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Premarital Screening and Genetic Counseling Program: Studies from an Endogamous Population

Abstract

Background: Studies in Arab countries have shown a significant lack of knowledge of Premarital Screening and Genetic Counseling (PMSGC) Program. PMSGC can identify and modify, through prevention and management, some behavioral, medical, and other health risk factors known to impact pregnancy outcomes. **Objective:** The aim of this study was to explore the knowledge, attitudes, and practice of Qatari's toward the premarital screening program and shedding more light on a complex matter. **Materials and Methods:** A cross-sectional study based on Hospitals and Primary Health Care Centers. A total sample of 1246 participants was surveyed, and 873 participants (70.0%) expressed their consent to participate in the study during January 2013–May 2014. The questionnaire based on sociodemographic data and for responses, on the PMSGC program knowledge, attitude, and practice statements. In addition, questions were asked regarding the services, activities, and how to attract and motivate the PMSGC program. **Results:** The mean age and standard deviation (SD) of the males' age were 30.4 ± 6.50 and the mean and SD of females' age were 31.08 ± 5.98. There were statistically significant differences between males and females with regard to age, educational status, occupation status, household income, consanguinity, body mass index, cigarette smoking, and Shisha smoking. There were no any statistically significant differences between males and females regarding sickle cell anemia and thalassemia, glucose-6-phosphate dehydrogenase deficiency cystic fibrosis, homocystinuria, HIV, and hepatitis. The response to the "Why proceeding through high-risk marriage?" by gender, males and females responded statistically significant differences ($P = 0.019$). The step-wise multivariate regression analyses as predictors for knowledge of PMSGC program revealed that age, educational level, the lack knowledge of genetics counseling, parental interventions for cousin marriage decision, positive test results affect and change marriage decision, religious impact, household income, consanguinity, hereditary diseases knowledge, occupational status, and love factors were considered as the main factors associated with the premarriage screening and genetics counseling after adjusting for age, gender, and other variables. **Conclusion:** The current study revealed that knowledge and attitude regarding PMSGC program were low in population. Motivation, enforcement, and implementation of program at the school and university educational campaigns are vital. Improved counseling and adding new topics for counseling on genetic, chronic, and mental illness; building healthy families; and reproduction and fertility are considered to be top priorities in community.

Keywords: *Consanguinity, knowledge and attitude, premarital screening program, premarital testing, Qatar*

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Introduction

Genetic carrier screening programs are systematic programs that are generally recommended by government health bodies, making screening available to the entire population of asymptomatic individuals or relevant sections of the population whose risk of particular genetic diseases is known to be increased or for whom carrier status information may be especially relevant.[1-3] As such, they are designed to determine whether individuals are at increased risk for particular genetic diseases or if they carry a genetic predisposition that may produce a disease in their offspring.[2,3]

The Premarital Screening and Genetic Counseling (PMSGC) program in Qatar was established by law in 2006 and implemented from December 2009.[1] The PMSGC program involves the promotion of health and well-being for a woman and her partner before pregnancy and is considered a primary preventive approach for couples planning conception and an important step toward promoting well-being throughout society.[4-9] This program

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includes premarital health counseling and a general medical examination.[4] Premarital examinations can particularly be important in the prevention of the spread of diseases.[5] Carroll and Doherty[10] conducted a meta-analytic review of 23 well-designed premarital programs and found that premarital prevention programs are generally effective in producing immediate and short-term gains in interpersonal skills and the overall quality of relationships.

However, several countries, mostly Mediterranean and Islamic countries,[4-14] such as Cyprus, Saudi Arabia, Iran, Bahrain, United Arab Emirates, Palestine, Jordan, and Qatar, have laws in place that makes premarital screening programs mandatory for the entire population before couples receive their marriage certificates.[5] Screening programs are implemented differently in each country, and they are designed according to the individual country's genetic disease prevalence and the availability of effective tests that allow a high rate of detection.[4-14]

The State of Qatar has recently enacted a law making the premarital screening program.[1] The purpose of this study was to assess the knowledge, attitudes, and practice of Qatari men and women regarding the PMSGC program, to identify the predictors of high knowledge scores and to explore the best way of presenting information about the PMSGC program.

Materials and Methods

This study comprises an administered cross-sectional questionnaire survey conducted at the Primary Health Care (PHC) Centers and Hospitals in the State of Qatar. The survey was conducted among Qatari national and Arab women aged 18–40 years old. Semi-structured but questionnaire-based interviews, conducted in English and Arabic, were held during the period from January 2013 to May 2014. The responses were stratified by age, gender, and the presence of consanguinity. In addition, questions assessing the knowledge, attitudes, and practice of participants toward the PMSGC program were asked, using the following format: the first part of the questionnaire-elicited information regarding the respondents' personal and sociodemographic characteristics and their degree of consanguinity and family history of hereditary genetic diseases. The questionnaire also asked the participants about their sources of knowledge for the PMSGC program. The second part is general knowledge regarding investigations in the PMSGC (eight items): the participants were asked, such as cystic fibrosis, hemoglobinopathy (sickle cell anemia and thalassemia), and glucose-6-phosphate dehydrogenase deficiency (G6PD). Furthermore, their knowledge was also assessed regarding the infectious diseases screened in the program such as hepatitis and AIDS. Knowledge was assessed by the accuracy of each person's selection of one answer for each statement out of four options for each. The third part is evaluating participants' attitudes toward

premarital screening (19 items): these questions aimed to measure the respondents' general level of awareness and their attitude toward the topic. Participants were asked about their attitude toward the PMSGC and about the misconception that the PMSGC violates Islamic rules. The participants' opinions regarding whether consanguinity may increase the risk of hereditary diseases and whether the PMSGC program is expected to decrease the prevalence of some genetic and sexually transmitted diseases (STDs) were also addressed. Questions were asked regarding the importance of counseling in reducing and preventing the spread of genetic diseases or STDs and whether religious leaders should adopt the ideas of the PMSGC to be discussed on different occasions. Patients were asked to answer the questions by grading them from 1 to 5; 1 for "strongly agree," 2 for "agree," 3 for "moderately agree," 4 for "moderately disagree," 5 for "disagree," and 6 for "strongly disagree." Finally, the last part is general questions regarding the PMSGC program practice. Several questions were asked regarding the services, how they have been implemented and how to attract and motivate people toward the PMSGC program. What type of PMSGC and genetic counseling initiatives would be the most effective? The participant was also asked if there was a description of the counseling and the benefits and accuracy of screening for these diseases or not?

The data were collected through a validated self-administered questionnaire based on face-to-face interviews by physicians and qualified nurses using the local language. Data collection took place from January 2013 to May 2014. Of the 22 PHC centers available, we selected 12 health centers on a random sampling basis; of these, ten were located in urban and 2 in semi-urban areas of Qatar. PHC centers frequently visited by all levels of the general population as a gateway to specialist care. Finally, participants were simply recruiting alternate patients 1-in-2 using a systematically sampling procedure. Each participant was provided with brief information about the study and was assured of strict confidentiality. A multistage sampling design was used and a total sample of 1246 males and females aged 18–40 years was approached; 873 participants agreed to participate (70.0%) and responded to the study. The survey instrument was initially tested for validation on 50 patients through face-to-face interview who visited the health centers. Internal consistency in the present study was explored for each scale, and Cronbach's alpha coefficients were adequate (0.82), confirming a high level of consistency among the different Likert items in this scale.

Data were analyzed using SPSS Windows version # 22 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.). Student's *t*-test was used to ascertain the significance of differences between the mean values of two continuous variables. The Chi-square and Fisher's

exact tests (two-tailed) were performed to test for differences in proportions of categorical variables between two or more groups. Reliability (internal consistency) of the questionnaire was tested by Cronbach's alpha coefficient, and the acceptable value to be met was >0.70. Multivariate regression analysis using the forward inclusion and backward deletion method was used to assess the relationship between dependent and independent variables and to adjust for potential confounders and orders the importance of factors (determinants) for knowledge score about premarriage screening and genetic counseling. All statistical tests were two-sided and *P* < 0.05 was considered statistically significant.

Results

Eight hundred and seventy-three males and females agreed to participate and were included in the study. The mean age and standard deviation (SD) of the males' age were 30.4 ± 6.50 and the mean and SD of females' age were 31.08 ± 5.98.

Table 1 shows the sociodemographic characteristics of the participants by gender. There were statistically significant differences between males and females with regard to age, educational status, occupation status, household income, consanguinity, body mass index, cigarette smoking, and shisha smoking.

Table 2 shows the knowledge of premarital screening and genetics counseling program by gender. There were no statistically significant differences between males and females regarding knowledge score of hemoglobinopathies (sickle cell anemia and thalassemia), G6PD, cystic fibrosis, homocystinuria, HIV, and hepatitis.

Table 3 reveals the attitude of participants toward the Premarital Screening and Genetic Counseling Program. There were statistically significant differences between males and females regarding their attitudes toward the PMSGC program both in principle and as they had experienced it in practice. The women were more aware of inherited diseases and the risks of genetics, PMC, and STDs.

Furthermore, the study population majority indicated social (males 28.4% vs. females 22.9%), religious (male 16.5% vs. females 23.9%), family or parental interventions (males 20.0% vs. female 18.9%), and love (males 19% vs. female 15%); there was statistically significant differences between males and females response (*P* = 0.019).

Table 4 gives the results of stepwise multivariate regression analyses as predictors for knowledge of the Premarital Screening and Genetic Counseling Program and some associated covariates. As can be seen from this table, the participant's age, educational level, knowledge of genetic counselling, their parents' intervention to support a decision for marriage to a cousin, the effect of a positive test result and the possibility of changing a decision about marriage, the impact of religion, household income, consanguinity, knowledge concerning hereditary disease, occupational status, and strength of love and attachment were considered as the main factors associated with the premarriage screening and genetic counseling, after adjusting for age, gender, and other variables.

Discussion

The nature of a screening program depends greatly on the stage of life at which it is made available. Worldwide, genetic screening programs are conducted either before or after birth or in adolescents and adults before conception but while they are considering marriage and reproduction.[1-16] Premarital screening can potentially reduce the burden of inherited hemoglobin diseases by reducing the number of high-risk marriages.[4,5,8,9] In addition, the implementation of premarital infectious disease screening is an ambitious and massive project with regard to cost and impact.[5,8] Those conducted before birth, such as screening of fetal DNA in maternal blood, maternal serum screening, and ultrasound screening, are designed to detect genetic disorders or malformations during early pregnancy, thus allowing couples to consider whether to terminate or continue the pregnancy. If a couple decides to continue the pregnancy, the early diagnosis enables the couples and the health-care provider to plan for the child's delivery, treatment, and follow-up care.[1-4,8] The Supreme Council of Health of Qatar stated that they do not prevent high-risk marriages and they only try to educate the couples about their possibility of having an child affected by disease, possible preventive measures, available treatments, and other information about the condition. Therefore, the decision about marriage is left to the couple after they have attended a genetic counseling session; this is consistent with other reported studies.[5-10,12-15]

Neonatal screening is usually designed to identify infants affected by a genetic disorder so that they can be started on an effective treatment at a younger age than if they were only diagnosed after presenting with signs of disease. Carrier screening programs, such as preconception carrier screening, premarital genetic screening, cascade screening, school-age screening, and adult screening, are designed to determine whether or not the individual carries a genetic disorder and might have an affected infant.[1-5,8]

Six years after the law was passed in Doha, Qatar, has started mandatory premarital screening, mainly to alert couples who may be related through consanguinity of any potential health risks for their future offspring.[1] About half of all marriages across Gulf nations are between cousins, and their frequency is increasing. According to a recent study in the State of Qatar, the rate of first and second cousin marriage appears highest there, having increased

Variable	Total (*n*=873), *n* (%)	Males (*n*=401), *n* (%)	Females (*n*=472), *n* (%)	*P*
Table 1: The sociodemographic of studied participants by gender (*n*=873)				
Age (years old)				
18-29	481 (55.1)	237 (59.1)	244 (51.7)	0.028
30-40	392 (44.9)	164 (40.9)	228 (48.3)	
Education level				
Illiterate	33 (3.8)	6 (1.5)	27 (5.7)	0.002
Elementary	44 (5.0)	18 (20.0)	26 (20.2)	
Intermediate	114 (13.1)	57 (14.2)	57 (12.1)	
Secondary	393 (45.0)	170 (42.4)	223 (47.2)	
University	289 (33.1)	150 (37.4)	139 (29.4)	
Occupation				
Student	126 (14.4)	31 (7.7)	95 (20.1)	<0.001
Sedentary professional	196 (22.5)	109 (27.2)	87 (18.4)	
Clerk/manual	337 (38.6)	150 (37.4)	187 (39.6)	
Businessman	61 (7.0)	43 (10.7)	18 (3.8)	
Arm/police	85 (9.7)	68 (17.0)	17 (3.6)	
Housewife	68 (7.8)	0 (0)	68 (14.4)	
Household income ($)				
<1500	46 (5.3)	15 (3.7)	31 (6.6)	<0.001
1500-3499	274 (31.4)	120 (29.9)	154 (32.6)	
3500-5499	286 (32.8)	175 (43.6)	111 (23.5)	
≥5500	267 (30.6)	91 (22.7)	176 (37.3)	
Consanguinity				
Yes	299 (34.2)	153 (38.2)	146 (30.9)	0.025
No	574 (65.8)	248 (61.8)	326 (69.1)	
BMI				
Normal (<25 kg/m^2)	267 (24.3)	145 (27.8)	122 (21.0)	0.031
Overweight (25-30 kg/m^2)	548 (49.7)	246 (47.2)	302 (52.1)	
Obese (30+ kg/m^2)	286 (26.0)	130 (25.0)	156 (26.9)	
Place of living				
Urban	732 (83.8)	335 (83.5)	397 (84.1)	0.820
Semi-urban	141 (16.2)	66 (16.5)	75 (15.9)	
Cigarette smokers				
Yes	103 (11.8)	62 (15.5)	41 (8.7)	0.002
No	770 (88.2)	339 (84.5)	431 (91.3)	
Shisha smokers				
Yes	130 (14.9)	49 (12.2)	81 (17.2)	0.041
No	743 (85.1)	352 (87.8)	391 (82.8)	

BMI: Body mass index

nearly 30% from the previous generation so that it is now over 50%.[1,2,11]

On its own, marriage between cousins, or consanguinity, is not necessarily problematic. However, many debilitating genetic disorders – including sickle cell anemia, cystic fibrosis, spinal muscular atrophy, and many forms of mental retardation and epilepsy – can be up to twenty times more frequent among populations in which cousin marriages are common.[17,18] The issue in the current study is not cousin marriage *per se*; the issue here is to avoid the inherited diseases that can result from this practice. Marriage between second cousins or more distant relations has much less impact on the incidence of genetic disorders, yet the children of first

cousins, who share 12.5% of their genes, are nearly twice as likely as the general population to contract such a disorder. Within populations that intermarry regularly over generations, the incidence of disorders can increase exponentially.[17-19]

In the Gulf, most cousin marriages are between first cousins.[1,2] Recently, several studies[17-19] found that a handful of genetic diseases have reached epidemic levels (more than 100 cases per 100,000) in several Gulf countries. This of course includes Down syndrome, as the usual incidence is around 1 in 800 (varying on the basis of maternal age), but it does seem that some complex disorders of multifactorial causation, and not only those of autosomal recessive inheritance, are more frequent in populations with high

Table 2: Knowledge of Premarital Screening and Genetic Counseling program: (*n*=873)

Variables	Male *n*=401, *n* (%)	Female *n*=472, *n* (%)	*P*
What are the genetic conditions the program screens for?			
Hemoglobinopathies, cystic fibrosis, homocystinuria, HIV, hepatitis	30.9	27.8	0.591
Hemoglobinopathies, Down syndrome, cystic fibrosis, HIV, hepatitis	23.7	22.2	
Homocystinuria, cystic fibrosis, HIV, and hepatitis	21.9	24.4	
Do not know	23.4	25.6	
Which of the following statements best describes hemoglobinopathy			
It is a skin disease	23.2	23.9	0.792
Mental illness	24.2	26.5	
Blood disorder	24.7	24.2	
Do not know	27.9	25.4	
Which of the following statements best describes homocystinuria			
It is a brain disorder	23.7	24.8	0.880
It is a eye disorder	20.9	21.0	
It is a food metabolism disorder	29.9	27.5	
Do not know	25.4	26.7	
Which of the following statements best describes cystic fibrosis			
It is a lung disorder	24.2	27.8	0.636
It is a muscle disorder	24.2	24.2	
It is a bone disorder	24.4	23.5	
Do not know	27.2	24.6	
Which statements best describes G6PD?			
It is a hereditary abnormality in the activity of an erythrocyte RBC enzyme	23.4	26.1	0.738
It is a lung disease	26.9	24.2	
It is brain disorder	24.2	24.6	
Do not know	25.4	25.2	
Which of the following statements best describes hepatitis?			
It is the final stage of infection when your body can no longer fight life-threatening infection	26.2	22.2	0.590
It is a muscle disorder	24.7	26.5	
It is an inflammation of the liver or condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis, or liver cancer	23.4	25.0	
Do not know	25.7	26.3	
Which of the following statements best describes AIDS			
It is a chronic, potentially life-threatening and caused by the HIV	27.9	23.3	0.067
It is a lung disorder	20.7	26.7	
It is a liver disorder	27.2	23.1	
It is kidney disorder	24.2	26.9	

HIV: Human immunodeficiency virus; RBC: Red blood cell; G6PD: Glucose-6-phosphate dehydrogenase deficiency

levels of consanguinity. The report also found that Arabs have one of the world's highest rates of genetic disorders, nearly two-thirds of which are linked to consanguinity.[2,3,17-19]

Qatar is the last Gulf nation to have instituted a program of premarital carrier screening, and many nationals remain unaware of the risks of marrying a close relation. More recently, a study found that the most Qataris surveyed did not know that consanguinity had been linked to serious genetic diseases[1,2] or that more distant cousin marriages were genetically less risky than unions between first cousins. In many Muslim countries, meanwhile, cousin marriage represents about 35%–40% of all unions. It is also increasing across the Gulf. In fact, the children of wealthy families tend to marry the children of other wealthy families or of their own extended family; perhaps the

rich like to protect their wealth. Therefore, consanguinity remains a common custom, at least partly for economic reasons, and perhaps also partly for cultural reasons. It might be worthwhile to develop standardized protocols that address knowledge, awareness, and practice in relation to the PMSGC program in daily clinical practice. In addition, increasing the number of educational programs in media, such as Internet web pages, religious scholars, TV channels, radio, and newspapers is an option which should be considered for mass outreach.

What is already known about this topic – studies in Arab countries have shown a significant lack of knowledge of PMSGC program which can identify and modify, through prevention and management, some behavioral, medical, and other health risk factors known to impact pregnancy outcomes.

Table 3: Knowledge and attitude of participants toward Premarital Screening and Genetic Counseling Program (*n*=873)

Sentences for PMCS and Genetics Counseling	1	2	3	4	5	6
	Male/female (%)					
	Strongly agree	Agree	Moderate agree	Moderate disagree	Disagree	Strongly disagree
PMCS is important (*P*<0.001)	22.4/16.3	17.7/19.9	19.0/19.5	19.7/13.8	17.5/20.1	3.7/10.4
Consanguinity may lead to hereditary diseases with increased risk for affected babies (*P*=0.046)	24.9/22.7	21.7/16.7	16.0/18.9	17.0/14.6	14.7/16.7	5.7/10.4
PMCS will help reduction of genetics and STDs diseases (*P*<0.001)	28.2/27.8	22.7/15.3	16.0/16.7	16.0/142	14.7/15.6	2.5/10.5
Inclusion PMCS and genetics counseling in curricula is essential	29.4/28.4	20.7/17.8	18.0/15.0	13.0/14.0	12.2/14.8	6.7/10.0
Implementation of PMCS and genetics counseling by law may reduce risk of STDs and hereditary diseases	26.4/26.9	20.0/16.3	17.5/13.6	15.0/18.6	17.0/14.4	4.2/10.2
Monitoring PMCS and genetics counseling by MoH (*P*<0.001)	29.2/21.6	14.7/12.7	15.5/18.6	18.5/17.6	18.0/18.4	4.2/11.0
Monitoring strictly confidentiality of test results (*P*<0.005)	25.4/19.7	23.2/23.5	16.7/17.8	19.2/18.6	11.0/9.3	4.4/11.0
Religious people should deliver message as importance of PMCS and genetics counseling (*P*<0.001)	25.4/19.7	23.2/23.5	16.7/17.8	19.2/18.6	11.0/9.3	4.4/11.0
Raising awareness about PMCS and genetics counseling before marriage to reduce risk of genetics STDs disease (*P*<0.001)	36.7/26.3	15.2/19.9	16.7/13.8	14.5/14.0	12.7/15.2	4.2/10.8
Do you believe that the compulsory law can obligate all future couple to conduct PMCS? (*P*=0.016)	26.7/25.0	20.7/14.4	19.5/18.2	13.5/17.8	15.5/16.1	4.2/8.5
In a case having STDs, marriage decision must be left for freedom of the couple (*P*=0.172)	30.7/29.7	22.4/24.4	19.2/17.2	13.7/12.3	9.7/8.0	4.2/8.6
PMCSC and genetics counseling may breaks personal privacy (*P*<0.001)	30.7/23.5	17.2/17.2	14.0/17.8	15.5/14.2	18.5/16.1	4.2/11.2
In a case of carrying genetics or inherited diseases, marriage decision must be left for freedom of the couple (*P*<0.006)	32.4/29.2	16.7/15.5	16.0/13.8	16.7/17.6	14.2/12.9	4.0/11.0
Positive test results that indicate the presence of genetic disease should affect and change marriage decision (*P*=0.004)	30.2/28.4	15.7/17.4	18.7/16.5	15.7/13.3	15.7/13.1	4.0/11.2
Marriage appointment and certificate can be provided conditionally PMCS and genetics counseling document (*P*=0.03)	26.4/25.6	18.2/18.9	20.9/15.7	15.7/13.8	14.7/14.6	4.0/11.4
'Do you think performing PMCS and genetics counseling at school level is helpful? (*P*=0.115)	30.4/30.7	21.4/19.5	12.2/13.8	14.2/13.6	17.2/14.2	4.5/8.3
Do you believe testing would make future marriage difficult=0.088	27.2/29.7	23.4/22.2	17.5/15.9	11.5/8.3	16.5/15.7	4.0/8.3
PMCS and genetics counseling is avoiding unnecessary risks (*P*=0.049)	27.4/26.3	20.0/24.2	18.2/14.2	16.6/14.6	13.4/12.5	4.6/8.3
Cousin marriage may involve too much parental intervention (*P*<0.001)	24.2/23.9	20.7/13.3	19.2/18.2	17.5/17.8	14.5/16.1	4.0/10.6

PMCS: Premarital care screening; STDs: Sexually transmitted diseases; MOH: Ministry of Public Health; PMCS: Premarital care screening

What the study adds – to our knowledge, the current study is the first large-scale community-based study conducted in Qatar on the knowledge, attitude, and satisfaction of the general population regarding the PMSGC program and to increase the general awareness of the potential health consequences of consanguinity.

Limitations and strengths

This study represents the first time that this important issue of the PMSGC program has been studied in Qatar.

The literature review provides a comprehensive summary of premarital screening programs. One of the strengths of this study was the large sample size; this is particularly important to have sufficient power to examine the effects of interaction between the various contributory factors.

There are several limitations to this study. First, this is a cross-sectional study, and therefore, participants might be misclassified in this analysis, and it is not possible to conclude that the associations recognized are necessarily

Table 4: Stepwise multiple regression analysis as predictors affecting Premarital Screening and Genetic Counseling Program*

Parameter	Regression		*t*-test value	P*
	B coefficient	SE		
*				
Cousin marriage involve too much parental interventions	3.832	1.020	3.745	<0.001
Educational level	7.958	0.916	8.687	<0.001
Lack knowledge of genetics counseling	5.474	0.856	6.394	<0.001
Parental interventions for cousin marriage decision	0.109	0.021	5.190	<0.001
Positive test results affect and change marriage decision	0.804	0.196	4.102	<0.001
Religious impact	0.786	0.212	3.707	<0.001
Household income	2.773	0.816	3.398	0.002
Consanguinity	3.708	1.350	2.746	0.007
Hereditary diseases knowledge	0.586	0.221	2.652	0.008
Occupation status	0.051	0.022	2.318	0.032
Love factor	0.796	0.385	2.07	0.039

*Adjusted for age, gender, and other variables. SE: Standard error

causal. Second, although the study sample was diverse in terms of geographic region of origin within Qatar and race/ethnicity, it may not have been entirely representative of the Qatari population as it (a) was based on couples visiting PHC clinics and (b) the sample included a modest excess of females (54%). Hence, the results may not be generalizable to the population of all premarriage participants. The results must be interpreted in the context of these limitations.

Conclusion

The current study revealed that knowledge in relation to the PMSGC program was low in the population, attitudes were not highly positive, and practical engagement was only modest. School and university educational campaigns to reinforce knowledge about the program and enhance motivation to comply with it are very important. Reproduction and fertility are considered to be top priorities for health care in this community.

Conflicts of interest

There are no conflicts of interest.

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