



SEXUAL FUNCTION AND *IN VITRO* FERTILIZATION

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SUMMARY – The aim of the study was to investigate the sexuality of individuals undergoing *in vitro* fertilization as one of the methods of infertility treatment. The focus was on sexual dysfunction, sexual satisfaction and associated risk factors. Data were collected based on a validated, standardized procedure. The sample consisted of 119 individuals who had undergone *in vitro* fertilization, 61 (51.3%) women and 58 (48.7%) men, average age 35 years. Most of the 119 survey participants were in the 31-35 age group (37%), married (79.8%), with high school diploma (51.3%), Catholic denomination (89.9%), childless (78.2%), with a one sexual partner in their lifetime (51.3%), and in current sexual relationship for a period of 7 to 8 years (18.5%). The survey found statistically significantly higher satisfaction among male participants, participants in the 26-30 age group, those with a higher level of education, nonreligious, without children in marriage, with four sexual partners in life, over a period of 1 to 2 years in current partner (sexual) relationship, and without a diagnosed sexual disorder. There was a correlation between infertility, associated treatment, and sexuality. Infertility and involvement in treatment procedures increased the risk of sexual dysfunction. The risk factors identified in our study could help facilitate detection and timely treatment of sexual dysfunction, which would help maintain healthy sexuality in couples participating in *in vitro* fertilization procedures.

Key words: *Infertility; In vitro fertilization; Sexual function; Sexual dysfunction; Sexual satisfaction*

Introduction

The desire to have offspring is one of the basic human desires¹. It is estimated that approximately 15% of couples worldwide have difficulty fulfilling

this desire due to infertility. Infertility is defined as a medical condition that prevents a couple from becoming pregnant after one year of unprotected, regular sexual intercourse and is considered one of the global public health problems^{2,3}. Although *in vitro* fertilization (IVF) procedures are becoming increasingly popular due to the growing number of infertile couples⁴, the authors of many studies point out their downsides. Namely, the procedures are accused of

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causing many inconveniences in the physical, psychological, social, and also economic spheres. These are associated with negative effects on the couples' quality of life, their relationships, and ultimately sexuality⁵⁻⁹, which is why, according to a study by Pedro *et al.*¹⁰, 29.5% of couples discontinue treatment before achieving success. In the context of sexuality, the procedure is accused of compromising privacy of the couple by involving a third party in their intimate life. This primarily involves health professionals needed for diagnostic and treatment procedures, but also germ cell donors if needed. Disclosure of one's sexuality causes a sense of 'surveillance' and destroys self-esteem, which in turn negatively impacts sexuality⁶. The loss of spontaneity and relaxation in sexual intercourse that occurs when it is 'instructed' by medical professionals to achieve the desired result is another area that threatens the sexuality of these couples¹¹. These are just two of the many factors cited in the literature that make sexuality uncomfortable, forced, and self-centered¹². As a result, it is severely compromised, as confirmed by participants in studies reporting numerous sexual dysfunctions¹³⁻¹⁵.

Another area they face is pressure from the society and family members^{7-9,16}. In their study, Monga *et al.*¹¹ found that 83% of couples who participated in treatment processes experienced social and family pressures related to conception. Questions about their desire to have children and the outcome of treatment usually cause them stress with feelings of guilt about their infertility and feelings of inferiority compared to couples with children^{7,8,16}. Women are thought to be more vulnerable to pressure than men, especially in cultures where women without children are stigmatized, often resulting in a shattered self-image and troubled identity^{7,16,17}. To avoid problems, couples often avoid social contact and isolate themselves^{8,9}. Pregnant women and couples with children are described as their additional burden⁷, which can also be the source of envy^{18,19}.

Studies also point out the inconvenience associated with performing the procedure^{5,8,16}. From description of the course, it appears that it consists of treatments, including various procedures and medications with their side effects which cause pain in couples, especially women, due to the nature of the procedure, which is quite invasive. Follicular puncture is highlighted as the most painful and uncom-

fortable part of the procedure^{8,16}. Establishing a confidential relationship with health care professionals and the economic burden, especially when the procedures are not publicly funded, are described as two other concerns of these couples^{7,9,16}.

They also highlight shortening of the marriage duration as a problem area^{7,11,17}. In a study by Drosdzol and Skrzypulec²⁰, 10.11% of women and 11.65% of men reported that infertility diagnosis and related treatment led to the breakdown of their marriage. Other studies report a higher number or a 34% decrease in marital satisfaction among women and 50% decrease among men^{21,22}. The possible reasons include the way partners experience themselves and each other at the time of diagnosis and treatment, the emergence of partner-centered conflict with the cause of infertility due to the imposition of guilt, a lack of intimacy with the feeling that third parties are involved in their relationship, and a lack of mutual support or even discontinuation of treatment in one of the partners^{6,8,9}. A failed marriage is more common among couples undergoing donor cell treatment²³ and is one of the main reasons why couples discontinue treatment^{5,24}.

Sexual dysfunction in couples treated with IVF procedures is a relatively new topic that has only recently been studied in the scientific literature⁶. Some of these studies, with their main findings on the nature and frequency of sexual dysfunction, are listed in Table 1, which also shows the worse sexual status compared to the general population. It is estimated that participation in treatment procedures increases the risk of sexual dysfunction compared with a diagnosis of infertility alone^{13,25}. In a study by Bayar *et al.*²⁵, the proportion of sexual dysfunction increased with participation in treatment procedures from 60% to 72% among women and from 34% to 48% among men compared with the proportion at the time of infertility diagnosis. Physical pain and discomfort^{8,15,16} and psychological pressure related to the procedure itself and the outcome of treatment^{8,26} are assessed as components that contribute to sexuality not being perceived by couples as something pleasurable and unifying, but rather associated with something negative, forced, obligatory, stressful, burdensome, and self-centered¹², leading to it being best avoided²⁷.

Table 1. Review of studies assessing sexual dysfunction in connection with *in vitro* fertilization (IVF)

Studies assessing sexual dysfunction in women in connection with IVF		
Authors	Methodology	Results
Huang <i>et al.</i> ²⁸	Surveyed 70 women who became pregnant under the IVF procedure and 75 women in control group who became pregnant naturally.	Women from the IVF group reported statistically significantly more sexual dysfunction in the first trimester compared to the control group ($p < 0.05$). A statistically significant difference was found in the following sexual dysfunctions: arousal disorders ($p = 0.031$), poorer sexual satisfaction ($p = 0.029$), and pain associated with sexual dysfunction ($p = 0.004$).
Facchin <i>et al.</i> ²⁶	269 women involved in IVF proceedings were interviewed.	At least one sexual dysfunction was noted in 81 (30%) participants.
Smith <i>et al.</i> ¹⁴	136 women interviewed who were currently or recently involved in IVF procedures.	The most commonly reported sexual dysfunctions were lack of sexual desire (30%), orgasm problems (15%), vaginal dryness (14%), and vaginismus (13%).
Millheiser <i>et al.</i> ²¹	119 women involved in treatment process (45% in IVF procedures) and 99 childbearing women as a control group.	Compared to 25% in the control group, 40% of women who participated in the treatment reported sexual dysfunction. Women in the treatment group had significantly lower sexual desire and arousal scores and were less likely to have sexual intercourse compared to the control group.
Oskay <i>et al.</i> ²⁹	308 women involved in the treatment process and 308 women from the control group were interviewed.	61.7% of women in the treatment group and 42.9% in the control group reported sexual dysfunction ($p < 0.001$). Specific areas rated statistically lower by women in the treatment group were lack of sexual desire, arousal disorders, and orgasm problems ($p < 0.001$). In addition, the frequency of sexual intercourse was significantly lower among women from the experimental group than in the control group ($p = 0.002$).
Studies assessing sexual dysfunction in men in connection with IVF		
Authors	Methodology	Results
Trinh <i>et al.</i> ³⁰	138 men involved in IVF procedures were interviewed.	18.1% of participants reported erectile dysfunction, of which 9.4% were mild, 5.1% mild to moderate, 1.4% moderate, and 0.7% severe.
Ozkan <i>et al.</i> ³¹	Interviewed 56 men involved in IVF procedures and 48 fertile men as a control group.	Mild to moderate erectile dysfunction was noted in 85.9% of men in the group who participated in IVF procedures. They also rated their orgasmic function ($p = 0.002$), sexual desire ($p = 0.001$), and sexual satisfaction ($p = 0.011$) statistically significantly worse.
Studies assessing sexual dysfunction in couples in connection with IVF		
Authors	Methodology	Results
Cocchiaro <i>et al.</i> ¹⁸	162 couples involved in IVF procedures were interviewed.	10% of men and 29% of women reported sexual dysfunction ($p < 0.01$). Women reported painful intercourse (56%) and difficulty in reaching orgasm (44%). Men reported erection problems (25%) and premature ejaculation (14%).

Yeoh <i>et al.</i> ¹²	150 women and 119 men involved in treatment were interviewed (25.3% in IVF).	Sexual dysfunction was noted in 11.3% of women.
Yangin <i>et al.</i> ¹⁵	102 couples involved in IVF proceedings were interviewed.	Female participants reported vaginismus (66.7%), anorgasmia (46.1%), and low sexual satisfaction (37.3%), while men reported premature ejaculation (61.8%), low sexual satisfaction (33.3%), and erectile dysfunction (24.5%).
Shoji <i>et al.</i> ¹³	Interviewed 93 couples involved in a treatment procedure (28% in IVF procedures) and 92 couples with a recent spontaneous pregnancy.	Couples involved in the treatment process showed lower sexual satisfaction ($p < 0.0001$ in men, $p = 0.0004$ in women). The lower sexual satisfaction in men was due to erectile dysfunction, premature ejaculation, and lack of sexual desire in themselves and their partner. In women, this was associated with lack of sexual desire, vaginismus, anorgasmia, and partner erectile dysfunction.
Purcell-Lévesque <i>et al.</i> ²⁷	45 couples involved in IVF procedures were interviewed.	60% of women and 28.9% of men reported a lack of sexual desire; 40% of women and 17.8% of men reported arousal disorder; 31.1% of women and 8.9% of men reported difficulty reaching orgasm; 8.9% of women reported pain during sexual intercourse.

The aim of our study was to investigate sexuality of individuals undergoing IVF as one of the methods of infertility treatment. Our study differs from the studies presented in Table 1 because we focused on sexual dysfunction and included more risk factors such as age, marital status, education, religious affiliation, number of children, number of lifetime sexual partners, and number of current sexual contacts.

Subjects and Methods

Ethical approval for the cross-national survey was obtained from the Ethics Committee of the Merkur University Hospital, Zagreb (03/1, 7078, 2020), and the research was conducted according to the principles of the Declaration of Helsinki. All participants gave written informed consent before the study. The target sample were infertile couples having undergone IVF treatment at the Department of *in Vitro* Fertilization, Merkur University Hospital, Department of Gynecology and Obstetrics, Division of Reproductive Medicine, in the period from September 2020 to January 2021. After an introductory written explanation of the purpose of the survey and signed consent to participate, 119 questionnaires were completed. After preliminary adjustment of the question on the number of years and months in the current partnership (sexual relationship) due to the over-

whelming lack of responses on duration, all 119 completed questionnaires were included in the analysis. A validated New Sexual Satisfaction Scale (NSSS)³² questionnaire was used with some adaptations to allow for completion of the gender questionnaire. Linguistic validation of the questionnaire was based on translation from English to Croatian and *vice versa*. The questionnaire contained 31 questions for female participants and 30 questions for male participants, and roughly included two sets of questions. The first set of the questions contained demographic data (age, marital status, educational level, religion, sexual orientation, number of children, number of all sexual partners in life, duration of current partnership (sexual relationship), diagnosed mental disorder and/or sexual disorder, and for female participants also the question about the number of orgasms during sexual intercourse. This was followed by the second set of questions consisting of 20 statements to test sexual satisfaction. A 5-point Likert scale was used, ranging from “not satisfied at all” to “very satisfied”.

Statistics

The data obtained were analyzed quantitatively using SPSS 26.0 statistical software (Statistical Package for Social Sciences, Inc., USA), the Kolmogorov-Smirnov and Shapiro-Wilk tests to check the normality of data distribution. The tests showed nor-

mal data distribution. Based on this result, the following statistical tests were used: Pearson correlation coefficient and ANOVA test to detect statistically significant differences among more than three samples. The values of $p < 0.05$ were considered statistically significant.

Results

After preliminary adjustment of the question about the number of years and months in the current partnership (sexual relationship) due to the mostly missing answers about duration, all 119 completed questionnaires were included in the analysis. Sixty-one (51.3%) questionnaires were completed by women and the remaining 58 (48.7%) by men. Most participants were in the 31-35 age group ($n=44$; 37%), followed by 36-40 ($n=37$; 31.1%), 26-30 ($n=25$; 21.1%), 41-45 ($n=10$; 8.3%), 46-50 age group ($n=2$; 1.6%), and one (0.8%) participant in the 51-55 age group.

Table 2. Age of study participants

Age group (years)	f	%
26-30	25	21
31-35	44	37
36-40	37	31.1
41-45	10	8,4
46-50	2	1.7
51-55	1	0.8
Total	119	100

The majority of participants were married ($n=95$; 79.8%), and the remainder ($n=24$; 20.2%) were living in an extramarital relationship.

In terms of educational level, participants had completed secondary school ($n=61$; 51.3%), followed by participants who had completed 2nd ($n=30$; 25.2%) and 1st level of university education ($n=17$; 14.3%), high school ($n=8$; 6.7%), elementary school ($n=2$; 1.7%), and one (0.8%) participant who was currently completing 3rd level of university education (Table 3).

Table 3. Level of education in study participants

Level of education	f	%
Elementary school	2	1.7
Secondary school	61	51.3
High school	8	6.7
1 st level of university education	17	14.3
2 nd level of university education	30	25.2
3 rd level of university education	1	0.8
Total	119	100

Most participants identified themselves as Catholics ($n=107$; 89.9%), followed by participants not belonging to any religious community, i.e., atheists ($n=6$; 5.0%), Orthodox, Muslims, and 2 (1.7%) participants in the group who did not want to provide this information.

All participants ($n=119$; 100%) described themselves as heterosexually oriented, meaning they had sex only with persons of the opposite sex.

The majority of participants were childless ($n=93$; 78.2%), 22 (18.5%) participants had one child, one participant (0.8%) had two children, and the remaining three (2.5%) participants did not provide information on the number of children.

Most participants had one sexual partner in their lifetime ($n=61$; 51.3%), 13 (10.9%) participants had two sexual partners, 11 (9.2%) participants had three or five sexual partners, six (5.0%) participants had four sexual partners, five (4.2%) participants had 10 sexual partners each, and one participant had 21 sexual partners. Four (3.4%) participants did not want to answer this question.

For current partner (sexual) relationship by number of years, the largest number of participants reported a 7- to 8-year time span ($n=22$; 18.5%), followed by the groups of 9 to 10 years ($n=21$; 17.6%), 3 to 4 years ($n=15$; 12.8%), 5 to 6 years ($n=14$; 11.8%); the groups reporting 1 to 2 years and 11 to 12 years had the same proportion of participants ($n=12$; 10.1%), and so did the groups from 13 to 14 years and 15 to 16 years ($n=6$; 5.0%), 17 to 18 years ($n=4$; 3.4%), 21 to 22 years ($n=3$; 2.5%), 19 to 20 years ($n=2$; 1.7%), and 23 to 24 years ($n=1$; 0.8%). One participant (0.8%) did not answer this question (Table 4).

Table 4. Number of years in current partnership (sexual relationship) reported by study participants

Years in current partnership	f	%
1-2	12	10.1
3-4	15	12.8
5-6	14	11.8
7-8	22	18.5
9-10	21	17.6
11-12	12	10.1
13-14	6	5.0
15-16	6	5.0
17-18	4	3.4
19-20	2	1.7
21-22	3	2.5
23-24	1	0.8
Missing	1	0.8
Total	119	100

None of our study subjects (n=119; 100%) participating in IVF procedures was diagnosed with a mental disorder and the majority had not been diagnosed with sexual dysfunction (n=117, 98.3%); there were no missing data, i.e., only two (1.7%) participants were diagnosed with a sexual disorder. This was also included in the analysis where correlations were sought.

We asked female participants about the number of orgasms during intercourse. Most participants experienced 1 orgasm during intercourse (n=48; 40.3%), 12 (10.1%) participants experienced 2 to 3 orgasms, and one (0.8%) participant experienced 5 or more orgasms (Table 5).

Table 5. Number of orgasms in study participants during one sexual intercourse

Number of orgasms	f	%
0	0	0
1	48	78.7
2-3	12	19.7
≥5	1	1.6
Total	61	100

Age (seven variables $p < 0.05$), as well as religious affiliation (two variables $p < 0.05$), number of children (eight variables $p < 0.05$), number of all sexual partners in life (one variable $p < 0.05$) and duration of marriage (four variables $p < 0.05$) proved to be statistically significant predictors of sexual dysfunction and sexual dissatisfaction in our participants. We can confirm that age, religion, number of children, number of all sexual partners in life, and duration of marriage have a statistically significant impact on the occurrence of sexual dysfunction and sexual dissatisfaction.

We found statistically significant correlations between age and intensity of sexual arousal ($F=5.451$; $p < 0.001$), intensity of orgasms ($F=2.379$; $p < 0.043$), and sexual pleasure during sexual activity ($F=2.693$; $p < 0.024$), focus on sexual activity ($F=2.375$; $p < 0.043$), sexual arousal relative to the partner(s) ($F=2.896$; $p < 0.038$), partner's ability to reach orgasm ($F=3.014$; $p < 0.014$), and emotional engagement during sexual activity ($F=3.036$; $p < 0.032$) (Table 6).

Table 6. Correlation between age and variables

	F	Sig.
Intensity of sexual arousal	5.451	0.001
Intensity of orgasms	2.379	0.043
During sexual activity, I indulge in sexual pleasure	2.693	0.024
Focus on sexual activity	2.375	0.043
Sexual arousal in relation to partner	2.896	0.038
Partner's orgasm ability	3.014	0.014
Emotional commitment during sexual activity	3.036	0.032

According to the mean scores (present value (PV) was calculated) in the satisfaction ratings for each age group, participants aged 26 to 30 years were most satisfied with the intensity of their sexual arousal (PV=4.52), the intensity of orgasms (PV=4.44), acting out sexual pleasure (PV=4.44), focusing on sexual activity (PV=4.32), sexual arousal in relation to partner (PV=4.60), partner's ability to reach orgasm (PV=4.32), and emotional engagement during sexual

activity (PV=4.48). Sexual satisfaction decreased with increasing age, so we can confirm a negative impact of increasing age on the occurrence of sexual dysfunction and sexual dissatisfaction. It appears that as couples are aging, their sexual activities are influenced by new responsibilities in their lives such as employment or involvement in caring for their children and other family and social responsibilities.

Regarding religious affiliation, we found a statistically significant correlation between partner onset of sexual activity (F=2.479; $p < 0.048$) and variety of sexual activity (F=2.620; $p < 0.039$) (Table 7).

Table 7. Correlation between religious affiliation and variables

	F	Sig.
Partner initiating sexual activities	2.479	0.048
Variety of sexual activities	2.620	0.039

Participants who did not self-identify as religious were most satisfied with their partner's initiation of sexual activity (PV=5.00) and the variety of their sexual activity (PV=5.00). Participants with any religious affiliation scored lower on sexual satisfaction. On this basis, we can also confirm that any religious affiliation negatively affects a person's sexuality and increases the risk of sexual dysfunction and sexual dissatisfaction. This study is one of the few that examined the relationship between religion and sex in adults, and suggests that religion continues to play a large role in shaping sexual life³³.

Depending on the number of children, we found statistically significant correlations with the following variables: intensity of orgasms (F=3.116; $p < 0.048$), emotional engagement during sexual activity (F=3.3000; $p < 0.040$), showing partner's emotions during sexual activity (F=5.967; $p < 0.003$), partner's initiation of sexual activity (F=4.085; $p < 0.019$), partner gives the subject sexual pleasure (F=4.561; $p < 0.012$), the way the partner takes care of the subject's sexual needs (F=5.023; $p < 0.008$), variety of sexual activities (F=4.097; $p < 0.019$), and frequency of sexual activities (F=4.015; $p < 0.021$) (Table 8).

Table 8. Correlation between the number of children and variables

	F	Sig.
Intensity of my orgasms	3.116	0.048
My emotional commitment during sexual activity	3.300	0.040
Showing partner's emotions during sexual activity	5.967	0.003
Partner initiating sexual activities	4.085	0.019
My partner indulges in sexual pleasure	4.561	0.012
The way my partner takes care of my sexual needs	5.023	0.008
The diversity of my sexual activity	4.097	0.019
The frequency of my sexual activities	4.015	0.021

Participants without children, compared to those with one or two children, were more satisfied with the intensity of orgasms (PV=4.24), their emotional engagement during sexual activity (PV=4.23), showing their partner's feelings during sexual activity (PV=4.28), the onset of their partner(s)' sexual activity (PV=4.03), their partner(s)' commitment to sexual pleasure (PV=4.35), the way the partner takes care of the subject's sexual needs (PV=4.32), the variety (PV=3.86) and frequency (PV=3.92) of their sexual activity. Based on these results, we can confirm that having children in marriage increases the risk of sexual dysfunction and decreases the couple's sexual satisfaction.

Regarding the number of sexual partners throughout life, the ANOVA test showed a statistically significant correlation with focus on the subject's sexual activity (F=2.567; $p < 0.008$) (Table 9).

Table 9. Correlation between the number of sexual partners during lifetime and variables

	F	Sig.
My focus on sexual activity	2.594	0.008

Participants with four lifetime sexual partners were most satisfied with their focus on sexual activity (PV=4.33). Those with six (PV=3.25) or two sexual

partners in life ($PV=3.62$) were least satisfied. With greatest dissatisfaction falling outside the range assumed to be a protective zone for a lower risk of sexual dysfunction and sexual dissatisfaction, with the greatest sexual satisfaction falling within the interval itself, we can confirm that fewer than three and more than five lifetime sexual partners increase the risk of sexual dysfunction and decrease sexual satisfaction.

The ANOVA test also found correlations of the number of years in the current (sexual) partnership with the following variables: mood after sexual activity ($F=2.600$; $p<0.006$), balance between what the subject gives and receives in sexual activity ($F=2.119$; $p<0.025$), partner's giving himself to sexual pleasures ($F=2.117$; $p<0.025$), and partner being sexually available ($F=2.315$; $p<0.014$) (Table 10).

Table 10. Correlation between the number of years in current partnership and variables

	F	Sig.
My mood after sexual activity	2.600	0.006
The balance between what I give and receive during sexual activities	2.119	0.025
My partner indulges in sexual pleasure	2.117	0.025
My partner is sexually available	2.315	0.014

Participants in the current partner (sexual) relationship for 1 to 2 years were most satisfied with their mood after sexual activity ($PV=4.75$), balance between what they give and receive during sexual activity ($PV=4.50$), partner's commitment to sexual pleasure ($PV=4.83$), and partner's sexual availability ($PV=4.75$). With prolongation of the current partner (sexual) relationship, the participants' sexual satisfaction decreased, which allows us to confirm that with the duration of a partner (sexual) relationship, sexual dysfunction is more frequent and sexual satisfaction decreases.

Statistically significant correlations were recorded of gender and the following variables: intensity of sexual arousal ($F=4.548$; $p<0.035$), during sexual activity the subject indulges in sexual pleasure ($F=4.031$; $p<0.047$), partner's ability to orgasm ($F=14.193$; $p<0.001$), partner indulges in sexual plea-

sure ($F=4.623$; $p<0.034$), and partner being sexually available ($F=6.573$; $p<0.012$) (Table 11).

Table 11. Correlation between gender and variables

	F	Sig.
Intensity of my sexual arousal	4.548	0.035
During sexual activity, I indulge in sexual pleasure	4.031	0.047
Partner's orgasm ability	14.193	0.001
My partner indulges in sexual pleasure	4.623	0.034
My partner is sexually available	6.573	0.012

The final results of our gender-related study showed greater satisfaction among male participants with their intensity of sexual arousal ($PV=4.33$) and their engagement in sexual pleasure during sexual activity ($PV=4.31$), whereas female participants expressed greater satisfaction with their partner's ratings of their orgasmic ability ($PV=4.33$), partner's engagement in sexual pleasure ($PV=4.41$), and partner's sexual availability ($PV=4.28$).

Female participants' satisfaction ratings were associated with better position in orgasmic ability, commitment to sexual pleasure, and sexual availability, while male participants self-reported greater satisfaction with intensity of sexual arousal and sexual pleasure. We cannot confirm that sexual dysfunction and sexual dissatisfaction affect women and men equally.

Correlations were also found between the level of education and the following variables: balance between what the subject gives and receives during sexual activity ($F=2.641$; $p<0.027$), onset of partner's sexual activity ($F=2.562$; $p<0.031$), the way the partner indulges in sexual pleasure ($F=2.231$; $p<0.056$), the way the partner takes care of the subject's sexual needs ($F=2.786$; $p<0.056$), partner being sexually creative ($F=3.240$; $p<0.009$), partner being sexually available ($F=3.310$; $p<0.008$), and variety of the subject's sexual activities ($F=2.485$; $p<0.036$) (Table 12).

Table 12. Correlation between the level of education and variables

	F	Sig.
Balance between what I give and receive during sexual activities	2.641	0.027
Partner's initiation of sexual activity	2.562	0.031
My partner indulges in sexual pleasure	2.231	0.056
The way my partner takes care of my sexual needs	2.786	0.021
My partner is sexually creative	3.240	0.009
My partner is sexually available	3.310	0.008
Diversity of my sexual activity	2.485	0.036

Discussion

Participants who completed high school were most satisfied with the balance between what they give and receive during sexual activity (PV=4.13), their partner's initiation of sexual activity (PV=4.11), their partner's sexual creativity (PV=4.20), and the way their partner responded to their sexual needs (PV=4.39); those with completed higher education expressed their highest satisfaction with their partner's engagement in sexual pleasure (PV=4.50) and the variety of their sexual activities (PV=4.00), while those with completed 1st level higher education expressed their greatest satisfaction with sexual availability of the partner(s) (PV=4.35). In our study, participants who completed secondary school to 1st level of university education expressed their higher sexual satisfaction than those who completed primary school or 2nd and 3rd level of university education. We cannot confirm that sexual dysfunction and sexual dissatisfaction are equally reported by individuals with low levels of education.

The influences of gender and age, educational level, religious affiliation, number of children, number of all lifetime sexual partners, and duration of marriage were found to be statistically significant for the occurrence of sexual dysfunction and sexual dissatisfaction in individuals who underwent IVF procedures. Factors that had a particularly negative effect on sexuality in our study were female age, older age, low (completed primary school) and very high education level (2nd and 3rd university level), any religious

affiliation, children in marriage, two or six sexual partners in life, and longer duration of marriage, while male gender, age 26-30 years, religious insecurity, no children in marriage, four sexual partners in life, and 1-2 years of marriage duration were found to be statistically significant factors for sexual satisfaction. A correlation was found between diagnosed sexual dysfunction and partner's ability to reach orgasm (F=5.351; p<0.022) (Table 13).

Table 13. Correlation between diagnosed sexual disorder and variables

	F	Sig.
Partner's orgasm ability	5.351	0.022

Participants without a diagnosed sexual disorder expressed statistically significantly more satisfaction with their partner's ability to reach orgasm (PV=4.22), which may confirm the assumption that a diagnosed sexual disorder decreases sexual satisfaction.

In a study by Smith *et al.*¹⁴, women who had participated in IVF treatment in the past year or were currently in the IVF program reported significantly lower desire for sexual activity, greater difficulty achieving orgasm, less frequent sexual activity, vaginal cramping, lower sexual satisfaction, and poorer overall sexual function compared with the control group. This was similar to a study by Yangin *et al.*¹⁵, except for the fact that they included male participants who were found to have erectile dysfunction, premature ejaculation, and low sexual satisfaction. The same sexual dysfunction in both sexes was also found in a study by Shoji *et al.*¹³. The presence of sexual dysfunction has been associated with treatment success in individuals participating in IVF procedures¹⁴.

Other studies point to a number of sexual issues faced by couples participating in IVF procedures^{5-9,16}. Luca *et al.*⁶ highlight the feeling of losing control and dealing with many uncertainties. They relate the sense of loss of control to fertility and life itself. When couples 'leave' their fertility to medical personnel, they feel they lose control over it. Men associate their fertility only with the role of 'sperm donor' and women with a 'tool' to have children. They associate the feeling of losing control of their lives with their entire lives being focused on the procedure itself, including a disrupt-

ed daily routine due to frequent doctor visits, as also reported by other research participants^{8,9}. Waiting for treatment outcome after embryo transfer is described as one of the most uncertain and stressful situations they experience^{8,35}. Uncertainty exists both in the case of a negative outcome with concerns about the future of their treatment and in the case of a positive outcome with concerns about the future course of the pregnancy^{8,9,36}. A negative outcome is described by participants as one of the most frustrating and painful disappointments in life⁸.

In the context of marriage, the authors highlight the changes in sexual function as one of the important aspects but believe that not enough attention is paid to them^{6,21,26,27}. If we look only at the Slovenian database with the keyword “sexual dysfunction and *in vitro* fertilization”, in the two largest databases, i.e., Cobiss.si and DiKUL, there are actually no hits, which is surprising considering that in Slovenia about 5% of all children born *per* year are born through these procedures, indicating their mass use⁴. The negative effects of infertility treatment with IVF procedures on sexual function are mainly attributed to the stress caused by the inability to become pregnant²⁶, particularly the loss of spontaneity and relaxation during sexual intercourse¹¹, to the negative impact of treatment procedures on physical and emotional well-being¹⁵, and to pressure from family members and society^{11,29}. Therefore, it is important to maintain healthy sexuality in these couples by identifying sexual dysfunction in a timely manner and responding appropriately²¹.

Couples undergoing IVF treatment are likely to have problems with their sexual health. Psychological problems such as depression, anxiety, or the perception of infertility as ‘nervous tension’ may contribute to sexual problems. In addition, problems such as vaginal dryness and tightness, pain during intercourse, and anxiety about sexual performance should be known and addressed throughout fertility treatment. Clinicians and all medical personnel involved in fertility treatment should be more sensitive to the need of infertile couples, especially women, for emotional support. Depending on the risk factors identified in our study, couples should be offered counseling and psychological support.

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Sažetak

SEKSUALNOST I IZVANTJELESNA OPLODNJA

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Cilj istraživanja bio je ispitati seksualnost osoba koje liječe neplodnost postupcima izvantjelesne oplodnje. Naglasak istraživanja bio je na seksualnoj disfunkciji, seksualnom zadovoljstvu i povezanim čimbenicima rizika. Podaci su prikupljeni na osnovi validiranog i standardiziranog upitnika. Uzorak je činilo 119 ispitanika koji su liječeni postupcima izvantjelesne oplodnje, 61 (51,3%) žena i 58 (48,7%) muškaraca, prosječne dobi od 35 godina. Većina od 119 ispitanika spadali su u dobnu skupinu od 31-35 godina (37%), bili su oženjeni (79,8%), sa završenom srednjom školom (51,3%), katoličke vjeroispovijesti (89,9%), bez djece (78,2%), s jednim seksualnim partnerom u životu (51,3%) i u trenutnoj seksualnoj vezi koja traje 7 do 8 godina (18,5%). Istraživanjem je utvrđeno značajno veće zadovoljstvo kod muškaraca, ispitanicima u dobnoj skupini od 26-30 godina, s višim stupnjem naobrazbe, agnostika, bez djece u braku, s 4 seksualna partnera u životu, u sadašnjoj partnerskoj (seksualnoj) vezi duže od 1-2 godine i bez dijagnosticiranog seksualnog poremećaja. Dokazana je povezanost između neplodnosti, liječenja i seksualnosti. Neplodnost i postupci liječenja neplodnosti povećavaju rizik za seksualnu disfunkciju. Rizični čimbenici koji su utvrđeni u našem istraživanju mogu pomoći pravodobnom otkrivanju i liječenju seksualne disfunkcije, što će omogućiti zdrave seksualne odnose parova koji se liječe postupcima izvantjelesne oplodnje.

Ključne riječi: Neplodnost; Izvantjelesna oplodnja; Seksualna funkcija; Seksualna disfunkcija; Seksualno zadovoljstvo