



Research article

Psychoeducational Group Therapy for sexual function and marital satisfaction in Iranian couples with sexual dysfunction disorder



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ABSTRACT

Background: Having sexual relations plays a very important role in the success and scope of procreation. Understanding sexual function can lead to sexual satisfaction and ultimately to marital satisfaction and reconciliation of spouses.

Objective: The aim of this study was to evaluate the effectiveness of a psychoeducational programme on sexual function and marital satisfaction of Iranian couples.

Materials and methods: This is a semi-experimental pre-test and post-test study with control group. The statistical population included all couples diagnosed with sexual dysfunction referred to Bahar Consulting Center in Mashhad in 2019. A total of 40 individuals were randomly assigned to the two treatment conditions which were experimental (n = 20) and control (n = 20) forming two groups. The individuals assigned to experimental condition experienced a 10 session psychoeducational program and the control condition comprised of Treatment As Usual (TAU) which was based on medical and general counseling regime. The data collection tool was marital satisfaction and sexual function questionnaire. Data was analyzed using SPSS version 22 software.

Results: there is a significant difference between the amount of sexual function and marital satisfaction before and after the test in experimental group (p < 0.01). The results of this study showed that Psychoeducational Group Therapy improved the sexual performance and improved marital satisfaction.

Conclusion: Psychoeducational Group Therapy helps to increase marital satisfaction and sexual functioning of married couples. Therefore, this intervention is recommended as an effective program for improving marital satisfaction and sexual performance of couples. It can help to strengthen the foundation of the family.

1. Introduction

Family is one of the key pillars of society. Achieving a healthy society depends on healthy families where all the family members enjoy mental health and descent relationships with each other [1]. The starting point of a family is marriage and an objective followed by entering into marriage is to create healthy marital relationships [2]. Marriage is a desirable event in any culture and more than 90% of the world population's experience it once at least [3]. Studies have described marriage as a norm, a personal life affair, an event in adulthood, and the involvement of two persons with different specifications and needs [4]. In general, people enter into a marriage for different reasons like finding a meaning

in life, love, and a higher level of quality of life. It is notable that continuance of a marriage depends on factors like satisfaction with marital life as a marriage is successful only when the both sides feel satisfaction with being with each other [5, 6] (see Figure 1).

Marital satisfaction refers to the level of affection in specific aspects or all aspects of marital relationship. In fact, it refers to a situation when the couple feels happiness, satisfaction, and love when they are with each other [3]. The concept of marital satisfaction is a multi-dimensional and multi-purpose concept comprised of psychological, social, economic, and spiritual elements [7]. Ellis (1989), cited by Oladi defined marital satisfaction as an objective sense of contentment, satisfaction, and enjoyment in the couple with their mutual relationship [8]. Sadeghi showed in a

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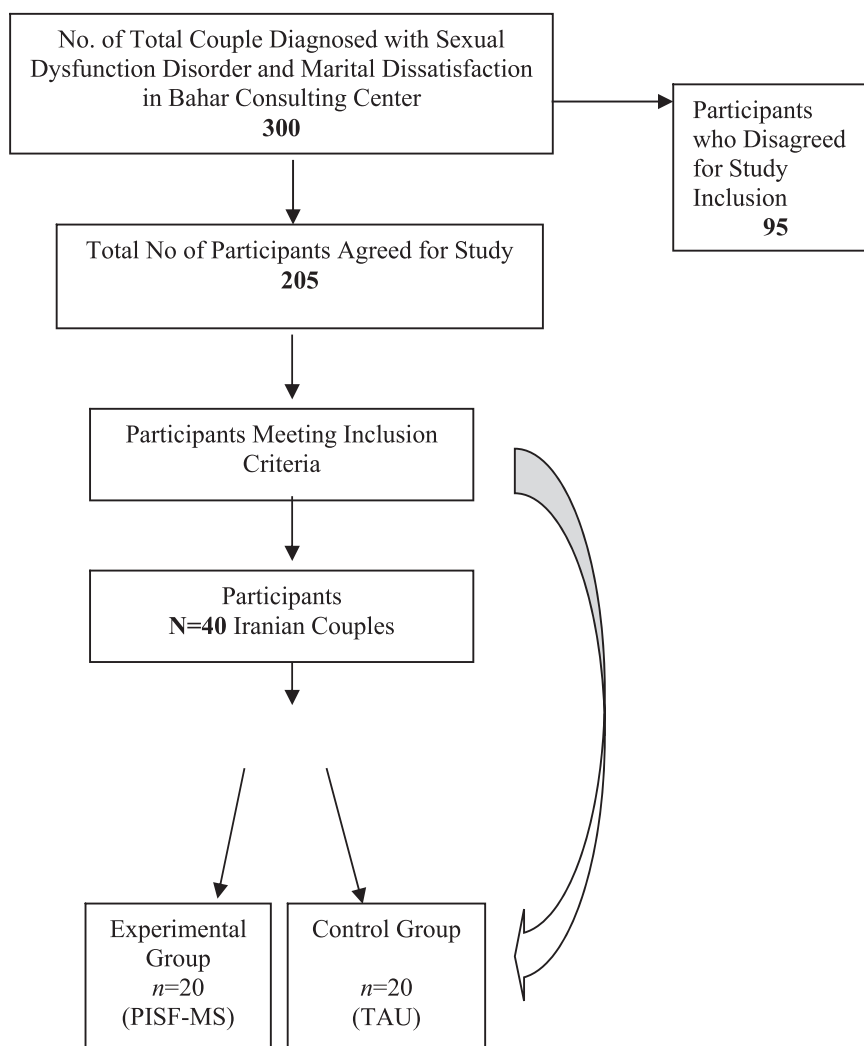


Figure 1. Participants inclusion & random assignment to treatment condition.

study that a successful marriage causes higher satisfaction and joy in individuals and dissatisfaction with marital life negatively affects not only social and mental interactions between the couple but also the growth and development of children raised in the family [9]. Moreover, several studies have shown that marital satisfaction is influenced by many factors including a healthy and joyful sexual function [10].

As recommended by several studies, sexual matters are at a top priority level in marital life and sexual satisfaction can lead to a pleasant and unchallenged marital relationship [11]. In religious societies, marriage is the only recognized system for sexual relationship [12]. Therefore a marriage can be formed based on stable sexual relationships [13]. A proper sexual relationship that leads to satisfaction in the couple is a key element in success and stability of family. Freud, the founder of psychoanalysis theory, takes sexual desire as a natural and physiological desire that forms the bedrock of man's needs [14].

Sexual relationships form a part of the critical perceptions of the couple about each other and these perceptions guarantee continuance of the marriage [15]. Masters and Johnson (1966) were among the pioneers who studied sexual behaviors through or by a systematic approach [16]. Accordingly, the sexual elements of sexual desire are arousal, orgasm, and decline. Rosen et al. (2000) listed six elements for sexual function including 1-sexual desire, 2- sexual arousal, 3-lubrication or moisture, 4-orgasm or climax, 5- sexual satisfaction, and 6- pain [17]. According to Basson, sexual function is a cycle included or compromised of biological and psychological factors –(i.e. internal and external factors) [18].

Nowadays, the role of a proper sexual relationship has been recognised in the quality of life as a critical issue for health care. As recommended by studies, sexual function disorders might have a profound effect on women's quality of life. A decrease in sexual function might have negative effects on self-confidence and interpersonal relationship, which lead to distress. Moreover, there is a significant relationship between sexual function disorder and physical/emotional disorders [19]. Disorder in sexual function creates serious problems in family life and quality of life [20]. According to Mazinani et al. the prevalence of general sexual function disorder was 31%. Moreover, prevalence of hypoactive sexual desire, sexual arousal, orgasmic disorder, and painful intercourse were reported 33%, 16.5%, 25%, and 45.5%, respectively [20]. Berman, Berman and Kanaly showed in their study that sexual function was related to depression and anxiety. on the other hand, not only sexual satisfaction brings vitality and energy into couples' relationship, it also protects them from many disorders and diseases so that there is a significant relationship between sexual satisfaction and satisfaction with marital life [21]. Sex therapy is an approach for treating sexual dysfunction, which was developed by William Marsh and Virginia Johnson during sexual revolution. According to its basic principles, sex therapy was based on the theory that most sexual problems are the results of sexual denial and performance anxiety. Modern sex therapy techniques involve time-limited approaches without accusing the partners. Today sex therapy is considered as a multidimensional technique to understand and treat sexual problems. Today the emphasis is on sexual

pharmacology, relationships, cultural factors, and awareness of complexity of sexual problems [22]. Sex therapists help people struggling sexual problems have an active sexual life. Transformative Approach to Sex Therapy aims to understand the psychological, biological, pharmacological, relational and contextual aspects of sexual problems [23]. The World Health Organization (WHO) introduced sexual health by defining it as a coordination between the mind, feeling, and body that leads man towards personality evolution [24]. Therefore, sex-therapy is needed to improve the knowledge and family health and attenuate issues related to sexual problem at all social levels [25]. Sexual educations support a healthy sexual development and improvement of marital hygiene, interpersonal relationship, affection, body image, and sexual roles. Such educations cover all aspects of gender like biological, cultural, social, psychological, and religious characteristics; they also deal with cognitive, emotional, and behavioral dimensions [26].

Sex-therapy education is a necessity (requisite) for those who started and those who have not started sexual activity. Through such educations the rates of unwanted pregnancy and the risky diseases transmitted through sexual intercourse can be decreased [27]. Vander Zanden proved effectiveness of sex-therapy education in their study [28]. Ebrahimipour et al. argued that sexual education was effective in sexual performance in women [27]. Given the higher rate of dissatisfaction with sex in Iranian society, that the majority of married women and men do not completely enjoy their sexual relationships, and given the paucity of studies on sex-therapy and its effect of sexual function and marital satisfaction and the mutual relationship between these elements in particular, the present study is an attempt to answer if Psychoeducational Group Therapy is effective in sexual function and marital satisfaction?

2. Materials and methods

The study was carried out as a semi-experimental study through pretest-posttest design with a control group. The study population consisted of all couples diagnosed with marital dissatisfaction and sexual dysfunction disorders by psychologists and psychiatrists at the Bahar Consulting Center in Mashhad in 2019. The couples were informed about the research study and were given option to have the Treatment as Usual or to be a part of psychoeducational program for improving sexual function and marital satisfaction. A total number of 300 couples gave their consent to be part of the study. They had no objection for their data to be used for research purpose.

The participating couples ($N = 40$) were selected from the study population based on inclusion criteria. 20 Participation were randomly assigned to the treatment conditions i. e Psychoeducational Intervention for Sexual Function & Marital Satisfaction (experimental group) and Treatment as usual (control group). grouped into control ($n = 20$) and experiment ($n = 20$) groups by chance. Inclusion criteria for the present study comprised of consent to participate, reading/writing literacy, no history of any other psychological disorder, no physical disease, and a clinical diagnosis for marital dissatisfaction and sexual dysfunction disorder. The participants were already diagnosed couples by psychologists or psychiatrists at the psychological clinics in Mashhad. Their score was low on assessment in the domains of sexual relation in marital satisfaction scale. The participant age range was between 20-35 years. Exclusion criterion was reluctance to participate in the study, no literacy, age above or below 20–35 years. Data gathering method included studying published papers, library review, searching the Internet, Enrich's Marital Satisfaction Questionnaire (EMSQ), and Sexual Functional Questionnaire (SFQ). The program was run in group therapy form. There were no drop outs from control group and experimental group.

2.1. Enrich Marital Satisfaction Questionnaire (EMSQ)

The questionnaire was introduced by Olson 1989 to determine functional areas and strengths in marital relationships [29]. The questionnaire is also used for consultations and improvement of marital

relationships. The tool consists 47 statements designed based on Likert's five-point scale (completely agree, agree, no idea, disagree, and completely disagree). The maximum possible score is 100 and the higher the score the higher the satisfaction with marital life. Scores below 30 indicate severe dissatisfaction, score range 30–40 indicates dissatisfaction, score range 40–60 indicates relative satisfaction of the couple, score range 60–70 indicates high satisfaction, and scores above 70 indicate extreme satisfaction [30]. According to Keramat et al. (2014), reliability of the tool based on Cronbach's alpha was equal to 0.91 and Vakili [31] supported the validity of tool based on content validity and that reliability of the tool based on Cronbach's alpha was 0.93.

2.2. Sexual function questionnaire (SFQ)

The questionnaire was designed by Quirk et al. (2002) with 38 (Yes/No) self-statement questions [32]. The test measures sexual function of the respondent in different sexual fields like desire, arousal, and orgasm. The 7 domains of SFQ are consisting of 26 items. These 7 domains included: desire (Q1–4, 13, 26; score range 5–31), arousal sensation (Q7–10; score range 4–20), arousal lubrication.

(Q11–12; score range 2–10), orgasm (Q22–24; score range 3–15), enjoyment (Q6, 14, 18, 19, 21, 25; score range 6–30), pain (Q15, 16, 20; score range 2–15), and partner relationship (Q28, 29; score range 2–10). Some questions are designed for male respondents and some are designed for women. There are 22 common questions, 12 questions for men and 4 questions for women. Moreover, there are six question on sexual desire, four on arousal, and seventeen on erection, ejaculation, and orgasm. The difference between mean score plus 1 and standard deviation gave the cut-off point of sexual function disorder [20].

Validity and reliability of the tool were supported by Khademi et al. (2006) for Iranian population [33]. Mohammadi et al. [34] reported that the reliability of scale and the subscales of the tool using Cronbach's alpha ($\alpha = 0.70$), which indicated good reliability of the tool. For the present study only composite scores were used for analyses.

2.3. Study procedure

After securing a permission from the director of Mashhad-based consultation clinics (State Welfare Organization) and creating an effective relationship with the couples, 40 couples (men and women) were selected among all the couples diagnosed with marital dissatisfaction and sexual function disorder (diagnosed by the resident psychologist or psychiatrist). Participation was voluntarily and the participants filled an informed letter of consent. Afterwards, the participants were grouped randomly into control and experiment groups and all filled out the questionnaires (EMSQ and FSFI) (pretest). Then, the experiment group received 10 group sex-skills education sessions (90 min), twice in week and the control group received no education. Afterwards, the participants filled out the questionnaires once more (post-test). Post-test measure was taken after 1 week of the 10th session when termination of the therapy was carried out. A feedback was taken for therapeutic sessions, what the couples learned from the sessions and how they will apply it or handle similar issues in future life was discussed. Regarding ethical consideration, the control group will receive education after final tests. This educational course is based on Nobreh and Pintogovia (2012); also Dehghani, et al. (2017) program focused on the cognitive approach, learning new information, and correcting previous ones [35]. A summary of the content of educational session is listed in Table 1.

2.4. Ethical concerns

All participants were ensured about the confidentiality of their information and that the information will be only used for research purposes. All the ethical concerns about confidentiality, informed consent of the participation, and voluntarily nature of the study were observed. Ethics approval, ref: IMP2354, This trial is registered with number

Table 1. Summary of the educational sessions of Psychoeducational Group Therapy (based on educational program- Dehghani, 2017).

| Sessions | Content |
|------------------|--|
| 1 st | Orientation, Conceptualization and briefing about program and therapeutic sessions |
| 2 nd | Discussing common beliefs about sexual matters and cultural/religious attitudes |
| 3 rd | Anatomy and physiology of sexual behavior based on Dord Pattern in man and woman |
| 4 th | Introducing interests, preferences, and sexual differences in men and woman and accepting the evident and semi-evident differences |
| 5 th | Relaxation, fantasizing and regular desensitization |
| 6 th | Emotional concentration 1 |
| 7 th | Emotional concentration 2 and giving feedback to each other |
| 8 th | Kegel practices |
| 9 th | Masturbation practices, introduction to the benefits of sexual relationship for physical and mental health |
| 10 th | Orientation to sexual dysfunction disorders and the causes |

(ISRCTN25998554) in International Clinical Trials Registry Platform (ICTRP).

2.5. Data analyses

The research data was analyzed using descriptive statistics (Mean and SD) and inferential statistics (multivariate covariance) in SPSS (V. 22) ($p < 0.05$).

3. Results

A total no. of 40 couples took part in the present study with mean ages of 29.85 ± 3.46 years in the experiment group and 29.88 ± 3.20 years in the control group. Mean terms of marriage in the experiment and control groups were 7.15 ± 1.18 and 6.80 ± 1.4 respectively.

Table 2 lists the descriptive statistics of the control and experiment groups for sexual function, marital satisfaction, and the pertinent element at pretest and posttest stages.

As can be seen in Table 3, the couples in experimental group taking psychoeducation for sexual function and marital satisfaction reported an increase in the sexual functioning in comparison to the couples in the control group who were merely taking treatment as usual based on medical and general counseling regime. Similarly, the couples in the experimental group showed an enhancement in their marital satisfaction in comparison to their counterpart in control group.

To find significant differences between the scores, multivariate covariance analysis was used. To check the presumptions of multivariate covariance analysis Leven's test was used for equal error variance of the two groups. Variance homogeneity tests supported significance of Leven's test for sexual function scores ($f = 1.269$) and marital satisfaction ($f = 0.957$) so that both of them were bigger than 0.05. In addition, homogeneity of regression line slop indicated that requirement and pretest were not significant. To examine normal distribution of the variables, Kolmogorov Smirnov (KS) test was used. As the results showed, normal

Table 2. Descriptive statistics of demographic variables.

| | | Number |
|------------------------------|-------------------|--------|
| Participants characteristics | 20–25 | 11 |
| | 26–30 | 12 |
| | 31–35 | 17 |
| Education | Diploma | 11 |
| | Associate diploma | 8 |
| | Bachelor's | 15 |
| | Master's | 6 |
| Marital period (years) | 1–5 | 9 |
| | 6–10 | 15 |
| | 11–15 | 11 |
| | 16–21 | 5 |

Table 3. Mean and standard deviation of sexual function and marital satisfaction of the groups.

| Variable | group | Test | Mean | SD |
|----------------------|------------|-----------|-------|------|
| Sexual Function | control | pretest | 22.45 | 2.25 |
| | | Post-test | 23.75 | 2.34 |
| | experiment | pretest | 24.54 | 2.38 |
| | | Post-test | 29.37 | 2.47 |
| Marital satisfaction | control | pretest | 18.53 | 2.31 |
| | | Post-test | 17.79 | 2.32 |
| | experiment | pretest | 19.11 | 2.24 |
| | | Post-test | 52.24 | 3.45 |

distribution of sexual function and marital satisfaction were 0.94 and 0.91 respectively (both of them are higher than 0.05). Therefore, the three prerequisites are supported and multivariate covariance analysis can be used in the study. The results of multivariate covariance analysis to compare sexual function and marital satisfaction are listed in Table 4 (see Table 5).

As the results Table 4, indicates there is a significant difference between experimental and control groups, at least in one of the dependent variables. ($p < 0.01$, $F = 11.71$, Wilks Lambda = 0.70). Eta-squared (η^2) indicates that the differences between groups is meaningful according to the dependent variables and the amount of difference based on Wilks Lambda test is 0.29, that means 29 percent of variance dependent to incompatibility between groups is the result of interaction of dependent variables.

According to the results of this table there is a significant difference between the amount of sexual function and marital satisfaction before and after the test in the experimental group ($p < 0.01$). And the amount of sexual function and marital satisfaction in those people who have spent sexual skills courses (sex therapy) is more than those who haven't participate in these courses so education of sexual skills (sex therapy) has a significant effect on sexual function and marital satisfaction of couples.

4. Discussion and conclusion

All the 20 couples in experimental group attended all the 10 sessions of the program. The psychoeducation program was provided with iranian culture in the backdrop (sex skills were recounted to all couples), therefore, it had a good outcome in terms of enhancement of sexual performance and marital satisfaction of all couples. There were no dropouts in experimental group. The participation in the study was 100% and all couples were fully involved in the study, none of the couples leave the study. Participation was 100% and all questionnaires for pre-test and post-test were returned because training sessions were completely free of cost. There were no missing data. There were no drop outs in control group. At the end of the research, training sessions were held for the

Table 4. The results of multivariate analysis of variance test.

| | Type of test | Value | F | DF Hypothesis | DF error | P | η^2 |
|-------|--------------------|-------|---------|---------------|----------|-------|----------|
| Model | Pillai's Trace | 0.99 | 2594.77 | 2.00 | 55.00 | 0.001 | 0.99 |
| | Wilks Lambda | 0.01 | 2594.77 | 2.00 | 55.00 | 0.001 | 0.99 |
| | Hotelling's Trace | 94.35 | 2594.77 | 2.00 | 55.00 | 0.001 | 0.99 |
| | Roy's Largest Root | 94.35 | 2594.77 | 2.00 | 55.00 | 0.001 | 0.99 |
| Group | Pillai's Trace | 0.29 | 11.71 | 2.00 | 55.00 | 0.001 | 0.29 |
| | Wilks Lambda | 0.70 | 11.71 | 2.00 | 55.00 | 0.001 | 0.29 |
| | Hotelling's Trace | 0.42 | 11.71 | 2.00 | 55.00 | 0.001 | 0.29 |
| | Roy's Largest Root | 0.42 | 11.71 | 2.00 | 55.00 | 0.001 | 0.29 |

Table 5. The Results of Analysis of Covariance Test that is the education of Sex Therapy Skills on Sexual Function and Marital Satisfaction.

| Source | Dependent variable | SS | DF | MS | F | P | η^2 |
|-------------------|----------------------|-----------|----|-----------|---------|-------|----------|
| Model | sexual function | 224971.26 | 1 | 224971.26 | 4970.95 | 0.001 | 0.98 |
| | marital satisfaction | 217803.75 | 1 | 217803.75 | 3696.06 | 0.001 | 0.98 |
| Pretest-Post-test | sexual function | 246.66 | 1 | 246.66 | 9.42 | 0.003 | 0.14 |
| | marital satisfaction | 442.81 | 1 | 442.81 | 7.51 | 0.008 | 0.11 |
| Group | sexual function | 1197.06 | 1 | 1197.06 | 26.45 | 0.001 | 0.32 |
| | marital satisfaction | 814.01 | 1 | 814.01 | 14.81 | 0.001 | 0.19 |
| Pretest-Post-test | sexual function | 1008.60 | 1 | 1008.60 | 22.28 | 0.001 | 0.25 |
| | marital satisfaction | 1000.41 | 1 | 1000.41 | 16.99 | 0.001 | 0.23 |

control group to observe ethical considerations, i.e. not to deprive clients from provision of treatment.

The effectiveness of a psychoeducational programme on sexual function and marital satisfaction of Iranian couples was examined. Studies on marital satisfaction have shown that a healthy and satisfactory sexual relationship is a key factor in marital satisfaction. Many authors have argued that sexual relationship is a determinant factor in marital satisfaction. According to the results of this study there is a significant difference between the amount of sexual function and marital satisfaction before and after the test in experimental group ($p < 0.01$). The results of the present study were consistent with Masoomi [15], Rahmani [10], Karimi [36], Tonekaboni [37], Baron and Byrne [38]. Satisfactory marital relations are prerequisite for better family function which result in developing capability, coping ability and resilience in children [39]. According to Sappington, divorce and marital unsatisfactory can induce physical and mental disorders in couples [40]. Sexual Enhancement Group Couples Therapy Approach is effective for enhancing sexual activity of the couples. Problems related to sexual desire or dysfunction may be treated successfully by improving the quality of the erotic connection of the couples and thus, may enhance their marital relationship [41].

Marital dissatisfaction also leads to sexual dissatisfaction and disorders in sexual performance. Sexual function disorder appears with other signs and symptoms like physical pains, depression, and dissatisfaction with marital life thus, it may lead to serious problems between partners and divorce [20]. Sexual function disorder, as a complication, plays a key role in life [42]. At the end divorce is one of the results of sexual and marital dissatisfaction and one of the most stressful events in our life that is related to physical and mental disorders [43].

There are evidences that couples in the modern society encounter several problems in creating affectionate relationships and having their feeling understood by their spouse. Clearly, imperfections in emotional qualities of women along with many other factors influence the marital life in bad ways [1]. Different theories have emphasized on different factors as the causes of marital dissatisfactions and disorders. Behavioral theory for couple-therapy is based on the assumption that all disorders and dissatisfactions in couples' relationships can be explained based on the principles of learning. Cognitive theories are based on the idea that disorders in marital relationships are rooted in wrong beliefs [44].

The essence of sexual incompatibility theory tells us that among all the factors in familial problems and those that lead to a divorce in particular, lack of sexual satisfaction or good sex is the most important of them. When couples are satisfied with their sexual relationships, they can overcome many other problems easily and enjoy a better life. On the other hand, lack of a good sexual experience intensifies trivial problems and makes them serious obstacles. Money, job, religious beliefs, children, and others' influence may not have a strong negative effect on family ties while the couples enjoy a good sexual relationship. whereas or while, without a good sex, none of these factors can guarantee a marital relationship. Theoreticians of marital sexual compatibility argue that seeking pleasure is not limited to a specific age range – i.e. it is beyond age ranges. Sexual and other pleasures are natural needs of human regardless of age. Although these needs are demonstrated in different ways at different stages of life course [45]. Gharshi and Esailizadeh showed that 2.45% of women found that after refusing to have sexual intercourse, their husbands were in bad mood the next day. They showed, by paying more attention to sexual needs of their spouses, women can attenuate tension level in family and vice versa [46, 47]. It has been observed through various studies that lower frequency of sexual intercourse is related with higher level of sexual dysfunction [48]. Similarly, female sexual function is strongly related with male sexual function [49].

Research findings showed sexual function dimensions are predictors of pleasure from intercourse and marital satisfaction. Thus, for accessing satisfactory sexual and relations, two couples need to complete each stage mutually. These stages include sexual desire, arousal, lubrication, orgasm.

Dissatisfaction in marital relationship and sexual function is a prologue to separation and divorce if it is not controlled. However, timely diagnosis and introduction of efficient treatment methods along with proper education of sexual skills to couples prevent many of these problems and leads to a higher quality of life in couples [50].

5. Conclusion

Based on this study results, sex education can results in intimacy and feeling of closeness between couples. Successful sexual relationship and sense of calmness after that can reduce sexual concerns and distress. Based on this study's results, sex education can result in intimacy and a

feeling of closeness between couples. Successful sexual relationships and a sense of calmness after that can reduce sexual distress; therefore, sexual satisfaction will rise.

Therefore, it is essential to find approaches to prevent and treat the problem and this convinced the authors to perform the present study. The authors hope that the findings pave the way for further studies. The results showed that Psychoeducational Group Therapy led to higher marital satisfaction and sexual function in the couples. Therefore, the intervention can be thought of as an effective way to improve marital satisfaction and sexual function in couples. By this, the foundation of family is strengthened as well. Governmental organizations and associated administrations may develop programs for sex education to prevent sexual problems and dysfunctions which lead to marital dissatisfaction and spousal distress. Education for sexual relations may be considered as a strategy for physical, psychological and relational health of couples in specific and people in general.

The present study lack follow-up of the intervention, future studies may be geared to overcome this limitation. To minimize selection bias, ensure random allocation or equivalence of participants in treatment or control group may be carried out by selecting other experimental designs for research. Present study was based on quasi experimental pretest posttest design, where only 1 assessment was taken after complete delivery of the intervention. Repeated measure design may be used to check the effectiveness of the intervention in enhancing sexual function and marital therapy by taking multiple outcome assessments in different point in time during and after the intervention.

It only focused on ruling out the efficacy of the intervention by comparing it to control group with TAU. Future studies may assess the efficacy by comparing various psychological modalities for instance marital therapy may be used as one condition or cognitive behavioral therapy for sexual concerns may also be used as another condition.

The treatment protocol for control group lack standardization, it requires needs to be addressed by future studies so, that findings can be more confirmed.

Declarations

Author contribution statement

M. Tahan, T. Saleem: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

M. Moshtagh, P Fattahi, R Rahimi: Analyzed and interpreted the data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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