Heliyon 8 (2022) e09827

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Research article

Paramedical counselling in infertility treatment: its effects on anxio-depressive symptom severity, perceived stress and self-esteem

Angelika Szatmári [a,*], Kornélia Helembai [a], János Zádori [b], Ildikó Kovács [c]

[a] Department of Health Sciences, Faculty of Health Sciences and Social Studies, University of Szeged, Hungary
[b] Center for Assisted Reproduction, Albert Szent-Györgyi Clinical Center, Faculty of Medicine, University of Szeged, Hungary
[c] Department of Psychiatry, Albert Szent-Györgyi Clinical Center, Faculty of Medicine, University of Szeged, Hungary

ARTICLE INFO

Keywords:
Male infertility
Paramedical counselling
Anxio-depressive symptoms
Perceived stress
Self-esteem

ABSTRACT

Aims: The importance of contributing psychological factors and stress-control in female infertility is well documented, but research on their role in male infertility is scarce. The present study aimed to evaluate the effects of a novel paramedical counselling on anxio-depressive symptom severity, perceived stress and self-esteem in infertile men participating in an infertility treatment programme.

Methods: Patients were recruited from clinics of University of Szeged, Hungary between 2019 May and 2020 December, and were sorted into control (n = 51) and experimental (n = 57) groups, where patients in the experimental group received a 5-session paramedical counselling in extension to their medical treatment. The levels of anxio-depressive symptom severity, perceived stress and self-esteem were measured prior to and after receiving paramedical counselling. The control group scored lower in regards of the severity of depressive symptom, and showed an increase of self-esteem, while the experimental group resulted in a significant decrease of anxio-depressive scores with the elevation of the level of self-esteem.

Results: Our results indicate that joining an infertility treatment programme alone had a positive role in reducing depressive symptoms and in the increase of self-esteem among infertile men, but receiving additional paramedical counselling throughout the treatment programme resulted in the decrease of anxio-depressive symptoms, besides the elevation of the level of self-esteem, with a significantly higher decrease in the state anxiety compared to not receiving this additional paramedical counselling.

Conclusions: Thus, it would be advisable for infertility treatment programmes to incorporate screening for psychological vulnerability and implement additional paramedical counselling to alleviate these confounding symptoms detrimental to conceiving.

1. Introduction

As reproduction is individually and socially essential, struggling with it represents a serious psychological issue for infertile couples. Approximately 15–20% of partners who live in developed countries suffer from infertility, and this frequency continues to rise (Policy Audit on Fertility, 2017). While female infertility is widely addressed in scientific literature, much less attention has been paid on male infertility, despite that it affects millions of men of reproductive age, and by this health professionals of the field are put in front of a challenging task, since its incidence continues to increase worldwide (Jungwirth et al., 2017). Its origin varies and can include lifestyle, psychological, and environmental factors, either together or separately. Recent literature even suggests that besides potential medical origins of infertility, affected people should focus on identifying psychological confounding factors as well (Baunacke et al., 2018). When faced with infertility, men may experience severe patopsychological mechanisms, such as the emergence of anxio-depressive symptoms, the appearance of stress symptoms and decreased self-esteem, which are documented to be stronger in men struggling from infertility than in the case of infertility of unknown origin or women having problems with fertility (Fisher and Hammarberg, 2012; Martins et al., 2016; Throsby and Gill, 2004).

Men represent a different attitude towards infertility compared to women, which is also depicted in their lower motivation for seeking proper professional help (Nikoloudikis et al., 2016; Peterson et al. 2006). Previous literature highlighted that men tend to have difficulties in utilizing adaptive

* Corresponding author.
E-mail address: szatmariangel@gmail.com (A. Szatmári).

https://doi.org/10.1016/j.heliyon.2022.e09827
Received 11 December 2021; Received in revised form 5 April 2022; Accepted 24 June 2022

coping strategies to deal with their own infertility; consequently, this leads them to experiencing higher levels of psychological symptoms, such as anxio-depressive symptoms, higher perceived stress or lower self-esteem (Greil et al., 2010; Swierkowski et al., 2016). Moreover, various former research have indicated the additional patopsychological aspects connected to infertility, that actually affects both the male and the female member of the couple. Despite that former literature has addressed the presence of anxio-depressive symptoms and the roles of various coping strategies in the case of infertile women, such research on infertile men is scarce, and the existing ones simply address men's level of information regarding the disease (Cserepes et al., 2014; Daniluk and Koert, 2013). Involuntary childlessness is documented to have negative psychological effects and can lead to a paranormative crisis, having a negative effect on men's self-esteem, work performance and personal life, thus is prone to induce and elevate the levels of concomitant anxio-depressive symptoms (Chiaffarino et al., 2011; Martins et al., 2016; Wischmann and Thorn, 2013).

Hence, in case of the highly stress-inducing situation of infertility, it would be necessary for men to use adaptive coping strategies, while the application of these diverse coping methods may be useful for various stages during the treatment of their infertility (Peterson et al., 2006). Literature states that knowledge of the psychology of infertility leads to the development of a more effective coping with this condition, and consequently have a positive impact on the success of starting a family (Daumler et al. 2016; Randi et al. 2016; Faramarzi et al. 2013; Peterson et al. 2006). By forming a strategy to address the problem and designing a series of targeted actions, men's sense of control and competence could be increased, resulting in taking greater effort to resolve the situation (Peterson et al., 2006). Very limited research has addressed the question of non-pharmacological stress or anxiety reduction in the case of infertile men; however, the potential confounding effects of the use of anxio-depressive drugs during the process of infertility treatments are well-known (Casilla-Lennon et al., 2016).

Paramedical counselling in infertility treatment is a professional assistance providing additional emotional support, education and help to patients in order to enhance their coping with their diagnoses and treatment procedures, and aids in identifying patients who are more vulnerable to emotional/psychological symptoms like the emergence of anxio-depressive symptoms. Paramedical counselling is non-equivalent to psychotherapeutical help, since it is traditionally conducted by mental hygienists or trained nurses and focuses on patients understanding their problems and treatments, their own role in factors that have an effect on fertility (lifestyle, dietary etc. factors affecting the health of reproductive organ) (Menning, 1980; Martins et al., 2016; Stevenson et al., 2016). There is less attention on the beneficial role and effect of

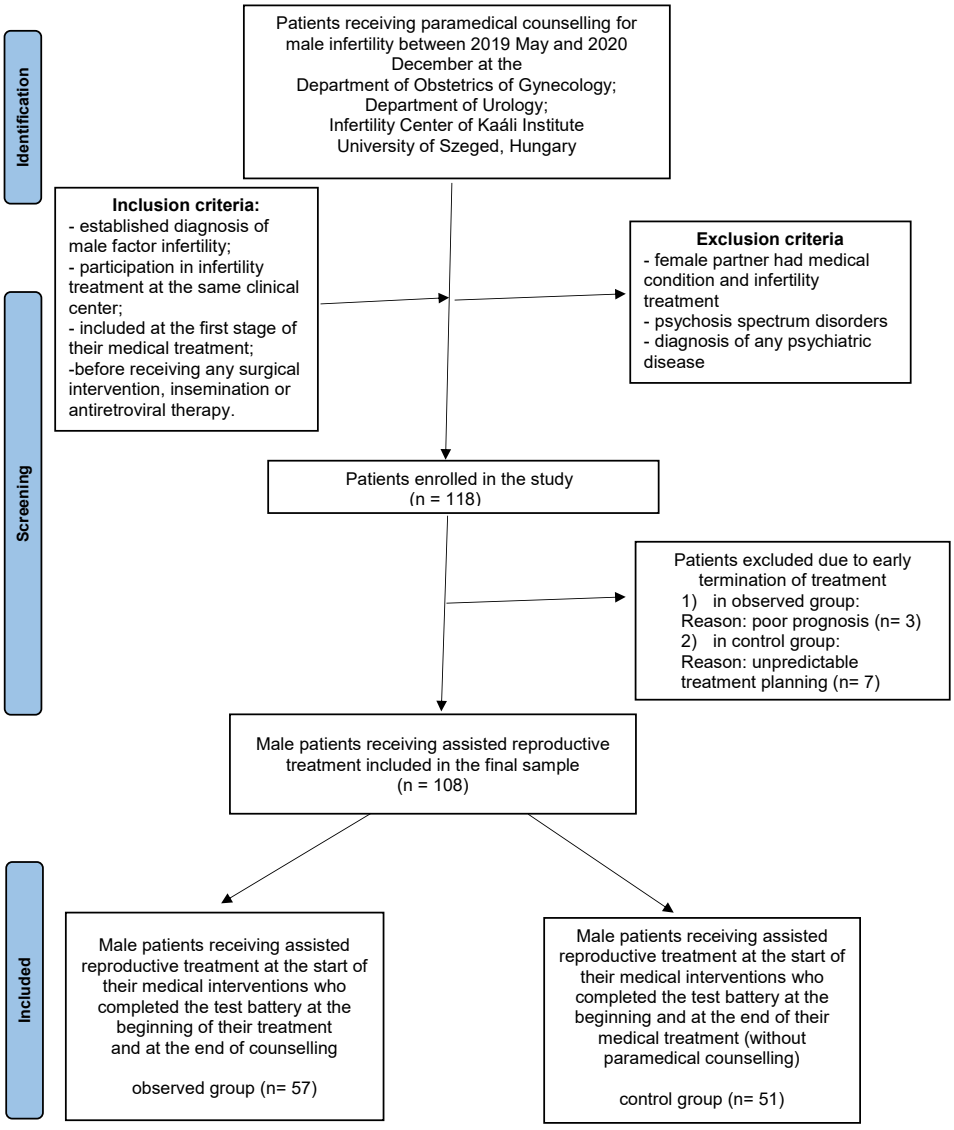

Figure 1. The complete study selection, inclusion and exclusion protocol. *From:* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. http://doi.org/10.1136/bmj.n71.

psychological and/or paramedical counselling during infertility treatments; despite these, there still are European countries and regions where such aid is only partially available or even completely missing from infertility centres (Boivin and Gamerio, 2015; Hakim et al., 2012; Fisher and Hammarberg, 2012).

Since literature on the beneficial effects of paramedical counselling in male infertility is scarce, in the present work we targeted to explore the potential beneficial effects on the levels of anxio-depressive symptom severity, perceived stress and self-esteem of a novel, 5-session infertility counselling program provided by professional helpers during the treatment period for men participating medical treatment for their infertility detailed in Szatmári et al. (2020). We hypothesized that patients receiving additional paramedical counselling throughout their infertility treatment would show more adaptive health behaviours, i.e., lower levels of anxio-depressive symptoms, lower perceived stress and higher self-esteem compared to those infertile patients who did not receive counselling.

2. Methods

2.1. Participants and procedure

Patients were enrolled from the Department of Obstetrics and Gynaecology, Department of Urology, Albert Szent-Györgyi Medical School, University of Szeged, Hungary and the Kaali Institute, Hungary between 2019 May and 2020 December. Overall, 108 patients were enrolled with the diagnosis of male factor infertility. Inclusion criteria were the following: 1) having a diagnosis of male factor infertility and 2) participants had to be enrolled to an infertility treatment programme at one of the units of the clinical centre mentioned above. Patients were included at the first stage of their medical treatment after being diagnosed, always before receiving any surgical intervention, insemination or antiretroviral therapy. In each case, the female partner had no medical condition behind the couple's infertility. This work was approved by the Human Investigation Review Board, University of Szeged (identification number of the ethical approval: 82/2017-SZTE) and was also performed conforming to the Declaration of Helsinki. Participants signed informed consent prior to participation in the research. For the complete study selection, inclusion and exclusion protocol see Figure 1.

2.2. Measures

2.2.1. Anxio-depressive measurement scales

The short version of the Beck Depression Inventory (BDI) consists of 9 items measuring depressive symptoms by addressing social introversion, indecisiveness, insomnia, anhedonia, concerns about somatic state and fatigue (Beck and Beck, 1972). The Hungarian adaptation showed good internal consistency (Rózsa et al., 2001) (Cronbach's α on our sample: 0.823).

The Spielbergers's State Anxiety Inventory (SSAI) is the most commonly used 20-item self-evaluation scale addressing the intensity of anxiety. Hungarian adaptation was made by Sipos et al. (1994); the measurement tool presented good internal consistency (Cronbach's α on our sample: 0.879).

2.2.2. Stress measurement scales

The Perceived Stress Scale (PSS) is the most widely used tool designed to assess one's perception of stress (Cohen et al., 1983). The questionnaire consists of 14 items and is self-rated on a 5-point Likert scale. Hungarian adaptation was made by Stauder and Konkoly-Thege (2006) and proved to be valid and reliable. Cronbach's α on our sample was good (0.896).

The Brief Stress and Coping Inventory (BSCI) is an 8-item self-measurement scale evaluating individuals' level of stress and used coping strategies (Rahe and Tolles, 2002). The Hungarian adaptation was made by Rózsa et al. (2005) and has good psychometric properties. Cronbach's α was acceptable (0.614) on our sample.

2.2.3. Assessment of self-esteem

The Rosenberg Self-Esteem Scale (RSES) is designed to assess global self-worth by addressing positive and negative aspects of one's self (Rosenberg, 1965). The 8-itemed questionnaire is to be rated on a 4-point Likert scale, and the Hungarian version (Rózsa et al., 2005) showed acceptable internal consistency (on our sample Cronbach's α: 0.614).

2.2.4. Paramedical counselling

The experimental group received a 5-session paramedical counselling conducted by a trained nurse with mental hygienist MSc qualification, which were based on three concepts: 1) disseminating knowledge about patients' treatment, 2) providing emotional support, and 3) giving help in screening for emotional and/or psychological vulnerability. Each session took place in 3-week intervals, and the examination period lasted for 5 months. A complete description and list of sessions and their contents are detailed in Table 1. See the components of infertility counselling in Table 2.

2.3. Data analysis

Patients included in the study were randomly allocated into two groups: 1) the experimental (n = 57) group consisted of patients

Table 1. Standardized programs of providing information and psychoeducation.

Paramedical Counselling Sessions				
First Meeting	Second Meeting	Third Meeting	Fourth Meeting	Fifth meeting
Program [*1*]; Describing the course of required examinations for infertility. *Program* [*2*]; Assessment and review of the importance and the results of examinations. *Program* [*3*]; Describing the diagnosed disease and assessment of the client's knowledge of the disorder. *Program* [*4*]; Clarification and emphasizing the role of the partner.	*Program* [*5*]; Information on the course of preparation for examinations, possible surgical interventions, and therapeutic alternatives to increase fertility/ treat infertility. Providing further information on assisted reproductive treatment.	*Program* [*6*]; Evaluation, interpretation and review of the results of examinations. *Program* [*7*]; Assessment of knowledge of and compliance with medicines. *Program (7.1);* Discussion of the significance and mechanisms of action of medicines and therapy settings. *Program (7.2);* Describing the appropriate way of taking medicines. *Program* [*8*]; Providing information to improve health(antioxidants)	*Program* [*9*]; Assessment of the key risk factors; (smoking, alcohol intake, stress, environmental risk factors) Reviewing the significance of lifestyle. Pathologically elevated chronic stress, smoking, alcohol intake, environmental risk factors. Lifestyle counselling.	*Program* [*10*]; Final evaluation of the whole process. Summary. How the knowledge of the patient changed. Discussion of the use of counselling in the patient's experience at the end of the programs.

The aims of each session of consultation were adapted to each patient. It emphasized on a 'key topic' representing each patients' key issue, i.e. a patient showing more severe stress or anxio-depressive symptoms, the counselling put an emphasis on these specific fields in order to facilitate a more adaptive coping with them

Table 2. The components of infertility counselling.

Exploration	Assessment of anxiety, self-esteem, depression, satisfaction with life, stress reactivity, social support and the applied coping strategies.
Support	Emotional support, providing space for ventilation. Exploration of the personal understanding of the infertility problem. Mobilization of coping strategies; facilitation of coping with distress. Increasing self-competence and activity (involving the client in decision making). Elaborating guilt and shame. Emphasizing the positive aspects of the difficult life situation. Assessment and support of the cohesion between the couple and the family.
Counselling	Psychoeducation; discussion of health behavior, life-style and stress. Providing information on the course of examinations, possible surgical interventions and therapeutic alternatives. Answering questions. Interpreting results. Providing help in decision making.

receiving a 5-session paramedical counselling as an extension to their medical treatment; and 2) the second control group (n = 51) did not receive any additional counselling besides medical treatment. Power analysis was conducted with G*Power (Erdfelder et al., 1996) software. Test of normality, group differences at baseline and after the end of the 5-session paramedical counselling were compared with independent sample *t*-tests and mixed ANOVA. Analyses were conducted with IBM SPSS v24 (IBM Corp., 2016).

3. Results

3.1. Power analysis and test of normality

A post hoc statistical power analysis was performed for computing achieved power with G*Power v3.1.9.7 (Erdfelder et al., 1996). The effect size (ES) in the present study was 0.5 and is considered to be medium using Cohen's (1988) criteria. With an alpha of 0.05 and power = 0.73, the applied sample size (n 51 and 57 in the control and experimental groups, respectively) is considered appropriate. Variables of both groups indicated normal distribution on the Shapiro-Wilk test (statistic between 0.823 and 0.944, p between 0.59 and 0.257), thus parametric tests were applied.

3.2. Demographic characteristics

Regarding the demographic characteristics, significant difference was observed only in case of the time of receiving the diagnosis of infertility between the control and the experimental groups, where the experimental group was diagnosed earlier ($t(106) = 3.096$, $p = 0.003$, 95%CI = 4.050–18.605); also the time when they started to attempt conceiving also differed, where the experimental group showed a longer period of time for trying to have a child ($t(106) = 2.483$, $p = 0.015$, 95% CI = 1.948–17.514), thus these variables were controlled for in further analyses. In case of other demographic variables, no significant differences were observed between the two groups (see Table 3).

3.3. Baseline group differences in clinical scales

At the first measurement point, the baseline state of the control group and the experimental group were compared. They did not differ in terms of PSS ($t(106) = -0.200$, $p = 0.842$, 95%CI = -−3.318–2.711), BDI ($t(106) = -0.73$, $p = 0.942$, 95%CI = −1.570–1.459), BSCI ($t(106) = 0.060$, $p = 0.952$, 95%CI = −0.957–1.017), RSES ($t(106) = 0.143$, $p = 0.887$, 95%CI = −1.593–1.841) and SSAI ($t(106) = -0.787$, $p = 0.433$, 95%CI = −4.995–2.155).

3.4. The effects of paramedical counselling on anxio-depressive symptoms, self-esteem and perceived stress

In terms of the comparison of anxio-depressive symptom severity, self-measured self-esteem and severity of perceived stress between the two measurement points, at the second measurement point the control group showed significant decrease in their BDI ($t(50) = 2.738$, $p = 0.009$, 95%CI = 0.167–1.088) and BSCI ($t(50) = 3.947$, $p = 0.002$, 95%CI = −0.051–1.188) scores, while their RSES scores increased ($t(50) = -2.645$, $p = 0.011$, 95%CI = −0.448–0.061), while the SSAI scores decreased only at the level of tendency ($t(50) = 1.844$, $p = 0.071$, 95%CI = 0.308–1.188). After receiving the 5-session paramedical counselling, at the second measurement point the experimental group showed significantly decreased BDI ($t(56) = 3.358$, $p = 0.001$, 95%CI = 0.481–1.905) and SSAI scores ($t(56) = 2.985$, $p = 0.004$, 95%CI = 0.796–4.046), and elevated RSES scores ($t(56) = -2.146$, $p = 0.036$, 95% CI = −1.459 to −0.050), while their PSS scores decreased only at the level of tendency ($t(56) = 1.697$, $p = 0.095$, 95%CI = −0.225–2.716). Group comparison at the second measurement point indicated that the experimental group showed significantly lower SSAI ($t(106) = -2.093$, $p = 0.039$, 95%CI = −6.372 – 0.173) scores than the control group; there were no significant differences in the other scales (see Figure 2). To test whether the initial differences of the time elapsed from receiving the infertility diagnosis in months and the start of family planning in months between the experimental and the control group had any significant effect on the differences in anxiety symptom reduction, mixed ANOVA were used with Time elapsed from diagnosis in months and start of family

Table 3. Demographic characteristic of the sample.

	Experimental group	Control group	
Age (*SD*)	35.57 (*5.565*)	34.84(*4.101*)	$t(106) = 0.664$, $p = 0.508$[a]
Education% (primary/secondary/higher)	17.5%/31.6%/50.9%	11.8%/37.3%/51%	$\chi 2$ [3] = 0.924, $p = 0.820$[b]
Marital status% (married/married but lives separately/civil partnership/single)	64.9%/7%/26.3%/1.8%	70.6%/7.8%/21.6%/0%	$\chi 2$ [3] = 1.300, $p = 0.729$[b]
Time elapsed from diagnosis in months (*SD*)	26.13 (*24.630*)	14.8 (*11.829*)	$t(106) = 3.096$, $p = 0.003$[a]
Start of family planning in months (*SD*)	36.12 (*25.307*)	26.39 (*14.489*)	$t(106) = 2.483$, $p = 0.015$[a]
Healthy diet% (not at all/slightly/moderately/rather/absolutely healthy)	10.5%/15.8%/38.6%/31.6%/3.5%	3.9%/15.7%/54.9%/23.5%/2.0%	$\chi 2$ [4] = 3.991, $p = 0.407$[b]
Sports% (never/less than once a month/less than once a week/more than once a week)	10.5%/36.8%/19.3%/21.1%/12.3%	5.9%/43.1%/15.7%/9.8%/25.5%	$\chi 2$ [4] = 5.864, $p = 0.210$[b]
Alcohol consumption% (never/once a month or less/2-3x per month/2-3x per week/4x or more per week)	12.3%/29.8%/42.1%/14.0%/1.8%	13.7%/43.1%/31.4%/11.8%	$\chi 2$ [4] = 3.203, $p = 0.524$[b]
Smoking % (non-smoker/social smoker/daily smoker trying to quit/daily smoker not trying to quit)	63.2%/14.0%/17.5%/5.3%	60.8%/19.6%/17.6%/2.0%	$\chi 2$ [3] = 1.319, $p = 0.725$[b]

[a] Independent sample *t*-test.
[b] chi-square test.

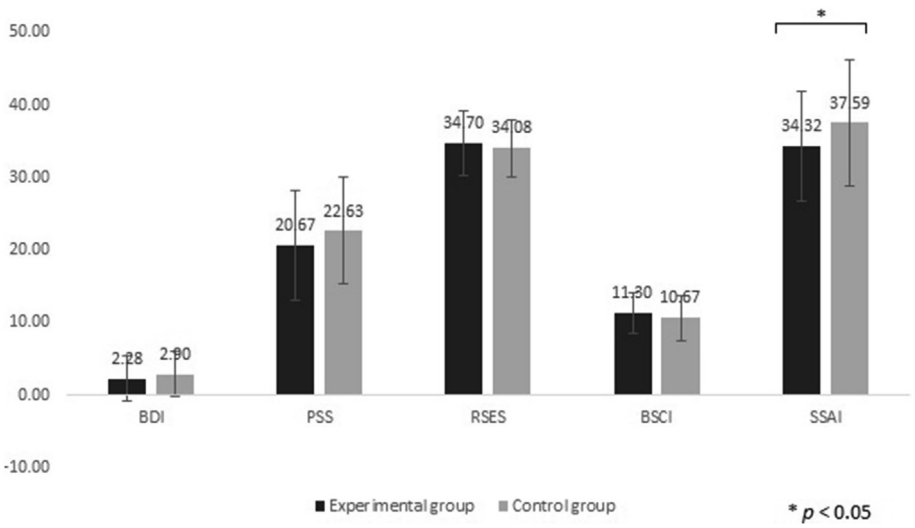

Figure 2. Effects of paramedical counselling on anxio-depressive symptoms, self-esteem and perceived stress. BDI: Beck Depression Inventory; PSS: Perceived Stress Scale; RSES: Rosenberg Self-Esteem Scale; BSCI: Brief Stress and Coping Inventory, SSAI: Spielberger State Anxiety Inventory.

planning in months as covariates. Significant interaction of paramedical counselling on the SSAI score could be observed ($F(1, 104) = 43.555$, $p = 0.038$, $\eta p2 = 0.041$), where nor the Time elapsed from diagnosis in months ($F(1, 104) = 10.467$, $p = 0.757$, $\eta p2 = 0.001$), nor the start of family planning in months ($F(1, 104) = 16.801$, $p = 0.696$, $\eta p2 = 0.001$) showed any significant effect on the main interaction.

4. Discussion

Our research aimed to examine the effects of a novel, 5-session paramedical counselling programme on the levels of anxio-depressive symptom severity, self-esteem and perceived stress. We found that joining an infertility treatment programme alone had an effect on depressive symptom severity reduction and on the increase of self-esteem among infertile men, but those who received additional paramedical counselling throughout their treatment expressed anxiety and depressive symptom reduction with a significantly higher decrease of their state anxiety than those patients who did not receive this additional counselling, and the decrease of state anxiety was not related to the time of reception of infertility diagnosis, nor to the time of the start of family planning.

Since men receive substantially less attention in regards of strategies for treating patopsychological factors emerging with their infertility compared to women, it may cause an issue as they are documented to ask fewer questions and overall are less conversative compared to women during medical consultations (Daumler et al., 2016; Wenger, 2011). Our results support previous literature demonstrating that the reception of information about their treatment, and a personalized series of sessions enhancing their coping indicate that the more satisfactory the medical and psycho-social information given during infertility treatment were, the more satisfied patients become with the infertility centre, and consequently it resulted in less pronounced concomitant psychological symptoms (Daniluk and Koert, 2013; Daumler et al., 2016; Fisher and Hammarberg, 2012; Martins et al., 2016; Randi et al., 2016). Research reflects on men seeing fewer options for treating their infertility, leading to the feeling of being less effective in coping with this problem, which subsequently leads to the feelings of shame, guilt, uselessness, thus lower self-esteem, that endorses the emergence of anxio-depressive symptoms (Daumler et al. 2016; Greil et al. 2010; Nachtigal et al. 1992; Swierkowski et al. 2016; Wischmann and Thorn, 2013). Lower self-esteem and higher anxio-depressive symptom severity are closely connected to decreased sexual activity in infertile men (Jamil et al., 2019), which can result in a secondary sexual dysfunction affecting conceiving negatively (Marci et al., 2012; Braverman, 2004). Clinical studies verified that psychological stress is closely connected to semen quality parameters and endocrine functions reducing the chance of successful conceiving (Bartolo et al., 2016; Greil et al., 2010; Nargund, 2015; Wdowiak et al., 2017).

Paramedical counselling during infertility treatment may aid men in decreasing their severity of anxiety by receiving additional knowledge about their condition and treatment and providing them a place for elaborating on their concerns. Research suggests that involvement in such a programme results in fewer couples interrupting their participation in a reproductive programme (Wdowiak et al., 2017; Nargund, 2015). Faramarzi et al. (2013) also found that counselling that included psychosocial interventions and the enhancement of coping strategies was found beneficial on psychological well-being among men. Previous studies point out that the emergence of mental health-related issues are well-known among infertile men receiving assisted reproduction treatment, from which psychosocial needs may often be met by the clinical staff of the reproductive clinic, but psychological issues may require more focused psychological interventions delivered by trained infertility counsellors or mental health professionals (Peterson et al., 2012). Counselling may be provided in different forms, e.g. delivered at the local infertility centre by their own staff, or employing external counselling, for which staff members should have a clear understanding of the most appropriate form of counselling a patient needs (i.e. paramedical counselling or psychotherapeutical help, individual or couples therapy setting etc.) (Peterson et al., 2006; Peterson et al., 2009; Van den Broeck et al., 2010; Verhaak et al., 2010).

Incorporating adaptive coping mechanisms in a supporting environment for enhancing men's anilities to cope more successfully with their feelings of losses and failures, and support maintaining a stable self-esteem and better predictability of their lives is of high importance in connection with the well-being of men suffering from infertility. However, the present study has several limitations. Since the number of couples attending infertility treatment in developed countries is around 45-45% of affected couples (Boivin et al., 2007), the generalization of our results may only be regarded with respect to this aspect. Also, since infertility is not only an issue for men, but for the couple, another limitation is that we did not include questionnaires examining anxio-depressive symptom severity, self-esteem and perceived stress of partners due to evading uncomfortably lengthy testing and lower participation rates in the study. On this notion, it is important to note that other possible factors out of the scope of the present study (e.g. serious life events during the received infertility treatment) may also have an effect in patients' levels of anxio-depressive symptoms, stress or self-esteem.

Overall, men suffering from problems regarding their fertility should be provided with opportunities with which they could enhance their psychological well-being and learn more adaptive coping strategies for managing the potential emergence of psychopathological problems in connection with their disease. It is documented that during initial evaluation, screening for psychological vulnerability is also advised. Additionally, it is recommended that the healthcare professional should emphasize the regular assessment of patient's mental status, i.e. the levels of anxio-depressive symptoms, perceived tress and emotional status (Boivin and Gamerio, 2015; Peterson et al., 2012; Schmidt, 2003). Our results support the notion that a psychosocial support focusing on the alleviation of psychopathological symptoms and enhancing adaptive coping mechanisms with targeting their specific problems and needs seems to be essential during the entire course of infertility treatment. Such a programme could help patients in decreasing the level of their anxiety and enhance their psychological well-being. Our results revealed that an additional paramedical counselling accompanying medical treatment may facilitate patient well-being, and could enhance patients' sense of involvement in their treatment process. Thus, it is recommended that such paramedical counselling, either in an individual or a couples' setting, should be organized, and it should be made available to patients throughout their course of treatment.

5. Conclusions

Empirical findings point out the augmenting role of paramedical counselling and/or lifestyle programmes in infertility treatments which may enhance fertility. Such programmes dedicated to modify disadvantageous health behaviours may represent an additional help in making the burden of male infertility more manageable (Boivin et al., 2007; Fisher and Hammarberg, 2012; Hammarberg et al., 2010; Martins et al., 2016; Van den Broeck et al., 2010). Our results indicate that joining an infertility programme itself helps in anxio-depressive symptom reduction and elevates the level of self-esteem; however, additional paramedical counselling significantly aids in the decrease of anxiety among infertile men.

Declarations

Author contribution statement

Angelika Szatmári Dr PhD: Conceived and designed the experiments; Performed the experiments; Wrote the paper.

Kornélia Helembai Dr PhD & János Zádori Dr PhD: Contributed reagents, materials, analysis tools or data.

Ildikó Kovács Dr PhD: Analyzed and interpreted the data; Wrote the paper.

Funding statement

This study was supported by University of Szeged [Open Access Grant No.: 5695].

Data availability statement

No data was used for the research described in the article.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

References

Bartolo, A., Reis, S., Monteiro, S., Leite, R., Montenegro, N., 2016. Psychological adjustment of infertile men undergoing fertility treatments: an association with sperm parameters. Arch. Psychiatr. Nurs. 30, 521–526.

Baunacke, M., Groeben, C., Borgmann, H., Salem, J., Kliesch, S., Huber, J., 2018. Andrology on the Internet: most wanted, controversial and often primary source of information for patients. Andrologia 50, 2877.

Beck, A.T., Beck, R.W., 1972. Shortened version of BDI. Postgrad. Med. 52, 81–85.

Boivin, J., Gamerio, S., 2015. Evolution of psychology and counseling in infertility. Fertil. Steril. 104 (2), 251–260.

Boivin, J., Bunting, L., Collins, J.A., Nygren, K.G., 2007. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. Hum. Reprod. 22 (6), 1506–1512.

Braverman, A.M., 2004. Psychosocial aspects of infertility: sexual dysfunction. Int. Congr. 1266, 270–276.

Casilla-Lennon, M.M., Meltzer-Brody, S., Steiner, A.Z., 2016. The effect of antidepressants on fertility. Am. J. Obstet. Gynecol. 215 (3), 314.e1–314.e3145.

Chiaffarino, F., Baldini, M.P., Scarduelli, C., Bommarito, F., Ambrosio, S., Dorsi, C., Torretta, R., Bonizzoni, M., Ragni, G., 2011. Prevalence and incidence of depressive and anxious symptoms in couples undergoing assisted reproductive treatment in an Italian infertility department. Eur. J. Obstet. Gynecol. Reprod. Biol. 158, 235–241.

Cohen, J., 1988. Statistical Power Analysis for the Behavioural Sciences. Lawrence Erlbaum Associates, Hillsdale, New Jersey.

Cohen, S., Kamarck, T., Mermelstein, R., 1983. A global measure of perceived stress. J. Health Soc. Behav. 24, 385–396.

Cserepes, R.E., Kőrösi, T., Bugan, A., 2014. A meddőséggel összefüggő életminőség jellemzői magyar pároknál. [Characteristics of infertility specific quality of life in Hungarian couples]. Orv. Hetil. 155, 783–788.

Daniluk, J.C., Koert, E., 2013. The other side of the fertility coin: a comparison of childless men's and women's knowledge of fertility and assisted reproductive technology. Fertil. Steril. 99 (3), 839–846.

Daumler, D., Chan, P., Lo, K.C., Takefman, J., Zelkowitz, P., 2016. Men's knowledge of their own fertility: a population-based survey examining the awareness of factors that are associated with male infertility. Hum. Reprod. 31, 2781–2790.

Erdfelder, E., Faul, F., Buchner, A., 1996. GPOWER: a general power analysis program. Behav. Res. Methods, Instrum. Comput. 28 (1), 1–11.

Faramarzi, M., Pasha, H., Esmaelzadeh, S., Jorsarai, G., Aghajani, M.R., Abedi, S., 2013. Is coping strategies predictor of anxiety and depression in couple infertile? Health 5, 643–649.

Fisher, J.R., Hammarberg, K., 2012. Psychological and social aspects of infertility in men: an overview of the evidence and implications for psychologically informed clinical care and future research. Asian J. Androl. 14 (1), 121–129.

Greil, A.L., Slauson-Blevins, K., McQuillan, J., 2010. The experience of infertility: a review of recent literature. Sociol. Health Illness 32, 140–162.

Hakim, L.Z., Newton, C.R., MacLean-Brine, D., Feyles, V., 2012. Evaluation of preparatory psychosocial counselling for medically assisted reproduction. Hum. Reprod. 27, 2058–2066.

Hammarberg, K., Baker, H.W., Fisher, J.R., 2010. Men's experiences of infertility and infertility treatment 5 years after diagnosis male factor infertility: retrospective cohort study. Hum. Reprod. 25, 2815–2820.

IBM Corp, 2016. IBM SPSS Statistics for Windows, Version 24.0. IBM Corp. (Released 2016), Armonk, NY.

Jamil, S., Shoaib, M., Aziz, W., Ather, M.H., 2019. Does male factor infertility impact on self-esteem and sexual relationship? Andrologia.

Jungwirth, A., Diemer, T., Dohle, G.R., Kopa, Z., Krausz, C., Tournaye, H., 2017. Guidelines on Male Infertility. European Association of Urology European Urology [Online]. Retrieved from. https://uroweb.org/guideline/male-infertility/.

Marci, R., Graziano, A., Piva, I., 2012. Procreative sex in infertile couples: the decay of pleasure? Health Qual. Life Outcome 10, 140.

Martins, M.V., Basto-Pereira, M., Pedro, J., Peterson, B., Almeida, V., Schmidt, L., Costa, M.E., 2016. Male psychological adaptation to unsuccessful medically assisted reproduction treatments: a systematic review. Hum. Reprod. Update 22 (4), 466–478.

Menning, B.E., 1980. The emotional needs of infertile couples. Fertil. Steril. 34, 313–319.

Nachtigall, R.D., Becker, G., Wozny, M., 1992. The effects of gender-specific diagnosis on men's and women's response to infertility. Fertil. Steril. 57, 113–121.

Nargund, V.H., 2015. Effects of psychological stress on male fertility. Nat. Rev. Urol. 12, 373–382.

Nikoloudakis, I.A., Vandelanotte, C., Rebar, A.L., Schoeppe, S., Alley, S., Duncan, M.J., Short, C.E., 2018. Examining the correlates of online health information–seeking behavior among men compared with women. Am. J. Men's Health 12 (5), 1358–1367.

Peterson, B., Boivin, J., Norré, J., Smith, C., Thorn, P., Wischmann, T., 2012. An introduction to infertility counseling: a guide for mental health and medical professionals. J. Assist. Reprod. Genet. 29 (3), 243–248.

Peterson, B.D., Newton, C.R., Rosen, K.H., Skaggs, G.E., 2006. Gender differences in how men and women who are referred for IVF cope with infertility stress. Hum. Reprod. 21, 2443–2449.

Peterson, B.D., Pirritano, M., Christensen, U., Boivin, J., Block, J., Schmidt, L., 2009. The longitudinal impact of partner coping in couples following 5 years of unsuccessful fertility treatments. Hum. Reprod. 24 (7), 1656–1664.

Policy Audit on Fertility, 2017. Analysis of 9 EU Countries. Available from. http://PolicyAuditonFertilityAnalysis9EUCountriesFINAL16032017-3.pdf [cited 2020. december 29.].

Rahe, R.H., Tolles, R.L., 2002. The Brief Stress and Coping Inventory: a useful stress management instrument. Int. J. Stress Maneg. 9 (2), 61–70.

Randi, S., Fürbringer, K.J., Schmidt, L., Pinborg, A., 2016. Infertile men's needs and assessment of fertility care. Ups. J. Med. Sci. 21 (4), 276–282.
Rozsa, S., Szadoczky, E., Füredi, J., 2001. A Beck Depresszió Kérdőív rövidített változatának jellemzői hazai mintán [Psychometric properties of the Hungarian version of the Shortened Beck Depression Inventory]. Psychiatr. Hung., [J. Hungar.Psychiatr. Assoc.] 16 (4), 379–397.
Rosenberg, M., 1965. Society and the adolescent self-image. Princeton University Press, Princeton, NJ.
Rozsa, S., Kő, N., Csoboth, Cs., Purebl, Gy., Beöthy-Molnár, A., Szebik, I., Berghammer, R., Rethelyi, J., Skrabski, A., Kopp, M.A., 2005. Rahe-féle stressz és Megküzdés Kérdőívvel szerzett hazai eredmények ismertetése [presenting the results of Rahe's stress and combat questionnaire]. Mentálhigiéné es Pszichoszomatika 6 (4), 275–294.
Schmidt, L., 2003. Patients' attitudes to medical and psychological aspects of care in fertility clinics: findings from the Copenhagen Multi-centre Psychosocial Infertility (COMPI) Research Programme. Hum. Reprod. 18 (3), 628–637.
Sipos, K., Sipos, M., Spielberger, C.D., 1994. A State-Trait Anxiety Inventory (STAI) magyar változata. In: Mérei, F., Szakács, F. (szerk.) (Eds.), Pszichodiagnosztikai vademecum I/2. Nemzeti Tankönyvkiadó, Budapest, pp. 123–148.
Stauder, A., Konkoly-Thege, B., 2006. Az észlelt stressz kérdőív (PSS) magyar verziójának jellemzői [The perceived stress questionnaire (PSS) is Hungarian version's features]. Mentálhigiéné es Pszichoszomatika 7 (3), 203–216.
Stevenson, E.L., Hershberger, P.E., Bergh, P.A., 2016. Evidence-based care for couples with infertility. J. Obstet. Gynecol. Neonatal Nurs. 45, 100–110.
Szatmári, A., Helembai, K., Zádori, J., Dudás, E.I., Fejes, Zs., Drótos, G., Rafael, B., 2020. Adaptive coping strategies in male infertility, paramedical counselling as a way of support. J. Reprod. Infant Psychol.
Swierkowski, B.N., Alter, L., Salama, S., 2016. To be or not to be fertile, that is the question. Basic Clin. Androl. 26, 12–13.
Throsby, K., Gill, R., 2004. It's different for men: masculinity and IVF. Men Masculinities 6, 330–348.
Van den Broeck, U., Emery, M., Wischmann, T., Thorn, P., 2010. Counselling in infertility: individual, couple and group interventions. Patient Educ. Counsel. 81 (3), 422–428.
Verhaak, C.M., Lintsen, A.M., Evers, A.W., Braat, D.D., 2010. Who is at risk of emotional problems and how do you know? Screening of women going for IVF treatment. Hum. Reprod. 25 (5), 1234–1240.
Wdowiak, A., Bien, A., Iwanowicz-Palus, G., Makara-Studzinska, M., Bojar, I., 2017. Impact of emotional disorders on semen quality in men treated for infertility. Neuroendocrinol. Lett. 38 (1), 50–58.
Wenger, L., 2011. M. Beyond ballistics: expanding our conceptualization of men's health-related help seeking. Am. J. Men's Health 5, 488–499.
Wischmann, T., Thorn, P., 2013. (Male) infertility: what does it mean to men? New evidence from quantitative and qualitative studies. Reprod. BioMed. 27 (3), 236–243.