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An Investigation of Treatments for the Prevention of Metabolic Complications for Women Suffering from Polycystic Ovarian Syndrome: Diet, Exercise, Weight Reduction and Herbal Remedies

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An Investigation of Treatments for the Prevention of Metabolic Complications for Women
Suffering from Polycystic Ovarian Syndrome: Diet, Exercise, Weight Reduction and Herbal

Remedies

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To the love of my life, who pushed me when I needed it and supported me despite the miles separating us. To my family: My Mother who filled my stomach with food and my heart with love. My Father who would sit down and eat with me no matter what time it was.

Abstract

The purpose of this research study is to compare the views of traditional versus alternative treatments available to women with Polycystic Ovarian Syndrome (PCOS) suffering from metabolic complications. Alternative treatments include diet, exercise, herbal remedies, or any combination of the three. Pharmacological interventions for the conditions associated with PCOS such as metformin, used to control glucose levels, and clomiphene, used to treat infertility. Through the literature review, articles show herbs and plant products to have similar mechanisms of actions as the pharmacological interventions, but with less side effects. For example, cinnamon was shown to increase insulin sensitivity and pomegranate juice was shown to reduce ovarian cysts.

According to Levine's nursing theory, the Four Conservation Principles, the manifestation of disease is a unique process, therefore the treatment must be modified to fit the patient's presentation of their disease. The principle of conserving energy and structural integrity focuses on nutrition and exercise. By modifying these two variables, a patient with PCOS may decrease their chances of developing further complications such as diabetes, and may increase their chances at becoming pregnant.

To explore perspective on the issue of using herbal and plant products to treat the conditions associated with PCOS, a pilot study is proposed. For this study, a survey with quantitative and qualitative, open-ended questions will be collected to understand how patients and health care professionals perceive herbal and other plant products as a supplement to pharmacological treatments, or as a primary treatment for symptom management and prevention of complications.

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Holistic Treatments for the Prevention of Metabolic Complications for Women Suffering
from Polycystic Ovary Syndrome: Diet, Exercise, Weight Reduction and Herbal/Plant
Product Medicine

Introduction

Polycystic ovarian syndrome (PCOS) affects about 10-12% of women in reproductive age (Tiwari, Pasrija, & Jain, 2019). PCOS is a cluster of disorders and conditions linked to the multiple cysts and increased of ovarian volume (Esmaeilnezhad, Babajafari, Sohrabi, Eskandari, Amooee, Barati-Boldaji 2019). Conditions such as the hyperandrogenic condition indicate that gonadotrophin is not secreted properly resulting to anovulation, incomplete follicle maturation, multiple cysts, and increased ovarian volume (Esmaeilnezhad, 2019). The exact etiology of PCOS is still unknown; however, genetics and environment may be contributing factors in the development of PCOS (Choi, et. al 2019). One of the important factors of PCOS is the effect on the metabolic and endocrine processes in the body. As a result of these effects, patients with PCOS can develop abdominal obesity, insulin resistance, and changes in androgen levels (Esmaeilnezhad, 2019).

Many other conditions caused by PCOS, including infertility, irregular menses, and androgenic features, can be exacerbated with obesity and insulin resistance (Tiwari, 2018). Every patient with PCOS may have different conditions. Therefore the treatment must be individualized for each patient. The main treatment for PCOS is to combat the modifiable conditions such as insulin resistance and obesity (Tiwari, 2018). A combination of lifestyle modifications and pharmacological interventions are used to reduce visceral fat and insulin resistance (Tiwari, 2018). Lifestyle modifications such as exercise and diet changes are encour-

aged. Pharmacological interventions include metformin for insulin resistance and clomiphene citrate for the anovulation (Choi, 2019). However, medications are limited to patients with PCOS suffering from those specific conditions (Choi, 2019). Alternative medicine may provide a safer and equally effective treatment for those who do not meet the criteria for medication (Choi,2019).

Problem Statement

Since there is no cure for PCOS, treatments are used only to reduce the effects of concurring illness once the patient starts to show symptoms. For example, a woman with PCOS is at a higher risk for developing type II diabetes but will not be treated with metformin until they are officially diagnosed. Additionally, medications may be contraindicated because of the risk of co-morbidities (Arentz, et. al, 2017). The pharmacological interventions can cause unfavorable side effects in the gastrointestinal system, such as nausea, vomiting, and diarrhea (Hajimonfarednejad, Nimrouzi, Heydari, Zarshenas, Rae, Jahromi, 2018). In the journal article, “Combined Lifestyle and Herbal Medicine in Overweight Women with Polycystic Ovary Syndrome (PCOS): A Randomized Controlled Trial”, the researches state that about 99% of women diagnosed with PCOS (648 out of 657) have been unsatisfied with their treatment plan and want alternatives to these drugs (Arentz, 2017).

Alternative treatments may provide a safer and equally effective treatment for women who want to manage their PCOS symptoms without the negative side effects, do not meet the criteria to be on pharmacological treatments, and want little to no drug-drug interactions. Modern day medications have been created from flora. Metformin was deprived from the

herb galena officinalis. There are studies that have shown the effectiveness of using herbal treatments to help alleviate the concurring illness associated with PCOS (Aretzn, 2017).

Collecting and analyzing the data from previous studies will uncover a combination of herbs and alternative treatments to create a treatment plan that can be used as an alternative to pharmacological treatments or be combined with lifestyle changes that may satisfy the patient's needs. The data collected may aid future studies that will provide treatment plans for nurses to educate patients with PCOS about lifestyle modifications and alternative medications in order to reduce their chances of developing detrimental complications related to PCOS.

Purpose Statement

The aim of this paper is to compare the treatments available to women with Polycystic Ovarian Syndrome suffering from metabolic complications. These treatments include diet, exercise, and herbal remedies or any combination of the three.

Research Question

Which combination of diet, exercise, and/or herbal remedies provide the best treatment for preventing metabolic complications in women suffering from polycystic ovarian syndrome?

Theoretical Framework

Registered nurse Myra Estrine Levine created the Four Conservation Principles in 1969. The goal of her model is to promote adaptation and maintain wholeness in a patient. Levine understood that every individual is unique and will have different adaptations to a disease. Nurses impact the four principles of conservation: energy, structural integrity,

personal integrity, and social integrity. Energy refers to helping the patient maintain adequate balance of energy going in and out of the body. Energy comes in the forms of rest, nutrition and exercise. Structural integrity refers to the prevention of harmful agents from entering the body and searching for any signs of infection or disease. Nurses help maintain structural integrity by keeping the environment clean, providing ventilation, and keeping fresh linens. Personal integrity consists of knowing that the patient has their own identity and that their emotions are influenced by their health. Their self-esteem can be negatively impacted by illness. By using therapeutic communication and individualizing their patients' care, nurses help a patient retain their sense of identity. The last conservation principle is social integrity. Social integrity is made up of the patients' social circle of friends and family. Additionally, understanding the patient's position in their community plays a role in maintaining social integrity. Nurses work with the support of the patient to restore their health.

PCOS represents with a wide variety of conditions. Every patient may have different clusters of conditions that present in different states that may not qualify to be on medications. Current treatment is used for patients who already have a condition that qualifies for medications such as diabetes or infertility. However, many patient are disallowed from starting medications or have adverse reactions to medications. Based on Levine's theory, every patient has a unique presentation of a disease and must be treated holistically. Focusing on the first two conservation principles, energy and structural integrity, a few similarities can be drawn. In order to conserve energy, there is a need to focus on nutrition and exercise. By modifying these two, the patient will decrease their chances of developing further complications such as diabetes, and will increase their chances at

becoming pregnant. Conserving structural integrity by doing a similar treatment of exercise and diet, as well as additional medications or herbal supplements a patient will also decrease their chances of becoming ill. Additionally, some patients may be hesitant to start medication but are more willing to try herbal remedies first. Changing the treatment based on the patients beliefs and medical condition may benefit them more than having them take something they do not have faith in. They may be more compliant and willing to follow through the treatment plan.

Nurses spend time knowing more than just the medical condition of the patient; they also learn their patients' personalities. Combining the knowledge of both to find the best treatment plan will benefit the patient greatly. Herbal remedies provide another treatment that a patient may identify with more and stay complying with.

Literature Review

Securing journals for this literature review was conducted on the Dominican University of California library database. Iceberg was used as the main research tool. Journals were from a variety of sites including Wiley Online Library, Science Direct, and Taylor & Francis Online. The search terms used to locate articles included herbs, plant products, exercise, PCOS, metabolic conditions, and weight management. Although there are many herbs and plant products addressed in the literature, only two will be summarized in this literature review because this author found their mechanisms of action to be most compelling; pomegranate and cinnamon.

Exercise and Weight Management

The article, “Randomized controlled trial to study the efficacy of exercise with and without metformin on women with polycystic ovary syndrome” by Nisha Tiwari, showed how well exercise on its own or in combination with oral metformin can change glucose tolerance, anthropometry, and the lab profile of women with PCOS (2018). The study was conducted in New Delhi, India at a district hospital for one year. The sample of 66 women, all diagnosed with PCOS based on the Rotterdam criteria, was divided into two groups. Group A’s treatment included a placebo pill and exercise, while group B’s treatment included metformin and exercise. The results showed an improvement in menstrual cycles lengths, lower mean waist circumference, lower mean waist-hip ratio, and lower body mass index in both groups. Both groups showed no statistically significant differences in acne, acanthoses nigricans, or other biochemical parameters. The study describes the positive impact of exercise on the conditions afflicting the women with PCOS. Despite exercise and metformin being the standard treatment for PCOS, conditions such as acne and acanthoses nigricans still persist. In the research study, “Combined Lifestyle and Herbal Medicine in Overweight Women with Polycystic Ovary Syndrome (PCOS): A Randomized Controlled Trial” by Susan Arentz, the research demonstrates a reduction of depression, anxiety, lower blood pressure, and an overall higher quality of life. This study compared lifestyle changes with an herbal supplement versus lifestyle changes alone. Similar to the study previously mentioned, the group with herbal supplement experienced a lower BMI, waist circumference, and weight. Taking herbal supplements may yield similar results as taking metformin with less side effects (Arentz,201). Women who are trying to become pregnant may benefit from

taking herbal supplements with similar mechanisms of action as a medication with fewer prenatal risks. This may greatly improve their quality of life and chances of becoming pregnant. Both articles showed cases of improvement in BMI, weight, and waist circumference. However, the study with the herbal supplement showed an improvement of not just anthropometry values, but also improvements in mood and overall quality of life. Additionally, those taking the herbal supplement saw less side effects than those who take metformin, suggesting herbal supplements may provide an alternative treatment plan for women with PCOS.

Herbs and Plant Products

In the study, “Effect of symbiotic pomegranate juice on glycemic, sex hormone profile and anthropometric indices in PCOS: A randomized, triple blind, controlled trial” by Zahra Esmaeilinezhad, researchers gave 92 women between the ages of 15-48 diagnosed with PCOS pomegranate juice with different types of microbes for 2 weeks (2018). The antioxidant property of pomegranate juice and the effects of the microbes in the gastrointestinal tract helped improve testosterone, androstenedione, and estrogen levels. Making these levels normal may help to alleviate androgen effects of PCOS. The fertility drugs given to treat PCOS induce negative side effects that cause many women to stop taking the drugs (Esmaeilinezhad, 2018). The article, “The Effect of Pomegranate Juice Extract on Hormonal Changes of Female Wistar Rats Caused by Polycystic Ovarian Syndrome”, by Hossein, shows similar results. In this study, only pomegranate juice was given. The results demonstrated improvements in the free testosterone, estrogen, and androstenedione in the rats given pomegranate juice. (Hossein, 2015). If pomegranate juice can help regulate the

hormone levels that improve fertility without the side effects, it would benefit the women who want to become pregnant.

One of the biggest conditions caused by PCOS is insulin resistance. Researchers are looking into cinnamon as possibly increasing insulin levels. In the study, “Insulin resistance improvement by cinnamon powder in polycystic ovary syndrome: A randomized double-blind placebo controlled clinical trial” by Mahdie Hajimonfarednejad, researchers gave cinnamon capsules to 66 women with PCOS for a period of twelve weeks. The results showed decreased insulin resistance. Similarly, in the literature review, “A review on role of medicinal plants in polycystic ovarian syndrome: Pathophysiology, neuroendocrine signaling, therapeutic status and future prospects”, the researchers showed cinnamon as a possible new manner to increase insulin sensitivity (Abasian, 2018). Cinnamon has to potential to be new way to control insulin levels in women with PCOS with adverse effects to metformin.

Other types of herbs and plant products discovered in this literature review are marjoram, soybeans, palm pollen, ginseng, and coconut flower. According to the study, “The effect of marjoram (*Origanum majorana*) tea on the hormonal profile of women with polycystic ovary syndrome: a randomised controlled pilot study” by H. Haj, marjoram is regularly used by women in the Middle East to alleviate a wide range of conditions (2016). In the study, marjoram was brewed into a tea and given twice daily to 25 patients with PCOS for a month. The results showed improved insulin levels and antiandrogen effects. Marjoram may benefit patients who are pre-diabetic and have some androgen effects suffering from PCOS. These patients may not qualify to be on metformin and may want to try to modify their diets. Soybean is another plant product that has shown promise in helping to alleviate

conditions associated with PCOS. The study, “Soy isoflavones exert beneficial effects on letrozole-induced rat polycystic ovary syndrome (PCOS) model through anti-androgenic mechanism” by Rajan, revealed how soybeans have anti-androgen, phytoestrogen, and antioxidants effects (Rajan, 2016). Through these mechanisms, the test subjects, sprague dawley rats, showed significant weight loss, less testosterone, and less oxidative stress. The phytoestrogen effects on soybeans is beneficial for the fertility conditions that afflict PCOS patients. The rats that were given higher doses of the soybean extract showed better results than the control and the low dose of soybean extract (Rajan, 2016). Date palm pollen has shown to have similar antiandrogen effects. The study, “The Effect of Palm Pollen Extract on Polycystic Ovary Syndrome (POS) in Rats” by Hojatollah Karimi Jashni, demonstrated decreased levels of estrogen and LH, increased levels of progesterone and FSH, and decreased number of cystic follicle (2015). There was also a decrease of cystic follicles and an increase of primary follicles. The regulation of these hormones may play role in alleviating the metabolic conditions associated with PCOS. Another plant product that has shown promise in alleviating conditions associated with PCOS is red ginseng. Ginseng root has been used as a treatment all across Asia. Jong Hee Choi, the researcher of the study, “Korean Red Ginseng alleviates dehydroepiandrosterone-induced polycystic ovarian syndrome in rats via its anti-inflammatory and antioxidant activities”, demonstrated how the anti-inflammatory aspects of ginseng can help reduce the inflammation process of PCOS (Choi, 2019). The results showed decreased follicular cysts. Reducing the number of cysts reduced the serum hormone levels (Choi,2019). In the study, “GC-MS analysis of Cocus nucifera (coconut palm tree) flower extract and its effects on heterogeneous symptoms of

polycystic ovarian disease in female Wistar rats” by V. Soumya, coconut palm tree flower extract is shown to alleviate the elevated lipid levels associated with PCOS (Soumya, 2014). In this study, 18 rats were given Letrozole to cause PCOS. The experimental group was given coconut flower extract. The results for experimental group showed an improvement in lipid profile, steroids, and gonadotrophin. Improving lipid values reduces the risk for cardiovascular complications seen in women with PCOS.

Conclusion

Herbal remedies provide a different type of treatment plan that will help specialize the treatments for patients. If certain plant products and herbs can be combined to create a personalized treatment, then every women with different presenting condition with PCOS can have their own plan. Exercise has shown overall health benefits for women with PCOS, medications can help with the endocrine presentations of the syndrome. However, the side effects may cause the patients to be medically noncompliant. Substituting medications for herbal remedies to alleviate endocrine conditions in women with PCOS may result in a better treatment plan.

Although many of the plant products mentioned have only been tested on rats, more and more women with PCOS are using alternative treatments. Future studies can provide more information on the effects of the products in human. The studies done on human subjects show beneficial prospects on future studies. Combining life style changes and herbal supplements may help patients with PCOS have a unique treatment plan that may have lesser side effects. Learning about the patient’s beliefs on medication can help personalize the treatments plan that will work the best for each patient.

Research Proposal

The purpose of this paper is to investigate the treatments available to women with Polycystic Ovarian Syndrome suffering from metabolic complications. These treatments include diet, exercise, herbal remedies or any combination of the three. The overarching research question for this senior thesis as stated above is, “Which combination of diet, exercise, and/or herbal remedies provide the best treatment for preventing metabolic complications (i.e., development of diabetes, infertility, hyperlipidemia) in women suffering from polycystic ovarian syndrome?” and the specific research question for the pilot study is, “What alternative or naturopathic interventions have you seen to be effective for the treatment of symptoms and the prevention of complications associated with PCOS?” For this pilot study, a survey will be collected to understand how patients and health care professionals perceive herbal/plant product as a supplement to pharmacological treatments or as an individual treatment for symptom management and prevention of complications.

Research Design

After the information was gathered from the literature review, a mix methodology is proposed. The survey will contain yes and no questions, along with satisfaction scale based on the Likert scale to gather quantitative data. Additionally it will contain open-ended questions where qualitative data is gathered.

Research Method

Subjects will be solicited from the nursing department of Dominican University of California and the members of PCOS Awareness Association. The survey will be created on Google Survey and set to collect data anonymously. No email addresses will be collected.

The researcher will be blinded to the respondents. Participants will be instructed not to include any identifying information in the open-ended question. In the unlikely case that a participant's identity is connected to the survey responses, every effort will be made to maintain strict confidentiality.

The survey will start with five demographic questions: age, specialization as nurse or employment type, how do you know about PCOS, and ethnicity. The questions of the survey offer a combination of closed and open-ended free responses that allows the participant to express their thoughts on the usefulness of the therapies they have suggested to others or have used themselves. The full survey is in **Appendix A**.

The procedure is the following:

1. With the Professor receive IRB approval
2. Request permission from the PCOS Awareness Association and Chair of the nursing department at Dominican University of California
4. Create the posts for social media (Facebook, Snapchat, Instagram) to be approved for the IRB
3. Send an electronic copy of the letter of introduction, consent of participation, and the survey to all members of the above groups.
4. Collect the survey over a period of two weeks. If too few participants, a second email will be sent with the same information listed above.
5. With the assistance of the professor the data will be analyzed (descriptive statistics)
6. Summarize the open ended data into pie charts and exemplar statements
7. Write the final honors thesis paper

8. Apply for the presentation at Dominican University of California, Scholarly Create Work Research Conference

The survey was left open for two weeks, however more data was needed so it was left open for an additional week.

The procedure above is the original plan for the research study, however due to the COVID-19 Crisis, the PCOS Awareness Organization and the nursing department at Dominican University of California were not able to participate. Social media was the only manner the survey was sent out to gather a sample size. Since the survey was specific to healthcare providers or to people with PCOS the sample size consisted of five subjects. However, not all the participants finished the survey.

Ethical Considerations

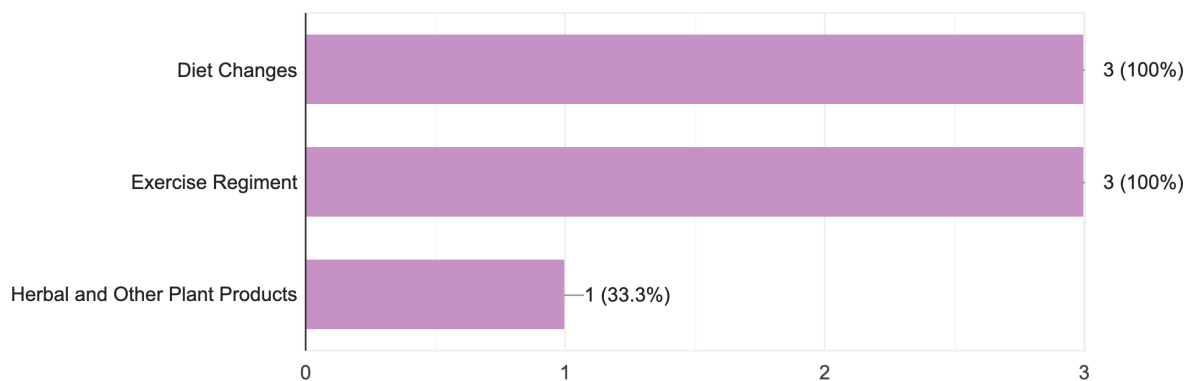
There is a low risk of a participant's identity becoming known. To minimize the risk, the researcher will be blind to who is participating in the study. The researcher will not know who responds by going to the link on social media and will not know who has access to the Facebook page of the PCOS Awareness Association. This will help eliminate the possibility of connecting the information to the participant. Every effort will be made to maintain participants' confidentiality. Only the researcher and research advisor will have access to the raw data.

Quantitative Results

Demographics. The demographic data showed the subjects range from under 30-70 years of age. Majority of them were not diagnosed with PCOS. About half of the subjects heard of PCOS from their family members, while the other half had encounter patients with PCOS. The subjects are different backgrounds such as Hispanic, Asian, Pacific Islander, and White. All the nurses had encountered patients with PCOS. Nurses had experience range from 8-20 years in fields such as home health and medical surgical.

Quantitative Survey Questions. The data shows all the participants believe exercise can influence and possibly alleviate symptoms associated with PCOS. Medications administered by HCP were contraceptives. Those with PCOS took Metformin for blood sugar regulation.

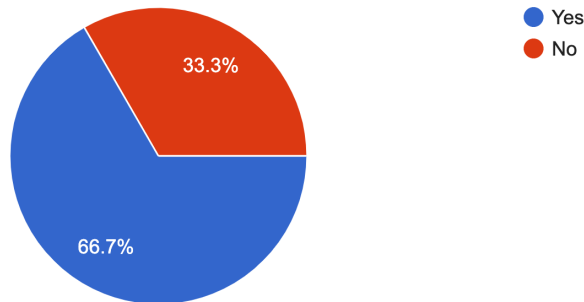
Which alternative methods you have used or suggested?
3 responses



For the types of alternative methods used or suggested by the participants included diet changes, an exercise regiment, or herbal and other plant products. All participants with PCOS tried diet changes and an exercise regiment. While 33.3% tried herbal or other plant products.

If you have not tried or recommended an herbal and/or other plant products to treat conditions related to PCOS, would you be willing to recommend or use these alternative treatments?

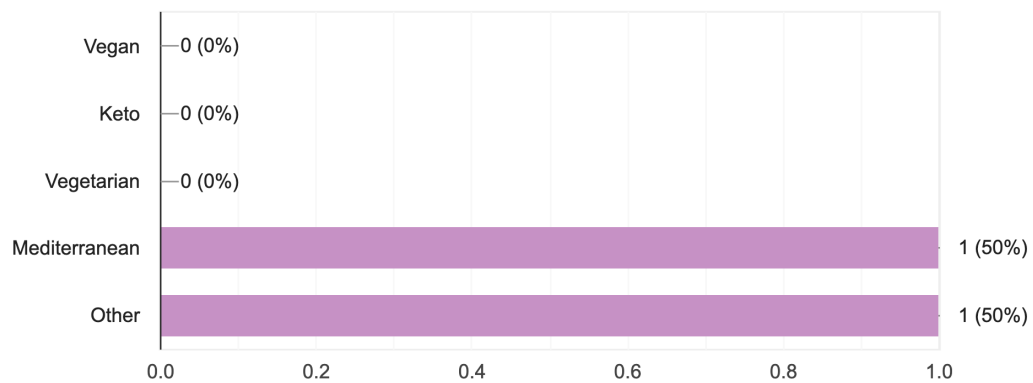
3 responses



66.7% of the subjects who responded would be willing to recommend or use alternative treatments, while 33.3% stated they would not be willing.

Have you suggested to others or have you yourself tried any of the following diets to alleviate symptoms associated with PCOS ?

2 responses

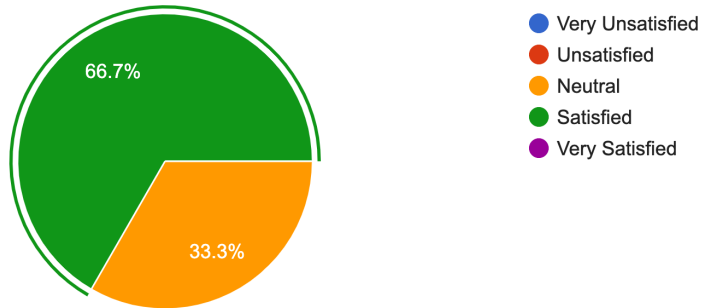


Half the respondents had tried a Mediterranean diet. The other half had tried a diet not listed.

Likert Scale. The following charts are on the satisfaction scale questions based on the Likert Scale.

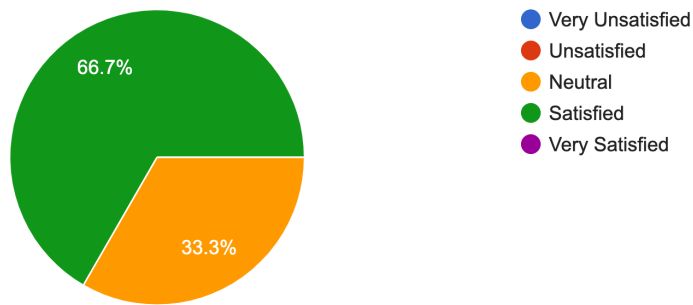
A Single Type Change Charts:

Diet
3 responses



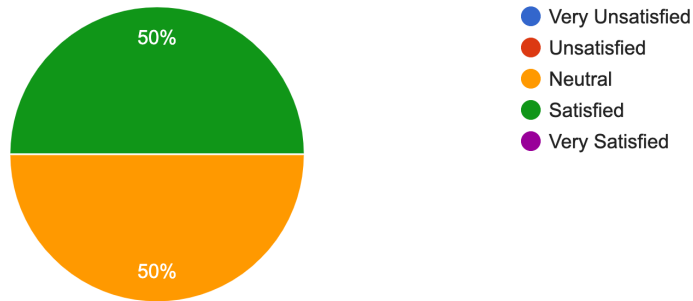
66.7% of respondents were satisfied with the symptom relief brought by diet changes. 33.3% of respondents were neutral.

Exercise
3 responses



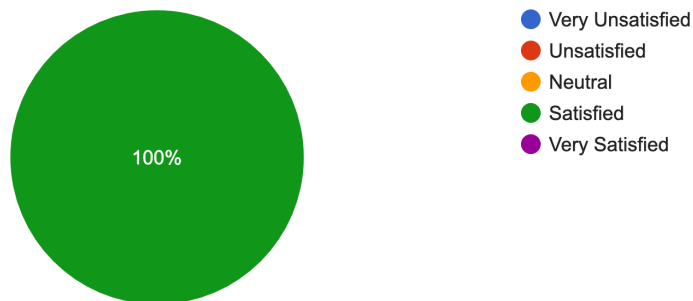
66.7% of respondents were satisfied with the symptom relief brought by exercise changes. 33.3% of respondents were neutral.

Herbal
2 responses



50% of respondents were satisfied with the symptom relief brought by herbal remedies. 50% of the respondents were neutral.

Pharmacological
3 responses

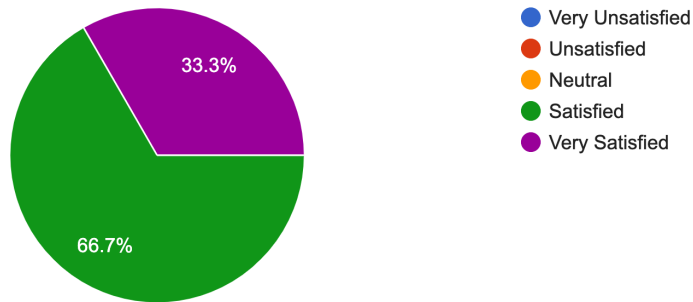


100% of the respondents were satisfied with the symptom relief brought by pharmacological treatment.

Two Types of Changes Charts:

Diet + Exercise

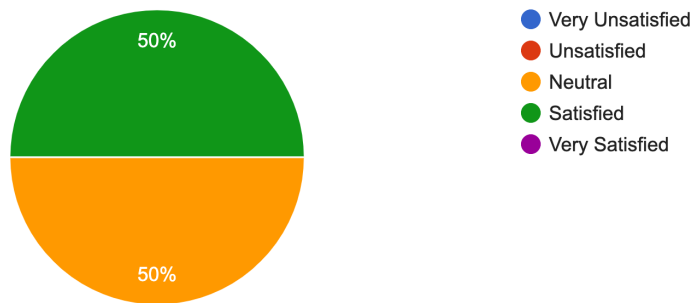
3 responses



66.7% of respondents were satisfied with the symptom relief brought by diet and exercise changes. 33.3% of respondents were very satisfied.

Diet + Herbal

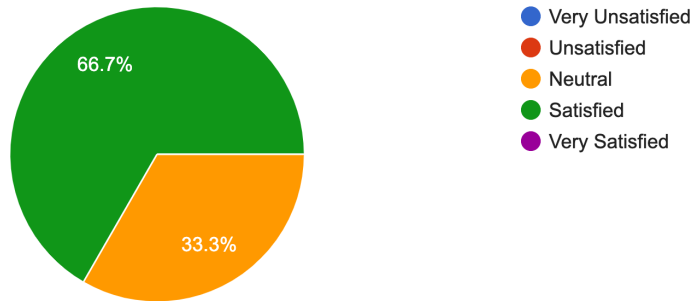
2 responses



50% of respondents were satisfied with the symptom relief brought by diet and herbal remedies. 50% of the respondents were neutral.

Diet + Pharmacological

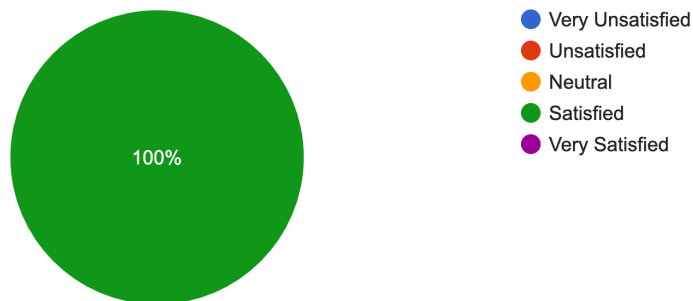
3 responses



66.7% of respondents were satisfied with the symptom relief brought by diet and pharmacological changes. 33.3% of respondents were neutral.

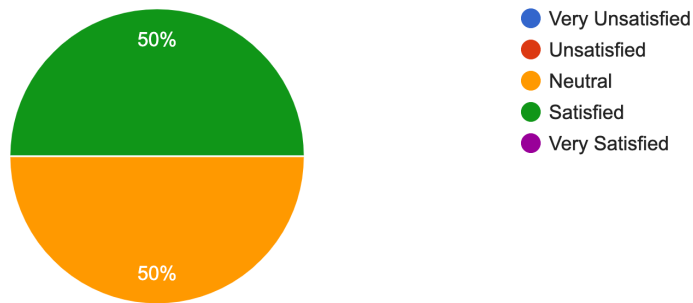
Exercise + Pharmacological

3 responses



100% of the respondents were satisfied with the symptom relief brought by pharmacological and exercise changes.

Exercise + Herbal
2 responses



50% of respondents were satisfied with the symptom relief brought by exercise and herbal remedies. 50% of the respondents were neutral.

Three Types of Changes Charts:

Diet + Exercise + Herbal + Pharmacological
2 responses



50% of respondents were satisfied with the symptom relief brought by diet, exercise, herbal, and pharmacological remedies. 50% of the respondents were neutral.

Qualitative Results

The following are exemplar statements are from the participants any additional thoughts on the usefulness of the therapies they have suggested to others or have used on

themselves. Participants stated they had a difficult time controlling their diet, however once they were able to stay on the changed diet, their symptoms were less severe. A respondent stated they believe herbal remedies may be effective in some cases in conjunction with health care providers recommendation, however they had not made any suggestions for using herbs. Another participant stated a low carbohydrate diet with meditation and yoga could be helpful.

Discussion

Similarities. The pharmacological treatments given by health care providers was contraceptive pills and the treatment used by PCOS participants was metformin. This was the main type of treatment found in the literature review that is used for treating patients with PCOS. The survey results coincided with the literature review findings that stated diet was the most difficult change for patients. Even if they diet change resulted in positive result it was difficult to maintain. Additionally, the satisfaction level of of the combination of lifestyle changes, exercise and diet, was similar to what was found in the literature review. Diet and exercise changes provided the higher level of satisfaction in comparison with any combination that included pharmacological treatment.

Differences. The difference was in the satisfaction level with herbal or plant products. The research found in the literature review showed those who took herbal/ plant products in conjunction with exercise or diet changed had the highest level of satisfaction. If there was a larger sample pool perhaps the results would have been different.

Conclusion

The survey and the literature review showed that diet and exercise changes have the most promise in alleviating symptoms for PCOS. Nurses often learn about the different diets

for disease and PCOS may be no different. Promoting exercise to all patients not just those with PCOS can benefit their health. In the scope of PCOS, exercise can help alleviate the symptoms such as glucose intolerance and fertility.

For future research, narrowing down the different types of exercise or diets that are the most impactful in alleviating symptoms for PCOS is needed.

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Appendix

Appendix A

Polycystic Ovarian Syndrome Treatment Survey

Demographics

1. Are you a registered nurse?

If yes, answers these questions below:

How long have you been a nurse (in years)?

What is your nursing speciality (if any)?

Have you ever cared for a patient with Polycystic Ovarian Syndrome (PCOS)?

Please estimate the average number of patients with PCOS for whom you have cared per year during practice?

2. What is your age? ___ <30 years ___ 31- 40 years ___ 41- 50 years ___ 41- 60 years ___ 61- 70 years ___ >70 years

3. Ethnicity?

4. How did you first learn about PCOS?

5. Have you been diagnosed with PCOS?

Survey Questions

1. What pharmacological medications have you have taken yourself to treat PCOS?

Please explain which the medication was used and the intended purpose

2. What pharmacological medications have you administered, as prescribed to patients with PCOS? _____

3. Which alternative methods you have used or suggested.

Diet Changes ___

Exercise Regiment ___

Herbal and Other Plant Products ___

4. If you have not tried or recommended an herbal and/or other plant products to treat conditions related to PCOS, would you be willing to recommend or use these alternative treatments?

Yes _ No _

5. Have you suggested to others or have you yourself tried any of the following diets to alleviate symptoms associated with PCOS ?

Vegan _

Keto __

Vegetarian_

Mediterranean __

Other (Name) __

6. According to your experience or knowledge, can exercise can influence and possibly alleviate symptoms associated with PCOS?

Yes _ No _

7. If you have used diet, exercise, herbal remedies and/or their combinations to help alleviate symptoms of PCOS, please choose your level of satisfaction with the results - on a scale from very satisfied to very unsatisfied?

Diet _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Exercise _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Herbal _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Pharmacological _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Diet + Exercise _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Diet + Herbal _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Diet + Pharmacological _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Exercise + Pharmacological _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Exercise + Herbal _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Herbal + Pharmacological _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

Diet + Exercise + Herbal + Pharmacological _

Very Unsatisfied _ Unsatisfied_ Neutral_ Satisfied_ Very Satisfied_

8. Please comment with any additional your thoughts on the usefulness of the therapies you have suggested to others or have used yourself.

Appendix B

Author, Yr., Journal, Citation, title	Purpose & Theoretical Framework	Sample & Setting	Design – Methods	Variables & Instruments	Results – Conclusions, Key Findings	Conclusions	Implications	Limitations & Strengths
Effect of synbiotic pomegranate juice on glycemic, sex hormone profile and anthropometric indices in PCOS: A randomized, triple blind, controlled trial	this study aimed to assess the effect of synbiotic pomegranate juice on glycemic indices, sex hormone profile and anthropometric measurements in PCOS patients for the first time.	aged 15–48 years who referred to Motahari Clinic which is a clinic affiliated to Shiraz University of Medical Sciences, 92 patients	randomized controlled parallel, triple-blind trial that conformed to the declaration of Helsinki and Good Clinical Practice Guidelines.	viability of five kinds of bacteria in pomegranate juice were measured over two weeks	Testosterone reduced in SPJ and SB groups significantly in comparison with the baseline Insulin decreased in SPJ and SB groups when compared to the baseline no significant change in LH and FSH in any of the groups	added synbiotic to fruit juice might be a good option to promote health and reduce the risk of metabolic diseases in these women most of fruit juices are rich in sugar, calories and low in fiber. So moderate consumption is recommended.	probiotics supplementation caused significant reduction in weight and BMI of women with PCOS after 12 weeks.	limitations inability to measure fasting plasma glucose level repeatedly and finally, fecal bacteria loads could not be measured before and after probiotic supplementation.

<p>The Effect of Pomegranate Juice Extract on Hormonal Changes of Female Wistar Rats Caused by Polycystic Ovarian Syndrome Kargar Jahromi</p>	<p>effect of pomegranate extract on hormonal changes caused by polycystic ovary syndrome in female Wistar rats.</p>	<p>56 adult rats Estradiol valerate to induce PCOS</p>	<p>experimentally, completely randomized and in vitro condition.</p>	<p>effect of</p>	<p>significant increases in related changes to estrogen, free testosterone, and androstendion (androgen) hormones in PCOS61 and PCOS81 groups compared with control 61 and control 81 groups, respectively feeding with pomegranate seed oil significantly reduces the accumulation of triglycerides and unsaturated fatty acids in rats</p>	<p>consumption of pomegranate extract improves changes of female sex hormones by reducing the concentration of estrogen, free testosterone, and androstendion hormones in patients with PCOS.</p>	<p>consumption of the extract is recommended for reduction of polycystic ovary syndrome complications</p>	<p>limitations only a short term was used longer may show better results</p>
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<p>Korean Red Ginseng alleviates dehydroepiandrosterone-induced polycystic ovarian syndrome in rats via its antiinflammatory and antioxidant activities Jong HeeCho</p>	<p>to determine the preventive and therapeutic potential of KRGE for PCOS using a dehydroepiandrosterone (DHEA)-mediated rat model and examine the role of its antiinflammatory and antioxidant activities in this regard.</p>	<p>Female Sprague Dawley rats</p>	<p>experimental</p>	<p>KRGE contained major ginsenosides</p>	<p>prevented the increase in BW and ovarian weight of rats with PCOS, corresponding to improved PCOS in rats</p>	<p>retreatment of KRGE significantly inhibited the enhancement of the weight of bodies and ovaries, size and number of follicular cysts, and serum levels of testosterone and estradiol following DHEA induction associated with its antiinflammatory effects</p>	<p>effect of</p>	<p>limit remains unknown which components in KRGE exert positive effect on PCOS</p>
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<p>Combined Lifestyle and Herbal Medicine in Overweight Women with Polycystic Ovary Syndrome (PCOS): A Randomized Controlled Trial Susan Arentz randomized controlled trial, w</p>	<p>clinical effectiveness of combining a herbal medicine treatment (including five herbal extracts) with a lifestyle intervention, compared with lifestyle alone for a greater reduction in oligomenorrhoea in overweight women with PCOS. Secondary outcomes were reproductive and metabolic hormones, anthropometric markers, quality of</p>	<p>110 women aged 18–44 years with PCOS with a confirmed medical diagnosis according to the Rotterdam body mass index (BMI) greater than or equal to 24.5 kg/m. Women were recruited in New South Wales, Queensland and Victoria, Australia, using advertising and referrals from health providers, gynaecologists and through the social networking site Facebook</p>	<p>The lifestyle intervention was guided by the evidence-based guidelines for the management of PCOS defined as dietary and exercise behaviours that induce weight loss or prevent weight gain. A nutritionist and an exercise physiologist collaboratively introduced diet modification (identification of nutrient dense foods, calorie content and low glycaemic index carbohydrates) tablet 2: follicular stimulations given only during follicular phase tablet 1:</p>	<p>two tablets exercise lifestyle modifications blood exams FSH insulin mental health</p>	<p>normal menstrual cycle was greater in the combined group than just lifestyle alone. Fasting insulin was significantly lower for women taking herbal medicine in addition to lifestyle compared with controls. There was a significant improvement for systolic and diastolic blood pressure for women taking the herbal medicine compared with controls. Participants taking the herbal medicine plus lifestyle recorded a significantly greater reduction in depression, anxiety and stress scores compared with controls. Conception rates were significantly higher for women taking herbal medicine plus lifestyle compared with controls</p>	<p>effectiveness and safety of the combined herbal medicine and lifestyle intervention in overweight women with PCOS. Improved anthropometry, oestradiol and LH, fasting insulin, blood pressure, conception rates and quality of life</p>	<p>of lifestyle plus herbal medicine demonstrates significant anthropometric improvements for overweight women with PCOS</p>	<p>limit: The lack of a placebo group prevents identification of the active component of this herbal and lifestyle intervention that has generated these outcomes. The lack of blinding could have influenced the estimated treatment effect size particularly for subjective outcome. Physical symptoms were mild and resolved following cessation of taking the herbal tablets. One participant experienced flu-like symptoms (headache, lethargy and joint pain) that were relieved following cessation of the herbal tablets.</p>
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<p>Insulin resistance improvement by cinnamon powder in polycystic ovary syndrome: A randomized double-blind placebo controlled clinical trial Mahdie Hajimonfarednejad</p>	<p>Our aim is to assess the effect of cinnamon powder capsules on insulin resistance, anthropometric measurements, glucose and lipid profiles, and androgens of women with polycystic ovarian syndrome (PCOS).</p>	<p>Out of 80 women that were diagnosed as PCOS by Rotterdam Criteria, 66 were enrolled in this randomized double-blind placebo-controlled clinical trial.</p>	<p>two-arm, blinded, randomized, placebo-controlled clinical trial</p>	<p>cinnamon powder capsules placebo capsules anthropometric measurements, fasting blood sugar, fasting insulin, blood glucose 2 hr after taking 75 g oral glucose, HbA1c, testosterone, dehydroepiandrosterone sulphate, homeostatic model assessment for insulin resistance, triglyceride, and cholesterol</p>	<p>Levels of fasting insulin, HOMA-IR, low-density lipoprotein (LDL), and high-density lipoprotein (HDL) in the cinnamon group were significantly lower after the intervention in comparison with the placebo group reduction in all anthropometric factors (weight, BMI, and waist circumference), FBS, 2-hr postprandial blood glucose, lipid profile, and serum androgen levels; however, these changes were not statistically significant.</p>	<p>cinnamon supplementation with the daily dose of 1.5 g for 12 weeks in combination with progesterone therapy was well tolerated and significantly improved insulin sensitivity and decreased insulin and LDL level in women with PCOS.</p>	<p>validate this result, a greater number of patients and longer treatment period are suggested in future studies.</p>	<p>limit:limitation of this study was the use of progesterone therapy (as standard treatment) besides the main intervention in both groups of the study. no sonographic view of ovarian cysts was done after the study. Other positive but not statistically significant changes were observed in anthropometric, metabolic, and hormonal disturbances of patients with PCOS. To validate this result, a greater number of patients and longer treatment period are suggested in future studies.</p>
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<p>GC-MS analysis of <i>Cocos nucifera</i> flower extract and its effects on heterogeneous symptoms of polycystic ovarian disease in female Wistar rats</p>	<p>To evaluate the effect of <i>Cocos nucifera</i> L. flowers in reducing the major multiple symptoms of letrozole-induced polycystic ovarian disease (PCOD) in female rats</p>	<p>Wistar rats</p>	<p>Wistar rats with letrozole-induced PCOS were left untreated for 21 days and then treated with 100 and 200 mg/kg of <i>C. nucifera</i> aqueous extract. A positive control group, a negative control group, and two treatment groups were studied.</p>	<p><i>C. nucifera</i> aqueous extract.g</p>	<p>Regulating estrous cycle and increasing uterus weight. the improved blood sugar level, ideal lipid profile, good antioxidant status, and histopathology results revealed the recovery from polycystic ovaries.</p>	<p><i>C. nucifera</i> flower is a potential medicine for the treatment of PCOD and this study supports the traditional uses of <i>C. nucifera</i> flower.</p>	<p>only in rat sun-known results in n human</p>
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<p>The Effect of Palm Pollen Extract on Polycystic Ovary Syndrome (POS) in Rats Hojatollah Karimi Jashni</p>	<p>the effectiveness of Palm pollen on female reproductive system, the current study is conducted to evaluate the effects of Palm pollen extract on polycystic ovary syndrome in rats</p>	<p>48 female Wistar rats assigned to 6 groups of 8 each: Control group, sham group administered with estradiol valerate solvent for 60 days and then treated with water for 21 days, PCOS1 control and PCOS2 control groups.</p>	<p>60-day administration with estradiol valerate and 21-day treatment with the extract.</p>	<p>palm pollen extract</p>	<p>Decreased levels of estrogen and LH, increased levels of progesterone and FSH, decreased number of cystic follicles, increased number of primary and antral follicles and Graafian such as corpus luteum</p>	<p>seems that reduction of PCOS symptoms by consumption of Palm pollen extract is related to reduced levels of LH and estrogen as well as increased levels of FSH and progesterone hormones, since reduced number of cystic follicles as well as increased number of corpus luteum was observed in the experimental groups treated with Palm pollen extract as a result of the hormonal changes.</p>	<p>Reduced number of cystic follicles and increased number of corpus luteum, which possibly represent the restarting process of ovulation, are related to antioxidant properties of the extract.</p>	<p>limits: short</p>
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<p>The effect of marjoram (<i>Origanum majorana</i>) tea on the hormonal profile of women with polycystic ovary syndrome: a randomised controlled pilot study I. Haj-Husein,</p>	<p>effect of</p>	<p>25 patients</p>	<p>25 patients were treated with O. majorana tea (14 patients) and placebo tea (11 patients). For one month</p>	<p>marjoram tea or a placebo tea twice daily for 1 month follicle-stimulating hormone, luteinising hormone, progesterone, oestradiol, total testosterone, fasting insulin and glucose, homeostasis model assessment for insulin resistance (HOMA-IR) and glucose to insulin ratio.</p>	<p>Decreasing fasting insulin levels and DHEA-S.</p>	<p>Improved insulin sensitivity and antiandrogen</p>	<p>beneficial effects of marjoram tea on the hormonal profile of PCOS women because it was found to improve insulin sensitivity and reduce the levels of adrenal androgens</p>	<p>Further research is needed to confirm these results and to investigate the active components and mechanisms contributing to such potential beneficial effects of marjoram herb</p>
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<p>Soy isoflavones exert beneficial effects on letrozole-induced rat polycystic ovary syndrome (PCOS) model through anti-androgenic mechanism Ravi Kumar Rajan</p>	<p>soy isoflavones may exhibit beneficial effects in PCOS associated with deficient aromatase activity</p>	<p>sprague dawley rats</p>	<p>Inducing PCOS in Sprague Dawley rats using letrozole and treating them with soybean isoflavones (in 50&100 mg/kg). 21-day administration with letrozole and 14-day treatment with the extract</p>	<p>effect of</p>	<p>Antiandrogen and phytoestrogen and antioxidant 100 mg/kg of soybean significantly changed PCOS symptoms through the body's weight loss, and reducing diestrus phase, testosterone, the activities of 3 betahydroxysteroid dehydrogenase and 17beta-hydroxysteroid dehydrogenase, and oxidative stress</p>	<p>Letrozole administration for 3 weeks resulted in significant increase in body weight in all the groups in comparison to control rats which denotes weight gain treatment with soy isoflavones 100 mg/kg in PCOS rats exhibited significant decrease in body weight at 4th week</p>	<p>these physical, biochemical and histological results clearly demonstrated that soy isoflavones can exert beneficial effects in PCOS phenotypes for the animals having decreased aromatase activity and elevated plasma testosterone levels</p>	<p>effect of</p>
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