

## Effect of Lifestyle Coaching Program on Health-Related Behavior and Blood Glucose Level among Gestational Diabetic Women

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### Abstract

**Context:** Gestational diabetes mellitus (GDM) stands out as a prevalent health issue during pregnancy. Health coaching emerges as a technique that enhances the well-being and health outcomes of women grappling with gestational diabetes. **Aim and design:** A pre and post-test quasi-experimental study design was employed, **aiming** to evaluate the effect of a lifestyle coaching program on health-related behavior and blood glucose level among gestational diabetic women. **Sample:** A purposive sample of sixty pregnant women was chosen from Kafr El-Sheikh University Hospital's prenatal outpatient clinic, which served as the study's setting. **Tools:** In the current study, four tools were used: a structured interviewing questionnaire, a gestational diabetes knowledge assessment questionnaire, a prenatal health behavior scale, a self-record or diary, and an Arabic educational booklet was used as supportive material. **Results:** The current study found that, when comparing the pre- and post-coaching program implementation periods for the studied sample, there was a highly statistically significant improvement in the total knowledge score and the total mean of health-promoting behavior regarding gestational diabetes mellitus ( $P < 0.001$ ). Additionally, the total mean of health-impairing behavior related to gestational diabetes as well as the total mean of fasting and postprandial blood glucose levels were significantly lower at post-coaching program implementation than they were at pre-program implementation ( $P < 0.001$ ). **Conclusion:** The implementation of a lifestyle coaching program has a better effect on pregnant women's knowledge and health-related behavior regarding gestational diabetes mellitus, besides decreasing women's blood glucose level. **Recommendations:** The Lifestyle Coaching Program ought to be incorporated into the prenatal routine care for pregnant women with gestational diabetes in the various health care settings

**Keywords:** lifestyle coaching program, health-related behavior, gestational diabetic women.

### Introduction

Complications during pregnancy, including conditions like gestational diabetes mellitus (GDM), are widespread and present a significant threat to the health of both the mother and the fetus. Gestational diabetes mellitus, characterized by elevated blood sugar levels during pregnancy, stands out as a significant health concern. It primarily affects pregnant women in the second and third trimesters due to insulin resistance triggered by hormonal production from the placenta (de Mendonça et al., 2022).

The development of GDM is linked to risk factors, some of which can be modified while others are inherent. Immutable risk factors encompass genetic predisposition, ethnicity, older maternal age, history of having a large baby, previous occurrences of GDM, abortions, family history of type 2 diabetes, unexplained fetal losses in previous pregnancies, as well as factors like

obesity, carrying twins, and polycystic ovarian syndrome (Nigatu et al., 2022).

Environmental and lifestyle variables are the modifiable risk factors that have been demonstrated to impact the development of GDM. These variables can be divided into risk factors for pregnancy and the postpartum period. While the latter category mostly refers to excessive weight gain, which is described as gestational weight gain, the first type is primarily related to lifestyle factors, such as obesity and being overweight before pregnancy, poor diet, and lack of physical activity (Zakaria et al., 2023).

Despite the fact that GDM is rarely discussed in low- and middle-income countries, it increases the risk of illness and mortality for both mothers and fetuses. Maternal complications resulting from GDM include the future development of type II diabetes mellitus, induced

labor, cesarean delivery, and pre-eclampsia. Fetal risks associated with GDM include congenital impairments, respiratory distress, respiratory asphyxia, heart problems, prematurity, retinopathy, nephropathy, central nervous system issues, prematurity, stillbirth, and macrosomia (Plows et al., 2018).

Modifiable lifestyle choices and behaviors that may impact a pregnant woman's overall health and well-being are referred to as health-related behaviors. The most crucial elements in reducing the additional hazards of gestational diabetes are healthy lifestyle adoption and health promotion behaviors, which enhance the life quality of diabetic women (Jeihooni et al., 2020).

A novel technique to control diabetes in gestational diabetic women is health coaching. This covers a range of strategies, including goal setting, learning about diabetes, providing tailored care, and ongoing follow-up. Furthermore, health coaching techniques can improve motivation, foster self-determination and self-efficacy, boost self-assurance and willingness to change, and modify behaviors linked to the development of disease (Hamdy et al., 2022).

Nurses, as health coaches, play an important role in educating gestational diabetic women about healthy lifestyles and behaviors that decrease the incidence of maternal and fetal consequences and improve their quality of life. Healthy lifestyle behaviors include maintaining a balanced diet, weight reduction, regular physical exercises, compliance with medical regimens, and effective stress management (Normand & Bober, 2020; Sabag et al., 2023).

### Significance of the study

There are potentially fatal consequences associated with gestational diabetes mellitus (GDM) for both the fetus and the mother. The majority of gestational diabetic mothers were in developing nations with limited access to maternity care, where the prevalence of the disease varies greatly worldwide, from 1 to 28% (Magbool et al., 2021). As indicated by the 2021 International Diabetes Federation (IDF) Report, gestational diabetes mellitus (GDM) affects 14.2% of pregnant women in Egypt. In 2018, the country ranked among the top 21 nations, reporting an incidence rate of 15.9% (Wang et al., 2022; Eltoony et al., 2021).

A higher incidence of cesarean section delivery, preeclampsia, prematurity, neonatal macrosomia, hyperbilirubinemia, birth defects, hypoglycemia, a high perinatal mortality ratio, shoulder dystocia, and neonatal intensive care admission are among the complications that pregnant women with gestational diabetes face (Nasiri et al., 2020).

GDM is one of the most pressing health issues of the twenty-first century due to its seriousness and sharply rising occurrence. Therefore, it's critical to increase women's awareness of this illness and lessen its negative repercussions after diagnosis. Modifying one's lifestyle is the primary strategy for controlling gestational diabetes (Abd Elmoaty et al., 2019).

One sort of health intervention that encourages women to develop and meet health-related goals is health coaching. Lately, there has been a significant focus on health coaching as a method to promote healthy lifestyle choices. Maintaining a healthy lifestyle is crucial for both preventing various lifestyle diseases and for patient care. In order to help patients with chronic diseases adopt supportive, health-promoting behaviors and improve their quality of life, health coaching has grown in popularity (Almulhim et al., 2023). So, this study was carried out to assess the effect of a lifestyle coaching program on health-related behavior and blood glucose level among gestational diabetic women. This study will enhance the body of research and knowledge on such critical topics as well as expand the scope of research and nursing practice on these issues.

### Aim of the study:

The study was conducted to evaluate the effect of a lifestyle coaching program on health-related behavior and blood glucose level among gestational diabetic women through:

- Assessing pregnant women's knowledge and health-related behaviors about gestational diabetes mellitus.
- Assessing the blood glucose level of gestational diabetic women.
- Developing and implementing a lifestyle coaching program for gestational diabetic women.
- Evaluating the effect of a lifestyle coaching program on knowledge, health-related behavior,

and blood glucose level among gestational diabetic women.

### Research hypothesis

**H 1:** Pregnant women who participated in a lifestyle coaching program will have a higher knowledge score on the posttest compared to the pretest.

**H 2:** Pregnant women who participated in a lifestyle coaching program will have improved health-related behaviors about GMD on the posttest compared to the pretest.

**H3:** Pregnant women who participated in a lifestyle coaching program will have a lower blood glucose level on the posttest compared to the pretest.

### Subjects and Methods:

#### Research design:

To fulfill the study's objective, a quasi-experimental study design was utilized, employing a single group pre and post-test approach. A quasi-experimental study is an empirical intervention that assesses the causal impact of an intervention on the target population without random assignment. Although it lacks random assignment to treatment or control groups, quasi-experimental research shares similarities with traditional experimental designs and randomized controlled trials (**Iowa State University of Science and Technology, 2020**). The pretest-posttest design involves measuring the dependent variable twice: once before the initiation of the treatment and once after it (**Spurlock, 2018**).

#### Setting:

The study was carried out at Kafr El Sheikh University Hospital's prenatal outpatient clinic. A hospital offers prenatal, gynecological, and family planning outpatient services, birth units, and postpartum inpatient units, which are just a few of the many services it offers to women. This sitting was chosen because it serves a sizable population from both urban and rural areas, has a higher attendance rate of women with gestational diabetes, and provides affordable services to expectant mothers.

#### Subjects:

#### Sample type:

A purposive sample of pregnant women was selected based on specific inclusion criteria.

These criteria included pregnant women recently diagnosed with gestational diabetes, those in the second and third trimesters of pregnancy, both prime and multipara women, individuals expecting a single fetus, and women who possessed the ability to read and write. Pregnant women with mental health disorders or chronic illnesses are excluded, as are those who are experiencing additional pregnancy-related complications like anemia, bleeding, or pregnancy-induced hypertension. This targeted selection aimed to ensure a diverse yet relevant participant group for the study.

#### Sample size

Sixty pregnant women took part in this research based on the following equation for comparing two means that was taken from **Gupta et al. (2016)**:

$$n = 2 (Z\alpha + Z [1-\beta])^2 / d^2 \times SD^2$$

**Where:** n is the sample size,  $Z\alpha$  and  $Z (1-\beta)$  are constant values for convention values of  $\alpha$  and  $\beta$  values, where  $Z\alpha = 1.96$  when  $\alpha = 0.05$  and  $Z (1-\beta) = 1.036$  when  $\beta = 0.20$ , SD is the standard deviation obtained from the previous study (**Abd Elmoaty et al., 2019**), and d is the effect size.

$$n = 2 (1.96 + 1.28)^2 \times 8.43^2 / 5^2 = 59.6$$

Therefore, the minimal sample size required is 60 participants.

#### Tools for data collection:

#### I) A Structured Interview Questionnaire:

The researcher developed and crafted it after reviewing the relevant literature (**Kolivand et al., 2019**) to acquire the essential information required to fulfill the objectives of the study. The questionnaire consists of two parts, containing 26 multiple-choice questions (MCQs).

**Part I;** covered the general characteristics of the studied women, including age, marital status, education, occupation, and residence.

**Part II;** involved obstetric history as well as gravidity, parity, gestational age, regularity of antenatal follow-up, and level of blood glucose.

## II) Gestational Diabetes Knowledge Assessment Questionnaire (pre-posttest)

It was created by researchers in Arabic to gauge women's awareness of gestational diabetes following an in-depth review of relevant literature (Thomas et al., 2020; El-Ansary & Fouad, 2020). It has 28 multiple-choice questions (MCQ) divided into five parts: the first part has seven questions about the meaning of gestational diabetes, its risk factors, the impact of smoking, stress, being overweight, eating a high-calorie and fatty diet, and elevated blood pressure on developing GDM; the second part has three questions about clinical manifestations of GDM; the third part has four questions regarding fetal and mother's complications of GDM; and the fourth part has seven questions about preventive measures of GDM such as self-monitoring of blood glucose, physical activity, healthy diet, and routine follow-up. Seven questions covered the management of GDM as a first line of treatment for GD, insulin dosage, insulin sites, normal and abnormal blood glucose levels, and indicators of hypo- and hyperglycemia in the fifth part.

### Knowledge Scoring System:

For every question, the correct answer is given a score of two, while the incorrect answer is given a score of one. The overall score was between 1 to 56. Total knowledge score was split up into:

- Good  $\geq 75\%$  (42–56 scores).
- Average 50% -74% (28–41 scores).
- Poor: <50% (1–27 scores).

### III: Prenatal health behavior scale:

The researcher adapted and updated it from Auerbach et al. (2019) to evaluate the health-related behavior of pregnant diabetic women. There were ten health-promoting and ten health-impairing behaviors among its twenty components. Exercise, rest, getting enough sleep, taking vitamins, eating a healthy diet, and checking blood sugar levels on a daily basis were all considered health-promoting behaviors. Health-impairing behaviors included skipping meals, eating unhealthy snacks in place of well-balanced meals, drinking coffee-containing beverages, and smoking cigarettes.

### Scoring system:

Likert scales are used to rate the items, with 1 denoting never, 2 rare, 3 sometimes, 4 often, and 5 very often, with a total score between 10 to 50 for each subscale. The higher the score taken from the scale, the better the healthy behavior adopted by women.

1. **Self-record or diary:** Data on the pregnant women's adherence to recommendations for both healthy and unhealthy behaviors—such as "blood glucose self-measuring, monitoring weight gain, medication administration, regular physical activity, a healthy diet, regular antenatal follow-up, and avoiding caffeine"—was collected by this diary.

### Validity and reliability:

Professionals specializing in maternity and newborn health nursing assessed the instruments based on criteria such as ease of use, comprehensiveness, clarity, applicability, and understanding. The reliability of the instruments was determined using the Cronbach's alpha method, indicating that tool (II) achieved a Cronbach's alpha of 0.98 and tool (III) demonstrated a Cronbach's alpha of 0.984.

### Administrative design:

The director of Kafer El Sheikh University Hospital and the dean of Kafr El Sheikh University's faculty of nursing both officially approved the research written request that stated its goal and scope of research.

### Ethical considerations:

Before initiating data collection, the research received approval from the Scientific Research Ethical Committee of the Faculty of Nursing at Kafr El-Sheikh University. Following an explanation of the study's purpose and significance, participants provided informed consent. No harmful techniques were employed with any of the participants, and they were free to withdraw from the study at any point. Human rights were respected throughout the research process. To ensure privacy, a coding system was implemented for data coding and protection.

### Pilot Study:

Six pregnant women, constituting 10% of the calculated sample, took part in the pilot study

aimed at evaluating the comprehensiveness and clarity of the instrument, along with assessing the feasibility of the research process. Adjustments, including the removal of specific questions from the tool for improved content simplicity, and clarity, were implemented based on the pilot study's findings. Participants in the pilot study were retained in the overall sample as the study instruments underwent no significant changes.

### Fieldwork:

The research was conducted over a span of six months, commencing in June 2023 and concluding at the end of November 2023. The investigator attended the pre mentioned setting three days a week, specifically on "Sunday, Monday, and Tuesday," from 9:00 a.m. to 12:00 p.m. The study comprised four phases: preparatory, interviewing and assessment, implementation, and evaluation.

### Preparatory phase:

A comprehensive review of both regional and global literature concerning various aspects of the research topic was made. This phase helps the researcher assess the scope and magnitude of the research problem and directs the preparation of the instructional materials and data collection instruments development (the educational Arabic booklet) after reviewing the relevant literature regarding gestational diabetes (Mensah et al., 2020; Schleicher et al., 2022; ElSayed et al., 2023; Mahdy, 2023). It was created in Arabic by the researcher to improve expectant mothers' awareness of gestational diabetes and promote healthy behaviors related to it. It consists of two sections. Basic facts concerning gestational diabetes, such as its description, causes, risk factors, symptoms, complications for both the fetus and mother, screening, diagnosis, and management, are covered in the first section. Preventive strategies against gestational diabetes and healthy lifestyle practices, including regular check-ups, physical activity, healthy nutrition, and weight control, were discussed in the second section. In addition to unhealthy behavior related to GDM include smoking, indulging in junk food and meals, consuming coffee and soda, and skipping exercises.

### Interviewing and assessment phase:

- In this stage, individual interviews were conducted with each woman in the outpatient clinic's waiting area. The researcher initiated the interview by greeting each participant, introducing herself, and providing information about the study's nature, purpose, duration, and activities. Verbal consent was then obtained from the women.
- The researcher proceeded to evaluate the general features of pregnant women, their obstetric history, blood glucose level, and knowledge related to GDM using tools (I, II).
- Tool (III) was employed to assess the health-related behaviors of pregnant women concerning gestational diabetes.
- Pregnant women were provided with a self-record or diary by the researcher, explaining its use to record their daily behaviors regarding GDM.
- Each woman's interview took approximately 20-30 minutes on average. The daily number of women interviewed ranged from 3 to 4. The data collected in this phase served as the baseline for subsequent comparison to assess the impact of a lifestyle coaching program.

### Implementation phase:

- The researcher delivers a program on healthy lifestyle coaching through five sessions, incorporating group discussions, telephone consultations, or personalized coaching sessions. These sessions occur once a week, with each lasting around 25 to 30 minutes.
- The GROW model of coaching strategy was used to standardize coaching sessions and assist participants in establishing a solution-focused systematic approach by using a collaborative approach to problem-solving, which comprises identifying the problem's origin, developing a solution, and placing it into action (Whitmore, 2002).
- This model focuses on coaches' activities as they help patients achieve their goals and deal with problems throughout the coaching process. The GROW model stands for (Goal, Reality, Options, Will), as detailed in Figure (1).



**Figure (1) GROW Model**

**Whitmore, J. (2002): Coaching for performance: Growing people, performance, and purpose. 3rd ed., London: Nicholas Brealey Publishing, 78–123.**

- *The researcher applied the GROW model throughout the coaching sessions, as follows:*
- In the initial coaching session, the researcher provided an overview of the coaching program's purpose, components, schedule, activities, and effects on the health of pregnant women. Then the researcher discussed with the pregnant women their feelings about living with gestational diabetes, personal obstacles and supports for diabetes self-management, the significance of establishing a strategy for self-management of diabetes, and their personal motivation for lifestyle change.
- The researcher then presented a brief overview of gestational diabetes, including "definition, risk factors, causes, signs and symptoms, maternal and fetal complications, preventive measures, and its management. The researcher distributed the Arabic educational booklet to each pregnant woman.
- The researcher then developed and verified the specific objectives that the women wanted to accomplish in the coaching program during Phase G (goal setting). In brief, the objectives of the coaching sessions include: encouraging a positive attitude through education and skill development; promoting a healthy lifestyle associated with gestational diabetes through verbal and written evidence-based information; reducing unhealthy lifestyles; providing education on problem-solving techniques and activity planning; adhering to active monitoring of body weight and blood glucose levels during pregnancy and viewing it as important in the prevention of complications.
- The promotion of healthy lifestyles for gestational diabetes was the main objective of the second and third coaching sessions. In order to accomplish this, the researcher gives each woman evidence-based information about healthy lifestyles, such as stress management and safe physical activity, including the recommended duration, type, and sufficient rest during exercise. and healthy diets that include fruits, high fiber, whole grains, and vegetables, along with other healthy foods. The significance of self-monitoring blood glucose levels and medication adherence was also stressed by the researcher.
- *The fourth and fifth coaching sessions* emphasized the goal of minimizing unhealthy behaviors, where the researcher explained the unhealthy behaviors associated with GDM that should be avoided, such as unhealthy eating, drinking caffeine, cola, and smoking.
- In between coaching sessions, the researcher delivered brief messages to expectant mothers on a range of subjects, including tracking blood glucose levels and weight changes, reiterating beneficial lifestyle modifications, supporting goal attainment, and encouraging self-evaluation of the situation.
- Each session, the researcher prompted the women to discuss their current situations, review their daily healthy behaviors that followed them, and record in their self-diary in the period between sessions how far they are from their goals (**Reality phase**). Furthermore, because they "did not know how to measure blood glucose and how to

self-inject insulin," the participants were urged to identify barriers and challenges to reaching their goals. Throughout the coaching sessions, the researcher described problem-solving techniques and assisted in developing ways to overcome these barriers.

- The researcher verified the data and motivated the participants to confidently implement coaching in their lives, such as maintaining a "healthy diet, regular exercise, self-measuring of glucose, self-injection of insulin, adherence to medication, avoiding caffeine, and smoking." During this phase (**Will phase**), the researcher assists women by carefully listening to their input and using open-ended questions to explore further, aiding them in devising an effective action plan to accomplish their objectives.
- The topics covered in the preceding session and the goals for the current one were briefly reviewed at the beginning of each coaching session. A summary of the session's topics was given at the end, and participant input was sought to make sure they were receiving the most advantages possible.
- A variety of instructional strategies were employed, including discussion, role plays, interactive sessions, lectures, demonstrations, re-demonstrations, and brainstorming for solving problems. A range of suitable educational resources, including pamphlets, PowerPoint presentations, video clips, and educational booklet, were employed.
- To offer direction, support, and follow-up, the researcher set up a follow-up meeting with participants and reached out to women via WhatsApp or mobile phone.

#### Evaluation Phase:

- Employing the previously outlined methods, the effectiveness of the lifestyle coaching program was evaluated by monitoring the blood glucose levels of pregnant women before and after a two-month intervention, in addition to appraising their knowledge and health behaviors related to gestational diabetes through the utilization of the previously listed instruments.

#### Statistical design

After the data underwent revision, coding, tabulation, and transfer to a personal computer, the Statistical Package for Social Sciences (version 22) was employed to process the gathered data. Descriptive statistics were employed, presenting the data as frequency, percentage, mean, and standard deviation (SD). The association between categorical variables was scrutinized using T-test and Chi-square tests. To assess the correlation between two variables, the Pearson correlation coefficient was utilized. The instrument employed in the study underwent testing for internal consistency or reliability using the Cronbach alpha coefficient. The significance of the results was assessed based on the following criteria: a difference is considered highly statistically significant when  $P \leq 0.01$ , statistically significant when  $P < 0.05$ , and non-significant when  $P > 0.05$ .

#### Results:

**Table (1);** indicates that 38.3% of the studied women were less than 25 years old, with a mean age of  $28.4 \pm 5.5$ , and 75% of them were from urban regions. In terms of education, 73.3% of the studied participants were housewives, and 63.3% had completed secondary education.

**Table (2);** illustrates that 63.3% of the studied women were multigravida, and 43.3% had more than para three. 56.7% had an irregular prenatal follow-up, with a mean gestational age of  $26.95 \pm 1.92$ .

**Table (3);** compares the studied women's knowledge of gestational diabetes. The table reveals a highly statistically significant difference between pre and post-coaching program implementation regarding all knowledge elements ( $P = 0.000$ ). As (18.3%, 30.0%, and 26.7%) of the studied women had correct knowledge of preventive measures, clinical manifestations, and treatment of gestational diabetes at the pre-coaching program, respectively, it reached (91.7%, 90.0%, and 88.3%) at the post-coaching program implementation.

**Table (4);** shows a highly statistically significant difference between pre and post-intervention ( $P < 0.001$ ). The majority of the

studied women had a good knowledge score (83.3%) at the post-coaching program implementation compared to (3.3%) at the pre-coaching program.

**Figure (2);** reveals that 27% of the women in the study obtained their information from healthcare providers, whereas 45% of them said they got their knowledge from friends and family.

**Table (5);** indicates a highly statistically significant difference ( $P < 0.001$ ) between the mean of all health-promoting behaviors of the studied women before and after the implementation of the coaching program. Additionally, the pre-intervention mean for all health-promoting behaviors was  $23.8 \pm 3.8$ , and the post-intervention mean improved significantly to  $42.3 \pm 1.9$ .

**Table (6);** shows a highly statistically significant difference for all health-impaired behaviors ( $P < 0.001$ ) of the studied women before and after the execution of the coaching

program. Furthermore, the pre-intervention overall mean of health-impairing behavior stood at  $28.3 \pm 3.3$ , decreasing to  $18.4 \pm 1.5$  post-intervention, exhibiting a highly statistically significant difference ( $P < 0.0001$ ).

**Table (7);** exhibits a highly statistically significant reduction in the mean scores for fasting blood glucose level ( $P < 0.001$ ) and there was a statistically significant reduction in the mean scores of postprandial blood glucose level subsequent to the coaching program implementation in contrast to the period before program implementation ( $P < 0.005$ ).

**Table (8);** shows a highly statistically significant positive relationship between knowledge and health-promoting behavior ( $P < 0.001$ ). As knowledge level increases, promoting health behaviors increases. While there was a significant inverse relation between health-impairing behavior and knowledge ( $P < 0.001$ ), when there is an increase in knowledge level, the impairing behavior decreases.

**Table 1: Frequency and percentage distribution of pregnant women's general characteristics: (n=60)**

variable	No.	%
<b>Age by years</b>		
<25	23	<b>38.3</b>
25 <30	19	31.7
30 <35	12	20.0
35+	6	<b>10.0</b>
Mean $\pm$ SD	<b>28.4<math>\pm</math>5.5</b>	
<b>Residence</b>		
Rural	15	25.0
Urban	45	75.0
<b>Education</b>		
Primary	10	16.7
Secondary	38	<b>63.3</b>
University	12	<b>20.0</b>
<b>Job</b>		
Housewife	44	<b>73.3</b>
Working	16	26.7

Table (2): Frequency and percentage distribution of pregnant women's obstetric history: (n = 60)

Items	No.	%
<b>Gravida</b>		
Primigravida	22	36.7
Multigravida	38	63.3
<b>Para</b>		
0	22	36.7
1-2	12	20.0
3+	26	43.3
<b>Current pregnancy gestational age</b>		
Mean ± SD	26.95±1.92	
<b>Antenatal follow-up</b>		
Regular	26	43.3
Irregular	34	56.7

Table (3): Comparison of the studied women's knowledge of gestational diabetes pre and post coaching program: (n=60)

Knowledge items	Pre				Post				Chi square	p-value
	Correct		Incorrect		Correct		Incorrect			
	No.	%	No.	%	No.	%	No.	%		
Meaning of GDM	15	25.0	45	75.0	52	86.7	8	13.3	41.03	0.000**
Risk factors	12	20.0	48	80.0	51	85.0	9	15.0	50.83	0.000**
Clinical manifestation	18	30.0	42	70.0	54	90.0	6	10.0	45.0	0.000**
Maternal complications	11	18.3	49	81.7	50	83.3	10	16.7	50.71	0.000**
Fetal complications	8	13.3	52	86.7	48	80.0	12	20.0	53.57	0.000
Preventive measures	11	18.3	49	81.7	55	91.7	5	8.3	65.19	0.000**
Treatment	16	26.7	44	73.3	53	88.3	7	11.7	46.68	0.000**

\*\*A highly statistically significant difference

Table (4): Comparison of the studied women's total knowledge of gestational diabetes at pre- and post-coaching program implementation: (n = 60)

Items	Preintervention		Postintervention		X <sup>2</sup>	P Value
	N	%	N	%		
Poor	47	78.4	4	6.7	82.03	0.000**
Average	11	18.3	6	10.0		
Good	2	3.3	50	83.3		

\*\* A highly statistically significant difference

Figure (2): Percentage distribution of the studied women's sources of information: (n = 60)

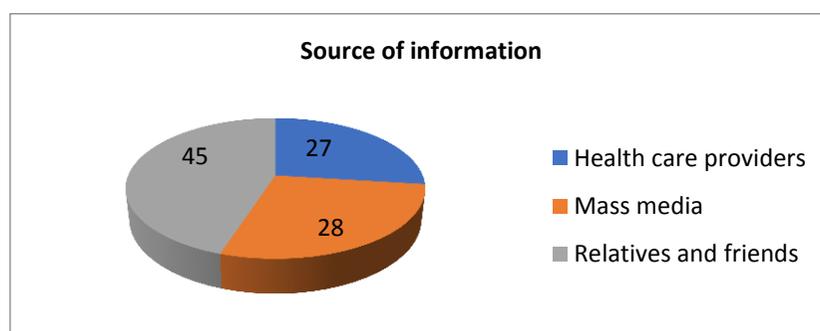


Table (5): Comparison of the studied women's health-promoting behavior regarding gestational diabetes at pre-and post-coaching program implementation: (n=60)

Items	pre	Post	t-test	P- value
	Mean± SD	Mean± SD		
Eat the recommended diet (low carbohydrate diet) and eat fruits and vegetables.	2.61±0.60	4.34±0.62	16.20	0.0001**
Take in calcium and vitamin D.	2.55±0.64	4.38±0.72	15.46	0.0001**
Drink 8 to 10 glasses of water every day	2.56±0.64	4.26±0.85	13.02	0.0001**
Practice regular exercise.	2.24±0.63	4.47±0.64	20.12	0.0001**
Get enough rest and sleep.	<b>2.26±0.64</b>	<b>4.33±0.54</b>	<b>20.20</b>	<b>0.0001**</b>
Measuring blood glucose levels daily.	2.08±0.66	3.98±0.12	22.98	0.0001**
check and record weighs regularly.	2.08±0.66	3.98±0.12	22.98	0.0001**
Managing and coping with stress.	2.38±0.78	4.12±0.75	13.04	0.0001**
adherence to prescription drug regimens.	2.56±0.64	4.63±0.49	20.91	0.0001**
compliance with recommended antenatal visits.	2.59±0.58	3.88±0.86	9.97	0.0001**
Total mean score	23.8±3.8	42.3±1.9	34.45	0.0001**

\*\* *A highly statistically significant difference*

Table (6): Comparison of studied women's health-impairing behavior regarding gestational diabetes at pre- and post-coaching program implementation: (n=60)

Items	Pre-intervention	Post-intervention	t-test	P value
	Mean± S D	Mean± S D		
Do lots of bending.	3.53±0.98	2.03±0.25	12.06	0.0001 **
Lift heavy objects.	3.59±0.88	1.98±0.48	13.05	0.0001 **
Standing for a long time	3.62±0.80	2.18±0.58	11.85	0.0001 **
Eating unhealthy snacks in place of well-balanced meals,	3.44±0.93	1.92±0.44	11.96	0.0001 **
Eat fatty or oily foods.	3.05±0.92	2.15±0.40	7.24	0.0001 **
Eat more food than you need.	3.12±0.83	2.18±0.49	7.89	0.0001 **
Skip a meal, such as breakfast or lunch.	3.05±0.88	1.91±0.72	8.11	0.0001 **
Drink something that contains caffeine, such as coffee, soda, or energy drink.	2.50±1.18	2.09±0.45	2.63	0.0001 **
Don't practice exercise.	3.41±0.82	1.00±0.00	4.04	0.0001 **
Smoking cigarettes.	2.03±0.17	1.00±0.00	3.43	0.0001 **
Total mean score	<b>28.3±3.3</b>	<b>18.4±1.5</b>	<b>21.52</b>	<b>0.0001 **</b>

\*\* *A highly statistically significant difference*

Table (7): Comparison of the studied women's blood glucose level at pre- and post-coaching program implementation: (n=60)

Items	Preintervention	Post intervention	t-test	P
	Mean± S D	Mean± S D		
Fasting	104 ±13.6	99±10.5	5.5	0.000**
Postprandial	151.8 ±42.9	118.8 ±23.9	4.25	0.05*

\*\* *A statistically significant difference p ≤ 0.05*

\*\* *A Highly statistically significant difference p ≤ 0.001*

**Table (8): Correlation between the studied sample's knowledge, health-promoting behavior, and health-impaired behavior at post-coaching program implementation:**

Variables	knowledge	
	r	P
Health-promoting behavior	0.94	0.0001*
Health-impaired behavior	-0.88	0.0001*

**\*\*A Highly statistically significant p difference  $\leq 0.001$**

## Discussion

Diabetes mellitus poses a considerable public health challenge, correlating with elevated rates of morbidity, mortality, utilization of medical resources, and associated expenses. Additionally, it is linked to potential adverse outcomes that may pose a threat to the health of both the mother and the fetus (**Desoky, Metwally, & Hussien, 2022**).

Lifestyle intervention is the first-line therapy to control blood glucose level and prevent future cardiometabolic complications. However, women with gestational diabetes face significant barriers to lifestyle interventions (**Sabag et al., 2023**). A well-known technique for encouraging positive behavior change in women with gestational diabetes to mitigate the effects of the disease, enhance quality of life, and improve health outcomes is health coaching (**Mi Ko. & Lee., 2018**). In light of the previous study, the current study was conducted to assess the effect of a lifestyle coaching program on health-related behavior and blood glucose levels among gestational diabetic women.

The present study comprised sixty pregnant women with gestational diabetes; around two-thirds had completed secondary education, slightly over one-third were below the age of 25, and roughly three-quarters were from urban regions. Accordingly, **Abd Elmoaty et al. (2019)** investigated the effect of the educational program at El Minia University on the knowledge and clinical outcome of recently diagnosed 74 gestational diabetic women. They observed that slightly less than half of these women are under 25 years old and that over two-thirds of them reside in rural areas. These findings emphasized how important it is that health care providers provide the studied group with complete direction, support, assistance, and education regarding prevalent health issues.

The ability of patients to take care of themselves on a daily basis is the foundation for diabetes treatment, and patient education is seen to be essential to reaching this objective. There is proof that those who suffer from this condition frequently lack an adequate understanding of the causes, symptoms, and risk factors of diabetes. Through its ability to shape attitudes and behaviors related to self-care, ignorance can have an effect the health of patients **Zeinal et al. (2021)**.

The findings of the present study reveal that concerning pregnant women's knowledge of gestational diabetes, just below half of the women exhibited poor overall knowledge scores before the coaching program, whereas the majority achieved high scores following program implementation. A highly significant improvement was observed in all knowledge aspects, encompassing clinical manifestations, strategies for preventing maternal and fetal complications, and gestational diabetes treatment post-intervention compared to pre-intervention. These results affirm that the lifestyle coaching program has the potential to enhance expectant mothers' understanding of crucial information related to gestational diabetes mellitus.

**Helmy et al. (2022)**, in their investigation into the effects of a coaching program on preventing peripheral neuropathy degeneration in diabetes mellitus patients, support these results. Their study revealed that the experimental group subjected to the coaching program experienced a statistically significant overall knowledge improvement in controlling the progression of diabetic peripheral neuropathy ( $t = 3.94$ ;  $p 0.001$ ) using a quasi-experimental design (control-study group). The observed effectiveness of coaching programs in educating mothers about gestational diabetes may contribute to the understanding of this improvement.

In line with **Chen et al. (2019)** quasi-experimental research, which aimed at assessing the effectiveness of short-term health coaching on diabetes control and self-management efficacy, health coaching was found to be beneficial in lowering type 2 diabetes mellitus (T2DM) risk factors and to be a viable tactic for enhancing diabetic patients' self-management and knowledge.

According to a study by **Saboula, Ahmed, and Rashad. (2018)** assessing the effect of nursing intervention on knowledge, attitude, and self-care activities among gestational diabetic women, "nursing intervention enhanced the women's self-care practices, knowledge, and attitudes regarding gestational diabetes. The study's findings corroborated these findings. They observed that the overall knowledge of pregnant diabetic women considerably improved following the intervention.

A statistically highly significant difference was noted in the mean scores of all facets of health-promoting and health-impairing behaviors related to gestational diabetes in the studied sample before and after the coaching program implementation ( $P < 0.001$ ), marking a pivotal discovery in the current study. During the pre- and post-intervention phases, there was a decrease in the overall mean of health-impairing behavior and an increase in the overall mean of health-promoting behavior. This might be as a result of the availability of more resources for expectant mothers; time and knowledge, encouragement to change their behavior, learning new activities and skills to be more effective, being prepared for new duties, and self-management through a coaching program.

The results of the present study were consistent with **Mohebbi et al. (2019)**, who conducted a study on the "Self-Management Intervention Program Based on the Health Belief Model (HBM) among Women with Gestational Diabetes Mellitus." In their quasi-experimental study, they observed a significant difference in health-promoting behaviors in the intervention group compared to the control group ( $P = 0.001$ ). These findings suggest that the educational intervention and coaching program were effective in increasing awareness among women about healthy and risky

behaviors associated with gestational diabetes. Which, moreover, will ultimately improve their quality of life, reducing the medical burden and global budget. Furthermore, this result also has contributions from research hypotheses.

These findings align with a study conducted by **Lin et al. (2021)**, which involved 114 diabetic patients at a medical center in Taiwan. The study utilized a randomized controlled trial to investigate the impact of health coaching on diabetes control and lifestyle modification. The control group received usual care throughout the entire 6-month period, while the intervention group received health coaching in addition to regular care. Following the 6-month health coaching, the study demonstrated a significant reduction in HbA1c and an enhancement in food quality. Participants in the intervention group increased their daily consumption of vegetables and decreased their intake of whole grains, fruits, meat, protein, fats, and oils. This positive outcome may be attributed to the continuous guidance and reinforcement provided during the coaching program, motivating participants to modify their diabetes lifestyle behaviors.

Knowledge and health-promoting behavior were shown to be significantly positively correlated ( $P < 0.001$ ), according to the correlation between the studied sample's knowledge, health-impaired behavior, and health-promoting behavior. However, there was a strong inverse correlation between knowledge and impairing behavior. The study "Effect of Theory-based Education on Promoting a Healthy Lifestyle in Pre-diabetic Women" by **Muhammad et al. (2022)** showed a significant relationship between knowledge and promoting behavior post-intervention, which supports the findings of the current study. This demonstrated that the lifestyle coaching program in the current study can encourage healthy habits and knowledge in women with gestational diabetes.

The current study examined the influence of coaching programs on blood glucose level and found that, when comparing the post-program intervention to the pre-coaching program, there was a statistically significant decrease in the mean score of fasting and postprandial blood glucose levels among the studied sample ( $P < 0.001$ ). This is consistent with research by **Mi**

**Ko and Lee. (2018)** assessing the impact of a coaching program on complete lifestyle adjustment for gestationally diabetic expectant mothers. Based on the study results, the coaching program is recommended for clinical usage as a helpful nursing intervention for women with gestational diabetes. It has been shown to improve self-care behaviors and lower depression, fasting blood sugar, and HbA1C.

Similar to **Soliman et al. (2022)**, who study the impact of health coaching and education on type 2 diabetes control from the standpoint of HbA1c. It concluded that diabetes health coaching plays a significant role in healthcare by supporting behavior change, encouraging self-care, and providing regular follow-up and support. For diabetics, health coaching is a useful tool for raising glycemic control.

Additionally, **Alamri et al. (2019)** study, "Effectiveness of health coaching on diabetic patients: A Systematic Review and Meta-analysis," supports this conclusion by showing that glycemic control, hemoglobin A1c, and high-density lipoprotein cholesterol are all significantly impacted by health coaching interventions. By providing continuous educational assistance throughout the coaching session, encouraging patient participation in the treatment plan, and ensuring that the patient is knowledgeable about the major subject matter, this guarantees the efficacy of the coaching program in improving the patient's lifestyle and health outcomes.

The findings from a study conducted by **Esheteal et al. (2023)** in their research titled "Effect of nutritional promotion intervention on dietary adherence among type II diabetes patients in North Shoa Zone Amhara Region: a quasi-experimental study" support and validate the results of the current study. The research demonstrated that the intervention led to a significant reduction in mean fasting blood glucose levels ( $P \leq 0.05$ ). These results reinforce the idea that a lifestyle coaching program has the potential to effectively improve glycemic control and bring about substantial changes in adherence to healthy eating practices among women with gestational diabetes.

## Conclusion

The current study concluded that the implementation of a lifestyle coaching program has a better effect on pregnant women's knowledge and health-related behaviors regarding gestational diabetes mellitus, as well as decreasing their blood glucose level. The research hypotheses were supported by the study's findings.

## Recommendations

The following was suggested in light of the study's findings:

- The Lifestyle Coaching Program for gestational diabetes should be incorporated into prenatal care for expectant mothers in various healthcare settings.
- Increasing awareness of the need for gestational diabetes women to adopt a healthier lifestyle through the use of ongoing coaching programs.
- More research is still required to evaluate the effect of a healthy lifestyle coaching program on pregnancy outcomes among women with gestational diabetes.
- Long-term follow-up and replication of the current study on a large statistical sample from other regions of Egypt are recommended to obtain more generalizable results.

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