VIA MEDICA
Journal of Sexual and Mental Health 2024, 22

ISSN 2956–4956, e-ISSN: 2956-5677
DOI: 10.5603/jsmh.87943

Effectiveness of cognitive behavioural therapy in improving the functioning of patients with polycystic ovary syndrome

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Abstract

Introduction: *Polycystic ovary syndrome (PCOS) is an endocrine disorder affecting a significant number of women of reproductive age. The experience of PCOS can negatively affect women's psychosexual health and impair their quality of life in various spheres. Women with PCOS may need expert care not only medically, but also psychologically. According to current guidelines for the treatment of women with PCOS, specialists recommend a multifaceted approach, providing interdisciplinary care. Due to the diversity of phenotypes of the syndrome, it is important to individually tailor both medical and psychological management according to the needs of the individual patient. To improve mental health in women with PCOS, it is recommended to consider behavioural or cognitive-behavioural interventions.*

Material and methods: *A review of the literature in the databases EBSCO, Google Scholar, PubMed, and PsychInfo was carried out in relation to the psychological interventions provided, including cognitive-behavioural approaches targeted at adolescent and adult women with PCOS in terms of their effectiveness in improving psychosexual health.*

Results: *Despite the higher risk of depressive disorders, anxiety and eating disorders, and sexual dysfunction among women with PCOS, there is still little evidence-based research on effective psychological support methods. The results of the analyses conducted so far on the basis of different protocols indicate the probable effectiveness of short-term structured cognitive-behavioural psychotherapy in improving the mental health and health-related quality of life of adolescent and adult women with PCOS. There is a lack of research on the impact of implemented solutions on the sexual health of women with PCOS. Further randomised clinical trials are needed to better understand the mechanism of change and the persistence of the effects achieved over time or to consider the use of new therapeutic approaches and technologies.*

Conclusions: *CBT, either as a monotherapy or as a component of implemented interventions, is an effective method of reducing the symptoms of the disorders experienced and contributes to improving the quality of life of those receiving this form of therapy. Due to its short duration, it may become an interesting and more accessible solution not only for women with PCOS and mental health professionals, but also for the institutions that fund it. The data collected and presented in this article, as well as the protocols for therapeutic management, can be an important guideline for professionals to facilitate their psychotherapeutic work with this group of patients.*

Keywords: cognitive behavioural psychotherapy, polycystic ovary syndrome, mental health, psychosexual health, health-related quality of life

Journal of Sexual and Mental Health 2024; 22: 39–49

Introduction

Polycystic ovary syndrome (PCOS) is one of the more common endocrine disorders, affecting, depending on accepted criteria, between 3 and 26% of adolescent girls and between 4 and 15% of adult women [1, 2]. Different severity and frequency of disorders

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Received: 20.10.2021 Accepted: 1.03.2023 Published 23.09.2024

are observed in women with PCOS; hence, there are several PCOS phenotypes [1, 3] with associated predominant clinical manifestations, i.e. metabolic disorders accompanying abdominal obesity, symptoms of hyperandrogenism, e.g. hirsutism, menstrual bleeding disorders with ovulation disorders or its absence, up to secondary amenorrhoea. The symptoms of PCOS can affect women's psychosexual functioning [4–6] and can significantly reduce health-related quality of life (HRQoL) as measured by standardised self-report questionnaires [7–10]. A significantly higher incidence of depressive disorders, anxiety disorders, and eating disorders [11–13], as well as a more than 30% higher risk of sexual disorders [14–17] included in the ICD-11 and DSM-5 classifications [18, 19] are found in this group of women. Given the discrepancies in diagnosis and clinical practice for women with PCOS in different countries, an international team of researchers has developed evidence-based recommendations for the comprehensive clinical management of PCOS diagnosis and treatment [20]. In terms of psychosexual health in all adolescent girls and women with PCOS, clinicians are advised to routinely diagnose for the aforementioned disorders and, if suspected, consider the use of screening tools and, if necessary, implement psychological therapy [20, 21]. To modify and maintain lifestyle and consequently improve mental health in women with PCOS, it is recommended that comprehensive behavioural or cognitive-behavioural therapy (CBT) interventions be considered [11, 20, 21]. This therapeutic strand, based on empirical research, is also recommended by the National Institute for Health and Clinical Excellence (NICE) and the American Psychological Association (APA) in the work of anxiety disorders, depressive disorders, and eating disorders [22]. The remainder of this article reviews the available research and therapeutic work protocols in the cognitive-behavioural approach in terms of the interventions used and their effectiveness in improving mental health and health-related quality of life in adolescent and adult female patients with PCOS.

Material and methods

Scientific texts available in the EBSCO, Google Scholar, PubMed, and PsychInfo databases were reviewed with regard to the psychological care interventions implemented in women with PCOS and their effectiveness in improving the psychosexual health of these women. The focus was on studies between 2007 and 2022. Data were searched for the phrases "PCOS", "psychological intervention", "psychological treatment", "psychological therapy", "behavioural therapy", and "cognitive-behavioural therapy".

Results

Most of the articles dealt with the impact of PCOS symptoms on women's psychosexual functioning, including accompanying depressive disorders, anxiety disorders, eating disorders, and sexual dysfunctions, often with a consequent reduced quality of life. Few publications have undertaken analyses of applied psychological interventions targeted at this population of women. These have mainly been based on second-wave cognitive behavioural therapy. In the following text, those that, in addition to indications of efficacy, included proposals for protocols for therapeutic work, which were considered relevant to clinical practice, are reviewed.

Rofey et al. [23] in a multidisciplinary team conducted a pilot study among female patients being treated for PCOS at a hospital in Pittsburgh. Following a two-stage recruitment process, 12 adolescent girls (aged 12–18 years) with PCOS, obesity, and a mild depressive episode were eligible to participate. Those suffering from other psychiatric disorders, taking antidepressants, or currently on other therapy were excluded from participation in the study. Study participants and their parents initially completed the Children's Depression Inventory (CDI, CDI-P) and participated in a clinical interview, followed by confirmation of a psychiatric diagnosis using the Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Age Children, Present and Lifetime version (K-SADS-PL). Body weight was monitored by regular weighing, BMI, and quality of life measures in the domains of physical comfort, body esteem, social life and family relationships — Impact of Weight on Quality of Life Questionnaire — Kids (IWQoL-K). Measurements of physical health and sleep were also conducted. Measurements were repeated after 4 and 8 sessions. After positive qualification, the PCOS-modified Primary and Secondary Control Enhancement Training-Physical Illness (PASCET-PI-2) was implemented. It included behavioural activation of adolescent girls, including increasing physical activity and implementing a proper diet, developing coping skills to deal with the disease and associated difficulties (emotional disturbances, disturbed body image) through cognitive restructuring and joint sessions with parents. Weekly meetings with adolescents included patient weigh-ins, 45–60 minutes of individual CBT sessions, 30–45 minutes of manual therapy, and 15–20 minutes of physical activity. Self-observation and the study participants' own work between sessions monitored by professionals who provided feedback and appropriate support were important. After 8 weekly meetings (see Box 1 for protocol) attended by the adolescents and 3 family sessions in a cognitive-behavioural approach,

Box 1. Cognitive behavioural therapy protocol for adolescent girls with PCOS Rofey et al. [23]

Session Weigh-ins; 45–60 min of manualized treatment; 20 min of physical activity

Session 1. Psychoeducation about comorbid depression and physical illness, CBT, and problem-solving approaches; incorporation of lifestyle change determined by adolescent; and difference between dieting and lifestyle change.

Session 2. Constructing physical illness narrative; applying the problem-solving approach to illness coping and lifestyle barriers, assess impact of sleep disturbances; logging food and physical activity; reading food labels; and avoiding food traps.

Session 3. Choosing enjoyable solo activities (physical activity); planning social activities; developing social problem-solving skills; resetting lifestyle goals (nutrition and exercise); avoiding sneak eating; and psychological vs. physiological hunger.

Session 4. Relaxation techniques; choosing 2–3 behaviourally activating events; planning ahead for healthy meals, special occasions, and eating out.

Session 5. Showing positive self; developing talents; body image development; re-assess lifestyle goals; staying motivated; increasing physical activity; everyday lifestyle movement; and decreasing sedentary behaviour.

Session 6. Identifying negative cognitive distortions; review body image diary; review sleep; and developing a health body image and self-esteem.

Session 7. Modifying negative cognitive distortions and attributions regarding health, emotions, and physical self; coping with barriers (teasing, bullying, and moodiness).

Session 8. Practicing positive reframing using thoughts, distracting activities, and social support; review of skills; staying on track; avoiding making lapses turn into relapses; and discussing booster session schedule.

An additional 60-minute session with the patient's family including a discussion between the adolescent and parents about progress and problems, psychoeducation about early signs of depression, affirming the grieving process and making meaning of difficult experiences related to the illness, strengthening relationships in family subsystems and skills learned.

it was found that they significantly reduced their depressive symptoms (CDI: 17, SD = 3 vs. 9.6, SD = 2, $p < 0.01$; $t(11) = 16.8$, $p < 0.01$); there was also a significant decrease in body weight (mean 104 kg, SD = 26 vs. 93 kg, SD = 18; $p < 0.05$; $t(11) = 6.6$, $p < 0.05$), improvement in BMI (39, SD = 9) vs. 35 (SD = 6), $t(11) = 6$, $p < 0.05$), and improvement overall health-related quality of life (77, SD ¼ 20 vs. 82, SD ¼ 27, t(11) ¼ 1, $p < 0.05$). In addition, the researchers noted a statistically significant improvement in selected clinical symptoms associated with PCOS (e.g. regularity of menstruation, less sleep-disordered breathing).

Although the pilot study has some limitations, such as the small sample size and the lack of a control group, given the results obtained by the researchers, the proposal of Rofey et al. [23] seems promising for therapeutic work with obesity and depression in adolescent girls with PCOS. However, further analyses seem warranted, e.g. continuation of the study to confirm the persistence of the effect obtained through therapeutic work or the importance of the influence of other, non-therapeutic factors on the improvement of the patients' functioning.

Correa, Sperry, and Darkes [24], on the other hand, seeking evidence-based psychotherapeutic interventions in this population of women, presented a case study of a 19-year-old woman with a diagnosis of PCOS at the age of 14 years, who had been receiving psychiatric treatment for depressive and anxiety disorders since she was 15 years old and had psychological support. Despite this, her health-related quality of life was significantly impaired due to the eating disorder experienced and persistent depressive and anxiety disorders. After 2 meetings, during which a diagnostic interview was conducted and a conceptualisation of the difficulties was developed, the adolescent was qualified to participate in the study. The therapeutic work carried out for 12 weeks under supervision based on *The PCOS Workbook* by Grassi and Mattei [25], developed on the basis of CBT techniques, resulted in a significant reduction in the patient's anxiety and depression symptoms, a decrease in psychosocial problems, as well as a change in eating habits and associated significant weight loss. On verification of the results obtained 6 months after the end of psychotherapy, the persistence of the improvement in her psychological functioning was confirmed, apart from a recurrence of her eating disorder and weight gain. Nevertheless, the adolescent reported a more accepting attitude towards herself and her body. The details obtained in the questionnaire measures of the study variables are shown in Figure 1 [24].

(a) Beck Depression Inventory-II (BDI-II) and Beck Anxiety Inventory (BAI) scores.
(b) Outcome Questionnaire-45.2 (OQ) scores.
(c) Results obtained from the Eating Disorder Examination-Questionnaire version 6.0 (EDE-Q.)
(d) Weight measurements in pounds.

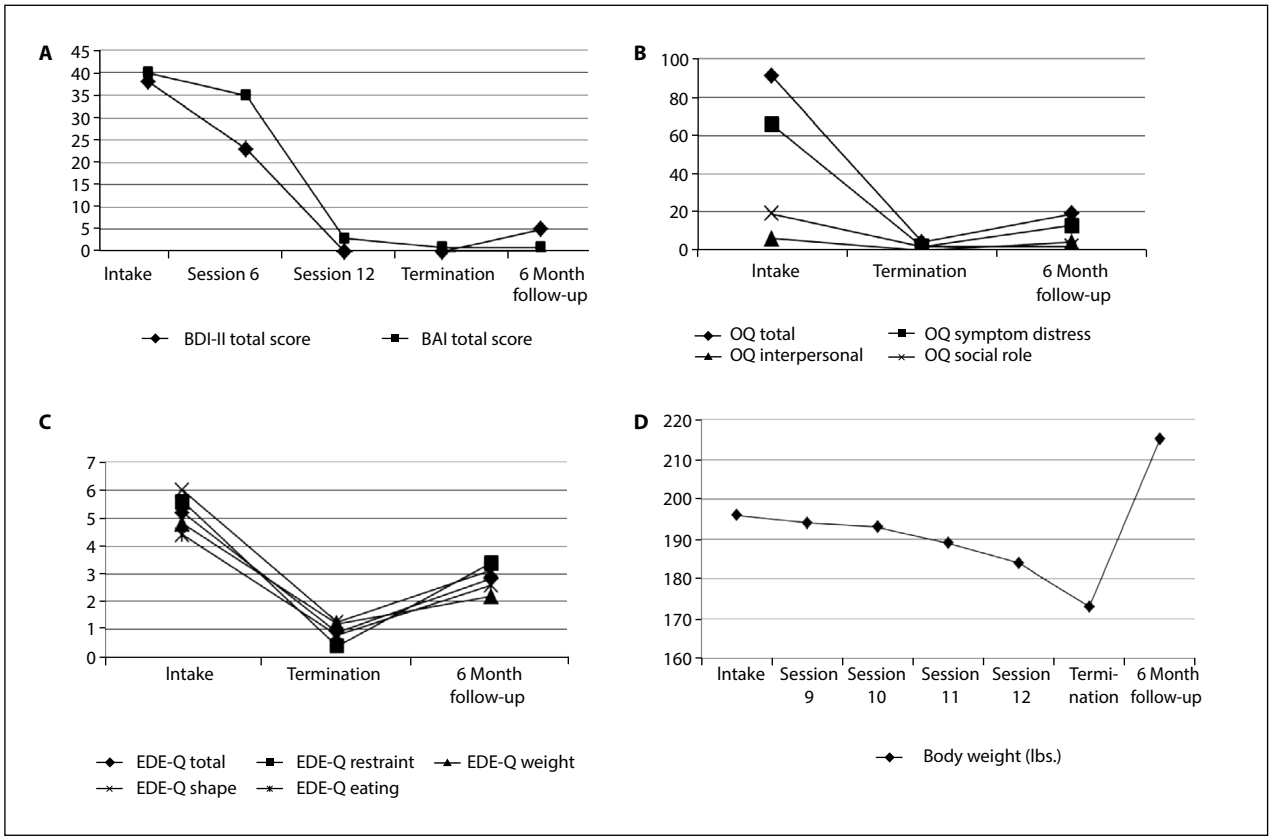

Figure 1. Changes in the severity of depressive and anxiety symptoms (**A**), general psychosocial functioning (**B**), eating disorders (**C**), and body weight (**D**) in the patient obtained during the course of her therapy

The observed effects were achieved by therapeutic work with the following protocol (see Box 2).

The case study presented [24] provides preliminary empirical evidence for the effectiveness of *The PCOS Workbook protocol* by Grassi and Mattei [25] in improving the mental health of adolescent girls with PCOS. Correa, Sperry, and Darkes [24] emphasise the importance of effective communication strategies within the family system in the treatment of PCOS, particularly for young adult women diagnosed with the syndrome. In addition, they note the relevance of deferred maintenance sessions to the long-term effectiveness of ongoing short-term psychotherapeutic interventions, particularly in relation to eating disorders. According to the patient herself, the cognitive restructuring techniques learned in therapy were most helpful in this regard. The case study research strategy carries both advantages and potential limitations. A detailed treatment programme specific to the disorder and replicable is undoubtedly a major asset of the study in question. However, it seems reasonable that the findings made should be verified, as the authors themselves emphasise, in randomised clinical trials. It is worth noting that the inclusion of mindfulness-based interventions in the protocol may also have been conducive to enhancing the achieved effect on the treatment of depressive and anxiety disorders and overeating [26, 27], as may be indicated by the questionnaire measurements carried out in the 12 sessions shown in Figure 1a. It has been demonstrated that the implementation of mindfulness techniques may be beneficial not only as an adjunct to standard medical management in women with PCOS, but also as a separate monotherapy [26]. This hypothesis is supported by the results of a randomised controlled trial by Stefanaki et al. [28], who demonstrated a statistically significant reduction in stress symptoms, depressive and anxiety disorders, and salivary cortisol levels, as well as improved quality of life and life satisfaction in non-psychiatrically treated women with PCOS of childbearing age as a result of implementing an 8-week ***mindfulness-based stress reduction programme*** (MBSR). A possible placebo effect on outcome was excluded [28]. Li et al. [29], meanwhile, in a meta-analysis comparing the effectiveness of the 2 approaches used as monotherapy, found no significant difference between ***mindfulness-based interventions*** (MBIs) and CBT in terms of outcomes for anxiety, depression, and sleep disorders.

Box 2. The cognitive behavioural therapy protocol of Correa, Sperry, and Darkes [24]

Session 1.	Initial intake session — received informed consent for treatment, administered measures, began semi-structured intake interview.	Beck Depression Inventory-II (BDI-II), Beck Anxiety Inventory (BAI), Outcome Questionnaire-45.2 (OQ), Personality Assessment Inventory (PAI)
Session 2.	Second intake session — administered additional measures, concluded semi-structured intake interview, discussed role of self-monitoring in CBT treatment.	Body weight, Eating Disorder Examination Questionnaire (EDE-Q)
Session 3.	Introduced *The PCOS Workbook* to the participant and reviewed chapter 1 of the workbook in session; provided psychoeducation about the nature of PCOS and corresponding physiological and psychological symptoms.	
Session 4.	Introduced the concepts of diet planning and behavioural activation to the participant and reviewed chapters 2 and 3 of *The PCOS Workbook*; discussed insulin resistance in women with PCOS and the importance of proper nutrition and regular physical activity in managing body weight.	
Session 5.	Discussed the process of goal setting while reviewing chapter 4 of *The PCOS Workbook*; contrasted realistic vs. idealistic goals and related this differentiation to the participant's PCOS symptoms.	
Session 6.	Presented methods of stress management to the participant while reviewing chapter 5 of *The PCOS Workbook*; discussed how stress exacerbates PCOS symptoms, what specific triggers cause the participant to feel stress, and what types of coping strategies might be most effective for the participant to manage stress.	BDI-II, BAI
Session 7.	Continued discussion of stress management, taught the participant diaphragmatic breathing techniques and progressive muscle relaxation.	
Session 8.	Family therapy session — the participant reviewed her progress in therapy thus far, discussed her perceptions of previous weight management strategies, and explained why receiving psychological treatment was important for her at this time; her parents provided supportive feedback and engaged in positive discussion about their roles in helping the participant manage her PCOS.	
Session 9.	Reviewed content of family therapy session and ways in which it would benefit participant's progress; introduced chapter 6 of *The PCOS Workbook*, which targets body image dissatisfaction; explored when body dissatisfaction first appeared in the participant's life and what behaviours caused this dissatisfaction to persist.	Body weight
Session 10.	Continued discussion of body image dissatisfaction and completed chapter 6 of *The PCOS Workbook*; identified specific cognitive distortions which maintained participant's low body image, and reviewed ways to challenge these distortions as they appear.	Body weight
Session 11.	Introduced the concepts of eating mindfully and attending to hunger and satiety cues, which correspond to chapters 7 and 8 of *The PCOS Workbook*; conducted an exercise in mindful eating that asked the participant to eat a raisin while attending to its characteristics and to the process of consuming it.	Body weight
Session 12.	Brief discussion of chapter 8 of *The PCOS Workbook*, which presented coping strategies and treatment options for infertility; also reviewed chapter 9 of *The PCOS Workbook*, which described common comorbid health problems in women with PCOS and reinforced the importance of a health-care team to management of the disorder.	BDI-II, BAI, body weight
Session 13.	Termination-administered measures, reviewed the most effective components of therapy for the participant, and developed a relapse prevention plan to help the participant counteract these symptoms if they should reappear; obtained consent for the 6-month follow-up session.	BDI-II, BAI, body weight, OQ, EDE-Q
Session 14.	6-month follow-up-administered measures, reviewed what therapy concepts remained helpful long term and what concepts were no longer useful.	BDI-II, BAI, body weight, OQ, EDE-Q

A pilot randomised clinical trial among adult female patients with PCOS who were struggling with overweight or obesity and depression was conducted by Cooney et al. [30]. Their aim was to validate the effectiveness of cognitive behavioural therapy and lifestyle change compared to lifestyle change alone on variables such as body weight, depressive and anxiety disorder symptoms, and stress response in this population of women. Study participants were able to attend 8 weekly 30-minute cognitive-behavioural therapy sessions (n = 7) or, in the control group without therapy, 8 meetings with members of the research team and 16 weekly lifestyle change counselling (LS arm) meetings. The counselling included weekly 30-minute meetings with a trained counsellor on healthy eating, exercise, and coping strategies. Patients in the group participating in CBT were provided with therapy sessions with a clinical psychologist trained in this stream. CBT sessions included behavioural activation, cognitive restructuring of automatic thoughts and cognitive distortions, and self-work between sessions guided by *The Brief Cognitive Therapy Manual* [31].

The study participants had regular anthropometric and laboratory measurements. They were weighed weekly, while at the 8th and 16th visits, they had their blood drawn for testing, their blood pressure measured, and their waist and hip circumferences measured. In addition, each completed a battery of standardised instruments (the Centre for Epidemiologic Studies Depression Scale, CES-D; the State-Trait Anxiety Inventory, STAI; the Polycystic Ovary Syndrome Health-Related Quality of Life Questionnaire, PCOSQ; the Mini International Neuropsychiatric Interview, MINI; the Perceived Stress Scale, PSS; the Adverse Childhood Experiences, ACEs; and the Trier Social Stress Test, TSST) before it began. The PCOSQ and PSS were completed again at the 8th and 16th sessions, while the CES-D and STAI were completed at each of the weekly meetings. Experimental stress levels were measured by the TSST at the start of the study and during the 8 sessions, combining this with salivary cortisol levels and heart rate recording before and after the stressor at 6 different time points. On this basis, there were no statistically significant differences in PCOS diagnostic criteria, scores on psychiatric scales, or anthropometric and laboratory measurements between the patient groups studied. At the end of week 16, study participants who attended CBT sessions had lost more weight than those in the control group (–3.2 kg [IQR –7.7 to –2.1 mean percentage loss 4.3%] vs. –1.8 kg [IQR –3.8 to –1.0 mean percentage loss 1.5%]; p = 0.08), and their waist-to-hip circumference ratio had improved. This included that women attending cognitive behavioural therapy sessions were more likely to achieve their weekly exercise goal (59% vs. 38% of sessions), exercised for more minutes per week (Me 102 min vs. 90 min), and were more likely to keep a weekly food diary (83% vs. 66% of sessions). In addition, there was a greater improvement in the PCOSQ for hirsutism (3.7 points [IQR 2.9 to 5.0; n = 7] vs. 1.2 points [IQR 0.9 to 2.7; n = 8]; p = 0.021). In the group of patients attending CBT sessions, there was a clinically significant improvement (R0.5 points) at week 8 in systolic blood pressure values and all PCOSQ domains (3.7 points [IQR 2.9-5.0; n = 7] vs. 1.2 points [IQR 0.9 to 2.7; n = 8]; p = 0.021) except for menstruation. However, this change was no longer significant at week 16. Patients' TSST scores were significantly lower, which was evident in heart rate and cortisol level measurements taken at baseline and week 8 of the study. At the end of week 16, it was reported that depression, which was one of the inclusion criteria for the study, had resolved in about half of the participants (7/15). Thus, despite the small study sample size, mainly due to a 50% dropout rate among women, it should be considered that the authors were very likely to be able to prove the effectiveness of weekly short-term (8 meetings) cognitive behavioural psychotherapy on weight management and quality of life improvement in PCOS patients struggling with overweight/obesity and depression. According to the researchers, a correlation can potentially be assumed between CBT, weight loss, and modulation of the stress response. This hypothesis is certainly an interesting starting point for further analyses on a much larger group of subjects.

A randomised controlled clinical trial in this patient population with a much larger sample was conducted by Abdollahi et al. [32]. It involved 74 women with PCOS aged between 18 and 35 years from Iranian gynaecology clinics. Participants were assigned to groups by block randomisation: 37 participated in 8 weekly CBT group sessions of 45 to 60 minutes, and 37 were included in the control group. The aim of the study was to determine the effectiveness of CBT on quality of life and chronic fatigue syndrome in women with PCOS. Before and after the intervention, patients completed a battery of tests (BDI; PCOSQ; Fatigue Impact Scale, FIS). Before the implementation of the therapeutic interventions, based on the measurements taken, no significant differences were found between groups with regard to sociodemographic variables, mean HRQoL score and its subdomains, and chronic fatigue syndrome. Women with a severe depressive episode (BDI > 29) and in psychiatric treatment were excluded from the study group. During the CBT sessions, psychoeducation about PCOS was provided, relaxation techniques

Box 3. The cognitive-behavioural therapy protocol of Abdollahi et al. [32]

Session 1.	Teaching the anatomy and physiology of the reproductive system, defining the ovaries and the mechanism of their function, defining CBT and repeating the positive statement of self-love and trying for one's own health.
Session 2.	Collecting the previous session's assignments; explaining the factors affecting the ovarian function; and defining polycystic ovary, respiratory technique and time technique.
Session 3.	Collecting the previous session's assignments, explaining how breathing and nutrition affect the health of the ovaries, fighting ineffective nutritional thoughts and providing information about appropriate and inappropriate foods in the PCOS.
Session 4.	Collecting the previous session's assignments, providing information regarding the impact of exercise on the PCOS, explaining the types of exercise and choosing them based on living environment limitations, and practicing some of the exercises.
Session 5.	Collecting the previous session's assignments, teaching relaxation method and stress control based on it, and visualizing the mind.
Session 6.	Collecting the previous session's assignments, explaining how the mind affects the body, explaining depression recognition and practicing meditation.
Session 7.	Collecting the previous session's assignments, explaining how to recognize happiness, and teaching positive self-expression and how to record thoughts in mind.
Session 8.	Monitoring the status of the participants and evaluating their progress through discussions between the participants themselves.

were incorporated, and self-work was done between sessions. The protocol is presented in Box 3.

In the group of women participating in CBT, not only was the mean HRQoL score significantly higher than in the control group (adjusted mean difference = 33.1, 95% CI = 28.5–37.8, $p < 0.001$), but also the mean scores of all its subdomains: hirsutism — 37.0 (26.8) vs. 59.2 (25.2), emotions — 25.8 (17.4) vs. 58.7 (15), weight — 31.3 (23.7) vs. 68.5 (19.4), infertility — 25.8 (24.3) vs. 60.5 (18.4), and irregular periods — 26.6 (17.9) vs. 50.6 (19.3). Regarding chronic fatigue syndrome in the PCOS patients studied, the results were significantly lower in the group with implemented psychotherapeutic intervention than in the control group (adjusted mean difference = 54.8, 95% CI = 24.0 to 65.6, and $p < 0.001$; cognitive function: 23 (10.1) vs. 10.6 (5.8), and physical functioning 23.7 (12.0) vs. 7.9 (5.1), social functioning: 26.9 (11.3) to 10.7 (6.3). Properly conducted and reported randomised controlled clinical trials are considered the gold standard of evidence-based science, providing a reliable source of information regarding the efficacy of the intervention under study. The study analysed appears to meet these criteria. Abdollahi et al. [32] proved the efficacy of cognitive behavioural therapy in a study group of female patients, observing a significant reduction in discomfort resulting from the illness and a significant improvement in their quality of life and, consequently, their health. The persistence of the results obtained over time remains a question mark because it did not include long-term follow-up in this respect. A valuable addition to them would therefore be to measure the persistence of the effect as measured in catamnestic studies [33].

In contrast, Jiskoot et al. [34] in a randomised controlled trial of 155 women with PCOS and a BMI above 25 kg/m^2 planning to become pregnant, demonstrated that a one-year intervention based on a standardised protocol subtracting the implementation of healthy eating principles, physical activity and 20 sessions of group cognitive behavioural therapy by an interdisciplinary team of professionals was more effective than standard care, i.e. weight loss counselling, in improving emotional well-being in the long term. The protocol involved the implementation of interventions in 4 quarterly phases. In phase I (sessions 1–11), during each weekly group meeting (max. 10 participants), a mental health specialist implemented CBT techniques to increase awareness and cognitive restructuring of dysfunctional lifestyle thoughts (regarding eating and physical activity), weight loss, and self-esteem, while a nutritionist and physiotherapist presented principles for implementing healthy eating and regular exercise. As part of their own work between meetings, the women kept self-observation diaries on their diet, physical activity, and emotions felt, which they sent to the mental health professional for review each week. In response, they received feedback providing them with social support and reinforcement of desired behavioural strategies. In the next phase (sessions 12–16), every fortnight, the women were motivated to maintain healthy eating and physical activity as part of reinforcing the behavioural changes developed in phase 1 and proactive coping. In phase 3 (sessions 17–19), on the other hand, during monthly meetings they were taught how to proactively manage relapse and maintain weight loss, as well as set new goals for the next quarter regarding maintaining a healthy lifestyle. They were able to attend 5 individual meetings with each of the specialists as needed. Phase 4, which included the final meeting, involved individual consultations with members of the interdisciplinary team of specialists as required. Outcome measures (family and

reproductive history, physical examination assessing anthropometric and ultrasound features, body weight, psychological well-being: Beck Depression Inventory-II, BDI-II, Rosenberg Self Esteem Scale, RSES; Fear of Negative Appearance Evaluation Scale, FNAES) were conducted regularly every 3 months from the start of the study. Additional feedback could be provided at 9 months via SMS. The implemented intervention resulted in a significant improvement (Cohen's d = –0.34; p = 0.045) in depression and self-esteem (Cohen's d = 0.48; p = 0.027) and a statistically insignificant improvement in body image (Cohen's d = –0.37; p = 0.087) compared to the control group. Weight loss only promoted an improvement in self-esteem in female study participants. The improvement in body image may have been a result of conducting CBT in a group format, where group cohesion and social support may have played an important role [34, 35], as mentioned by the study participants. CBT was most likely effective in improving mood disorders in the women studied [21, 22, 24, 33], which also seems to be confirmed by the results of the meta-analysis of Jiskoot et al. (Cohen's d = 1.02, 95% confidence interval 0.02–2.02) [36]. The mediating role of androgens, insulin, HOMA-IR, or cortisol between the interactions used and emotional well-being was not confirmed [34].

Key data from the discussed studies are presented in Table 4.

Discussion

The results of studies on the effectiveness of psychological interventions in improving not only the mental but also the physical health of women with PCOS seem promising, although the number of good quality publications on this topic is still insufficient. Available analyses indicate the implementation of protocols based on cognitive-behavioural therapy techniques, often implemented in multidisciplinary teams, with good results in this group of women [23, 24, 34]. The CBT protocols analysed, usually short-term (treatment duration ranged from 8 weeks to one year, involving 8 to 20 meetings lasting 45 minutes to 2.5 hours), sometimes supplemented by medical, dietary, and physiotherapeutic consultations [23, 24, 34], involved individual [23, 24, 30] or group [32, 34] therapeutic work with both adolescent and adult women with PCOS. Most of the protocols used were based on techniques of the so-called second wave of cognitive-behavioural therapy, i.e. psychoeducation, cognitive restructuring, learning to solve problems, behavioural activation (e.g. by increasing physical activity and implementing a proper diet), and relaxation techniques. The women's own work between sessions and their regular self-observation was important. In the case of adolescent girls, sessions with parents were also held. Cognitive restructuring of negative beliefs, self-work between sessions, psychoeducation on healthy lifestyles, and behavioural modification through behavioural activation were indicated as the most effective techniques. As a result of the interventions carried out in this population of women, a reduction in the severity of symptoms of depressive disorders [23, 24, 30, 32, 34], anxiety disorders [24], and eating disorders [23, 24, 30] or an improvement in health-related quality of life [23, 30, 32] through lifestyle changes, and development of coping skills to cope with the disease and its accompanying difficulties have been reported. The studies analysed did not include information on improving women's sexual health. Some of the protocols used were extended, with good results, to include elements of the so-called third wave of CBT approaches, i.e. mindfulness techniques [24]. The single available studies indicate that MBSR [27] and motivational dialogue [37] can probably also be effective as monotherapy in this group of women, although this issue requires further research. No publications were found on therapeutic work in other therapeutic streams in this population of women, which does not preclude it.

The analysed studies differ significantly from each other in many respects. Although all authors verified the effectiveness of cognitive behavioural psychotherapy, they had different methodological assumptions, used different recruitment and qualification procedures for participants, different protocols and methods of their implementation, and different monitoring tools and statistical verification of the obtained data (Tab. 1). This makes it difficult to compare them and to draw far-reaching conclusions. No attempt was always made to answer the question of how the implemented treatment worked, which is the practised standard in cognitive behavioural therapy as an empirically based treatment [33, 38]. At times, this was probably not possible due to the assumptions made and the small groups of people participating in the studies. Information on controlling contextual variables, potential deviations from the accepted protocol, and the persistence of improvement over time was sometimes insufficient. These data may have been relevant to the results obtained and their interpretation. These limitations may become a starting point for further research projects and, consequently, for improving theory and clinical practice.

Further research into the effectiveness of both cognitive behavioural therapy and other therapeutic approaches and forms of psychological support in this group of women seems warranted, as well as not

Table 1. Summary of studies included in the analyses

Authors of the study	Rofey et al. [23]	Correa, Sperry and Darkes [24]	Cooney et al. [30]	Abdollahi et al. [32]	Jiskoot et al. [34]
Type of test	Pilot	Case study	Pilot randomised clinical trials	Randomised clinical trials	Randomised controlled trials (secondary analysis)
Study group	12 adolescent girls (12–18 years) with PCOS, obesity and mild depressive episode	19-year-old diagnosed with PCOS at 14, treated for depression, anxiety and eating disorders since 15	7 out of 15 adult (25–34 years) women with PCOS, overweight or obesity and depression	37 of 74 adult (18–35 years) women with PCOS with depression	155 adult (18–38 years) women with PCOS, overweight or obesity and depression, planning to become pregnant
Protocol used in the study	PASCET-PI-2 [23]	*The PCOS Workbook* by Grassi and Mattei [25]	*The Brief Cognitive Therapy Manual* [31]	Proprietary group therapy protocol [32]	*PCOS lifestyle textbook* [34]
Intervention	8 weekly individual CBT sessions of 45–60 minutes with adolescents, 30–45-minute manual treatment, 15–20 minutes of physical activity, 3 family sessions of 60 minutes conducted with a multidisciplinary team	14 weekly individual sessions according to an established CBT protocol and a family session	8 weekly individual CBT meetings vs. no CBT in the control group + 16 lifestyle change counselling meetings conducted in the interdisciplinary team	8 weekly group sessions of 45−60 minutes according to an accepted CBT protocol	20 group sessions (max 10 people) per year of 2.5 hours including cognitive behavioural therapy combined with the introduction of a healthy diet (90 minutes) and exercise (60 minutes) conducted in a multidisciplinary team + 5 individual meetings of 45 minutes each with each professional
Measurement tools	CDI, CDI-P, K-SADS-PL, IWQoL--K, PSQ, BMI, weight measurements, clinical interview, medical examination	BDI-II, BAI, OQ, PAI, EDE, weight measurements	CES-D, STAI, PCOSQ, MINI, PSS, ACEs, medical research	BDI, PCOSQ, FIS	BDI-II, RSES, FNAES, weight measurements, clinical interview, medical examination
Results obtained	Significantly fewer depressive symptoms (CDI: 17, SD = 3 vs. 9.6, SD = 2, $p < 0.01$); weight loss (104 kg, SD = 26 vs. 93 kg, SD = 18; $p < 0.05$); improved BMI (39, SD = 9 vs. 35, SD = 6, t(11) = 6, $p < 0.05$); overall health-related quality of life (77, SD ¼ 20 vs. 82, SD ¼ 27, t(11) ¼ 1, $p < 0.05$); and selected PCOS-related aspects (e.g. menstrual regularity, sleep breathing)	Significant improvement in the patient's psychological functioning, i.e. less severe symptoms of anxiety disorders, depressive disorders, psychosocial problems, change in eating habits and significant weight loss, sustained 6 months after the end of psychotherapy, in addition to a recurrence of eating disorders and weight gain	After 16 weeks, women participating in CBT sessions reported resolution of depressive symptoms in approx. 50% of study participants; greater weight loss than control group women (3.2 lbs vs 1.8 lbs, $p < 0.08$), improved WHR (0.05 vs. 0.0; $p < 0.049$) and PCOSQ for hirsutism (3.7 vs 1.2 p; $p < 0.049$), total cholesterol (–19 vs. +3 mg/dl; $p < 0.03$)	After 4 weeks in the group of patients participating in CBT sessions, significant improvement in BDI (16.4 vs. 4.5; control group: 13.7 vs. 16.5); after 8 weeks, slight improvement in BMI (before CBT = 27.6 ± 5.9; after CBT 27.3 ± 5.4); reduction in discomfort due to illness and significant improvement in HRQoL were observed	Significant improvement (Cohen's d = –0.34; $p = 0.045$) in relation to depression, self-esteem (Cohen's d = 0.48; $p = 0.027$), statistically non-significant improvement in body image (Cohen's d = –0.37; $p = 0.087$) compared to the control group

only a quantitative but also a qualitative increase in published studies. Recruiting more female participants for research and effectively motivating them to work on change in the long term is one of the challenges facing researchers [30], as is further measurement of the sustainability of the effects obtained through therapeutic work in catamnestic or randomised clinical trials. Conducting more studies in interdisciplinary teams in the future may contribute to better management of bias, as well as broadening the analyses to include the effectiveness of interventions on the sexual health of women with PCOS. The intensive development of new information and communication technologies favours the diffusion of new forms of therapeutic interventions provision. Such solutions favour greater accessibility to psychological support, if only by eliminating logistical barriers. Hence, it is worth taking this fact into account in future studies.

Conclusions

As an empirically based approach, cognitive behavioural therapy (CBT) is a recommended component of the comprehensive clinical management of women with PCOS. The results of studies to date in this group of women indicate that CBT is an effective method of reducing the symptoms of the disorders experienced, as well as contributing to an improvement in the health-related quality of life of those receiving this form of therapy compared to standard forms of treatment and control groups. Due to its short duration, it may therefore become an interesting, as well as more accessible, solution not only for women with PCOS and mental health professionals, but also for the institutions funding it. The data collected and presented in this article, as well as the treatment protocols, can be an important guideline for professionals to facilitate their psychotherapeutic work with this group of patients.

Article information and declarations

Funding

This work was not prepared under a grant or other funding sources.

Conflict of interest

None declared.

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