
HEMOGLOBINOPATHIES IN BALKAN COUNTRIES

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Hemoglobinopathies are the commonest autosomal recessive disorders worldwide (1, 2). Inherited hemoglobin disorders are characteristics of the tropics and subtropics and also prevalent in Mediterranean basin. Sickle cell anemia as the commonest form of hemoglobinopathies mainly occurs in sub-Saharan Africa; the data suggest that each year almost 180 000 babies are born with sickle cell anemia. Hemoglobin E/beta thalassemia and alpha thalassemia are mainly restricted to South-east Asia while beta and alpha thalassemia are more common forms of disease in Mediterranean countries (3).

Cooley defined thalassemia in children with severe anemia, splenomegaly, and bone abnormalities first in 1925 (4). At about the same time, Rietti independently described a disease having similar but lighter symptoms of Cooley's anemia in Italy (5). Hemoglobinopathies have been recognized in Balkan countries in late 1940s. The earliest studies on hemoglobinopathies were published at late 1950's by Aksoy in Turkey (6) and early 1960's by Stamatoyannopoulos in Greece. These reports were followed by the authors from Bulgaria, Yugoslavia and Romania (8,9,10).

Epidemiological studies in Balkan countries indicated broad regional differences on prevalence of thalassemia. Beta-thalassemia trait is uncommon (0.5%) in the Romanian population (11) with a total of 300 patients with thalassemia major (12). The overall prevalence of hemoglobinopathy carriers in Yugoslavia (except Slovenia) was 1.2%, ranging from 2.9% in Macedonia and 0.8% in Croatia (13). The overall prevalence was confirmed in a later report by the same author that carrier state of hemoglobinopathies in Republic of Macedonia was 2.6%, ranging

from less than 1% in northeast to 10% in the south (14). It has been reported that the overall prevalence of hemoglobinopathies in Bulgaria was 2.5% with a range from 0.5% to 19.9% based on different approaches for the detection of beta thalassemia carriers (15). The mean frequency of heterozygous thalassemia all over Greece was found as 7.4%. However; distribution was extremely uneven and reached to 15% in some regions (16). The prevalence of beta-thalassemia carriers in Turkey was reported to be 2.1% in all over Turkey (17) with considerable regional differences such as 2.7% in Izmir (18), 10.2% in Antalya (19), 3.4% in Adana (20). It was reported that the Turks who immigrate from Western Thrace or still living there had a high prevalence (10.2%) of beta thalassemia (21).

Molecular heterogeneity of beta thalassemia and other hemoglobinopathies have also been studied in Balkan countries. IVS1-110 (G..>A), IVS1-6 (T-->C), IVS1-1 (G-->A), Cd39 (C-->T) and Poly-A mutations have accounted for 85% of all beta-thalassemia alleles in Yugoslavia (22). The beta thalassemia alleles showed a broad spectrum in Bulgaria; the most frequent mutations were Cd39 and IVS1-110 while Cd5, 6, 7 and 8/9 were also prevalent. Frequencies of milder mutations such as IVS1-6 and Poly-A were relatively low among Bulgarians (23). The commonest beta globin gene mutations were IVS1-110, Cd39, IVS1-1 and IVS1-6 (85% of all alleled) in Greece (24). A large molecular heterogeneity has been observed in Turkish population. The most common mutation in Turkey was IVS-I-110, followed by IVS-I-6 and frameshift codon (FSC) 8 (-AA). The six most common mutations added up to approximately 70.3% and the overall frequency of the first 12 mutations was 83.3% (25).

Epidemiological data suggested that hemoglobinopathies should be considered as a common health problem most seriously in Greece with the highest overall prevalence compared to other Balkan countries followed by Turkey with the highest number of population in a large country and high incidence of consanguinity marriage. Larger molecular heterogeneity of hemoglobinopathies in Turkish population compared to population living in Greece and former Yugoslavia may lead difficulties in prenatal diagnosis in Turkey. Epidemiological studies suggest that hemoglobinopathies should also be considered as a significant concern for public health at least in some parts of Macedonia and Bulgaria but relatively less in Romania and other countries of former Yugoslavia.

Hemoglobinopathies can be controlled cost-effectively in countries where the prevalence of disease is high by programs that include carrier detection and genetic counseling. Greece was initiated the first pilot population programs directed to prevent beta thalassemia major by carrier screening, counseling, and prenatal diagnosis started in several at-risk populations in 1974 while prenatal diagnosis was provided since 1977(26). Although the first official movement on population screening has been initiated in 1993 in Turkey, it has been restricted in only 4 provinces of Turkey until 2003 when a comprehensive national prevention program which includes public awareness and education, carrier screening, and counseling, as well as prenatal diagnosis and pre-implantation genetic diagnosis has been started (27). Prevention program has not been established in other Balkan countries or not required.

The data obtained from National Programs of both countries showed that the total number of patients with hemoglobinopathies were 4506 in

Table 1. The number of patients with hemoglobinopathies in Greece and Turkey

Hemoglobinopathy type	Greece (2012)	Turkey (2008)
Thalassemia major	2485	3329
Thalassemia Intermedia	756	722
Hemoglobin H	178	-
HbS/HbS	205	1220
HbS/beta thalassemia	875	90
Not specified	7	90
Total	4506	5451

Greece in 2012 (28) and 4513 in Turkey in 2001 despite prevention program has been delayed in Turkey (27). Despite a continuous decline of birth rate of major hemoglobinopathies in Turkey by years after initiation of prevention program after 2003, the latest official record from National Registry of Turkey indicated that the number of hemoglobinopathies increased to 5451 in 2008 (29) (Table 1).

In conclusion; hemoglobinopathies are common health problem in Balkan countries, particularly in Greece and Turkey. In fact, hemoglobinopathies were officially considered as public health problems by National Health Services of Greece and Turkey and services were established for optimizing management and control of disease in these countries. Although Hemoglobinopathies are now a global problem due to population migration and there are considerable epidemiological and molecular genetic data from the other Balkan countries, few are known about the services that were provided for the patients and the dimensions of problem in the other Balkan countries.

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