

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Role Of Education In Preventing Overweight During Pregnancy: A Systematic Review

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ABSTRACTS

An increase in the pregnant woman's weight is an important change during her pregnancy, which is caused by changes in the uterus and its contents (fetus, placenta, and amniotic fluid) and metabolic changes in the mother's body such as accumulation of fat and liquids. Lifestyle change toward industrialization along with changes in nutritional behaviors and physical activities has increased the prevalence of obesity during pregnancy. Obesity during pregnancy is associated with maternal and neonatal complications, and it is necessary and important to prevent obesity during this period. In this regard, the present review study was carried out in order to control and prevent obesity during pregnancy by examining interfering factors such as education and educational methods that are based on models of changing behavior. Electronic search was carried out using Persian keywords (pregnancy, overweight) and English ones (obesity, weight change) from Iran Medex, SID, Google Scholar, Pubmed, and Scopus over the period of March 21, 2014 to August 22, 2014. After the databanks were searched and large number of articles (532 articles: 50 in Persian and 482 in English) were extracted based on their title and abstract and examined, out of which 500 articles were crossed out because they had not used educational intervention in order to prevent overweight during pregnancy and they were descriptive studies. An exact number of 32 articles were examined, out of which 20 were crossed out because education had not been their major intervention. Finally, 12 articles were included in the present study. The results of the present study indicated that theory-based education and educational models such as theories of self-regulation, self-efficacy, and social support, and health belief model played an effective role in controlling gestational weight and changing lifestyle and pregnant women's behaviors.

Keywords: educational intervention, gestational weight gain, systematic review

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INTRODUCTION

An increase in the pregnant woman's weight is an important change during her pregnancy, which is caused by changes in the uterus and its contents (fetus, placenta, and amniotic fluid) and metabolic changes in the mother's body such as accumulation of fat and liquids [1]. Lifestyle change toward industrialization along with changes in nutritional behaviors and physical activities has increased the prevalence of obesity in communities. Almost all countries, both developed and developing ones, are experiencing obesity epidemic [2]. Likewise, obesity is increasing during pregnancy [2, 3]. Weight gain during pregnancy is associated with maternal and neonatal complications. Maternal complications include preeclampsia (pregnancy blood pressure), cesarean, assisted delivery, premature birth, and gestational diabetes, and neonatal complications are hyperglycemia, hyper bilirubinemia, and macro somia [4]. Moreover, overweight during pregnancy is an important predictor of long-term obesity after pregnancy [5]. Obese mothers' infants may also be faced with overweight during their childhood [6]. It is more than 2 decades that the US Institute of Medicine (IOM) [7] has recommended a guideline for weight gain during pregnancy. The increase rate of the recommended weight during pregnancy has experienced a remarkable change over the last several decades [8]. During the first half of the last century, it was recommended that weight increase during pregnancy should be less than 9 kg in order to prevent hypertensive disorders and embryo's largeness [9]. In the 1970s, pregnant women were encouraged to prevent premature delivery and fetal growth restriction (a minimum weight of 14 kg). However, after extensive research, nowadays it is cleared that an increase in weight during pregnancy cannot be the same for women of all groups. In this regard, the US Institute of Medicine recommended a weight increase of 12.5-18 kg for BMI less than 19.8 kg/m², 11.5-16 kg for BMI of 19.8-26.1kg/m², 7-11.5 for BMI of 26.1-29kg/m², and less than 7 kg for BMI more than 29kg/m² during pregnancy [10]. Almost 30% of pregnant women who receive prenatal care have a body mass index (BMI) of over 26 kg/m²[11]. Pregnancy is appropriate when the individual's behaviors are challenged according to the desired goals; therefore, a pregnant woman takes into account not only her own health but also that of her infant, which is a strong motivating factor for the mother to change her behavior, such that different studies have indicated that interventions like quitting smoking have been successful [12]. Currently, for prevention of overweight during pregnancy, lifestyle interventions, i.e. nutritional intervention and sports, have been known as safe and effective approaches. However, factors like social and economic situations and ethnicity as confounding factors may affect the relationship between obesity and pregnancy and pregnancy health [13, 14]. The researcher aimed to examine and review those studies that had used educational interventions and programs to prevent overweight during pregnancy. And the present study was carried out in order to compare the effects of lifestyle interventions without education, interventions based on educational methods, and education using behavior change models on the control and prevention of overweight during pregnancy

METHOD

In the present systematic review, intervention studies in which education had been used as the main intervention to prevent overweight during pregnancy were used. Data bases were searched using Persian and English keywords during March 21, 2014 to August 22, 2014. The Persian databases that were searched included Iran Medex and SID, and English ones were Google Scholar, Scopus, and Pubmed.

English keywords included pregnancy, pregnant, gestational, maternal, obesity, body mass index, overweight, weight change, health education, health promotion, experimental, randomized controlled trial, intervention studies, model, theory, and Persian ones were pregnancy, weight gain, BMI, intervention, health education theories and models, and health promotion.

Inclusion criteria:

Intervention studies in which education had been used as their main intervention and the study sample had been pregnant women who had no specific diseases, and that were published within 2000-2014 were selected.

Exclusion criteria:

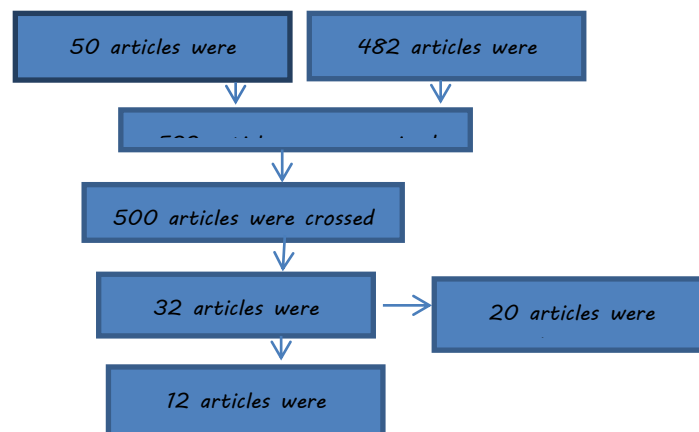
Descriptive studies and those that had used non-educational interventions were crossed out.

In order to determine the quality of the studies, 2 researchers examined the articles according to the inclusion criteria and their study design and crossed out those that did not have necessary quality according to the study's aim. It is necessary to note that interventions were taken into account that focused on overweight during pregnancy. A summary of the features of the examined studies is provided in tables by the researchers. Details of those tables included study environment, name(s) of author(s), the beginning and end time of the studies, the study's objectives, experimental group, sample size, the method of conducting the intervention, and results.

RESULTS

After the databases were searched and a large number of articles were extracted, 532 articles (50 Persian and 482 English articles) were reviewed based on their title and abstract. Out of those 532 articles, 500 were crossed out because they had not used educational intervention in order to prevent overweight during pregnancy (See Diagram 1).

More precise examinations were carried out on 32 articles out of which 20 articles were not included for further investigation because their major intervention had not been education. Finally, 12 articles were included for further review. Out of those 12 articles, 4 had used a health education theory and model. Two studies had used self-regulation theory, health belief model had been employed in one study, and one study had utilized motivational interview and social support to control weight during pregnancy. In all those four studies, utilizing educational principles had led to favorable results and the researchers had been able to control the pregnant women's weight.



DISCUSSION

In the current systematic review, the interventions were presented in the form of lifestyle interventions in order to prevent over weight during pregnancy. Lifestyle interventions include nutritional and physical activity interventions in which the researchers had tried to use education and consultation in order to control gestational weight according to the protocols recommended by IOM [7].

Polley et al. conducted a study in Pittsburgh hospital, the US, in which low income pregnant women entered the study from week 20, and women who experienced weight loss and had BMI<19.8 and all high-risk pregnancies were crossed out, and finally 120 individuals (60 in control group and 60 in experimental group) took part in the study. In that study, using self-regulation theory (self-management, regulation of aims, and problem solving), education and consultation were provided to the pregnant women of group A) with appropriate weight gain during pregnancy, group B) with exercise during pregnancy, and C) with healthy eating habit during pregnancy, and they were given feedback on their overweight. They were encouraged to have active lifestyles and to walk short distances instead of driving. Since that study was designed based on a theory, it could significantly reduce the pregnant women's weight more than what is recommended by IOM. And this issue has a strong relationship with their weight before pregnancy, and those who had had a normal weight gained weight normally and according to IOM protocol during their pregnancy, such that lifestyle interventions were more effective for women with normal weight [15].

In their study carried out in Netherlands, Allen Althuisen et al. focused on 220 nulliparous pregnant women (110 intervention women and 110 control group) who had not entered their 14th week of pregnancy. The pregnant women were provided with education and consultation about healthy lifestyle on an individual basis and provision of brochures over 5 sessions in weeks 36, 30, 22, and 18 of pregnancy and 8 weeks after delivery and follow-up in weeks 26 and 52 after delivery. The intervention group was trained how to control their weight during and after pregnancy and how to maintain their weight using a healthy life style during pregnancy which is associated with severe physical and psychophysical changes. In that consultation, emphasis was more on problem solving and the sense of controlling problems as a psychological intervention. During pregnancy, consultants provided the individuals with feedbacks on the trend of weight gain. In that study, the principles of problem solving (PST-pc) and treatment for primary care were utilized, which include the constructs of 1) an increase in the individual's knowledge, 2) an increase in the individual's capacity to define behaviors that should be changed, 3) learning after solution for problems by determining goals for improvement or maintenance of healthy behavior, 4) emphasis on positive experiences in order to enhance self-confidence. PST-pc based education and consultation could control the intervention women's weight and they reached a standard weight gain (according to IOM protocol) with a significant difference compared to the control group [16].

Another study conducted by Kinnunen et al. in Finland included 105 nulliparous pregnant women who were assigned into 3 control groups (56 women) and 3 intervention groups (49 women). They were studied in 8-9, 16-18, 22-24, 32-34, and 36-37 weeks of pregnancy. Behavioral model of hLaitakari and Asikainen (1998) was used for the consultation. In consultation sessions, the individuals were encouraged to do some activities on their free time and increase the level of their activities by participating in supervised group exercise sessions which included endurance exercise and muscle education exercise held once a week for 45-60 minutes in a place that was near the clinic. Dietary advice focused on four aspects: 1) regular pattern of meals with an emphasis on the importance of breakfast, 2) eating at least five meals of 400 gr including different types of vegetables, fruit, and berries, 3) consumption of more high-fiber bread, and 4) restriction of the intake of high sugar cereal. In that study, educational intervention could not prevent pregnancy overweight and normal weight gain as recommended by IOM; however, consumption of fiber and vegetables had increased among those mothers, which prevented the infants' macrosomia [17].

In their study carried out in Chicago, Rosen bloom et al. focused on singleton pregnant women with BMI of over 19.8. Their study included 109 control and 57 intervention women. The intervention group was provided with an educational package including 1) nutritional guidelines, 2) exercise guidelines, and 3) a booklet with weight planning instructions, and they were given feedbacks through weight distribution description diagram. In that study, educational intervention could control the pregnant women's weight according to IOM protocol. The intervention group showed a more appropriate weight compared to the control group [18].

In Iran, Mohebbi et al. used the health belief model to study 110 pregnant women (54 intervention and 56 control women) in order to figure out the effect of nutritional education on weight gain among pregnant women based on health belief pattern. The intervention included 3 one-hour sessions in which lecture, group discussion, questions and answers, and individual counseling were utilized. In the first session, the women's husband also participated as action guides. After the intervention, the intervention group obtained significantly higher scores in awareness, sensitivity, intensity, threat, and perceived barriers compared to their scores before the intervention. There was also a significant difference between the two groups in terms of the appropriate weight according to IOM protocol. Moreover, a higher percentage of intervention women gained standard gestational weight than the control women. The results of that study showed that utilizing health education model in education and counseling individuals plays an important role in obtaining favorable results [19].

In the US, Shelly et al. studied 18-19-year-old pregnant women. One hundred pregnant women (57 intervention and 43 control women) entered the study before week 16 of their pregnancy. During consultation session, the intervention individuals were provided with information on pregnancy and selection of special diets according to proper weight and lifestyle and nutritional recommendations including the available caloric value including carbonic value in carbohydrates, proteins, and fats. They were also encouraged to participate in moderate exercise at least three times a week and preferably 5 times a week. Moreover, they were

presented with information on appropriate weight gain during pregnancy using IOM instructions by a nutritionist, they were also given appropriate feedback each session, so that they would modify their diet if their overweight was over or below the standard level. The intervention caused the intervention group to have reduced weight during pregnancy, and women with normal weight gained weight according to IOM standard compared to the control group and other participants. Another result of that study was the level of cesarean which was lower in the control group [20].

Another study was carried out in Canada by Hui et al., in which 190 individuals (88 pregnant women in the control group and 102 women in the intervention group) who did not have diabetes and were in weeks 20-26 of their pregnancy participated. In the intervention, a community-based exercise program was specifically designed for pregnant women in the form of 1 session per week, and the intervention individuals were recommended to do aerobic exercise and stretching and strengthening exercises at home. Those 30-45-minute sessions started from weeks 20 and 26 of pregnancy and finished in week 36. All exercises were supervised by an exercise physiologist. The individuals were also given educational CD so that they could continue those exercises at home and write down their time in a notebook. Moreover, each individual was provided with nutritional advice twice based on the food choice map. According to their one-week food reminder, the individuals were supervised and consulted by a nutritionist. After education and consultation and follow-up for two months, the level of daily consumption of calorie, fat, and cholesterol in the intervention group experience reduction compared to the control group. Moreover, the intervention group experienced an increase in physical activity compared to the control group. Furthermore, lifestyle interventions could prevent overweight during pregnancy over the limit recommended by IOM [21].

In Norway Moholdt et al. carried out a study in which 150 singleton pregnant women (75 intervention and 75 control women) with before-pregnancy BMI of over 30 kg/m² participated in weeks 11-14 of their pregnancy. The intervention included education and invitation to exercise according to a program that had been designed for pregnancy. The program included aerobic exercise, special exercise appropriate to fix hip and waist, and exercises for hip muscles and specific for pregnancy. The intervention group's sessions lasted 60 minutes and were held four times a week in a hospital. The pregnant women were required to participate in those sessions at least twice a week between the weeks of 14 and 37 of their pregnancy so that they would be trained. They were also encouraged to exercise after the pregnancy week of 37 in the form of endurance education including 10 minutes of warm-up followed by walking on a treadmill for 25 minutes. Moreover, the intervention pregnant women were encouraged to exercise at least 50 minutes once a week at home (35 minutes of endurance exercise and 15 minutes of strength education). Moreover, exercises of pelvic floor muscles were carried out on a daily basis. The intervention individuals were encouraged to keep on exercises by recording their activities in notebooks. Motivational interview was used in the educations such that the participants would be prepared for change and motivation. Each pregnant woman participated in a 30-minute session of motivational interview in each trimester of pregnancy. They also had a weight gain curve that indicates that how the trend of weight gain was during pregnancy and how compatible it was with the figure recommended by IOM. All of the participants were followed up during 3 months after the delivery. The results of that intervention indicated that the effect of education regular exercise among obese and inactive pregnant women through motivational interview could lead to a decrease in their weight according to IOM protocol [22].

In Brazil, Nascimento et al. studies pregnant women with BMI of 9-26/29 kg/m² and over 30 kg/m². They were invited to take part in the study during weeks of 14-24 of their pregnancy. Individuals who entered the study had no restrictions for exercise and had not carried out regular exercises in their daily schedule. Eighty-two pregnant women of over 18 years old (40 intervention and 42 control women) were focused on in that study. The women were encouraged to increase the level of their physical activity in order to promote quality of life through supervised simple exercises that had no harm to the mother and the embryo. They were also recommended to have physical activities in order to achieve appropriate weight with classification of their BMI. During the education sessions, the intervention group was provided with information on the importance and effects of physical activities during pregnancy, the optimal rate and intensity of home-based exercises, diet, and appropriate clothes during exercise. According to the recommendations of ACOG (2002), the exercise protocol was carried out by a physiotherapist, where it was determined that the woman's heartbeat would not exceed 140 pulses. Individual exercises included 10 minutes of stretching, 22 minutes of strengthening the muscles of upper and lower extremities, and 10 minutes of relaxation, which makes a total of 40 minutes. The results of that study showed that exercises were effective in reducing gestational weight and the pregnant

women's weight and enhanced the pregnant women's weight according to IOM protocol. In regard to quality of life; however, there was no significant difference between the control and the intervention groups [23].

In Belgium, Guelinckx et al. studied 195 pregnant women (2 intervention groups of 65 people and a control group of 65 women). One of the intervention groups only received a brochure on physical activity (PA) nutrition and instructions on how to limit the increase in gestational weight. The other intervention group was also provided with the same brochure, and they were also consulted by a well-trained nutritionist over 3 sessions of 1 hour in groups of 5 people during weeks of 15, 20, and 32 of their pregnancy. During those sessions, the participants were recommended to follow dietary advice (1-9% of the energy should be obtained from proteins, 30-35% from fat, and 50-55% from carbohydrates) in order to balance their healthy diet and plan to replace consumption of full-energy foods like fast food and sweets with healthy ones and increase the consumption of fruits and low fat dairies, whole grains, wheat, and reduce saturated fatty acids in their diet. In those sessions, topics like energy balance, body composition, nutrition, nutritional labels, and the method of increasing physical activities were discussed in the form of asking and answering questions. The results of that study showed that consumption of fat in the intervention group dropped, and their consumption of proteins, vegetables, and calcium experienced an increase compared to the control group, which was especially more outstanding in the last three months of pregnancy compared to other trimesters. However, the rate of physical activity and weight gain in the intervention group did not experience a significant difference compared to the control group [24].

In another study carried out in Germany by Rauh et al., 2500 singleton pregnant women (1250 intervention and 1250 control women) aging 18-43 and having BMI \geq 18.5 kg/m² of before pregnancy were studied. They entered the study in week 12 of their pregnancy. The intervention program included four visits and individual consultation sessions had a relative emphasis on diet, physical activities, and weight control in 12-16, 16-20, and 30-34 weeks of pregnancy and 6-8 weeks after delivery. The consultation sessions were specifically managed by a trained midwife following a defined educational program. The women were presented with exercise program brochure that was appropriate with their pregnancy age. They were also provided with necessary nutritional recommendations. They were also given a weight gain diagram based on appropriate BMI in order to monitor their weight in accordance with IOM recommendations. In the first visit during weeks 12-16 of pregnancy, full information on healthy diet and physical activities during pregnancy was face-to-face presented to the women. The importance of healthy lifestyle during pregnancy and determining factors was also discussed in 30-45 minutes. The pregnant women would learn how shoulder the responsibility of consideration of their health diet and understand the risks of alcohol consumption and smoking during pregnancy. Consultation was more about gestational weight gain (GWG), weight control and consumption of important nutritional materials during pregnancy (folic acid, iodine and iron). The intervention group was also provided with a list of appropriate exercise programs, a brochure containing recommendations for a balanced diet during pregnancy, and also a chart for appropriate weight gain according to BMI. During the second visit, in weeks 16-20 of pregnancy, the intervention women were provided with consultation aimed at teaching dietary habits and physical activities to the participants. Moreover, the women obtained motivation to participate in the 2-hour Oral Glucose Tolerance Test (OGTT) between the weeks of 24 and 28 of standard pregnancy. In the third visit during weeks 30-34 of pregnancy, the materials that had been presented before were repeated and stabilized with an emphasis on weight control. The consultants provided information on exercise after delivery and the importance of breastfeeding. A blood sample was also taken to measure glycosylated hemoglobin (HbA1c). In the last visit, during weeks of 6-8 after delivery, the fourth consultation including diet during breastfeeding and information on the principles of feeding infants was conducted. This intervention could increase the pregnant women's weight according to IOM protocol and reduce gestational complications such as preeclampsia and gestationxal diabetes in the intervention group [25].

In England³, Elinor et al. studied 570 pregnant women aging 18 years old with BMI of 30 kg/m² in weeks 12-20 of their pregnancy. The intervention included holding a weight management session that lasted 1.5 hours once a week and joining the Sliming World and telephone communication with midwives for the intervention group in 3 and 6 months of delivery in order to support and encourage them continually. Telephone contacts were aimed at maintaining the reduction of weight and helped the effectiveness of weight decrease interventions. Four sections of these interventions included: 1) eating healthy food, 2) conducting physical activities, 3) providing midwifery consultation, and 4) behavioral section.

(1) Eating healthy food was based on the principles of Slimming World and management flexible weight and the program of eating healthy food called "Super Easy" which includes the UK government's recommendation for healthy diet and consists of combined nutritional diet (different types of food: about 80% fruit, vegetables, carbohydrates, and proteins, and smaller portions of milk and dairies and restriction of high use of fat or high-sugar foods). (2) Physical activity includes the program of individual physical activities for obese pregnant women based on the instructions for exercising during pregnancy according to flexibility, easiness, cost efficiency, and the program focus on primary walking which was recorded with a pedometer and written down in a notebook on a daily basis up to 7 successive weeks to week 36 of pregnancy, 6 weeks after delivery, 6 months after delivery, and 12 months after delivery. It was recommended that they should carry out 30-minute exercise, 5 days a week which is equal to 10,000 steps per week. (3) Midwifery section included usual midwifery care and intervention for consultation about pregnancy and lifestyle. Moreover, providing extra information was provided about issues that women may be anxious about like work and breastfeeding. The participants were required to write down their diet over 7 days in a notebook so that the midwife could intervene if necessary. (4) Behavioral section included practical and strategic skills for management of behavioral changes in the form of group discussion and motivational support aimed at enhancing self-confidence and enriching the group members through a motivational interview and mind involvement theory and promotion of motivation for changing and avoiding judgment or criticism and sympathy, and helping individuals overcome the barriers and identifying and regulating goals and solving problems based on self-regulation theory. Moreover, the intervention individuals became familiar with cooking fresh vegetables and were given feedback on their weight control. According to self-regulation theory and behavioral monitoring, the main goal in the intervention group was to improve and increase self-efficacy [26].

Comparison with other studies:

Four systematic reviews focused on lifestyle interventions during pregnancy, two of which could not reach a certain conclusion due to the effectiveness of the studies [27, 28]. In those two systematic reviews, randomized and nonrandomized controlled studies were taken into consideration [29-42]. Since in controlled randomized studies, the significance of the interventions is not clear, the effect of the interventions cannot be stated in a certain way. In the present study, the effect of educational theories on behavior change was taken into account. As indicated in the studies carried out by Hazavehi et al. (43-50), educational models were effective behavior changes, in the present study the authors tried to show the importance of health education theories and models as a pattern for promotion of interventions.

CONCLUSION

The results of the present review showed that because self-regulation theory is actually an internal control mechanism, it determines what behavior should be carried out and make it possible for internal controls to replace external ones and provides a basis for purposeful action. It also allows individuals to control their thoughts, feelings, motivations, and actions. Education through this theory on weight control can effectively increase self-efficacy. It can also prevent overweight during pregnancy through by providing feedback and self-monitoring.

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