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The effect of religious background on the attitude towards sex selection

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ABSTRACT

Objectives: Surveys of the general population regarding sex selection using pre-implantation genetic diagnosis are limited and were mainly conducted in the United States and Northern Europe. In those Western societies, surveys have shown that people's interest in using sex selection techniques is encouraged by the desire for a sexually balanced family. It is important to determine attitudes to sex selection in a wider range of countries especially that cultural differences exist among countries.

Study design: A questionnaire-based cross-sectional study regarding attitudes towards sex selection for non-medical reasons was designed. One thousand five hundred participants of the reproductive age group presenting to the Women's Health Center at the American University of Beirut Medical Center were offered to complete the survey. The questionnaire included demographic details, obstetric and infertility history, opinions regarding sex selection, personal interest in expanding the family, and personal interest in choosing the sex of a future child.

Results: The response rate was 86.6%. Nineteen per cent of the respondents considered it strictly prohibited, 38.8% considered the technique acceptable only if medically indicated while 33.4% believed that it should be available to all those who request it. Multivariate logistic regression on the predictors of the variable affecting the attitudes towards sex selection showed that the educational level, religious disapproval and the desire of the opposite sex of the already existing children were the only significant predictors.

Conclusion: The middle-eastern multi-religious population studied has a negative attitude towards sex selection through pre-implantation genetic diagnosis. Religion, educational status and desire of children of both genders were identified as the significant predictors of the decision whether to accept sex selection or not.

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Introduction

The desire to control the sex of the offspring has been an issue for centuries and in different cultures [1–3]. It was not until the discovery and the advent of Pre-implantation Genetic Diagnosis (PGD) that this desire became fulfillable with a high degree of precision [4,5]. PGD was developed initially to create disease-free offspring through assisted reproductive techniques. It was used to identify specific genetic disorders and therefore choose the non-affected embryos for transfer. However, the non-medical

applications of PGD including sex selection of embryos for social or cultural reasons are growing [6]. Since such a practice poses serious moral, legal and social problems, it has become one of the most controversial issues in reproductive bioethics today. Objection to sex selection for nonmedical reasons is driven by the fear of a subsequent social sex imbalance, devaluation of women in the society and spread of the trend of 'designer babies' [7,8]. On the other hand, supporters argue that in Eastern cultures sex selection contributes to population control and helps relieve families from economic and social burdens. This results in freeing women from need to have many children, to illegally abort, or to abandon/neglect their daughters [9,10].

The American College of Obstetricians and Gynecologists (ACOG) and the International Federation of Gynecology and Obstetrics (FIGO) already state their opposition to sex selection for nonmedical reasons [8,11]. In contrast, the Ethics Committee of

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the American Society of Reproductive Medicine (ASRM) since 2001 has been stating that preconception sex selection for nonmedical purposes was ethically acceptable for providing a family with a child of a different sex than an existing child (gender variety), given that the sex selection methods used were safe and effective [12]. In 2015, the ASRM stated that practitioners who are willing to provide sex selection services are highly encouraged to properly counsel their patients about the anticipated pros and cons of the procedure. They also recommended that infertility clinics with such services have clear policies about the indications and the circumstances of non-medical sex selections [13]. Countries as well vary considerably in their regulation of nonmedical sex selection. While it is practiced in the US with 72.7 percent of the ART clinics offering sex selection, other countries, such as India and most European countries, ban it [14]. The United Kingdom recently outlawed any technique used for sex selection for nonmedical reasons, after public opinion polls found most respondents not in favor of such technology [15].

Surveys of the general population regarding sex selection using PGD are limited and were mainly conducted in the US and Northern Europe. In Western societies, surveys have shown that people's interest in using sex selection techniques is encouraged by the desire for a sexually balanced family [16,17]. The United Kingdom interview survey revealed that 68 percent to 82% favored regulation of sex selection for nonmedical reasons while investigators in Germany found that 92% of the population was not interested in sex selection [18]. It is important however to determine the attitudes to sex selection in a wider range of countries especially that cultural differences do exist and that the findings of western surveys may not be applicable to other parts of the world such as the Middle Eastern societies.

Lebanon is a middle-eastern country that is well known worldwide for its cultural, ethnic and religious diversity. Add to that, sex selection is offered to patients in many Lebanese IVF centers. The demand for sex selection is on the rise from both locals and foreigners who visit Lebanon for that specific reason. However, the attitude of the population in the Middle East towards sex selection is not known. We performed a survey in Lebanon, a middle-eastern country, to define the attitude of the general population towards sex selection via PGD. We aimed to highlight the effect of such socio-religious diversity on the sex selection acceptance rates. Such information will be of great value in formulating ethical statements and health policies, as well as affecting clinical practice in the private and public assisted reproductive techniques sectors.

Materials and methods

Material

A cross-sectional study was designed where 1500 Male and female patients aged 18 years old and above presenting to the Women's Health Center at the American University of Beirut Medical Center (AUBMC) were offered to complete the survey.

Methods

The patients were approached during the period extending from January 1st, 2016 till September 30th, 2017 by a research assistant, and after explaining the purpose of the study and the complete anonymous nature of the survey, they were handed the questionnaire to fill. The patients were informed about their right to discontinue participation at any point in the study, and the option of not answering questions deemed sensitive or inappropriate. The questionnaire which contained no participant identifiers was available in two languages: Arabic and English as per the

participants' preference. It included the following items: demographic details (age, sex, religion, education, income, marital status, and region of residence), obstetric and infertility history, opinions regarding sex selection, personal interest in expanding the family, and personal interest in choosing the sex of a future child. Out of the 1500 patients approached, 1300 agreed to fill the questionnaire. The study protocol and questionnaires in both languages were approved by the Institutional Review Board of the American University of Beirut Medical Center. Statistical analyses were performed using SPSS 22 (Statistical Package for Social Sciences) for data cleaning, management and analyses. Descriptive statistics were summarized by presenting the number and percentage for categorical variables and mean and standard deviation (SD) for continuous variables. In the bivariate analysis, the association between the new technology and other categorical variables was carried out by using the chi-square and Fisher's exact test, as appropriate. Student's *t*-test was used for the association with continuous variables. Multivariate regression analysis was used to adjust for potentially confounding variables. A stepwise multivariate logistic regression was conducted with all factors found to be significant in the bivariate analysis in addition to those considered as being clinically meaningful. The results were presented by the odds ratio (OR) and 95% confidence interval (CI). P-value of <0.05 was considered statistically significant.

Results

The demographic data of the respondents is presented in Table 1. One thousand three hundred of the 1500 participants filled the survey. The majority of the respondents was females (80.6%), Muslim (63.4%), was employed (58.7%), and had completed a university degree (83.1%). Thirty percent of the respondents had already been diagnosed with infertility and around 71.7% had already received some sort of infertility treatment in the form of IUI, IVF or a combination of both.

Patients' attitudes to sex selection per se are presented in Table 2. Around 79.5% accepted the procedure where 46.2% considered it a couple's free choice while 53.8% supported performing sex selection exclusively for medically indicated situations. Playing God was the most common reason for not supporting sex selection as a free choice (38.6%). The belief that technology should be used as per couples' wishes was the most selected reason for acceptance of sex selection (57.1%). When asked about the gender preference of their first child, 71.7% said they didn't care. Add to that, 42.1% expressed their wishes of having an equal number of boys and girls. Only 20.1% would have performed sex selection despite religious disapproval and only 35% would use it even if it was for free. On the other hand, 41.6% expressed their acceptance to use it in order to have a gender different than already existing children.

The acceptance rate between different religions, age groups and sexes wasn't statistically significant ($P=0.08$, 0.69 and 0.85 respectively). Married people were significantly less supportive of the sex selection technique when compared to the non-married single population with a *p* value of 0.02 . Employed people, university attendees and participants with higher income accepted sex selection significantly more than the non-employed, school attendees and lower income participants population ($p=0.003$, <0.0001 and <0.0001 respectively). Infertility history wasn't associated with significant difference however the duration of infertility of less than 4 years was associated with a significantly higher acceptance rate of sex selection ($p=0.01$). The desire to have equal number of boys and girls was the main significant cause of sex selection ($p=<0.0001$) (Supplementary Table 1). Multivariate logistic regression on the predictors of the variables affecting the attitudes towards sex selection showed that the educational

Table 1
Demographic data and infertility history.

		Total N=1300
Sex	Female	1044 (80.6)
	Male	251 (19.4)
Age group	18-35	632 (62.0)
	36-45	224 (22.0)
	>45	163 (16.0)
Religion	Christian	334 (26.2)
	Muslim	808 (63.4)
	Druze	111 (8.7)
	Others	20 (1.6)
Marital status	Married	1019 (78.4)
	Not married	280 (21.6)
	Married	1019 (78.4)
	Single	238 (18.3)
	Widow	17 (1.3)
	Divorced	25 (1.9)
Employment	Employed	561 (58.7)
	Unemployed	395 (41.3)
Education	Middle School	52 (4.0)
	High School	165 (12.8)
	University	1069 (83.1)
Monthly income	300-500\$	104 (9.7)
	500-1000\$	257 (24.1)
	1000-2000\$	461 (43.2)
	>3000\$	246 (23.0)
Address	Beirut area	651 (51.7)
	Out of Beirut	608 (48.3)
Infertility history	Yes	384 (30.3)
	No	882 (69.7)
Duration of infertility	2-3 years	43 (17.2)
	3-4 years	51 (20.4)
	>4 years	86 (34.4)
Assisted reproduction	IUI	49 (13.4)
	IVF	160 (43.8)
	Both IUI and IVF	53 (14.5)

Note: Values are number of participants n (%).

level, religious disapproval and the desire of the opposite sex of the already existing children were the only significant predictors with p-values of 0.01, <0.0001, and < 0.0001 respectively (Table 3).

Association analysis was then performed to check the significant variables associated with the reasons of acceptance of sex selection. It was found that infertility history, desire of balanced families, not being religious and the free of charge procedure were significant variables for accepting the sex selection procedure for all couples. Christians were more tolerant of the procedure for medical reasons while Muslims accepted the procedure more as a free choice for all couple (p = 0.002) (Table 4).

Discussion

A middle-eastern multi-socio-religious community like Lebanon is facing new experiences as well as challenges especially when it comes to assisted reproductive techniques and PGD sex selection. Such services are being offered in many centers and at different costs. In the absence of any official or governmental legislation, as well as the lack of reporting of sex ratio disparities, a survey that digs into attitudes of the general population towards sex selection is needed. Lebanon is the only Middle-Eastern country composed of a multi-sectarian society with Muslim

Table 2
Attitude characteristic.

		Total N=1300
New reproductive technology	Yes	919 (79.5)
	No	237 (18.6)
Reasons for refusal:	A child is a gift	252 (35.0)
	Playing god	278 (38.6)
	Unnatural	55 (7.6)
	Skewing the natural sex ratio	51 (7.1)
New reproductive technology - reasons	Sexist	55 (7.6)
	Others	29 (4.0)
	Reasons for acceptance:	
	Right of the couples to use as they wish	230 (57.1)
Gender preferred of the first child	Small and balanced family of both sexes	152 (37.7)
	Don't believe affect the sex ratio	21 (5.2)
	A boy	185 (16.5)
Genders preferred of the children in the family	A girl	132 (11.8)
	Do not care	802 (71.7)
	Only boys	23 (1.9)
	Only girls	14 (1.1)
Will perform sex selection despite religious disapproval	More boys than girls	77 (6.2)
	More girls than boys	54 (4.4)
	An equal number of boys and girls	520 (42.1)
	Do not care	548 (44.3)
Acceptance of sex selection for opposite sex of already existing children	Yes	246 (20.1)
	No	978 (79.9)
Pay 5000\$ for sex selection	Yes	512 (41.6)
	No	718 (58.4)
Perform sex selection for free	Yes	286 (23.2)
	No	945 (76.8)
		423 (35.0)
		786 (65.0)

community predominance a fact that was reflected in our results. A surprising finding was that most of our respondents neither had preference for the gender of the first child nor for the gender composition of the family as total. This contrasts with what is already published concerning the cultural preferences of having sons in Middle Eastern societies [19]. Moreover, 44 percent of the respondents favored having small balanced families with equal number of boys and girls which parallels the European societies' preferences [18].

Table 3
Multivariate logistic regression of the predictors of attitude towards the new technology^a.

	OR (95% CI)	P-value
Education – university	0.13 (0.03 – 0.57)	0.01
Will perform sex selection despite religious disapproval	0.16 (0.08 – 0.33)	<0.0001
Acceptance of sex selection for opposite sex of already existing children	4.72 (2.60 – 8.59)	<0.0001

Note: p-value <0.05 is statistically significant.

^a Variables included in the model were: Marital status(reference: not married); employment (reference: not employed); religion ; address (reference: outside Beirut); gravid; Para; infertility (reference: no); education (reference: high school); income (reference: <1000); Will perform sex selection despite religious disapproval; Acceptance of sex selection for opposite sex of already existing children; Pay 5000\$ for sex selection; Perform sex selection for free.

Table 4

Association between the reasons that patients agreed to use the new technology of sex selection and other variables.

		Reason - New technology		p-value	
		Medical indication N=494	All couples N=425		
Sex	Female	397 (80.9)	345 (81.2)	0.9	
	Male	94 (19.1)	80 (18.8)		
Age group	18-35	263 (63.7)	213 (62.8)	0.96	
	36-45	86 (20.8)	71 (20.9)		
	>45	64 (15.5)	55 (16.2)		
Religion	Christian	159 (32.9)	91 (22.0)	0.002	
	Muslim	281 (58.2)	281 (67.9)		
	Druze	37 (7.7)	32 (7.7)		
	Others	6 (1.2)	10 (2.4)		
Marital status	Married	348 (70.6)	353 (83.1)	<0.0001	
	Not married	145 (29.4)	72 (16.9)		
	Married	348 (70.6)	353 (83.1)		<0.0001
	Single	128 (26.0)	56 (13.2)		
	Widow	6 (1.2)	4 (0.9)		
Divorced	11 (2.2)	12 (2.8)			
Employment	Employed	253 (65.4)	180 (57.0)	0.03	
	Unemployed	134 (34.6)	136 (43.0)		
Education	Middle School	4 (0.8)	19 (4.5)	<0.0001	
	High School	37 (7.6)	55 (13.0)		
	University	449 (91.6)	349 (82.5)		
Monthly income	300-500\$	27 (6.4)	37 (10.6)	0.003	
	500-1000\$	85 (20.2)	83 (23.7)		
	1000-2000\$	204 (48.6)	126 (36.0)		
	>3000\$	104 (24.8)	104 (29.7)		
Number of children	None	210 (45.0)	165 (41.6)	0.03	
	1	93 (19.9)	83 (20.9)		
	2	74 (15.8)	92 (23.2)		
	3	56 (12.0)	30 (7.6)		
	≥4	34 (7.3)	27 (6.8)		
Infertility history	Yes	129 (27.0)	146 (34.8)	0.01	
	No	349 (73.0)	274 (65.2)		
Duration	< 2 years	28 (33.7)	25 (25.0)	0.43	
	2-3 years	13 (15.7)	17 (17.0)		
	3-4 years	21 (25.3)	23 (23.0)		
	>4 years	21 (25.3)	35 (35.0)		
Gender of the first child	A boy	43 (9.9)	92 (23.2)	<0.0001	
	A girl	43 (9.9)	63 (15.9)		
	Do not care	348 (80.2)	241 (60.9)		
Gender of the children in the family	Only boys	4 (0.8)	8 (1.9)	<0.0001	
	Only girls	3 (0.6)	10 (2.4)		
	More boys than girls	22 (4.6)	33 (8.0)		
	More girls than boys	26 (5.5)	14 (3.4)		
	An equal number of boys and girls	176 (37.1)	223 (53.9)		
Do not care	244 (51.4)	126 (30.4)			
Will perform sex selection despite religious disapproval	Yes	69 (14.9)	151 (37.3)	<0.0001	
	No	393 (85.1)	254 (62.7)		
Acceptance of sex selection for opposite sex of already	Yes	110 (23.1)	324 (79.4)	<0.0001	
	No	367 (76.9)	84 (20.6)		

Table 4 (Continued)

		Reason - New technology		p-value
		Medical indication N=494	All couples N=425	
existing children				
Pay 5000\$ for sex selection	Yes	44 (9.3)	198 (49.1)	<0.0001
	No	429 (90.7)	205 (50.9)	
Perform sex selection for free	Yes	83 (17.7)	270 (68.4)	<0.0001
	No	386 (82.3)	125 (31.6)	

Note: p-value <0.05 is statistically significant.

The main cause for opposition of sex selection is that it is considered as playing God. Sex ratio imbalance and a sexist act were the least of the concerns for our respondents a result which is similar to the previously conducted surveys in the western world [18]. It was noted however that the acceptance of the procedure whether as a free choice or for medically indicated situations was affected mainly by the educational level, religious status and the desire of the opposite sex of the already existing children. Infertility per se was found to be a significant variable in accepting sex selection unconditionally even if no medical indications were present. As it is known, infertility is a condition that limits the chances of having children spontaneously and hence people might strive to have small balanced families with the least attempts possible and thus the acceptance of sex selection. Similar results were found in the United States where a survey showed that there is significant demand among infertility patients for preimplantation sex selection, with a significant portion of this demand coming from patients who do not have any children or have children of the same sex [23].

One of the main determinants of the attitude towards sex selection in the Lebanese culture remains to be religion and that is irrespective of the belief status. Even when the procedure was offered for free the percentage of people willing to use sex selection didn't increase significantly in comparison to those who would pay for the procedure. This reflects the influential impact of religious factors on the social aspects of the Lebanese society as well as on personal choices. Similarly, this trend was also noted in the survey that was performed in Israel by Hashiloni-Dolev et al. [20]. They found that the more religious the respondents, the greater is their support for restricting sex selection [20]. These findings are supported by a survey performed in Malaysia, a multi-religious South-East Asian community, which recommended taking into consideration the religious clergymen's attitudes towards sex selection as their opinions affects believers' choices [21]. Our survey showed that Muslims accepted performing sex selection for non-medical reasons significantly more than Christians. Schenker et al noted that the Islamic legal status on sex selection is that it to be allowed on individual basis. It is the Roman Catholic Christian churches that forbid not only PGD but also the majority of the available assisted reproductive techniques [22]. Christian clergymen were very skeptical of the non-medical use of PGD because of concerns of the future impact on humanity and basic human relationships [21].

This survey is the first of its kind to be done in a Middle-Eastern religiously diverse society. Another advantage is the large sample size, inclusion of genders, different age groups, employment status and income. It also shed light on people with and without an infertility issue to help better understand the influence of infertility on personal choices. Third, this study included people

of different religious background which is an important feature of the multi-sectarian Lebanese society. Of the limitations that this study had and despite the large sample size, all the participants were visitors of one clinic located in the center of the capital. Thus, the population that we had might not actually reflect the total population living in the peripheral areas. Second, the majority of the respondents were females. This limits the generalization of the results to both sexes.

The results of this study will help the physicians understand the motives of their patients based on their socio-religious backgrounds and thus provide well-tailored counseling for the couples seeking infertility treatment. Add to that, it can aid the fertility specialists address the concerns of couples presenting from neighboring countries seeking fertility treatments and pre-conception sex selection. The knowledge of the factors that affect decision making in reproductive issues will improve couple counseling in this part of the world where religion plays an important role in decision making. This is imperative especially in debated situations such as sex selection for medical and non-medical reasons.

Conclusion

We conclude that the middle-eastern multi-religious population studied has a negative attitude towards non-medically indicated sex selection through PGD. Religion, educational status and desire of children of both genders were identified as the significant predictors of the decision whether to accept sex selection or not.

Conflict of interest

The authors have nothing to declare.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.eurox.2019.100052>.

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