Psychiatr. Pol. 2025; 59(4): 517–530
PL ISSN 0033-2674 (PRINT), ISSN 2391-5854 (ONLINE)
www.psychiatriapolska.pl
DOI: https://doi.org/10.12740/PP/OnlineFirst/191103

Depression and ineffective reproduction, i.e. psychiatric aspects of infertility

Damian Zieliński[1], Kamila Tokarczyk[1], Magdalena Piegza[2]

[1] Student Scientific Club, Clinical Department of Psychiatry, Chair of Psychiatry, Faculty of Medical Sciences in Zabrze, Medical University of Silesia in Katowice

[2] Clinical Department of Psychiatry, Chair of Psychiatry, Faculty of Medical Sciences in Zabrze, Medical University of Silesia in Katowice

Summary

Depressive disorders are one of the most common psychiatric problems in the general population, and they often also affect people struggling with infertility. It has been proven that this problem is widespread in many countries around the world and affects both women and men, but with greater intensity of depressive symptoms in infertile women. Assisted reproductive technologies, such as in vitro fertilization, are a key method in the treatment of infertility, but they may also increase the risk of depression related to unsuccessful conception attempts. Antidepressants, especially SSRIs commonly used to treat symptoms of depression, can have many negative effects on fertility, but the risk of infertility is statistically lower with drug therapy than with untreated depression. Psychological support, including psychotherapy, can be an important element of infertility treatment, increasing the chances of getting pregnant by relieving stress, reducing the severity of symptoms of mental disorders, and thus improving the quality of life.

The following study aims to provide information on the interdependence between depression and infertility, highlight the scale of the phenomenon of co-occurrence of depressive symptoms and infertility, and present directions for counteracting this problem.

Key words: depression, infertility, psychotherapy

Introduction

Infertility is a complex and multidimensional health issue that has a significant impact on individuals, couples, and society as a whole. Global infertility affects nearly 15% of the population of reproductive age, but forecasts indicate that this problem will continue to deepen [1]. The World Health Organization defines infertility as "the inability to conceive a child despite regular sexual intercourse for more than two years,

without using any contraceptive methods" [2]. Primary infertility mainly occurs in developed countries, while secondary infertility is more common in developing countries. The infertility rate varies between countries and ranges from 10% to 20% [3]. This is a huge problem, not only medical but also social and economic. For both women and men, the causes of infertility include, among others, genetic, immunological and psychological factors, comorbidities and wide-scale mental disorders [4]. In Poland, despite the lack of complete data, it is estimated that about 3 million people struggle with infertility, which constitutes about 15–20% of couples of reproductive age [1]. This percentage does not differ much from the European average, which concerns one in five couples of reproductive age. However, Poland lags behind Western European countries in terms of the use of modern medical technologies in the treatment of infertility and psychological support for couples experiencing this problem [5].

Depression is becoming an increasingly serious health and social challenge, affecting approximately 350 million people worldwide and 1.2 million people in Poland [6]. Information from the National Health Fund (NFZ) registers from 2021 shows that in the group of people under 18 years of age there is an increased frequency of prescription of antidepressants [7]. The global prevalence rate of clinically significant symptoms of depression between 2001 and 2020 was 34% in the general population [6]. However, women experiencing fertility problems were reported to have depressive symptoms almost twice as often as the general population [8]. Unfortunately, according to research conducted in infertility clinics, only 21% of infertile people with mental disorders received any form of treatment [9]. The reason for the lack of treatment for depressive disorders is attributed to the global shortage of psychiatrists, ineffective treatment, ineffective mental health care system and stigmatization [10]. The above information only presents an outline of the problem, the scale of which seems to be much larger and whose importance for public health is enormous.

According to information from the Central Statistical Office from 2019–2023, a decline in fertility among women aged 15–49 has been observed in Poland. This indicator has consistently decreased during the analyzed period, reflecting changing demographic trends in our country. Detailed data along with the total fertility rate, which represents the number of children a woman would have during her reproductive period assuming she gives birth at the intensity observed in the given year, is presented in Table 1 [11].

Table 1. **Fertility of women and population reproduction rates; national data**

Year	Fertility – live births per 1000 women aged 15–49	Total fertility rate
2023	31.54	1.1578
2022	35.05	1.2609
2021	37.54	1.3203
2020	39.92	1.3779
2019	41.81	1.4186

The first law regulating the use of in vitro fertilization in the treatment of infertility in Poland dates back to 2015. From June 1, 2024, a free program by the Ministry of Health for couples affected by infertility and for oncology patients is being implemented, providing full funding for fertility preservation procedures and psychological support. The program, which will run until December 31, 2028, has been funded with 2.5 billion PLN and is being carried out by 58 facilities nationwide [12]. Data from medically assisted reproduction centers indicate an increase in the number of embryos used in in vitro procedures, except for a significant decline in 2018 [13].

The above information clearly highlights the significant issue of infertility and declining birth rates in Poland and the need for solutions that will contribute to increased fertility. This poses a challenge not only for the healthcare system but also for the sector responsible for the country's social policy.

Purpose and method

This study is a narrative review and aims to organize and summarize the current knowledge about the increased incidence of clinically significant depressive symptoms among people affected by infertility and an attempt to determine the mutual cause and effect relationships between depression and infertility. For this purpose, the PubMed archive was searched using the phrases "depression," "infertility" and "anxiety." Publicly available Polish statistical studies (available on the websites), WHO statistics and publications from the journal *Nature* were also used to present reliable epidemiological data. After a thorough analysis of the articles, 52 works were finally selected (42 research papers, 10 review papers). In addition, one book was included to supplement the issues discussed in the articles. Below is a chart presenting the procedure for selecting works for analysis. Below, there is a diagram that presents the procedure for selecting works for analysis.

Prevalence of depressive symptoms among infertile people

A special group of patients with depression are infertile people, therefore there is a need to create a diagnostic tool to assess the mental state of this population. One study on this topic aimed to assess the reliability and validity of the *Four-Item Patient Health Questionnaire-4* (PHQ-4) among 539 infertile patients at an infertility treatment center in Tehran. The PHQ-4, consisting of two subscales measuring depressive symptoms (PHQ-2) and generalized anxiety symptoms (-2), has not been previously validated in this population. Factor analysis confirmed the effectiveness of the two-factor PHQ-4 model. The results of correlations between PHQ-4, PHQ-2 and – 2 items and other psychological questionnaires, such as the *Hospital Anxiety and Depression Scale* (HADS), *Well-Being Index* (WHO-5) and *Penn State Worry Questionnaire* (PSWQ), confirmed convergent validity, which allowed the questionnaire to be considered a reliable screening test also dedicated to infertile people [14]. Investigating the relationship between infertility and the mental health of couples, the new WHO-5 *Well-Being Index*

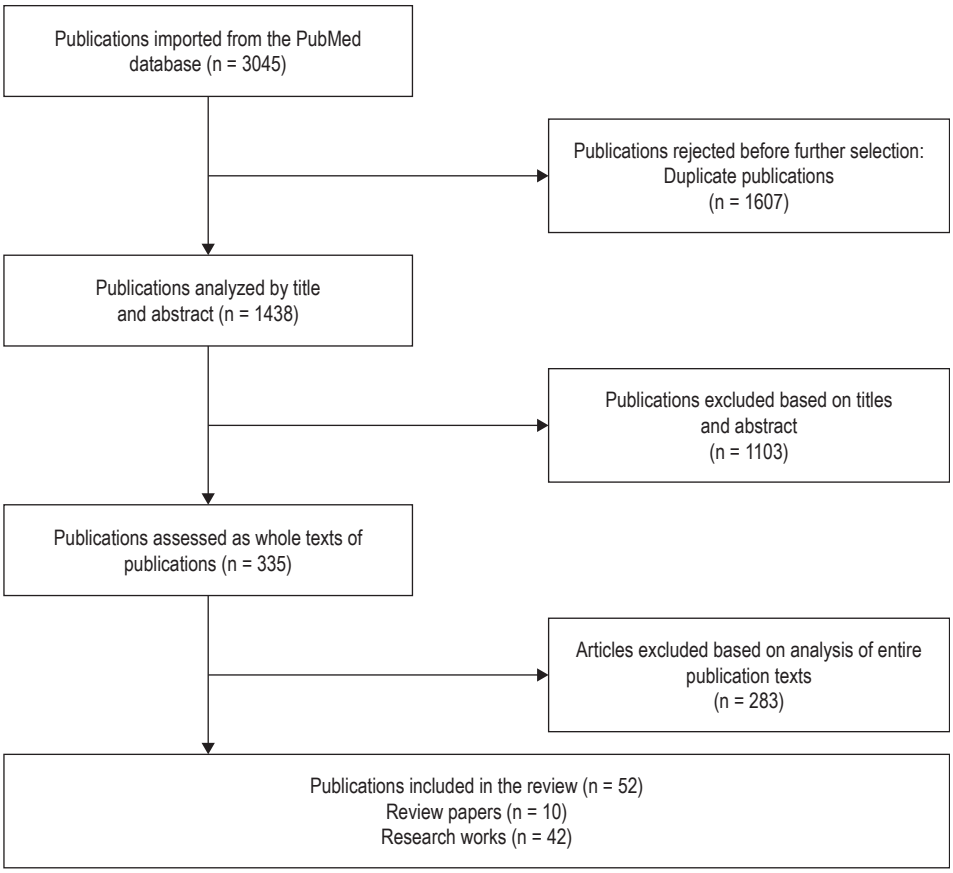

Diagram 1. **Scheme for selecting scientific publications that were included in the article**

(WHO-5-WBI) questionnaire was tested for the first time, which is a quick screening method for identifying couples with mental disorders, which turned out to be a promising tool for reliable mental health examination of spouses and identifying couples in need of psychological support in the context of infertility treatment [15].

In 2022, a systematic review and meta-analysis were published, which included thirty-two studies with a low risk of bias involving 124,556 women. A statistically significant relationship was observed between depression and infertility among women, with an OR of 1.40 compared to fertile women, which, according to the authors, indicates the validity of researching this issue [16].

A cross-sectional study conducted in Poland on the differences between infertile and fertile couples with symptoms of depression and anxiety showed that 35.44% of infertile women obtained results indicating the presence of depressive symptoms. In the group of fertile women, only 19.47% of respondents obtained such results on the *Beck Depression Inventory*. Among men, the frequency of negative results and

their intensity in terms of depression were comparable in the groups of fertile and infertile men [17].

A prospective cohort study conducted in the United States among 174 women and 144 of their partners showed that 39% of women and 15.3% of men met the criteria for major depressive disorder. It is worth mentioning that the time spent trying to conceive a child was 18 months in the study [18].

Researchers from Saudi Arabia, using the same screening test (BDI), reached similar conclusions and noted higher incidence and greater severity of depressive symptoms in infertile women compared to fertile women (53.8% and 37.2%, respectively) [19]. Another study, this time conducted in India, confirmed the relationships described above [20]. Similar data also apply to women in the Hungarian population, but study participants who were not undergoing infertility treatment presented less severe depressive symptoms compared to those who were undergoing infertility treatment (Assisted Reproductive Technology (ART) [21].

Research was also carried out in Iran to determine the prevalence and factors predisposing to the occurrence of mental disorders among infertile and fertile women. It was found that 44% of infertile and 28.7% of fertile women suffered from mental disorders, of which depressive disorders were among the most common [22]. Another study conducted in Iran, concerning 1,128 infertile people, showed the prevalence of anxiety at 49% and depression at 33% in a mixed group of women and men [23]. A similar relationship was observed in Pakistan [24], while in the United States, in a study using the *Center for Epidemiologic Studies Depression Scale* (CES-D), 19% of women suffered from moderate and 13% of severe depression [25].

However, men diagnosed with infertility achieved higher results on the BDI scale compared to the control group of fertile men [26]. Similar data were obtained in China, where depression affected as many as 20.4% of infertile men who, unlike fertile men, were characterized by more frequent erectile dysfunction [27].

Infertility treatment and depression

In the USA, approximately 12.7% of women of reproductive age undergo infertility treatment each year, and only in 85% of cases the cause is identified. The more common causes include ovulation disorders and fallopian tube diseases. Ovulation disorders, accounting for 25% of diagnoses, are associated with polycystic ovary syndrome in 70% of the surveyed women. In the treatment of anovulation, clomiphene citrate, aromatase inhibitors (e.g., letrozole) and gonadotropins are used, often to induce ovulation or stimulate ovarian function during in vitro fertilization (IVF) cycles. For people aged 38–40, immediate IVF may be considered as a first-line strategy due to declining fertility with age. It is worth noting that in the remaining 15% of couples the causes of infertility cannot be determined [28]. Assisted reproductive technologies have made significant progress, enabling the increasingly widespread use of in vitro fertilization and its variants to treat virtually all types of infertility [29].

Studies have been conducted to estimate the relationship between depression rates and oocyte and sperm counts and pregnancy rates during in vitro fertilization treatment.

Among 80 Turkish couples treated in vitro, a significant correlation was observed between the occurrence of depressive symptoms and data on oocyte retrieval and oocyte number. Low oocyte counts were associated with higher levels of depression. Additionally, higher levels of anxiety and depression were associated with a lower chance of getting pregnant. However, there was no significant correlation between sperm count and anxiety and depression scores, but attention was drawn to poor sperm motility, which was inversely correlated with depression scores [30]. Similar observations were made in another study, however, men with anxiety symptoms were characterized by a lower final motile sperm count (fTMSC) during in vitro fertilization compared to men without anxiety symptoms. However, there were no differences in live birth rates (LBR) among people with anxiety, depression and those treated with antidepressants, and there was no significant effect of depression on fTMSC [31].

More and more evidence suggests that both infertility and its treatment constitute a psychological burden for couples, which may significantly affect their quality of life (QoL) [32]. Quality assessment study of lives of infertile couples showed that both depressive symptoms in men and women affected their quality of life, and there was also a significant impact of men's depression on the quality of life of their wives ($\beta = -0.128$; $p = 0.030$). Despite the lack of a statistically significant impact of women's mental state on men's quality of life, it was noticed that men in relationships with women with more severe depression were more likely to perceive their quality of life as worse. The above results highlight the need for interventions to improve the quality of life of infertile couples [33].

A Turkish study provides information on the prevalence of depressive symptoms among couples with primary and secondary infertility. It was shown that the mean total scores on the BDI scale were comparable in both groups of women, while mild depression was more common in primarily infertile women and moderate depression in fertile women constituting the control group. Statistically, women had higher depression scores than their partners in which no significant differences were found between mean BDI scores. The number of treatment cycles used for depressive episodes showed only a weak positive correlation with the average total BDI score [34].

The prevalence of mental disorders was also investigated in a Swedish population of infertile women and men undergoing in vitro fertilization. Mood disorders occurred in 26.2% of women and 9.2% of surveyed men, while anxiety disorders occurred in 14.8% of women and 4.9% of men [9].

In a similar research project conducted by Volgsten et al. [35], a negative pregnancy test result was found to be an independent risk factor for depression in women undergoing in vitro fertilization, but the result of a pregnancy test after in vitro fertilization was not associated with the risk of developing anxiety disorders. Pregnancy test results were not a risk factor for the development of depression or increased anxiety in men. It is also worth emphasizing that in this study, women with major depression were more likely to have a negative history of fertility than women without a psychiatric diagnosis [35].

In Saudi Arabia, based on the *Mini International Neuropsychiatric Interview* (MINI) documented the prevalence of mental disorders among 36.9% of infertile

women and 30% of infertile men, with the most common diagnosis in both sexes being depression affecting 21, 7% of respondents [36]. Similar results were also obtained in Poland, with additionally reduced levels of testosterone ($p = 0.001$) and increased levels of prolactin and cortisol ($p < 0.001$) in the group of infertility patients with higher male BDI scores. Statistically significant negative correlations were also found between the BDI score and the levels of sex hormone binding globulin (SHBG) and dehydroepiandosterone sulfate (DHEA-S) produced by the adrenal glands ($p < 0.001$). Negative correlation was also confirmed between BDI scores and sperm count and semen volume, indicating the impact of depression severity on the reduction of semen volume and density. Moreover, several studies cited above highlighted the significant impact of other factors on the incidence of depressive symptoms in infertile people [30], which mainly include the female gender and lower social status [32, 34, 36].

The psychological burden associated with infertility treatment is one of the main reasons for discontinuing such treatment. Previous research on the relationship between depression and the initiation of infertility treatment provides inconclusive results. In one study from the United States, 20% of couples who discontinued treatment indicated emotional stress as the main reason for discontinuing therapy [37]. The aim of another study was to determine whether positive depression screening results using the PROMIS (Patient-Reported Outcomes Information System) short form are associated with continued infertility treatment. This study of 416 women showed that 41% of the subjects suffered from depression. Women with depression were 0.55 times less likely to start infertility treatment and 0.58 times less likely to start depression treatment within 4 months. Additionally, women with depression were less likely to decide to undergo treatment with oral drugs or in vitro treatment ($p = 0.01$ and $p = 0.03$) compared to those without symptoms of depression [38].

The impact of pharmacotherapy in depression on the incidence of infertility

In 2011, the most commonly prescribed medications in the United States were antidepressants (over 260 million prescriptions). Recently, there has been a steady increase in the frequency of prescription of psychotropic drugs. Allopregnanolone, which is a progesterone derivative, acts as a positive allosteric modulator of the $GABA_A$ receptor [39], and the latest studies conducted on rodents suggest that an increase in allopregnanolone concentration may have a negative impact on the hypothalamic-pituitary-ovarian axis, which consequently translates into infertility [40]. Current research on the teratogenicity of antidepressants does not provide sufficient information on their direct impact on fertility [41]. Results from animal studies indicate a reduction in the distribution of the allopregnanolone dose into the hypothalamus of circulating LH, leading to a reduction in the number of oocytes during estrus in rats. Studies conducted among the human population suggest that intravenous administration of allopregnanolone in healthy and fertile women may reduce the level of the follicle-stimulating hormone (FSH) and LH, and consequently reduce ovulation rates [42]. In subsequent studies that assessed the effects of antidepressants, mainly from the group of serotonin reuptake inhibitors (SSRIs), on female fertility has been shown

the effect of drugs on cycle length and regularity at the beginning of the study did not differ substantially. However, the use of drugs in a given cycle was associated with: lower probability of getting pregnant. Similar results were obtained by women with both anxiety disorders and depression [43]. A retrospective study comparing 25 women using SSRIs and seeking in vitro fertilization with a control group shows that the use of this group of antidepressants may be associated with a lower pregnancy rate, but the results did not reach statistical significance [44].

A group of 950 women was analyzed to assess the impact of SSRIs on the results of in vitro fertilization. Taking into account women's age, number of births, ovarian stimulation protocols, and intracytoplasmic injection, there was no statistically significant difference in the percentage of started cycles or embryo transfer between the population using SSRIs (17.1%) and the group that did not use inhibitors (28.9%). The percentage of live births did not differ statistically significantly between women taking SSRIs (14.3%) and patients not taking these drugs (24.2%). The rate of cycle interruption due to poor ovarian response was significantly higher in women using SSRIs (26.8%) compared to those not treated with these drugs (10.0%). A higher rate of cycle cancellation was observed in 4.3% of patients using SSRIs, but no significant difference was observed in the rate of pregnancies and live births per started cycle. The reason for the significantly higher rate of cycle cancellation due to poor response in SSRI users is unknown, but the authors suspect that the class of serotonin reuptake inhibitors may interfere with the gonadal axis [45]. Studies conducted on animal models suggest that these drugs may affect the levels of gonadotropins and estrogen [46].

When analyzing the relationship between SSRI use and the outcome of in vitro fertilization, it should also be emphasized that the presence of depression itself, and not SSRI treatment, may reduce the chances of getting pregnant. Recent reports suggest that depression and anxiety may be associated with lower pregnancy rates in patients undergoing in vitro fertilization [47]. Patients with untreated depression, who may not undergo infertility treatment due to the severity of depressive symptoms, which reduces their chance of having children, require special attention.

The use of selective serotonin reuptake inhibitors has been associated with reduced fertility in men by affecting the quality of sperm in semen. In vitro tests confirmed the spermicidal effect of these drugs. Fluoxetine showed comparable effectiveness in this respect to the N-9 spermicide, while other drugs from this group showed less effectiveness [48]. Two case reports provided similar information on semen quality in men treated with SSRIs. A temporary association was noted between the use of SSRIs and deterioration of semen quality in both patients, which is consistent with previous observations [49]. Similar conclusions were reached in a prospective control study involving 25 men who were administered 10 mg of escitalopram for 3 months, after which a significantly lower sperm concentration, a lower percentage of normal-shaped sperm compared to baseline values and reduced sperm motility were observed [50]. Comparable results were also obtained with sertraline in a study of 60 men who were randomly divided into two groups: (1) receiving sertraline 50 mg plus cognitive behavioral therapy and (2) supported by cognitive-behavioral therapy alone for 3 months.

Comparing baseline values, men treated pharmacologically had significantly lower sperm concentration (119 million/ml compared to 147 million/ml), a lower percentage of normal morphology (25% compared to 44%) and a higher percentage of sperm with increased DNA fragmentation (31% compared to 16%) compared to patients treated with psychotherapy alone [51]. Other studies indicate that SSRIs may disrupt the process of spermatogenesis, affect hormonal homeostasis, degrade the sperm cell membrane, adversely affect their transport and modify sperm DNA. The adverse effects correlate with increasing dose and duration of treatment. Discontinuing the drug used to treat depression may partially restore normal fertility [52].

Effects of psychiatric therapy in couples with ineffective procreation

The relationship between infertility and psychological factors is an important area of research frequently undertaken by scientists. There are three main relationships: the psychological consequences of infertility, the influence of psychological factors on the occurrence of infertility and the co-occurrence of psychological factors with infertility. Both chronic stress and depression affect the hypothalamic-pituitary-adrenal-gonadal axis, which consequently disrupts the hormonal system that determines proper fertility. The presence of depressive symptoms has a negative impact on infertility treatment and, consequently, may contribute to a lower pregnancy rate. Emotional problems accompanying each stage of infertility diagnosis may affect the effectiveness of fertilization therapy. Psychotherapeutic treatment and psychological counseling during in vitro fertilization procedures are often offered for the above-mentioned psychological problems [53]. Some people seek help from psychiatric specialists.

The lack of children among couples actively trying to have them may be one of the most difficult life experiences caused by infertility. 41.9% of people undergoing psychotherapy and 42% using cognitive behavioral consultations achieved their dream goal – pregnancy, while only 13.5% of people from the control group achieved the same effect [54]. Among 70 infertile couples in the group receiving psychiatric advice and 70 infertile couples in the control group, at least one partner of each couple had severe depressive symptoms on the BDI scale. Infertility due to male factor was observed in 31.4% of couples in the study group and in 34.4% of couples in the control group. Pregnancies occurred in 47.1% of couples in the study group and only in 7.1% of couples in the control group, which is a significant difference. The pregnancy rate in the study group was 14 times higher than in the control group. The impact of psychiatric and counseling intervention on women's mental state led to an increase in the chance of getting pregnant in the study group by 40%. Psychological interventions in the treatment of infertility reduce stress and alleviate the symptoms of mental disorders, including depression, which contributes to improving the quality of life of couples struggling with reproductive problems [55]. Psychosocial interventions resulted in a significant reduction in the level of depression in infertile women, but no significant impact on pregnancy rates was observed during ART treatment. However, the methodological assessment indicated heterogeneity of research designs and samples, which makes it difficult to compare results and formulate uniform conclusions [56].

It is worth mentioning that sociological data indicate the problem of infertile women not reporting to doctors for help with infertility treatment, which affects almost 30% of them. This may be due to limited access to treatment due to high costs [57].

Recapitulation

Infertility remains an increasingly significant medical and social issue. Studies indicate that it can lead to lowered self-esteem due to the inability to fulfill the role of a parent, crises in the sense of femininity or masculinity, feelings of guilt, and problems in partner relationships, often resulting in the development of full-blown depression. In many cultures, the ability to have children is strongly linked to gender identity and its associated social role, hence infertility can lead to stigmatization, social isolation and discrimination, exacerbating psychological problems. The prevalence of depressive symptoms among infertile individuals varies slightly across populations worldwide, but regardless of geographical location, infertile women are at significant risk of anxiety and depressive disorders. Analyzing the relationship between the severity of depressive symptoms and in vitro treatment outcomes indicates a significant negative correlation, particularly with the number of oocytes. Apart from the increased risk of depression and other mental disorders, infertile couples tend to have a lower quality of life, making psychological support essential.

Antidepressants, especially SSRIs, are commonly used to treat emotional disorders and can adversely affect fertility. In women, they mainly disrupt the central nervous system and hormonal processes related to the menstrual cycle, while in men, they can reduce semen quality, directly impacting fertilization capability. Research on the link between infertility and psychological factors identifies three main hypotheses: the psychological consequences of infertility, the impact of psychological factors on infertility, and their mutual, independent co-occurrence.

Both depressive symptoms and adverse psychological factors negatively affect the undertaking of infertility treatment and the effectiveness of procreative therapy. In countries where infertility treatment is not covered by healthcare systems, many couples cannot afford therapy. The therapy itself is often lengthy and associated with intense emotional stress due to the pressure to conceive. Psychological support, including psychotherapy, can benefit couples dealing with infertility by improving both mental health and pregnancy chances.

Infertility is a serious health issue with multifaceted implications. Its impact extends beyond the medical realm, affecting psychological, social, economic, and demographic aspects.

References

1. Kraaij V, Garnefski N, Schroevers MJ. *Coping, goal adjustment, and positive and negative affect in definitive infertility*. J. Health Psychol. 2009; 14(1): 18–26.
2. Holka-Pokorska J, Jarema M, Wichniak A. *Clinical determinants of mental disorders occurring during the infertility treatment*. Psychiatr. Pol. 2015; 49(5): 965–982.
3. Trzęsowska-Greszta E, Jastrzębski J, Sikora R, Fiałek M, Trębicka P. *Poziom depresji u kobiet z utrudnioną prokreacją a styl radzenia sobie ze stresem i płeć psychologiczna*. Kwartalnik Naukowy Fides Et Ratio 2017; 29(1): 191–215.
4. Wdowiak A, Wdowiak E, Stec M, Bojar I. *Post-laparoscopy predictive factors of achieving pregnancy in patients treated for infertility*. Wideochir. Inne Tech. Maloinwazyjne. 2016; 11(4): 253–258.
5. Hendrixson A. *Beyond bonus or bomb: Upholding the sexual and reproductive health of young people*. Reprod. Health Matters 2014; 22(43): 125–134.
6. Shorey S, Ng ED, Wong CHJ. *Global prevalence of depression and elevated depressive symptoms among adolescents: A systematic review and meta-analysis*. Br. J. Clin. Psychol. 2022; 61(2): 287–305.
7. NFZ o zdrowiu. Depresja. ezdrowie.gov.pl (retrieved: 1.07.2024).
8. Kahyaoglu Sut H, Balkanli Kaplan P. *Quality of life in women with infertility via the FertiQoL and the Hospital Anxiety and Depression Scales*. Nurs. Health Sci. 2015; 17(1): 84–89.
9. Volgsten H, Skoog Svanberg A, Ekselius L, Lundkvist O, Sundström Poromaa I. *Prevalence of psychiatric disorders in infertile women and men undergoing in vitro fertilization treatment*. Hum. Reprod. 2008; 23(9): 2056–2063.
10. Smith K. *Mental health: A world of depression*. Nature 2014; 515(7526): 181.
11. https://demografia.stat.gov.pl/bazademografia/Tables.aspx (retrieved: 1.07.2024).
12. https://pacjent.gov.pl/artykul/program-wsparcia-vitro (retrieved: 1.07.2024).
13. https://pulsmedycyny.pl/ministerstwo-zdrowia-w-2020-r-w-polsce-w-procedurze-in-vitro-wykorzystano-prawie-33-tys-zarodkow-1109937 (retrieved: 1.07.2024).
14. Ghaheri A, Omani-Samani R, Sepidarkish M, Hosseini M, Maroufizadeh S. *The Four-item Patient Health Questionnaire for Anxiety and Depression: A validation study in infertile patients*. Int. J. Fertil. Steril. 2020; 14(3): 234–239.
15. Hegyi BE, Kocsis K, Király A, Ando B, Kovács I, Kozinszky Z et al. *Clustering infertile couples with dyadic approach: WHO-5-WBI as a promising tool for assessing psychological state*. Psychol Belg. 2020; 60(1): 152–163.
16. Nik Hazlina NH, Norhayati MN, Shaiful Bahari I, Nik Muhammad Arif NA. *Worldwide prevalence, risk factors and psychological impact of infertility among women: A systematic review and meta-analysis*. BMJ Open 2022; 12(3): e057132.
17. Drosdzol A, Skrzypulec V. *Depression and anxiety among Polish infertile couples – An evaluative prevalence study*. J. Psychosom. Obstet. Gynaecol. 2009; 30(1): 11–20.
18. Holley SR, Pasch LA, Bleil ME, Gregorich S, Katz PK, Adler NE. *Prevalence and predictors of major depressive disorder for fertility treatment patients and their partners*. Fertil. Steril. 2015; 103(5): 1332–1339.
19. Al-Homaidan HT. *Depression among women with primary infertility attending an infertility clinic in Riyadh, Kingdom of Saudi Arabia: Rate, severity, and contributing factors*. Int. J. Health Sci. (Qassim). 2011; 5(2): 108–115.

20. Kamboj N, Saraswathy KN, Prasad S, Babu N, Puri M, Sharma A et al. *Women infertility and common mental disorders: A cross-sectional study from North India*. PLoS One 2023; 18(1): e0280054.
21. Lakatos E, Szigeti JF, Ujma PP, Sexty R, Balog P. *Anxiety and depression among infertile women: A cross-sectional survey from Hungary*. BMC Womens Health 2017; 17(1): 48.
22. Noorbala AA, Ramezanzadeh F, Abedinia N, Naghizadeh MM. *Psychiatric disorders among infertile and fertile women*. Soc. Psychiatry Psychiatr. Epidemiol. 2009; 44(7): 587–591.
23. Maroufizadeh S, Omani-Samani R, Hosseini M, Almasi-Hashiani A, Sepidarkish M, Amini P. *The Persian version of the Revised Dyadic Adjustment Scale (RDAS): A validation study in infertile patients*. BMC Psychol. 2020; 8(1): 6.
24. Begum BN, Hasan S. *Psychological problems among women with infertility problem: A comparative study*. J. Pak. Med. Assoc. 2014; 64(11): 1287–1291.
25. Nelson CJ, Shindel AW, Naughton CK, Ohebshalom M, Mulhall JP. *Prevalence and predictors of sexual problems, relationship stress, and depression in female partners of infertile couples.* J. Sex. Med. 2008; 5(8): 1907–1914.
26. Ozkan B, Orhan E, Aktas N, Coskuner ER. *Depression and sexual dysfunction in Turkish men diagnosed with infertility*. Urology 2015; 85(6): 1389–1393.
27. Ma JX, Wang B, Dang J, Li XB, Ding J, Zhu YT et al. *Erectile dysfunction and psychological status in infertile males*. Zhonghua Nan Ke Xue 2017; 23(7): 609–614.
28. Carson SA, Kallen AN. *Diagnosis and management of infertility: A review*. JAMA 2021; 326(1): 65–76.
29. Doody KJ. *Infertility treatment now and in the future*. Obstet. Gynecol. Clin. North Am. 2021; 48(4): 801–812.
30. Gürhan N, Akyüz A, Atici D, Kisa S. *Association of depression and anxiety with oocyte and sperm numbers and pregnancy outcomes during in vitro fertilization treatment*. Psychol. Rep. 2009; 104(3): 796–806.
31. Walker Z, Ernandez J, Lanes A, Srouji SS, Ginsburg E, Kathrins M. *The effects of male anxiety and depression on IVF outcomes*. Hum. Reprod. 2023; 38(11): 2119–2127.
32. Maroufizadeh S, Ghaheri A, Omani Samani R, Ezabadi Z. *Psychometric properties of the Satisfaction with Life Scale (SWLS) in Iranian infertile women*. Int. J. Reprod. Biomed. 2016; 14(1): 57–62.
33. Maroufizadeh S, Hosseini M, Rahimi Foroushani A, Omani-Samani R, Amini P. *The effect of depression on quality of life in infertile couples: An actor-partner interdependence model approach*. Health Qual. Life Outcomes 2018; 16(1): 73.
34. Yoldemir T, Yassa M, Atasayan K. *Comparison of depression between primary and secondary infertile couples*. Gynecol. Endocrinol. 2020; 36(12): 1131–1135.
35. Volgsten H, Skoog Svanberg A, Ekselius L, Lundkvist O, Sundström Poromaa I. *Risk factors for psychiatric disorders in infertile women and men undergoing in vitro fertilization treatment*. Fertil. Steril. 2010; 93(4): 1088–1096.
36. Alosaimi FD, Altuwirqi MH, Bukhari M, Abotalib Z, BinSaleh S. *Psychiatric disorders among infertile men and women attending three infertility clinics in Riyadh, Saudi Arabia*. Ann. Saudi Med. 2015; 35(5): 359–367.
37. Domar AD, Gross J, Rooney K, Boivin J. *Exploratory randomized trial on the effect of a brief psychological intervention on emotions, quality of life, discontinuation, and pregnancy rates in in vitro fertilization patients*. Fertil. Steril. 2015; 104(2): 440–51.e7.

38. Crawford NM, Hoff HS, Mersereau JE. *Infertile women who screen positive for depression are less likely to initiate fertility treatments*. Hum. Reprod. 2017; 32(3): 582–587.
39. Pinna G, Almeida FB, Davis JM. *Allopregnanolone in postpartum depression*. Front. Glob. Womens Health. 2022; 3: 823616.
40. McEvoy K, Osborne LM. *Allopregnanolone and reproductive psychiatry: An overview*. Int. Rev. Psychiatry 2019; 31(3): 237–244.
41. Farr SL, Bitsko RH, Hayes DK, Dietz PM. *Mental health and access to services among US women of reproductive age*. Am. J. Obstet. Gynecol. 2010; 203(6): 542.e1–542.e5429.
42. Timby E, Hedström H, Bäckström T, Sundström-Poromaa I, Nyberg S, Bixo M. *Allopregnanolone, a GABAA receptor agonist, decreases gonadotropin levels in women. A preliminary study*. Gynecol. Endocrinol. 2011; 27(12): 1087–1093. Doi: 10.3109/09513590.2010.540603.
43. Casilla-Lennon MM, Meltzer-Brody S, Steiner AZ. *The effect of antidepressants on fertility*. Am. J. Obstet. Gynecol. 2016; 215(3): 314.e1–314.e3145.
44. Klock SC, Sheinin S, Kazer R, Zhang X. *A pilot study of the relationship between selective serotonin reuptake inhibitors and in vitro fertilization outcome*. Fertil. Steril. 2004; 82(4): 968–969.
45. Friedman BE, Rogers JL, Shahine LK, Westphal LM, Lathi RB. *Effect of selective serotonin reuptake inhibitors on in vitro fertilization outcome*. Fertil. Steril. 2009; 92(4): 1312–1314.
46. Vitale ML, Chiocchio SR. *Serotonin, a neurotransmitter involved in the regulation of luteinizing hormone release*. Endocr. Rev. 1993; 14(4): 480–493.
47. Bapayeva G, Aimagambetova G, Issanov A, Terzic S, Ukybassova T, Aldiyarova A et al. *The effect of stress, anxiety and depression on in vitro fertilization outcome in Kazakhstani public clinical setting: A cross-sectional study*. J. Clin. Med. 2021; 10(5): 937.
48. Kumar VS, Sharma VL, Tiwari P, Singh D, Maikhuri JP, Gupta G et al. *The spermicidal and antitrichomonas activities of SSRI antidepressants*. Bioorg. Med. Chem. Lett. 2006; 16(9): 2509–2512.
49. Tanrikut C, Schlegel PN. *Antidepressant-associated changes in semen parameters*. Urology 2007; 69(1):.
50. Koyuncu H, Serefoglu EC, Yencilek E, Atalay H, Akbas NB, Sarıca K. *Escitalopram treatment for premature ejaculation has a negative effect on semen parameters*. Int. J. Impot. Res. 2011; 23(6): 257–261.
51. Akasheh G, Sirati L, Noshad Kamran AR, Sepehrmanesh Z. *Comparison of the effect of sertraline with behavioral therapy on semen parameters in men with primary premature ejaculation*. Urology 2014; 83(4): 800–804.
52. Nørr L, Bennedsen B, Fedder J, Larsen ER. *Use of selective serotonin reuptake inhibitors reduces fertility in men*. Andrology 2016; 4(3): 389–394.
53. Mitsi C, Efthimiou K. *Infertility: Psychological-psychopathological consequences and cognitive-behavioural interventions*. Psychiatrike 2014; 25(4): 293–302.
54. Massarotti C, Gentile G, Ferreccio C, Scaruffi P, Remorgida V, Anserini P. *Impact of infertility and infertility treatments on quality of life and levels of anxiety and depression in women undergoing in vitro fertilization*. Gynecol. Endocrinol. 2019; 35(6): 485–489.
55. Ramezanzadeh F, Noorbala AA, Abedinia N, Rahimi Forooshani A, Naghizadeh MM. *Psychiatric intervention improved pregnancy rates in infertile couples*. Malays J. Med. Sci. 2011; 18(1): 16–24.

56. Kremer F, Ditzen B, Wischmann T. *Effectiveness of psychosocial interventions for infertile women: A systematic review and meta-analysis with a focus on a method-critical evaluation*. PLoS One 2023; 18(2): e0282065.
57. Smith JF, Eisenberg ML, Glidden D, Millstein SG, Cedars M, Walsh TJ et al. *Socioeconomic disparities in the use and success of fertility treatments: Analysis of data from a prospective cohort in the United States*. Fertil. Steril. 2011; 96(1): 95–101.

Address: Damian Zieliński
e-mail: damianzielinski817@gmail.com