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THE PREVALENCE OF CONSANGUINEOUS MARRIAGES AND AFFECTING FACTORS IN TURKEY: A NATIONAL SURVEY

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Summary. This study was carried out by the Turkish Republic Ministry of Health to determine the prevalence of consanguineous marriage and its correlates with socio-demographic and obstetric risk factors in women in Turkey. The cross-sectional, national-level study was carried out from October to December 2013. The study population was composed of women between the ages of 15 and 65 years living in Turkey. The sample size was calculated as 9290 houses within Turkey's 81 provinces so as to improve the Turkish rural–urban expectations by means of systematic stack sampling according to the Turkish Statistical Institute's address-based vital statistics system. The target sample size was 6364, but only eligible 4913 women, who had been married, were included in the study. The consanguineous marriage frequency in the sample was found to be 18.5%, and of these 57.8% were first cousin marriages. Women living in an extended family and whose education level and first marriage ages were low, and whose perceived economic status was poor, had higher frequencies of consanguineous marriage ($p < 0.001$). Consanguineous marriage frequencies were higher ($p < 0.001$) for women who had spontaneous abortions and stillbirths or who had given birth to infants with a congenital abnormality. In this context, it is important to develop national policies and strategies to prevent consanguineous marriages in Turkey.

Introduction

Consanguineous marriage is defined as a marriage between people who are related as second cousins or closer (Bittles, 2001). Consanguineous marriages are supported for social, economic, psychological, religious and geographical reasons in some cultures

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(Kelmemi *et al*., 2015). According to the 2011 Geneva International Consanguinity Workshop report, the prevalence of consanguineous marriages throughout the world is estimated to be approximately 20%, and this rate varies from 20% to 60% in North Africa, the Middle East and Western Asia. According to a report by Hamamy *et al*. (2011), the frequency of family-based, close-relation consanguineous marriage at the country level is 32–34% in Yemen, 29–33% in Iraq, 25–30% in Afghanistan, 14–24% in Egypt, 6–26% in Iran, 7–52% in South India, 44–49% in Sudan and 15–25% in Turkey. According to the Turkish Demographic and Health Survey (TDHS), the consanguineous marriage frequency in Turkey varied between 22.0% and 29.2% from 1968 to 2008, and has increased over the years (TDHS, 2008). According to data from the Turkish Family Structure Survey (TFSS), the consanguineous marriage rate in Turkey in 2011 was 23.3% – 21.1% in urban areas and 28.2% in rural areas. Consanguineous marriage is most common is the Southern Anatolian Region of Turkey (44.8%), and least common in the Western Marmara Region (6.4%) (TFSS, 2011).

Women in consanguineous unions tend to have a lower level of education, lower labour force participation rate, have extended and traditional family types and be more likely to be married and to start childbearing at an earlier age. Women in consanguineous unions have generally been reported in rural areas and among communities of low socioeconomic status (Reddy, 1988; Tuncbilek & Ulusoy, 1988; Saedi-Wong *et al*., 1989; Baki *et al*., 1992; Tuncbilek & Koc, 1994; Shami *et al*., 1994; Hussain, 1999; Koc, 2008). Consanguinity increases the prevalence of rare genetic congenital anomalies and nearly doubles the risk of neonatal and childhood death, intellectual disability and other anomalies in first cousin unions (WHO, 2014a). In this context, it is important to develop international and national policies and strategies to prevent consanguineous marriages within Turkey, which has a high rate of consanguinity. Similarly, it is also important to provide educational and counselling services to societies most at risk, as well as to carry out more studies about the social, cultural and economic reasons for consanguineous marriage.

The present study was carried out to determine the prevalence of consanguineous marriage and its correlates with socio-demographic and obstetric risk factors in Turkey, with a view to contributing to the development of policies in connection with consanguineous marriage.

Methods

The study was carried out by the Turkish Republic Ministry of Health between October and December 2013. The population of the study, designed on a cross-sectional, national level, was composed of women between the ages of 15 and 65. The sample size was calculated as 9290 houses in a total of 81 provinces so as to improve the Turkish Rural–Urban expectations by means of a systematic stack sampling according to the Turkish Statistical Institute's address-based vital statistics system. A total of 9290 house visits were undertaken, and interviews were held with 6364 families. Of these, 4913 eligible women, who had been married, were included in the study. As the response rate to the study (69%) was lower than expected (80%), the sample size was appropriate for obtaining a prevalence for the entirety of Turkey, but prevalence at the rural–urban level could not be determined.

A questionnaire was developed that included a total of 47 questions related to the socio-demographic and obstetric characteristics of women. Face-to-face interviews were conducted by 62 surveyors in respondents' houses. All individuals, including women aged between 15 and 65 living in each house, were listed, along with their addresses. At the final stage, eligible women were selected by means of the Kish method (Leslie, 1965). For interviews, three separate visits were foreseen, and if the persons to be interviewed were not in the house during the first visit, the day and time they would be at home was established and they were re-visited.

All women who reported being married to either their first cousin ($F = 0.0625$), second cousin ($F = 0.0156$) or less than second cousin ($F < 0.0156$) were included in the category of consanguineously married women (Bittles, 2001). Thus marriages were grouped as non-consanguineous, first cousin marriages, second cousin marriages and less than second cousin marriages. Age at first pregnancy was grouped as <18 years (adolescent), 18–34 years (normal) and ≥35 years (advanced age); inter-pregnancy interval was grouped as ≤24 months and >24 months (Coimbra *et al.*, 2007). Women who had at least one antenatal care (ANC) visit during her pregnancy were considered as 'ANC serviced'. Low birth weight was defined as weight at birth of less than 2.500 g (WHO, 1992). Spontaneous abortion was defined as the natural loss of a pregnancy prior to the 20th week of pregnancy or the loss of an embryo/fetus of less than 400 g. Stillbirth was accepted as the death prior to the complete expulsion or extraction from its mother of a product of fertilization, at or after 20 completed weeks of gestation (Zegers-Hochschild, 2009). Congenital malformation was defined as a physical defect in a baby at birth, which can involve many different parts of the body, including the brain, heart, lungs, liver, bones and intestinal tract (Zegers-Hochschild, 2009).

Data were transferred to the Statistical Package for Social Sciences 21.0 (SPSS) package software. Descriptive analyses (percentage distribution, mean and standard deviation), and grouped variable comparison, chi-squared and logistical regression analyses were employed. Weighting processes, in compliance with sampling design, were made during the study, and multi-staged sampling method-compatible analyses were made by using a corrections complex samples module according to these weightings and non-response speed. All percentages are given as weighted and numbers are given as weightless. For statistical significance, situations for which type 1 error level was under 5% were deemed significant.

Ethical permission was obtained from the Research Ethics Board of the State Hospital in Turkey (dated: 13.06.2013; number: 18). The written approval of the women included in the study was obtained. The rules specified in the Helsinki Declaration were observed in the data collection phase.

Results

The study was conducted on 4913 married women aged between 15 and 65 years. Their mean age was 41.63 ± 0.22 years (min. = 15; max. = 65). Of these, 59.4% graduated from primary school, 74.9% lived in rural areas and 18.5% were married to a spouse related as less than second cousin or closer. First cousin unions were the most common type of consanguineous unions, and constituted 57.5% of all consanguineous marriages.

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Table 1. Prevalence of consanguineous marriages, women aged 15–65 years living in Turkey, 2013

Marrisge type	Prevalence (%)
Non-consanguineous	81.5
Consanguineous	18.5
First cousin	57.5
Father's brother's son	19.2
Father's sister's son	12.8
Mother's sister's son	15.5
Mother's brother's son	10.3
Second cousin	41.8
Less than second cousin	0.4
Total	100.0
Number of observations	4913

Of the first cousin unions 32.0% were patrilateral first cousin unions, while 25.8% were marriages between matrilateral offspring. Second cousin unions accounted for 41.8% of all consanguineous marriages. The remaining 0.4% of the consanguineous marriages were unions between less than second cousins (Table 1).Women in consanguineous unions were more likely both to be married and to start childbearing at an earlier age. In addition, women in consanguineous unions were more likely to have experienced their last pregnancy at a later age, and have a greater number of pregnancies (Table 2).

A statistically significant difference was found between groups with or without consanguineous marriage according to education status, marriage age, income status and family type ($p < 0.001$) (Table 3). Whereas 35.2% of women whose education level was literate and below were married to their first cousin, this figure was 0.5% for those who were university graduates or higher. Whereas 68.0% of the women whose age at first marriage was under 19 were married to their first cousin, only 46.7% of women in non-consanguineous marriages were married to their first cousin. The consanguineous marriage frequency for women who perceived that their economic status was good was 7.7%, and 21.5% for women who perceived that their economic status was poor. The percentage of women with a first cousin marriage living in extended families was 31.6%, whereas this figure was 16.4% for those who were in non-consanguineous marriages. Although there was no statistically significant difference between groups with and without consanguineous marriage by age ($p > 0.05$), for women aged over 50 the consanguineous marriage frequency was 30.5%, and the non-consanguineous marriage frequency was 26.9%. Similarly, for women living in urban areas the first cousin marriage frequency was 31.0%, and the non-consanguineous marriage frequency was 25.2%. There was no statistically significant relation between settlement location and consanguineous marriage frequency ($p > 0.05$).

Table 3 shows the consanguineous marriage status of women by individual characteristics (age, education status, first marriage age, income status perception, family type and settlement location), analysed using logistic regression with multivariable models. Consanguineous marriage frequency was found to be higher for

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Table 2. Distribution of sample women by consanguinity status and sociodemographic characteristics

Characteristic	Non-consanguineous marriages (mean ± SD)	Consanguineous marriages		
		All (mean ± SD)	First cousin (mean ± SD)	Second cousin and below (mean ± SD)
Current age	41.42 ± 0.24	42.54 ± 0.51	42.39 ± 0.65	42.75 ± 0.75
Age at first marriage	20.28 ± 0.07	18.38 ± 0.13	18.36 ± 0.17	18.42 ± 0.19
Age at first pregnancy	21.53 ± 0.84	19.81 ± 0.13	19.67 ± 0.17	19.99 ± 0.20
Age at last pregnancy	28.76 ± 0.12	29.56 ± 0.27	29.94 ± 0.38	29.05 ± 0.33
Total no. pregnancies	3.51 ± 0.05	4.76 ± 0.11	4.90 ± 0.16	4.57 ± 0.16

women who were high school graduates (OR = 2.5; 95% CI = 1.2–4.7) and whose education status was literate or below (OR = 4.8; 95% CI = 2.4–9.5), compared with those who were university graduates or higher. The consanguineous marriage frequency of those whose first marriage age was below 19 years was 2.1 times higher than that of women whose first marriage age was 29 and above (OR = 2.1; 95% CI = 1.082–4.329). Furthermore, the consanguineous marriage frequency of the group with a perception of poor economic status was 1.5 times greater than that of the group with a perception of good economic status (OR = 1.5; 95% CI = 1.037–2.209). Consanguineous marriage frequency was higher for women living in extended families compared with those living in nuclear families (OR = 1.9; 95% CI = 1.5–2.4). Also, there was no significant difference between age, settlement location variables and consanguineous marriage frequency.

The distribution of women by consanguinity status and obstetric characteristics is shown in Table 4. The spontaneous abortion frequency of women in first cousin marriages was 37.3%, and that for women in non-consanguineous marriages was 24.1% ($p < 0.001$). Furthermore, although there was a statistically significant difference between stillbirths and consanguineous marriage ($p < 0.001$), the stillbirth frequency for women in first cousin marriages was 12.6%, whereas this rate was 5.6% for those in non-consanguineous marriages. Similarly, 5.1% of the women in first cousin marriages had babies with congenital abnormalities, whereas this frequency was 2% for those with non-consanguineous marriages ($p < 0.001$). Although there was a significant relation between women receiving ANC (ANC serviced) and marriage type ($p < 0.001$), the frequency of receiving ANC was 72.2% for the group without consanguineous marriage. Furthermore, the frequency of women having an adolescent pregnancy in first cousin marriages was 93.9%, whereas this rate was 79.9% for those with non-consanguineous marriages.

The consanguineous marriage frequency of women with a history of spontaneous abortion was 1.4 times greater than that of women with no history of spontaneous abortion (OR = 1.4; 95% CI = 1.16–1.75). The consanguineous marriage frequency of women with a history of stillbirth was 2.0 times greater than that of women with no history of stillbirth (OR = 2.0; 95% CI = 1.54–2.80). The consanguineous marriage

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Table 3. Distribution of sample women by consanguinity status and individual characteristics

Characteristic	Non-consanguineous marriages *n* (%)	Consanguineous marriages: First cousin *n* (%)	Consanguineous marriages: Second cousin and below *n* (%)	*p*-value	OR	95% CI
Age (n = 4913)						
<20	23 (0.6)	3 (1.0)	3 (0.7)	0.574	1.00	
20–39	781 (15.3)	86 (14.8)	61 (15.1)		1.16	0.89–1.51
30–39	1291 (31.7)	129 (27.2)	105 (31.0)		1.15	0.88–1.50
40–49	949 (25.5)	124 (26.5)	81 (25.5)		1.15	0.84–1.56
>50	1032 (26.9)	135 (30.5)	110 (27.7)		0.83	0.29–2.38
Education status (n = 4888[a])						
Literate or below	588 (15.9)	166 (35.2)	98 (30.8)	<0.001	1.00	
Primary	2415 (59.8)	274 (58.3)	218 (57.2)		1.29	0.67–2.48
High school	744 (17.5)	30 (6.0)	34 (8.7)		2.48	1.29–4.77
University or higher	306 (6.8)	5 (0.5)	10 (3.3)		4.83	2.43–9.59
Age at first marriage (n = 4913)						
<19	1858 (46.7)	325 (68.0)	233 (67.7)	<0.001	1.00	
20–29	2089 (50.4)	145 (30.6)	124 (31.4)		1.19	0.59–2.40
>29	129 (2.9)	7 (1.4)	3 (0.9)		2.16	1.08–4.32
Income status perception (n = 4913)						
Good	626 (13.9)	43 (7.7)	31 (9.7)	<0.001	1.00	
Intermediate	2903 (71.4)	331 (70.8)	260 (71.1)		1.32	0.96–1.83
Poor	537 (14.7)	100 (21.5)	67 (19.2)		1.51	1.03–2.20
Family type (n = 4895[a])						
Nuclear	3549 (82.3)	366 (67.1)	276 (68.3)		1.00	
Extended	463 (16.4)	101 (31.6)	79 (30.6)	<0.001	1.96	1.55–2.48
Separated	52 (1.3)	6 (1.3)	3 (1.1)		1.01	0.43–2.36
Settlement location (n = 4913)						
Rural	2815 (74.8)	303 (69.0)	239 (71.6)	0.091	1.00	
Urban	1261 (25.2)	174 (31.0)	121 (28.4)		0.97	0.77–1.23

[a] Number decreased due to unanswered questions.
χ^2 test.

frequency of women with a history of congenital abnormality infants was 2.0 times greater than that of women with no history of congenital abnormality infants (OR = 2.0; 95% CI = 1.2–3.3). Furthermore, the consanguineous marriage frequency of women who were 'ANC serviced' was 0.8 times more than that of women who were not (OR = 0.8; 95% CI = 0.61–0.95). The consanguineous marriage frequency of women who were of adolescent age at first pregnancy (OR = 2.4; 95% Cl = 1.7–3.3) was 2.4 times higher compared with women whose first pregnancy age was at 'normal' age (18–35 years). There was no significant difference between having low birth weight

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Table 4. Distribution of sample women by consanguinity and obstetric characteristics

Characteristic	Non-consanguineous marriages *n* (%)	Consanguineous marriages: First cousin *n* (%)	Consanguineous marriages: Second cousin and below *n* (%)	*p*-value	OR	95% CI
Spontaneous abortion ($n = 4608$)						
No	2924 (75.9)	297 (62.7)	240 (67.9)		1.00	
Yes	870 (24.1)	165 (37.3)	112 (32.1)	<0.001	1.42	1.16–1.75
Stillbirth ($n = 4608$)						
No	3591 (94.4)	405 (87.4)	303 (87.3)	<0.001	1.00	
Yes	203 (5.6)	57 (12.6)	49 (12.7)		2.07	1.54–2.80
Congenital abnormality ($n = 4608$)						
No	3723 (98.0)	438 (94.9)	339 (95.8)	<0.001	1.00	
Yes	71 (2.0)	24 (5.1)	13 (4.2)		2.04	1.23–3.39
ANC serviced[b] ($n = 4553$[a])						
Yes	2731 (72.2)	296 (62.5)	227 (63.5)		1.00	
No	1014 (27.8)	163 (37.5)	122 (36.5)	<0.001	0.77	0.61–0.95
Low birth weight infants ($n = 4549$[a])						
≥2.500 g	296 (8.6)	64 (13.4)	39 (9.5)		1.00	
<2.500 g	3457 (91.4)	385 (86.6)	308 (90.5)	0.010	1.17	0.87–1.57
Planned pregnancy (last) ($n = 4530$[a])						
Yes	2745 (71.4)	308 (62.9)	220 (63.8)		1.00	
No	981 (28.6)	151 (37.1)	125 (36.2)	<0.001	1.19	0.95–1.48
Age at first pregnancy ($n = 4531$[a])						
18–35 (normal)	752 (19.6)	29 (5.6)	42 (11.6)		1.00	
<18 (adolescent)	2948 (79.9)	427 (93.9)	304 (87.9)		2.40	1.73–3.31
>35 (advanced)	25 (0.5)	3 (0.5)	1 (0.4)	<0.001	2.68	0.48–9.90
Inter-pregnancy interval ($n = 3946$[a])						
≥2 years	2552 (80.3)	335 (77.2)	248 (77.2)		1.00	
<2 years	633 (19.7)	102 (22.8)	76 (22.8)	0.268	1.14	0.89–1.45

[a] Number decreased due to unanswered questions.
[b] A woman who received at least one antenatal care (ANC) visit during her pregnancy was considered to be 'ANC serviced'.
χ^2 test.
CI, confidence interval; ANC, antenatal care.

infants, planned pregnancy, inter-pregnancy interval variables and consanguineous marriage frequency.

Discussion

One of the most discussed marriage types today is consanguineous marriage (Hamamy *et al.*, 2011; Kelmemi *et al.*, 2015). Studies conducted worldwide show that countries with the highest prevalence of consanguineous marriage are geographically located in

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the Middle East (Shami *et al*., 1994; Hussain, 1999; Gunaid *et al*., 2004). The consanguineous marriage prevalence is 25–42% in Saudi Arabia, 20–30% in the United Arab Emirates, 17–31% in Kuwait, 6–26% in Iran, 17–38% in Pakistan and 14–24% in Egypt. The prevalence is significantly lower in European and American societies: 1% in France, 4.6% in Spain, 0.36% in The Netherlands, 5% in Belgium and less than 2% in America (Hamamy *et al*., 2011). According to the TDHS, the consanguineous marriage frequency in Turkey varied between 22.0% and 29.2% from 1968 to 2008 and has increased over the years (TDHS, 2008). According to TFSS data, the consanguineous marriage rate in Turkey is 23.3%, with a rate of 21.1% in urban areas and 28.2% in rural areas (TFSS, 2011). In this study, the consanguineous marriage prevalence in Turkey was determined to be 18.5% (Table 1). While this is lower than in Middle Eastern countries, when compared with developed countries Turkey's consanguineous marriage rate is still high.

First cousin marriages are preferred in Turkey for reasons such as protecting assets and the family's territorial integrity, and preventing strangers from entering a family (Ayan *et al*., 2001). In this study, the fact that more than half of consanguineous marriages (57.5%) were first cousin marriage is an interesting finding. According to TDHS data, 76.3% of consanguineous marriages were first cousin marriages in Turkey in 2008 (TDHS, 2008). In a study in the eastern region of Turkey, 75% of consanguineous marriages were found to be first cousin marriages (Akbayram *et al*., 2009), and another study in Ankara found 81% of consanguineous marriages to be first cousin marriages (Ayan *et al*., 2001). Thus first cousin marriages are still common in Turkey.

Of the factors affecting the frequency of consanguineous marriages, education status has one of the strongest influences. Evidence that consanguineous marriage frequency decreases as women's education level increases has been obtained from regional-level studies (Hussain & Bittles, 2000; Liascovich *et al*., 2001; Gunaid *et al*., 2004; Yuksel *et al*., 2009; Bhasin & Kapoor, 2014; Jabeen & Malik, 2014). According to TFSS data, the consanguineous marriage frequency of women who are not literate is three times greater than that of women who graduated from university or above (TFSS, 2011). It is an especially interesting finding that consanguineous marriages are 4.8 times more frequent for women whose education level is literate or below, compared with women who graduated from university or above ($p < 0.001$) (Table 3). These results show an awareness that consanguineous marriages and their medical consequences increase as the education level of women increases.

The preference for consanguineous marriage has been shown to increase as income status decreases (Shami *et al*., 1989; Hussain & Bittles, 2004; Hamamy *et al*., 2005; Koc, 2008; Barbour & Salameh, 2009; Assaf & Khawaja, 2009). In the present study it was found that women with a perception of poor income status were 1.5 times more likely to have a consanguineous marriage compared with women with a perception of good income status ($p < 0.001$) (Table 3). According to TFSS 2011 and TDHS 2008 data, consanguineous marriages are more frequent in regions with lower income statuses in Turkey (Koc, 2008; TFSS, 2011). Akbayram *et al*. (2009) found that the frequency of consanguineous marriages was lowest for women with a high income level. It is generally thought that giving women a greater chance to participate in the labour market will increase their autonomy around their marriage decisions.

One interesting findings of this study is that the consanguineous marriage frequency of women who married under the age of 19 was 2.1 times higher than that of women who married at the age of 29 or above ($p < 0.001$) (Table 3). This supports previous findings that there is a significant relation between early age at marriage and consanguineous marriage (Shami *et al*., 1989; Hussain & Bittles 2004; Koc, 2008; Akbayram *et al*., 2009). According to the 2013 TDHS, the mean marriage age in Turkey is 21 (TDHS, 2013). In this study the mean marriage age was found to be 19.9, and shows a wide age range of 12 to 45 years. Furthermore, when international studies are considered, mean marriage age is 31.8 in The Netherlands, 30.8 in Spain, 30.6 in France and 31.5 in Germany (UNECE, 2011; Statistics Netherlands, 2013). Compared with these statistics, women are still marrying at an early age in Turkey. This situation is negatively affecting women, as they are making marriage decisions before they are emotionally mature (Koc, 2008).

In Turkey consanguineous marriages are entered into for reasons such as maintaining continuance of the same race, prevention of the distribution of assets and so that related children can have more harmony as they share the same culture and religion. This view is especially supported in wide and paternalistic families, where different generations live together (Akin, 2000). This study found the consanguineous marriage frequency of women living in extended families was 1.9 times higher compared with that of women living just with their immediate nuclear families (Table 3). In the 2008 TDHS it was found that consanguineous marriage was two times more frequent in extended families compared with those living only with their nuclear families (Koc, 2008). Denic *et al*. (2012) found that populations with extended families can have higher rates of first cousin marriages. Thus the results of this study are similar to those of other surveys.

Traditional culture encourages the continuance of consanguineous marriage, especially in rural areas of Turkey (TDHS, 2008). According to TFSS data, the consanguineous marriage frequency in rural regions of Turkey is higher than in urban regions (TFSS, 2011), and this has been confirmed by other studies (Khoury & Massad, 1992; COSIT, 2006; Alper *et al*., 2004; Othman & Saadat, 2009). In the present study, no significant difference was found between consanguineous marriage frequencies in urban and rural regions ($p > 0.05$) (Table 3).

Previous studies have shown that consanguineous marriage increases the obstetric risks of women (Tuzun & Elyas, 1996; Ozcan, 1997; Yakinci *et al*., 1999; Samli *et al*., 2006). The present study found that the spontaneous abortion frequency of women with consanguineous marriages was 37.3%, and 24.1% for women in non-consanguineous marriages ($p < 0.0001$). Also, women with a history of spontaneous abortion had a consanguineous marriage frequency 1.4 times greater than those with no history of spontaneous abortion (Table 4). In a study performed in the city of Malatya in Turkey, the spontaneous abortion frequency in first cousin marriages was 16.7%, and 10.7% for those in non-consanguineous marriages (Yakinci *et al.*, 1999). In another study, performed in Elazig in Turkey, while the spontaneous abortion frequency of families in consanguineous marriages was 8.4%, it was 5.2% for those who in non-consanguineous marriages (Tuzun & Elyas, 1996). A study by Ozcan (1997) found the spontaneous abortion frequency to be 9.3% for the consanguineous marriage group, and 1.7% for the non-consanguineous marriage group. A study by Samli *et al*. (2006) found the

spontaneous abortion frequency of families with consanguineous marriages to be 30.9%, and 28.7% for those in non-consanguineous marriages. It is interesting that the spontaneous abortion frequency of women in first cousin marriages is so high.

Another obstetric risk related to consanguineous marriage is stillbirth. This study found that the stillbirth frequency of women in consanguineous marriages was twice that of women in non-consanguineous marriages ($p < 0.001$) (Table 4). Donbak (2005) found that there was a close relation between consanguineous marriage and stillbirths, as well as in infant deaths. Ozcan (1997) found that there was at least one stillbirth for approximately every four consanguineous marriages cases. Mohammadi *et al*. (2012) found that there was a significant relation between stillbirths and consanguineous marriage. In this context, it is important to offer counselling services to couples in consanguineous marriages, starting from the preconception period.

Congenital abnormalities occur during the prenatal stage and they can be seen in any part of the body. Some of the abnormalities are minor and only cause cosmetic problems, but approximately 3% disturb normal body functioning and cause early death or various disabilities, which continue for a lifetime. The most frequently experienced major abnormalities are neural tube defects, split palate–lips, congenital pyloric stenosis and heart abnormalities (Balci *et al*., 2012). Studies have shown that there is close relation between consanguineous marriage and the birth of infants with congenital abnormalities (Ozcan, 1997; Samli *et al*., 2006; Hamamy, 2007). This study found that 5.1% of the women with consanguineous marriages had babies with congenital abnormalities, and that there was a significant relation between marriage type and the birth of infants with congenital abnormalities ($p < 0.001$). In addition, consanguineous marriages are 2.0 times more frequent for the women with a history of infant congenital abnormality, compared with those who do not. It is known that while the direct reason for 10% of congenital abnormalities is genetic and chromosomal factors, 10% are caused by environmental factors and 80% are caused by both environmental and genetic factors (Ersoy *et al*., 1999). In consanguineous marriages, as the incidence of mutations, which are rarely faced and progress recessively in the population, at the homozygote level increases, the frequency of congenital abnormalities also increases (Modell & Darr, 2002). Although congenital abnormalities are significantly and commonly seen in the families of consanguineous marriages, these abnormalities are also significantly affected by the age of the mother, inadequate health care services, poor environmental conditions and low socioeconomic and cultural levels (Bittles, 1994; Koç, 2008; Hamamy *et al*., 2011).

Antenatal care aims to improve the health of pregnant women and their babies from start of pregnancy until birth (Republic of Turkey Ministry of Health, 2005). The World Health Organization recommends at least four ANC visits during the pregnancy period (WHO, 2014a). According to World Health Statistics 2014, the percentage of women receiving at least one ANC during pregnancy was 81% globally in 2006–2013 (WHO, 2014b). According to TDHS (2013) data, 97% of pregnant women in Turkey received at least one ANC visit, and this has increased over the years. In this study, the percentage of women who received at least one prenatal care service during the pregnancy period was 70.4%. Also, it is interesting that the ANC service receiving frequency of women in first cousin marriages is 62.5%, but 72.2% in non-consanguineous marriages ($p < 0.001$). In addition, consanguineous marriages are 0.8 times more frequent for women not receiving ANC compared with receiving ANC (Table 4). It is evident that the ANC

service receiving rate of women in consanguineous marriages in Turkey is low. It is very important to start the pregnancy follow-up of women from consanguineous marriages at an early stage, see them at regular intervals and employ prenatal diagnosis methods for early determination of genetically transmitted diseases.

The results of this study indicate that consanguineous marriage exerts a differential impact on some reproductive behaviours. Women in consanguineous unions were more likely both to be married and to start childbearing at an early age (Hussain & Bittles, 2004; Koç, 2008; Islam, 2013). In the present study, consanguineous marriages were found to be 2.4 times more frequent for the women whose first pregnancy was at adolescent age compared with those whose first pregnancy was at age 18–35. Turkey has a high rate of adolescent marriage, and pregnancies in this age group do not receive enough ANC (TDHS, 2013). Women at this age have not completed their intellectual, social and physical development and are emotionally immature. So, the problems that develop due to consanguineous marriages tend not to be diagnosed early, or are overlooked. Therefore, preconception counselling of adolescent-age women in consanguinity is important (Goossens *et al*., 2015; Karabulut *et al*., 2015).

Consanguinity also has a differential impact on contraceptive use behaviour. Husband–wife communication about use of family planning methods is significantly lower among women in first cousin unions, while current use of family planning methods is also lower among women with consanguineous marriages than in those with non-consanguineous marriages (Islam, 2013). A lower planned pregnancy rate and shorter inter-pregnancy intervals have been found in consanguineous marriages (Tunçbilek & Koç, 1994). The present study found a lower planned pregnancy rate and shorter inter-pregnancy intervals in consanguineous marriages, which have a negative impact on maternal and child health. Consanguinity is associated with an increased risk of low birth weight. Low birth weight has been found to be significantly more frequent among children with a parental history of consanguinity (Morton, 1958; Sibert *et al*., 1979; Kulkarni & Kurian, 1990; Jaber *et al*., 1997; Mumtaz *et al*., 2007; Joseph *et al*., 2015), and the present study's results agree with these findings. A sufficient number of ANC visits by qualified personnel of pregnant women can be effective in reducing the incidence of low birth weight infants.

Conclusion

This study found that approximately one in five marriages in Turkey was consanguineous. Most of the consanguineous marriages were first cousin marriages. Consanguineous marriage frequencies were higher for women living in extended families, and whose education level and first marriage age were low, as well as those whose perceived economic status was poor. No statistical relation was found between age and settlement location and consanguineous marriage frequency. Furthermore, spontaneous abortions, stillbirths and infant births with congenital abnormalities increase with consanguineous marriages.

In this context, it is recommended that national and international policies and strategies are developed to raise awareness in Turkish society about the risks of consanguineous marriage, and to apply and maintain these effectively. It is also particularly recommended that genetic counselling services on genetically transmitted diseases are offered to couples

prior to marriage, and if pregnancy occurs after consanguineous marriage, to implement regular follow-ups. There is a need for further epidemiological research on the socio-cultural and economic reasons for consanguineous marriages.

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