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Knowledge, Attitude, and Satisfaction of University Students Regarding Premarital Screening Programs in Kuwait

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ABSTRACT

The prevalence of genetic blood disorders is high, ranging from 10-25%, in Kuwait. This high prevalence is mainly due to a preventable cause, namely, consanguineous marriages. One of the most successful programs in Kuwait implemented to reduce such high prevalence is premarital screening program. The aim of the study was to determine the level of knowledge, attitude and satisfaction among university students regarding premarital screening program, and to find out the factors influencing knowledge, attitude, and satisfaction of the people toward premarital screening program. A cross-sectional study was conducted among 809 students of Kuwait University during July-October 2016. A self-administered questionnaire including 51 questions was handed out to the participants after taking informed consent. The main outcome variables of this study were: knowledge of hereditary diseases, premarital screening, attitude, and satisfaction toward premarital screening program. The mean ± SD of knowledge score about hereditary diseases was 5.80 ± 2.9 out of a total of 14, and the knowledge score for premarital screening was 3.99 ± 1.2 out of 6. In univariate analysis, knowledge scores about hereditary diseases were significantly associated with marital status ($P = 0.043$), education in medical faculties ($P < 0.001$), higher education of father ($P = 0.027$), higher education of mother ($P = 0.001$), and presence of hereditary disease in the family ($P = 0.003$). The level of attitude toward premarital screening program was significantly associated with female gender ($P < 0.001$), marital status ($P = 0.023$), higher years of study ($P = 0.002$), higher family income ($P = 0.019$). In multivariate analysis, education in medical faculties and presence of hereditary disease in the family were significant predictors of knowledge about hereditary disease. This study identified some demographic factors which determined the outcome of knowledge about premarital screening and hereditary disease. Also, the study demonstrated that more than 90% of the people were not satisfied about the premarital screening program, and more than 70% had to wait for a long time before receiving the test results. These areas of dissatisfaction should be improved for a successful program.

Keywords: knowledge, attitudes, university students, premarital screening, hereditary diseases

INTRODUCTION

Genetic blood disorders are chronic in nature, thus creating a major public health problem that burdens the health care systems and significantly affect the quality of life of the involved patients and their families. Transmission of hereditary diseases occurs through specific patterns: it is either X-linked, autosomal dominant or autosomal recessive. The autosomal recessive transmission happens only if both parents carry the same defective

gene. Globally, many surveys have concluded that at least 2 in every 1,000 neonates have autosomal recessive disorders (Abdel-Meguid et al., 2000).

Sickle cell anemia and thalassemia major are the most common inherited hemoglobinopathies and are a major public health problem worldwide (Old, 2009). The prevalence of genetic diseases in the member countries of Gulf Cooperation Council (GCC) is high in comparison with rates in Europe and North America. Hemoglobinopathies, G6PD deficiency, inborn errors of metabolism, congenital hypothyroidism, deafness, and Down's syndrome represent the most prevalent genetic diseases in the GCC countries (Al-Jasir et al., 2009).

Sickle cell gene, thalassemia and red cell enzymopathies are the major contributors to genetic diseases in Saudi Arabia (Al-Arrayed et al., 1997). In Kuwait, the prevalence of genetic blood disorders is high, and according to preliminary epidemiological studies the carrier rate for sickle cell anemia is around 10% to 25% (Al-Arrayed et al., 2003). It is estimated that 70% of patients presented with birth defects in Kuwait had inherited genetic defects. Of these, 45% were autosomal recessive disorders or unknown disorders with a family pattern suggestive of autosomal recessive inheritance (Teebi, 1994). A higher frequency of genetic diseases was found in the first-(6.97%; $p < 0.001$), second- (6.78%; $p < 0.001$), and third-cousin (6.46%; $p = 0.022$) couples' offspring compared with those of non-consanguineous couples (Al-Kandari and Crews, 2011).

Consanguinity is an important issue in the Arab region where, in comparison to other populations, there is a strong preference for consanguineous unions, most frequently contracted between the first cousins (Bittles, 2001). The prevalence of such marriages differs across the Arab region. For example, in the south of Egypt it constitutes 70% of the marriages while it represents 34% in the urban areas. A total of 5,007 Kuwaitis were ascertained to study the incidence of consanguineous marriages during 1983. The rate of consanguineous mating was found to be 54.3% with estimated population incidence rates varying from 52.9 to 55.7% (Al-Awadi et al., 1985). In Qatar, the rate of overall consanguinity was 51-54% and that of first-cousin marriage was 33.5%. In Saudi Arabia, the rate of overall consanguinity was 57.7% and the first-cousin consanguinity was 31% (Al-Jasir et al., 2009). In Bahrain, there has been a significant reduction in the rate of consanguineous marriage from 39% to 20% over 18 years after the introduction of the genetic preventive campaign program implemented in 1980s. This reduction in consanguinity was accompanied by corresponding decrease in the prevalence of genetic diseases in the country (Al-Arayyed et al., 2007).

Mandatory premarital screening program have been implemented into high-risk populations worldwide since the 1970's (McGeorge and Carlson, 2006; Wang et al., 2013) with a remarkable success. The success of thalassemia control program of Cyprus is a promising example of how measures such as health education, carrier screening, premarital counseling and prenatal diagnosis can reduce the incidence of B-thalassemia major (Saxena and Phadke, 2002). Similarly, in Turkey, the four years result of the premarital screening program was reported to be a very useful and effective way of controlling thalassemia major (Keskin et al., 2000). In Saudi Arabia, complete blood count, sickle cell test, and hemoglobin-electrophoresis were used in the premarital screening, resulting into more than 70% reduction of the prevalence of B-thalassemia during the period of 2004 – 2009 (Memish and Saeedi, 2011).

In order to avoid the financial, psychological and social burdens that are usually present among families with children affected by genetic and chronic infectious diseases, the State of Kuwait passed the Premarital Law No. 31/2008 which mandates the premarital screening to maintain protection against diseases that can be transmitted by marriage (Ministry of Health, Kuwait, 2008).

The aims of the study were twofold: 1) to assess the knowledge, attitude, and satisfaction of university students regarding the premarital screening program in Kuwait; and 2) to determine the socio-demographic factors modifying the knowledge about hereditary diseases and premarital screening programs.

METHOD

Study Design and Population

This was a cross-sectional study that was conducted among students of Kuwait University. The faculties in Kuwait University included in the study were: Medicine, Dentistry, Nursing and Allied Health as medical-based colleges; and Faculty of Education, Social Educations, Law, Engineering and Shari'a as non-medical-based colleges. This study included both Kuwaitis and non-Kuwaitis of either gender, irrespective of their marital status. The study targeted university students because the mean age at marriage for Kuwaiti males and females was about 26 and 24 years, respectively (Shah, 2010).

The research proposal was approved by the Ethics Committee of Health Science Center, Kuwait University, and the Ministry of Health. An informed consent was obtained from all the participants before enrollment.

Questionnaire and Data Collection Procedure

Data was collected using a pre-tested closed-ended structured questionnaire comprising of 51 questions. Participants were asked to complete a self-addressed questionnaire which took about 10 minutes to fill out. The student researcher was available to answer any questions while completing the questionnaire. The questionnaire was initially formulated in English then translated into Arabic which is the spoken language of the target population. The questionnaire included the following components: Part A: Questions related to socio-demographic characteristics of the participants (14 questions); Part B: Questions to assess knowledge of hereditary diseases, premarital screening and genetic counseling programs (25 questions; yes/no/don't know format); Part C: Questions to assess attitude toward premarital screening program (6 questions in a 5-point Likert Scale); and Part D: Questions to assess satisfaction about premarital screening program for married only (6 questions in a 5-point Likert Scale).

Questions related to knowledge and attitude were asked to both married and unmarried people; however, the satisfaction questions were only for those who were married. Pilot testing of the questionnaire was done among 20 participants at the Faculty of Engineering to verify the acceptance and to ensure coherence of the questionnaire.

Statistical Methods

Data was entered and analyzed using IBM SPSS Statistics for Windows, Version 23.0 (Armonk, NY: IBM Corp). Descriptive analysis was performed for socio-demographic variables and for variables related to knowledge about hereditary diseases. Chi-square test was used to test the significance between different categorical variables. For each correct answer of the knowledge questions, participants were given 1 point and for each incorrect or "don't know" answers he/she received "0" point. A composite score of knowledge was calculated for the total knowledge scores. To distinguish participants with different levels of knowledge (poor or satisfactory), the score was recorded into categories according to a prior cutoff point based on quartiles in which the first quartile represented the poor and the remaining represented the satisfactory score.

The participants' knowledge about hereditary diseases was assessed through a score based on the responses to 14 questions. A score from 0 to 4 reflected poor knowledge, whereas a score from 5 to 14 reflected satisfactory knowledge. The knowledge of premarital screening (PMS) program was assessed through a score based on the responses to 6 questions. A score from 0 to 3 reflected poor knowledge, whereas a score from 4 to 6 reflected satisfactory knowledge of PMS.

The participants' attitude toward premarital screening was assessed through a score based on the responses to 6 attitudinal statements on the form of five to one points Likert scale. A prior cutoff point was selected at the first quartile value which was 20. A score from 6 to 20 reflected unfavorable attitudes whereas a score of 21 to 30 reflected favorable attitude.

The participant's satisfaction toward premarital screening was assessed through a score based on the responses to 6 satisfaction statements on a five-point Likert scale. A prior cutoff point was selected at the first quartile value which was 20. A score from 6 to 20 reflected poor response whereas a score of 21 to 30 reflected satisfactory response.

The main outcome variables in this study were the knowledge of both hereditary diseases and premarital screening program and attitude toward premarital screening program. The determinants of knowledge score and attitude were assessed using univariate analysis and then multivariate model to control for confounders. A p-value of 0.05 or less and 95% confidence internals were used for statistical significance.

Estimation of Sample Size

The sample size was estimated using a software called GPower, version 3.0.10. Since there was no published data about the prevalence of knowledge regarding premarital screening and genetic counseling programs in Kuwait, the prevalence of such information was obtained from Saudi Arabia which represented a similar society. The proportion of people having knowledge about premarital screening was 21.9% and 35% among males and females, respectively (Al-Aama et al., 2008). With a 95% confidence interval, a precision of 5%, and 80% power, the estimated sample size was 737. With a 10% dropout sample size was 810.

RESULTS

A total of 850 students who fulfilled the eligibility criteria were approached; of them 810 participated in the study, yielding a response rate of 95%. One of them was dropped from the analysis because of having incomplete information.

Table 1. Socio-demographic characteristics of Kuwait university students (n = 809)

Socio-demographic characteristics		Frequency	
		N	%
Age	mean age (±SD)	21.27 (3.71)	
	<20	234	28.9
	20-24	498	61.6
	≥25	77	9.5
Gender	Male	292	36.1
	Female	517	63.9
Nationality	Kuwaiti	723	89.4
	Non-Kuwaiti	86	10.6
Marital status	Married /Divorced/Widowed	161	19.9
	Not married	648	80.0
Faculty of Education	Medical	92	11.4
	Non-medical	717	88.6
Year of study	1-2	301	37.2
	≥3	508	62.8
No. of siblings including participant	≤3	96	12.2
	4-7	504	63.8
	≥8	190	24.0
Father's education Level	High School and Less	354	44.1
	Diploma and More	448	55.9
Mother's education Level	High School and Less	340	42.4
	Diploma and More	462	57.6
Family monthly Income (KD)	Less than 1000	57	7.3
	1000 to <1500	239	30.5
	1500 to <2000	214	27.3
	2000 or more	273	34.9
Is your spouse related to you (cousin or other)?	Yes, cousin	51	33.1
	Yes, other	37	24.0
	No	66	42.9
Are your parents related (cousin or other)?	Yes	369	45.9
	No	435	54.1
Family origin	Badoo	440	59.9
	Hather	295	40.1
Does anyone in your family have inherited disease?	Yes	326	41.4
	No	461	58.6

Socio-demographic Data

Table 1 shows that the participants were young adults with a mean ± SD age of 21.27 ± 3.7 years; the majority (64%) were females, and 89% were Kuwaitis. The predominant number of participants (88.6%) were from non-medical faculties, and 11% represented medical faculties. About 63% had their college education of 3 years or more. More than 50% of the parents had diploma or more education. More than 62% had a monthly income of KD 1,500 or more (US$ 4,950 or more). Of the family origin, about 60% were Badoos.

Interestingly, 57% of the participants mentioned that their spouses were their first cousins or otherwise related, and 46% of their parents were also related (cousin or other). Approximately, 41% of the participants also mentioned that they had someone in their family suffering from an inherited disease.

Knowledge about Hereditary Disease

The mean ± SD of knowledge score about hereditary diseases was 5.80 ± 2.9 out of a total of 14. About 89% mentioned correctly that consanguinity marriage leads to hereditary diseases; 59% mentioned that sickle cell disease is hereditary; and 31% identified thalassemia as a hereditary disease (Figure 1). However, about one-third of the people were incorrect in their statement that gastritis, and gonorrhea are hereditary diseases, and that pregnancy complications, X-ray during pregnancy, and hypertension lead to hereditary diseases. Although a majority (65%) believed that hereditary diseases are preventable, only 13% mentioned that they are curable. The knowledge scores were significantly higher among the students of medical faculties compared to those of non-medical faculties ($P < 0.001$) (Figure 2).

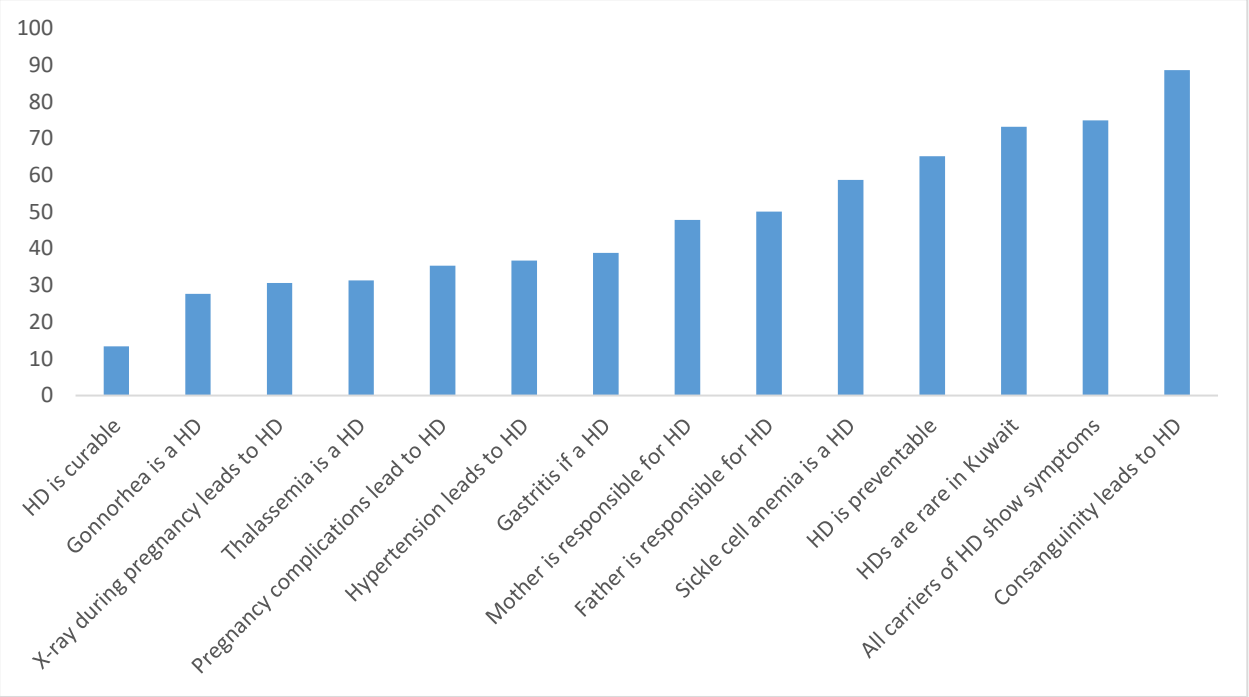

Figure 1. Knowledge about hereditary disease (HD). Numbers are in percentage.

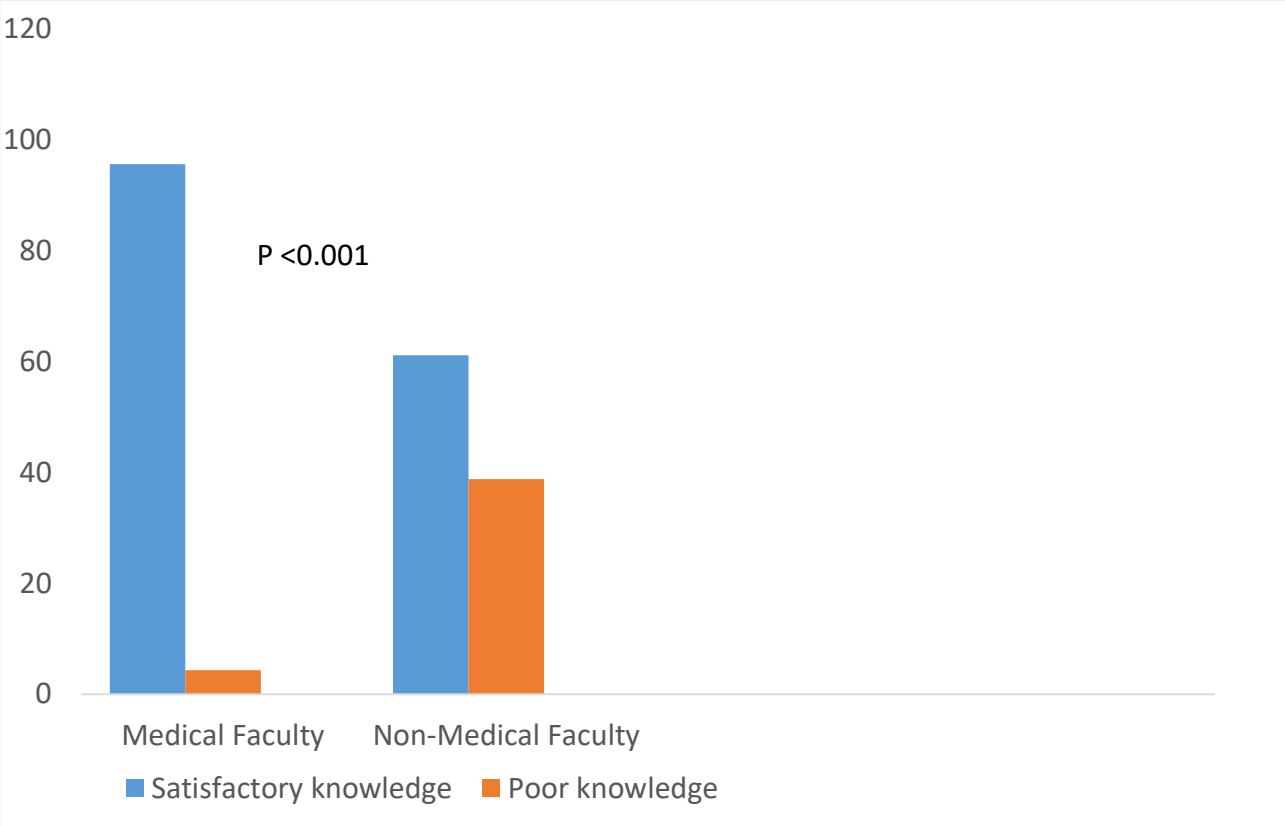

Figure 2. Knowledge about hereditary diseases among medical and non-medical faculty students. Numbers are in percentage.

Table 2 shows that several sociodemographic variables were significantly associated with a higher knowledge score about hereditary diseases: unmarried vs. married people (66.9% vs. 58.4%, P = 0.04); medical faculty vs. non-medical faculty (95.7% vs. 61.2%, P <0.001); father's education of diploma and more vs. high school or less education (68.4 vs. 60.9%, P = 0.0277); mother's education diploma or more vs. high school or less education (70.3% vs. 58.7%, P = 0.001); and presence of a hereditary disease in the family vs. no such diseases (72% vs. 62%, P = 0.003).

Table 2. Relationship between knowledge about hereditary diseases and socio-demographic factors among Kuwait university students

Socio-demographic factors		Poor		Satisfactory		P-value
		N	%	N	%	
Age	<20	85	37.9	139	62.1	0.097
	20-24	160	32.2	337	67.8	
	≥25	33	42.9	44	57.1	
Gender	Male	105	36.5	183	63.5	0.470
	Female	173	33.9	337	66.1	
Nationality	Kuwaiti	249	35.0	463	65.0	0.818
	Non-Kuwaiti	29	33.7	57	66.3	
Marital status	Married/Divorced/widowed	67	41.6	94	58.4	0.043
	Not married	211	33.1	426	66.9	
Faculty of education	Medical	4	4.3	88	95.7	0>.001
	Non-medical	274	38.8	432	61.2	
Year of study	1-2	111	38.1	180	61.9	0.137
	≥3	167	32.9	340	67.1	
Father's education level	High School and Less	137	39.1	213	60.9	0.027
	Diploma and More	140	31.6	303	68.4	
Mother's education level	High School and Less	138	41.3	196	58.7	0.001
	Diploma and More	136	29.7	322	70.3	
Family monthly income (KD)	Less than 1000	18	32.7	37	67.3	0.088
	1000 to <1500	98	41.4	139	58.6	
	1500 to <2000	72	34.1	139	65.9	
	2000 or more	84	30.8	189	69.2	
Does anyone in your family suffer from any inherited diseases?	Yes	91	27.9	235	72.1	0.003
	No	176	38.2	285	61.8	

Table 3. Relationship between level of knowledge about premarital screening program and socio-demographic factors among Kuwait university students

Socio-demographic factors		Poor		Satisfactory		P-value
		N	%	N	%	
Age	<20	69	35.9	123	64.1	0>.001
	20-24	137	29.7	324	70.3	
	≥25	6	8.2	67	91.8	
Gender	Male	98	38.0	160	62.0	>0.001
	Female	114	24.4	354	75.6	
Nationality	Kuwaiti	183	28.1	469	71.9	0.046
	Non-Kuwaiti	29	39.2	45	60.8	
Marital status	Married/Divorced/widowed	19	12.5	133	87.5	>0.001
	Not married	193	33.6	381	66.4	
Faculty of education	Medical	28	32.2	59	67.8	0.514
	Non-medical	184	28.8	455	71.2	
Year of study	1-2	91	35.3	167	64.7	0.008
	≥3	121	25.9	347	74.1	
No. of siblings including participant	≥3	31	37.8	51	62.2	0.003
	4-7	143	31.1	317	68.9	
	≥8	33	19.3	138	80.7	
Father's education level	High School and Less	86	27.2	230	72.8	0.295
	Diploma and More	125	30.8	281	69.2	
Mother's education level	High School and Less	69	22.6	236	77.4	0.001
	Diploma and More	142	34.1	274	65.9	
Family monthly income (KD)	Less than 1000	13	28.3	33	71.7	0.789
	1000 to <1500	58	27.5	153	72.5	
	1500 to <2000	61	31.6	132	68.4	
	2000 or more	72	27.8	187	72.2	
Does anyone in your family suffer from any inherited diseases?	Yes	76	25.0	228	75.0	0.033
	No	135	32.3	283	67.7	

Knowledge about Premarital Screening Program

Ninety two percent (727/789) had heard about premarital screening. When asked about the sources of the information, many had multiple answers: friends or relatives (91%), media (70%), health workers (33%), and school (55%). The knowledge score for premarital screening was 3.99 ± 1.2 out of 6. According to **Table 3**, factors that were significantly associated with a better knowledge score about premarital screening program were: older age (P <0.001), female gender (P < 0.001), Kuwaiti nationality (P = 0.046), marital status (P < 0.001), higher years of

Table 4. Relationship between level of attitude toward premarital screening program and socio-demographic factors among Kuwait university students

Socio-demographic factors		Poor		Satisfactory		P-value
		N	%	N	%	
Age	<20	36	17.9	165	82.1	0.239
	20-24	62	13.1	412	86.9	
	≥25	12	16.7	60	83.3	
Gender	Male	58	21.5	212	78.5	<0.001
	Female	52	10.9	425	89.1	
Nationality	Kuwaiti	93	13.9	574	86.1	0.081
	Non-Kuwaiti	17	21.2	63	78.8	
Marital status	Married/Divorced/widowed	13	8.8	135	91.2	0.023
	Not married	97	16.2	502	83.8	
Faculty of education	Medical	10	11.1	80	88.9	0.302
	Non-medical	100	15.2	557	84.8	
Year of study	1-2	53	20.1	211	79.9	0.002
	≥3	57	11.8	246	88.2	
Father's education level	High School and Less	48	15.3	266	84.7	0.694
	Diploma and More	61	14.3	367	85.7	
Mother's education level	High School and Less	48	15.6	259	84.4	0.541
	Diploma and More	61	14.0	374	86.0	
Family monthly income (KD)	Less than 1000	12	25.0	36	75.0	0.019
	1000 to <1500	36	16.5	182	83.5	
	1500 to <2000	31	15.9	164	84.1	
	2000 or more	26	9.8	238	90.2	
Does anyone in your family suffer from any inherited diseases?	Yes	42	13.6	267	86.4	0.547
	No	66	15.2	369	84.8	

study (3 years or more) (P = 0.008); more number of siblings (P = 0.003), mother's education of diploma and higher (P = 0.001), and presence of hereditary disease in the family (P = 0.033).

Attitude towards Premarital Screening Program

The majority opined that 1) they should not be comfortable before doing premarital screening test (92%); 2) premarital screening does not conflict with customs and tradition (83%); 3) premarital screening does not conflict with the religion (83%); and 4) premarital screening is not against the principle of confidentiality (88%). Twenty eight percent (196/709) mentioned that premarital screening tests can decrease the burden of disease in the society. Only 14% opined against premarital screening. It is also important to mention that 40% were in agreement that "the results of premarital screening should not influence my marriage decision".

In univariate analysis (**Table 4**), female gender (P = <0.001), marital status (P = 0.023), higher years of study (P = 0.002), and higher income (P = 0.019) were significantly associated with better attitude score toward premarital screening program.

Satisfaction Regarding Premarital Screening Program

In general, the people were not satisfied regarding premarital screening program. The major areas of dissatisfaction included: 1) the health workers did not explain the procedure of the premarital screening program (56%); 2) the procedure was not smooth and free of complications (85%); 3) had to wait for a long time before receiving the test results (71%); and 4) not satisfied in general about the program (93%).

Multivariate Analysis

In multiple logistic regression analysis, a better knowledge about hereditary diseases was significantly predicted by education in medical faculties (adjusted OR = 12.74, 95% CI = 4.39, 36.94), if parents were not related (cousin or other) (adjusted OR = 1.41, 95% CI = 1.01, 1.98), and presence of any hereditary disease in the family (adjusted OR = 1.42, 95% CI = 1.00, 2.02), after adjusting for other demographic variables including age, gender, marital status, number of siblings, parents' education, family income, and family origin (Badoo or Hather) (**Table 5**). Only one variable, spouse being not related (cousin or other) was significantly associated with knowledge about premarital screening program (adjusted OR = 5.29, 95% CI = 1.09, 25.75), after adjusting for other demographic variables (**Table 6**).

Table 5. Relationship between knowledge about hereditary diseases and socio-demographic factors among Kuwait university students using multivariable logistic regression

Socio-demographic factors			N	Adjusted odds ratio[a]	(95% CI)	P-value
Faculty of education	Medical		92	12.74	(4.39, 36.94)	0>.001
	Non-medical	Reference	717	1.0		
Year of study	1-2	Reference		1.0		
	≥3			1.42	(0.86, 2.36)	0.175
Are your parents related (cousin or other)?	Yes	Reference	369	1.0		
	No		435	1.41	(1.01, 1.98)	0.046
Does anyone in your family suffer from any inherited diseases?	Yes		326	1.42	(1.00, 2.02)	0.05
	No	Reference	461	1.0		

[a]Adjusted for age, gender, nationality, marital status, number of siblings, parents' education, family income, and family origin (Badoo or Hather). CI = confidence intervals.

Table 6. Relationship between knowledge about premarital screening program and socio-demographic variables among Kuwait university students using multivariable logistic regression

Socio-demographic factors			N	Adjusted odds ratio[a]	(95% CI)	P-value
Does anyone in your family suffer from any inherited disease?	Yes		326	1.99	(0.57, 6.97)	0.282
	No	Reference	461	1.0		
Is your spouse related to you (cousin or other)?	Yes	Reference	88	1.0		
	No		66	5.29	(1.09, 25.75)	0.039
Are your parents related (cousin or other)?	Yes	Reference	369	1.0		
	No		435	2.16	(0.62, 7.50)	0.226
Family origin	Badoo	Reference	440	1.0		
	Hather		295	1.45	(0.20, 10.40)	0.710

[a]Adjusted for age, gender, nationality, marital status, number of siblings, parents' education, and family income. CI = confidence intervals.

Table 7. Relationship between level of attitude toward premarital screening program and socio-demographic variables among Kuwait university students using multivariable logistic regression

Socio-demographic factors			N	Adjusted odds ratio[a]	(95% CI)	P-value
Gender	Male	Reference	292	1.0		
	Female		517	2.23	(1.33, 3.73)	0.002
Year of study	1-2	Reference	301	1.0		
	≥3		508	2.65	(1.35, 5.21)	0.005
Family monthly Income (KD)	Less than 1000	Reference	57	1.0		
	1000 to <1500		239	2.81	(1.13, 7.03)	0.027
	1500 to <2000		214	2.85	(1.10, 7.38)	0.031
	2000 or more		273	3.84	(1.45, 10.19)	0.007

[a]Adjusted for age, nationality, marital status, faculty of education, number of siblings, parents' education, presence of any hereditary diseases in the family, and family origin (Badoo or Hather). CI = confidence intervals.

For the level of attitude toward premarital screening program, the significant predictors were: female gender (adjusted OR = 2.23, 95% CI = 1.33, 3.73), higher years of study (adjusted OR = 2.65, 95% CI = 1.35, 5.21), and higher income levels of KD 1000 - <1500 (adjusted OR = 2.81, 95% CI = 1.13, 7.03), KD 1500 - <2000 (adjusted OR = 2.85, 95% CI = 1.10, 7.38), and KD 2000 and more (adjusted OR = 3.84, 95% CI = 1.45, 10.19) (**Table 7**).

DISCUSSION

This study identified a poor knowledge about hereditary disease and the importance of premarital screening among university students in Kuwait. However, the knowledge score about hereditary diseases was higher among students of medical faculties compared to those of non-medical faculties. Another determinant factor of increased knowledge about hereditary diseases was the presence of any hereditary diseases in the family.

In Saudi Arabia, a recent study among college students showed that students had a good knowledge of genetics, and that the majority had positive attitudes toward genetic testing. The predictors of better knowledge was medical faculty and higher academic year of education (Olwi et al., 2016).

The European Society of Human Genetics recommends several interventions to prevent genetic diseases, including genetic literacy of health-care professionals, and availability of information on genetic testing to the public (van El and Cornel, 2011). The provision of premarital law enacted in 2008 in Kuwait allows mandatory

premarital screening program for unmarried Kuwaiti nationals. Since the program targets only Kuwaitis, they were found to gain most on the knowledge score for premarital screening program in the country (P = 0.046). However, a general poor knowledge of the college students regarding specific issues, such as the importance of premarital screening and diseases that are considered hereditary indicates the need for more emphasis on genetics in the college curriculum.

Overall, the majority (92%) of the participants knew about the existence of the PMS program in the country. This finding was similar to a study done in Oman among adults attending primary healthcare centers (Al-Farsi et al., 2014). Most of the participants (89%) heard about PMS program from health workers, friend/relatives, and media. The main sources of knowledge about premarital screening were from friends (61%), media (36%), and medical curriculum (22%), as reported in another study in Saudi Arabia (Alghamdi et al., 2016). In our study, the predominant source of information were from friends and relatives (91%). Interestingly, about one-third of the participants in Oman (Al-Farsi et al., 2014) were not in favor of premarital blood screening test: 36% of them were due to lack of awareness, 13% had lack of testing centers, 10% expressed of no interest, 9% mentioned they did not have any hereditary disease in the family, and 7% considered it not important. A similar negative attitude against performing mandatory premarital screening was observed among university students in North Jordan (Alkhaldi et al., 2016), mainly because of the fear that such screening test would affect their future marriage opportunities. On the contrary, 92% of the people in our study knew about PMS program in Kuwait, and 28% believed that premarital screening is important in terms of decreasing the burden of disease in the society. This high rate of acceptance of the program in Kuwaitis could be due to the fact that the hereditary disease is quite prevalent in the community, as 41% of the participants mentioned that someone in the family were suffering from a similar illness, or because the program has been mandatory by law in the country, or both.

In our study, females had significantly higher scores of knowledge about PMS program. It is similar to the results obtained from university students in north Jordan (Alkhaldi et al., 2016) and Syria (Gharaibeh and Mater, 2009). Ganczak (2010) also reported that females in United Arab Emirates expressed a higher importance to premarital testing. It can be explained that women worry more about the existence of life-lasting diseases that burden the quality of life of both mothers and children. When asked about family size, the knowledge score about PMS program was significantly increased with families having more siblings. This may be explained by the fact that families having more members were more likely to go through the mandatory premarital screening program, and that family members passed the information about the program to their younger siblings.

In general, the majority of Kuwait university students (85%) showed positive attitude towards PMS program. This favorable attitude is similar to a study done among university students in Oman (Al-Kindi et al., 2012). Yet, when the students were asked: "I should be comfortable before doing premarital screening test", more than 90% expressed a negative attitude. When they were asked: "the result of premarital screening should not influence my marriage decision", about 40% and 35% expressed negative and uncertain attitudes, respectively. This demonstrates that although PMS test is mandatory for the formal process of issuing a safe marriage certificate in Kuwait, many couples and their families take it as the last step in the process of the marriage. It is also noteworthy that withdrawing from marriage based on the results of PMS test is difficult in this culture. Hence, there is a need for a well-organized ongoing community campaign about hereditary diseases that can facilitate the PMS program.

One of the potential limitations of this study was that there was no standardized criteria for knowledge and attitude scoring. Based on the distribution of data, we used the first quartile as "poor" and the rest as "satisfactory" groups. Because of the nature of the cross sectional study, we could only show the association but could not establish any causal relationship between the associated factors and the outcome variables.

CONCLUSION

This study identified an overall poor knowledge on hereditary diseases, especially among students of non-medical faculties. Because of the observed misconception about hereditary diseases in about one-third of the study population, there is scope to improve the knowledge through organized mass media campaign and by emphasizing on genetics and hereditary diseases in the college curriculum. Genetic educational programs targeting youths should improve their perceived knowledge on consequences of consanguineous marriage.

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