Effect of Roy's Adaptation Model Based Intervention on Healthy Behaviors and Quality of Life among Gestational Diabetic Women

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Abstract

Background: One of the most pervasive endocrinopathies and medical implications of pregnancy is gestational diabetes mellitus. Applying Roy's adaptation model can contribute to more physically and mentally healthy behaviors, appropriate disease management, fewer complications, and an overall higher quality of life. **Aim:** The study aimed to evaluate the effect of Roy's adaptation model based intervention on healthy behaviors and quality of life among gestational diabetic women. **Design:** A quasi-experimental research design (two groups "control/study", ″pre –posttest″) was used to fulfill the study's aim. **Setting:** The study was carried at Obstetric and Gynecological Outpatient Clinic at Benha University Hospital in Benha City, Qaliobya governorate, Egypt. **Sample:** A purposive sample of pregnant women was selected from the above-mentioned study setting. **Tools:** A structured interviewing self-administered questionnaire, women's knowledge questionnaire, women's healthy behaviors questionnaire, Roy's adaptation model scale and diabetes quality of life questionnaire. **Results**: After implementation of Roy's adaptation model based intervention, the mean scores of healthy behaviors and diabetes quality of life among the study group were significantly higher than in the control group. There was a highly significant statistical positive correlation between total Roy's adaptation model scores and total scores of healthy behaviors and diabetes quality of life in both groups at Pre, 2 weeks and one-month post-intervention phases. **Conclusion:** The Roy's adaptation model based intervention for gestational diabetic women significantly improve knowledge, healthy behaviors and quality of life. **Recommendations:** Developing evidence-based intervention based on Roy's adaption model to provide more insight into the promotion of women's health and adaption related to gestational diabetes.

Keywords: Gestational diabetes, Roy's adaptation model, Healthy behaviors, Quality of Life

Introduction

Gestational Diabetes Mellitus (GDM) is among the most prevalent pregnancy-related medical conditions, and if it is not treated properly, it can have major negative health repercussions on both woman and fetus. **(Modzelewski et al., 2022).** Any level of glucose intolerance that originally appeared or developed during pregnancy with a significant economic impact is referred to as GDM **(Sedigheh et al., 2023).** GDM is often identified early in the third trimester of pregnancy or between weeks 13 and 26 of gestation. It develops when the pancreas fails to generate enough insulin to prevent blood sugar from rising **(Zakaria et al., 2023).**

Maternal age over 35 years, pre-pregnancy overweight ((BMI above 30 kg/m2)) or obesity (BMI above 30 kg/m2), a first-degree relative with diabetes or a family history of the disease, and previous macrosomia (birthweight exceeding 4,500 g) are some of the modifiable and non-modifiable risk factors for GDM that have been identified. Moreover, a history of GDM during previous pregnancy is the greatest risk factor for GDM **(Sweeting et al., 2022).** Furthermore, GDM can also result from insulin resistance, involving pre-eclampsia and polycystic ovarian syndrome **(Guadix et al., 2023).**

Diabetes screening is prioritized care in the 2022 Standards of Care for women that are attempting to conceive or who are currently pregnant **(Beyene et al., 2023).** It is

recommended that all women have universal screening between 24 and 28 weeks of pregnancy **(Sperling et al., 2023).** Gestational diabetes may be indicated by a blood glucose test that reveals glucose levels greater than 126 mg/dl following fasting **(Haim, 2023).**

Gestational diabetes mellitus enhances the possibility of negative results in both short- and long-term problems. Short-term problems include increased body fat, fetal macrosomia, shoulder dystocia and pre-eclampsia in the women. In addition, postpartum complications include prolonged labor, surgical complications, cesarean section, severe perineal lacerations, bleeding and infection. However, type 2 diabetes mellitus, obesity, metabolic syndrome, and cardiovascular disease can all become more likely as a result of long-term consequences from GDM later in life **(Yefet et al., 2023; Luo et al., 2023).**

Efforts to prevent GDM are of paramount significance to reduce the risk of possible harmful effects on the woman's and offspring's health. Reducing insulin resistance and hyperglycemia is an aspect of the prevention of GDM, which influenced by several factors, including dietary intake, supplement use, physical activity, weight, and lifestyle. Moreover, reducing excessive gestational weight gain and losing weight before becoming pregnant are crucial aspects of diabetes prevention **(Lim et al., 2023).**

Gestational diabetes mellitus management concentrates on controlling the blood glucose levels of women by means of lifestyle modifications, with the main strategies being exogenous insulin delivery and medical nutrition therapy. Also, the cornerstone treatments for the management of metabolic disease is lifestyle modification, involving eating a healthy diet and exercising regularly **(Sabag et al., 2023).** A significant aspect of managing GDM is teaching women about the condition. This will lead to surge in self-care due to early diagnosis, appropriate treatment, and a reduction in the disease's negative impacts **(Mohamed et al., 2023).**

Healthy behaviors enhancing social facilitation, strengthening self-regulation skills and abilities, and expanding knowledge and attitudes may all contribute foster healthy behaviors. Women with GDM continue to have low levels of self-management, despite therapies meant to increase self-management practices **(Xu et al., 2023).** Achieving GDM treatment goals and maximizing life quality are contingent upon the development of healthy behaviors and preservation of mental well-being. Medical nutrition therapy, diabetes self-management instruction and support, regular exercise, quitting smoking counseling, health behavior counseling, and psychosocial care are all critical to reaching the objectives after a preliminary thorough medical assessment **(ElSayed et al., 2023).**

Quality of life (QOL) is a multi - dimensional and delicate structure that incorporates an individual's perspective of the culture, values, and living environment. Health professionals generally believe that the life quality of a woman is a reflection of the health **(Abolfathi et al., 2022).** There are several aspects of QOL that fall into three categories: Social, mental, and physical. Enhancing women's quality of life and making lifestyle changes can greatly increase the independence and productivity as well as help them effectively manage the difficulties and complications associated with GDM **(Ghanbari-Afra et al., 2023).**

The Roy's Adaptation Model (RAM) is applied as an organized framework for evaluating the effectiveness of nursing practices and care programs, when providing nursing care to patients in the acute, chronic, and advanced stages of the illnesses. **(Hosseini and Soltanian, 2022).** The objectives of nursing, according to RAM, are to support adaptation in the four adaptive modes, contribute to health, and ensure a dignified death **(Mao and Zhou, 2023).** The goals of RAM include interdependent adaptability, role-function, and self-concept are illustrated by incorporating diabetes into one's current lives, social interactions, and self-perception **(Hering, 2022**)

Nursing guidance is one of the most important aspects to decrease GDM-related morbidity and mortality as well as helps pregnant women to prevent the complication

and adapt healthy behavior that proves to be beneficial for both mother and fetus **(Rayamajhi and Thapa, 2022).** Direct involvement of nurses in the care of pregnant GDM patients is a pivotal. It is imperative that nurses have extensive knowledge and skills in order to create and implement a suitable care plan for pregnant women throughout the antenatal and intrapartum phases **(Stan et al., 2023).**

Significance of the research

One of the major metabolic diseases is gestational diabetes mellitus. In recent years, there has been a notable increase in the number of pregnancies complicated by GDM **(Tocci et al., 2023).** GDM also considered an epidemic with increasing incidence, the incidence of GDM is escalating in concurrently with the growing in the prevalence of obesity and advanced maternal age **(Greco et al., 2023).**

Globally, GDM affects around 14.0% of pregnant women, varies from 7.1% in the Caribbean and North America to 27.6% in North Africa and the Middle East, around 20 million births annually, according to the most current approximations provided by the International Diabetes Federation (IDF) 2021 Report. Moreover, in 2018, Egypt had an incidence rate of 15.9%, placing it among the top 21 countries. **(Wang et al., 2022).** Additionally, **Eltoony et al., (2021),** revealed that 17.5% of pregnant women who undergoing universal screening had GDM, compared to 82.5% who did not in Aswan.

There is insufficient data exists in Egypt regarding the quality of healthcare provided to pregnant women who have diabetes mellitus. Additionally, there are no national standards for the management and screening of GDM, and there is a lack of knowledge regarding the effect of GDM, nursing care practices and its management to minimize complications and educate pregnant mothers about self-care measures **(El-Ansary and Fouad, 2020).** Therefore, pregnant women who are aware of GDM are more likely to have healthy lives, practice good health habits, take better care of themselves, prevent or identify the condition early, actively cooperate with treatment and significantly improve pregnancy outcomes **(Saad et al., 2023).** RAM can help in boosting the degree of compliance, which will enable better management of GDM and an improvement in quality of life **(Hadis et al., 2018).**

Aim of the study:

The study was aimed to evaluate the effect of Roy's adaptation model based intervention on healthy behaviors and quality of life among gestational diabetic women. The following objectives will help accomplish this aim:

1. Assess the knowledge of women, healthy behaviors, and quality of life in regards to gestational diabetes.
2. Constructing and executing Roy's Adaptation Model based Intervention regarding gestational diabetes.
3. Evaluating the impact of Roy's Adaptation Model based intervention among gestational diabetic women.

Research hypotheses

H1: Gestational diabetic women who will receive Roy's adaptation model based intervention will have a higher degree of knowledge than those who will not receive it.

H2: Gestational diabetic women who will receive Roy's adaptation model based intervention will have healthy behaviors than those who will not receive it.

H3: Gestational diabetic women who will receive Roy's adaptation model based intervention will have a healthy life quality than those who will not receive it.

H4: Gestational diabetic women who will receive Roy's adaptation model based intervention will become more adaptive with disease than those who will not receive it.

Conceptual definitions:

Healthy behaviors: Refers to health-related practices performed by pregnant women that can directly affect health outcomes which including, healthy diet, check blood glucose,

taking medication, and regular exercise and perform personal hygiene.

Quality of life: Refers to a good indicator of lifespan that evaluates the extent to how GDM and treatment affects the health status of pregnant woman which included three main domains, namely, “anxiety about the long-term implications of diabetes”, “impact of diabetes control”, and “satisfaction with treatment and various aspects of life”.

Operational definition:

Roy's adaptation model: Refers to adaptation model that used in nursing to improve healthy behaviors of gestational diabetic women and consisting of four modes that enabled for early detection and control of maladaptive behaviors: Physiological, self-concept, interdependence and role function modes.

Subjects and method

Research design:-

A quasi-experimental research design (two groups "control/study", ″pre –posttest″) was utilized to achieve the aim this study. The objective of a quasi-experimental design is to establish a cause-and-effect relationship between an independent and dependent variable. It is a useful tool when real experiments cannot be carried out for ethical or practical reasons. The groups in a quasi-experiment are nonequivalent, not randomly selected, and may differ in other respects **(Thomas, 2023).**

Research Setting:-

The study was completed at Obstetrics and Gynecological Outpatient Clinic at Benha University Hospital in Benha City, Qaliobya Governorate, Egypt. This specific setting was selected because it is the principal Hospital serving a large geographic area of Benha City and Qaliobya Governorate, housing and caring for women from a variety of social backgrounds. All patients, including pregnant women, can receive affordable and complimentary services from this hospital. Every month, a sizable number of pregnant women from both urban and rural areas come to the hospital to seek follow-up care.

Sample type and criteria:

From the aforementioned research setting, pregnant women were selected as a purposive sample using the inclusion criteria. listed beneath: Pregnant women who documented medically diagnosis of GDM by an obstetrician or endocrinologist, already diagnosed with GDM from at least 4 weeks, gestational age between 24 and 28 weeks' gestation, having single living fetus, free from any other medical complications (e.g. hypertension, anemia, epilepsy, thyroid dysfunction, cardiac and respiratory diseases), no pregnancy problems either fetal or maternal, free from other causes of high-risk pregnancy, free from any neurologic or psychological diseases, no exposure to stressful circumstances throughout the study period (such as a spouse's or child's significant illness, a close relative's death, an accident, or childbirth) and can read and write.

Sample size and technique:

A purposive sample of (90) pregnant women after exclusion of those who didn't fulfill inclusion criteria. As per the report from Benha University Hospital Statistical Center (2023), there were 117 women from the previously described setting who were medically diagnosed with GDM in 2023.The following formula was utilized to determine the sample size **(Mani et al, 2015).** Wherever: n=sample size, N=population size (117), e=Margin of errors which is±0.05

$$n = \frac{N}{1 + N(e)^2}$$

Two groups were randomly selected from the sample: The study group, consisting of 45 women who obtained an intervention based on Roy's adaption model and the control group, consisting of 45 women who obtained routine care simply. In order to avoid bias through data collection, the pregnant women at Obstetrics and Gynecological Outpatient Clinic were randomly divided so that the first case was considered from the control group and the

second case from the intervention group so that the control group had odd numbers and the intervention group had even numbers.

Tools of data collection:

Five tools were used for data collection:

Tool I: A structured interviewing self-administered questionnaire: It was constructed by researchers after reviewing a related literature and translated into Arabic language. It included two parts:

Part (1): Socio-demographic characteristics of pregnant women: It comprised 4 items which were (age, residence, level of education and occupation).

Part (2): Obstetric history: It comprised of 5 items which were (current gestational age, number of gravida, number of parity, personal history of GDM and family history of gestational diabetes).

Tool II: Women's knowledge questionnaire (pretest/posttest): Researchers created it after searching through relevant literature **(Abd Elmoaty et al., 2016; Mohammed et al., 2021& Said and Aly, 2019)** and translated into Arabic language. It was designed to assess knowledge of pregnant women in regards to gestational diabetes mellitus. It was composed of (fifteen questions) as (definition, risk factors, causes, symptoms of gestational diabetes, symptoms of hypoglycemia, diagnosis, investigations, maternal complications, fetal complications, guidelines for treating gestational diabetes, pharmacological therapy of gestational diabetes, proper nutrition, importance of practicing exercise and importance of follow up schedule during pregnancy and postpartum period).

Scoring system:

Each knowledge question was given a weight based on the elements that it contained. (multiple choice questions). Each item was given a score (2) in case of correct answer, a score (1) in case of incorrect answer or don't know. All of the question scores were added together to determine the final score. The mean of all the item responses was used to determine the total mean score for knowledge. The possible score range is between 15 to 30 with the higher score demonstrating increased knowledge.

Tool III: Women's healthy behaviors questionnaire (pre/posttest): It was created by researchers using Arabic after a survey of relevant literature **(Ural and Beji, 2021 ; Sayakhot et al., 2016).** It was used to evaluate pregnant women's healthy behaviors in relation to gestational diabetes mellitus. It consisted of (20 items) grouped under (5) domains including: **Domain (1): Following the diet plan developed by the dietitian** (6 items) e.g. (eating the allowed number of meals per day (breakfast, lunch and dinner), having a plan designed for a diet defined by a nutritionist, eating foods low in sodium and fat, eating a variety of meals that contain vitamins, mineral and low carbohydrate, avoid consuming sugars and soft drinks and avoid eating canned foods or fast food that contain a large amount of sodium so that fluids are not retained in the body). **Domain (2): Checking of blood glucose at home** (4 items) e.g. (having a blood glucose measuring device at home, trained to measure a blood glucose by yourself, measuring the blood sugar level according to the doctor's orders and according to the recommended times and showing home blood sugar measurements to doctor during each visit and performing urine analysis for glucose). **Domain (3): Taking medications regularly and following fetal movement** (3 items) e.g. (taking medications regularly as doctor prescription and monitoring side effects, avoid taking medication without consulting a doctor and counting fetal movement daily). **Domain (4): Regular exercise training and monitoring weight** (4 items) e.g. (daily walking for at least half an hour, exercising regularly 3-5 times a week in a health club under the supervision of specialists, weighing of yourself weekly and getting enough sleep daily "8 hrs. at night and 2 hrs. nap"). **Domain (5): Personal hygiene and skin care** (3 items) e.g. (regular feet and skin care and gently nails cutting, daily oral and teeth care and caring for the genital area constantly).

Scoring system:

Each behavior was judged according to the reported answer. Each behavior received a score of (1) for a "no" response and a score of (2) for a "yes" response. The item-by-item scores were added to determine the healthy behaviors score. The achieved scores ranged between 20 and 40, with higher scores signifying greater participation in healthy behaviors. **Total healthy behaviors score was classified into two levels:**

- Satisfactory level: if the overall scores (≥ 60% -100%)
- Unsatisfactory level: if the overall scores (< 60 %)

Tool IV: Roy's Adaptation Model Scale (RAMS) (pre/posttest): It was adapted from **(Roy and Andrews, 2009 & Russo, 2019)** and the appropriate adjustments were made by the researchers so that they could evaluate women's maladaptive behaviors and the associated focal, contextual, and residual stimuli in order to investigate the degree of adaptability in women. It included 39 items in four adaptive modes. Every mode is made up of questions that are used for measurements, observations, and interviews regarding women's maladaptive behaviors. **Physiologic Mode**: (10) items as (breathing, note the color of lips, remain calm, drink enough fluids, eat a well-balanced diet, sleep, rest, dizziness or fatigue, pain management and changes in hearing, vision and touch). **Self-Concept Mode:** (10) items as (looking in the mirror, getting better, looking presentable, taking care of myself, personal neatness, spiritual strength, importance of looking healthy, remain positive, getting healthy and manage stress spirituality). **Role Function Mode:** (9) items as (have to change my role, capable of taking care of myself, face transitions bravely, not fear change, capable of making changes in my daily functions, perform as expected when working in groups, helping others, my manual skills meet the expectations of my job and having the character to endure my positions' demands). **Interdependence Mode:** (10) items as (my family loves me even with my illness, having support systems to help me, having relationships with people to help me, feeling secure and safe, my colleagues understand and support me, my friends are close to me in difficult times, feeling I can count on God, security provided by family, security provided by work and in my relationship I'm not the same person).

Scoring system:

Every response was categorized using a three-point Likert scale. The lowest score of 1 indicates (rarely), a score of 2 indicates (sometimes), and the highest score of 3 indicates (often). The mean of the responses to each item is calculated to determine the total score. The possible score range is 39–117, where a high score denotes a more adaptive behavior regarding GDM. **Total Roy's Adaptation Model scores was categorized as following:**

- High adaptation: if the overall score (≥ 75%-100%)
- Moderate adaptation: if the overall score (60% - < 75%)
- Poor adaptation: if the overall score (< 60%)

Tool V: A Revised Version of Diabetes Quality of Life (DQOL) questionnaire (pretest/posttest): It was adapted from **(Nsyhtkn et al., 2012 & Bujang et al., 2018).** DQOL is a 13-item questionnaire that assesses the quality of life for pregnant diabetic women. It included three domains: **Satisfaction domain** (6 items) about (time takes to manage diabetes, time spend getting checkups, current treatment, time it takes to determine the sugar level and knowledge about diabetes).

Impact domain (4 items) about (feel pain associated with the treatment, feel physically ill, interfere with the family life and limiting social relationships and friendships).

Worry domain (3 items) about (pass out, body looks differently and get complications).

Scoring system:

A five-point Likert scale was used to rate quality of life questions ranging from 1 (completely disagree) to 5 (completely agree) for satisfaction domain and the reverse score for impact and worry domains. Higher scores

denote a higher quality of life. The questionnaire has a minimum score of 13 and a maximum score of 65. Then, two groups are created based on overall quality of life:

- Acceptable QOL: (achieving 60% or more)
- Non-acceptable QOL: (achieving less than 60%)

Tools validity:

A panel of three jury professionals in related fields of Obstetrics and Gynecological Nursing and Community Health Nursing Departments at Faculty of Nursing, Benha University assessed the validity of the questionnaires to make sure the tools were applicable, relevant, clear, and complete. Sentences needed to be slightly modified. According to the experts' perspective, the tools were deemed legitimate.

Tools reliability:

The reliability of the tools was assessed using the Cronbach's Alpha coefficient test., which showed that the internal consistency of research tools as following:

Tool	Cronbach's alpha value
Tool II: Women's knowledge questionnaire.	Internal consistency (α =0.81).
Tool III: Women's healthy behaviors questionnaire.	Internal consistency (α =0.88).
Tool IV: Roy's Adaptation Model Scale (RAMS).	Internal consistency (α =0.83). It ranged from 0.71 to 0.86 in the four domains
Tool V: A Revised Version of Diabetes quality of life (DQOL) questionnaire.	Internal consistency (α = 0.92). It was 0.84 for (satisfaction) domain, 0.98 and 0.60 for (impact) domain, and 0.99 and 0.57 for (worry) domain

Ethical consideration:

Prior to beginning the study, ethical aspects would be taken into account as the following: The study was approved by the scientific research ethical committee of Benha University's Faculty of Nursing for fulfillment of the study. For the study to be completed, formal consent from the chosen study sites was obtained. The researchers gained the trust of the women by explaining the purpose and significance of the study before using the tools. Women who exhibited interest in participating part in the study provided verbal consent, and the researchers guaranteed their privacy. There were no dangers to the women's health, safety, or psychological well-being associated with this study. After statistical analysis, all data collection tools were destroyed to preserve the privacy of the women who were involved. Moreover, didn't contain any unethical remarks and respected human rights. The women were allowed to stop the study at any moment.

Pilot study:

A pilot study involving 10% of the entire sample population was carried out (9 gestational diabetic women) taking around (3 weeks) before actual data collection to test the objectivity, feasibility, clarity and tools applicability and identify any potential barriers or problems that could arise for the researcher and obstruct data collection, and identify any problems particular to the statements, such as the sequencing of questions and clarity. Estimating the period of time required for data gathering was also helpful. To prevent sample contamination, changes were made in accordance with the pilot results, and the pilot sample was removed from the study.

Field work:

After outlining the purpose of the study, Benha University Hospital's director received formal written approval from the Faculty of Nursing's dean to proceed with the research. The study took six months to complete, starting in early February 2024 and ending at the end of July 2024.

The study was carried out by the researchers in the previously specified setting three days a week, on Sundays, Mondays, and Thursdays, from 9:00 a.m. to 1:00 p.m., until the predefined sample size was reached. The researchers conducted one- to three-woman interviews each day in small groups to implement Roy's Adaptation Model based

interventions regarding GDM. The handout (booklet) about gestational diabetes mellitus (GDM) and associated healthy habits was dropped off at the Outpatient Obstetric and Gynecological Clinic at the conclusion of the research, so the benefit is shared by all pregnant women.

Roy's adaptation model based intervention

Roy's adaptation model based intervention was implemented through the following six phases; preparatory phase, interviewing and assessment phase, planning phase, implementation phase, break phase and evaluation phase.

Preparatory phase:

The preparation phase of the research involves a survey of relevant local and internationally literature pertaining to the research subject by the researchers. This helped the researchers understand the scope and gravity of the problem and assisted them in setting up the necessary tools for gathering data. The tools were distributed to three experts in the field of obstetrics & gynecological nursing and community health nursing Departments at Faculty of Nursing, Benha University; Testing for suitability, completeness, relevance, clarity, and applicability was the goal. The jury results were completed.

Interviewing and assessment phase:

The researchers greeted the woman and asked for her consent before beginning the interview. They also introduced themselves to each pregnant woman who was part of the study, explained its goal, and gave her all the information she needed to ensure that she adhered to the interventions, including the number and frequency of sessions and scheduled visits. The pregnant women were given **(Tool: I)** to assess socio-demographic characteristics of pregnant women and obstetrical history. Then, the researchers used **(Tool: II)** to assess knowledge of pregnant women regarding GDM and **(Tool: III)** to assess healthy behaviors of pregnant women regarding gestational diabetes mellitus, **(Tool: IV)** to assess the maladaptive behaviors of women and the associated focal, contextual, and residual stimuli and finally, **(Tool: V)** to assess the quality of life of women with gestational diabetes. The average time needed to complete the questionnaires was about (40-60 minutes). This phase's data collection provided the baseline versus which subsequent comparisons could be made to assess the impact of Roy's Adaptation Model based intervention. In this phase, the researchers start to determine the needs for each woman which help in the planning phase. To make it easier to follow up with the women, the phone numbers of the women were collected.

According to Roy adaptation model there are four phases of assessment to determine maladaptive behaviors of women regarding GDM:

Phase I: Physiologic adaptation: General assessment includes breathing pattern, nutrition, fluid intake, rest, sleep and others related to physiological condition, **Phase II: Self-concept assessment:** To identify how women see themselves, level of anxiety, stress and how to manage stress, **Phase III: Role function assessment:** To assess if there is change in their role as a wife or mother, relationships with husband or children or in her work and also assess alteration in her daily activities and **Phase IV: Interdependence assessment:** To assess existence of support systems as family, friends or even co-worker and if woman feels secure and safe.

Planning phase:

Taking into account the results of the assessment phase, Roy's adaptation model based intervention regarding GDM was created by the researchers as a printed booklet that was illustrated with colored pictures. The booklet was created especially in basic Arabic to meet their understanding level and address the pregnant women's knowledge gaps and improve healthy behaviors. The number of sessions and their contents, as well as the various teaching modalities and educational media, are decided. Objectives were designed to be achieved upon completion of Roy's adaptation model based intervention. **The general objective was**: By the end of Roy's adaptation model based

interventions, every woman will be capable of obtaining vital knowledge, improve women's healthy behaviors regarding GDM and attain better quality of life.

Implementation phase

For study group: The researcher designed Roy's adaptation model based intervention. There were four scheduled sessions used to carry out this intervention. It was carried out at waiting area in Outpatient Clinic at Benha University Hospital as soon as the assessment phase is finished. Every session lasted about 40-60 minutes based on their accomplishments and opinions. Pregnant women were given an orientation on the contents of the intervention at the start of the first session. The next session began with a review of the goals of the previous session and the objectives of the new session. To accommodate the women's understanding level, basic Arabic language was employed. A brief discussion time was allocated at the conclusion of every session to enable women to ask questions in order to elucidate the topics covered and address any misinterpretations. Every woman was advised of the timing of the upcoming sessions.

A variety of instructional techniques, including lectures, group discussions, problem solving, and brainstorming were utilized. Instructional media include helpful tools such as laptop and PowerPoint presentations; as well as, to meet the objectives of the study, a booklet was given to each enrolled woman from the initial session. Additionally, the researchers deployed supportive tools, such as stickers and flyers that reaffirm the intervention's principles that serve as stimulus control to encourage the desired improvements and emphasizing the effects of Roy's adaptation model based intervention on women's knowledge and healthy behaviors regarding GDM and QOL.

The **first session (theoretical)** was about GDM and its management such as (definition, risk factors, causes, symptoms of gestational diabetes, symptoms of hypoglycemia diagnosis and investigations, maternal complications, fetal complications, guidelines for treating gestational diabetes, pharmacological therapy of gestational diabetes, importance of proper nutrition, importance of practicing exercise and importance of follow up schedule during pregnancy and postpartum period).

The **second session (theoretical)** was about effect of GDM on quality of life of the women and benefits of routine screening using a standardized protocol for the early detection and to what extend early diagnosis is crucial and important to prevent complications of gestational diabetes resulting in better quality of life and pregnancy outcomes.

The **third session (semi-practical)** was about healthy behaviors related to (following the diet plan developed by the dietitian, checking of blood glucose at home, taking medications regularly and following fetal movement, regular exercise training and monitoring weight and personal hygiene and skin care).

The **fourth session** (**semi-practical**) was about techniques for managing stress and outlined the detrimental impacts of stress on women's fitness, coping mechanisms, and health-related behaviors. Among these abilities were assertiveness training, positive thinking, relaxing methods like yoga, meditation, and visualization, and encouraging behavior changes like regular exercise, healthy food, and adequate sleep. By going through the six steps of Roy's Adaptation Model:

– Evaluating the impact of the four adaptable modes on the behaviors of the women.

– Categorizing the stimuli as contextual, focal, or residual after evaluating them.

– Provide a nursing diagnosis based on the level of adaptability of the woman.

– Establish objectives to promote healthful behaviors.

– Execute an intervention designed to manage the stimuli.

– Evaluate the effectiveness of the adaptive objectives.

The break phase

This phase involved phone conversations with study group during the post-implementation period and until the evaluation phase commenced to reply the questions of the women and increase their involvement in the intervention. Women were reassured by the researchers that they may contact them at any time during a designated hour each day (researchers designated one evening hour per day for women to phone or talk with mobile application users as WhatsApp or Telegram if they need any more clarifications).

Evaluation phase:

For study group, the effectiveness of Roy's Adaptation Model based intervention was evaluated twice; two weeks and one-month post-intervention from the last session for both the study and control groups following implementation; using the same tools (Tool II, Tool III, Tool IV and Tool V) which used during the assessment phase**.** This phase could be accomplished during antenatal visits and follow up or via telephone or mobile applications in case of late.

For control group: routine antenatal care was provided to the women of control group, didn't receive any intervention by the researchers, were followed and evaluated as the same in the study group and gave them the designed booklet at the end of research.

Statistical analysis:

Prior to computerized entry, data were checked. The gathered data will be sorted, coded, entered into a computer, and examined using the proper statistical techniques and tests. The Statistical Package for Social Sciences (SPSS version 22.0) was used. Standard deviations, averages, and frequencies and percentages were all included in descriptive statistics. Inferential statistics, namely the independent t test and the Chi-square test, were used to assess the study hypothesis. The correlation coefficient was used to look at the correlation ship between knowledge scores and health-related behaviors. For all statistical tests performed, a P-value > 0.05 signified no statistically significant difference, a P-value < 0.05 revealed a statistically significant difference, and a P-value ≤ 0.001 indicated a highly statistically significant difference.

Limitations

The sessions occasionally dragged on too long because of other people's loudness and interruptions, but the researchers got around this restriction by interviewing the women. Before overcrowding of the waiting room and sometimes the researchers take permission to gather the women in students' educational classes if it is empty and the students do not need it at the time of program implementation. Moreover, limited researches about application of Roy adaptation model regarding diabetes. So the researchers cited the positive effect of model on other chronic disease which reveals its significance.

Results

Table (1): Clarifies that the control and study groups, including 57.8% and 51.1% of the 20–30 age group, had mean ages of 31.42± 4.57 and 33.22± 3.11 years, respectively. In terms of residence, 68.9% and 66.7% of the control and study groups, respectively, resided in an urban region. Regarding educational level, it was shown that secondary education was attained by 53.3% and 42.2% of the control and study groups, respectively. Depending on the occupation, 53.3% and 60% of the study and control groups, respectively, were employed. Consequently, between the control and study groups, there was no statistically significant difference in regards to socio-demographic data ($p > 0.05$) that demonstrated the group's homogeneity.

Table (2): Elaborates that the mean of current gestational age of both control and study groups were 27.46± 2.58 and 28.33± 1.75 weeks, respectively. In relation to gravida, 73.3% & 75.6% of control and study groups were multigravida, respectively. As well as, 48.9 % & 44.4 % of them were multipara, respectively. According to personal and family history of gestational diabetes, only 17.8% & 11.1% and 2.2% & 8.9% of control and study groups have personal and family history of gestational diabetes, respectively. Therefore, no

statistically significant difference was seen between the control group and the study group regarding previous and current obstetric history ($p > 0.05$) that demonstrated the homogeneity of the group.

Table (3): Demonstrates that, prior to the intervention phase, no statistically significant difference was observed. between the mean scores for total knowledge for the two groups ($P > 0.05$). Nevertheless, the mean score for the study group was noticeably higher than that of the control group at two weeks and one month after the intervention ($P < 0.001$).

Figure (1): clarifies that, the study and control group's mean total knowledge scores at the pre-intervention phase were 19.38 and 19.93, respectively. But two weeks and one month after the intervention, the study group's mean total knowledge scores significantly surpassed the control group, coming in at 25.47 and 26.00 versus 19.93 and 20.49, respectively.

Table (4): Shows that, at the pre-intervention phase, for every healthy behaviors, there is no statistically significant difference in the mean scores between the two groups related to gestational diabetes and its domains ($P>0.05$). However, the study group's mean difference score for the overall and healthy behavior domains was greater than the control group's scores after two weeks and one month of the intervention ($P\leq0.001$).

Figure (2): Illustrates that, 31.1% and 35.6% of both the study and control groups, respectively had a satisfactory level of healthy behaviors regarding gestational diabetes at pre-intervention phase. Meanwhile, 2 weeks and one-month post-intervention, 71.1% and 37.8% versus 80.0% and 40.0% of the study and control groups, respectively had satisfactory level healthy behaviors regarding gestational diabetes.

Table (5): Elaborates that, at the pre-intervention phase, no statistically significant difference exists between the two groups' mean scores for the overall Roy's adaption model and its modes ($P > 0.05$). At two weeks and one month after the intervention, the mean difference between the study group's overall score and Roy's adaptation model modes was greater than the control group's ($P < 0.001$).

Figure (3): Illustrates that, during the pre-intervention phase, 11.1% and 15.6% of women in the study and control groups, respectively, had a high level of adaptation to gestational diabetes. At two weeks and one month after the intervention, the percentage of women in the study and control groups who were highly adapted to gestational diabetes increased from 66.7% and 17.8% to 71.1% and 22.2%, respectively.

Table (6): Reveals that, at the pre-intervention period, there is no statistically significant difference between the two groups' mean scores on the diabetes quality of life (DQOL) and its domains ($P>0.05$). Nevertheless, after two weeks and one month of the intervention, the study group's mean difference score for overall and domains of diabetes quality of life (DQOL) was higher than the control group ($P\leq0.001$).

Figure (4): Illustrates that, at pre-intervention phase 26.7% and 33.3% of both the study and control groups, respectively had an acceptable level of diabetes quality of life. Meanwhile, 2 weeks and one-month post-intervention, 75.6% and 37.8% versus 77.8% and 40.0% of the study and control groups, respectively had a more acceptable level diabetes quality of life regarding gestational diabetes.

Table (7): Clarifies that, there was a highly significant statistical positive correlation between total Roy's adaptation model score and total scores of (healthy behaviors and diabetes quality of life) in both groups at Pre, 2 weeks and one-month post-intervention phases ($P\leq 0.001$).

Table (1): Distribution of the studied sample in both groups according to their Socio-demographic characteristics (n=90).

Socio-demographic characteristics	Control group n=45		Study group n=45		X2	P value
	No.	%	No.	%		
Age/years:						
<20	8	17.8	6	13.3		
20 – 30	26	57.8	23	51.1	**1.39**	**0.49**
>30	11	24.4	16	35.6		
Mean ± SD =	31.42±4.57		33.22±3.11			
Residence:						
Rural	14	31.1	15	33.3		
Rural Urban	31	68.9	30	66.7	**0.05**	**0.82**
Level of education:						
Read/write (primary)	8	17.8	10	22.2		
Secondary education	24	53.3	19	42.2	**1.11**	**0.57**
University education	13	28.9	16	35.6		
Occupation:						
Housewife	18	40.0	21	46.7		
Working	27	60.0	24	53.3	**0.40**	**0.52**

Table (2): Distribution of the studied sample in both groups regarding their obstetric history (n=90).

Obstetric history	Control group n=45		Study group n=45		X2	P value
	No	%	No	%		
Current gestational age in weeks:						
Mean ± SD =	27.46±2.58		28.33±1.75		**Independent t-test= مختلف عن راس الجدول 1.86**	**0.06**
Gravida:						
Primigravida	12	26.7	11	24.4	**0.058**	**0.80**
Multigravida	33	73.3	34	75.6		
Parity:						
Nulliparous	12	26.7	11	24.4		
Primipara	11	24.4	14	31.2	**0.49**	**0.77**
Multipara	22	48.9	20	44.4		
Personal history of gestational diabetes:						
Yes	8	17.8	5	11.1	**0.80**	**0.36**
No	37	82.2	40	88.9		
Family history of gestational diabetes:						
Yes	1	2.2	4	8.9	**1.90**	**0.16**
No	44	97.8	41	91.1		

Table (3): Mean scores of total knowledge of the studied groups regarding gestational diabetes in both groups at pre, 2 weeks and one-month post-intervention phases (n=90).

Knowledge	Possible score	Control group n=45	Study group n=45	Independent t-test	P value
		Mean ± SD	Mean ± SD		
Pre-intervention	15-30	19.93±2.61	19.38±2.84	0.964	0.338
2 weeks post-intervention		20.20±2.45	25.47±3.07	8.97	0.000**
One-month post-intervention		20.49±2.93	26.00±3.39	8.23	0.000**

Figure (1): Total mean scores of knowledge of study and control groups at pre, 2 weeks and one-month post-intervention phases (n=90).

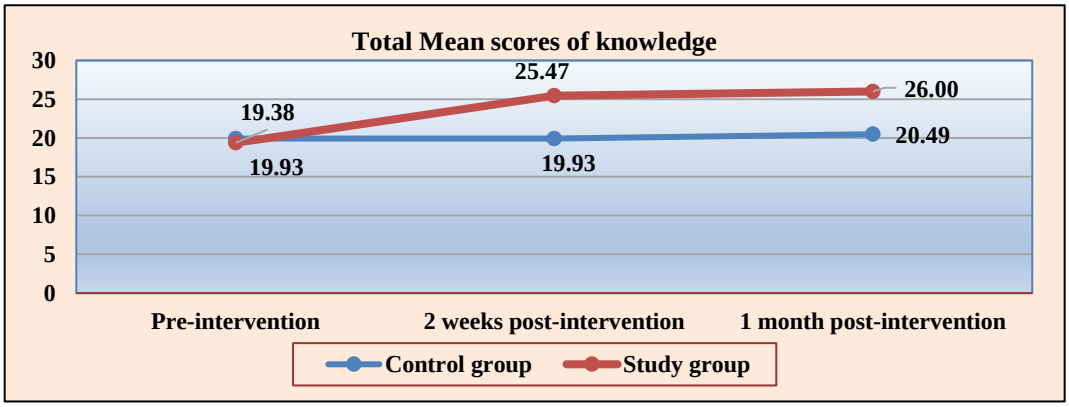

Table (4): Mean scores of healthy behaviors of the studied groups regarding gestational diabetes in both groups at pre, 2 weeks and one-month post-intervention phases (n=90).

Domains	Possible score	Control group n=45	Study group n=45	Independent t-test	P value
		Mean ± SD	Mean ± SD		
Following the diet plan developed by the dietitian:					
Pre-intervention	6-12	8.40±1.38	8.89±1.36	1.68	0.096
2 weeks post-intervention		8.71±1.57	10.22±1.50	4.65	0.000**
One-month post-intervention		8.58±1.40	10.31±1.57	5.50	0.000**
Checking blood glucose at home:					
Pre-intervention	4-8	5.44±1.15	5.24±1.13	0.82	0.410
2 weeks post-intervention		5.64±1.20	6.61±1.31	3.62	0.001**
One-month post-intervention		5.51±1.16	7.02±1.08	6.33	0.000**
Taking medications regularly and following the movement of the fetus :					
Pre-intervention	3-6	4.04±0.79	3.89±0.85	0.89	0.357
2 weeks post-intervention		4.00±0.82	4.73±0.89	3.97	0.000**
One-month post-intervention		4.07±0.78	5.02±0.92	5.26	0.000**
Regular exercise training and weight gain control:					
Pre-intervention	4-8	4.67±1.10	4.42±0.89	1.15	0.252
2 weeks post-intervention		4.78±1.08	6.76±0.98	0.907	0.000**
One-month post-intervention		4.67±1.10	6.89±1.02	0.986	0.000**
Personal hygiene and skin care:					
Pre-intervention	3-6	4.64±0.85	4.89±0.68	1.49	0.244
2 weeks post-intervention		4.76±0.77	5.44±0.89	3.91	0.000**
One-month post-intervention		4.71±0.75	5.76±0.60	7.20	0.000**
Total score					
Pre-intervention	20-40	27.20±2.43	27.33±2.31	0.266	0.791
2 weeks post-intervention		27.88±2.60	33.68±2.99	9.74	0.000**
One-month post-intervention		27.53±2.45	34.95±2.64	13.17	0.000**

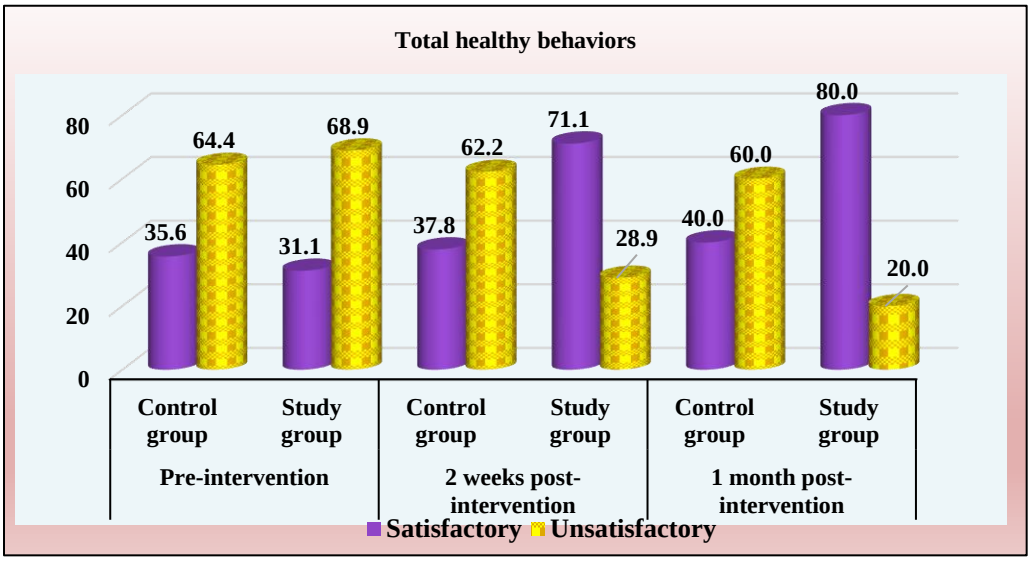

Figure (2): Percentage distribution of studied sample (study and control groups) regarding their total healthy behaviors scores about gestational diabetes at pre, 2 weeks and one-month post-intervention phases (n=90).

Table (5): Mean scores of Roy's adaptation model of the studied groups regarding gestational diabetes in both groups at pre, 2 weeks and one-month post-intervention phases (n=90).

Modes	Possible score	Control group n=45	Study group n=45		Independent t-test	P value
		Mean ± SD	Mean ± SD			
Physiologic Mode						
Pre-intervention	10-30	15.08±2.81	15.20±2.95		0.18	0.85
2 weeks post-intervention		14.88±1.99	21.02±4.00		9.19	0.000**
One-month post-intervention		14.73±1.94	23.20±4.89		10.7	0.000**
Self-Concept Mode						
Pre-intervention	10-30	14.68±2.78	14.48±3.15		0.31	0.75
2 weeks post-intervention		14.22±2.09	20.91±4.18		9.57	0.000**
One-month post-intervention		14.68±2.05	22.97±5.28		9.81	0.000**
Role Function Mode						
Pre-intervention	9-27	12.57±4.05	12.71±4.41		0.14	0.88
2 weeks post-intervention		12.44±3.59	16.35±5.32		4.0	0.000**
One-month post-intervention		12.91±2.98	18.22±3.97		7.17	0.000**
Interdependence Mode						
Pre-intervention	10-30	16.44±4.28	16.53±4.30		0.09	0.92
2 weeks post-intervention		17.00±4.16	21.88±3.55		5.99	0.000**
One-month post-intervention		17.11±4.18	23.26±4.31		6.86	0.000**
Total score						
Pre-intervention	39-117	58.80±10.48	58.93±12.12		0.05	0.95
2 weeks post-intervention		58.55±8.26	81.40±14.25		9.29	0.000**
One-month post-intervention		59.44±7.30	87.66±15.77		10.8	0.000**

Figure (3): Percentage distribution of studied sample (study and control groups) regarding total Roy's Adaptation Model score at Pre, 2 weeks and one-month post-intervention phases (n=90).

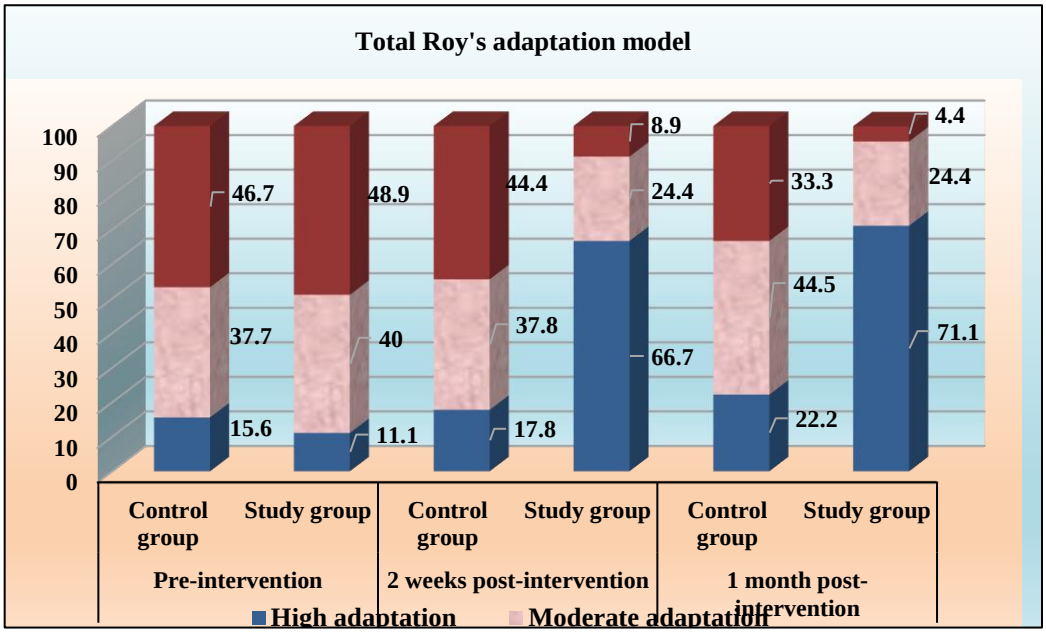

Table (6): Mean scores of diabetes quality of life (DQOL) in both groups at pre, 2 weeks and one-month post-intervention phases (n=90).

Domains	Possible score	Control group n=45	Study group n=45	Independent t-test	P value
		Mean ± SD	Mean ± SD		
Satisfaction					
Pre-intervention	**6-30**	15.51±4.55	16.20±4.21	0.744	0.459
2 weeks post-intervention		16.22±4.51	24.00±3.74	8.90	0.000**
One-month post-intervention		15.87±4.62	25.02±3.46	10.63	0.000**
Impact					
Pre-intervention	**4-20**	10.07±3.25	9.76±3.20	0.457	0.649
2 weeks post-intervention		10.33±3.23	15.11±3.12	7.12	0.000**
One-month post-intervention		10.18±3.25	15.73±3.31	8.02	0.000**
Worry					
Pre-intervention	**3-15**	6.71±2.76	6.27±2.40	0.813	0.419
2 weeks post-intervention		6.31±2.45	11.98±2.75	10.30	0.000**
One-month post-intervention		6.47±2.47	12.31±2.95	10.17	0.000**
Total score					
Pre-intervention	**13-65**	32.28±6.08	32.22±6.09	0.052	0.959
2 weeks post-intervention		32.86±5.94	51.08±6.48	13.89	0.000**
One-month post-intervention		32.51±6.00	53.06±6.68	15.33	0.000**

Figure (4): Percentage distribution of studied sample (study and control groups) regarding their total healthy behaviors scores about gestational diabetes at pre, 2 weeks and one-month post-intervention phases (n=90).

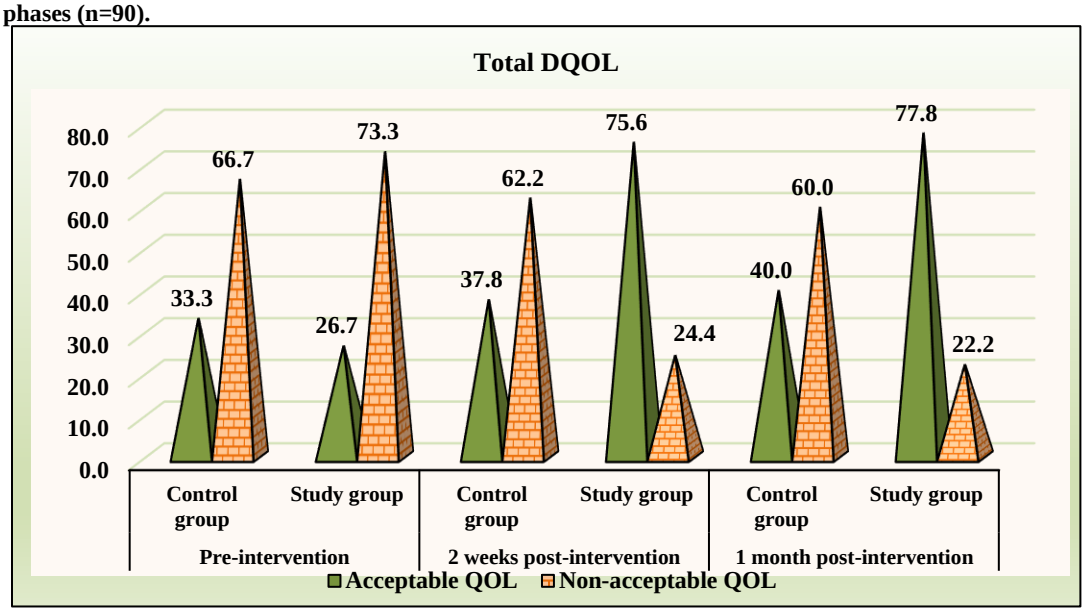

Table (7): Correlation between total Roy's adaptation model scores and total scores of (healthy behaviors and diabetes quality of life) at pre, 2 weeks and one-month post-intervention phases (n=90).

Variables	Total Roy's adaptation model scores											
	Control group (n=45)						Study group (n=45)					
	Pre-intervention		2 weeks post-intervention		One-month post-intervention		Pre-intervention		2 weeks post-intervention		One-month post-intervention	
	r	P-value	r	P-value	r	P-value	r	P-value	r	P-value	r	P-value
Total healthy behaviors scores	0.460	0.000**	0.714	0.000**	0.664	0.000**	0.489	0.000**	0.741	0.000**	0.694	0.000**
Total diabetes quality of life score	0.559	0.000**	0.613	0.000**	0.514	0.000**	0.567	0.000**	0.547	0.000**	0. 647	0.000**

****A Highly Statistical significant p ≤ 0.001**

Discussion

Gestational diabetes mellitus is a worldwide health issue and is a diverse condition resulting from a complex combination of physiological, environmental, and genetic risk factors **(Sadiya et al., 2022).** In early stages, GDM is asymptomatic that damages internal organs and has negative effect on maternal and fetal health **(Goulis, 2022).** Roy' adaptation model based intervention is a backbone, a safe, non-medication, and economical method of reducing the physical and psychological problems that patients with illnesses face. RAM could promote the adoption of healthy behaviors and better QOL of gestational diabetes **(Majeed et al., 2020).**

A woman's health can be significantly influenced by general traits. **Regarding to socio-demographic characteristics of the studied groups,** the findings of the current study clarified that more than half of both control and study groups who were aged 20-30

years old with a mean age of 31.424.57 and 33.223.11 years, respectively. Concerning residence, over two thirds of the study group and the control groups, respectively, were urban residents. Pertaining to the level of education, it was illustrated that more than half of control group and less than half of study group had secondary education. Regarding occupation, among the control group, less than two thirds were working, compared to more than half of the study group. Therefore, in terms of group homogeneity, there was no statistically significant difference (P > 0.05) between the socio-demographic characteristics of the study and control groups.

These findings were congruent with the study of **Ural and Beji (2021),** in Istanbul and reported that there was no statistically significant difference was found between the study and the control groups regarding socio-demographic characteristics (age, education level and occupation) (P> 0.05). Also, such outcomes corresponded with **Lamadah et al. (2022),** and showed that there no significant differences between the study and control groups concerning all sociodemographic characteristics.

As regarding the obstetric history of studied groups, the findings of the current study elaborated that the mean of current gestational age of both control and study groups were 27.46±2.58 and 28.33±1.75 weeks respectively. In relation to gravida, less than three quarter of control group and more than three quarters of study group were multigravida. As well as, less than half were multipara in both groups. According to personal and family history of gestational diabetes, the minority of both control and study groups had personal and family history of gestational diabetes. Therefore, there was no statistically significant difference between both control and study groups regarding obstetric history (p > 0.05) that reflected group homogeneity. This result was in accordance with **Desoky et al. (2022)**, who discovered that over half of the women had three or more pregnancies, and the average gestational age of the group under study was 28.7±2.4 weeks. Also, these results were accepted by **Lamadah et al. (2022),** and proved that there no significant differences between the intervention and control groups concerning obstetric history..

Regarding to knowledge of the studied groups about gestational diabetes mellitus, the findings of the present study revealed that at the pre-intervention phase, there was no statistically significant difference in the mean scores of the total knowledge between two groups (P > 0.05). Nevertheless, the study group's mean scores were considerably higher than the control group's at two weeks and one month post the intervention (P < 0.001). The results supported the study hypothesis that "gestational diabetic women who receive health intervention based on Roy's adaptation model will have a higher level of knowledge". This result illustrated the effectiveness of intervention based on Roy's adaptation model, educational materials, group discussion, presentation and booklet content in increasing the level of knowledge among women. Furthermore, participation of pregnant women in the intervention sessions and their good communication with the researchers helped them acquire essential information.

This finding was consistent with **Desoky et al. (2022)**, who performed a study in Zagazig and demonstrated that a highly statistically significant difference was found between the knowledge items before and after the implementation of the GDM educational package (P< 0.000). The mean of total knowledge were 5.9 ±3.5 pre intervention compared to 8.9±3.1 post intervention. Moreover, the finding was accepted by **Lamadah et al. (2022),** who clarifies that the mean knowledge scores significantly increased among the intervention than in the control group post educational intervention, this finding also was agreed with a study performed in Mansoura by **El-Ansary and Fouad (2020)**, and demonstrated that for every knowledge item, there was a highly statistically significant difference betwee before and after the GDM educational program was implemented. (P< 0.000).

Healthy behaviors of GDM are still considered as the cornerstone of care. **Regarding to healthy behaviors of the studied groups about gestational diabetes,** the

findings of the current study revealed that at pre-intervention phase, there was no statistically significant difference in the mean score of gestational diabetes and its domains between the two groups (P>0.05). However, two weeks and one-month post-intervention, in the study group, the mean difference score for healthy behaviors overall and by domain was higher than in the control group (P 0.001).This finding was supported the study hypothesis which stated that "gestational diabetic women who will receive health intervention based on Roy's adaptation model will have better healthy behaviors than those who will not receive it". This result might be due the consequence of appropriate intervention, which raises pregnant women's knowledge and enhances their healthy behaviors. Accurate knowledge acquisition is thought to be the cornerstone for taking care of one's health on one's own, improving self-care routines, and adhering to treatment plans, all of which have an impact on behavior changes.

Our results are in line with those of **Li et al. (2023),** who demonstrated that a multidisciplinary intervention might improve the delivery outcomes for patients with GDM, regulate blood glucose levels, and enhance self-management behavior. This finding also aligned with with **Dietz et al. (2023)**, who made a study in USA and showed that increasing engagement in diabetes self-care behaviors after participation in diabetes self-management support programs. Additionally, this result was agreement with a study in Port Said performed by **Ali et al. (2022**), and proved that when comparing the self-care behaviors of pregnant women before and after the self-care guidelines were implemented, there was a highly statistically significant difference. (p <0.001).

Roy adaptation Model is one of the most complete models that emphasize on the empowerment of women for health promotion and disease prevention via behavioral changes. **As regard to Roy's adaptation model about gestational diabetes,** the findings of the present study elaborated that between the two groups in the pre-intervention phase, there were no statistically significant differences in the mean score of Roy's adaptation model and its modes. Meanwhile, two weeks and one-month post-intervention, in the study group, the mean score and modes of Roy's adaptation model scores were higher than in the control group (P 0.001). As a result of this finding, the study hypothesis was supported which mentioned that "gestational diabetic women who will receive health intervention based on Roy's adaptation model will become more adaptive than those who will not receive it". This reflects the positive efficacy of the intervention based on RAM, as better understanding of the relationship between physical and psychological adaptation can improve quality of life and support healthy adaptive measures.

This result agreed with **Mohamady et al. (2023)**, and demonstrates that, before the program was implemented, there was no significant difference between the two groups' mean scores for Roy's application model scores (P 0.05). However, the study group's RAM and its modes mean scores were significantly greater than the control group's after three and six months of program implementation (P < 0.001). Moreover, this result was consistent with **El Gawab et al. (2022),** study in Egypt and reported that after the administration of RAM, patients' adaption levels improved. Additionally, this finding was congruent with **Ali et al. (2022),** who Elaborated that in the pre-intervention phase, there is non-statistically significant difference between the two groups' mean scores for the overall Roy's adaption model and its modes (p > 0.05). Subsequently, following three and six months of intervention, the study group's mean difference in the total score and modes of Roy's adaption model was higher than that of the control group (P < 0.001).

Quality of life is a good indicator of lifespan, especially for gestational diabetic women. **Concerning diabetes quality of life of the studied groups,** the findings of the current study proved that between the two groups at the pre-intervention phase, there is no statistically significant difference in the mean score of the overall diabetes quality of life scores and its domains (P>0.05). Nevertheless, at two weeks and one month following the intervention, the study group's mean difference score for diabetes quality of life scores and its dimensions was greater than the control groups. (P≤0.001). This finding was supported the study hypothesis

which stated that "gestational diabetic women who will receive health intervention based on Roy's adaptation model will have improved quality of life than those who will not receive it". This result might be due to increasing awareness and knowledge of pregnant women that lead to better quality of life. Therefore, preconception care is crucial for educating women about the healthy food, physical exercise, and glycemic control are essential to avoiding gestational diabetes before pregnancy.

This finding agreed with **Ghasemi et al. (2021)**, who performed a study in Iran and proved that after self-care interventional program, the QOL in the intervention group was higher than that of the control group. These findings are also in accordance with **Majeed et al. (2020)**, a study in Pakistan and clarified that Roy' model based interventions have positively affected quality of life in type II diabetics post-intervention as p-value is indicative of a signification effect (P-value is 0.000). Moreover, this finding was agreed with **Abdel-Mordy et al. (2021),** and showed that the quality of life and knowledge of women were enhanced by the adoption of Roy's adaption model. Also encouraged women to adapt to the illness and the recommended course of therapy.

As regards correlation between total RAM scores and total scores of (healthy behaviors and diabetes quality of life), the findings of the current study demonstrated that there was a highly significant statistical positive correlation between total Roy's adaptation model scores and total scores of (healthy behaviors and diabetes quality of life) in both groups at pre, two weeks and one-month post-intervention phases (P≤ 0.001). This emphasize on positive effects of RAM on all variables. Also, RAM played an essential part in improving gestational diabetes QOL and healthy habits, which can be used to effectively manage chronic diseases for where no cure is present. This result was congruent with **Ali et al. (2022)**, who clarified that before the intervention, and three months , and six months after the RAM intervention, there was a highly statistically significant positive correlation between the total adaptation scores and the overall health-promoting lifestyle behavior scores in both groups. Additionally, This result was supported by **Mohamady et al. (2023)**, who showed that after three and six months of program application, in the study group, there was a correlation between total RAM and overall knowledge and coping mechanisms.

Conclusion

The present study's findings led to the following conclusion, the empowerment intervention grounded on the Roy's adaptation model for gestational diabetic women significantly improve knowledge, healthy behaviors, and quality of life and help them to adapt with disease. Moreover, there was a highly statistically significant difference between both groups regarding all variables at 2 weeks and one-month post-intervention phases (P≤ 0.001). Therefore, the research hypotheses were supported and the research aims were achieved.

Recommendations

- Develop simple clarified educational programs for gestational diabetic women that focus on the preventive aspect and screening of complications rather than treatment only to improve pregnancy outcomes.

- Developing evidence-based intervention based on Roy's adaption model to provide more insight into the promotion of women's health and adaption related to gestational diabetes.

- Dissemination of the booklet and posters regarding gestational diabetes to enhance women's knowledge, and encourage self-care, about gestational diabetes as well as promote QOL.

Further researches:

- Training sessions and workshops regarding GDM care should be held to enhance the knowledge and skills of the nurses at the Obstetric and Gynecological Outpatient Clinic.

- Further research is important to carry out this study on larger sample size in different settings to enable the findings to be applied broadly.

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