

Online TeleHealth of Mind-body Interventions Versus Face-to-Face Counseling and the Health-related Quality of Life in Women with Polycystic Ovary Syndrome: A Randomized Clinical Trial

Maryam Javanbakht (MSc)¹, Tahmineh Farajkhoda (PhD)^{2,3*}, Akram Ghadiri-Anari (MD)⁴, Hassan Zareei Mahmoodabadi (PhD)⁵

¹ MSc Student in Midwifery Counseling, Student Research Committee, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

² Professor, Research Center for Nursing and Midwifery Care, Non-Communicable Diseases Research Institute, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

³ Department of Midwifery, School of Nursing and Midwifery, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

⁴ Associate Professor, Endocrinologist, Diabetes Research Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

⁵ Associate Professor, Family Counseling, Department of Psychology and Educational Sciences, Yazd University, Yazd, Iran

ARTICLE INFO	ABSTRACT
Article type: Original article	Background & aim: Limited studies have been conducted on the effectiveness, applicability, and satisfaction of mind-body interventions as short-term methods that affect body conditions like Polycystic Ovary Syndrome (PCOS). Therefore, this study aimed to compare the efficacy of online mind-body interventions versus face-to-face counseling on the quality of life (QOL) of women with PCOS.
Article History: Received: 21-Mar-2022 Accepted: 10-Dec-2022	Methods: This parallel randomized clinical trial was implemented in Yazd in 2020. Sixty eligible women with PCOS were randomly allocated to the online group (n=30) and face-to-face counseling (n=30) groups. Eight 120-minute sessions of mind-body interventions were held for both groups, either as online or face-to face. Data was collected using the PCOS Health-Related Quality of Life (HRQOL) questionnaire (at baseline, week 8 and 12), counseling satisfaction scale (at week 8 and 12), and FBS (at baseline and week 8) in both groups. Data were analyzed by SPSS (version22) using T-test, and repeated measures ANOVA.
Key words: Counseling Mind-body Therapies Polycystic Ovary Syndrome Quality of life Women	Results: HRQOL was 94.87±11.75 in online and 90.50±9.76 in face-to-face group at baseline, which increased significantly to 108.53±4.5 in the online and face-to-face groups at week 12, with a greater increase in the online group (P<0.001). Satisfaction with counseling increased at week 12 compared to week 8 in both groups, which was not significantly different (P=0.31). FBS decreased at week 8 compared to baseline in both groups without a significant difference (P=0.26).
	Conclusion: The greater effectiveness of online mind-body interventions on HRQOL in women with PCOS highlights their potential value as telehealth interventions.

► Please cite this paper as:

Javanbakht M, Farajkhoda T, Ghadiri-Anari A, Zareei Mahmoodabadi H. Online Tele Health of Mind-body Interventions Versus Face-to-Face Counseling on the Health-related Quality of Life in Polycystic Ovary Syndrome: A Randomized Clinical Trial. Journal of Midwifery and Reproductive Health. 2024; 12(1): 4135-4147. DOI: 10.22038/JMRH.2023.64507.1878

Introduction

Polycystic ovary syndrome (PCOS) with a prevalence of 6-10% is the most common

metabolic and endocrine disorder in women of reproductive age (1-2). According to the Rotterdam criteria, the prevalence of PCOS in Iran is 14.6% (3). In addition to infertility, PCOS

* Corresponding author: Tahmineh Farajkhoda, Professor, Research Center for Nursing and Midwifery Care, Non-Communicable Diseases Research Institute, Shahid Sadoughi University of Medical Sciences, Yazd, Iran. Tel: 00989133533125, Email: farajkhoda_t@yahoo.com

is associated with insulin resistance, hyperinsulinemia, and hyperandrogenism. Also, PCOS affects 2-20% of female population (2). According to the Rotterdam criteria, a clinical diagnosis of PCOS is confirmed when a patient presents with two of the following symptoms: oligomenorrhea or anovulation, hyperandrogenism, and compatible ultrasound evidence (4-5). Hyperandrogenism results in complications such as increased risk of diabetes and endometrial cancer, anovulation, menstrual irregularity and infertility, increased risk of cardiovascular disease, and hypertension. The symptoms associated with hyperandrogenism include obesity, hirsutism, and acne (4-6). Treatment objectives are to prevent metabolic complications, improve the quality of life, achieve an ideal weight, and regulate hormonal disorders.

Health-Related Quality Of Life (HRQOL) is a new multidimensional concept including physical, mental, and social aspects of a disease and its treatment (7). Metabolic and hormonal disorders like diabetes, cancer, infertility, menstrual irregularity, changes in a person's appearance, and common psychological manifestations like depression and anxiety significantly reduce the physical and mental domains of Quality Of Life (QOL) in these patients (8-9). Pharmacotherapy is usually recommended in these patients (10). Non-pharmacological treatment includes diet restrictions, increased physical activity, and counseling methods such as Cognitive-Behavioral Therapy (11).

Mind-body intervention is another counseling method that benefits from the mind's ability to impact the body and its physiological responses (12-14). The purpose of this method is to develop a comprehensive model of health improvement that results in a complete understanding of the relationship between mind and body (15). Mind-body interventions are of interest because of their low physical and emotional risks, relatively low cost, active involvement of patients in the treatment process, and the patient's ability to learn and implement these interventions (11,16). The techniques include mindfulness, problem solving, meditation, hypnosis, relaxation, biofeedback, tai chi, yoga, music therapy,

breathing techniques, and acupuncture (14-15,17-18). Research has shown that the main mechanism of this method is the interaction between the Central Nervous System (CNS) and the autonomic, endocrine, and immune systems and psychological resilience which can affect the health status (11,16,19). Mind-body interventions focus on the relationships between the mind, brain, and body, and their behavior and effect on health and disease, which may be a helpful treatment for psychological stress (11). The efficacy of these interventions is shown to decrease the psychological problems of couples regarding infertility, divorced people, and cancer patients (15). Moreover, mind-body interventions help to reduce blood sugar, hypertension, and lipids in patients with diabetes and cardiovascular disease by reducing the stress response, resulting in decreased secretion of cortisol and adrenalin (20-21).

The Internet has caused significant changes in online counseling and education services (22-23). It has also been used in the treatment of some psychological disorders (24) including panic and anxiety disorder, which is more effective compared to the control group and as effective as face-to-face treatment (25,26). The benefits of online counseling include lower costs, a lack of time and place restrictions, increased learning speed, more attractiveness, safety, acceptance, simplicity, availability, increased motivation, and the ability to update (27). However, it has some disadvantages such as lack of appropriate eye contact during counseling, possibility of the reduced effectiveness of treatment, misunderstanding, and lack of access to the Internet (28). Unfortunately, the psychological method of improving the QOL of women with PCOS has not been incorporated in health education programs (6-7). The effectiveness of online versus face-to-face intervention on women with PCOS has been mentioned in some studies (29-32).

Although the effectiveness of mind-body interventions in some diseases and their mechanisms were discussed earlier, there is limited research regarding the efficacy of these interventions on the quality of life, blood sugar, and satisfaction of women with PCOS by online

counseling compared to face-to-face counseling. Considering the lack of a definitive treatment for PCOS, online or face-to-face counseling interventions could be used to improve the QOL in women with PCOS. The main research question is which of the online and face-to-face mind-body counseling methods has more effectiveness on the quality of life and Fasting Blood Sugar (FBS) and is associated with more satisfaction in women with PCOS. Special physical and psychological support from the healthcare system should be provided for

women with PCOS to manage their disease through lifestyle changes, but it seems this need has not been completely fulfilled (33). The current research was performed with the aim of comparing the efficacy of online mind-body interventions versus face-to-face counseling on the QOL of women with PCOS.

Materials and Methods

This randomized clinical trial with a parallel design was conducted on women with PCOS registered in the computer system of the

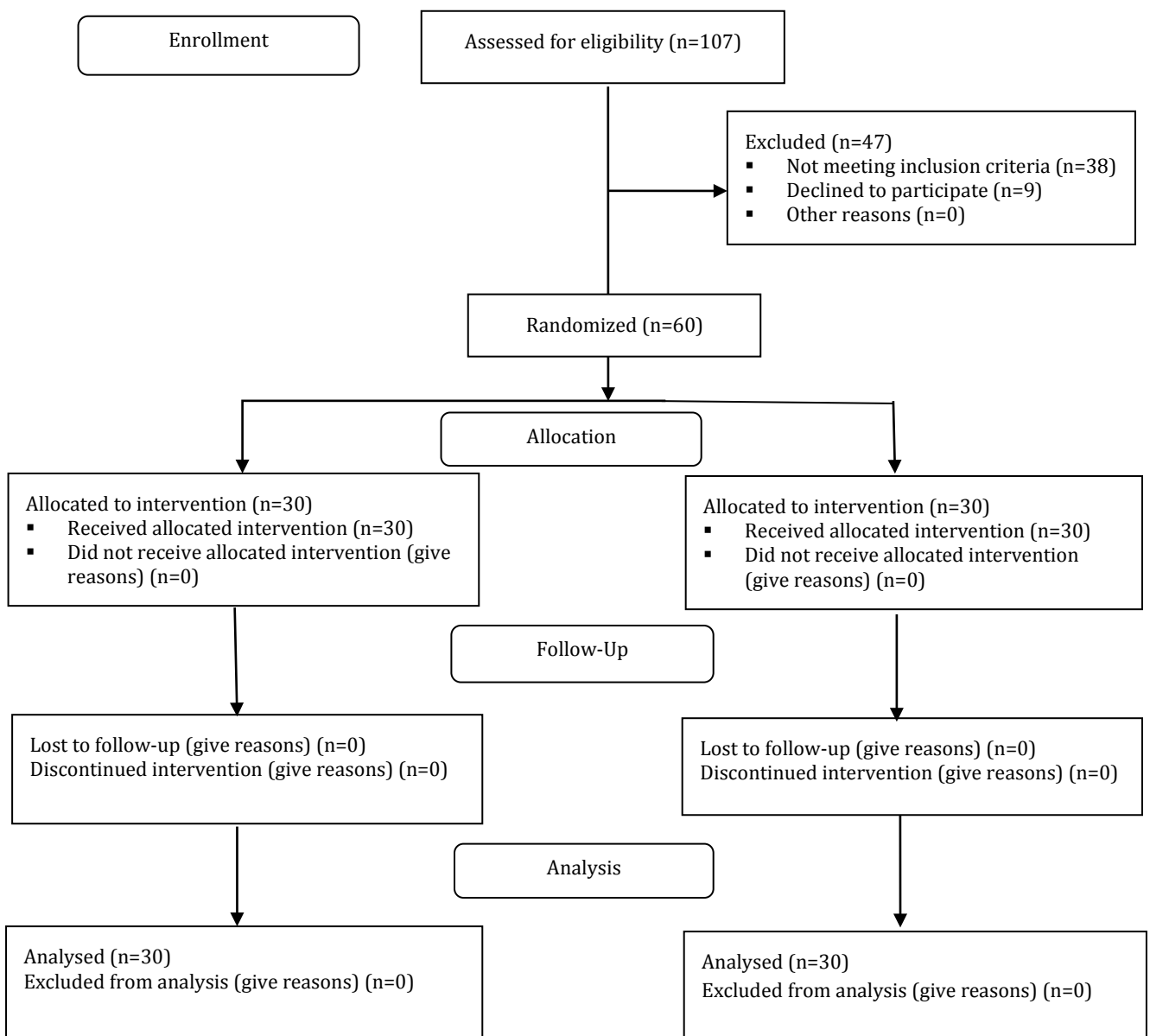


Figure 1. The CONSORT flow diagram of intervention in the two groups

Diabetes Clinic of Shahid Sadoughi University of Medical Sciences, Yazd, Iran in 2020 2020-04-27 from 2020-09-23.

This research was approved by the Research Ethics Committee of IR.SSU.REC.1398.004 and registered in the Iranian Registry of Clinical Trials (IRCT IRCTID: IRCT20190916044783N1 x). According to the study by Jalilian et al. (2018) (34), considering a significance level of 0.05, an intergroup difference of 35% in the QOL score, a standard deviation of 4, a confidence interval of 95%, and a power of 80%, thirty subjects were included in each group.

The inclusion criteria were married women of reproductive age who were Iranian, had Internet literacy, had an Android or iOS cell phone, were diagnosed with PCOS according to the Rotterdam criteria and were treated in the Yazd Diabetes Clinic, were willing to undergo FBS measurement at baseline and after eight weeks, and were willing to participate in the study. The exclusion criteria were pregnancy, participation in another study, history of other chronic mental and physical illnesses, use of other medications (except PCOS treatment drugs), and age less than 15 and more than 50 years old.

Initial the assessment of 107 women for eligibility by convenience method who was called via phone by the third author (an endocrinologist). The sampling was completed and finally, 60 women were selected as participants (47 women were excluded from the study due to the reasons presented in the CONSORT flowchart) (Figure 1). The mentioned clinic is equipped with the necessary facilities for the diagnosis and treatment of PCOS patients, including endocrinology, gynecology, and psychology clinics and laboratories. Sixty women met the inclusion criteria and tended to participate in the study. They were randomly assigned to online (n=30) and face-to-face (control group, n=30) counseling groups by the second author using a random number table generated by a biostatistician. Since the ideal number of patients in a group counseling session is 12-20 subjects, the participants in each group were randomly divided into two subgroups (A and B) even or odd (even: group

A, odd: group B). All women signed the informed consent form to participate in the study.

The research tools included demographic form seven questions) such as age, education level, occupation, history of female infertility due to PCOS, duration of PCOS, weight, and height.

PCOS Health-Related Quality of Life (HRQOL) questionnaire contains 26 questions in five domains including body hair, emotions, weight, infertility, and menstrual problems using a 7-point Likert-type scale from 1 to 7 (Cronbach's alpha: 0.56- 0.96) that was mentioned in the study of Cronin et al. (1998) (25).

Average time length for completeing the questionnaires was 40 minutes. A researcher-made scale was prepared using relevant literature (35-36) to evaluate satisfaction with the counseling method. The scale contained eight questions on a score of 1-10. This scale was validated by 12 related experts. It was completed by women in both groups after the intervention at week 8 and during follow-up at week 12 in order to evaluate satisfaction with the counseling method as a main outcome variable (Cronbach's alpha: 0.87).

FBS was measured in both groups at baseline and week 8 in the Yazd Diabetes Clinic laboratory using the Accu-Check Performa with a precision of 0.02.

Instructions were given to the participants in both groups to complete the questionnaires. The questionnaires were completed three times, including baseline, 8 weeks after the intervention, and during the follow-up at week 12 in person in the face-to-face group or through a WhatsApp channel electronic link in the online group.

The group intervention was performed using similar content one day a week for eight weeks through 120-minute sessions of mind-body counseling (Table 1) for both groups by a midwifery counselor under the supervision of a psychologist. In this study, mind-body interventions included empowerment through relaxation and meditation techniques, emotional and mood regulation skills, imagery and mindfulness, visualization and autogenic training, assertiveness encounter's skills via

psychotherapy, group's supportive role, and enjoyable activities (18,33).

Table 1. Session contents of mind-body intervention

Sessions objects	Content of sessions
Objects, group regulations	<p>The welcome session, familiarity, and creating therapeutic communication. Explanations of PCO's causes, consequences, and treatments. Preparing for an experience of healing in new and different ways Explanation of mind-body components, techniques, mechanism, and effectiveness. Explanation of the patients' duties at home.</p> <p>Reviewing the first session and assessment of patients' improvement.</p>
Empowerment through relaxation and meditation techniques	<p>Changes in the stress response from the "fight or flight" Response to a state of altered consciousness, slowing of breath, and heart rate via relaxation exercises. Training of mind to be more attentive, to focus in a nonanalytical way, trying to avoid rumination via meditation exercises. Explaining the patients' duties at home.</p> <p>Reviewing the second session materials and assessment of patients' improvement.</p>
Emotional and mood regulation skills	<p>Explain the differences between feelings, thoughts, perceptions, and behaviors, and the relationship between them to regulate emotions and mood. Using a transient state of altered consciousness to facilitate behavioral and lifestyle changes and overcoming concerns. Explaining the patients' duties at home.</p> <p>Reviewing the third session materials and assessment of patients' improvement.</p>
Imagery and mindfulness	<p>The formation of images in perception, thought, feeling, memory, and fantasy, all in the absence of sensory stimulants. Being mindful of the present moment without thinking about the past and future. Explaining the patients' duties at home.</p> <p>Reviewing the fourth session materials and assessment of patients' improvement.</p>
Visualization and autogenic training	<p>Activated imagery to influence attitude, behavior, or physiological responses. Even a small amount of intentional imagery of thought activates the brain. Using relaxation and self-hypnosis via a specific, tested sequence of positive wording. Explaining the patients' duties at home.</p> <p>Reviewing the fifth session materials and assessment of patients' improvement.</p>
Assertiveness encounter's skills via psychotherapy	<p>Treatments like simple active listening, and dialogue, using behavioral/emotive approaches to create positive changes in mind and behavior. Assertiveness to encounter unpleasant consequences due to PCOs and acceptance of some of their unchangeable impact. Explaining the patients' duties at home.</p> <p>Reviewing the sixth session materials and assessment of patients' improvement.</p>
The group's supportive role and enjoyable activities	<p>Encouragement group interactions that improve bonding and belonging, being understood, self-expression, learning, stress relief, and longevity. Decreases anxiety and isolation.</p>

Sessions objects	Content of sessions
Self-reevaluation of the healing process	Practice observation of the relationship between mood and enjoyable activities Encouragement doing enjoyable aesthetic activities like painting, writing or bodily exercise that act as an analgesic or relaxant. Doing body movement to improve self-esteem, facilitate attention, express anger, develop a more positive body image and useful for weight lost. Using Yoga to achieve good body postures, control breathing, and reduce stress and stress hormones. Explaining the patients' duties at home. Reviewing the objectives, performances, and barriers. Self-reevaluation of changes in perceptions, thoughts, emotions, and behaviors related to PCOs. Conversation regarding the follow-up period, planning the post-therapy activities, conclusion, and ending.

In the online group, the sessions started with an explanation regarding body-mind interventions and continued via presenting the relevant multi-media files (movie clips, PowerPoint slideshow, photos) and group chat in Sky room. The women in the online group were requested to ask their questions in the online chat. In the face-to-face group, the contents of the sessions were similar to the online group at Yazd Diabetes Clinic. In both groups, at the beginning of each session, the assignments from the previous session, the degree of improvement, and the changes which the women experienced were evaluated. The counselor evaluated the assignments by presenting a review of the exercises, asking relevant questions, and checking the assignments.

Data were analyzed by SPSS (Statistical Package for the Social Sciences) software. Descriptive statistics were used to determine the percentage, frequency, mean, and standard deviation of the variables. The Kolmogorov-Smirnov test assessed the normality of the obtained data. Since the data of FBS and PCOS QOL had a normal distribution, an independent t-test was used to compare the mean values between the groups and repeated measures ANOVA was used to measure the differences in mean values in each group. Mann-Whitney U test and Wilcoxon test were used for comparison of the data of satisfaction with the counseling method due to the non-normal distribution of counseling. $P < 0.05$ was considered statistically significant.

Results

The data of sixty women were analyzed. No significant difference was observed between the two groups regarding demographic characteristics (Table 2).

According to the independent t-test, the mean score of QOL was 94.87 ± 11.75 and 90.50 ± 9.76 in the online and face-to-face groups at baseline respectively, indicating no significant difference between the two groups ($P = 0.12$). After the intervention at week 8, a significant difference was observed in the mean score of QOL between the online (105.33 ± 4.15) and face-to-face group (97.83 ± 4.93) ($P < 0.001$). At week 12, the mean score of QOL was 108.53 ± 4.5 in the online group and 103.2 ± 6.44 in the face-to-face group ($P < 0.001$).

The mind-body intervention significantly increased the QOL score at week 12 compared to baseline ($P < 0.001$); this increase was larger in the online group versus the face-to-face group. In the inter-group comparison, repeated measures ANOVA showed a significant increase in the quality-of-life score in the online ($P < 0.001$) and face-to-face ($P < 0.001$) groups (Table 3).

Mann-Whitney test indicated an increase in the satisfaction score at week 12 compared to week 8, but the difference was not significant (65.9 ± 2.48 in online group and 64.57 ± 3.2 in face-to-face group at week 8 ($P = 0.53$); 68.26 ± 1.82 and 66.03 ± 2.95 , respectively at week 12 ($P = 0.12$) (Table 4). In general, there was no significant difference in the satisfaction

score between the two groups at 12 weeks compared to week 8 (P=0.31).

According to the Wilcoxon test, the satisfaction score significantly increased at week 12

compared to week 8 in the online group (p=0.02) while the difference was not significant in the control group (P=0.75).

Table 2. Comparison of the frequency distribution of demographic variables in two groups

Variables	Online group (N=30)	Face-to-face group (N=30)	P-Value
Age (year)*	26.77±4.76	27.60±4.84	0.96
Height (CM)**	163.5±4.97	162.83±7.63	0.89
Weight (Kg)**	69.47±11.79	68.47±11.09	0.72
Duration of PCOS **	4.00±3.3	3.77±3.31	0.67
Occupation***			
Housewife	12 (40)	11 (36.66)	0.76
Freelance jobs	8 (26.66)	9 (30)	
Employee	9 (30)	10 (33.33)	
Labor	1 (3.33)	0(0)	
Education level***			
High school	2 (6.66)	2 (6.66)	0.95
Diploma	13 (43.33)	15 (50)	
Bachelor	11 (36.66)	10 (33.33)	
Masters' degree and higher	4 (13.33)	3 (10)	
History of female infertility ***			
Yes	2 (6.66)	2 (6.66)	0.69
No	28 (93.33)	28 (93.33)	

* Independent Samples T Test ** Mann-Whitney U ***Fisher's Exact Test

Table 3. Comparison of QOL between study groups at 8 weeks (end of intervention) and 12 weeks (end of follow-up)

Variable	Online (N=30) Mean±SD	Face-to-face (N=30) Mean±SD	T	P-Value*	P-Value*
Baseline	11.75±94.87	9.76± 90.50	1.56	0.12	
Week 8	4.15±105.33	4.93±97.83	6.36	0.001<	
Follow-up (week12)	4.5±108.53	6.44±103.2	3.71	0.001<	0.001<
F	30.41	30.41			
P-Value**	<0.001	<0.001			

* Independent Samples T-Test ** Repeated Measures

According to the independent t-test, FBS was 87.63±8.19 in the online and 93.10±9.30 in the face-to-face group at baseline (P=0.31), which

reduced to 85.6±8.66 in the online and 88.67±9.46 in the face-to-face group at week 8 indicating no significant difference (P=0.83).

Table 4. Comparison mean score of satisfaction with the counseling method between two study groups at week 8 (end of intervention) and week 12 (follow-up)

Variable	Online (N=30) Mean±SD	Face-to-face (N=30) Mean±SD	F	P-Value*	P-Value*
Week 8	2.48±65.9	3.2±64.57	0.62	0.53	
Follow-up (week 12)	1.82±68.26	2.95±66.3.	1.51	0.12	0.31
F	2.27	0.31			
P-Value**	0.02	0.75			

* Mann-Whitney U ** Wilcoxon

In general, despite FBS reduction at week 8 compared to baseline, the difference between the two groups was not significant (P=0.26). In the intergroup analysis, repeated measures

ANOVA showed a non-significant reduction in FBS at week 8 compared to baseline in the online (P=0.30) and face-to-face groups (P=0.07) (Table 5).

Table 5. Comparison of FBS between study groups at baseline and 8 weeks (end of intervention)

Variable	Online (N=30) Mean±SD	Face-to-face (N=30) Mean±SD	T	P-Value*	P-Value*
Baseline	8.19±87.63	9.30±93.10	2.41	0.31	
Week 8	8.66±85.6	9.46±88.67	1.3	0.83	
T	1.04	1.84			0.26
P-Value**	0.30	0.07			

*Independent Samples T Test **Paired Samples T Test

Discussion

this study aimed to compare the efficacy of online mind-body interventions versus face-to-face counseling on the quality of life (QOL) of women with PCOS. As evidenced by the results of the current study, a comparison of the mean scores of PCOS QOL between baseline, week 8 (after the intervention), and week 12 (follow-up) between the two groups showed a significant difference in the mean score between 8 and 12 weeks with a greater increase in the online versus face-to-face group. Ansari et al. (2021) reported that online motivational interview compared with face-to-face routine care is an effective technique to manage stress in women with PCOS (31). Moreover, Wang et al. (2022) showed that the internet-based mobile health application plus to routine care group compared with the control group (who received only face-to-face routine care) caused more positive behavioral changes related to PCOS (32). Liu and colleagues (2022) concluded that an integrated therapeutic method and social media are more effective than standard treatment for PCOS (29). Jiskoot et al. (2020) reported that cognitive behavioral therapy integrated with nutrition tips and exercise with or without Short Message Service (SMS) via mobile phone is more effective than usual care (30). The results of these studies are in line with the current study (29–32). The reasons for the effectiveness of mind-body interventions on the PCOS health-related quality of life in the present study could be the mechanism of these interventions and the larger number of techniques. Quality Of Life considers the thoughts, emotions, behaviors, and concerns

related to the disease besides physical factors. Most of the techniques used in mind-body interventions increase the motivation for treatment and adopting positive and effective methods of coping with disease complications through reducing stress, regulating mood and emotions, replacing ruminations with positive thinking resulting in improved self-efficacy, behavior change, and lifestyle modification, and interactions (11,18-19) that the patient can enjoy a higher quality of life.

Online body-mind counseling is a widely accepted method (37) counseling that improves coping changes, enhances self-esteem, self-efficacy, and social support, and helps to solve cancer-related psychological problems (38). Compos et al. (2018) found that Internet-based therapy was effective in treating some phobias and improving the physical and mental conditions of the patients (39). Online education using Telegram is effective in improving women’s self-efficacy to prevent osteoporosis (40). In online counseling, the information is simply transferred via multimedia files and therefore the intervention is more effective compared to face-to-face counseling. Other reasons for the positive effect of online counseling include increased patient cooperation and participation, possibility of learning from electronic resources at the preferred time and place according to the patient’s condition, and more attractiveness due to the use of multimedia like movie clips, audio files, and photos. Online communications apps are one of the most popular messaging apps in Iran. The expected pleasure, social impact, expected benefits, and ease of use have a direct positive impact on the use of technology-

assisted communication (37). Another reason for the positive effects of online counseling is the lack of need for physical presence during counseling. Other advantages of online counseling include ease of information transfer and a new and exciting audiovisual experience that removes real-world barriers to some extent and reduces travel costs. According to the results of the present study, it seems that users who prefer online apps may find face-to-face counseling a little boring. This result was reported in the study of Olthuis et al. (2016) (41) considering the cultural situation of most Iranian women, like other women across the world, the wide acceptance of online counseling services may be due to better interaction with online platforms compared to traditional methods. They examined the effect of Internet Cognitive Behavioral Therapy (CBT) on the treatment of anxiety disorders in adults. Their results showed that Internet CBT had no effects on patients with anxiety resulting from phobias (41), which is inconsistent with the results of the present study. The reason for this difference may be cultural and socioeconomic conditions, level of online education acceptance, education level of participants, techniques used, duration of educational methods, and the participants' experiences with these methods.

According to the results of the present study, a comparison of the FBS between baseline and after 8 weeks (post-intervention) showed a non-significant reduction in both groups. Since none of the previous studies reported the effect of counseling interventions on FBS, no similar studies were found for comparison. A study found that CBT-based intervention had no effects on FBS in diabetic patients while it had positive effects on reducing HbA1C and stress (42). Another study reported that CBT-based intervention reduced FBS and stress and improved the quality of life in diabetic patients (43). Farajkhoda et al. (2020) and Ansari et al. (2021) reported that online intervention is more effective compared with face to face method (31,35). While comparing the results of the previous studies with the present study, it should be noted that the control groups of the above studies received no interventions while the control group in the present study received face-to-face body-mind interventions. It seems

that since FBS reduction due to mind-body counseling was similar in both groups, the difference between the two groups was not significant. Another reason could be FBS measurement after a short-term intervention of eight weeks. If FBS was measured at longer intervals after the intervention, the stress reduction mechanisms of mind-body interventions may demonstrated a greater effect on FBS. Moreover, the use of drugs like metformin in the process of PCOS treatment affects the blood sugar level, but it was not ethical to deprive patients of the required treatment for research purposes.

Also, according to the results of the present study, a comparison of the score of satisfaction with the counseling method between week 8 (post-intervention) and week 12 (follow-up) showed a non-significant difference in the satisfaction score between the two groups despite a high satisfaction with the counseling method in each group. This finding was not consistent with the results of the studies conducted by Ruffinengo et al (2009) (44) and Ghalibaf et al (2015) (45). In the study of Ruffinengo and colleagues (2009), the content of the intervention was not similar in the two groups (44). Ghalibaf et al. (2015) also performed an intervention on one group without any control group (45). Methodological differences explain the dissimilarity of the results in the two mentioned studies with the present study. The reason for the lack of significant difference in the satisfaction score between the two groups in the present study could be similar mind-body interventions, similar counselors, similar homework assignments, and similar counseling time in both groups.

Although mind-body interventions have been mentioned in previous studies, their cultural applicability and acceptability through online group counseling in Iranian women showed that some cultural issues like fear of violation of privacy rights in virtual space did not act as barriers in online group counseling. Therefore, this type of online intervention could be used in the treatment of similar diseases in women. Additionally, the content of intervention sessions, assessment of satisfaction with the intervention method, and FBS measurement are

considered as the strengths of this study. Since masking the kind of intervention was impossible in this study, blindness was not performed. This condition was considered as the study limitation. Considering noticeable prevalent of PCOs (5-10 percent) worldwide and its related health consequence, appropriate counseling interventions are necessary for promotion of their quality of life (46,47). The study suggests these results may integrate in clinical treatment/care protocols and guidelines of women affected by PCOs. In addition, couple mind-body interventions is recommended for further research.

Conclusion

Mind-body interventions increased the PCOS Quality Of Life in both online and face-to-face counseling groups while the online method was more effective. Since there is no definitive treatment for PCOS and the necessity of interventions that are effective on the quality of life, online mind-body interventions, which were associated with a high level of satisfaction, could help women with PCOS as an online telehealth method.

Acknowledgements

The authors wish to thank the Vice Chancellery for Research and Technology of Shahid Sadoughi University of Medical Sciences for grant no. 5864. The authors also extend their gratitude to all participants.

Conflicts of interest

The authors declared no conflicts of interest.

References

1. Jeanes YM, Reeves S, Gibson EL, Piggott C, May VA, Hart KH. Binge eating behaviours and food cravings in women with Polycystic Ovary Syndrome. *Appetite*. 2017; 109(1): 24–32.
2. Cooney LG, Dokras A. Depression and Anxiety in Polycystic Ovary Syndrome: Etiology and Treatment. *Curr Psychiatry Reports*. 2017; 19(11): 1–10. Available at: <https://link.springer.com/article/10.1007/s11920-017-0834-2>. Accessed October 9, 2021.
3. Mehrabadi S, Jahanian Sadatmahalleh S, Kazemnejad A. Association of Depression and Anxiety with Cognitive Function in Patients with Polycystic Ovary Syndrome. *Journal of Mazandaran University of Medical Sciences*. 2017; 27(147): 159–170. Available at: <http://jmums.mazums.ac.ir/article-1-9821-en.html>. Accessed October 9, 2021.
4. Berek JS. *Berek & Novak's Gynecology*. 16th ed. USA, Philadelphia. Lippincott Williams & Wilkins; 2019.
5. Jiskoot G, Benneheij SH, Beerthuisen A, Niet JE de, Klerk C de, Timman R, et al. A three-component cognitive behavioural lifestyle program for preconceptional weight-loss in women with polycystic ovary syndrome (PCOS): a protocol for a randomized controlled trial. *Reproductive Health*. 2017; 14(1): 1–12. Available at: <https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-017-0295-4>. Accessed October 9, 2021.
6. Raja-Khan N, Agito K, Shah J, Stetter CM, Gustafson TS, Socolow H, et al. Mindfulness-based stress reduction for overweight/obese women with and without polycystic ovary syndrome: Design and methods of a pilot randomized controlled trial. *Contemp Clin Trials*. 2015; 41: 287–297.
7. Santos LER, Costa A dos S, Costa EC, Damasceno VO, Chen Z, Oliveira IA de, et al. Effects of Self-Selected Passive Recovery Time in Interval Exercise on Perceptual and Heart Rate Responses in Older Women: A Promissory Approach. *Journal of Aging and Physical Activity*. 2022; 30(3): 434–444. Available at: <https://journals.human-kinetics.com/view/journals/japa/aop/article-10.1123-japa.2021-0086/article-10.1123-japa.2021-0086.xml>. Accessed October 9, 2021.
8. Williams S, Sheffield D, Knibb RC. The Polycystic Ovary Syndrome Quality of Life scale (PCOSQOL): Development and preliminary validation. *Health Psychol Open*. 2018; 5(2): 1–8.
9. Alemi S, Malihialzackerini S, Abolmaali Alhoseini K, Khabiri M. Comparison of the Effectiveness of Mindfulness Training and Massage-Aromatherapy on Rising Psychological Health of Elderly Women with Chronic Pain. *Iranian Journal of Health Education and Health Promotion*. 2019; 7(4): 359–370.
10. Tsikouras P, Spyros L, Manav B, Zervoudis S, Poiana C, Nikolaos T, et al. Features of Polycystic Ovary Syndrome in adolescence. *The Journal of Medicine and Life*. 2015; 8(3): 291–296. Available at: [/pmc/articles/](http://pmc/articles/)

- PMC4556908/Accessed October 9, 2021.
11. Wahbeh H, Elsas S-M, Oken BS. Mind-body interventions. *Neurology*. 2008; 70(24): 2321-2328. Available at: <https://n.neurology.org/content/70/24/2321>.
 12. Beddoe AE, Lee KA. Mind-Body Interventions During Pregnancy. *Journal of Obstetric, Gynecologic & Neonatal*. 2008; 37(2): 165-175.
 13. Deckro GR, Ballinger KM, Hoyt M, Wilcher M, Dusek J, Myers P, et al. The Evaluation of a Mind/Body Intervention to Reduce Psychological Distress and Perceived Stress in College Students. *Journal of American College Health*. 2002; 50(6): 281-287. Available at: <https://www.tandfonline.com/doi/abs/10.1080/07448480209603446>. Accessed May 15, 2023.
 14. Pike AJ. Body-mindfulness in physiotherapy for the management of long-term chronic pain. *Physical Therapy Reviews*. 2013; 13(1): 45-56. Available at: <https://www.tandfonline.com/doi/abs/10.1179/174328808X251957>. Accessed October 9, 2021.
 15. Ng SM, Yau JK, Chan CL, Chan CH, Ho DY. The measurement of body-mind-spirit well-being toward multidimensionality and transcultural applicability. *Social Work in Health Care*. 2005; 41(1) :33-52.
 16. Dusek JA, Benson H. Mind-Body Medicine: A Model of the Comparative Clinical Impact of the Acute Stress and Relaxation Responses. *Minnesota Medicine*. 2009; 92(5): 47-50.
 17. Grensman A, Acharya BD, Wändell P, Nilsson GH, Falkenberg T, Sundin Ö, et al. Effect of traditional yoga, mindfulness-based cognitive therapy, and cognitive behavioral therapy, on health related quality of life: a randomized controlled trial on patients on sick leave because of burnout. *Alternative Medicine*. 2018; 18(1): 80. Available at: <https://bmccomplementmedtherapies.biomedcentral.com/articles/10.1186/s12906-018-2141-9>. Accessed October 9, 2021.
 18. Rice BI. Mind-Body Interventions. *Diabetes Spectr*. 2001; 14(4): 213-217. Available at: <https://spectrum.diabetesjournals.org/content/14/4/213>. Accessed October 9, 2021.
 19. Love MF, Sharrief A, Chaoul A, Savitz S, Beauchamp JES. Mind-Body Interventions, Psychological Stressors, and Quality of Life in Stroke Survivors. *Stroke*. 2019; 50(2): 434-440. Available at: <https://www.ahajournals.org/doi/abs/10.1161/STROKEAHA.118.021150>. Accessed October 9, 2021.
 20. Nidhi R, Padmalatha V, Nagarathna R, Ram A. Effect of a yoga program on glucose metabolism and blood lipid levels in adolescent girls with polycystic ovary syndrome. *International Journal of Gynecology & Obstetrics*. 2012; 118(1): 37-41.
 21. Mehrabani HH, Salehpour S, Amiri Z, Farahani SJ, Meyer BJ, Tahbaz F. Beneficial Effects of a High-Protein, Low-Glycemic-Load Hypocaloric Diet in Overweight and Obese Women with Polycystic Ovary Syndrome: A Randomized Controlled Intervention Study. *The Journal of the American College of Nutrition*. 2013; 31(2): 117-125. Available at: <https://www.tandfonline.com/doi/abs/10.1080/07315724.2012.10720017>. Accessed October 9, 2021.
 22. Aggarwal R, Hueniken K, Eng L, Kassirian S, Geist I, Balaratnam K, et al. Health-related social media use and preferences of adolescent and young adult cancer patients for virtual programming. *Support Care Cancer*. 2020; 28(10): 4789-4801. Available at: <https://link.springer.com/article/10.1007/s00520-019-05265-3>. Accessed October 9, 2021.
 23. Williams L, Martinasek M, Carone K, Sanders S. High School Students' Perceptions of Traditional and Online Health and Physical Education Courses. *Journal of School Health*. 2020; 90(3): 234-244. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1111/josh.12865>. Accessed October 9, 2021.
 24. Berg M, Malmquist A, Rozental A, Topooco N, Andersson G. Knowledge gain and usage of knowledge learned during internet-based CBT treatment for adolescent depression - a qualitative study. *BMC Psychiatry*. 2020; 20: 441; 1-11. Available at: <https://bmcp psychiatry.biomedcentral.com/articles/10.1186/s12888-020-02833-4>. Accessed October 9, 2021.
 25. Cronin L, Guyatt G, Griffith L, Wong E, Azziz R, Futterweit W, et al. Development of a Health-Related Quality-of-Life Questionnaire (PCOSQ) for Women with Polycystic Ovary Syndrome (PCOS). *The Journal of Clinical Endocrinology & Metabolism*. 1998; 83(6): 1976-1987. Available at: <https://academic.oup.com/jcem/article/83/6/1976/2865351>. Accessed October 9, 2021.

26. Reger MA, Gahm GA. A meta-analysis of the effects of internet- and computer-based cognitive-behavioral treatments for anxiety. *The Journal of Clinical Psychology*. 2009; 65(1): 53-75. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1002/jclp.20536>. Accessed October 9, 2021.
27. Salarfard M, Moradi M. Health Literacy and Adherence to Dietary Regimen among Women with Gestational Diabetes under Nutrition Therapy. *Evidence Based Care Journal*. 2021; 10(4): 32-39. Available at: https://ebcj.mums.ac.ir/article_17936.html. Accessed October 9, 2021.
28. Bastemur S, Bastemur E. Technology Based Counseling: Perspectives of Turkish Counselors. *Procedia - Social and Behavioral Sciences*. 2015; 176: 431-438.
29. Liu R, Li M, Wang P, Yu M, Wang Z, Zhang GZ. Preventive online and offline health management intervention in polycystic ovary syndrome. *World Journal of Clinical Cases*. 2022; 10(10): 3060-3068. Available at: <https://pmc/articles/PMC9082701/>. Accessed July 4, 2022.
30. Jiskoot G, Timman R, Beerthuis A, Dietz de Loos A, Busschbach J, Laven J. Weight Reduction Through a Cognitive Behavioral Therapy Lifestyle Intervention in PCOS: The Primary Outcome of a Randomized Controlled Trial. *Obesity*. 2020; 28(11): 2134-2141. Available at: <https://onlinelibrary.wiley.com/doi/full/10.1002/oby.22980>. Accessed July 4, 2022.
31. Ansari F, Hamzehgardeshi Z, Elyasi F, Moosazadeh M, Ahmadi I. The effect of online motivational interviewing on stress management in infertile women with PCOS: A randomized clinical trial. *European Psychiatry*. 2021; 64(Suppl 1): S761- S761.
32. Wang L, Liu Y, Tan H, Huang S. Transtheoretical model-based mobile health application for PCOS. *Reproductive Health*. 2022; 19(1): 1-10. Available at: <https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-022-01422-w>. Accessed July 4, 2022.
33. Ying L, Wu LH, Loke AY. The effects of psychosocial interventions on the mental health, pregnancy rates, and marital function of infertile couples undergoing in vitro fertilization: a systematic review. *Journal of Assisted Reproduction and Genetics*. 2016; 33(3): 689-701.
34. Jalilian H, Imani A, Mir H, Javanshir E, Mamene M, Heydari S. The effect of cognitive behavioral counseling on quality of life in women with polycystic ovarian syndrome. *Payesh*. 2018; 17(6): 667-676.
35. Farajkhoda T, Ashrafi F, Bokaie M, Zareei Mahmoodabadi H. Online Compared to Face-to-Face Sexual Intimacy Enhancement Training Program Counseling with Cognitive-Behavioral Approach on Sexual Intimacy in Pregnant Women. *Sex & Marital Therapy*. 2021; 47(5): 446-459. Available at: <https://www.tandfonline.com/doi/abs/10.1080/0092623X.2021.1895388>. Accessed November 13, 2021.
36. Arab M, Tabatabaei SG, Rashidian A, Forushani AR, Zarei E. The Effect of Service Quality on Patient loyalty: a Study of Private Hospitals in Tehran, Iran. *Iran J Public Health*. 2012; 41(9): 71. Available at: <https://pmc/articles/PMC3494218/>. Accessed October 9, 2021.
37. Hoch DB, Watson AJ, Linton DA, Bello HE, Senelly M, Milik MT, et al. Correction: The Feasibility and Impact of Delivering a Mind-Body Intervention in a Virtual World. *PLoS One*. 2017; 12(2): e0172863. Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0172863>. Accessed October 16, 2021.
38. Cleary EH, Stanton AL. Mediators of an internet-based psychosocial intervention for women with breast cancer. *Health Psychology*. 2015; 34(5): 477-485.
39. Campos D, Mira A, Bretón-López J, Castilla D, Botella C, Baños RM, et al. The acceptability of an internet-based exposure treatment for flying phobia with and without therapist guidance: Patients' expectations, satisfaction, treatment preferences, and usability. *Neuropsychiatric Disease and Treatment*. 2018; 14: 879-892.
40. Karimiankakolaki Z, Eslami A, Gerayllo S, Heidari F, Safari Hajataghaie S, Behzadi Goudari S. Effect of Education Using the Virtual Social Networks on Promoting Women's Self-Efficacy in Preventing Osteoporosis. *Journal of Education and Community Health*. 2018; 5(3): 57-62. Available at: <http://jech.umsha.ac.ir/article-1-520-en.html>.
41. Olthuis J V, Watt MC, Bailey K, Hayden JA, Stewart SH. Therapist-supported Internet cognitive behavioural therapy for anxiety disorders in adults. *Cochrane Database of Systematic Reviews*. 2016; 3(3): CD011565.
42. Madjidzadeh R, Hakimjavadi M, Gholamali

- Lavasani M. The Reduction of Anxiety and Blood Sugar Level with Group Cognitive-Behavior Therapy in Men and Women with Type II Diabetes: An Experimental Study. *Caspian Journal of Neurological Sciences*. 2017; 3(2): 95-105. Available at: <http://cjns.gums.ac.ir/article-1-180-en.html>. Accessed October 16, 2021.
43. Dadras S, Alizadeh S, Tavakkoli Mehr M, Ghavam F. The study of the effect of stress management through behavioral cognitive group therapy on the control of diabetes and the improvement of quality of life and stress in diabetic female patients in Urmia. *The Studies in Medical Sciences*. 2015; 26(8): 704-715. Available at: <http://umj.umsu.ac.ir/article-1-3107-en.html>
44. Ruffinengo C, Versino E, Renga G. Effectiveness of an Informative Video on Reducing Anxiety Levels in Patients Undergoing Elective Coronarography: An RCT. *European Journal of Cardiovascular Nursing*. 2009; 8(1): 57-61. Available at: <https://academic.oup.com/eurjcn/article/8/1/57/5929201>. Accessed October 16, 2021.
45. Kamel Ghalibaf A, Kamel Ghalibaf A, Karimi H, Rastegar Moghadam N, Bahaadinbeigy K. Assessing satisfaction, technology usability, and therapeutic alliance in tele-psychotherapy from patients' and counselor's perspective. *Job Hazard Analysis*. 2015; 18(61): 92-105.
46. Rabiepoor S, Yas A. Quality of Life in Normal and Overweight Women with Polycystic Ovary Syndrome: A CrossSectional Study. *Journal of Midwifery and Reproductive Health*. 2020; 10(3): 3374-3381.
47. Jafari S, Taghian F. Effects of Three-month Aerobic Training on Inflammatory Markers Among Young Females Suffering from Polycystic Ovary Syndrome. *Journal of Midwifery and Reproductive Health*. 2020; 8(2): 2194- 2202.