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Attitude of Medical Students toward Third-party Reproductive Techniques

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Abstract

Background: *Pregnancy with the help of a third party, including the use of sperm, oocyte, embryo, and uterus, can be considered as an option for some infertile couples. Due to the important role of health professionals in infertility treatments, their attitudes are of particular importance in the acceptance or rejection of fertility suggestions involving the help of a third party. This study aimed to determine the attitudes of medical students at medical universities in Tehran toward third-party reproduction.*

Methods: *This descriptive cross-sectional study was carried out at the medical university of Tehran in 2018. Medical students (n=187) filled out the questionnaire, which consisted of two parts: the demographic characteristics of the research subjects and the questionnaire consisted of 76 questions about attitudes toward third-party reproduction. The content and face validity of the questionnaire were determined, and test-retest reliability of the questionnaire was established (0.89).*

Results: *According to gender, participants' attitudes toward childbearing, the importance of genetic dependency between parents and children, law issues, anonymity in donation programs, parental affection, the importance of the recipient's and donor's characteristics, surrogacy, gamete, and embryo donation were all statistically non-significant (Pvalue>0.05). According to age and also to year of entering the university, participants' attitude only toward childbearing was statistically significant (Pvalue=0.018 and 0.01, respectively).*

Conclusions: *Since medical school students may set on the road to a specialty associated with infertility and its ramifications, it's better to educate our soon-to-be health system professionals on all necessary aspects of infertility and third-party reproduction.*

Keywords: Attitude; Donor conception; Infertility; Medical students; Assisted reproductive technique.
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Introduction

Infertility is one of the most important health phenomena in the world, affecting the lives of 13% to 15% of couples.[1] The prevalence of infertility varies among different populations and is estimated to affect 48.5 million couples worldwide.[2] It is defined as having one year of regular unprotected intercourse without pregnancy occurring.[3]

Nowadays, there are significant advances in the field of infertility and many infertile couples are treated by assisted reproductive techniques (ART). Some of these methods include ovulation induction, gamete intrafallopian transfer (GIFT), in-vitro fertilization (IVF), and intracytoplasmic sperm injection (ICSI). However, these methods cannot be a general and universal solution for all couples.[4] Couples who have a genetic disease, several unsuccessful IVF treatments, azoospermia, or severe oligozoospermia, or for whom pregnancy is dangerous cannot have children by these methods.[5]

Therefore, pregnancy with the help of a third party can be considered as an option for infertility treatment. Third-party reproduction is defined as the use of sperm, egg, embryo, or uterus from a third party to help an infertile person or couple that lacks gametes or cannot otherwise get pregnant to become parents.[6]

Sperm donation is a type of third-party infertility treatment in which another man's sperm is used by couples where the male partner has azoospermia, severe oligospermia, ejaculatory dysfunction, significant oligoasthenospermia, or immunologic infertility, a significant genetic defect that will affect reproduction and ineradicable sexually transmissible infection. Sperm donation is also important in cases where there is Rh incompatibility between partners or in vitro fertilization failure.[7,8]

Oocyte donation has generally been used by fewer people because technically it is unwieldy and it can be seen to violate some traditional socio-cultural norms.[9] However, due to the success achieved by oocyte donation for infertility treatment, demand for donated eggs by those who wish to have children has increased in the past two decades.[10] Embryo donation could be a substitute technique for couples who have a genetic disease have no gametes or have undergone several unsuccessful IVF treatments. In most countries, adoption is the only choice for these couples. Embryo donation is affordable and includes fewer costs than IVF treatment or egg and sperm donation.[5]

Another form of assisted reproductive treatment is surrogacy. Complete surrogacy is when an embryo produced by IVF from an infertile couple is transferred to the uterus of a surrogate woman who gives the baby to the couple at birth.[11] In partial surrogacy, a woman assists an infertile couple by being

artificially inseminated by the man's semen, carrying the pregnancy to term, and once the baby is born giving the child to the couple.[12] Despite surrogacy being one of the most difficult moral situations in the field of infertility treatments, it provides a chance for women with medical problems, or for whom pregnancy and delivery are dangerous, to have their children.[13]

Having a child for many people is one of the most wonderful and important events in their lives,[14] and infertility and not having a baby may have a negative influence on the lives of couples. It can also affect a person's mental health, social status, personality, and self-esteem, as well as a sense of competency and worthiness for some infertile women.[15,16]

Therefore, due to the importance of fertility in people's lives and the increasing requests for infertility treatments, as well as the important role that physicians and specialists play in this field, medical professionals be fully familiar with the details of all possible infertility treatment options including donation. Furthermore, considering the controversial and sensitive nature of this issue, the opinions and attitudes of health professionals are particularly important because they have a significant effect on infertile couples accepting or rejecting fertility suggestions involving a third party. It is expected that a community of health professionals will apply their specialists and practices for the benefit of the patient, not for their self-interests.[17] Therefore, as future healthcare professionals, the current attitudes and views of medical students toward third-party reproduction are worthy of study.

Materials and Methods

This study aimed to determine the attitudes of medical students in medical universities in Tehran toward third-party reproductive techniques. A descriptive survey was carried out using a self-administered questionnaire of medical students who were studying in four different medical universities in Tehran, a major city in Iran. The study population was comprised of all the students (using the census method) in the academic year 2017-2018 who were in their last year of medical sciences at the medical universities of Tehran, Shahid Beheshti, Iran, and Shahed. Entry criteria included being a student in medical sciences and not a guest student, having no other university degree, not having participated in infertility treatment workshops, and not having participated in similar research in the past.

The tools used in the research were the demographic characteristics of the research subjects, such as age, gender, and the university where they study, and a researcher-made questionnaire to measure attitudes toward fertility treatments involving the help of a third party.

A researcher-made questionnaire was used to measure attitudes toward third-party reproductive techniques, for which the Svanberg et al.[18], Purewal et al.[9], Khalili et al.[19] and Jafari et al.[20] questionnaires were used in its construction. Our modified questionnaire was then piloted by 24 medical students (n=24) at 4 medical universities in Tehran; no changes were made as a result of the pilot study.

Due to a large number of questions, the questionnaire was divided into two parts and given to the participants at different times. The 2-part questionnaire consisted of 76 questions in 12 subscales (Attitude, A): Attitude toward childbearing (4 questions), the importance of genetic dependency between parents and children (5 questions), legal issues (5 questions), the confidentiality of the donation process (11 questions), parent-child relationship (4 questions), from donor perspective (egg, sperm and embryo) the importance of characteristics in fertility receptor couples (9 questions), from receptor perspective (egg, sperm and embryo) the importance of characteristics in donor couples (9 items), the general attitude toward donation methods (9 items), attitude toward oocyte donation (4 items), attitude toward sperm donation (6 items), attitude toward embryo donation (6 questions), and finally attitude toward surrogacy (4 questions). 5-point Likert scale statements were used to measure attitudes toward third-party reproductive techniques: Strongly agree (5), agree somewhat (4), neutral (3), disagree somewhat (2), and strongly disagree (1), though for some questions, the ratings were reversed.

The participants were informed that their decision regarding participation would not affect their studies or their relationships with their professors. Only those who were willing to participate in the study, after being fully informed of the aim of the study and its methodology, were included in the target sample. All participants also had the right to withdraw from the interview before completion. Participants were asked not to mention their names on the questionnaires so as to be anonymous. Informed consent was implied through the students' completion of the questionnaire.

The validity of the questionnaire was determined by the content validity method. By reviewing the articles and resources available, the form was provided at an elementary level and then corrected and approved by 15 experts in infertility, reproductive biology, embryology, midwifery and social sciences.

The questionnaire's reliability was also achieved through internal consistency and Cronbach's alpha coefficient, which was 0.89.

The test-retest reliability of the questionnaire was established using Cronbach's alpha coefficient (0.89) following a pilot study on a sample of 24 medical students. Then, Cronbach's alpha coefficient was calculated for each single test and, according to its acceptability, the first-stage test and the second stage test, respectively, were 0.82 and 0.83. The scientific reliability of the data collection tool was confirmed.

The collected data was analyzed by SPSS software 22.0. continuous variables were presented as mean±SD and categorical variables as number (percentage). In this paper, responses (using a 5-point Likert scale) to questions about medical students' attitudes were compared using independent samples t test. Pvalue<0.05 was considered statistically significant.

Results

This study included an overall number of 187 participants that were all medical students. In terms of marital status, 177 participants (94.7%) were single, and only 10 participants (5.3%) identified as married. In terms of gender, 105 participants (56.1%)

were male and the remaining 82 participants (43.9%) were female. Further supplemental information on the characteristics of participants, including age ranges and year of entry into university, are presented in table 1.

Table 1. Descriptive statistics based on demographic characteristics of the participants (n=187)

Demographic characteristics	Number	Percentage (%)
Age (years)		
<20	100	53.5
20-22	23	12.3
23-25	47	25.1
26-28	11	5.9
>29	6	3.2
Gender		
Male	105	56.1
Female	82	43.9
Marital status		
Single	177	94.7
Married	10	5.3
Year of entering the university		
<2011	15	8
2011-2013	51	27.3
2013-2015	20	10.7
2015-2017	101	54

As shown in table 2, questions were categorized in different attitude fields (A), and the frequency and percentage of participants' answers to each question (Q) are presented.

According to gender, participants' attitudes toward the importance of donor characteristics such as beauty, age, nationality, race, education, physical and mental health, socioeconomic status, and religion were all statistically non-significant except for one characteristic, intelligence (table 3). Male and female participants were mostly neutral toward the importance of the donor's intelligence (Pvalue=0.001). Male and female participants were supportive of a friend or an acquaintance's decision to become a donor with little substantial difference in their opinions (Pvalue=0.035). There was also notable support for a friend or acquaintance's decision to have a child through donation-related fertility methods by both the male and female participants of our study (Pvalue=0.011). Our data further states that male and female participants agreed that if it is impossible for the couple to have a child, they should adjust to not having child rather than having a child through alternative methods of reproduction (Pvalue=0.040). Moreover, there was near unanimous agreement on the goodness of donor-assisted reproductive techniques as a way of helping childless couples by both the male and female students who participated in our study (Pvalue=0.034). The participants were also neutral toward the possibility that children born as a result of assisted reproductive techniques would likely have some abnormalities at the time of their birth (Pvalue=0.036).

As presented in table 4, in terms of the possibility of continuing a marriage while being childless there were almost two types of perspectives: participants less than 20 years old and between 26-28 were neutral toward it (Pvalue=0.030), while those between 20-22, 23-25, and more than 29 years old agreed with this attitude (Pvalue=0.030). Additionally, most of our participants were neutral toward the idea that the adoption option should be the first choice for those who are infertile. Participants who were less than 20, between 20-22, 23-25, and 26-28 years old were neutral (Pvalue=0.033), and participants more than 29 years old disagreed with the idea (Pvalue=0.033).

As shown in table 5, participants who entered university before 2011 and those who entered between 2015-2017 were neutral (Pvalue=0.006) about the idea that even without having a child it is possible to continue a marriage, but those participants who entered university between 2011-2013 and 2013-2015 had a slightly different perspective, and agreed with the idea (Pvalue=0.006). Participants who entered university in 2013-2015 also agreed with the statement that if they were unable to have children, they would end up living alone in the future (3.7500±0.71635, Pvalue=0.011); however, those who entered university before 2011, between 2011-2013 and between 2015-2017 were neutral toward this statement (Pvalue=0.011). Additionally, participants who entered university before 2011, between 2011-2013 and between 2015-2017 all agreed that the donation-related resultant child would love his/her recipient father as much as his/her biological father, even after the facts of the procreation method were disclosed (Pvalue=0.045), but participants who entered university in 2013-2015 had a more neutral perspective about this issue (Pvalue=0.045). We also observed a fluctuating perspective toward the importance of the donor's academic education, with participants who entered university before 2011 and between 2011-2013 taking a more neutral view on this matter (Pvalue=0.015), those who entered university in 2013-2015 agreeing with it (Pvalue=0.015), and those whose university entrance year was between 2015-2017 expressing disagreement about its importance (Pvalue=0.015). Furthermore, while the groups who started medical school before 2011, between 2011-2013 and between 2015-2017 chose to be supportive of a friend or an acquaintance's desire to become a reproductive donor (Pvalue=0.042), one group (those who entered between 2013-2015) expressed neutrality toward the idea (Pvalue=0.042). Similarly, three groups: those who were freshmen before 2011, between 2011-2013 and between 2015-2017, identified themselves as supportive for a friend or an acquaintance's decision to become parents by donation-related fertility options (Pvalue=0.010), and only those who were freshmen between 2013-2015 chose to be neutral on this issue (Pvalue=0.010). In regards to the goodness of donor-assisted reproductive techniques as a way of becoming parents for childless couples, participants were divided into two parties, those who were in favor of the idea and those who were neutral toward it. Participants who were in medical school before 2011 and those who started between 2013-2015 expressed neutrality toward the idea (Pvalue=0.046), but the participants whose year of university entrance was between 2011-2013 and between 2015-2017 were more supportive of the idea (Pvalue=0.046). Finally, most of this study's participants (freshmen students before 2011, between 2011-2013 and between 2015-2017) remained neutral to the idea that it is better not to have a child at all rather than have one who is the result of a stranger's oocyte donation (Pvalue=0.022), but there was strong disagreement to this from those whose freshmen year started between 2013-2015 (p=0.022).

Table 2 (Part II). The frequency and percentage of answers to questions based on the attitude of the participants (n=187)

Items		Strongly agree: n(%)	Agree; n(%)	Neither agree or disagree: n(%)	Disagree: n(%)	Strongly disagree: n(%)
	A1	Attitude toward child bearing				
Q1	Having a child is the most important issue in my life.	40(21.4)	28(15.0)	70(37.4)	18(9.6)	31(16.6%)
Q2	It is possible to continue marriage without a child.	50(26.7)	73(39.0)	21(11.2)	17(9.1)	26(13.9)
Q3	If I do not have a child, I will be alone in the future.	27(14.4)	57(30.5)	41(21.9)	40(21.4)	22(11.8)
Q4	I believe that infertility is a problem that is most related to women.	57(30.5)	70(37.4)	41(21.9)	7(3.7)	12(6.4)
	A2	Attitude toward the importance of genetic dependency between parents and children				
Q5	It is important for me that my child looks like me.	22(11.8)	49(26.2)	73(39.0)	25(13.4)	18(9.6)
Q6	It is important for me that my child is behaviorally like me	26(13.9)	64(34.2)	68(36.4)	24(12.8)	5(2.7)
Q7	The child resulting from a donation method belongs to the recipient family.	28(15.0)	71(38.0)	54(28.9)	21(11.2)	12(6.4)
Q8	The child resulting from a donation method belongs to the donor.	39(20.9)	58(31.0)	58(31.0)	20(10.7)	12(6.4)
Q9	Although genetics is important in who we are, the role of environmental factors is more important.	29(15.5)	93(49.7)	47(25.1)	11(5.9)	7(3.7)
	A3	Attitude toward law issues				
Q10	I think the donor has the right to claim the child.	21(11.2)	58(31.0)	54(28.9)	41(21.9)	13(7.0)
Q11	I think the resultant child inherits wealth from the donor.	26(13.9)	58(31.0)	65(34.8)	27(14.4)	11(5.9)
Q12	Hereditary affiliation is important between the child and the parent.	11(5.9)	79(42.2)	69(36.9)	23(12.3)	5(2.7)
Q13	I have no problem with the resulting donation child being intimate with the recipient.	21(11.2)	68(36.4)	73(39.0)	19(10.2)	5(2.7)
Q14	I consider reasonable payments made to the donor as appropriate.	22(11.8)	90(48.1)	46(24.6)	17(9.1)	11(5.9)
	A4	Attitude toward anonymity in donation programs				
Q15	Oocyte and embryo donors as well as surrogate mothers should be anonymous to the recipient couple.	42(22.5)	59(31.6)	55(29.4)	23(12.3)	8(4.3)
Q16	The surrogate mother must have little connection with the recipient couple.	22(11.8)	58(31.0)	59(31.6)	39(20.9)	9(4.8)
Q17	In case of treatment with donation methods, I will always worry that someone will inform my child about the matter in the future.	29(15.5)	79(42.2)	51(27.3)	22(11.8)	6(3.2)
Q18	In case of treatment with donation methods, I think it would be better if my family members were not informed.	29(15.5)	47(25.1)	46(24.6)	52(27.8)	12(6.4)
Q19	In case of treatment with donation methods, I think it would be better if my relatives were not informed.	43(23.0)	61(32.6)	48(25.7)	23(12.3)	11(5.9)
Q20	In case of treatment with donation methods, I think it would be better if my friends were not informed.	39(20.9)	73(39.0)	44(23.5)	24(12.8)	7(3.7)
Q21	I think that it is possible for the couple to receive information from the donor (such as age, race, religion, etc.) without identifying his/her identity.	36(19.3)	88(47.1)	44(23.5)	15(8.0)	4(2.1)
Q22	I think that it is possible for the donor to receive information from the recipient couple (such as age, race, religion, etc.) without identifying their identity.	35(18.7)	72(38.5)	52(27.8)	19(10.2)	9(4.8)
Q23	I think that the child could be informed of his/her creation method after 18 years of age.	26(19.3)	50(26.7)	35(18.7)	56(29.9)	20(10.7)
Q24	I think that the child could be informed of his/her creation method before 18 years of age.	36(19.3)	62(33.2)	50(26.7)	25(13.4)	14(7.5)
Q25	It is acceptable to me that the child contact his/her genetic parents before 18 years of age.	36(19.3)	56(29.9)	58(31.0)	32(17.1)	5(2.7)
	A5	Attitude toward parental affection				
Q26	I think the recipient of the donation method (mother) likes the resulting child as her natural child.	47(25.1)	85(45.5)	44(23.5)	4(2.1)	7(3.7)
Q27	I think the recipient of the donation method (father) likes the resulting child as his natural child.	41(21.9)	72(38.5)	55(29.4)	15(8.0)	4(2.1)
Q28	I think the child of the donation method loves his/her recipient mother like his birth mother after disclosure of his/her creation method.	32(17.1)	95(50.8)	40(21.4)	10(5.3)	10(5.3)
Q29	I think the child of the donation method loves his/her recipient father like his birth father after disclosure of his/her creation method.	22(11.8)	98(52.4)	56(29.9)	8(4.3)	3(1.6)
	A6	In a same situation as donor: Which personal specifications of the recipient couple is most important for you?				
Q30	Beauty	26(13.9)	81(43.3)	53(28.3)	15(8.0)	11(5.9)
Q31	Age	35(18.7)	92(49.2)	39(20.9)	11(5.9)	10(5.3)
Q32	Nationality and race	32(17.1)	78(41.7)	56(29.9)	12(6.4)	9(4.8)
Q33	Academic education	11(5.9)	23(12.3)	70(37.4)	62(33.2)	21(11.2)
Q34	Physical health	57(30.5)	80(42.8)	29(15.5)	14(7.5)	7(3.7)
Q35	Psychological health	60(32.1)	88(47.1)	29(15.5)	5(2.7)	3(1.6)
Q36	Socio-economic status	4(2.1)	21(11.2)	70(37.4)	62(33.2)	30(16.0)
Q37	Intelligence	51(27.3)	80(42.8)	44(23.5)	8(4.3)	4(2.1)
Q38	Religion	14(7.5)	27(14.4)	55(29.4)	53(28.3)	38(20.3)

Table 3. Participant's attitudes according to gender

Attitude	Males	Females	Pvalue
A1	13.6190±2.86014	13.7317±2.51440	0.779
A2	17.5619±3.70531	17.1341±2.65163	0.378
A3	16.6857±2.36283	16.8902±2.88036	0.594
A4	37.1048±5.42417	38.7805±7.06762	0.068
A5	14.7714±2.48943	15.1463±2.69486	0.326
A6	31.2000±6.32212	31.0854±6.72236	0.905
A7	30.3619±4.98483	29.7195±3.80148	0.335
Q46	3.3143±1.28837	2.6220±1.41107	0.001*
A8	31.0095±5.42695	32.6585±6.01484	0.972
Q48	3.5333±1.02906	3.8415±.92255	0.035*
Q49	3.7048±.89790	4.0244±.76941	0.011*
Q51	3.6476±1.19277	3.9878±1.01220	0.040*
Q52	3.5429±1.00027	3.8293±.78260	0.034*
Q54	2.8190±1.01698	3.1341±1.00323	0.036*
A9	13.2571±3.79278	13.1585±2.24141	0.835
A10	19.5238±5.53502	19.3293±4.38588	0.795
A11	20.1714±4.60864	20.1707±2.93049	0.999
A12	12.4286±2.26111	12.5976±2.45885	0.626

Data are reported as mean±standard deviation (SD)

Table 4. Participant's attitudes according to age

Attitude	<20	20-22	23-25	26-28	>29	Pvalue
A1	13.1100±3.01476	14.3913±1.77711	14.5319±2.07313	13.0909±3.04810	14.5000±1.87083	0.018*
Q2	3.3000±1.48051	3.6522±1.11227	4.0638±1.00875	3.4545±1.43970	3.6667±1.03280	0.030*
A2	17.5200±2.75417	17.8261±6.27152	17.0213±2.48901	17.3636±2.29228	16.0000±2.36643	0.698
A3	17.0000±2.67423	16.9130±3.16103	16.3830±2.33641	16.4545±2.25227	16.1667±1.32916	0.670
A4	38.3500±6.45008	37.8261±5.11373	36.7872±6.15713	38.8182±7.66574	35.8333±4.40076	0.579
A5	14.9500±2.65290	14.0435±3.16914	15.2340±2.17908	15.3636±2.20330	15.0000±2.44949	0.454
A6	31.0200±6.08190	32.4348±11.32506	31.0000±4.86782	31.0000±3.94968	29.8333±2.71416	0.877
A7	30.1800±4.65449	29.8696±3.38854	30.0213±5.17305	30.0909±2.87939	29.6667±3.44480	0.997
A8	31.9700±5.75678	31.3043±4.43575	31.6170±6.63179	31.4545±4.90640	30.8333±4.99667	0.975
Q50	2.8200±1.09526	3.2609±1.09617	2.7872±.99861	3.2727±1.10371	1.8333±.98319	0.033*
A9	13.1300±2.40645	13.3043±3.09596	13.4894±4.65726	11.5455±1.96792	15.1667±2.22860	0.226
A10	19.3700±4.70687	19.0870±4.36841	20.2979±5.58692	17.5455±7.07621	18.6667±4.80278	0.533
A11	20.1300±3.98901	20.6087±3.12961	20.0851±4.69889	20.1818±2.13627	19.8333±3.06050	0.986
A12	12.5300±2.23586	12.3478±2.85416	12.5319±2.42138	11.8182±2.18258	13.6667±1.86190	0.642

Data are reported as mean±standard deviation (SD). *. Significant Pvalue

Table 5. Participants' attitudes according to year of entering the university

Attitude	<2011	2011-2013	2013-2015	2015-2017	Pvalue
A1	12.6667±2.63674	14.6275±1.95919	14.7000±1.75019	13.1287±3.00554	0.001*
Q2	3.2000±1.42428	4.0588±1.00820	3.8000±.95145	3.3069±1.47474	0.006*
Q3	2.5333±1.45733	3.3529±1.11038	3.7500±0.71635	3.0099±1.30763	0.011*
A2	16.1333±2.50333	17.8235±4.52418	16.2500±1.91600	17.5545±2.76216	0.124
A3	16.2667±1.98086	16.5490±2.51646	16.5000±2.87457	17.0198±2.66826	0.559
A4	36.6000±4.96847	37.6078±6.82079	36.8000±4.42005	38.3465±6.41784	0.600
A5	14.7333±2.05171	15.4118±2.45093	13.6500±2.60111	14.9802±2.65699	0.077
Q29	3.7333±0.70373	3.8824±0.71125	3.3000±0.97872	3.6535±0.79291	0.045*
A6	30.5333±3.44065	31.2353±4.83979	32.1500±12.11035	31.0000±6.05475	0.881
A7	29.1333±3.27036	30.0000±3.13688	30.4500±7.14124	30.1881±4.63187	0.835
Q42	2.7333±0.96115	2.5294±1.13759	4.4000±6.87788	2.4752±1.07326	0.015*
A8	30.1333±4.95504	32.5490±6.39473	29.6500±3.86992	31.9703±.72792	0.171
Q48	4.1333±1.06010	3.5490±0.92334	3.2500±1.29269	3.7426±0.92362	0.042*
Q49	4.0000±0.75593	3.9412±0.78516	3.2500±1.33278	3.8911±0.74701	0.010*
Q52	3.4000±0.98561	3.7255±0.98140	3.2000±0.89443	3.7723±0.85885	0.046*
A9	12.5333±2.53170	13.1373±2.10732	14.2000±7.19356	13.1584±2.41136	0.454
Q60	2.8000±1.37321	3.1765±1.17823	4.9500±6.69230	3.1980±1.28078	0.022*
A10	18.0000±6.39196	20.4706±5.49310	18.0000±4.12948	19.4158±4.70588	0.174
A11	19.4667±2.16685	20.5882±4.69543	19.7500±2.69258	20.1485±3.97338	0.738
A12	12.8667±2.03072	12.4118±2.53911	12.3000±2.75490	12.5347±2.22515	0.897

Data are reported as mean±standard deviation (SD). *. Significant Pvalue

Discussion

This study's participants approved of donor-assisted reproductive techniques as a way of helping childless couples become parents, an overall attitude which was quite similar to those of other studies regarding this issue. In accordance with the Halman et al. study, which consisted of fertile and infertile husbands and wives, the acceptability of infertility interventions was questioned. Those interventions were accepted in a very similar acceptability profile by infertile husbands and wives, with wives being more inclined toward the use of such interventions. They also found that fertile couples expressed an openness, within their comfort zones, to the idea of such fertility interventions, but to a lesser extent in comparison with infertile couples.[21] Regarding gestational surrogacy, according to a study done by Kian et al., 33.3% of men and 43.3% of women expressed a negative attitude toward the use of this method. The same study also claimed that positive attitudes toward the method, which was the overall attitude, came from 54.6% of men and 53.3% of women. Despite such positivity toward the method, it was stated that the general attitude of the participants still lacked a strong positivity, and further efforts were suggested for the method to become more accepted among the community of infertile husbands and wives.[17] With that being said, there are also some issues to consider before taking any fertility treatment action. For instance, cultural and societal norms can influence the ethical behavior of the people or community facing a particular situation.[22] Religious considerations are also a factor that must be weighed. Roman Catholicism strongly bans all kinds of assisted reproduction, especially if it involves sperm or oocyte donation.[23] However, the Anglican church is more moderate as it does not ban surrogacy.[13] Gestational surrogacy is not banned in the Jewish religion, which encourages its followers to form families and confers on them the responsibility of having children;[24] thus, however, the woman bringing the pregnancy to term and the man who donated the sperm will respectively be the mother and father of the resultant child born of surrogacy.[25] In accordance with Islamic law, although sperm donation are strictly forbidden, oocyte donation and surrogacy have been permitted by some Islamic scholars.[26]

The current study also states that its participants were neutral in terms of the possible abnormalities of a child who is the result of assisted reproductive techniques, but the actuality of such abnormalities and the consequences thereafter seem to be a red light for deciding about such treatments as a way of having a child. In accordance with some studies, there have been birth defects reported in children born by gestational surrogacy including one chromosomal aberration in an ongoing pregnancy,[27] Spina Bifida and hydrocephalus in a twin,[28] and one renal- and two cardiac-related birth defects in three children.[29] Despite these cases, there are still comparable perinatal outcomes to standard IVF and oocyte donation.[30] Furthermore, one study claims that at the age of 10 there are no major psychological differences between children resulting from gestational surrogacy and those resulting from either other assisted reproduction techniques or simply natural conception.[30] Considering all of that, all parties involved in such treatments should participate in meticulous counseling sessions to consider any short- or long-term consequences of this type of treatment and review it from every possible angle. In terms of gestational surrogacy, the proposed host must also consider any possible effects of such processes on her family, including existing children.[31] So profound counseling along with evaluations before, during and after the initiation of the third-party assisted reproduction procedures will increase the ability for all the involved parties to manage psychological and social conflicts.[32]

Some interrelated criteria may act to influence the ethical analysis of any given person's or society's actions. Traditional considerations resulting from a society's religious beliefs are one of these criteria that seem to have substantial influence on the rules and lawful regulations by which that society is governed. Public opinion, as another interrelated criteria seems to be the most flexible and vulnerable factors, taking form from the new situation it is confronting.[33] Other studies have suggested that strict rules and regulations can cause hard times for couples looking forward to becoming parents through third-party assisted reproduction techniques, and can also cause them to move to countries which are much more moderate and relaxed on the issue.[34,35] Some strong evidence has been found that couples will do whatever it takes to cross physical and virtual borders to have a baby through surrogacy.[36]

Despite some neutral views from our participants toward the idea that the inability to have children leads to a solitary type of life in the future, some agreed with the idea. Similarly, the participants of another study were asked about their future decisions if their corresponding infertility treatment, in this case IVF, failed. 209 participants (59.7%) replied "nothing", 134 participants (38.3%) mentioned possible adoption, only 7 participants (2%) considered sperm or oocyte donation as a solution while the rest of the participants (4.9%) responded with information which was labeled as disqualified to be reported.[37] Couples who are more inclined toward third-party assisted reproduction techniques should not only undergo meticulous counseling but also considering numerous issues including alternative treatments, the consequences of not having children, the possibility of adoption, treatment costs, the risks associated with these techniques and the possibility of multiple pregnancy.[38]

The participants of our study agreed that even after disclosing the facts of third-party assisted reproduction methods to the resultant child, the child would still love his/her recipient father as much as his/her biological one. However, there has been other research regarding the necessity of disclosing information to the resultant child. One study reported that 96% of its participants agreed or strongly agreed that the child resulting from sperm, egg or embryo donation should be given information regarding the method of his/her conception, with only 3 participants (2.4%) expressing neutrality about the idea and only 2 participants (1.6%) expressing disagreement or strong disagreement.[39] Accordingly, in another study 47% of parents showed no intention of disclosing this information while 29% had pre-existing intentions of informing their child in the future about the methods of his/her conception. Additionally, in the same study, approximately 66% had already informed a friend or an acquaintance.[40] The question of whether or not to disclose associated information to the resultant child has been a major concern in this field, and different studies have stated diverse and sometimes similar motivations for both disclosure and non-

disclosure. The reasons for not disclosing any information included child protection,[40] an intention to protect the mother,[40] no basic need to inform the child,[40,41] the fact that disclosure may cause harm to the family relationships,[41,42] and concerns of maternal identity.[42] Reasons for disclosing information included the child's right to this information,[39-42] honesty, truth, and openness,[41] prevention of accidental disclosure by others,[40-42] and protecting the child from stigmatization.[42]

Our study's participants maintained neutrality toward the importance of the donor's intelligence, along with different perspectives about the importance of the donor's academic education. According to other studies, however, the characteristics of the sperm, egg or embryo donors were of paramount importance and a patient-generated wish list of desired characteristics was created in some cases in order to find the best potential donor-recipient match. In one study, recipients were asked to make a list of their preferred donor characteristics in order of importance. The most important factor was the donor's medical history, as 74% of the recipients put at the top of their list, and 54% named race as the second most important element. Intelligence was selected by 39%, making it third on the list, smoking/alcohol/narcotics history was fourth according to 28% of the recipients, and family history and age were the fifth and sixth most important donor characteristics with 21% and 10% approval, respectively, from the recipients.[43]

One of the major obstacles to the wide application of third-party assisted reproduction techniques is their commercialization, the financial exploitations of the techniques, and so legislators have a great responsibility to set rules and regulations that strongly minimize all possible risk exposure for the parties involved.[32]

It is a hard if not impossible task to determine whether our study's reported attitudes are translatable to actual attitudes or not. However, as other studies have so far stated, in order to increase the acceptability rate and create an aura of strong positivity toward third-party assisted reproduction techniques, further efforts, studies, and improved awareness along with larger and broader study sample sizes are suggested and required. Since all our participants in this study were medical school students, and may at some point pursue a specialty field associated with infertility and its ramifications, it is best to educate these soon-to-be health system professionals on all the necessary aspects of infertility and third-party assisted reproduction techniques. In that way, these students will be prepared to take the best course of action for themselves and their patients in the future.

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Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Ombelet W, Cooke I, Dyer S, Serour G, Devroey P. Infertility and the provision of infertility medical services in developing countries. Hum Reprod Update 2008;14:605-21. doi:10.1093/humupd/dmn042

2. Datta J, Palmer MJ, Tanton C, Gibson LJ, Jones KG, Macdowall W, et al. Prevalence of infertility and help seeking among 15 000 women and men. Human Reproduction 2016;31:2108-18. doi:10.1093/humrep/dew123

3. Burkman RT. Berek & Novak's gynecology. JAMA 2012;308:516-7.

4. Bruce-Hickman K, Kirkland L, Ba-Obeid T. The attitudes and knowledge of medical students towards surrogacy. Journal of Obstetrics and Gynaecology 2009;29:229-32. doi:10.1080/01443610802712926

5. Lee J, Yap C. Embryo donation: A review. Acta Obstetricia et Gynecologica Scandinavica 2003;82:991-6.

6. Greenfeld DA. Effects and outcomes of third-party reproduction: Parents. Fertility and Sterility 2015;104:520-4. doi:10.1016/j.fertnstert.2015.07.1128

7. Corley SO, Mehlman M. Sperm donation: Legal aspects. Third-Party Reproduction 2014:143-58. doi:10.1007/978-1-4614-7169-1_14

8. Langer G, Lemberg E, Sharf M. Artificial insemination. A study of 156 successful cases. International Journal of Fertility 1969;14:232-40

9. Purewal S, van den Akker OB. British women's attitudes towards oocyte donation: ethnic differences and altruism. Patient Educ Couns 2006;64:43-9. doi:10.1016/j.pec.2005.11.007

10. Kenney NJ, McGowan ML. Egg donation compensation: Ethical and legal challenges. Development 2014;4:15-24.

11. Jadva V, Murray C, Lycett E, MacCallum F, Golombok S. Surrogacy: The experiences of surrogate mothers. Human Reproduction 2003;18:2196-204. doi:10.1093/humrep/deg397

12. Hathout M. Surrogacy: An Islamic perspective. Journal of the Islamic Medical Association of North America 1989;21. doi:10.5915/21-3-13364

13. Brinsden PR. Gestational surrogacy. Human Reproduction Update 2003;9:483-91. doi:10.1093/humupd/dmg033

14. Kainz K. The role of the psychologist in the evaluation and treatment of infertility. Women's Health Issues 2001;11:481-5. doi:10.1016/S1049-3867(01)00129-3

15. Poote AE, van den Akker OB. British women's attitudes to surrogacy. Human Reproduction 2009;24:139-45. doi:10.1093/humrep/den338

16. Isikoglu M, Senol Y, Berkkanoglu M, Ozgur K, Donmez L, Stones-Abbasi A. Public opinion regarding oocyte donation in Turkey: First data from a secular population among the Islamic world. Human Reproduction 2006;21:318-23. doi:10.1093/humrep/dei274

17. Mohebbi Kian E, Riazi H, Bashirian S. Attitudes of Iranian infertile couples toward surrogacy. Journal of Human Reproductive Sciences 2014;7:47-51. doi:10.4103/0974-1208.130847

18. Svanberg AS, Lampic C, Bergh T, Lundkvist Ö. Public opinion regarding oocyte donation in Sweden. Hum Reprod 2003;18:1107-14. doi:10.1093/humrep/deg222

19. Khalili MA, Isikoglu M, Tabibnejad N, Ahmadi M, Abed F, Parsanejad ME, et al. IVF staff attitudes towards oocyte donation: a multi-centric study from Iran and Turkey. Reproductive Biomedicine Online 2008;17:61-6. doi:10.1016/S1472-6483(10)60333-1

20. Jafari H, Latifnejad Roudsari R, Taghipour A, Khadem N, Ebrahimzadeh S. Comparison of knowledge and attitude towards reproductive donation procedures between recipient and non-recipient infertile couples at Mashhad infertility center. Journal of Torbat Heydariyeh University of Medical Sciences (Journal of Health Chimes) 2015;3:16-25.

21. Halman LJ, Abbey A, Andrews FM. Attitudes about infertility interventions among fertile and infertile couples. American Journal of Public Health 1992;82:191-4

22. Armour KL. An overview of surrogacy around the world: trends, questions and ethical issues. Nursing for Women's Health 2012;16:231-6. doi:10.1111/j.1751-486X.2012.01734.x

23. McCormick RA. Surrogacy: A catholic perspective. Creighton L. Rev. 1991;25:1617

24. Hirsh AV. Infertility in Jewish couples, biblical and rabbinic law. Human Fertility 1998;1:14-9. doi:10.1080/1464727982000198041

25. Schenker JG. Infertility evaluation and treatment according to Jewish law. European Journal of Obstetrics & Gynecology and Reproductive Biology 1997;71:113-21. doi:10.1016/S0301-2115(96)02621-8

26. Husain FA. Reproductive issues from the Islamic perspective. Human Fertility 2000;3:124-8. doi:10.1080/1464727002000198831

27. Corson SL, Kelly M, Braverman AM, English ME. Gestational carrier pregnancy. Fertility and Sterility 1998;69:670-4. doi:10.1016/S0015-0282(98)00020-X

28. Dermout S, van de Wiel H, Heintz P, Jansen K, Ankum W. Non-commercial surrogacy: an account of patient management in the first dutch centre for IVF surrogacy, from 1997 to 2004. Human Reproduction 2010;25:443-9. doi:10.1093/humrep/dep410

29. Dar S, Lazer T, Swanson S, Silverman J, Wasser C, Moskovtsev SI, et al. Assisted reproduction involving gestational surrogacy: an analysis of the medical, psychosocial and legal issues: experience from a large surrogacy program. Human Reproduction 2014;30:345-52. doi:10.1093/humrep/deu333

30. Söderström-Anttila V, Wennerholm UB, Loft A, Pinborg A, Aittomäki K, Romundstad LB, et al. Surrogacy: Outcomes for surrogate mothers, children and the resulting families—a systematic review. Human Reproduction Update 2016;22:260-76. doi:10.1093/humupd/dmv046

31. Boivin J, Appleton TC, Baetens P, Baron J, Bitzer J, Corrigan E, et al. Guidelines for counselling in infertility: Outline version. Human Reproduction 2001;16:1301-4. doi:10.1093/humrep/16.6.1301

32. Fasouliotis SJ, Schenker JG. Social aspects in assisted reproduction. Human Reproduction Update 1999;5:26-39. doi:10.1093/humupd/5.1.26

33. Schenker JG. Surrogate maternity. Rev Chil Obstet Ginecol 1989;54:103-4

34. Patel NH, Jadeja YD, Bhadarka HK, Patel MN, Patel NH, Sodagar NR. Insight into different aspects of surrogacy practices. Journal of Human Reproductive Sciences 2018;11:212-8. doi:10.4103/jhrs.JHRS_138_17

35. Saxena P, Mishra A, Malik S. Surrogacy: Ethical and legal issues. Indian Journal of Community Medicine 2012;37:211-3. doi:10.4103/0970-0218.103466

36. Bromham DR. Surrogacy: ethical, legal, and social aspects. Journal of Assisted Reproduction and Genetics 1995;12:509-16. doi:10.1007/BF02212913

37. Baykal B, Korkmaz C, Ceyhan ST, Goktolga U, Baser I. Opinions of infertile Turkish women on gamete donation and gestational surrogacy. Fertility and Sterility 2008;89:817-22. doi:10.1016/j.fertnstert.2007.04.022

38. Association BM. Changing conceptions of motherhood: the practice of surrogacy in Britain. 1996.

39. Rodino IS, Burton PJ, Sanders KA. Donor information considered important to donors, recipients and offspring: An Australian Perspective. Reproductive BioMedicine Online 2011;22:303-11. doi:10.1016/j.rbmo.2010.11.007

40. Murray C, Golombok S. To tell or not to tell: The decision-making process of egg-donation parents. Human Fertility 2003;6:89-95. doi:10.1080/1464770312331369123

41. Hahn, S.J. and M. Craft-Rosenberg, The disclosure decisions of parents who conceive children using donor eggs. Journal of Obstetric, Gynecologic, & Neonatal Nursing 2002;31:283-93. doi:10.1111/j.1552-6909.2002.tb00050.x

42. Hershberger P, Klock SC, Barnes RB. Disclosure decisions among pregnant women who received donor oocytes: A phenomenological study. Fertility and Sterility 2007;87:288-96. doi:10.1016/j.fertnstert.2006.06.036

43. Lindheim SR, Sauer MV. Expectations of recipient couples awaiting an anonymous oocyte donor match. Journal of Assisted Reproduction and Genetics 1998;15:444-6. doi:10.1007/BF02744939