Original Article

Do dietary interventions aimed at enhancing fertility improve nutritional status in overweight or obese women?

Al Foraih Meisa PhD[1], Velangi Monal PhD[2]

[1]*Food Science and Nutrition Department, College of Health Sciences, Public Authority for Applied Education and Training, Shuwaikh Industrial, Kuwait*
[2]*Department of Nutrition and Dietetics, Faculty of Health, University of Canberra, Australia*

Background and Objectives: Overweight and obesity represent critical public health challenges, impacting over one-third of the global population. This issue is particularly pressing for women of reproductive age, who are more vulnerable to weight gain. Addressing this connection is vital for promoting overall reproductive health and ensuring the well-being of future generations. This systematic review evaluates the critical relationship between preconception dietary interventions and weight loss, along with their impacts on the nutritional status and fertility of women with obesity. **Methods and Study Design:** Our research draws from various literature sources, including CINAHL Plus (EBSCO), Medline, PubMed, the Cochrane Library, Scopus, and the Web of Science Core Collection, covering findings from 2010 to April 30, 2024. **Results:** Out of 180 studies screened, 16 met the inclusion criteria. Short-term weight loss programs showed limited impact on fertility in overweight women, and intensive weight-loss interventions were not more effective than exercise-focused programs. A preconception diet that is high in fruits, vegetables, and omega-3 fatty acids, but low in trans fats and processed foods, was associated with better fertility. The evidence regarding the benefits of weight loss is inconsistent, partly due to the reliance on indirect measures and limited use of biomarkers. **Conclusions:** Weight loss programs assist women with obesity in conceiving, but rapid weight loss may pose nutritional risks. Inconsistent nutritional assessments limit understanding of these programs. More objective measures are necessary to clarify the role of diet in fertility.

Key Words: obesity, women, infertility, pregnancy, nutritional status

INTRODUCTION

Overweight and obesity are major public health concerns affecting over a third of the world's population.[1, 2] They contribute significantly to worldwide morbidity, including increased risk for coronary heart disease, diabetes, various types of cancers (breast, prostate, and colon cancer), gallstones, osteoarthritis, liver and kidney disease, sleep apnea, depression, and mortality.[3, 4] Between 1990 and 2021, global rates of overweight and obesity surged dramatically, affecting about 1 billion men and 1.11 billion women.[5] The largest populations impacted are in China, India, and the USA, with alarmingly high prevalence rates in Oceania, North Africa, and the Middle East, where some countries exceed 80%.[5] Since 1990, obesity has risen by 155% in men and 105% in women, particularly in North Africa and the Middle East[5] By 2050, an estimated 3.8 billion adults, over half the global adult population, will be affected. Sub-Saharan Africa is projected to see a 255% increase, with Nigeria alone expected to have 141 million affected adults, making it the fourth highest globally. Addressing this growing epidemic is crucial.[5] No country has successfully reversed the rising rates of adult obesity. Without immediate action, cases will continue to grow, especially in Asia and Africa, adding to the burden of related diseases. Urgent, targeted measures are necessary, as obesity poses a significant, preventable global health threat.

Women of reproductive age, particularly 15 to 44 years, have shown more vulnerability to weight gain.[6,7 8-10] Numerous studies have highlighted the association between obesity and delayed conception in women, and infertility in both men and women, especially when developed early in life, such as during infancy or pubertal age.[11-15] The risk of infertility[16] is increased by 78% and 27% in women of childbearing age with obesity and overweight, respectively, as compared with women of normal weight (BMI 18.5–25).[17] In addition, it has been shown that the probability of pregnancy is reduced by 5% per unit of BMI exceeding 29 kg/m^2.[18,19] Several mechanisms are involved in the relationship of fertility and obesity.[19] Obesity in women may affect fertility through

Corresponding Author: Dr Meisa Al Foraih, Food Science and Nutrition Department, College of Health Sciences, Public Authority for Applied Education and Training, Shuwaikh Industrial, Kuwait 23778
Tel: + 24630500; Fax: + 24630333
Email: mt.alforaih@paaet.edu.kw
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anovulation which results in menstrual irregularity; impairment of oocyte development and quality;[16, 20] and may cause biochemical alterations in the preovulatory follicular environment.[11, 13, 21-24] In addition, both underweight and overweight women are at risk of lower follicular-phase estradiol levels.[13, 24] In addition, overweight women who struggle with fertility mostly have co-morbidities such as polycystic ovarian syndrome (PCOS), which creates additional challenges to fertility due to disturbances in insulin resistance, sex-steroid metabolism, and menstruation.[25,26] An estimate of 75% infertile women with obesity have been reported to have PCOS.[25,26]

Obesity is related to a need for higher doses of assisted reproductive therapy medications, more frequent cycle cancellations, and lower rates of efficacy at each stage of the in vitro fertilization process.[11] Several studies have shown that women who are overweight or obese undergoing assisted reproductive treatment (ART) have poorer reproductive outcomes than women within normal weight ranges, especially those with central adiposity and PCOS.[19, 27-29] Therefore, patients seeking fertility treatments are often advised to optimize their weight before embarking on ovulation-induction drugs or ART such as in vitro fertilization.[18]

Weight loss, particularly around the abdominal area, may have beneficial effects on reproductive functions.[30,31] A study by Clark et al. 1998, showed that weight loss in obese infertile women was extremely effective for the resumption of ovulation, improvement of spontaneous pregnancy rates, and reduction of miscarriage rates.[32, 33] In addition, Sim et al. 2014, reported an adequate enhancement in pregnancy rates with a loss of only 6.9% of initial body weight.[32, 34] Treatment of obesity should therefore be the initial aim in obese women unable to conceive.[31]

Various strategies for weight reduction, including diet, exercise, pharmacological and surgical intervention exist, a lifestyle modification continues to be of paramount importance. Sim et al. 2014,[34] reviewed eleven studies investigating the effect of various weight loss interventions on fertility outcomes. Six studies showed that weight loss achieved by diet and lifestyle interventions resulted in significantly increased pregnancy rates.[34] Veen et al. 2011, carried out a study on 2896 obese women with subfertility, to examine the effects of a lifestyle intervention program on weight loss and subsequent fertility.[35] Results showed weight loss > 10% in a substantially higher number of obese women who participated in the lifestyle programme (received personal coaching and dietary consultations), than the women who were advised to reduce weight without further help (72% vs 5%). Also, while the pregnancy rates in both groups were practically even, spontaneous pregnancy rates were lower in subjects not involved in the weight loss programme (9%) compared to those who were (38%).[36]

Additionally, a large prospective cohort by Chavarro et al.,[36] showed that women who were on a specific diet comprised of plant protein from sources, full-fat dairy foods, iron, and monounsaturated fats, during the preconception period, had a 66% lower risk of infertility related to ovulatory disorders and a 27% lower risk of infertility due to other causes compared to women with the lowest intake of this diet pattern.[36,37]

Therefore, although numerous studies have shown that dietary interventions may play a crucial role in the adverse reproductive outcomes associated with obesity, there is limited data on food patterns that encourage optimal health outcomes in these women.

The purpose of this systematic review is to investigate the effect of preconception dietary interventions in overweight women on weight and fertility outcomes, and to determine whether these dietary interventions improve overall nutritional status.

METHODS

The systematic review titled “Dietary Interventions to Enhance Fertility in Overweight/Obese Women and Improve Nutritional Status” was meticulously designed and carried out by the researcher from the Public Authority for Applied Education and Training in Kuwait and supported by experts from India.

Ethical clearance

This systematic review did not require ethical clearance, as it utilized established, evidence-based research published online.

Objectives

The key objectives of this study were to identify effective diet-related lifestyle interventions that enhance fertility in overweight women and to evaluate how these strategies impact body weight and nutritional status while improving fertility outcomes.

Criteria for selecting studies

Types of studies

This review highlights important studies that investigate the crucial link between dietary intake and fertility. It emphasizes how weight loss and improved BMI can significantly enhance reproductive health. By examining nutritional status in relation to fertility, researchers can uncover vital insights. This review is particularly focused on intervention studies involving overweight or obese women who are actively trying to conceive, regardless of their study design or duration of follow-up. Furthermore, it includes systematic reviews that delve into the intersection of obesity, nutrition, and fertility, reinforcing the need for informed dietary choices in the journey to conception.

Participants

This review targets women of reproductive age struggle with infertility defined as a persistent desire to conceive without success. These participants are committed to improving their health through dedicated dietary and lifestyle changes aimed at weight loss. To ensure the study's relevance, participants should be classified as at least overweight according to World Health Organization (WHO) body mass index standards. A body mass index of 25 kg/m² or greater qualifies as overweight, while a BMI of 30 kg/m² or more indicates obesity. Those with a BMI of 40 kg/m² or higher fall into the category of morbid obesity.[38]

Exclusion criteria

Certain individuals will be excluded to maintain the study's integrity. This includes anyone with a BMI below 25, as well as males and women who are not actively trying to conceive. Additionally, participants with polycystic ovarian syndrome (PCOS) or similar reproductive disorders, cancer, ongoing assisted reproductive treatments, eating disorders, prior weight loss surgeries (bariatric), or a history of surgeries involving reproductive organs will not be eligible. To minimize heterogeneity and focus specifically on the effects of obesity on infertility without the influence of confounding endocrine conditions, studies involving PCOS were excluded. Polycystic ovary syndrome has a unique pathophysiology and response to treatment, which could mask the specific impact of obesity on fertility outcomes in the general population. By carefully selecting participants, the study aims to produce reliable and impactful results for those seeking to overcome infertility challenges.

Types of interventions

Researchers considered a wide range of effective weight-loss interventions, such as strategies for rapid weight reduction, dietary adjustments, exercise programs, psychological support, and the use of weight-loss foods and medications. Diet interventions, for instance, are defined as structured dietary strategies aimed at promoting weight loss or improving metabolic health. These interventions include calorie-restricted diets, macronutrient-modified diets (such as low-carb, low-fat, and high-protein), meal replacements, and nutritional plans prescribed by healthcare professionals. To distinguish diet interventions from other types of interventions, we characterized them by their primary focus on modifying food intake, as opposed to physical activity interventions (which emphasize exercise), psychological support (such as behavioral therapy), or pharmacological approaches (such as anti-obesity medications). It is important to note that researchers excluded studies involving bariatric surgery and liposuction, focusing instead on approaches that promote sustainable health and well-being.

Types of outcome measures

The primary outcomes of interest include changes in body weight, the occurrence of pregnancy, and live births. The secondary outcomes of interest consist of changes in BMI, body fat percentage, and waist circumference. Nutritional status refers to an individual's health condition as influenced by the intake and utilization of nutrients. In this review, we assessed nutritional status using commonly reported indicators from the included studies, such as BMI, body composition (including fat mass and lean mass), and relevant biochemical markers (such as serum levels of vitamins, iron, glucose, and lipid profiles), when available. These measures offered insights into the participants' baseline health and the effects of interventions on their nutritional health over time. Additionally, these outcomes encompass menstrual changes, improvements in ovulation and menstrual regularity, enhancements in reproductive hormone profiles, time to conception (TTC), alterations in reproductive hormones, and instances of miscarriage or loss of pregnancy.

Search methods for identifying studies

The keywords used to search for relevant studies included "obesity," "overweight," "BMI," "nutrition," "diet," "food," "fertility," "pregnancy," and "reproduction." The articles were published in English over the past twenty-four years, specifically from January 1, 2010, to April 30, 2024. The electronic databases searched included CINAHL Plus (EBSCO), Medline, PubMed, the Cochrane Library, Scopus, and the Web of Science Core Collection. Full copies of the articles that met the reviewers' PICO-derived inclusion criteria were obtained based on their titles, abstracts, and subject descriptors for data extraction and analysis. Additionally, articles identified through reference lists and citation searches were also considered for data collection based on their titles.[39]

Data collection and analysis

Researchers from Kuwait and India collected data by identifying articles that met the PICO criteria for inclusion in their publication. The articles were categorized based on their study designs, which included retrospective, prospective, and cross-sectional studies. The quality of each study was independently evaluated by two primary reviewers before it was included in the review.[40] Because of the heterogeneity in study designs, interventions, and outcome measures, a narrative synthesis approach was adopted. The studies were grouped according to the type of intervention (e.g., dietary, physical activity, psychological, pharmacological) and their primary fertility-related outcomes. Any contradictory findings were reconciled through a critical comparison of study quality, sample sizes, and risk of bias, following the assessments provided by the Academy of Nutrition and Dietetics Quality Criteria Checklist. In cases of discrepancies, the two independent reviewers discussed the issues, with preference given to studies demonstrating higher methodological rigor. Due to variability in outcome reporting and intervention protocols, a quantitative synthesis, such as a meta-analysis, was not performed. The selected studies were imported into Covidence, a primary screening and data extraction tool essential for managing systematic reviews. This software aids in citation screening and reduces the risk of bias assessment, similar to tools used by the Cochrane Library.[41, 42] After screening, pertinent data was extracted from each article, including the title, author, language, country of the first author, reasons for inclusion, study design, number of participants and their characteristics, relevant intervention strategies, study outcomes, and limitations. Additionally, the articles were evaluated for inter-rater reliability using Cohen's Kappa statistic. The kappa statistic is a reliable measure for assessing the level of agreement between two raters.[42]

Data extraction and quality assessment

A template for data extracting was developed including participants, study duration, study design, interventions, and primary and secondary outcomes, including reproductive hormones, ovulation rates, and pregnancy rates. Data from outcomes reported by only one study, such as leptin, were excluded to maintain analysis integrity. One author conducted the extraction, while a second author verified the findings for accuracy. Both authors assessed

study quality using the Quality Criteria Checklist for Primary Research and Review (Table 3), a tool focused on minimizing bias and enhancing validity in nutrition and dietetics. Studies were rated as negative (weak quality), neutral (average quality), or positive (strong quality). Consensus on ratings was achieved through discussion, and in cases of uncertainty, a final response of "no" was recorded to preserve assessment rigor.

Bias assessment

Two authors (MF and MV) independently assessed the risk of bias by utilizing the Evidence Analysis Manual Steps from the Academy Evidence Analysis Process, as well as the Quality Criteria Checklist for Primary Research and Reviews. They evaluated the studies in terms of high, low, and unclear risk of bias based on the level identified (Figure 2). To minimize bias, we included randomized controlled trials (RCTs) and systematic reviews in our analysis.

Data synthesis and reconciliation of contradictory findings

The data synthesis approach in this review aimed to integrate a diverse body of evidence while acknowledging methodological heterogeneity across studies. Given the variation in intervention types, population characteristics, and outcome measures, a narrative synthesis was employed rather than a meta-analysis. Contradictory findings particularly regarding the impact of weight loss on live birth rates were reconciled by examining the context of each study, including sample size, intervention intensity, duration, and methodological rigor. Greater weight was given to high-quality randomized controlled trials and systematic reviews with lower risk of bias. In cases of discrepancy, such as between Shen et al.[43] (2023), which showed improved live birth rates with weight loss, and Jeong et al.[47] (2024), which found no significant improvement, differences in intervention design, baseline BMI, and follow-up periods were considered as possible explanatory factors. This contextual interpretation allowed for a better understanding of how lifestyle interventions may influence reproductive outcomes in women with obesity.

RESULTS

A total of 180 studies were identified during the initial database search (PubMed, EBSCO, and CINAHL Plus), and the outcomes of the search are detailed below (Figure 1). After removing duplicates, 48 titles and abstracts were screened, and the full texts of 19 studies were evaluated for eligibility. In Table 1, sixteen studies met the inclusion criteria, while three were excluded because they did not focus on dietary and lifestyle modifications. Additionally, three studies examined fertility outcomes in both males and female.

The reviewed studies examine various interventions for weight loss or lifestyle changes before or during infertility treatment, primarily among women with overweight or obesity. While some studies[43,44] indicate that significant weight loss (10-15%) is associated with improved conception and live birth rates, larger reviews [45,47, 21] suggest that pre-IVF weight loss may not consistently lead to better outcomes. Intensive lifestyle interventions involving pharmacological support or structured programs can improve metabolic health,[46, 44] but these benefits do not always result in enhanced reproductive success. Low-carbohydrate diets show promise for improving hormonal profiles,[26] though more evidence is needed regarding their effect on fertility. Digital tools, like online coaching platforms,[55] positively influence behaviors but their effects on pregnancy rates remain unclear. Furthermore, some studies highlight limited long-term well-being benefits from interventions,[54] and risky weight control practices may emerge among women trying to conceive.[54] Beyond BMI, factors like waist-to-hip ratio may better predict live birth outcomes,[58] and dietary components such as high trans-fat and low omega-3 intake could affect fecundability.[13] Nevertheless, methodological differences across studies

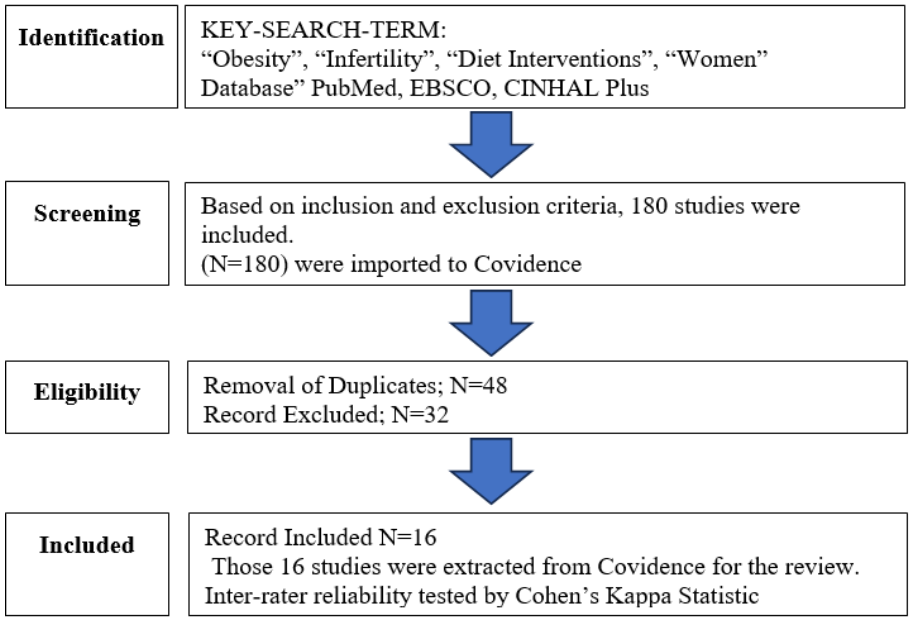

Figure 1. Search and selection criteria based on PRISMA guidelines

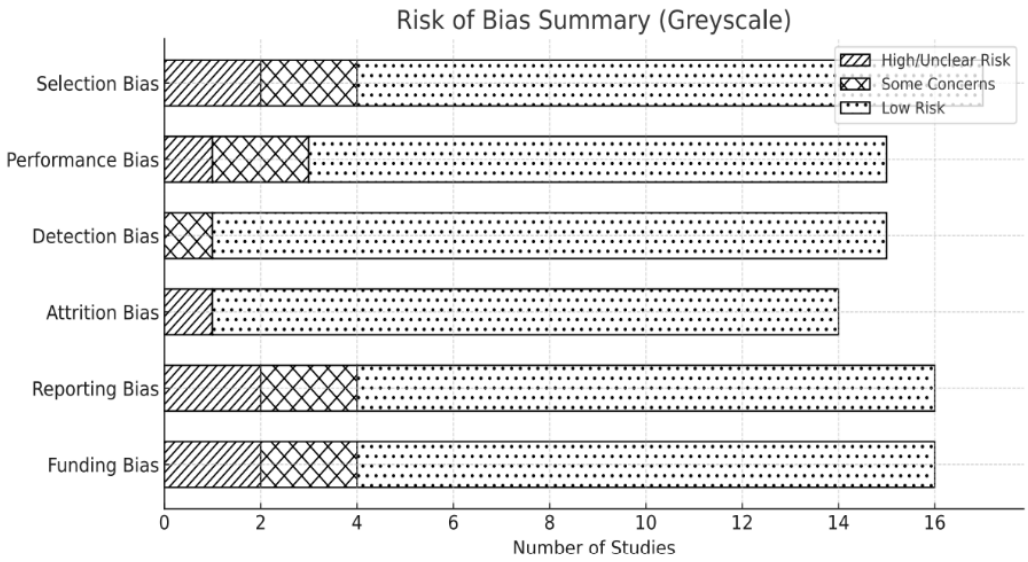

Figure 2. Risk of bias summary.

complicate comparisons and weaken the conclusions drawn. For example, the variety of study designs such as randomized controlled trials, cohort studies, and systematic reviews along with differing populations (varying BMI cut-offs and infertility causes) complicates direct comparisons. Outcomes assessed differ significantly, with some focusing on weight loss and others on pregnancy or live birth rates, as well as metabolic or hormonal changes. Intervention durations range from 3 to over 16 weeks, and follow-up periods vary, complicating outcome evaluations. This diversity of interventions including diet, physical activity, medication, and coaching further contributes to inconsistencies in findings.

A summary of Table 2 synthesizing the nutritional status and dietary-related findings across the studies. This focuses on nutrition components, diet interventions, and their reported effects on fertility or related outcomes. Some studies[13,49] used self-reported dietary tools, such as Food Frequency Questionnaires (FFQs), to estimate nutrient intake and dietary patterns before conception. While these tools assessed key nutrients (e.g., trans fats, omega-3 fatty acids) and food groups (e.g., fruits, fast food), they are limited by recall bias and measurement error. Many intervention trials in Shen et al.[43] (2023), Lergo et al.[46] (2022) and Rothberg et al.[44] (2016) studies relied on body weight, BMI, and waist-to-hip ratio as indirect indicators of nutritional status and metabolic health. Although these weight-loss interventions aimed to improve fertility outcomes, they do not directly capture diet quality or micronutrient status. Some studies implemented specific dietary interventions, like low-carbohydrate diets,[26] while others focused on lifestyle coaching55 to assess compliance and dietary risk scores. A study was conducted by Fontana and Della Torre [50] (2016) that included metabolic hormones and biomarkers (e.g., insulin, adipokines) to link nutrition and fertility, but this was not consistent across all research. There was no standardized method for assessing nutritional status, leading to significant variation in data collection. The reliance on self-reporting and indirect measures limits the understanding of how specific nutrients or dietary patterns affect fertility, complicating efforts to synthesize findings and draw clear conclusions.

Nutritional interventions encompass a diverse range of approaches, from specific diets like low-carb to meal replacements, weight-loss medications, and comprehensive lifestyle coaching. Research highlights the critical role of diet quality considering factors such as the choice between vibrant fruits and convenient fast food, or the types of fats consumed in shaping fertility outcomes. While weight loss is often viewed as a marker of enhanced nutritional status, more direct assessments of nutrition are surprisingly rare. The evidence underscores the significance of dietary quality and balance, yet the diversity in intervention methods and outcome measures can make it challenging to reach definitive conclusions. Nevertheless, prioritizing nutrition is undeniably essential for fostering optimal health and fertility. To better understand the role of nutrition in fertility, future research should incorporate standardized, validated nutritional assessment tools, including objective biomarkers, alongside anthropometric measures to comprehensively characterize nutritional status. While weight loss and lifestyle interventions appear to improve some intermediate outcomes (e.g., weight, metabolic health, hormonal profiles), evidence on their direct impact on live birth or pregnancy rates in women with obesity is inconsistent. This inconsistency is due to variations in study populations, interventions, outcome measures, and follow-up durations.

DISCUSSION

This systematic review synthesizes evidence from 16 studies including nine primary studies, six systematic reviews/meta-analyses, and one position paper examining the effects of preconception dietary interventions and weight loss on the nutritional status and fertility of overweight and obese women. Numerous studies demonstrate that losing weight can positively affect fertility outcomes.[11,33,34,44] A retrospective cohort study, for instance, by Shen et al.[43] showed improved conception and live birth rates in infertile obese patients that had undergone a weight loss of ≥10% body weight. In addition, a

Table 1. The characteristics of participating studies

Title	Study type	Participants; Study duration	Methods
1- Shen et al., 2023.[43]	Retrospective cohort study	197 women with obesity(BMI>30kg/m2), first IVF/intracytoplasmic sperm injection (ICSI) cycle;3-6 months	Obese women participate in weight management program before undergoing their first IVF/ICSI cycle, Divided into 2 groups according to the weight loss goal > or < of 5%.
2- Lergo, et al., 2022.[46]	Randomized controlled study (FIT-PLESE)	379 women with obesity (BMI ≥ 30 kg/m^2) and unexplained infertility were randomly assigned in a 1:1 ratio to 2 preconception lifestyle modification groups lasting 16 weeks	The intensive group underwent increased physical activity and weight loss (target 7%) through meal replacements and medication (Orlistat) compared to a standard group with increased physical activity alone without weight loss. This was followed by standardized empiric infertility treatment consisting of 3 cycles of ovarian stimulation/intrauterine insemination.
3- Jeong et al., 2024.[47]	Systematic review and Meta-analysis	1627 women with obesity participated in weight loss program before in vitro fertilization (IVF).	A systematic search of the PubMed, Embase, and Cochrane Library databases was conducted from their inception until December 2022, utilizing relevant keyword combinations. Six randomized controlled trials were analysed.
4- Rothberg et al., 2016.[44]	Intervention trial (pilot study). Single site, academic institution-based study.	39 Women with obesity (BMI 35 – 45 kg/m2) with anovulatory subfertility;16 weeks	Intensive weight loss (IWL) (15% weight loss) versus standard-of-care nutrition (SCN) (≥ 5% weight loss) by randomization. IWL - 12 weeks of very-low energy diet (800 kcal/day) + 4 weeks of a low-calorie conventional food-based diet (CFD) SCN - 16 weeks of CFD, further transitioned to weight maintenance diets and referred to reproductive endocrinology for ovulation induction.

Title	Outcome measures	Findings
1- Shen et al., 2023.[43]	Primary outcomes: Weight reduction and outcome of IVF cycle. Secondary outcomes: Clinical pregnancy and live birth rates.	Weight loss of 10% enhances conception and increase live birth rates.
2- Lergo, et al., 2022.[46]	The primary outcomes: healthy live birth incidence. Secondary outcomes: healthy metabolic, gastrointestinal side effects	No significant differences in the incidence of healthy live births [standard 29/191(15.2%), intensive 23/188 (12.2%), rate ratio 0.81 (0.48 to 1.34), $p = 0.40$]. Intensive had significant weight loss compared to standard (−6.6 ± 5.4% versus −0.3 ± 3.2%, $p < 0.001$). Improvements in metabolic health, decrease in incidence of the metabolic syndrome (baseline to 16 weeks: standard: 53.6% to 49.4%, intensive 52.8% to 32.2%, $p = 0.003$)
3- Jeong et al., 2024.[47]	Primary outcomes: Weight reduction before IVF. Secondary outcomes: Pregnancy and live birth rates	Weight reduction before IVF did not significantly improve the live birth rate in women with obesity or overweight infertility.
4- Rothberg et al., 2016.[44]	Primary outcomes: Weight loss, pregnancy rates, delivery rates. Secondary outcomes: insulin sensitivity.	Intensive weight loss intervention showed higher percentage of weight loss and improvements in insulin sensitivity, with successful pregnancies and deliveries which was not seen in standard-of-care nutrition counselling group.

Table 1. The characteristics of participating studies (cont.)

Title	Study type	Participants; Study duration	Methods
5- McGrice and Judi Porter, 2017. 26	Systematic Review	7 studies included Infertile women, Low carbohydrate diets (< 45% total energy from carbohydrates), compared to usual diet (with or without co-treatments).	Four databases and a supplementary Google scholar were searched for related studies, and the title and abstract, then full text review, were recorded independently and in duplicate. Reference lists of included studies and relevant systematic reviews were checked to ensure that all relevant Seven studies were identified for inclusion. Quality assessment was undertaken independently by both authors using the Quality Criteria Checklist for Primary Research.
6- Lan et al., 2017. [21]	Systematic review and meta-analysis	8 RCTs studies included overweight or obese sub-fertile women seeking reproductive assistance, with few community-based studies and none including men. from earliest available time until April, 2016, using CINAHL (from 1937), Ovid Medline (from 1946), Embase (from 1947) and the Cochrane Central Register of Controlled Trials (from 1991).	Main search terms were those related to preconception lifestyle. Database searched were Ovid MEDLINE(R), EBM Reviews, PsycINFO, EMBASE and CINAHL Plus. No language restriction was placed on the published articles. The final search was performed on 10 January 2017. Bias and quality assessments were performed.
7- Berenson et al., 2014. [53]	Cross-sectional survey.	1711 women aged 16-40 years with low income, racially diverse, and attending reproductive health clinic; 9 months.	This study explores the health behaviors related to nutrition and weight management in women trying to conceive versus those who are not. Using multivariable logistic regression.

Title	Outcome measures	Findings
5- McGrice and Judi Porter, 2017. [26]	Primary outcomes: Improvements in reproductive hormones profile, ovulation rates and/or pregnancy rates.	The examined interventions were diverse, featuring low-carbohydrate diets with or without energy deficits and other treatments. Of the seven studies that met the inclusion criteria, six received high marks for quality, indicating a low risk of bias, while one was rated neutral. Notably, five of the six studies that investigated reproductive hormones reported significant improvements post-intervention.
6- Lan et al., 2017. [21]	Primary outcomes: live birth, birth weight and pregnancy rate (both from natural conception and ART). Secondary outcomes: quality of life, anthropometric and metabolic profile, obstetric and fetal outcomes measures.	Lifestyle interventions can promote weight loss and improve natural pregnancy rates, though they do not affect live birth rates or birth weight.
7- Berenson et al., 2014. [53]	Primary outcomes: Binary health behaviours details about consumption of fruits, vegetables, fast-food, soda, smoking, alcohol, sleep medicines, diet pills, laxatives, etc.; exercise, sleep quality, fasting behaviours.	Women trying to conceive are more likely to participate in unhealthy and potentially dangerous weight loss practices than women not trying to conceive. There were no significant differences between the two groups in amount of exercise, current smoking status or current alcohol consumption.

Table 1. The characteristics of participating studies (cont.)

Title	Study type	Participants; Study duration	Methods
8- Van Dammen et al., 2019.[54]	Randomized controlled trial.	577 women with infertility aged 18 - 39 years and body mass index (BMI) 29 kg/m^2; 6 months.	To assess the effects of lifestyle intervention in women with obesity and infertility on perceived stress, mood symptoms, sleep quality and quality of life (QoL) five years after randomization.178 women who participated in the LIFE style study, a multicentre RCT (intervention (n = 84) and control groups (n = 94) were assessed for outcome measures. T-tests and linear regression models were used to assess differences between the intervention and control groups.
9- Fontana and Della Torre, 2016. [50]	Review	Reviewing studies in terms of energy metabolism, hormones, dietary intervention, lifestyle and female fertility.	Relevant studies on nutrition, energy balance, and female fertility were reviewed, focusing on the effects of body weight, hormonal changes, and dietary components on reproductive health. Evidence on lifestyle and dietary interventions was also examined to assess their role in managing infertility.
10- Best, Avenell and Bhattacharya, 2017.[11]	Systematic review and meta-analysis.	Lifestyle interventions of any study design in participants of either gender with an unfulfilled desire to conceive.	A total of 40 studies were included, of which 14 were RCTs. A systematic search of MEDLINE, EMBASE, and the Cochrane Library (1966–2016) identified studies on lifestyle interventions for individuals with infertility. Text word and MESH search terms used related to infertility, weight and barriers to weight loss Inclusion required an active desire to conceive and excluded studies on bariatric surgery or unrelated medical conditions. Two reviewers independently assessed study quality using the Cochrane Risk of Bias Tool for randomized trials, and a ratified checklist (ReBIP) for non-randomized studies.

Title	Outcome measures	Findings
8- Van Dammen et al., 2019.[54]	Five years post-randomization, no lasting effect of the pre-conception lifestyle intervention on female well-being was found. Non-responders had lower baseline mental QoL and showed greater physical QoL improvements during the intervention.	The examined interventions were diverse, featuring low-carbohydrate diets with or without energy deficits and other treatments. Of the seven studies that met the inclusion criteria, six received high marks for quality, indicating a low risk of bias, while one was rated neutral. Notably, five of the six studies that investigated reproductive hormones reported significant improvements post-intervention.
9- Fontana and Della Torre, 2016. [50]	Diet and lifestyle are key to female fertility, but inconsistent research and lack of standardized methods limit identification of an effective "fertility diet." Despite modern lifestyle challenges disrupting metabolic balance, dietary and lifestyle interventions remain a promising, cost-effective approach to support reproductive health.	Lifestyle interventions can promote weight loss and improve natural pregnancy rates, though they do not affect live birth rates or birth weight.
10- Best, Avenell and Bhattacharya, 2017.[11]	Weight reduction through dietary changes and physical activity can significantly improve fertility outcomes in overweight and obese individuals. However, more research is needed, particularly involving men, couples, and the challenges faced by infertile populations in achieving weight loss.	Women trying to conceive are more likely to participate in unhealthy and potentially dangerous weight loss practices than women not trying to conceive. There were no significant differences between the two groups in amount of exercise, current smoking status or current alcohol consumption.

Table 1. The characteristics of participating studies (cont.)

Title	Study type	Participants; Study duration	Methods
11- Wise et al., 2018.[56]	Preconception Cohort Studies.	1290 Women who were attempting to become pregnant; Pregnancy status was tracked through self-administered follow-up questionnaires every 8 weeks for up to 12 months or until conception.	Snart Foraeldre (SF) is a Danish prospective cohort study of women aged 18–45 trying to conceive. Recruitment began in 2011 via online platforms, with data collected through self-administered questionnaires. Participants were not receiving fertility treatment and completed a dietary questionnaire starting in 2013. Baseline questionnaires in the SF and PRESTO studies collected data on demographics, lifestyle, and reproductive history.
12- Spencer et al., 2015.[57]	Systematic review (only the quantitative study design of randomized controlled trials (RCTs) – level II evidence from National Health and Medical Research Council, and level 1 from The Joanna Briggs Institute Review of multicentre RCT (Secondary analysis) of the LIFE-style study.	Pregnant or post-partum adult females (>18 years), all pre-pregnancy BMI categories. Comorbidities (gestational diabetes or diabetes only); from 1980 to September 2014.	A three-step search strategy targeting English-language studies was used to focus on research following the rise in obesity. The process included an initial limited search (MEDLINE, CINAHL), a comprehensive keyword and index term search across multiple databases (including EMBASE, Scopus, and PsycINFO), and hand-searching references. Keywords included terms related to pregnancy, obesity, and diet. Two independent reviewers screened all studies for relevance and inclusion, with a third reviewer consulted to resolve any disagreements.

Title	Outcome measures	Findings
11- Wise et al., 2018.[56]	Primary outcomes: fecundability and pregnancy status. High trans-fat intake and low ω-3 fatty acid intake were associated with reduced fecundability, particularly among North American women.	High trans-fat intake was linked to reduced fecundability in North American women, while higher ω-3 fatty acid intake was associated with improved fecundability. No significant associations were found in Danish women.
12- Spencer et al., 2015.[57]	Primary outcomes: Weight during pregnancy and/or postpartum. Weight change outcomes reported as weight (kg or lb.), Body Mass Index, waist or hip circumference and/or percentage body fat will be included. Adverse outcomes will be documented if reported. Healthy live birth rate within 24 months, as well as the rate of overall live births (live births independent of gestational age, mode of delivery and health) and natural conceptions within 24 months.	No existing systematic reviews were identified on this topic. This review will evaluate the effectiveness of dietary-based weight management interventions in pregnant and postpartum women and analyze the strategies employed.

Table 1. The characteristics of participating studies (cont.)

Title	Study type	Participants; Study duration	Methods
13- Van Oers et al., 2016. [58]	Randomized controlled trial	577 obese infertile women under the age of 36 were randomly assigned to either a 6-month lifestyle intervention followed by infertility treatment (intervention group) or to receive prompt infertility treatment (control group). Between 2009 and 2012.	A secondary analysis of a multicentre RCT (randomized controlled trial), the LIFE style study, obese infertile women were randomly assigned to a 6-month lifestyle intervention followed by infertility treatment (intervention group) or to prompt infertility treatment (control group). Predefined subgroups were based on age, ovulatory status, BMI, and waist–hip ratio.
14- Ng et al., 2018.[55]	Randomized controlled trail	440 Women aged 18-45 years suffering from subfertility or recurrent miscarriages attending the outpatient clinic.	This RCT tests whether an online lifestyle coaching application improves periconception advice and outcomes in women with subfertility or recurrent miscarriage. Women suffering from subfertility or recurrent miscarriages attending the outpatient clinic will be randomized into either the intervention arm (personalized online lifestyle coaching application) or the control arm (standard periconceptional advice including information from NHS websites). Both groups were asked to complete a validated lifestyle questionnaire at baseline, and 6, 12, 18 and 24 weeks after randomization.
15- Grieger et al., 2018. [54]	Multi-center pregnancy-based cohort study	5628 Nulliparous women with low-risk singleton pregnancies who participated in the Screening for Pregnancy Endpoints (SCOPE) study; from November 2004 to February 2011 in Adelaide (Australia).	The study assessed preconception diet and time to pregnancy (TTP), using data collected at 14–16 weeks' gestation. Dietary intake for the month before conception was recorded via food frequency questions. Fertility treatment use was also documented. Statistical analyses estimated the impact of diet on TTP and infertility risk, adjusting for various confounders and conducting sensitivity analyses to address potential biases.

Title	Outcome measures	Findings
13- Van Oers et al., 2016. [58]	Primary Outcomes: healthy live birth rate and natural conception rate within 24 months after randomization.	Maternal age, ovulatory status, and BMI did not affect healthy or overall live birth rates within 24 months. However, waist–hip ratio (WH) significantly influenced the effect of lifestyle intervention on healthy live birth rate, with women having WH ratio <0.8 showing lower rates. WHR had no impact on overall live birth or natural conception rates. Lifestyle intervention led to more natural conceptions in anovulatory women compared to ovulatory women. No other subgroup interactions were observed.
14- Ng et al., 2018.[55]	Primary outcomes: dietary and lifestyle risk score at 12 weeks. Secondary outcomes: program compliance, spontaneous conception rate, and risk score at 24 weeks.	The personalized online lifestyle coaching application showed greater effectiveness in improving dietary and lifestyle behaviours compared to standard NHS advice, particularly in women with subfertility or recurrent miscarriage.
15- Grieger et al., 2018.[54]	Primary outcomes: time to pregnancy (TTP) and the risk of infertility (defined as TTP >12 months), assessed in relation to preconception dietary intake.	Lower fruit intake and higher fast food intake were linked to modest increases in time to pregnancy (TTP) and infertility risk. The greatest differences were observed between the lowest and highest intake categories for both food types.

Table 1. The characteristics of participating studies (cont.)

Title	Study type	Participants; Study duration	Methods
16- Stang, et al., 2016. [59]	Position paper	Women of reproductive age trying to conceive and pre-conception overweight or obesity or high gestational weight gain.	The Academy of Nutrition and Dietetics recommends educating all women of reproductive age on the risks of pre-pregnancy obesity and excessive weight gain. Lifestyle and behavioural counselling should begin preconception and continue through pregnancy and postpartum, for at least 12 to 18 months postpartum.

Title	Outcome measures	Findings
16- Stang, et al., 2016. [59]	Primary outcomes: Fertility, healthy weight gain, fewer pregnancy complications, and postpartum weight retention. Secondary outcomes: Maternal and fetal risks like pre-eclampsia, delivery issues, and infant size problems.	Diet, physical activity, and behaviour interventions effectively promote healthy weight gain during pregnancy. However, evidence is limited regarding their impact on broader reproductive outcomes.

Table 2. Nutritional status and dietary- related findings across the studies

Study (author, year)	Nutrition/ diet intervention or status	Population	Key nutritional findings related to fertility	Comments
McGrice & Porter, 2017.[26]	Low carbohydrate diets (<45% total energy from carbs)	Infertile women	Low-carb diets improved reproductive hormones in 5/6 studies	Dietary diversity and energy deficit included
Wise et al., 2018.[13]	Dietary intake: trans-fat and ω-3 fatty acids	Women trying to conceive	High trans-fat intake ↓ fecundability; higher ω-3 intake ↑ fecundability	Effect varied by geographic population
Grieger et al., 2018.[49]	Preconception diet assessment: fruit and fast-food intake	Nulliparous pregnant women	Lower fruit intake and higher fast food intake ↑ time to pregnancy and infertility risk	Dietary intake based on food frequency questionnaire
Shen et al., 2023.[43]	Weight management program (no specific diet detailed)	Women with obesity in IVF	Weight loss improved conception and live birth rates	Weight loss likely related to nutritional changes
Lergo et al., 2022.[46]	Meal replacements + Orlistat vs physical activity alone	Obese women with infertility	Intensive group lost more weight but no difference in healthy live births	Medication + diet vs exercise alone
Fontana & Della Torre, 2016.[50]	Review of energy metabolism, hormones, and diet on fertility	Female fertility studies reviewed	Diet and lifestyle impact fertility; inconsistent methods limit conclusions	Highlights importance of energy balance
Ng et al., 2018.[55]	Online lifestyle coaching focusing on diet and lifestyle	Women with subfertility	Personalized coaching improved dietary and lifestyle behaviors	Digital intervention
Berenson et al., 2014.[53]	Survey of nutrition-related behaviors	Low-income women trying to conceive	Unhealthy weight loss practices common in women trying to conceive	Behavioral risk despite fertility goals
Spencer et al., 2015.[57]	Review of dietary-based weight management in pregnancy	Pregnant/postpartum women	Evaluating diet effects on weight and pregnancy outcomes	No prior comprehensive reviews found

Table 3. Quality assessment of included studies (The Academy of Nutrition and Dietetics Quality Criteria Checklist).

Author	Validity Ratingb									
	1	2	3	4	5	6	7	8	9	10
1- Shen et al., 2023.[43]	Y	Y	Y	N	Y	Y	Y	Y	Y	N/A
2- Lergo, et al., 2022.[46]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
3- Jeong et al., 2024.[47]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4- Rothberg et al., 2016. [44]	Y	N	N	Y	Y	Y	Y	Y	Y	Y
5- McGrice and Judi Porter, 2017. [26]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
6- Lan et al., 2017. [21]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
7- Berenson et al., 2014. [53]	Y	Y	Y	N	N	Y	Y	Y	Y	Y
8- Van Dammen et al., 2019.[54]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9- Fontana and Della Torre, 2016. [50]	Y	N	N	N	N/A	Y	N	unclear	Y	N
10- Best, Avenell and Bhattacharya, 2017.[11]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
11- Wise et al., 2018.[56]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Author	Overall rating	Examples of reason for downgrading
1- Shen et al., 2023.[43]	Positive	Method of handling withdrawals and Statement of the role of funding source were not included.
2- Lergo, et al., 2022.[46]	Positive	The small number of pregnancies reduced the statistical power for examining differences in the rate of pregnancy complications between groups
3- Jeong et al., 2024.[47]	Positive	The quality of evidence may be limited by the heterogeneity among studies and the risk of bias.
4-Rothberg et al., 2016. [44]	Positive	Results show a relatively high rate of ineligibility for IWL, a reluctance to be randomized, and a high initial dropout rate. Small sample size, and lack of quantitative assessment of dietary intake and physical activity.
5- McGrice and Judi Porter, 2017. [26]	Positive	There were no time or language restrictions placed on the search strategy.
6- Lan et al., 2017. [21]	Positive	Attrition bias is an important factor that could affect the efficacy of interventions.
7- Berenson et al., 2014. [53]	Positive	Self-reported data are subject to recall and social- desirability biases. Some questions had simplified binary responses limited details, and behaviour data had notable gaps.
8- Van Dammen et al., 2019.[54]	Positive	Selective participation and the lack of baseline and short-term data for perceived stress, mood symptoms and sleep quality. So authors do not know if the intervention had any short-term effects on these outcomes.
9- Fontana and Della Torre, 2016. [50]	Negative	The lack of a common protocol of analysis (the methods used, the parameters and the endpoints evaluated are generally different among the different studies) makes it impossible to integrate the high heterogeneity of data available and currently represent a main hindrance in leading to conclusive results.
10- Best, Avenell and Bhattacharya, 2017.[11]	Positive	Authors could not exclude publication bias, where studies with less positive outcomes remain unreported.
11- Wise et al., 2018.[56]	Positive	Selected results were slightly stronger among women with shorter attempt times at study entry, providing little support for selection bias.

Y = response of "yes" to the validity question; N = response of "no" to the validity question; N/A = not applicable. a Assessed using The Quality Criteria Checklist for Primary Research; b Validity items: [1] research question stated; [2] subject selection free from bias; [3] comparable study groups; [4] method for withdrawals described; [5] blinding used; [6] interventions described; [7] outcomes stated, measurements valid and reliable; [8] appropriate statistical analysis; [9] appropriate conclusions, limitations described; [10] funding and sponsorship free from bias. Validity items 2, 3, 6, 7 must be satisfied for a positive quality rating.

Table 3. Quality assessment of included studies (The Academy of Nutrition and Dietetics Quality Criteria Checklist) (cont.)

Author	Validity Ratingb									
	1	2	3	4	5	6	7	8	9	10
12- Spencer et al., 2015.[57]	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
13- Van Oers et al., 2016. [58]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
14- Ng et al., 2018.[55]	Y	Y	Y	N	Y	Y	Y	Y	N/A	Y
15- Grieger et al., 2018. [54]	Y	Y	Y	N	N	Y	Y	Y	Y	Y
16- Stang, et al., 2016. [59]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Author	Overall rating	Examples of reason for downgrading
12- Spencer et al., 2015.[57]	Positive	Statement of the role of funding source not included
13- Van Oers et al., 2016. [58]	Positive	Authors did not identify a subgroup in which lifestyle intervention did increase the healthy live birth rate.
14- Ng et al., 2018.[55]	Positive	The study has not yet been completed, and there are no final analyses or results available.
15- Grieger et al., 2018. [54]	Positive	Retrospective TTP studies and include the possibility of planning bias, medical intervention bias, truncation bias and behaviour change bias
16- Stang, et al., 2016. [59]	Positive	Lack of evidence in other areas related to reproductive outcomes.

Y = response of "yes" to the validity question; N = response of "no" to the validity question; N/A = not applicable. a Assessed using The Quality Criteria Checklist for Primary Research; b Validity items: [1] research question stated; [2] subject selection free from bias; [3] comparable study groups; [4] method for withdrawals described; [5] blinding used; [6] interventions described; [7] outcomes stated, measurements valid and reliable; [8] appropriate statistical analysis; [9] appropriate conclusions, limitations described; [10] funding and sponsorship free from bias. Validity items 2, 3, 6, 7 must be satisfied for a positive quality rating.

randomized clinical trial carried out to evaluate a weight loss intervention on pregnancy rates in obese women undertaking fertility treatment, reported sufficiently enhanced pregnancy in infertile women who had lost 6.9% body weight.[34] Clark et al, also suggested that a weight loss of approximately 5-10% had progressively positive effects on reproductive outcomes.[33] Additionally, a systematic review aimed to determine whether non-surgical weight reduction strategies improved reproductive parameters affected by obesity; showed increased ovulation and pregnancy outcomes, live birth rate, and weight change.[11] Rothberg et al.,[44] demonstrated that both short- and long-term intensive weight loss interventions improved insulin sensitivity and were associated with successful pregnancies. These findings suggest that weight management may enhance fertility, particularly among women with metabolic dysfunction.

On the other hand, several randomized controlled trials and a recent systematic review suggested that short-term weight loss programs have limited or no effect on the ability of overweight and obese women to conceive or give birth.[45-47] Jeong et al.,[47] found that weight reduction before IVF did not significantly improve the live birth rate in obese or overweight women with infertility. Legro et al.,[46] also reported that preconception-intensive lifestyle intervention for weight loss did not improve fertility or birth outcomes compared to an exercise intervention without targeted weight loss. Moreover, a study by LeBlanc et al. (2021), highlighted a potential adverse effect where women with pre-pregnancy weight loss experienced greater gestational weight gain, which may pose risks to maternal health and reinforce concerns about weight cycling after rapid weight loss.[48] This is consistent with previous findings that have shown an increased risk of weight regain in adults after an intensive weight-loss phase.[49-51] These mixed findings underscore the complexity of fertility and suggest that promoting sustainable, healthy dietary and lifestyle habits may be more beneficial than focusing solely on intensive weight loss before conception. Long-term behavioral changes that emphasize diet quality and physical activity might offer more consistent reproductive and metabolic benefits.

Nutritional quality appears to play a crucial role in fertility beyond simple weight metrics. For instance, adherence to a pro-fertility diet rich in supplemental folic acid, vitamin B12, vitamin D, whole grains, dairy, and seafood was associated with increased live birth rates in assisted reproductive technology (ART) patients.[22, 31] It has been noted that high intake of trans fats and low intake of omega-3 fatty acids were associated with reduced fertility.[47] A systematic review by McGrice and Judi Porter (2017) demonstrates the necessity for further research on low-carbohydrate diets. It is imperative that future randomized controlled trials investigate the effects of carbohydrate intake both with and without an energy deficit on hormonal balance and fertility outcomes.[23] Gaining a deeper understanding of the vital link between diet and reproductive health offers invaluable insights that can transform our approach to well-being. The Mediterranean diet emphasizing lean proteins, healthy fats, fiber-rich foods, and limiting red meat and trans fats has also been linked with decreased weight gain, insulin resistance, and improved pregnancy outcomes.[49,50] The risk of developing obstetric complications associated with adverse health outcomes for the mother and child are also reduced, such as hypertensive disorders of pregnancy (HDPs), preterm delivery, gestational diabetes mellitus, low intra-uterine size, and low birth weight.[50] These findings emphasize the importance of dietary patterns that support metabolic and reproductive health. Furthermore, micronutrients such as omega-6 fatty acids may influence menstrual cycle regulation and follicular development, further supporting the link between nutrition and fertility.[50-52] Despite these insights, direct assessment of nutritional status remains limited in many studies, often relying on indirect markers such as BMI and waist-to-hip (WH) ratio rather than detailed dietary intake or biomarkers. It is however, encouraged that, weight management programs guided by medical and nutritional professionals be available for these women, not as a pre-pregnancy diet, but as a lifelong diet to help assist in healthy eating patterns central to achieving optimal pregnancy and particularly overall health. Interestingly, when Berenson et al., 2014,[53] evaluated the nutritional habits and weight management strategies of women trying to conceive as compared to women who were not. They found that women trying to conceive were making unhealthy food and lifestyle choices, such as low fruit and vegetable intake, frequent fast-food consumption, and infrequent physical activity.[53] These women also participated in potentially dangerous weight loss practices that may reduce nutrient intake or absorption, such as fasting, using laxatives, and purging.[53] It is proposed that these unhealthy dietary behaviours carried out by overweight/obese women could be due to desperation to conceive or because of insufficient knowledge regarding nutrition and fertility.[52, 54] Accordingly, it is argued that obsessive focus on weight loss for fertility is perhaps misguided, and efforts should be redirected to ones focused on the prevention of weight gain for optimal health.[45] This points to a knowledge gap and the need for education and support to promote safe, effective lifestyle modifications.

Finally, it should be noted that intervention programs on comorbidities associated with obesity in women trying to conceive, although especially crucial, does not appear to have been fully explored in previous literature. Intensive weight loss programs have improved metabolic parameters and ovulatory function,[44] while lifestyle interventions in obese infertile women led to weight reduction, decreased metabolic syndrome prevalence, and enhanced quality of life.[54] The long-term effectiveness of such interventions, particularly in improving live birth rates, remains unclear. Thus, suggesting that lifestyle interventions targeting women before conception can improve maternal health behaviors and reduce weight. Van Oers et al.[58] (2016) also found that maternal age, ovulatory status, and body mass index have little impact on healthy live birth rates within 24 months. However, women with a higher WH ratio tend to have lower rates. Importantly, lifestyle interventions can significantly enhance natural conception rates among anovulatory, obese women facing infertility, highlighting the value of holistic approaches to reproductive health.[49] However, little evidence exists on long-term changes in lifestyle and health outcomes of

obese women trying to conceive. Lifestyle interventions promote weight loss and improve natural pregnancy rates, but they do not significantly impact live birth rates or birth weight.[18] Further investigation is needed to identify the most effective components and the ideal nature, intensity, and timing of these interventions.[18] Is it, therefore, necessary to investigate and encourage years of follow-up to examine and assist these overweight/obese women to remain healthy in weight, nutritional status, and quality of life.

Innovative delivery methods, including personalized online lifestyle coaching, provide effective and cost-efficient support for women facing subfertility or recurrent miscarriage, potentially facilitating behavior changes earlier than conventional pre-pregnancy interventions.[55] Due to its efficiency, this method can be used significantly earlier than the pre-pregnancy stages to promote long-term improvements in health status prior to conception. Stang et al. (2016) underscore the vital role of healthy eating and exercise after childbirth in preventing weight retention and reducing future obesity risks.[51] Continuous support for healthy diet and exercise beyond pregnancy is critical. Although diet and physical activity are established as important for reproductive health, further research is needed to clarify their effects on a wider range of reproductive outcomes and to develop evidence-based guidelines.

Strengths and limitations

This review highlights several strengths that enhance its value. The data gathered from diverse studies were of exceptional international quality, showcasing a remarkable standard of research excellence. Its focus on the public health implications of obesity and fertility provides essential insights for healthcare professionals and policymakers. The balanced evaluation of the benefits and risks of pre-pregnancy weight-loss interventions offers a comprehensive perspective. It advocates for sustainable recommendations that prioritize long-term healthy habits over quick fixes. Moreover, it emphasizes the accessibility of cost-effective online lifestyle coaching. Finally, by adopting a holistic view of women's health, the review underscores the importance of overall well-being beyond just weight management. Nonetheless, the review has some significant limitations. Some of the examined studies are cross-sectional, which restricts the depth of the findings. Variability in study quality raises concerns, as inconsistent methodologies and biases can distort results. Additionally, the review lacks robust psychological insights, neglecting the emotional and motivational barriers to weight loss. The nutritional advice offered is overly generalized, failing to consider individual and cultural dietary differences. Crucially, the long-term impacts remain unclear due to insufficient evidence regarding maternal and fetal health outcomes. Lastly, the absence of comparisons among different weight-loss interventions limits our understanding of effective strategies. These limitations emphasize the need for a more comprehensive approach to this important topic.

Conclusion

While weight-loss interventions can benefit women with obesity who are trying to conceive, rapid weight loss before pregnancy can lead to risks, such as unhealthy eating habits, weight regain, and long-term health issues. Sustainable improvements in fertility are more likely to result from comprehensive lifestyle changes that focus on balanced nutrition, regular physical activity, and behavioral support, rather than from short-term, intensive weight loss. It is important to promote healthier dietary habits and moderate exercise before conception, potentially through accessible, cost-effective programs like online coaching. Further research should be concentrated on long-term outcomes, employ standardized nutritional assessments, and include diverse populations to create personalized and effective interventions that enhance both reproductive success and overall health.

Recommendations for future research

Future research should prioritize standardized definitions and consistent outcome measures, such as live birth and clinical pregnancy rates, to enhance clarity and comparability across studies. Longer follow-up periods are essential for rigorously assessing the sustainability of intervention effects. Additionally, analyzing key factors such as age, BMI, and WH ratio can uncover valuable insights for personalized interventions. Innovative approaches that combine behavioral and metabolic components should be explored to improve treatment effectiveness. Expanding research to include more male participants and couple-based studies is crucial, as health outcomes often depend on collaboration. Finally, addressing psychological and lifestyle factors alongside physiological outcomes will provide a more comprehensive understanding of health impacts.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURES

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