



Evaluation of premarital health screening results in Izmir, Turkey (2012-2013)

Melih Kaan Sozmen¹, Ebru Turhan¹, Mustafa Tozun^{1*} and Lütfiye Serap Göneç²

¹Izmir KatipÇelebi University Medicine Faculty, Public Health Department, Izmir, Turkey

²Izmir Public Health Directorate, Izmir, Turkey
mtzn76@gmail.com

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Abstract

The aim of this study was to evaluate the prevalence rates of hepatitis B, HIV and syphilis carriers in infectious diseases as well as the prevalence of hereditary diseases, beta thalassemia carrier, and sickle cell anemia carrier prevalence in premarital screening tests in Izmir province (2012-2013). This is cross-sectional study. Data of 35.457 people who were counseled by performing premarital screening tests between May 2012 and May 2013 in Izmir province were evaluated. Beta thalassemia carrier is defined as "The mean corpuscular volume (MCV) is lower than $80 \mu\text{m}^3$ (fL)/red cell, and the hemoglobin A2 level is more than 3.5%". Those who were "HbS positive" were considered to be carriers of sickle cell anemia. HBS Ag positivity was defined as hepatitis B carrier, and anti-HIV positivity as HIV carrier, and VDRL and TPHA positivity as syphilis carrier was defined. Chi-square test was used in the intergroup comparisons. The statistical significance level was accepted as $p < 0.05$. The prevalence of beta-thalassemia and sickle cell anemia was 1.8% ($n = 631$) and 0.1%, respectively. In the case of consanguineous marriages, beta-thalassemia carrier (5.5%) had statistically significantly higher prevalence than non-consanguineous marriages (1.7%) ($p < 0.05$). Hepatitis B carrier prevalence was found as 1.3% ($n = 475$). Addition, 0.10% ($n = 36$) of the individuals were HIV carriers and 0.10% ($n = 33$) were syphilis carriers. The prevalence of beta thalassemia carriers in Izmir is lower than the prevalence values reported from Turkey. The prevalence of sickle cell anemia in Izmir is similar to that of Turkey. The prevalence of hepatitis B, HIV and syphilis carrier shows a similar trend in Izmir from 2006 to 2013.

Keywords: Premarital health screening, Beta thalassemia, sickle cell anemia, hepatitis, HIV, syphilis.

Introduction

Pre-marriage health examinations and tests are conducted free of charge at Community Health Centers, Mother and Child Health Centers and Family Health Centers, in Turkey. In Izmir, a province of West Turkey, these services are coordinated by the Department of Communicable Diseases, the Department of Mother and Child Health and Family Planning Branch and Public Health Laboratories under the roof of the Public Health Directorate. For hemoglobinopathies and infectious diseases screening, venous blood samples are taken from couples who apply for marriage. The blood sample is taken into blood tubes containing EDTA and evaluated on the same day at the Public Health Laboratory. According to the test results, consultation is given about genetic - hereditary diseases and infectious diseases, the persons are informed and they are directed to appropriate centers for the necessary medical services in accordance with the results of the tests¹.

Hemoglobinopathy Control Programs are an important part of premarital health screenings. Each year, around 70,000 babies come to the world with beta thalassemia, and 270 million people are carriers of hemoglobinopathy all over the world. Beta thalassemia is common among populations in Southeast Asia,

India, Africa, Central America and the Middle East, as well as in all Mediterranean countries^{2,3}.

In Turkey, The Hemoglobinopathy Control Program was initiated by the Ministry of Health in 33 provinces which were under the risk of hemoglobinopathy in 2003. On top of that, the proportion of married couples surveyed in 2013 rose to 86.0%.

In Turkey, beta thalassemia is common in the Mediterranean and Aegean regions, especially, because of its frequent occurrence in the Mediterranean basin. The average prevalence of beta thalassemia carriers in Turkey is 2.1% (compared to 2006). In some regions this ratio is up to 10%. The number of thalassemia and hemoglobinopathic newborns decreased from 272 in 2002 to 25 in 2010⁴⁻⁶.

Sickle cell anemia is a hereditary disease that results in the abnormal production of hemoglobin chains in the red blood cells. It is reported that the majority of sickle cell anemia patients in Turkey (56.7%) live in Hatay province⁷.

Human immunodeficiency virus (HIV), Hepatitis B virus and syphilis are blood borne and sexually transmitted infectious diseases. With national screening programs, it provides as

counseling services to couples, according to the results obtained by conducting blood tests for sexually transmitted diseases. Upon this, to prevent the spread of sexually transmitted diseases is aimed^{1,8}.

The aim of this study was to evaluate the prevalence rates of hepatitis B, HIV and syphilis carriers in infectious diseases as well as the prevalence of hereditary diseases, beta thalassemia carrier, and sickle cell anemia carrier prevalence in pre-marital screening tests in İzmir province (2012-2013).

Materials and methods

In this cross-sectional study, the data of 35.457 people who were counseled by performing premarital health screening tests between May 2012 and May 2013 in İzmir province were evaluated.

Beta thalassemia carrier is defined as follows: "The mean corpuscular volume (MCV) is lower than $80 \mu\text{m}^3$ (fL)/red cell, and the hemoglobin A2 level is more than 3.5%". Those who were "HbS positive" were considered to be carriers of sickle cell anemia⁹.

For the diagnosis of hepatitis B, HIV and syphilis carrier, HBsAg, anti-HIV I/II and Treponema pallidum antibody (VDRL and TPHA) levels were evaluated, respectively. HBSAg positivity was defined as hepatitis B carrier (Hepatitis B (+)), and anti-HIV I/II positivity as HIV carrier (HIV (+)), and VDRL and TPHA positivity as syphilis carrier (syphilis (+)) was defined^{10,11}.

For this study, necessary permissions were obtained from the İzmir Public Health Directorate and worked together with the "Research and Development Unit" of the Directorate. Chi-square test was used in the intergroup comparisons. Bivariate analyses were performed using the SPSS 22.0. The statistical significance level was accepted as $p < 0.05$.

Results and discussion

In this study, 17.159 (48.4%) men and 17.598 (51.6%) women were among 35.457 people who had pre-marital health screening. The mean age of men was 30.7 ± 8.8 years. The mean age of women was 27.0 ± 7.9 years.

The prevalence of beta-thalassemia and sickle cell anemia was 1.8% (n=631) and 0.1%, respectively. When evaluated according to gender; 49.4% (n=312) of the beta-thalassemia carriers were men and 50.6% (n=319) of the women. There was no significant difference between genders in terms of beta-thalassemia carrier ($p > 0.05$).

In the case of consanguineous marriages, beta-thalassemia carrier (5.5%) had statistically significantly higher prevalence than non-consanguineous marriages (1.7%) ($p < 0.05$). The

prevalence of beta thalassemia carrier was significantly higher in the individuals born in İzmir (2.0%) than the individuals born elsewhere than İzmir (1.6%) ($p < 0.05$). Consanguineous marriage prevalence was higher in those who were not İzmir (0.9%) than İzmir ones (0.6%) ($p < 0.05$). Distribution of beta thalassemia carrier by some variables was presented in Table-1.

Table-1: Distribution of beta thalassemia carrier by some variables.

	Variables	Beta thalassemia carrier		p values
		Yes	No	
		n (%)	n (%)	
Gender	Male	312 (1.7)	17.547 (98.3)	0.640
	Female	319 (1.8)	17.279 (98.2)	
	Total	631 (1.8)	35.424 (98.2)	
Consanguineous Marriage	Yes	15 (5.5)	256 (94.5)	<0.05
	No	616 (1.7)	35.165 (98.3)	
	Total	631 (1.8)	35.421 (98.2)	
Birth place	Izmir	354 (2.0)	17.516 (98.0)	<0.05
	Other provinces	277 (1.6)	17.309 (98.4)	
	Total	631 (1.8)	34.825 (98.2)	

*The differences in total values are due to the lack of some records.

Hepatitis B carrier prevalence was found as 1.3% (n=475). Addition, 0.10% (n=36) of the individuals were HIV carriers and 0.10% (n=33) were syphilis carriers.

Comorbidity with syphilis carrier (36.1%) and Hepatitis B carrier (47.2%) were found to be significantly higher in the individuals with HIV carriers than the non-HIV carriers ($p < 0.05$).

The prevalence of syphilis and HIV carriers did not differ significantly from gender (for each one $p > 0.05$). Hepatitis B carrier prevalence was higher in men (1.7%) than women (0.9%) ($p < 0.05$).

Distribution of infectious diseases by gender was presented in Table-2.

Discussion: In Turkey, beta thalassemia and sickle cell anemia carrier differ between regions, and an average prevalence of about 2% is reported for beta thalassemia carriers (6).

It is known that Beta thalassemia carriage is more common in the Mediterranean, especially in Cukurova and its surroundings, and in the Aegean region. This information is verified when we look at the results of recent studies in Turkey.

Table-2: Distribution of infectious diseases by gender.

		n (%)	n (%)	p values
		Syphilis (+)	Syphilis (-)	
Gender	Men	18 (0.1)	17841 (99.9)	0.631
	Women	15 (0.1)	17598 (99.9)	
	Total	33 (0.1)	35424 (99.9)	
		HIV(+)	HIV(-)	
Gender	Men	19 (0.1)	17840 (99.9)	0.772
	Women	17 (0.1)	17581 (99.9)	
	Total	36 (0.1)	35421 (99.9)	
		Hepatit-B (+)	Hepatit-B(-)	
Gender	Men	312 (1.7)	17547 (98.3)	<0.05
	Women	163 (0.9)	17435 (99.1)	
	Total	1.3 (475)	34982 (98.7)	

*The differences in total values are due to the lack of some records.

The prevalence of relatively low beta thalassemia carriers in provinces relatively remote from the Mediterranean basin and Aegean region is as follows: 0.9% in Kocaeli (3), 1.4% in Çanakkale, 1.7% in Kayseri (13), 1.9% in Adiyaman (14) reported.

Prevalence is reported to be between 2% and 5% in studies conducted in risky areas and nearby provinces to risky areas^{4,5,15-20}. In Hatay, the prevalence was 6%²¹. The prevalence value (1.8%) obtained in our study can be said to be low, when compared with other studies from Turkey.

Differences in the prevalence of beta thalassemia carriage can be attributed to differences in diagnostic criteria and laboratory methods used in researches, but the results obtained from risky regions were high, as expected.

The prevalence of beta thalassemia carrier did not differ in terms of gender in our study (p>0.05). This result is an expected result because the disease is thought to be an autosomal

recessive disease. It is known that consanguineous marriages increase the risk of beta thalassemia²². In this study, the carriers of beta thalassemia were found to be higher in couples who have consanguineous marriages than the couples who did not have consanguineous marriages (p<0.05). The number of consanguineous marriages in this study should not be considered too small. It is necessary to note that the number of consanguineous marriages that can be counted as high even in the west of Turkey necessitates continuing the effective provision of premarital counseling services. However, another result is that beta thalassemia carrier is higher in the individuals whose born in Izmir than the individuals whose born in outside of Izmir (p<0.05). This result can be explained to the geographical feature of beta thalassemia, in other words that Izmir is also in a risk zone for beta thalassemia.

The prevalence of sickle cell anemia in our study was found to be 0.1%. When we look at the results of the studies performed in different parts of Turkey, the prevalence of sickle cell anemia is reported between 0.05% and 0.5%^{3-6, 9,17,18}, except Hatay and Mersin, where sickle cell anemia is most frequently seen. In Mersin province¹⁶, sickle cell anemia carrier prevalence was reported as 1.21% and Hatay²¹ as 6.3%. Excluding the Çukurova region where sickle cell anemia is most frequently seen as a result of the study, our result is a similar result to Turkey in general.

In 2010, the European Center for Disease Prevention and Control (ECDC) reported that the prevalence of hepatitis B in the general population in Turkey varied between 2% and 8%. According to this report, Turkey is one of the countries with the highest prevalence of hepatitis B in the general population compared to European countries²³.

In Turkey, there have not been many publications offering prevalence of hepatitis B carriers for premarital health screening. Studies conducted in hepatitis B risk groups are more common. Some study results are as follows: In Turkey, HBsAg positivity was 4.19% in the blood of 6.240.130 donors who were admitted to the *Red Crescent Blood Centers* between 1989-2004²⁴. In a study of 2006, HBs Ag positivity was found in only one out of 30 sex workers (3.3%) who were under periodic health control²⁵. Ege University Rectorate Family Planning and Infertility Research and Practice Center Among 1664 women who applied for infertility treatment between 01.01.2005 and 01.05.2013, HBsAg positivity was reported as 3.1% (26). According to these studies, the prevalence value of our study is low. The reason for this may be that the individuals studied in our study are only couples to be married (and therefore younger than the general population).

In Turkey, 119 pre-marriage surveys were conducted in a state hospital in Mardin and 4.5% of carriers of hepatitis B were reported⁸. Since the number of participants in the study of Mardin is low the prevalence value determined may seem high compared to our study.

In this case, it would be more meaningful to evaluate the prevalence value of the Hepatitis B carrier in our study according to the Izmir data obtained in the last years. According to the findings of pre-marital screening tests conducted in İzmir province, The prevalence of HBsAg positivity in 2006, 2007 and 2008 was; 0.99%, 2.40% and 2.42%, respectively, while it was 1.3% in 2013 in our study. A lower HBsAg positivity rate in 2013 than in previous years may be related to the effective implementation of the hepatitis B control program in İzmir.

Hepatitis B carrier was found to be higher in men than women ($p < 0.05$). In a study conducted in the Jordanian population and conducted on 18,000 blood donors, the hepatitis B carrier in men was reported higher than women²⁷. This may be due to the fact that in the age of marriage, at a young age population, men are in more risky behaviors for Hepatitis B than women.

According to premarital health screening results in İzmir; The prevalence of HIV carriers was 0.07% in 2006, 0.06% in 2007, 0.07% in 2008 and 0.10% in our study (2013). It can be said that HIV positives show a similar course over the years in Izmir.

According to premarital health screening results in İzmir; The prevalence of syphilis carrier was 0.04% in 2006, 0.07% in 2007, 0.12% in 2008 and 0.10% in our study (2013) It can be said that a similar course over the years in terms of syphilis carriers in Izmir.

In the literature, there were no studies presenting premarital health screening results for HIV and syphilis carriers in Turkey. However, the screening test results of the Blood Center of Süleyman Demirel University Medical Faculty in Isparta between from 2000 to 2007 can be compared with our study results. In a study of 51,361 blood donors by Kaya et al.²⁸, the prevalence of HIV carrier and syphilis carrier was reported as 0.09% and 0.08%, respectively. These results are consistent with the results of our study. In another study carried out on 34.666 people in Izmir in 2013, the HIV carrier was reported as 0.04%²⁹. We can say that this study's result is compatible with our study's result.

In our study, the comorbidity with syphilis and hepatitis B carriers in HIV carriers was significantly higher than in non-HIV carriers. We can say that as a reason for explaining this result, the transmission routes for these three diseases are similar and the same risky behaviors are effective in the formation of these diseases. In addition, there are many studies concluding that comorbidity exists between HIV, syphilis and hepatitis B³⁰⁻³². Our study's result is as expected.

Conclusion

According to the results of our study on hereditary diseases; the prevalence of beta thalassemia carriers in İzmir is lower than the prevalence values reported from Turkey. If we exclude the Cukurova region where sickle cell anemia is most frequently

seen, the prevalence of sickle cell anemia in Izmir is similar to that of Turkey. According to the results of our study on infectious diseases; The prevalence of hepatitis B, HIV and syphilis carrier shows a similar trend in Izmir from 2006 to 2013. Comorbidities with syphilis and hepatitis B carriers have been observed in HIV carriers. The evaluation of consanguineous marriage in couples applying for marriage screening is a matter that should be considered in premarital counseling. Pre-marriage screening tests are important for the prevention of sexually transmitted diseases, and dissemination of awareness-raising activities at the community level, as well as provision of preventive services for carriers and their partners, will provide significant contributions to the prevention of sexually transmitted diseases.

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