



Effectiveness of Lifestyle Modification on Reproductive Health among Young Women: An Integrative Review

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Authors' contributions

This work was carried out in collaboration among all authors. Author PS prepared the designed and pre formed the study. Authors MS and BS helped to frame the draft. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Background: The present review focuses on the effectiveness of lifestyle modification on reproductive health among young women. Obesity causes various physical and psychological health risks in women's reproductive health and overweight, obesity are increasing and have become an epidemic worldwide.

Objective: This article investigated the outcome of a lifestyle modification package on the reproductive health of young obese and overweight women.

Methods: The literature published in English from 2010 to 2020 was reviewed using PRISMA guidelines. Scientific articles were searched in the electronic data base (Scopus, Medline, Google scholar, and PubMed central) on the lifestyle modification on reproductive health.

Results: After reviewing the literature, it showed that the outcome of lifestyle modification had improved the reproductive health of women in infertile women in many ways.

Conclusion: The review highlights the need for specific interventional studies on reproductive health which can improve the health of young women.

Keywords: *Life style modification; obesity; overweight; menstrual cycle; PCOD; reproductive health; sexual function; fertility rates; weight management; exercise, activity and diet.*

1. INTRODUCTION

Obesity, a serious health problem, is a widespread affliction among women of reproductive age. Obesity and overweight refer to an abnormal and excessive fat deposition that harms the body's health. The World Health Organization (WHO) defines overweight as having a body mass index (BMI) of equal to or more than 25 kg/m², while obesity is defined as having a BMI of equal to or greater than 30 kg/m² [1].

Obesity causes a slew of issues, including social, psychological, demographic, and health issues.

It has been associated with elevated health risks like diabetes, hypertension, coronary heart disease, and osteoarthritis, as well as numerous cancers like endometrial, breast, and colon cancers. Obesity has also been linked to reproductive issues, particularly in women. It's linked to anovulation, menstrual irregularities, infertility, assisted reproduction issues, miscarriage, and poor pregnancy outcomes [1].

Fedorcsák, P., Storeng, et al., 2000 discovered that greater peripheral aromatization of androgens to estrogens affects gonadotropin production in obese women. Hyperandrogenemia is caused by insulin resistance and hyperinsulinemia in obese women. Leptin levels rise while sex hormone-binding globulin (SHBG), growth hormone (GH), and insulin-like growth factor binding proteins (IGFBP) levels fall. As a result, the hypothalamic-pituitary-gonadal (HPG) axis' neuro-regulation deteriorates. Impaired ovulatory function and, as a result, reproductive health could be explained by these changes [2].

Lifestyle factors are changeable aspects of one's life that can have an impact on one's general health and well-being. Lifestyle factors such as age at which a woman starts a family, weight, nutrition, exercise, stress, occupational and environmental exposure can all have a significant impact on a woman's reproductive health. Other factors that have a negative impact on reproductive health include illicit drug usage, cigarette smoking, caffeine consumption, and

alcohol consumption Sharma, Biedenharn, Fedor, & Agarwal [3].

These lifestyle factors are controllable and can help young women have better reproductive health. The lifestyle change is determined by the individual and her circumstances. For reproductive health, a total lifestyle change is regarded as the first and best choice. Lifestyle modification also refers to behavioural weight control, which includes dietary changes, physical exercise, and behavioural changes Wadden, Webb, Moran, & Bailer [4].

Mc Caffery et al. stated in their finding that comprehensive lifestyle modification programs provide weekly individual or group treatment to modify activity and eating habits. Literature suggests the need for lifestyle modification strategies, chiefly including dietary changes. Reduced calorie intake, low fat, low carbohydrate, low glycemic load diets, and the Mediterranean diet are all examples of this [5].

Another advised lifestyle change technique is a portion regulated diet with a defined portion of protein and a liquid diet. Obesity treatment has been found to be particularly effective when using a glycemic load diet with meal replacements such as liquid shakes and meal bars.

Physical activity, which is another way to change your lifestyle, appears to be linked to significant weight loss and long-term weight management. Physical activity lowers blood pressure and cholesterol levels while also improving glucose tolerance. Another significant aspect of lifestyle change is behavior therapy, which assists obese people in developing ideas and procedures for changing their eating, physical activity, and thinking behaviors that contribute to their weight gain. Self-monitoring is a critical component of weight loss. Frequent monitoring is a key predictor of both short and long-term weight loss Wadden, Webb, Moran, & Bailer [4].

The fact that there is evidence to support the benefits of lifestyle adjustment in the treatment of obesity and overweight, As a result, the goal of

this integrative review is to assess the impact of lifestyle changes on reproductive health in young overweight and obese women. This literature will be an added value to the evidence based literature which will help in improving the best health care practice of overweight and obese women in the reproductive age group.

2. METHODS

Integrative review of literature was done through a systematic process in an attempt to understand the outcome of the lifestyle modification package on reproductive health among obese young women. With the help of existing available qualitative and quantitative literature, an integrative review method was adopted. A search of the databases Scopus, Pubmed, Google Scholar, MedLine was done. The most effective data on lifestyle modification was selected. The following keywords: Life style modification, Obesity, Overweight, Menstrual cycle, PCOD, Reproductive health, Sexual function, Fertility rates, Weight management, Exercise, Activity, and Diet were used in different combinations to identify the eligible article.

A total of 533 articles were obtained through electronic search engines. After removing the duplicates, 176 articles were available for further screening. Of these, 146 articles were removed because they did not meet the eligible population. After screening the full text of the remaining 30 articles, although lifestyle modification studies apart from reproductive health were in many articles, those were rejected to conserve the main focus of lifestyle modification on reproductive health. Finally, a total of 8 articles were included in the review. [Fig. 1].

These articles were hand searched and those with general information, commentary, speech/lecture, biography and instructional material/guideline were excluded. Although non relevant articles were rejected. The article which provided complete information was excluded. The use of limiters such as the timeframe from January 2010 to December 30, 2020. Articles published before 2010 were excluded. English language, peer-reviewed journals, and nursing reduced the number to 8. All articles were further analyzed based on the availability of keywords Life style modification, Obesity, Overweight, Menstrual cycle, PCOD, Reproductive health, Sexual function, Fertility rates, Weight management, Exercise, Activity, and Diet. This resulted in 8 articles for the analysis. [Table 1]

Through the whole process, the authors screened the titles and the abstract of each relevant review at the first stage after the rejection of copying and in the second stage, the author assessed the full relevant texted articles for eligibility and disagreement was settled by agreement. The author independently carried out the data extraction. In the third stage, the author screened out the relevant data from the articles and mingled it into an article review matrix.

The narrative analysis was done to interpret the text in this article as only limited literature was available to generate the evidence of a lifestyle modification package on reproductive health in obesity.

3. RESULT

The detailed information of the articles analyzed through narrative analysis is appended in table - 1, Article Review Matrix. The outcome variables analyzed in this article included were sexual function, fertility rate improvement in irregular menstrual cycle and weight management. The most common intervention in lifestyle modification was diet and exercise for all the studies. In the review matrix, a total of 8 articles were taken.

3.1 Sexual Function

Wekker et al. conducted a study on lifestyle intervention which shows improvement in sexual function of women with obesity and infertility. The total time was 6 months and the intervention targeted physical activity, diet and behavior modification. As a result, women reduced 5-10% in weight or a reduction in BMI below 29 kg/m² within the intervention period. The result showed the total 'sexual function' score (96.514.2 vs. 91.412.8; 95% CI 0.84 to 9.35) compared to the control group (n = 72) indicated that lifestyle interventions can contribute to better long-term sexual function in women who are at greater risk of sexual problems [6].

3.2 Fertility Rate

Van Elten TM, Karsten MDA et al., 2019 conducted a study for 6 months to see the effect of a preconception lifestyle in obese infertile women on diet and physical activity. In another study, a 6 month lifestyle intervention program combined with diet, physical activity and

behavioral modification plan resulted in weight loss and reduced energy intake [7]. (Karsten et al., 2019) conducted a study, on 6 month lifestyle intervention program combined with diet, physical activity and behavioral modification plan was implemented aiming at 5-10% weight loss. Women with previous dietetic support lost weight during the intervention period and women with higher self-efficacy reduced energy intake. The higher levels of physical activity were associated with a higher number of daily steps and on completion of the lifestyle intervention program; the weight loss could be noticed [8]. Secondary analysis of a multicenter RCT reported that anovulatory women after receiving lifestyle intervention had more natural conceptions than ovulatory women Van Oers et al. [9].

3.3 Weight Management

Sim, K. et al' conducted a weight loss programme, incorporating dietary, exercise and behavioural components which showed intervention group achieved a pregnancy rate of 48% compared with 14% (P=0.007) [10],in

addition to this Mutsaerts, MAQ, et al. conducted a six months study on subfertile women by providing a life style modification by diet, increase of physical activity and behavioural modification and the women were benefited by the weight loss of 4.4 kg in the intervention group and 1.1 kg in the control group (P<0.001) which showed that the life style modification was very effective in obese infertile women [11]. In addition to this [12] conducted a 6-week lifestyle intervention that consisted of structured exercise training (SET) and hypocaloric diet which increased the ovulation rate in overweight and obese CC-resistant PCOS patients [12].

3.4 Improvement In Irregular Menstrual Cycle

A lifestyle modification program implemented for one year among women with PCOS resulted in an increased number of regular menstrual cycles in women of the study group. In addition, 58.5% were menstruating regularly compared to none in the control group (Marzouk, Nabil, & Senna [13].

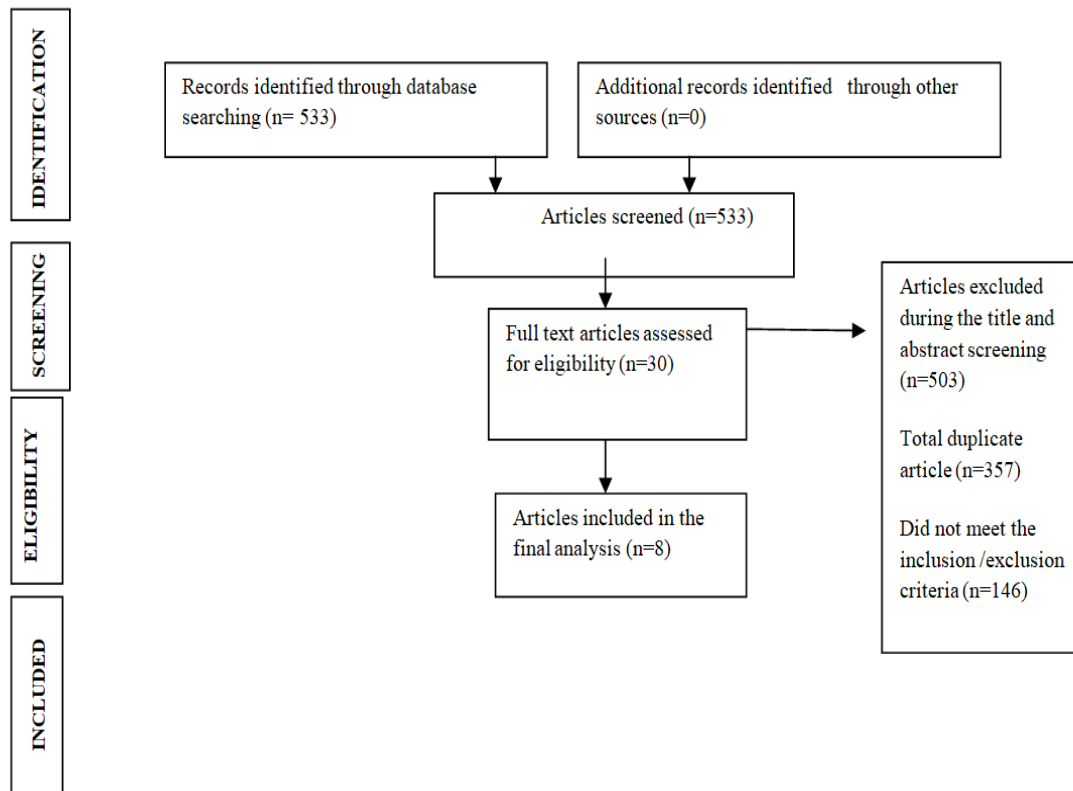


Fig. 1. PRISMA flow Diagram

Table 1. Article Review Matrix showing the effectiveness of lifestyle modification on reproductive health among young women

S. No	Author / Year	Study Objective	Methods	Life Style modification	Finding
1	Van Elten et al., [7]	To assess the effects of preconception lifestyle intervention on diet, physical activity and body mass index (BMI) at 5.5 years (range = 3.7-7.0 years) after the intervention.	Location : - Netherlands Setting: infertility clinic Design: multicentre RCT Duration : 6 month Sample: 577 women aged 18 to 39 years (intervention group; N = 290) or prompt infertility treatment (control group; N = 287).	Exercise, diet and counseling. To increase physical activity in daily life by taking 10.000 steps per day monitored with a pedometer. caloric reduction of approximately 600kcal	The study showed that A six-month structured preconception lifestyle intervention in obese infertile women decreased the intake of unhealthy, high caloric foods and beverages and increased physical activity compared to the control group receiving prompt infertility treatment. Improvements in lifestyle, together with improved cardiometabolic health, may in the future have beneficial effects on the health of women and their offspring.
2.	Karsten et al., [8]	To identify demographic, (bio) physical, behavioral, and psychological determinants of successful lifestyle change and program investigating a preconception lifestyle intervention.	location : not specified setting :not specified Design: multicenter RCT in 577 women with obesity and infertility Duration: 6 month sample: 577 BMI) ≥ 29 kg/m ² aged between 18 and 39 years	The intervention consisted of dietary counseling, physical activity, and behavioral modification diet with a caloric reduction of approximately 600 kilocalories (kcal) per day. Physical activity in daily life by taking 10,000 steps per day monitored by a pedometer To evaluate the feasibility of a brief, intensive	The study found a significant a positive result with diet successful weight loss (OR 1.10, 95% CI 1.05–1.16). Women with the previous dietetic support lost 0.94 kg less during the intervention period (95% CI 0.01–1.87 kg). Women with higher self-efficacy reduced energy intake more than women with lower self-efficacy ($p < 0.01$). Tremendous change towards physical activity was associated with a higher number of daily steps ($p = 0.03$). A high stage of change towards weight

S. No	Author / Year	Study Objective	Methods	Life Style modification	Finding
				weight loss intervention to improve reproductive outcomes in obese sub fertile women.	loss was associated with completion of the intervention ($p = 0.04$).
3	Wekker et al., [6].	A study to assess whether lifestyle intervention improves sexual function of women with obesity and infertility.	<p>Location: Netherlands.</p> <p>Setting :medical centers Design:RCT</p> <p>Duration: 6 month Sample: total 577 women, 18–39 years of age, with infertility and a BMI ≥ 29 kg/m² Intercourse frequency and sexual function were assessed with the McCoy Female Sexuality Questionnaire (MFSQ), 5.4\pm0.8 years after randomization. 550 women could be approached for the follow-up study, of which 84 women in the intervention and 93 in the control group completed the MFSQ.</p>	Physical activity, diet and behaviour modification or prompt infertility care.	The intervention group more often reported having had intercourse in the past 4 weeks compared to the control group (a OR: 2.3 95% CI 0.96 to 5.72). Among women reporting intercourse in the past 4 weeks, the intervention group (n = 75) had intercourse more frequently (6.65.8 vs. 4.94.0 times; 95% CI 0.10 to 3.40) and had higher scores for vaginal lubrication (16.5 Sexual interest, satisfaction, orgasm and sex partner scores did not differ statistically between the groups. The intervention effect on sexual function was 21% mediated by the change in moderate to vigorous physical activity.
4	Van Oers et al., [9].	Effectiveness of lifestyle intervention in subgroups of obese infertile women	This is a secondary analysis of a multicentre RCT (randomized controlled trial), the Lifestyle study. Between 2009 and 2012, 577 obese infertile women were randomly assigned to a 6-month lifestyle intervention followed by	Exercise and diet Daily dietary energy intake was reduced by 600 kcal and was maintained at a minimum of 1200 kcal/day. Physical	The study showed a positive result. The WH ratio showed a significant interaction with the effect of lifestyle intervention on healthy live birth rate (P = 0.05), natural conception rate (P = 0.38).

S. No	Author / Year	Study Objective	Methods	Life Style modification	Finding
			infertility treatment (intervention group) or to prompt infertility treatment (control group). Data of 564 (98%) randomized women who completed follow-up were analysed.	activity was stimulated to a level of 10 000 steps a day and at least 30 minutes of exercise two to three times a week. Behavioral changes were facilitated by motivational counseling. Dietary Modification (Calorie restriction with a low fat diet)	
5	Marzouk, Nabil,& Senna, [13].	This study aimed to evaluate the impact of a lifestyle modification program on menstrual irregularity among overweight and obese women with polycystic ovarian syndrome.	Location: Egypt. Setting: Gynecology and Obesity clinics of Mansoura University Hospital, Egypt. Design: quasi experimental research design Duration: 42 wks sample: 82 young women A structured interview questionnaire was used to assess the women's general characteristics, menstrual patterns, and 24-hour dietary recall and the researcher took anthropometric measurements and assessed hirsutism by the Ferriman-Gallwey scale.	Dietary Modification (Calorie restriction with a low fat diet)	After one year of lifestyle modification, the number of menstrual cycles significantly increased from 2.7+/-1.6 to 6.9+/-1.5 (t=12.26, p< 001) in the study group compared to insignificant minor changes among the control group (t=0.69, p=488). Additionally, 58.5% were menstruating regularly compared to none in the control group (chi2=33.93, p<001).
6	Sim,Dezarnaulds,Denyer, Skilton,	The aim of this evaluator-blinded, randomized controlled trial was to evaluate a weight	Forty-nine obese women, aged ≤ 37 years, presenting for fertility treatment were randomized to	The intervention consisted of a very-low-energy diet for the	The 22 women who completed the intervention had greater anthropometric changes (-6.6

S. No	Author / Year	Study Objective	Methods	Life Style modification	Finding
	&Caterson,[10]	loss intervention on pregnancy rates in obese women undertaking fertility treatment.	<p>either a 12-week intervention (n = 27); or a control group (n = 22) who received recommendations for weight loss and the same printed material as the intervention. Anthropometric and reproductive parameters were measured at baseline and at 12 weeks.</p> <p>location : setting :</p> <p>Design: randomized controlled trial Duration: 12 weeks Sample: Forty-nine obese women, aged ≤37 years, intervention (n = 27) consisting of a very-low-energy diet for the initial 6 weeks followed by a hypocaloric diet, combined with a weekly group multidisciplinary programme; control group (n = 22) who received recommendations for weight loss and the same printed material as the intervention</p>	initial 6 weeks followed by a hypocaloric diet, combined with a weekly group multidisciplinary programme of exercise and behavioural components.	4.6 kg and-8.7 5.6 cm vs.-1.6 3.6 kg and-0.6 6.3 cm) compared with the control group (n = 17; P The intervention group achieved a pregnancy rate of 48% compared with 14% (P = 0.007), took a mean two fertility treatment cycles to achieve each pregnancy compared with four in the control group (P = 0.002), and had a marked increase in the number of live births
7	Mutsaerts et al., [11]	To assess the lifestyle study costs and effects of a structured lifestyle program in overweight and obese subfertile women to reduce the need for fertility treatment and improve	<p>location : Netherland setting :</p> <p>Design: Multicenter randomized controlled trial in subfertile women</p>	Diet, increase in physical activity and behavioral modification. Their dietary pattern and sustain a healthy diet	The result showed a significant weight loss was 4.4 kg in the intervention group and 1.1 kg in the control group (P<0.001). The primary outcome occurred in 27.1% of the women in the

S. No	Author / Year	Study Objective	Methods	Life Style modification	Finding
		reproductive outcome.	Duration: 6 month sample: 289 women in the intervention group and 285 women in the control group were included age 18-39 year body mass index between 29 and 40 kg/m ²	with a caloric reduction of approximately 600kcal compared to their previous caloric intake (but not below 1200 kcal/day). For physical activity daily, a pedometer (PAM; step counter) will be used aiming at 10.000 steps per day.	intervention group and 35.2% of those in the control group (rate ratio in the intervention group, 0.77; 95% confidence interval, 0.60 to 0.99).
8.	Palomba et al., [12].	The aim of the study was to test the hypothesis that a 6-week intervention that consisted of structured exercise training (SET) and hypocaloric diet increases the probability of ovulation after CC in overweight and obese CC-resistant PCOS patients.	A cohort of 96 overweight and obese CC-resistant PCOS patients was enrolled consecutively in a three-arm randomized, parallel, controlled, assessor-blinded clinical trial. The three interventions were: SET plus hypocaloric diet for 6 weeks (Group A); 2 weeks of observation followed by one cycle of CC therapy (Group B); and SET plus hypocaloric diet for 6 weeks, with one cycle of CC after the first 2 weeks (Group C).	In overweight and obese CC-resistant PCOS patients, a 6-week intervention of SET and a hypocaloric diet were given.	After 6 weeks of SET plus hypocaloric diet, the ovulation rate was significantly (P =0.008) higher in Group C [12/32 (37.5%)] than in Groups A [4/32 (12.5%)] and B [3/32 (9.4%)] 3.9 [95% confidence interval (CI) 1.1-8.3; P = 0.035] and 4.0 (95% CI 1.2-12.8; P = 0.020) compared with Groups A and B, respectively. Compared with baseline, in Groups A and C, a significant improvement in clinical and biochemical androgen and insulin sensitivity indexes was observed. In the same two groups, the insulin sensitivity index was significantly (P 0.05) better than that in Group B.

4. DISCUSSION

The Author identified various lifestyle modifications and their effect on reproductive health. In which five of the included studies were Multicenter randomized controlled trials, one quasi experimental design and two used randomized controlled trials. The participants were young women (18-39year) whose reproductive health in terms of PCOS, infertility and menstrual cycle was assessed before and after lifestyle modification intervention. Sample sizes varied. The participants were exposed to life style modification interventions in which dietary modification, exercises and behavior therapy were primarily used interventions. The time period of interventions varied in all studies, but in 7 studies the time period was 6 month and in one study the time period was 1 year. The Self-Administered scale, Rotterdam Scale for PCOS and likert type scales were used to evaluate reproductive health. None of the investigators has mentioned any specific exercises which could yield the best possible results in terms of improvement of reproductive health. Most of the evidence shows that lifestyle modification interventions, both dietary modification and physical exercises, proved to be effective in improving the overall reproductive health of young women.

Our search is limited to examining the studies relevant to only young women and adolescents below 18 years were not studied. The finding of this study cannot be generalized to all women population. Also, the search was restricted to studies published in the English language, and we have excluded 3 of the similar studies in other languages; therefore, it is possible that additional studies might present different findings. Also, there is a big challenge to finding similar studies because of very limited studies available on lifestyle modification on reproductive health. We included all the best possible studies to the best of our knowledge. We have included the studies from 2010 onwards in the review, but there were many similar studies which may have been overlooked. We could not conduct a meta analysis because the optional statistical analysis differed across the studies. Studies in this review analysis showed that lifestyle modification is the best and cost-effective treatment in all group women. Therefore, the authors recommend that lifestyle intervention should be a part of the nurses' role while caring for overweight and obese women. In addition, adolescent girls must be targeted at an early stage to prevent them

from developing obesity to have better reproductive health.

5. CONCLUSION

The literature has clearly identified a series of advantages of the lifestyle modification package and its impact on young women's reproductive health. Lifestyle modification has the potential to improve reproductive health, which raises a number of health issues in young women and for young women it's a good opportunity for primary prevention to protect themselves from reproductive health problems. This will help and minimize young women from costly and invasive treatment.

6. LIMITATION

The investigator reviewed and summarized the literature pertaining to the effectiveness of lifestyle modification interventions on reproductive health among young women, although the results would vary as very limited literature is available.

7. PRIORITIES FOR FUTURE RESEARCH

Therefore, the authors would recommend a study on structured lifestyle modification for obesity and reproductive health. Future research could be directed towards reproductive health.

CONSENT

It's not applicable.

ETHICAL APPROVAL

It's not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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