

RESEARCH ARTICLE

# Attitude of Saudi Arabian adults towards consanguineous marriage

Omar A. Alharbi<sup>1</sup>, Walaa A. Al-Shaia<sup>2</sup>, Abdulaziz A. Al-Hamam<sup>3</sup>, Hala M. Al-Marzoug<sup>4</sup>, Anwar E. Ahmed<sup>5</sup>, Muhammed Bagha<sup>6</sup>

Address for Correspondence:

**Anwar E. Ahmed**

<sup>1</sup>College of Medicine, King Saud University, Riyadh, Saudi Arabia

<sup>2</sup>College of Applied Medical Sciences, University of Dammam, Dammam, Saudi Arabia

<sup>3</sup>College of Medicine, King Faisal University, Al Ahsaa, Saudi Arabia

<sup>4</sup>College of Medicine, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia

<sup>5</sup>College of Public Health and Health Informatics, King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia

<sup>6</sup>King Abdullah Specialist Children Hospital, King Abdulaziz Medical City, Riyadh, Saudi Arabia  
Email: ahmedan@ngha.med.sa; ahmeda5@vcu.edu

<http://dx.doi.org/10.5339/qmj.2015.12>

Submitted: 14 September 2015

Accepted: 03 December 2015

© 2015 Alharbi, Al-Shaia, Al-Hamam, Al-Marzoug, Ahmed, Bagha, licensee Bloomsbury Qatar Foundation Journals.

This is an open access article distributed under the terms of the Creative Commons Attribution license CC BY 4.0, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited

Cite this article as: Alharbi OA, Al-Shaia WA, Al-Hamam AA, Al-Marzoug HM, Ahmed AE, Bagha M. Attitude of Saudi Arabian adults towards consanguineous marriage, Qatar Medical Journal 2015;12 <http://dx.doi.org/10.5339/qmj.2015.12>

## ABSTRACT

**Background:** Research on the attitudes of Saudi adults towards consanguinity is scarce. The study aimed to explore the attitudes towards consanguinity and its associations with socio-demographic characteristics in a sample of Saudi adults.

**Methods:** A cross-sectional study was conducted using a self-administered questionnaire. A total of 386 outpatient waiting-area attendees at King Abdul-Aziz Medical City-Riyadh were included. Participants were asked about their socio-demographic characteristics, attitude towards consanguinity and the reasons behind this.

**Results:** The positive attitude towards consanguinity among the study respondents was 48.1% with 95% confidence interval (42.91 – 53.33%). Social and traditional culture (59.9%) were found to be the predominant reasons for favoring consanguinity in Saudi Arabia. Evidence against a positive attitude towards consanguinity was noted in respondents who received medical information about consanguinity versus those who had not received medical information (42.3% vs. 57%, p-value = 0.008). According to the multivariate logistic model, the odds of a positive attitude towards consanguinity were 2 times higher for males (adjusted odds ratio [aOR]: 2.2; 95% CI: 1.147, 4.290) and 4.1 times higher in respondents in consanguineous marriages (aOR: 4.1; 95% CI: 2.350, 7.156). The odds of a positive attitude towards consanguinity were 50% less in respondents who received health information on consanguinity compared to those who had not received health information about consanguinity (aOR: 0.50; 95% CI: 0.253, 0.863).

**Conclusion:** One in every two Saudi adults favors consanguinity however, Saudi men and women differ in their attitudes towards consanguinity. Receiving

health information on consanguinity was associated with a negative attitude towards this practice.

Keywords: consanguineous marriage, consanguinity, attitude, gender, Saudi Arabia

## INTRODUCTION

Consanguinity is an acquired Latin word with two parts: "con," which refers to the word "common," and "sanguineus," which points to the word "blood." By combining the two words, we have a word meaning "common blood".<sup>1</sup> Consanguinity is also defined as a coupling between males and females who both have common blood in the form of a common progenitor.<sup>2</sup> The prevalence of inbreeding is varied worldwide. In the United States, consanguineous marriages are illegal by law in the majority of the states.<sup>3</sup> In Europe, the rate of consanguinity is less than 0.5%.<sup>4</sup> In the Gulf region, many studies have reported a prevalence of more than 50% in Qatar, Kuwait, and the United Arab Emirates.<sup>5-7</sup>

In Saudi Arabia, a recent study was conducted to estimate the prevalence of consanguinity in thirteen provinces, including urban and rural areas. The overall prevalence of the types of consanguinity was found to be 56%. Moreover, this rate has been classified by the degree of spousal relationship. According to the authors, the prevalence of first-degree cousins was 33.6%, while the prevalence of other types of consanguineous marriages was 22.4%. It was also found that rural areas had a higher prevalence of consanguinity than in urban areas.<sup>8</sup> A similar finding was reported in Pakistan,<sup>9</sup> which shares similar cultural and tribal traits to Saudi Arabia, where two-thirds of the married population are in consanguineous marriages. Additionally, the reasons for favoring consanguinity were investigated in that study. The sociocultural reason was the predominant factor in favoring consanguinity. Other reasons that were reported included less expensive dowries, consolidation of family bonds and cultural traditions.<sup>9</sup>

Many studies have shown the association between consanguineous marriages and inherited diseases in offspring.<sup>10,11</sup> A study conducted in Saudi Arabia identified the association between the prevalent consanguinity in the Kingdom and common genetic diseases. According to this study, congenital heart diseases were strongly associated with inbreeding.<sup>12</sup> Offspring of consanguineous marriages have a high

probability of acquiring homozygous deleterious inherited factors, and thus have a higher possibility of developing autosomal recessive disorders. For instance, a study reported that first-cousin marriages tends to increase the risk of having a child with a recessive disorder.<sup>13</sup>

As the Middle East has the highest prevalence of consanguineous marriages, the attitude towards consanguineous marriages was reported to be favorable in various studies. In Qatar, females were reported to have a more positive attitude to consanguineous marriages than males. Also, respondents who had consanguineous parents were more likely to show a positive attitude towards consanguineous practices.<sup>14</sup> In Palestine, a positive attitude was found in a quarter of interviewed respondents.<sup>15</sup> In Iran, 30% of respondents had a positive attitude. Moreover, the positive attitude was reported to be higher in respondents who were male, with lower education, having parents with lower education and who were in support of a consanguineous marriage and having a family with highly practiced inbreeding.<sup>16</sup> Another study in Iran found that status of employment and ethnicity had an impact on attitude towards consanguinity.<sup>17</sup> In Western society, a positive attitude was found more in people who had consanguineous relationships with their spouses and in people who were not familiar with children acquiring hereditary diseases due to consanguinity.<sup>18</sup>

Understanding the attitude towards consanguinity and its predictors of socio-demographic characteristics will help to determine the societal need for educational programs and the best way of targeting information to people. Research on the attitude towards consanguinity in the Arab world is scarce, especially in the Gulf region where inbreeding is high. To the best of our knowledge, no previous study has been conducted in Saudi that addresses the relationship between attitude and age, receiving health information on the health risks of consanguinity in offspring and the sources of health information. The aim of our study was to explore the attitude of Saudi outpatient attendees of the King Abdul-Aziz Medical City in Riyadh towards consanguinity, its predictors, and the reasons it is favored in our society. We also aimed to assess the relationship between a positive attitude towards consanguineous marriages and socio-demographic characteristics.

## METHODS

A cross-sectional study was conducted using self-administered questionnaires. The study was approved by King Abdullah International Medical Research Center (KAIMRC). The subjects of the study were attendees in the waiting areas of the outpatient building at King Abdul-Aziz Medical City-Riyadh (KAMC-R). KAMC-R is a tertiary hospital established in 1983. It has been recognized as a distinguished healthcare provider in Saudi Arabia with a bed capacity of 690. It serves mainly Saudis who are affiliated to the National Guard Ministry and also serves their families. The attendees of KAMC-R represent a spectrum of different age groups and varying socio-demographic characteristics.

Both visitors and patients were recruited using a convenience sampling method. There were 386 net respondents (aged 18 years and above, as this reflects the legal age of marriage and engagement) with a response rate of 96.5%. The inclusion criteria were Saudi adults, visitors, and patients in the waiting areas of outpatient clinics, as it is the most crowded area of people in KAMC-R and represents people of different socio-demographic characteristics. There were two sections in the questionnaire. The first section comprised of 13 closed questions related to socio-demographic characteristics, which included age/year, gender (male, female), occupational status (employed, unemployed), marital status (married, unmarried), educational level of the participant (high school or less, university), educational level of the father and mother (high school or less, university), family income per month (< 1000 SR, > 1000 SR), presence of spousal consanguinity if married (relative, nonrelative), presence of parental consanguinity (relative, nonrelative), presence of any inherited diseases among the respondents or their families (yes, no), and having received any health information on the health risks related to consanguineous marriages (yes, no). We asked participants to report the source of the health information they had received, such as from doctors, friends, and social media. The second section included a question regarding their attitude towards supporting consanguineous marriage in Saudi Arabia, in the form of "Are you a supporter of consanguineous marriages in Saudi Arabia?" with the answer of "yes" or "no". Furthermore, we asked a question regarding the reasons behind supporting consanguinity in Saudi Arabia, in the form of "Why are consanguineous marriages culturally

favored in our society?" with the ability to choose from more than one answer of "social and traditional reasons; to live near to family; to strength family bonds; for financial reasons."

## STATISTICAL ANALYSES

The IBM Statistical Package for Social Sciences (SPSS® Inc., Chicago, IL) version 22.0, was used to carry out the required statistical analyses. Univariate analysis was performed for categorical data such as gender, attitude towards consanguineous marriages, etc., and were summarized using counts and percentages (Table 1). Bivariate analysis was performed for differences in positive attitude towards consanguineous marriages across gender, marital status, education levels, etc., and were assessed by Chi-square tests (Table 1). Multivariate analysis using a binary logistic model was employed to identify the factors associated with a positive attitude towards consanguineous marriages (Table 2). Furthermore, the logistic model was evaluated using the Hosmer and Lemeshow Test, McFadden's, Cox and Snell's and Nagelkerke's goodness-of-fit tests. The strength of the associations were assessed by the adjusted odds ratio (aOR).

## RESULTS

The mean age of the respondents was 34.1 years with a standard deviation of  $\pm 10.3$  years. Of 386 respondents, 50.1% were male. Approximately two-thirds of respondents had previously received medical information about consanguineous marriage, 47.4% had high school education or less, 55.6% were employed, and 80.5% were married. Regarding family income, 66.4% of the respondents reported a family income of less than 10,000 Saudi Riyals a month. Table 1 shows the other sample characteristics. A positive attitude towards consanguinity was shown by 48.1% (95%CI 42.9 – 53.3%) of the respondents. As indicated in Table 1, there was a significant difference in attitudes between genders, with males having a more positive attitude towards consanguineous marriage compared to females (57.8% vs. 38.0%,  $p$ -value = 0.001). In addition, consanguineous spouses had a more positive attitude towards supporting consanguineous marriages than non-consanguineous spouses (65.8% vs. 30.5%,  $p$ -value = 0.001). Respondents with consanguineously married parents had a significantly more positive attitude towards consanguinity compared to

Table 1. Attitude of Saudi Arabian adults towards consanguineous marriage across sample characteristics.

Characteristics	Levels	Overall N = 370		Positive 178 (48.1%)		Negative 192(51.9%)		P	OR(95%CI)
		%	%	%	%				
Gender	Male	50.1	57.8	42.2	0.001*	2.2(1.473 – 3.389)			
	Female	49.9	38.0	62.0		1			
Family income	< 10000 SR	66.4	49.8	50.2	0.441	1.2(0.768 – 1.834)			
	≥ 10000 SR	33.6	45.5	54.5		1			
Occupation	Employed	55.6	50.5	49.5	0.297	1.2(0.824 – 1.884)			
	Unemployed	44.4	45	55.0		1			
Marital status	Married	80.5	48.5	51.5	0.760	1.1(0.645 – 1.821)			
	Unmarried	19.5	46.5	53.5		1			
Education	High school or less	47.4	50.3	49.7	0.366	1.2(0.801 – 1.826)			
	University	52.6	45.5	54.5		1			
Father education	High school or less	81.5	49.7	50.3	0.297	1.3(0.779 – 2.258)			
	University	18.5	42.6	57.4		1			
Mother education	High school or less	85.3	48.9	51.1	0.306	1.4(0.750 – 2.489)			
	University	14.7	41.2	58.8		1			
Consanguineous marriages	Yes	50.3	65.8	34.2	0.001*	4.4(2.719 – 7.098)			
	No	49.7	30.5	69.5		1			
Family history of consanguinity	Yes	53.0	56.0	44.0	0.001*	2.1(1.354 – 3.147)			
	No	47.0	38.1	61.9		1			
Inherited disease	Yes	15.6	50.0	50	0.752	1.1(0.625 – 1.918)			
	No	84.4	47.7	52.3		1			
Family history of inherited disease	Yes	27.4	44.7	55.3	0.429	0.8(0.527 – 1.313)			
	No	72.6	49.2	50.8		1			
Have you ever received any medical information on consanguineous marriages?	Yes	66.1	42.3	57.7	0.008*	0.6(0.354 – 0.858)			
	No	33.9	57.0	43.0		1			
Source of health advice on consanguineous marriages? Doctor	Yes	32.3	53.8	46.3	0.022*	1.9(1.091 – 3.206)			
	No	67.7	38.3	61.7		1			

Table 1 – continued.

Characteristics	Levels	Overall N = 370		Positive 178 (48.1%)		Negative 192(51.9%)		P	OR(95%CI)
		%		%		%			
Friends	Yes	22.0		33.3		66.7		0.100	0.6(0.313 – 1.110)
	No	78.0		45.9		54.1			1
Social media	Yes	48.8		35.5		64.5		0.022*	0.6(0.331 – 0.918)
	No	51.2		50.0		50.0			1
Age (18–72years)	Mean ± SD	34 ± 10		33.6 ± 10.5		34.5 ± 9.9		0.427	1.0(0.972 – 1.012)

\*Chi-square test is significant at  $\alpha = 0.05$ .

non-consanguineous parents (56% vs. 38.1%, p-value = 0.001). The positive attitude towards consanguineous marriage was significantly less among respondents who had received health advice on the risks of consanguineous marriages in offspring than those who had not received any health advice on consanguineous marriages (42.3% vs. 57%, p-value = 0.008). Furthermore, respondents who had received health information from a social media source had a significantly less positive attitude towards consanguinity than those who had not received it from a social media source (35% vs. 50%, p-value = 0.022). The positive attitude towards consanguinity was significantly higher among respondents who had received health information from a doctor than those who had not received it from this source. However, family income, level of education, occupational status, age, marital status, and positive history of inherited disease had no significant association with a positive attitude towards consanguinity.

According to the sample, the predominant reason why Saudi society favors consanguineous marriage is attributed to social and traditional factors (59.9%). Other reasons were reported like living near to family (21%), to strengthen family bonds (36.1%) and for financial reasons (6.9%).

Table 2 displays the findings from binary logistic regression. It identifies the predictors of a positive attitude of Saudi Arabians towards consanguineous marriage. Gender and consanguineous marriages were associated with the attitude towards consanguinity. The study showed that the odds of a positive attitude towards consanguinity were 2.2 times higher for males compared to females (aOR: 2.2; 95% CI: 1.147, 4.290). The odds of positive attitude towards consanguinity were three times higher for respondents in consanguineous marriages than respondents not in consanguineous marriages (aOR: 4.1; 95% CI: 2.350, 7.156). Respondents who received health information from doctors were 50% less likely to display a positive attitude towards consanguinity than those who had not received information from doctors (aOR: 0.50; 95% CI: 0.253, 0.863). We evaluated the goodness-of-fit of the logistic model, the p-value of Hosmer and Lemeshow test was 0.655 (Chi-square = 5.934). The goodness-of-fit test revealed that our final model fits the data well. Furthermore, other goodness-of-fits of the final model were measured such as Cox & Snell (R-square = 0.189) and Nagelkerke (R-square = 0.252).

Table 2. Factors associated with a positive attitude of Saudi Arabians towards consanguineous marriage.

Factors	Reference	B	S.E.	P	OR	95% C.I. for OR	
						Lower	Upper
Age		-0.01	0.02	0.616	1.0	0.962	1.023
Male	Female	0.80	0.34	0.018*	2.2	1.147	4.290
Income < 10000 SR	≥ 10000 SR	0.30	0.33	0.356	1.4	0.713	2.560
Employed	Unemployed	0.15	0.35	0.670	1.2	0.585	2.298
Married	Unmarried	0.24	0.85	0.777	1.3	0.240	6.741
High school or less	University	-0.29	0.32	0.366	0.7	0.395	1.409
High school or less	University	0.15	0.41	0.722	1.2	0.517	2.595
High school or less	University	0.24	0.45	0.596	1.3	0.526	3.058
Consanguineous marriages	No	1.41	0.28	0.001*	4.1	2.350	7.156
Family history of consanguinity	No	0.30	0.28	0.289	1.4	0.774	2.360
Inherited disease	No	0.15	0.43	0.726	1.2	0.503	2.684
Family history of inherited disease	No	-0.42	0.35	0.233	0.7	0.328	1.312
Received medical information on consanguineous marriages	No	-0.76	0.31	0.015*	0.5	0.253	0.863
Constant		-1.18	1.06	0.264	0.3		

\*Wald Chi-square test is significant at  $\alpha = 0.05$ .

## DISCUSSION

Consanguinity is a worldwide issue, but particularly so in the Middle East. Saudi Arabia was ranked as the second highest Arab country to have a high frequency of consanguineous marriage, with the prevalence varying in different studies from 22–55%.<sup>2</sup> Exploring the attitude towards consanguineous marriages and its health-related issues among Saudis is an attempt to clarify such a problem and suggest some solutions. In this study, the positive attitude towards consanguinity among the respondents was high, with approximately half of the respondents having a positive attitude towards consanguinity.

A study conducted in Turkey among high school students assessed students' knowledge and attitudes before and after a training program on consanguinity, and changes were noted in their attitudes towards consanguinity after the training program. However, some students had not changed their attitude. They queried this and found influences preventing students from changing their attitude such as the influence from their parents.<sup>19</sup> Our study showed that respondents who received medical information had a less-positive attitude towards supporting consanguinity. This could point to the significant association between educational sessions and attitude changes.

This finding could be further implicated by creating educational activities and programs for people at the age of marriage and those intending on marriage, in order to determine the influence this would have on their attitude towards consanguinity and then on the type of marriage they would choose.

Our study reported that receiving health information on consanguinity was an important modifiable risk factor for negative attitude towards consanguinity. The source of medical information has been shown to be correlated with the attitude towards consanguinity. For example, social media had been shown in different studies to be effective in increasing awareness, especially in areas where people do not have access to specialized knowledge or experience, and aids in constructing and changing of attitude towards different health issues.<sup>20–22</sup> In turn, this could be implicated in increasing awareness on consanguinity and subsequently could result in attitude changes towards it. Unexpectedly, people who received medical information from doctors about the health risk of consanguinity in offspring were more likely to have a positive attitude compared to people who had not received medical information from doctors. This raises a question of the reason behind that, which needs to be thoroughly investigated in further research.

A study conducted in Iran, which has a similar prevalence of consanguinity to our study, on gender: the positive attitude towards consanguinity between males and females was found to be similar to our result.<sup>23</sup> People in consanguineous marriages were more likely to have a positive attitude compared to people in non-consanguineous marriages. This finding has similarly been reported in a Western society, which showed the important association between positive attitude and consanguineous marriage, as a positive attitude may reflect on the decision in marrying consanguineously.<sup>18</sup>

Another study conducted in Iran found a significant correlation between young people's attitude towards consanguineous marriages and their level of education.<sup>16,23</sup> However, we did not find a significant relationship between positive attitude towards consanguineous marriage and education. The higher tendency towards inbreeding could be associated with more traditional beliefs and reasons related to strengthening or developing family ties.<sup>9,24</sup> This might be illustrated by the important role extended family plays in convincing children to accept consanguinity as a means of increasing family ties.<sup>19,25</sup> The Saudi sample has been investigated to understand the reasons for people favoring consanguinity in this society. There were several reasons, but social and traditional factors were the predominant reasons for favoring consanguinity in Saudi Arabia. This may be attributed to the preservation of ongoing tribal habits as illustrated in a study in Pakistan which has similar cultural and tribal traits to Saudi Arabia.<sup>9</sup>

There were several limitations in our study.

The findings were based on a cross-sectional study therefore, association does not necessarily mean causation. Care must be taken in interpreting and generalizing the findings of this study. Another important limitation is the use of the convenience sampling method. However, we noted an important finding that the male gender is one factor that favors consanguinity. Likewise, a consanguineous spouse may favor consanguinity.

## CONCLUSION

The study sample has demonstrated that approximately one in every two Saudi adults favors consanguineous marriage. Saudi men and women differ in their attitudes towards consanguineous marriage. A large national survey of public attitudes in Saudi Arabia is needed in order to address the attitudes towards consanguinity in various regions and cultures. Receiving health information on consanguinity was associated with a negative attitude towards consanguinity. Future studies are warranted to investigate the effect of educational programs, social media, and public health policies on the attitudes of Saudi adults towards consanguinity.

## COMPETING INTERESTS

None.

## FUNDING

None.

## REFERENCES

1. Joseph N, Pavan KK, Ganapathi K, Apoorva P, Sharma P, Jhamb JA. Health awareness and consequences of consanguineous marriages: A community-based study. *J Prim Care Community Health*. 2015;6(2):121 – 127.
2. Warsy AS, Al-Jaser MH, Albdass A, Al-Daihan S, Alanazi M. Is consanguinity prevalence decreasing in Saudis?: A study in two generations. *Afr Health Sci*. 2014;14(2):314 – 321.
3. Ottenheimer M. Forbidden relatives: The American myth of cousin marriage. University of Illinois Press: Chicago, Illinois. 1996.
4. Bittles AH. A community genetics perspective on consanguineous marriage. *Community Genet*. 2008;11:324 – 330.
5. Bener A, Alali KA. Consanguineous marriage in a newly developed country: The Qatari population. *J Biosoc Sci*. 2006;38:239 – 246.
6. Al-Awadi SA, Moussa MA, Naguib KK, Farag TI, Teebi AS, El-Khalifa M. Consanguinity among the Kuwaiti population. *Clin Genet*. 1985;27:483 – 486.
7. Al-Gazali LI, Bener A, Abdulrazzaq YM, Micallef R, Al-Khayat AI, Gaber T. Consanguineous marriages in the United Arab Emirates. *J Biosoc Sci*. 1997;29:491 – 497.
8. El-Mouzan MI, Al-Salloum AA, Al-Herbish AS, Qurachi MM, Al-Omar AA. Regional variations in the prevalence of consanguinity in Saudi Arabia. *Saudi Med J*. 2007;28(12):1881 – 1884.

9. Hussain R. Community perceptions of reasons for preference for consanguineous marriages in Pakistan. *J Biosoc Sci.* 1999;31(4):449 – 461.
10. Al Husain M, Al Bunyan M. Consanguineous marriages in a Saudi population and the effect of inbreeding on prenatal and postnatal mortality. *Ann Trop Paediatr.* 1997;17:155 – 160.
11. Al-Abdulkareem AA, Ballal SG. Consanguineous marriage in an urban area of Saudi Arabia: Rates and adverse health effects on the offspring. *J Community Health.* 1998;23:75 – 83.
12. El Mouzan MI, Al Salloum AA, Al Herbish AS, Qurachi MM, Al Omar AA. Consanguinity and major genetic disorders in Saudi children: A community-based cross-sectional study. *Ann Saudi Med.* 2008;28(3):169 – 173.
13. Hamamy H, Antonarakis SE, Cavalli-Sforza LL, Temtamy S, Romeo G, Kate LP, Bennett RL, Shaw A, Megarbane A, van Duijn C, Bathija H, Fokstuen S, Engel E, Zlotogora J, Dermitzakis E, Bottani A, Dahoun S, Morris MA, Arsenault S, Aglan MS, Ajaz M, Alkalamchi A, Alnaqeb D, Alwasiyah MK, Anwer N, Awwad R, Bonnefin M, Corry P, Gwanmesia L, Karbani GA, Mostafavi M, Pippucci T, Ranza-Boscardin E, Reversade B, Sharif SM, Teeuw ME, Bittles AH. Consanguineous marriages, pearls and perils: Geneva International Consanguinity Workshop Report. *Genet Med.* 2011;13:841 – 847.
14. Sandridge AL, Takeddin J, Al-Kaabi E, Frances Y. Consanguinity in Qatar: Knowledge, attitude and practice in a population born between 1946 and 1991. *J Biosoc Sci.* 2010;42:59 – 82.
15. Jaber L, Romano O, Halpern GJ, Livne I, Green M, Shohat T. Awareness about problems associated with consanguineous marriages: Survey among Israeli Arab adolescents. *J Adolesc Health.* 2005;36:530.
16. Sedehi M, Keshtkar AA, Golalipour MJ. The knowledge and the attitude of youth couples on/towards consanguineous marriages in the North of Iran. *JCDR.* 2012;6:1233 – 1236.
17. Hosseini H, Erfani A. Ethnic differences in the attitudes and practice of consanguineous marriage among Kurds and Turks in Uromiyeh District, Iran. *Journal of Comparative Family Studies.* 2014;45(3): 389 – 403.
18. Teeuw ME, Loukili G, Bartels EA, ten Kate L, Cornel MC, Henneman L. Consanguineous marriage and reproductive risk: Attitudes and understanding of ethnic groups practising consanguinity in Western society. *Eur J Hum Genet.* 2014;22(4):452 – 457.
19. Kisioglu AN, Ormeci AR, Uskun E, Ozturk M, Ongel K. Effects of a formal training programme on consanguineous marriages on high school students' knowledge and attitudes: An interventional study from Turkey. *J Biosoc Sci.* 2010;42:161 – 176.
20. D'Alessandro AM, Peltier JW, Dahl AJ. A large-scale qualitative study of the potential use of social media by university students to increase awareness and support for organ donation. *Prog Transplant.* 2012;22(2):183 – 191.
21. Happer C, Philo G. The role of the media in the construction of public belief and social change. *Journal of Social and Political Psychology.* 2013;1(1):321 – 336.
22. Petrella R, Speechley M, Kleinstiver PW, Ruddy T. Impact of a social marketing media campaign on public awareness of hypertension. *Am J Hypertens.* 2005;18(2):270 – 275.
23. Hasanzadeh-Nazarabadi M, Rezaeetalab G, Dastfan F. Study of youths' knowledge, behavior, and attitude towards consanguineous marriages. *Iranian J Public Health.* 2006;35(3):47 – 53.
24. Khlaf M. Consanguineous marriages in Beirut: Time trends, spatial distribution. *Soc Biol.* 1988; 35(3 – 4):324 – 330.
25. Shelkamy F, Alaael-din SM, Kotb S, Sharkawy SA. Knowledge and attitude of students living in Assiut University dorms about consanguinity. *The Medical Journal of Cairo University.* 2013;81(2).