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Biomedical ethical analysis of patients' perspectives on posthumous reproduction in a gynecology and obstetrics clinic

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Abstract

Background This study explores the perspectives of patients attending a gynecology and obstetrics clinic in Türkiye regarding posthumous reproduction from a biomedical ethics standpoint. To examine the bioethical issues about the subject related surviving spouses and potential children may face.

Methods A cross-sectional and descriptive survey was conducted between May 1, 2023, and August 1, 2023. A total of 200 women visiting the Kırşehir Ahi Evran University Gynecology and Obstetrics Clinic participated in face-to-face interviews. The survey comprised 20 questions aimed at evaluating participants' views on posthumous reproduction. Data were analyzed using SPSS 25 software, and the Chi-square test was applied, with statistical significance set at $p < 0.05$.

Results Of the participants, 59.5% opposed a woman having a child using a preserved embryo after her husband's death, while 75.5% disapproved of a man having a child through a surrogate after his wife's death. Additionally, 55% supported a woman's reproductive rights in such cases, whereas 57% objected to a man exercising the same right. Concerns about the potential negative impact on children ranged from 50% to 57.5%. The majority believed that posthumous reproduction should only be ethically permissible if the deceased had provided explicit consent beforehand.

Conclusion Findings indicate that perspectives on posthumous reproduction are influenced by social, cultural, and ethical considerations. Turkish society generally maintains a reserved and critical stance on this issue, with stronger opposition to male surrogacy. The ethical and legal implications of posthumous reproduction highlight the need for legal regulations and public awareness initiatives.

Keywords Posthumous reproduction, Reproductive rights, Surrogacy, Medical ethics, Biomedical ethics

Introduction

Rapid advancements in medical technology bring new ethical issues and dilemmas into various aspects of human life. In particular, discussions surrounding an individual's reproductive rights and the use of biomedical technologies in reproduction have sparked significant debates. Contemporary reproductive technologies have made posthumous reproduction possible. The medical, ethical, and legal interpretations regarding the use of reproductive technologies to enable conception after

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death have become a central focus of modern bioethical discussions [1, 2].

Undoubtedly, revolutionary advancements in infertility treatments have clearly demonstrated that having children is no longer dependent on traditional family structures [3]. In cases where one or both parents have passed away, the use and application of advanced medical technologies make conception and childbirth technically possible [4]. In this context, having a child through the use of frozen embryos is possible. The desire of the surviving spouse to use these embryos after the death of their partner has become a complex issue that requires examination from a biomedical ethics perspective [5–7]. Because the ability to conceive and reproduce posthumously has now become technically possible, a new dimension has emerged in reproductive choices. While reproductive freedom is considered a fundamental right, its integration with medical technologies that serve as alternatives to “natural” reproduction has sparked intense debates. Today, not only a widow but also a widower, single individual and same sex couple can technically become a parent through assisted reproductive methods [3].

Cultural differences that intensify debates on posthumous reproduction play a significant role in shaping policies related to posthumous reproductive practices [4]. In Türkiye, where the majority of the population is Muslim, the Presidency of Religious Affairs (Diyanet İşleri Başkanlığı), recognized as an official Islamic authority, issued a fatwa in 2009 stating that marriage is considered dissolved upon death. Consequently, the use of frozen gametes or embryos for reproductive purposes after death is deemed impermissible under Islamic law. [8]. In Iran, another Muslim-majority country, there are differing views among Shia jurists regarding posthumous reproduction. While some scholars oppose it entirely, others hold that a woman may use frozen embryos to conceive under certain conditions, even if she remarries after her husband's death [9]. In Catholic Christianity, posthumous reproduction is strictly prohibited, while in Protestantism, it is also forbidden in a manner similar to the Islamic fatwa issued in Türkiye. In contrast, Judaism does not generally oppose posthumous reproduction, demonstrating a more permissive stance on the issue [10].

Turkish legislation does not explicitly prohibit posthumous reproduction; however, in cases where one of the spouses passes away, it is legally required to destroy any existing frozen embryos as seen in the *article 20, paragraph 5 of the Regulation on Assisted Reproductive Treatment Practices and Assisted Reproductive Treatment Centers states: “In cases where more embryos are obtained from the candidates than necessary, the embryos shall be cryopreserved with the consent of both spouses. If the*

storage period exceeds one year, the couple must apply each year and submit a signed petition indicating that they wish to continue storing the embryos. If both spouses jointly request it, or in the event of the death of one of the spouses, legal confirmation of divorce, or the expiration of the designated storage period, the embryos shall be destroyed by a commission established within the Directorate, with an official record being prepared.” There is no other legislation in Türkiye that addresses posthumous reproduction [11]. Iranian law does not explicitly prohibit posthumous reproduction. Certain legal interpretations grant the deceased individual's spouse and parents the right to continue infertility treatment if they wish. Additionally, fertility clinics may make decisions regarding the use or disposal of reproductive embryos based on their internal policies and agreements with the deceased's family members [9]. In Greece, a woman has the legal right to pursue posthumous reproduction after her husband's death. According to legislation, she may request the transfer of a frozen embryo within 300 days following his passing. Furthermore, a child born through this process is recognized as the legal heir of the deceased father. However, the same right is not extended to a widowed man seeking to have a child after his wife's death [12]. In the United States, there is no federal regulation regarding posthumous reproduction; however, state-level practices are based on legal precedents. The generally accepted view, according to these precedents, is that the use of assisted reproductive technology after death falls within the scope of reproductive rights [10]. The Ethics Committee of the American Society for Reproductive Medicine (ASRM) states *“However, when embryos were created for the purpose of allowing a couple to reproduce together, in the absence of a written directive prohibiting the use of cryopreserved embryos by the surviving partner, it seems reasonable to allow surviving partners to reproduce from embryos he or she helped to create for that purpose unless there is other evidence that indicates that this would have been opposed by the deceased.”* On the other hand, the use of posthumous gametes or embryos is ethically acceptable if the deceased individual provided written consent beforehand. This emphasizes the importance of obtaining explicit prior consent regarding the use of reproductive materials after death. [13]. Similarly, sperm banks operating in the United States are known to obtain prior consent from donors regarding the use or disposal of their sperm in the event of their death [10]. However, in cases where the deceased individual did not provide prior consent, debates continue regarding whether postmortem reproduction should be legally permitted. Such situations create complex ethical and legal challenges [14].

In countries like Türkiye, where traditional values intersect with modern medical practices, posthumous

reproduction becomes a highly sensitive issue with both individual and societal implications. Evaluating the perspectives of patients visiting a gynecology and obstetrics clinic on posthumous reproduction from a biomedical ethics perspective will provide insights into both individual and societal viewpoints in the existing literature. Additionally, individuals' awareness, attitudes, and ethical evaluations on this issue will provide valuable guidance for healthcare professionals and policymakers [4, 15]. In this context, it is essential to examine bioethical issues at both individual and societal levels.

In the context of advancing reproductive technologies, posthumous reproduction has become a subject of debate from biomedical ethics, legal, and cultural perspectives. Previous research has shown that attitudes toward posthumous reproduction vary across different cultures. However, research that specifically examines the perspectives of female patients on this issue in detail is extremely limited. This study aims to explore the biomedical ethical implications of the use of frozen embryos by the surviving spouse, whether male or female, after the death of one partner in Türkiye, where the topic requires further ethical discussion. For this reason, this study aims to examine the perspectives of women visiting a gynecology and obstetrics clinic for any reason, analyzing the biomedical ethical, legal, and cultural implications of posthumous reproduction on surviving spouses and potential children.

Methods

Study design

The study design is a prospective, cross-sectional, and descriptive survey study. A comprehensive literature review was conducted, and 20 survey questions were developed based on different bioethical topics related to posthumous reproduction in cases of both male and female death. The survey used in the study was developed by the authors after a comprehensive literature review. This survey has not been published elsewhere.

Sampling and recruitment

Women who visited the Gynecology and Obstetrics Clinic for any medical reason. Participants were selected using a random sampling method.

Data collection

Between May 1, 2023, and August 1, 2023, face-to-face surveys were conducted with 200 women who visited the Kırşehir Ahi Evran University Training and Research Hospital Gynecology and Obstetrics Clinic for any medical reason.

Data analysis

The collected data were statistically analysed using SPSS 25. Frequencies and percentages were calculated for categorical variables, and Chi-square tests were conducted for group comparisons. A p -value of <0.05 was considered statistically significant.

Results

The total number of volunteers participating in the study is 200, and all of them are women. The majority of the participants are between the ages of 18 and 39, and their total number is 130. One hundred forty-eight of them are married. One hundred thirty-three have children. Most of them have not experienced infant loss. The majority have an education level below a bachelor's degree. All of them are Muslim (Table 1).

There are 19 volunteers who did not specify their occupation. The distribution of occupational groups among the participants is as follows: Housewife 91, student 22, teacher 15, engineer 11, officer 11, nurse 2, unemployed 6, medical doctor 4, tradesperson 4, academician 3, midwife 3, child development specialist 2, hospital staff 2, food technician 1, lawyer 1, s physiotherapist 1, security officer 1, sales consultant 1.

The numerical and percentage distributions of responses to the survey questions administered to patients admitted to the Department of Obstetrics and Gynecology were

Table 1 Sociodemographic data

Variable	Category	n	%
Age	18–29	80	40
	30–39	50	25
	40–49	40	20
	50 and above	16	8
	Age not specified	14	7
Marital Status	Married	148	74
	Single	52	26
Having Children	Yes	133	66,5
	No	67	33,5
Infant Loss	Yes	18	9
	No	182	91
Education Level	Primary Education	40	20
	High School	57	28,5
	Associate Degree	19	9,5
	Bachelor's Degree	60	30
	Postgraduate Degree	17	8,5
	Education Level Not Specified	7	3,5
Occupation	Housewife	91	45,5
	Other Occupations	90	45
	Occupation Not Specified	19	9,5
Religion	Islam	200	100

calculated, making it possible to evaluate their perspectives on posthumous reproduction within the framework of biomedical ethics (Table 2). These responses allow for the analysis and discussion of participants' views on posthumous reproduction under the thematic categories of "Cultural Perspective, Reproductive Rights, Beneficence, Harm to the Potential Child, Consent of the Deceased and Surviving Parent, Medical Will, Surrogate Decision-Maker, Potential Child as an Heir, and Religious Perspective".

The responses to the survey questions were compared across the groups of "Having Child(ren), Infant Loss, Marital Status, Education Level, and Age." A p -value of <0.05 was considered statistically significant, and such values are indicated in bold within the table. Statistically significant values in responses were observed in the following groups: Having Child(ren) ($Q3=0.031$, $Q7=0.047$, $Q19=0.021$), Infant Loss ($Q19=0.026$, $Q20=0.009$), and

Education Level ($Q4=0.032$, $Q19=0.030$, $Q20=0.011$). In contrast, no statistically significant differences were identified in the responses given by participants grouped by Marital Status and Age (Table 3).

Discussion

It is known that individuals' sociodemographic characteristics influence their attitudes toward posthumous reproduction. Being young is associated with a more supportive attitude toward posthumous reproduction, while gender is considered a factor affecting these attitudes. Being married is thought to have a positive impact on perceptions of posthumous reproduction. Additionally, a lower level of education is identified as a factor contributing to a negative outlook on posthumous reproduction, and religious beliefs are recognized as a significant determinant of attitudes toward this issue [16, 17]. In

Table 2 Responses to survey questions

NO	QUESTIONS	YES		NO		HESITANT	
		n	%	n	%	n	%
1	Do you find it appropriate for a woman to have a child using an embryo after the death of her husband?	79	39.5	119	59.5	2	1.0
2	Do you find it appropriate for a man to have a child using an embryo through a surrogate mother after the death of his wife?	49	24.5	151	75.5	0	0
3	Should a woman's desire to have a child using an embryo after her husband's death be considered within the scope of reproductive rights?	110	55	87	43.5	3	1.5
4	Should a man's desire to have a child using an embryo through a surrogate mother after his wife's death be considered within the scope of reproductive rights?	78	39	114	57	8	4
5	Does having a child using an embryo after the husband's death benefit the woman?	93	46.5	101	50.5	6	3
6	Does having a child using an embryo through a surrogate mother after the wife's death benefit the man?	70	35	125	62.5	5	2.5
7	Does having a child using an embryo after the husband's death cause harm to the child to be born?	100	50	93	46.5	7	3.5
8	Does having a child using an embryo through a surrogate mother after the wife's death cause harm to the child to be born?	115	57.5	83	41.5	2	1
9	Is the woman's consent sufficient for the medical procedures required to have a child using an embryo after the husband's death?	109	54.5	88	44	3	1.5
10	Is the man's consent sufficient for the medical procedures required to have a child using an embryo through a surrogate mother after the wife's death?	94	47	100	50	6	3
11	Should the husband's consent be obtained while he is alive for the woman to have a child using an embryo after his death?	166	83	32	16	2	1
12	Should the wife's consent be obtained while she is alive for the man to have a child using an embryo through a surrogate mother after her death?	169	84.5	31	15.5	0	0
13	Should the husband's consent given while he was alive be considered a medical will for the woman to have a child using an embryo after his death?	141	70.5	58	29	1	0.5
14	Should the wife's consent given while she was alive be considered a medical will for the man to have a child using an embryo through a surrogate mother after her death?	143	71.5	56	28	1	0.5
15	Should the husband appoint a surrogate decision-maker while he is alive for the woman to have a child using an embryo after his death?	71	35.5	123	61.5	6	3
16	Should the wife appoint a surrogate decision-maker while she is alive for the man to have a child using an embryo through a surrogate mother after her death?	71	35.5	125	62.5	4	2
17	After the husband's death , in the case where the woman has a child from the embryo, should the child be considered the heir of the deceased father?	161	80.5	38	19	1	0.5
18	After the wife's death , in the case where the man has a child through a surrogate mother from the embryo, should the child be considered the heir of the deceased mother?	156	78	43	21.5	1	0.5
19	Do you consider it religiously acceptable for a woman to have a child from an existing embryo after the husband's death?	85	42.5	107	53.5	8	4
20	Do you consider it religiously acceptable for a man to have a child through a surrogate mother using an existing embryo after the wife's death?	73	36.5	120	60	7	3.5

Table 3 Comparison to survey questions by groups

Question Number/ Answers	Having Child(ren)		Infant Loss		Marital Status		Education Level		Age	
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Married n (%)	Single n (%)	Before Bachelor's Degree n (%)	Bachelor's Degree and Postgraduate Degree n (%)	18-39 years	40 years and over
Q1	Yes	46 (34.6)	33 (49.3)	10 (55.6)	69 (37.9)	55 (37.2)	24 (46.2)	40 (34.8)	38 (47.5)	55 (42.3)
	No	86 (64.7)	33 (49.3)	8 (44.4)	111 (61.0)	91 (61.5)	28 (53.8)	73 (63.5)	42 (52.5)	73 (56.2)
	Hesitant	1 (0.8)	1 (1.5)	0 (0.0)	2 (1.1)	2 (1.4)	0 (0.0)	2 (1.7)	0 (0.0)	2 (1.5)
	p-Value	0.072		0.343		0.440		0.100		0.607
Q2	Yes	29 (21.8)	20 (29.9)	4 (22.2)	45 (24.7)	35 (23.6)	14 (26.9)	26 (22.6)	22 (27.5)	34 (26.2)
	No	104 (78.2)	47 (70.1)	14 (77.8)	137 (75.3)	113 (76.4)	38 (73.1)	89 (77.4)	58 (72.5)	96 (73.8)
	Hesitant	0 (0)	0 (0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	p-Value	0.226		1		0.708		0.500		0.717
Q3	Yes	65 (48.9)	45 (67.2)	10 (55.6)	100 (54.9)	79 (53.4)	31 (59.6)	59 (51.3)	49 (61.3)	74 (56.9)
	No	65 (48.9)	22 (32.8)	8 (44.4)	79 (43.4)	66 (44.6)	21 (40.4)	54 (47.0)	30 (37.5)	55 (42.3)
	Hesitant	3 (2.3)	0 (0.0)	0 (0.0)	3 (1.6)	3 (2.0)	0 (0.0)	2 (1.7)	1 (1.3)	1 (0.8)
	p-Value	0.031		1		0.639		0.371		0.390
Q4	Yes	47 (35.3)	31 (46.3)	6 (33.3)	72 (39.6)	54 (36.5)	24 (46.2)	38 (33.0)	40 (50.0)	50 (38.5)
	No	79 (59.4)	35 (52.2)	12 (66.7)	102 (56.0)	86 (58.1)	28 (53.8)	71 (61.7)	39 (48.8)	75 (57.7)
	Hesitant	7 (5.3)	1 (1.5)	0 (0.0)	8 (4.4)	8 (5.4)	0 (0.0)	6 (5.2)	1 (1.3)	5 (3.8)
	p-Value	0.214		0.746		0.152		0.032		0.809
Q5	Yes	54 (40.6)	39 (58.2)	11 (61.1)	82 (45.1)	68 (45.9)	25 (48.1)	50 (43.5)	42 (52.5)	60 (46.2)
	No	74 (55.6)	27 (40.3)	6 (33.3)	95 (52.2)	75 (50.7)	26 (50.0)	59 (51.3)	38 (47.5)	66 (50.8)
	Hesitant	5 (3.8)	1 (1.5)	1 (5.6)	5 (2.7)	5 (3.4)	1 (1.9)	6 (5.2)	0 (0.0)	4 (3.1)
	p-Value	0.056		0.211		0.955		0.068		0.695
Q6	Yes	44 (33.1)	26 (38.8)	8 (44.4)	62 (34.1)	53 (35.8)	17 (32.7)	37 (32.2)	33 (41.3)	44 (33.8)
	No	85 (63.9)	40 (59.7)	9 (50.0)	116 (63.7)	91 (61.5)	34 (65.4)	73 (63.5)	47 (58.8)	84 (64.6)
	Hesitant	4 (3.0)	1 (1.5)	1 (5.6)	4 (2.2)	4 (2.7)	1 (1.9)	5 (4.3)	0 (0.0)	2 (1.5)
	p-Value	0.655		0.274		0.896		0.083		0.297
Q7	Yes	73 (54.9)	27 (40.3)	11 (61.1)	89 (48.9)	75 (50.7)	25 (48.1)	62 (53.9)	37 (46.3)	64 (49.2)
	No	54 (40.6)	39 (58.2)	7 (38.9)	86 (47.3)	68 (45.9)	25 (48.1)	48 (41.7)	42 (52.5)	63 (48.5)
	Hesitant	6 (4.5)	1 (1.5)	0 (0.0)	7 (3.8)	5 (3.4)	2 (3.8)	5 (4.3)	1 (1.3)	3 (2.3)
	p-Value	0.047		0.653		0.958		0.221		0.396
Q8	Yes	77 (57.9)	38 (56.7)	10 (55.6)	105 (57.7)	85 (57.4)	30 (57.7)	63 (54.8)	50 (62.5)	75 (57.7)
	No	54 (40.6)	29 (43.3)	7 (38.9)	76 (41.8)	61 (41.2)	22 (42.3)	50 (43.5)	30 (37.5)	53 (40.8)
	Hesitant	2 (1.5)	0 (0.0)	1 (5.6)	1 (0.5)	2 (1.4)	0 (0.0)	2 (1.7)	0 (0.0)	2 (1.5)
	p-Value	0.839		0.207		1		0.412		0.506

Table 3 (continued)

Question Number/ Answers	Having Child(ren)		Infant Loss		Marital Status		Education Level		Age	
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Married n (%)	Single n (%)	Before Bachelor's Degree n (%)	Bachelor's Degree and Postgraduate Degree n (%)	18-39 years	40 years and over
Q9	Yes	69 (51.9)	40 (59.7)	9 (50.0)	81 (54.7)	28 (53.8)	59 (51.3)	46 (57.5)	74 (56.9)	29 (51.8)
	No	61 (45.9)	27 (40.3)	8 (44.4)	65 (43.9)	23 (44.2)	54 (47.0)	33 (41.3)	55 (42.3)	25 (44.6)
	Hesitant	3 (2.3)	0 (0.0)	1 (5.6)	2 (1.4)	1 (1.9)	2 (1.7)	1 (1.3)	1 (0.8)	2 (3.6)
	p-Value	0.413		0.307	1		0.768		0.297	
Q10	Yes	59 (44.4)	35 (52.2)	8 (44.4)	70 (47.3)	24 (46.2)	54 (47.0)	38 (47.5)	63 (48.5)	26 (46.4)
	No	68 (51.1)	32 (47.8)	9 (50.0)	73 (49.3)	27 (51.9)	57 (49.6)	40 (50.0)	64 (49.2)	28 (50.0)
	Hesitant	6 (4.5)	0 (0.0)	1 (5.6)	5 (3.4)	1 (1.9)	4 (3.5)	2 (2.5)	3 (2.3)	2 (3.6)
	p-Value	0.159		0.619	0.955		1		0.825	
Q11	Yes	110 (82.7)	56 (83.6)	16 (88.9)	123 (83.1)	43 (82.7)	98 (85.2)	65 (81.3)	116 (89.2)	42 (75.0)
	No	21 (15.8)	11 (16.4)	2 (11.1)	23 (15.5)	9 (17.3)	15 (13.0)	15 (18.8)	14 (10.8)	13 (23.2)
	Hesitant	2 (1.5)	0 (0.0)	0 (0.0)	2 (1.4)	0 (0.0)	2 (1.7)	0 (0.0)	0 (0.0)	1 (1.8)
	p-Value	0.929		0.787	0.906		0.355		0.200	
Q12	Yes	112 (84.2)	57 (85.1)	16 (88.9)	124 (83.8)	45 (86.5)	98 (85.2)	68 (85.0)	115 (88.5)	45 (80.4)
	No	21 (15.8)	10 (14.9)	2 (11.1)	24 (16.2)	7 (13.5)	17 (14.8)	12 (15.0)	15 (11.5)	11 (19.6)
	Hesitant	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	p-Value	1		0.745	0.824		1		0.168	
Q13	Yes	93 (69.9)	48 (71.6)	13 (72.2)	106 (71.6)	35 (67.3)	78 (67.8)	61 (76.3)	92 (70.8)	41 (73.2)
	No	39 (29.3)	19 (28.4)	5 (27.8)	41 (27.7)	17 (32.7)	36 (31.3)	19 (23.8)	38 (29.2)	14 (25.0)
	Hesitant	1 (0.8)	0 (0.0)	0 (0.0)	1 (0.7)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	1 (1.8)
	p-Value	1		1	0.700		0.326		0.325	
Q14	Yes	95 (71.4)	48 (71.6)	14 (77.8)	106 (71.6)	37 (71.2)	79 (68.7)	61 (76.3)	93 (71.5)	41 (73.2)
	No	37 (27.8)	19 (28.4)	4 (22.2)	41 (27.7)	15 (28.8)	35 (30.4)	19 (23.8)	37 (28.5)	14 (25.0)
	Hesitant	1 (0.8)	0 (0.0)	0 (0.0)	1 (0.7)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	1 (1.8)
	p-Value	1		0.804	1		0.451		0.323	
Q15	Yes	44 (33.1)	27 (40.3)	10 (55.6)	61 (33.5)	20 (38.5)	41 (35.7)	29 (36.3)	44 (33.8)	20 (35.7)
	No	83 (62.4)	40 (59.7)	7 (38.9)	116 (63.7)	31 (59.6)	68 (59.1)	51 (63.7)	83 (63.8)	34 (60.7)
	Hesitant	6 (4.5)	0 (0.0)	1 (5.6)	5 (2.7)	1 (1.9)	6 (5.2)	0 (0.0)	3 (2.3)	5 (2.7)
	p-Value	0.155		0.077	0.908		0.127		0.777	
Q16	Yes	46 (34.6)	25 (37.3)	10 (55.6)	61 (33.5)	20 (38.5)	41 (35.7)	29 (36.3)	45 (34.6)	20 (35.7)
	No	83 (62.4)	42 (62.7)	7 (38.9)	118 (64.8)	31 (59.6)	70 (60.9)	51 (63.7)	83 (63.8)	34 (60.7)
	Hesitant	4 (3.0)	0 (0.0)	1 (5.6)	3 (1.6)	1 (1.9)	4 (3.5)	0 (0.0)	2 (1.5)	2 (3.6)
	p-Value	0.466		0.056	0.836		0.320		0.679	

Table 3 (continued)

Question Number/ Answers	Having Child(ren)		Infant Loss		Marital Status		Education Level		Age	
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Married n (%)	Single n (%)	Before Bachelor's Degree n (%)	Bachelor's Degree and Postgraduate Degree n (%)	18-39 years n (%)	40 years and over n (%)
Q17	Yes	112 (84.2)	49 (73.1)	17 (94.4)	144 (79.1)	121 (81.8)	40 (76.9)	93 (80.9)	65 (81.3)	104 (80.0)
	No	20 (15.0)	18 (26.9)	1 (5.6)	37 (20.3)	26 (17.6)	12 (23.1)	21 (18.3)	15 (18.8)	25 (19.2)
	Hesitant	1 (0.8)	0 (0.0)	0 (0.0)	1 (0.5)	1 (0.7)	0 (0.0)	1 (0.9)	0 (0.0)	1 (0.8)
	p-Value	0.080	0.277	0.277	0.567	0.567	1	1	0.672	0.672
Q18	Yes	109 (82.0)	47 (70.1)	17 (94.4)	139 (76.4)	117 (79.1)	39 (75.0)	91 (79.1)	63 (78.8)	102 (78.5)
	No	23 (17.3)	20 (14.4)	1 (5.6)	42 (23.1)	30 (20.3)	13 (25.0)	23 (20.0)	17 (21.3)	28 (21.5)
	Hesitant	1 (0.8)	0 (0.0)	0 (0.0)	1 (0.5)	1 (0.7)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)
	p-Value	0.078	0.208	0.208	0.672	0.672	0.917	0.917	0.142	0.142
Q19	Yes	48 (36.1)	37 (55.2)	5 (27.8)	80 (44.0)	61 (41.2)	24 (46.2)	40 (34.8)	43 (53.8)	60 (46.2)
	No	80 (60.2)	27 (40.3)	10 (55.6)	97 (53.3)	82 (55.4)	25 (48.1)	70 (60.9)	34 (42.5)	64 (49.2)
	Hesitant	5 (3.8)	3 (4.5)	3 (16.7)	5 (2.7)	5 (3.4)	3 (5.8)	5 (4.3)	3 (3.8)	6 (4.6)
	p-Value	0.021	0.026	0.026	0.481	0.481	0.031	0.031	0.348	0.348
Q20	Yes	42 (31.6)	31 (46.3)	3 (16.7)	70 (38.5)	50 (33.8)	23 (44.2)	33 (28.7)	39 (48.8)	52 (40.0)
	No	86 (64.7)	34 (50.7)	12 (66.7)	108 (59.3)	93 (62.8)	27 (51.9)	78 (67.8)	38 (47.5)	73 (56.2)
	Hesitant	5 (3.8)	2 (3.0)	3 (16.7)	4 (2.2)	5 (3.4)	2 (3.8)	4 (3.5)	3 (3.8)	5 (3.8)
	p-Value	0.143	0.009	0.009	0.361	0.361	0.011	0.011	0.545	0.545

addition, although cross-cultural studies on posthumous reproduction have shown variations in attitudes toward the practice, there is a lack of research data on how the experience of having children or losing a child influences these attitudes [4].

Cultural perspective

A cross-cultural comparison of posthumous reproduction in Israel and Germany has indicated that factors such as the beginning and end of life, gender roles, and family dynamics significantly influence individuals' attitudes toward the practice [4]. Although different cultures exhibit varying perspectives on posthumous reproduction, the diverse ethical values adopted by individuals raised within the same cultural environment are also considered a significant factor influencing personal cultural outlooks [18]. In this study, 59.5% of participants considered it unacceptable for a woman to have a child from an embryo after the man's death. Similarly, 75.5% of participants disapproved of a man having a child from an embryo through a surrogate mother after the woman's death. This finding highlights that individuals raised within the same cultural environment can still hold diverse perspectives on posthumous reproduction.

Reproductive rights

Both international and national regulations emphasize the absolute nature of an individual's right to reproduction. Documents addressing reproductive rights, which are widely recognized by nearly all nations, manifest in various cultural regions and geographical contexts through positive adaptations in their implementation. These variations reflect differing legal, ethical, and societal approaches while maintaining a core commitment to reproductive autonomy [19]. When it comes to posthumous reproduction, discussions about the rights of the potential child often come into conflict with an individual's right to reproduction [1, 4]. There is no specific research data on posthumous reproduction in Türkiye. However, according to the findings of this study, 55% of participants consider a woman's desire to have a child from an embryo after the man's death as a reproductive right. In contrast, 57% of participants do not regard a man's desire to have a child from an embryo through a surrogate mother after the woman's death as a reproductive right. This indicates gender-based differences in how reproductive rights are perceived in the context of posthumous reproduction. Although this remains a subject of debate within the context of reproductive rights, it should also be noted that surrogacy is not legally permitted in Türkiye. Accordingly, it is illegal for a husband to use a surrogate after the death of his wife. When considered in light of the research findings, it can be inferred

that a portion of the population does not oppose surrogacy, suggesting the presence of diverse ethical and social attitudes toward the practice within society.

Beneficence

A surviving individual may continue to desire having a child with their deceased partner. This desire may stem from the intention to honor the memory of their loved one, fulfill the deceased partner's pre-existing wish to have a child, or complete the envisioned family structure they had planned together. Fulfilling these aspirations can be considered a psychological benefit for the surviving partner, potentially providing emotional healing and a sense of continuity despite the loss [20, 21]. From the perspective of the deceased partner, it is evident that posthumous reproduction does not provide any direct benefit. However, it is believed that it may offer potential benefits to the surviving partner and the deceased person's parents. For the surviving partner, the birth of a child can serve as a source of emotional comfort, continuity, and fulfillment of shared aspirations. Similarly, for the deceased's parents, having a grandchild may provide a sense of legacy, emotional solace, and familial continuity, helping them cope with their loss [14]. In contrast to arguments emphasizing potential benefits, the findings of this study suggest that 50.5% of participants believe that a woman would not gain any benefit from having a child from an embryo after the man's death. Similarly, 62.5% of participants think that a man would not benefit from having a child through a surrogate mother after the woman's death. These results indicate that a significant portion of participants do not perceive posthumous reproduction as providing a tangible benefit to the surviving partner, highlighting the subjectivity and complexity of perceived advantages in such cases.

Harm to potential child

It is believed that the birth of a child following the death of one parent may contribute to the well-being of the surviving partner. However, it is argued that finding concrete evidence that posthumous reproduction negatively impacts the child's well-being is highly challenging. While concerns exist regarding potential psychological, emotional, and social disadvantages, there is no definitive empirical data proving that the child's welfare would be significantly harmed [22]. In this study, 50% of participants believe that if a woman has a child from an embryo after the man's death, it would be harmful to the child. Similarly, 57.5% of participants think that if a man has a child from an embryo through a surrogate mother after the woman's death, it would negatively affect the child's well-being. These findings indicate that a significant proportion of individuals perceive posthumous reproduction as potentially detrimental to the future child, reflecting

societal concerns about the psychological, emotional, and social challenges that may arise in such cases.

Consent of the deceased and surviving parent

In cases of posthumous reproduction, if the deceased partner did not provide explicit consent while alive, it is argued that their implicit consent should be assumed if there is proof that they had sought or undergone assisted reproductive treatment during their lifetime. This perspective suggests that a demonstrated intention to pursue reproduction while alive should be considered a valid basis for presumed consent, even in the absence of direct authorization for posthumous use [23, 24]. On the contrary, the American Society for Reproductive Medicine (ASRM) emphasizes that the explicit written consent of the deceased partner is ethically and legally necessary for the use of their reproductive material after death [13]. There is no specific viewpoint regarding the sufficiency of consent from only the surviving spouse. However, in this study, 54.5% of participants consider the woman's consent sufficient for medical procedures to have a child from an embryo after the man's death, while 50% of participants believe that the man's consent alone is not sufficient for using an embryo through a surrogate mother after the woman's death. Additionally, 83% of participants state that the man's consent should be obtained while he is alive, and 84.5% believe that the woman's consent should be obtained while she is alive.

Medical will

It is a natural right for an individual to make requests and directives regarding their wishes after death while they are still alive. In the context of posthumous reproduction, such directives should be recognized and considered within the framework of existing legal and regulatory provisions [13]. Deficiencies in consent documents related to posthumous reproduction can lead to significant legal, ethical, and medical challenges. Due to circumstantial or procedural constraints, it is not always possible to obtain a written or witnessed medical will. The assumption that individuals who have sought medical assistance for reproduction during their lifetime implicitly consent to the use of their reproductive material for posthumous reproduction is not universally accepted. It is recommended that a medical will be considered only if the deceased person's wishes have been explicitly documented through official channels [25, 26]. Contrary to these perspectives, the findings of this study conducted in Türkiye indicate that 70.5% of participants accept that a man's prior consent during his lifetime should be regarded as a medical will allowing the woman to have a child from an embryo after his death. Similarly, 71.5% of participants accept that a woman's prior consent

should be considered a medical will permitting the man to have a child through a surrogate mother after her death. Since posthumous reproduction is not legally permitted in Türkiye, infertility centers do not include any information or provisions regarding posthumous reproduction in the consent forms obtained from individuals undergoing fertility treatments. In this context, the findings of this study are particularly noteworthy for Türkiye, as they highlight a societal perspective that contrasts with the existing legal framework.

Surrogate decision-maker

When a patient loses decision-making capacity, medical procedures can be carried out based on surrogate consent. Surrogate decision-makers are generally considered individuals who have prior knowledge of the patient's wishes and can make decisions that align with the patient's preferences and values. However, when it comes to posthumous reproduction, the decisions made by surrogate decision-makers may create a conflict of interest [27]. Therefore, it is recommended not to rely on the surrogate decision-maker in order to prevent conflicts of interest [10]. In line with this perspective, 61.5% of participants consider it unacceptable for a man to appoint a surrogate decision-maker during his lifetime to authorize the use of his embryo after his death for the woman to have a child. Similarly, 62.5% of participants find it inappropriate for a woman to designate a surrogate decision-maker during her lifetime to allow the use of her embryo through a surrogate mother after her death. These findings suggest a general skepticism toward delegating reproductive decisions to a third party in the context of posthumous reproduction.

Potential child as an heir

Posthumous reproduction also has the potential to affect relatives and family dynamics due to its implications for inheritance law. Therefore, legal regulations should be established to address the inheritance rights of the potential child conceived through posthumous reproduction. These legal regulations should, of course, be linked to the deceased partner's consent regarding posthumous reproduction [22]. It is argued that a child born through assisted reproductive technologies after the death of a parent should be recognized as an heir in order to secure their well-being. Indeed, when examining legal regulations, it is observed that the inheritance rights of posthumously conceived children are legally protected in many U.S. states as well as in Greece, a neighboring country of Türkiye. [12, 28]. Although there is no known precedent or legal practice in Türkiye regarding posthumous reproduction and inheritance rights, the findings of this study reveal a strong societal inclination toward recognizing such

rights. Specifically, 80.5% of participants believe that if a woman has a child from an embryo after the man's death, the child should be recognized as the deceased father's heir. Similarly, 78% of participants argue that if a man has a child from an embryo through a surrogate mother after the woman's death, the child should be recognized as the deceased mother's heir. These findings indicate significant public support for the legal acknowledgment of posthumously conceived children's inheritance rights in Türkiye.

Religious perspective

According to the religious authority representing Islam in Türkiye, posthumous reproduction is not considered permissible [8]. Although all participants in the study identified as Muslim, the findings reveal variations in religious perspectives on posthumous reproduction. Specifically, 42.5% of participants consider it religiously acceptable for a woman to have a child from an embryo after the man's death, while 36.5% of participants find it religiously permissible for a man to have a child through a surrogate mother after the woman's death. This indicates that even among individuals who share the same religious background, differences in interpretation and belief exist regarding the permissibility of posthumous reproduction, highlighting the influence of personal, cultural, and ethical viewpoints in shaping religious perceptions.

Finally, no significant difference was found in the responses to the questions based on marital status. This suggests that opinions on posthumous reproduction were not strongly influenced by whether participants were single, married, divorced, or widowed, indicating that other factors, such as personal beliefs, ethical considerations, and religious views, may play a more significant role in shaping attitudes toward this issue. Statistically significant differences were observed in the responses to Q3, Q7, and Q19 between participants with children and those without; in responses to Q19 and Q20 between those who had experienced child loss and those who had not; and in responses to Q4, Q19, and Q20 between participants with a pre-university level education and those with a bachelor's degree or higher. These differences suggest that sociodemographic characteristics such as parenthood status, experience of child loss, and educational level may influence attitudes toward posthumous reproduction.

Limitations

- a) Conducting the research in a province with conservative values within Türkiye, which may influence the findings.
- b) Collecting data from a female patient group, which may be considered socioculturally challenging for data collection.
- c) The homogeneous religious background of the participants, as all were Muslim, which may limit the generalizability of the findings to more diverse populations
- d) The study population does not constitute a representative sample of the target population.

Conclusion

This study examines the perspectives on posthumous reproduction from a biomedical ethics standpoint among individuals seeking care at a gynecology and obstetrics clinic in a conservative province of Türkiye. The findings reveal that individual and societal evaluations of posthumous reproduction vary across sociocultural, religious, ethical, and legal contexts, highlighting the complexity and diversity of attitudes toward this issue.

There is a clear division of opinion within society regarding a woman having a child from an embryo after the man's death, though attitudes toward this scenario appear to be relatively more accepting. In contrast, there is greater opposition to a man having a child through a surrogate mother after the woman's death. This contrast suggests that traditional societal norms and perceptions of reproductive technologies play a significant role in shaping individuals' attitudes. Furthermore, this influence appears to result in a more accepting stance toward a woman reproducing using frozen embryos after her husband's death compared to the reverse scenario.

The research findings provide striking insights into how individuals perceive reproductive rights in the context of posthumous reproduction. More than half of the participants believe that posthumous reproduction should be considered a reproductive right, yet many also emphasize that this right should be restricted in cases involving surrogacy. Additionally, when posthumous reproduction is evaluated in terms of the psychological benefit to the surviving partner, a significant portion of participants express that the process would not provide a tangible benefit to the surviving spouse.

In evaluations concerning the well-being of the child, the majority of participants believe that posthumous reproduction could have negative consequences for the child. However, a significant portion of individuals also argue that children born through posthumous reproduction should be recognized as the legal heirs of their deceased parent. This suggests that while there are concerns about the potential challenges faced by such children, there is also a strong belief in ensuring their legal and financial security through inheritance rights.

One of the most striking findings in the context of posthumous reproduction concerns attitudes toward medical wills and surrogate decision-making. The vast majority of participants believe that the deceased individual must have explicitly consented to the use of their reproductive material while alive and that this consent should be recognized as a medical will. However, the involvement of surrogate decision-makers in this process has been widely rejected by participants, indicating a strong preference for direct, documented consent from the deceased rather than decisions made by third parties.

In conclusion, this study provides significant insights into individual and societal attitudes toward posthumous reproduction in the context of Türkiye. Posthumous reproduction remains an ethically, legally, and culturally debated issue, with individuals' perspectives varying based on multiple factors. In this regard, it is recommended to develop educational programs to increase public awareness, taking cultural factors into account. Additionally, the development of ethical guidelines and legal regulations is essential to address the complexities surrounding posthumous reproduction. Furthermore, ethical and legal discussions on this topic should be considered at an international level to establish a balanced framework that respects both societal values and individual rights. Different results may be obtained if this study is conducted with women undergoing infertility treatment. In future studies, research could be carried out exclusively with this specific sample group.

Abbreviation

ASRM American Society for Reproductive Medicine

Supplementary Information

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Supplementary Material 1.

Human ethics and consent to participate

Written informed consent was obtained from all participants prior to data collection.

Authors' contributions

AHK: Conceptualisation, Methodology, Formal Analysis, Writing-Original draft preparation ÖK: Conceptualisation, Methodology, Formal Analysis, Writing-Original draft preparation NI: Conceptualisation, Methodology, Formal Analysis, Writing-Original draft preparation MK: Conceptualisation, Methodology, Formal Analysis, Writing-Original draft preparation.

Author agreement

This study was orally presented titled "Biomedical Ethical Analysis of Patients' Perspectives on Posthumous Reproduction in a Gynecology and Obstetrics Clinic" at the 10th Bioethics Congress organized by the Turkish Bioethics Association, held in the days September 11–13, 2023 in Samsun/TÜRKİYE.

The article is the authors original work and had not received prior publication or under consideration for publication elsewhere. All the authors have seen and approved the submitted manuscript. The authors abide by the copyright terms and conditions.

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Data availability

Datasets are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Kırşehir Ahi Evran University Clinical Research Ethics Committee on January 25, 2023, under decision number 2023-08/52. This study was conducted in accordance with the requirements of the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interest

The authors declare no competing interests.

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