AUCTORES
Globalize your Research

New Medical Innovations and Research

Hanan Elzeblawy Hassan *

Open Access

Case Report

# Hirsutism among Infertile Women: Impact of Lifestyle Modifications

**Hanan Elzeblawy Hassan [1]*, Fatma Hosny Abd-ELhakam [2], Enas Kasem Ali Kasem [3]**

[1]Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt.

[2]PhD Student in Maternal and Newborn Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt.

[3]Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Menoufia University, Egypt.

***Corresponding Author:** Hanan Elzeblawy Hassan, Professor of Maternal and Newborn Health Nursing, Faculty of Nursing, Beni-Suef University, Egypt.

**Received date: April 29, 2025; Accepted date: May 16, 2025; Published date: May 20, 2025**

**Citation:** Hanan E. Hassan, Abd-ELhakam FH, Ali Kasem EK, (2025), Hirsutism among Infertile Women: Impact of Lifestyle Modifications, *J New Medical Innovations and Research,* 6(5); **DOI:10.31579/2767-7370/158**



## Abstract:

**Background:** Hirsutism, or excessive terminal hair growth with a masculine pattern distribution, affects 60–70% of PCOS patients

**Aim:** evaluate the effect of lifestyle modification intervention on hirsutism among infertile overweight and obese women with PCOs.

**Subjects and Methods:** A quasi-experimental research design was used to study 116 infertile women at gynecological and infertility outpatient and inpatient clinics and specialized medical center for the treatment of infertility and delayed childbearing affiliated with Beni-Suef University Hospital in Egypt. The study utilized modified Ferriman-Gallwey (mFG) to determine the degree of Hirsutism.

**Results:** prior to the intervention, 51.7% of the study group exhibited significant hair growth in the upper abdomen and lower abdomen, but 58.6% of the study group had no visible terminal hair. 45% and 30% of the study group had moderate and severe hirsutism, respectively, before the intervention, compared to 23% and 11% after the intervention, respectively. Statistically significant association between hirsutism levels and lifestyle dietary habits after program implementation was found ($p<0.05$). Statistically significant association between physical activity level was observed after program implementation ($p<0.05$).

**Conclusion:** Lifestyle modification interventions have a significant positive effect on hirsutism levels for infertile overweight and obese women.

**Recommendations:** As counselors, nurses should offer advice and support as well as teach infertile overweight women about lifestyle change, since it presents a significant challenge in the modern society.

**Keywords:** hirsutism; lifestyle; modifications; infertile women

## Introduction

Since 1990, various diagnostic standards have been used to categorize PCOS. In 1990, the National Institutes of Health (NIH) established its criteria. A new diagnostic standard known as the Rotterdam criteria was developed in 2003 at a workshop in Rotterdam. The Androgen Excess Society (AES) updated the diagnostic standards and announced new standards in 2006. Another significant factor to take into account is the psychological health of the patient due to the impact of PCOS on physical appearance such as Hirsutism (Deswal et al., 2020; Hassan et al., 2019b; Mohamed & Hassan, 2020; Hassan & Farag, 2019).

Women with PCOS have been reported to have intrinsic theca cell malfunction, which results in excessive androgen synthesis and overexpressed luteinizing hormone (LH) receptors that are unaffected by endocrine or paracrine regulation (Zeng et al., 2020; Hassan et al., 2025). Additionally, androgens promote lipolysis, which raises the levels of free fatty acids in the blood, which leads to the development of insulin resistance and the development of abdominal obesity, particularly visceral obesity, which is frequent in women with PCOS. The effects of too much androgen on pertinent tissues; acne, male pattern baldness, and hirsutism are among other signs of hyperandrogenism (Di Lorenzo, et al., 2023; Mohamed et al., 2024; Hassan et al., 2015; Emem & Hassan, 2017).

Hirsutism, or excessive terminal hair growth with a masculine pattern distribution, affects 60–70% of PCOS patients (Kamenov & Gateva, 2020). The modified Ferriman-Gallwey (mFG) is the most widely used visual assessment technique to evaluate terminal hairs, which are pigmented, medullated hairs that would grow longer than 5 mm if unmolested (Willis et al., 2020; Hassan, 2019a; Nady et al., 2018a; Gamel

et al., 2019).

In Egypt, there were 27.4% of women who had PCOS. Infertile women had a prevalence of 37.5%, whereas fertile women had a prevalence of 14%. Infertile patients with POCS had ovulatory disorders, hirsutism, and PCO in proportions of 73.3%, 60.4%, and 79.4%, respectively. PCOS prevalence and elevated BMI were significantly correlated (Sanad, 2014; Sheha et al., 2018; Nady et al., 2018b; Mohammed et al., 2018).

The modified Ferriman-Gallwey (mFG) evaluates the presence of terminal hair in nine areas of the body that are predominantly masculine: the upper lip, chin, and neck; the upper chest (excluding the nipples), upper abdomen (above the umbilicus), lower abdomen, thighs (front and/or back), upper back and upper arms. Each area is visually scored from zero (no terminal hair visible) to four (terminal hair consistent with a well-developed male) (John, 2021). A total score of zero denotes the absence of hirsutism, six to fifteen denotes mild hirsutism, and greater than fifteen denotes moderate to severe hirsutism. (Kamenov & Gateva, 2020; Hassan, 2020a).Treatment options for PCOS underlined are pharmacological, surgical intervention, and non-pharmacological interventions (Lifestyle interventions).

I. Pharmacological treatment

a) Glucocorticoids: They can aid in preventing and managing hirsutism and enabling ovulatory cycles in patients with classic congenital adrenal hyperplasia when their usage is best justified (Davariya et al., 2022).

c) Gonadotropin-releasing hormone agonist (GnRHa): It improves hirsutism, inhibits pituitary hormones, and increases estradiol output while decreasing androgen (Calcaterra, et al., 2023).

II. Treatment for hirsutism

a) Direct hair removal therapy: For many years, the standard method was to get rid of extra hair in PCOS. It operates by inserting a small needle with an electrical current into the hair follicle. Although laser treatment is more expensive, less uncomfortable, and produces results much more quickly, the adverse effects are more severe (Davariya, et al., 2022).

b) Eflornithine hydrochloride: It is an inhibitor of the enzyme ornithine decarboxylase in human skin and has been approved for topical application in hirsutism (Rashid, et al., 2022).

III. Surgical treatment:

Laparoscopic ovarian drilling, Bariatric surgery, and Assisted Reproductive Technology

IV. Non-pharmacological interventions (Lifestyle interventions):

The majority of PCOS patients said that they rarely obtain lifestyle recommendations from their therapists, although the majority of physicians support lifestyle changes for the management of PCOS (Nemchikova & Frontoni, 2022; Mostafa et al., 2018; Hassan, 2020b; Nady et al., 2017; Hassan, 2016).

## Aim of the study:

This study was conducted to evaluate the effect of lifestyle modification intervention on hirsutism among infertile overweight and obese women with PCOs.

## Study hypotheses:

Infertile overweight and obese women who will receive lifestyle modification interventions will experience an improvement and decrease hirsutism level.

## Subject and methods:

**Research design:** A quasi-experimental design.

**Study setting**: The study was conducted at gynecological and infertility outpatient and inpatient clinics and specialized medical center for the treatment of infertility and delayed childbearing affiliated with Beni-Suef University Hospital.

## Sample type and size:

A purposive sample 116 infertile overweight and obese women who attended the previously mentioned sitting will be selected, and fulfilled the following criteria:

**Tools of data collection:** Arabic Structured interviewing questionnaire divided into two parts**:**

**Part I.** Basic data and sociodemographic characteristics as telephone number, age, residence, marital status, employment, length in centimeters, weight in kilograms, waist circumference, and thigh circumference

**Part II.** Questions about Hirsutism; in the nine predominantly masculine body areas (androgen-dependent), such as the upper lip, chin and neck, upper chest (excluding the nipples), upper abdomen (above the umbilicus), lower abdomen, thighs (front and/or back), upper back, lower back, and upper arms, the presence of terminal hair (hairs that would grow >5mm in length if left unmolested, are typically pigmented, and are medullated) was assessed (Kahraman & Erdoğan, 2021).The participants' level of hirsutism was assessed using the modified Ferriman-Gallwey (mFG), which rates the nine mainly masculine body locations for terminal hair. Visual scores ranging from one (little unseen hair development) to four (extremely thick hair) were applied to each place (Kahraman & Erdoğan, 2021).

**Scoring system:** The total score was adopted from Kahraman & Erdoğan (2021) and assessed by summation of sub-scores in the nine areas:

- A total score of ≤33.3% indicates no or mild hirsutism (0-12)
- A total score of >33.3%-66.6% indicates moderate hirsutism (>12-24)
- A total score >66.6%-100% indicates severe hirsutism (>24-36)

## Ethical Considerations:

Official approval will be obtained from ethical and research counsels that were approved by the Faculty of Nursing, Menoufia University Counsel. Informed oral consent was obtained from all women after an explanation of the nature and purpose of the study.

## Field Work:

The study aimed to evaluate the impact of a lifestyle modification intervention on hyper-androgenic infertile overweight and obese women. The research involved a comprehensive review of literature, including textbooks, articles, journals, and websites. The study also involved interviews and assessments to assess socio-demographic characteristics, lifestyle habits, and baseline measures related to hyper-androgenism. The intervention was implemented in training halls, aiming for a 5-10% weight loss or a BMI < 29 kg/m2 within six months. The intervention included three educational sessions, with an Arabic card for assessment.

Follow-up was conducted monthly, with regular follow-ups recorded in weekly logs. After six months, the study evaluated the girls' anthropometry measures, menstrual cycle, and changes in hirsutism total score and acne grade. The post-test was conducted two weeks to one month after the program's completion.

### Statistical Analysis: -

Data was entered and analyzed using SPSS (version 25). Graphics were done using the excel program as well as the SPSS package. The level of significance was set at a P value of <0.05 for all significant tests.

## Results

Figure 1 showed that while 48.3% of women with polycystic ovarian syndrome had no apparent terminal hair, 26% of infertile, overweight, and obese women had severe upper lips. According to the study, 58.6% of the control group had moderate hirsutism both before and after the intervention, compared to 29.3% of the study group who had severe hirsutism in their neck and chin. Before the intervention, 67.2% of the study and control groups, excluding the nipples, had no terminal hair visible on the upper chest; after the intervention, this number increased to 77.6%.

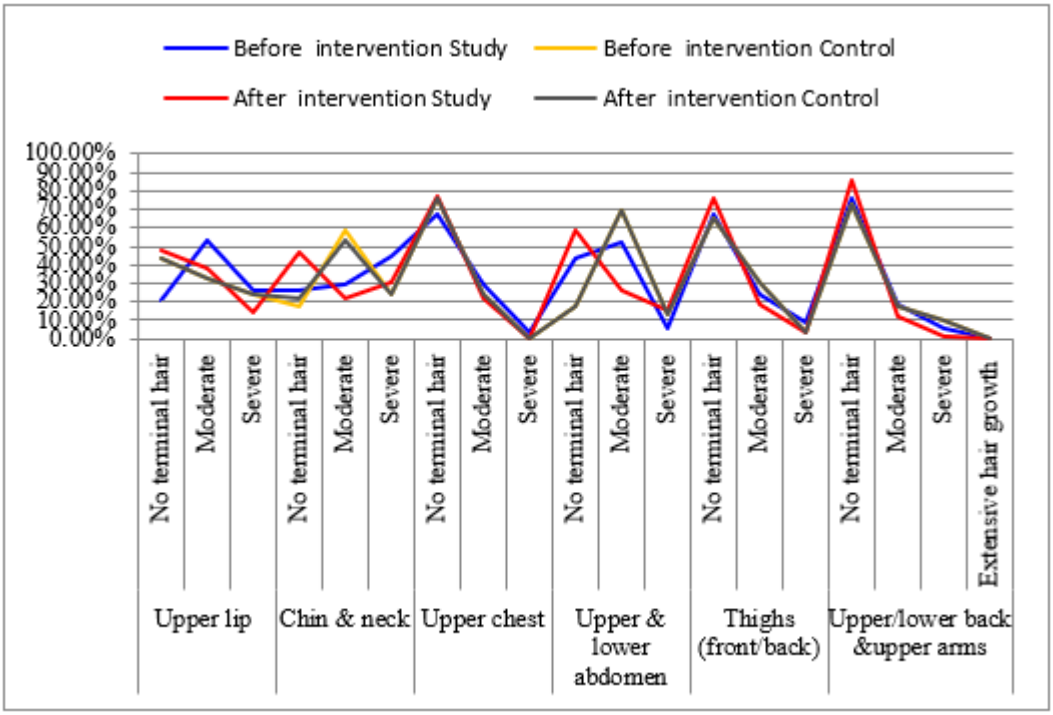


**Figure 1:** hirsutism among the Studied Infertile Overweight and Obese Women with Polycystic Ovary Syndrome

Furthermore, prior to the intervention, 51.7% of the study group exhibited significant hair growth in the upper abdomen (above the umbilicus) and lower abdomen, but 58.6% of the study group had no visible terminal hair, and 67.2% and 75.6% of the study groups, respectively, had no terminal hair visible on the thighs (front and/or back) before and after the intervention. Furthermore, before and following the intervention, there was no discernible terminal hair on the upper back, lower back, or upper arms in 75.9% and 86.2% of the research groups, respectively.

**Table 1** shows the shows the total hirsutism levels among the studied infertile, overweight, and obese women with polycystic ovary syndrome. It presents that 45% and 30% of the study group had moderate and severe hirsutism, respectively, before the intervention, compared to 23% and 11% after the intervention, respectively. Furthermore, after the intervention, 66% of the studied women had no visible terminal hair. However, no changes occur with the control group.

| Variables | Before the intervention | | | | $\chi^2$ P – value | After the intervention | | | | $\chi^2$ P –value |
|---|---|---|---|---|---|---|---|---|---|---|
| | Study n=58 | | Control n=58 | | | Study n=58 | | Control n=58 | | |
| | No. | % | No. | % | | No. | % | No. | % | |
| **Total Hirsutism Levels** | | | | | 0.396ns > 0.05 | | | | | 0.058ns > 0.05 |
| - No hirsutism | 14 | 25% | 24 | 40% | | 39 | 66% | 24 | 40% | |
| - Moderate hirsutism | 26 | 45% | 23 | 39% | | 13 | 23% | 23 | 39% | |
| - Severe hirsutism | 18 | 30% | 11 | 21% | | 6 | 11% | 11 | 21% | |

**Table 1:** Total Hirsutism Levels among the Studied Infertile Overweight and Obese Women with Polycystic Ovary Syndrome (n = 116)

**NB:** ns non- statistically significant (p≥0.05)

**Table 2** showed relationship between hirsutism levels and dietary habits among the study group of infertile overweight and obese women with polycystic ovary syndrome. No hirsutism was observed in 64.3% of the studied group of women before intervention, compared to 92.3% after intervention for good habits. Statistically significant association between hirsutism levels and lifestyle dietary habits among the study groups of

infertile overweight and obese women was observed after program implementation (p<0.05).

| Variable | Dietary Habits Before the intervention | | | | | Dietary Habits After the intervention | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hirsutism Levels | Poor habits N=42 | | Good habits N=16 | | χ2 P–value | Poor habits N=17 | | Good habits N=41 | | χ2 P –value |
| No | 5 | 35.7 | 9 | 64.3 | 0.56 ns>0.05 | 3 | 7.7 | 36 | **92.3** | 73.91** <0.001 |
| Moderate | 21 | 80.8 | 5 | 19.2 | 0.34 ns>0.05 | 9 | 69.2 | 4 | 30.8 | 83.41** <0.001 |
| Severe | 16 | 88.9 | 2 | 11.1 | 2.13 ns>0.05 | 5 | 83.3 | 1 | 16.7 | 72.75** <0.001 |

**Table 2** Relationship between hirsutism levels and dietary habits among the Study group of Infertile Overweight and Obese Women with Polycystic Ovary Syndrome (n=58)

**NB:** ns non- statistically significant (p≥0.05) **highly statistically significant (p≤0.001)

**Table 3** showed relationship between hirsutism levels and physical activity levels among the study group of infertile overweight and obese women with polycystic ovary syndrome. No hirsutism was observed in 11.5% of the studied group of women before intervention, compared to 23.1% after intervention for moderate activity women. Statistically significant association between physical activity level among the study group of infertile overweight and obese women was observed after program implementation (p<0.05).

| Variable | Physical Activity Before the intervention | | | | | | | Physical Activity After the intervention | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hirsutism Levels | Mild N=47 | | Moderate N=11 | | Severe N=0 | | $\chi^2$ P–value | Mild N=15 | | Moderate N=36 | | Severe N=7 | | $\chi^2$ P –value |
| | No | % | No | % | No | % | | No | % | No | % | No | % | |
| No | 7 | 50 | 7 | 50 | 0 | 0 | 0.56 ns>0.05 | 4 | 10.2 | 31 | **79.6** | 4 | 10.2 | 73.91** <0.001 |
| Moderate | 23 | 88.5 | 3 | 11.5 | 0 | 0 | 0.34 ns>0.05 | 7 | 53.8 | 3 | 23.1 | 3 | 23.1 | 83.41** <0.001 |
| Severe | 17 | 94.4 | 1 | 5.6 | 0 | 0 | 2.13 ns>0.05 | 4 | 66.6 | 2 | 33.4 | 0 | 0 | 72.75** <0.001 |

**Table 3** Relationship between hirsutism levels and physical activity levels among the Study group of Infertile Overweight and Obese Women with Polycystic Ovary Syndrome (n=58) Average in relationships

**NB:** ns non- statistically significant (p≥0.05) **highly statistically significant (p≤0.001)

## Discussion:

The current study findings revealed that nearly half and more than one-third of the study and control groups had moderate hirsutism before the intervention, respectively. After the intervention, about two-thirds of the study group had no terminal hair visible. Meanwhile, there were no statistically significant differences between study and control groups, neither before nor after the intervention.

These findings came in agreement with Niranjani et al. (2022), who studied "Effectiveness of cinnamon, exercise, and counseling on hyperandrogenic symptoms and level of anxiety among young girls with olycystic ovarian syndrome." They revealed that on the Modified Ferriman Gallwey scale (Hirsutism), during Pre-test through Post-test 2, the non-interventional group showed no improvement in score, whereas group A and group B showed a 1 score decrease.

On the contrary, these findings were inconsistent with those of Pramod et al. (2023), who studied dietary and physical activity patterns in PCOS women and found that less than one-quarter of respondents had dark hair growth. These differences might be attributed to the different populations in their study on overweight and obese women with PCOS.

The current study findings revealed that there is an improvement in lifestyle and daily habit levels among the studied hyper-androgenic infertile overweight and obese women. It reveals that most of the study and control groups had poor habits before the intervention, which improved to most of the study, and less than one-third of the control group had good habits after the intervention, respectively.

These results came in agreement with These findings came in agreement with Eleftheriadou et al. (2015), who study "Dietary Habits in Adolescent Girls with Polycystic Ovarian Syndrome" and found that poor eating habits were demonstrated in this group of adolescent PCOS patients, and this may contribute to the development of obesity in later life. Increased body weight increases long-term health risks and should be tackled with lifestyle interventions early in life.

Regarding total physical activity levels among the studied hyper-androgenic infertile overweight and obese women. The current study findings revealed that there is an improvement in total physical activity. Most of the study and control groups had mild physical activity (sedentary lifestyle) before the intervention, compared to two-thirds of the study group after the intervention having moderate physical activity. There is a statistically significant difference between the study and control groups after the intervention.

But in disagreement with the current study, Zhang et al. (2018) did not find differences in physical activity between the PCOS and control groups. Also, the current study is supported by Mutsaerts et al. (2013), who revealed that women with PCOS did not show a different change in lifestyle and moderate to vigorous physical activity compared with non-PCOS obese controls. This disagreement may be attributed to the type and intensity of physical activity.

The current study findings revealed that there is a statistically significant association between hyper-androgenic features (Hirsutism, acne, and

alopecia) improvement and lifestyle habits in the study group of hyper-androgenic infertile overweight and obese women.

A meta-analysis indicated that hirsutism and menstruation dysfunction were the two aspects of quality of life most affected by PCOS; however, a more recent systematic review discovered that infertility and weight issues were the two factors most detrimental to HRQoL (Naumova et al., 2021). In addition, a recent study found that women with PCOS are 40% more likely to attempt suicide and are more likely to have personality disorders, schizophrenia, or bipolar illness (Farajzadegan et al., 2023).

Significant improvements in hirsutism can be achieved with lifestyle changes (diet and exercise) that result in a small to moderate weight loss of about 5%-10% (Cowan & Moran, et al., 2023).

## Conclusion

Lifestyle modification interventions have a significant positive effect on hirsutism levels for infertile overweight and obese women.

## Recommendations

1. As counselors, nurses should offer advice and support as well as teach infertile overweight women about lifestyle change, since it presents a significant challenge in the modern society.
2. Establish nurse education and information programs grounded in research regarding the causes, symptoms, and handling of PCOs.

## Reference


1. Calcaterra, V., Rossi, V., Massini, G., Casini, F., Zuccotti, G., & Fabiano, V. (2023). Probiotics and Polycystic Ovary Syndrome: A Perspective for Management in Adolescents with Obesity. Nutrients, 15(14), 3144
2. Cowan, S., Grassi, A., Monahan Couch, L., Jeanes, Y., Lim, S., Pirotta, S., Harris, J., et al. (2023). Evidence-Based Lifestyle Guidelines and Self-Management Strategies Utilized by Women with Polycystic Ovary Syndrome. Nutrients, 15(3), 589.
3. Davariya, J., Patel, H., Patel, S., Saraiya, Y., Lalwani, T., & Despande, S. (2022). Landing Eyes on Unnoticed Disorder: A Polycystic Ovary Syndrome. International Journal of Current Science Research and Review, 5 (12), 4391-4401
4. Deswal, R., Narwal, V., Dang, A., & Pundir, C. S. (2020). The Prevalence of Polycystic Ovary Syndrome: A Brief Systematic Review. Journal of human reproductive sciences, 13(4), 261–271.
5. Di Lorenzo, M., Cacciapuoti, N., Lonardo, M. S., Nasti, G., Gautiero, C., Belfiore, A., & Chiurazzi, M. (2023). Pathophysiology and Nutritional Approaches in Polycystic Ovary Syndrome (PCOS): A Comprehensive Review. Current Nutrition Reports, 1(2), 1-18.
6. Eleftheriadou, M., Stefanidis, K., Lykeridou, K., Iliadis, I., & Michala, L. (2015). Dietary habits in adolescent girls with polycystic ovarian syndrome. Gynecological Endocrinology, 31(4): 269-271.
7. Emem E., Hassan H. (2017). Correlation between Quality Of Life and Dysmenorrhea among Nursing Schools Students. International Journal of Nursing Science, 7(6): 123-132.
8. Farajzadegan, Z., Kazemi, A., Salehi, M., & ZareMobini, F. (2023). Psychological Experiences in Women with Polycystic Ovary Syndrome: A Qualitative Study. Iranian Journal of Nursing and Midwifery Research, 28(4), 391-397.
9. Gamel W., Hassan H., El-ezazy A. (2019). Male Infertility and Psychological Repercussions: A Neglected Problem in Northern Upper Egypt. International Journal of Studies in Nursing, 4(4): 1-26.
10. Hassan H & Farag D. (2019). The impact of polycystic ovary syndrome on women's quality of life: Nursing guidelines for its management. Clinical Nursing Studies, 7(3):42-57.
11. Hassan H. (2016). Infertility profile, psychological ramifications and reproductive tract infection among infertile women, in northern Upper Egypt. Journal of Nursing Education and Practice, 6(4): 92-108.
12. Hassan H. (2019). The Impact of Evidence-Based Nursing as The Foundation for Professional Maternity Nursing Practices. Open Access Journal of Reproductive System and Sexual Disorder, 2(2): 195-197. OAJRSD.MS.ID.000135.
13. Hassan H. (2020). Evidence-Based Practice in Midwifery and Maternity Nursing for Excellent Quality of Care Outcomes. American Journal of Nursing Research, 8(6): 606-607.
14. Hassan H. (2020). Quality of Life with Gestational Diabetes. American Research Journal of Public Health, 3(1): 1-4.
15. Hassan H., Abd-ELhakam F., Kasem E. (2025). Androgen-related Alopecia and Infertility: Impact of Lifestyle Modifications. International Journal of Clinical Research and Reports, 4(2): 1-6. DOI:
16. Hassan H., Ahmed W., Ahmed Arafa A. (2019). Physical Activity and Menstrual Disorders Among School Girls in Southern Egypt. International Journal of Studies in Nursing, 4(3): 54-59.
17. Hassan H., Hassan S., Baraka M. (2015). A Survey of Relationship between Duration of Infertility and Depression among Infertile Women in Beni Suef Governorate. International Journal of Science and Research, 4(10): 1170-1177
18. Hassan H., Nady F., Youns E., Zahran K. (2016). Call for Change Level of Knowledge, Awareness and Attitude to Follow A High Folate Diet Among Pregnant Women. IOSR Journal of Nursing and Health Science, 5(1): 93-100.
19. Hassan H., Zahran K., Youness E., Nady F., (2015). Pregnant Women's Awareness, Intention and Compliance regarding Folic Acid Usage for Prevention of Neural Tube Defects According to Health Belief Model in Beni-Suef City. Pyrex Journal of Nursing and Midwifery, 1(3): 13-26.
20. Kahraman, F. C., & Erdoğan, S. S. (2021). Grading of hirsutism: a practical approach to the modified Ferriman-Gallwey scoring system. Advances in Dermatology and Allergology/Postępy Dermatologii i Alergologii, 39(4), 744-748.
21. Kamenov, Z., & Gateva, A. (2020). Inositols in PCOS. Molecules, 25(23), 5566.
22. Mohamed S., Omran A., Ramadan E., Hassan H. (2024). Effect of Body Mass Index on Urinary Incontinence among Menopausal Women. Journal of Women Health Care and Issues, 7(3): 1-6.

23. Mohamed W., Hassan H. (2020). Effect of Instructional Supportive Guideline for Improving Women's Awareness towards Endometriosis. American Journal of Nursing Research, 8(1): 38-47.
24. Mohammed F., Shahin M., Youness E., Hassan H. (2018). Survivorship in Women Undergoing Gynecological and Breast Cancer Treatment in Upper Egypt: The Impact of Quality of Life Improvement Educational Program". American Research Journal of Gynaecolog 2(1): 1-28.
25. Mostafa H., Yousef F., Hassan H. (2018). Health Related Quality of Life Educational Interventions: Effect on Chronic Hepatitis C Patients'. Saudi Journal of Nursing and Health Care, 1(2): 56-67.
26. Mutsaerts, M.A.Q.; Kuchenbecker, W.K.H.; Mol, B.W.; Land, J.A.; Hoek, A. (2013). Dropout is a problem in lifestyle intervention programs for overweight and obese infertile women: A systematic review. Hum. Reprod. 28, 979–986
27. Nady F., El-Sherbiny M., Youness E., Hassan H. (2018). Effectiveness of Quality of Life Planned Teaching Program on Women Undergoing Gynecologic Cancer Treatment. American Research Journal of Oncology, 1(1): 1-17.
28. Nady F., Said M., Youness E., Hassan H. (2017). Impact of Tailored Educational Program of Quality of Life Improvement on Women Undergoing Breast Cancer Treatment at El-Minia Region, Egypt. American Research Journal of Gynaecology, 1(1): 1-17.
29. Nady F., Said M., Youness E., Hassan H. (2018). Effect of Nursing Intervention Program on Quality of Life Improvement for Women Undergoing Gynecological and Breast Cancer Treatment. Assuit Scientific Nursing Journal, 6(15): 62-77.
30. Nady F., Zahran K., Youness E., Hassan H. (2014). Women's Knowledge and Perception about Benefits of Folic Acid Intake Before and During Pregnancy According to Health Belief Model in Beni-Suef City. Assuit Scientific Nursing Journal, 2(3): 1-13.
31. Naumova, I., Castelo-Branco, C., Kasterina, I., & Casals, G. (2021). Quality of life in infertile women with polycystic ovary syndrome: a comparative study. Reproductive Sciences, 28(7), 1901-1909.
32. Nemchikova, O., & Frontoni, S. (2022). The role of dietitian in the multidisciplinary treatment of PCOS. Nutrition, Metabolism and Cardiovascular Diseases, 32(4), 827-832.
33. Niranjani, S., Bhuvaneswari, G., Hemamalini, M., & Vijayaraghavan, R. (2022). Effectiveness of cinnamon, exercise and counselling on hyper androgenic symptoms and level of anxiety among young girls with Polycystic Ovarian Syndrome. NeuroQuantology, 20(8): 9534.
34. Pramod, A. (2023). Dietary and physical activity pattern IN PCOS women (Doctoral dissertation, St Teresa's College (Autonomous), Ernakulam). 4(12):1-50
35. Rashid, R., Mir, S. A., Kareem, O., Ali, T., Ara, R., Malik, A., & Bader, G. N. (2022). Polycystic ovarian syndrome-current pharmacotherapy and clinical implications. Taiwanese Journal of Obstetrics and Gynecology, 61(1), 40-50.
36. Sanad, A. S. (2014). Prevalence of polycystic ovary syndrome among fertile and infertile women in Minia Governorate, Egypt. Egypt J Fertil Steril, 125, 81-2.
37. Sheha E., Hassan H., Gamel W. (2018). Association between pre-pregnant overweight and obesity and periodontal disease during pregnancy: a cross sectional study. International Journal of Studies in Nursing, 3(1): 1-21.
38. Willis, S. K., Mathew, H. M., Wise, L. A., Hatch, E. E., Wesselink, A. K., Rothman, K. J., & Mahalingaiah, S. (2020). Menstrual patterns and self-reported hirsutism as assessed via the modified Ferriman-Gallwey scale: A cross-sectional study. European Journal of Obstetrics & Gynecology and Reproductive Biology, 248, 137-143.
39. Zeng, X., Xie, Y. J., Liu, Y. T., Long, S. L., & Mo, Z. C. (2020). Polycystic ovarian syndrome: correlation between hyperandrogenism, insulin resistance and obesity. Clinica chimica acta, 502(10), 214-221.
40. Zhang, J., Zhou, K., Luo, L., Liu, Y., Liu, X., & Xu, L. (2018). Effects of exercise and dietary habits on the occurrence of polycystic ovary syndrome over 5 years of follow-up. International Journal of Gynecology & Obstetrics, 142(3), 329-337.

**DOI:10.31579/2767-7370/158**