mean values in men and women

Variables	Men (n=2100) Mean $\pm$ s.d.	Women (n=500) Mean $\pm$ s.d.	All cases(n=2600) Mean $\pm$ s.d.	P value*
Age (years)	25.7 $\pm$ 7.2	20.8 $\pm$ 5.4	24.4 $\pm$ 7.2	<0.001
Hb (gr/100ml)	15 $\pm$ 1.3	12.9 $\pm$ 1.4	14.6 $\pm$ 1.6	<0.001
RBC(10 <sup>6</sup> cell/ml)	5.59 $\pm$ 0.6	4.92 $\pm$ 0.6	5.4 $\pm$ 0.7	<0.001
MCV (fl)	83.5 $\pm$ 6.9	81.9 $\pm$ 7	83.6 $\pm$ 6.9	<0.001
MCH (pg)	27.2 $\pm$ 3	26.4 $\pm$ 3.2	27 $\pm$ 3.1	<0.001

Abbreviations: Hb, Hemoglobin; RBC, Red Blood Cell; MCV, Mean Corpuscular Volume; MCH, Mean Corpuscular Hemoglobin. \*: With student's t-test

The finding reveals that the prevalence of beta-thalassemia trait in Southeast Asia is compatible with world's population but 5-10% of the Southeast Asia's populations carry genes for alpha-Thalassemia.<sup>3-6</sup>

The prevalence of beta-thalassemia trait and silent carrier in Iran and neighboring countries is higher than it in the other Asian countries.<sup>5-7</sup> The prevalence of beta-thalassemia trait is about 5-10% in Iran. Due to screening program of beta-thalassemia trait before marriage, the prevalence of Cooley's anemia has declined from 11.6 to 7.2 in 10000 persons of population in a five-year period.

Considering that Gorgan is a city located beside the Caspian Sea and it is assumed as one of the prevalent areas for beta-thalassemia, statistical rendering of beta thalassemia trait and carrier is epidemiologically important. So we designed this study to determine the Frequency of beta thalassemia trait and carrier in Gorgan.

## METHODOLOGY

In Iran, before marriage all prospective grooms are subjected to CBC, MCV and MCH testing; If their MCV is <80fl and /or MCH is <27pg, then their prospective brides are also subjected to CBC testing. In this analytic cross sectional study, over a period of one year,

2600 persons (2100 prospective grooms and 500 prospective brides) were tested for CBC.

In all couples that MCV was <80fl and/or MCH was <27pg, hemoglobin A<sub>2</sub> levels were also tested with column chromatography. Beta-Thalassemia trait was recognized with MCV <80fl and/or MCH <27pg. The criteria for categorizing a case as beta thalassemia carrier (minor beta-Thalassemia) was Hb A<sub>2</sub> >3.5% in cases with MCV <80fl and/or MCH < 27pg.

## RESULTS

From 2600 blood samples were tested for CBC, there were 2100 men (80.8%) and 500 women (19.2%). The range of their age was 12-82 years. The range of hemoglobin concentration was 5.6-19.4 gr/100ml. The range of RBC count was 3.8-8.64 10<sup>6</sup>cell/ml. Three hundred forty four men (16.4%) and one hundred twenty eight women 25.6%) had MCV <80fl. The range of MCH was 13.8-35.5 pg.

From 500 prospective grooms that had MCV <80fl and/or MCH <27pg, 128 prospective brides had abnormal MCV and/or MCH (256 cases from 2600 cases=9.8%). They were suggested as thalassemia trait and HbA<sub>2</sub> was performed for them. The range of HbA<sub>2</sub> was 1.2-12% and the mean of it was 3.06 $\pm$ 1.5. Fifty five cases of 256 cases (21.5%) had HbA<sub>2</sub> >3.5% .They

Table-II: Frequency of Hb A<sub>2</sub> >3.5% in cases with MCV <80fl and/or MCH <27pg

Variable	Men(n=128)	Women(n=128)	All cases(n=256)	p value*
Hb A <sub>2</sub> >3.5%	43 (33.6%)	12 (9.4%)	55 (21.5%)	<0.001

Abbreviation: HbA<sub>2</sub>, Hemoglobin A<sub>2</sub>.

\*: With Chi-square test

were suggested as beta-Thalassemia carrier (minor beta-Thalassemia). The mean values are present in Tables-I and II.

## DISCUSSION

In our study, the frequency of beta-Thalassemia trait and minor was 9.8% and 21.5% respectively. This is compatible with Iraq and Pakistan.<sup>7,8</sup> Basra, southern Iraq, was mapped for hemoglobinopathies of 1064 couples aged 14-60 years recruited from the public health laboratory. Carriers of major beta-globin disorders comprised 11-48%.<sup>8</sup> A brief survey of abnormal hemoglobin variants among a major ethnic group of Karachi on 202600 subjects was conducted. Population screening showed 13% beta-thalassemia trait.<sup>7</sup>

In Taiwan, the prevalence of beta-Thalassemic trait is at least 1.1%. Taiwan initiated a national screening program in 1993.<sup>3</sup> Thalassemia is common in Thailand and varies from mild to severe anemia. In tested 358 third-year royal Thai army medical cadets for complete blood count, red blood cell indices, hemoglobin typing, inclusion bodies and HbA<sub>2</sub>, prevalence of beta-trait was 1.5% in men.<sup>4</sup>

In Sultanate of Oman 6342 children less than 5 years old, were examined for genetic blood disorders. The results of this survey revealed that hemoglobinopathies are prevalent in Oman. The prevalence of beta-Thalassemia trait and homozygous beta-Thalassemia was 2% and 0.07% respectively.<sup>5</sup>

In Bahrain and neighbouring countries inherited disorders of hemoglobin are common. In screening of 11<sup>th</sup> grade student from 38 schools (5685 students) the prevalence of beta-thalassemia trait was 2.9%.<sup>6</sup>

The high frequency of minor beta-Thalassemia in Gorgan constitutes a real health problem and necessitates a management plan and public health education counseling for early diagnosis and treatment. Further studies should examine the value of counseling and the prevalence of beta-Thalassemia in the children of those married.

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