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Original Article

Effect of Motivation-based Instructional Guidelines on Health Behaviors and Feto-maternal Outcomes among women with Pregnancy-related Acute Kidney Injury

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ABSTRACT

Background: To enhance feto-maternal outcomes, affected women should receive appropriate health education based on motivational teaching recommendations because pregnancy-related acute kidney injury is still a significant issue linked to a higher risk of maternal and fetal mortality and morbidity. **Aim:** The study aimed to examine the effect of motivation-based instructional guidelines on health behaviors and feto-maternal outcomes among women with pregnancy-associated kidney injury. **Design:** A quasi-experimental research design (two groups "control/study") was utilized. **Research Setting**: The research was carried out in two hospitals (Benha University Hospitals and Benha Teaching Hospital) in AL-Qaliobya governorate, Egypt, at the obstetrics and gynecological department in cooperation with the internal medicine department (nephrology unit) and outpatient clinics of both departments. **Sample:** 46 pregnant women who met the inclusion and exclusion criteria and had pregnancy-related acute kidney injury for 1.5 years or 18 months were included in the purposive sample. **Tools:** Four tools were used: A structured interviewing questionnaire, Women's knowledge questionnaire, Health-related behaviors questionnaire, Maternal and fetal outcomes questionnaire. **Results:** Following the introduction of motivation-based instructional guidelines, there was a high statistically significant difference in knowledge, health behaviors, and maternal and fetal outcomes between two groups. **Conclusion:** The motivation based-instructional guidelines had a great positive effect in improving, knowledge, enhancing health behaviors and attaining better fetal and maternal outcomes with a highly statistically significant difference between study and control groups. Therefore, the research hypotheses were accepted and the research aim was attained. **Recommendations:** In order to increase awareness and enable pregnant women with renal illness to receive the greatest care and assistance at the appropriate time, all maternity facilities should distribute motivational instructional guidelines.

Key words: Health behaviors, Feto-maternal outcomes, Motivation based -instructional guidelines, Pregnancy-related acute kidney injury.

Introduction

An abrupt loss of kidney function is known as acute kidney injury (AKI). Pregnancy-related AKI (PRAKI), often referred to as AKI during pregnancy, delivery, and the postpartum period, is a condition that results in a quick loss of renal excretory function, as shown by elevated serum levels of urea and creatinine, decreased urine output, or both. It is a terrible consequence that significantly increases the morbidity and death of both mothers and fetuses. The following criteria may be used to diagnose AKI in pregnant women: (1) oliguria or anuria; (2) a sharp rise in serum creatinine of more than one

mg/dL; and (3) the requirement for dialysis (***Mohammed, 2023).***

In pregnant women, acute kidney damage is thought to be uncommon. It is predicted to impact 1.0–2.8% of people in wealthy nations and 4–26% of people in underdeveloped nations. Similarly,, high PRAKI levels have been documented in African nations. For example, 14% of all AKI patients who visited a tertiary care hospital in Egypt had PRAKI. In other developing nations like Pakistan and India, the reported incidence of PR-AKI varies from 0.02% to 1.5%. Ten percent of AKI cases are PR-AKI, according to data from South Asia ***(Gaber, et al., 2021).***

The use of assisted reproductive technology, obesity, advanced maternal age at conception, and a higher incidence of pregnancy in women with chronic hypertension or chronic renal illness are risk factors for PRAKI. The most prevalent risk factors for PR-AKI in low-income nations continue to be inadequate management of pregnancy-related diseases and ineffective prenatal care. Young, otherwise healthy women who experience obstetric difficulties or pregnancy-related diseases may suffer an acute renal damage ***(Rao and Jim, 2021)***

According to ***Shah et al. (2020),*** pregnancy-related disorders and pre-renal, renal, and post-renal causes are all considered when evaluating pregnancy-related acute kidney damage (AKI). Based on the length of the pregnancy, there are three cohorts for obstetric-related acute kidney injury causes: first half, second half, and postpartum. The most frequent causes of PRAKI during the first trimester of pregnancy were hyperemesis gravidarum and septic abortion. Preeclampsia and antepartum hemorrhage (APH) were the most frequent causes in the second half. Puerperal infection and postpartum hemorrhage are the causes of AKI after childbirth. During the third trimester, obstetricians struggle to differentiate between diagnosis ***(Taber-Hight & Shah, 2020)***.

Because normal pregnancy causes a 50% increase in glomerular filtration rate (GFR), diagnosing AKI during pregnancy might be challenging. Therefore, different levels of renal function impairment during pregnancy may be indicated by blood creatinine values that are normal in non-pregnant women ***(Shalaby and Shemies, 2022).*** Furthermore, because the Risk, Injury, Failure, Loss, End-stage renal disease criteria and the Kidney Disease Improving Outcomes guidelines for diagnosing AKI in pregnant women have not been validated, there are no standard criteria to characterize pregnancy-related AKI. Serum creatinine, however, continues to be the most reliable and economic indicator for diagnosing AKI during pregnancy. In order to diagnose pregnancy-related AKI, it is also necessary to conduct urinalysis, urine microscopy, a comprehensive metabolic panel, a coagulation panel, and a suitable serological workup. To rule out pathological hydronephrosis and other obstructive causes of pregnancy-related AKI, kidney ultrasonography should be performed. The choice to do a kidney biopsy is based on the

pregnancy's viability, available treatments, and gestational age ***(Yadav et al., 2022).***

Additionally, when a diagnosis of AKI can help with care to enhance outcomes for both the mother and the fetus, a kidney biopsy should be carried out. Biopsies are safe during the first and second trimesters, and there is little chance of complications if the gestational age is less than 25 weeks. Due to the fetus's viability, therapeutic efforts can be directed toward an early birth and, if necessary, a postpartum biopsy as the pregnancy gets closer to the third trimester ***(Shah and Verma, 2023).***

Because of its high detection rates, hospital deliveries, high-risk pregnancies, and elevated comorbidities that lead to poor fetal and mother outcomes, pregnancy-related acute kidney injury (AKI) presents a substantial challenge for nephrologists and obstetricians ***(Gameiro et al., 2020).*** Abortion, intrauterine fetal death (IUFD), intrauterine growth retardation (IUGR), prematurity, intrapartum fetal distress, low birth weights, perinatal mortality, and admission to the neonatal intensive care unit were among the fetal outcomes. Because it frequently results in intensive care unit (ICU) admission, termination of pregnancy (TOP), and acute kidney injury prior to fetal maturation, PR-AKI is regarded as one of the most significant obstetric problems for women. Anuria, heart failure, severe pulmonary edema, and a high likelihood of maternal mortality due to amniotic fluid embolism are further consequences of PR-AKI. About 25% of dialysis referrals in tertiary care facilities are related to PR-AKI. Maternal mortality rates have been reported to range from 9% to 55%. Renal outcomes include full recovery (40–75%), partial recovery (4–9% require dialysis 4–6 months after delivery), progression to end-stage renal disease (1.5–2.5% of patients), and even death (***Shah and Verma, 2023).***

For nephrologists and their medical team, managing pregnant women with AKI is extremely difficult. To promote the best potential outcomes for both the mother and the fetus, a multidisciplinary team of nephrologists, obstetricians, and neonatologists should manage AKI throughout pregnancy. Identification of the underlying cause of kidney impairment, intravenous fluid resuscitation, immediate beginning of dialysis if necessary, and timely fetal delivery, if necessary, are general strategies to treat pregnancy-related AKI. Treatment options include immunosuppressive medication and steroids for glomerulonephritis, early delivery for severe preeclampsia, HELLP syndrome, and acute fatty liver of pregnancy, and plasmapheresis and eculizumab for thrombotic microangiopathies such as thrombotic thrombocytopenic purpura ***(Ismael et al., 2023).***

Pregnant women should be educated about physical activity, disease-specific health habits, and risk factor reduction for PRAKI through in-person preparation and the Health Action Process Approach (HAPA), according to motivation-based instructional guidelines ***(Elzyen et al., 2023).***

Healthy lifestyle choices seem to improve the health of pregnant women with kidney disease. For

women with renal disease, physical activity improves cardiovascular outcomes, and quitting smoking and keeping a healthy BMI can significantly lower proteinuria ***(Zarbock,et al., 2021).*** A key component of pregnant women's care should be healthy behavior, which may slow the development of disease by encouraging women to cooperate with their treatment ***(Cunningham, et al., 2021).***

As educators, nurses are in charge of satisfying the educational needs of society and teaching expectant women and their families about renal disease. AKI is a challenging procedure that calls for cooperative educational efforts. Education comprises a methodical process of inquiry, need assessment, healthy behavior, treatment adherence, and warning indicator detection to help women adjust to changes in their function ***(Mohammed, 2023).*** As caretakers, nurses are first and foremost accountable for assessing and tracking sequel through history taking, physical examination, laboratory monitoring, and adhering to a low-salt diet. Making sure the time is spent lying in bed, monitoring water, protein, and potassium consumption, and listening to the fetal heart at least twice a day. Additionally, nurses monitor pregnancy issues and support safe births, a successful pregnancy, and the postpartum period in their position as ongoing care providers ***(Ponce and Balbi, 2020).***

Significant of the research:

In developing countries, preeclampsia is the most common cause of pregnancy-related acute kidney injury, followed by sepsis and hemorrhagic shock ***(Choudhary, et al, 2024).*** PRAKI is still common in developing nations, nonetheless, with a recent frequency of 4.2–15% (***Arrayhani, et al., 2023).*** PR-AKI accounts for 5–27% of all adult AKI cases in Africa, affecting about 1 in 1,000 deliveries. Compared to wealthy nations, this is 20–100 times higher (***Shalaby and Shemies, 2022).*** Six to thirty-six percent of adult cases of AKI in poor nations are PRAKI.

A research conducted at Ain Shams University Obstetrics and Gynecology Hospital in Egypt reported that 78 of the 13050 obstetric patients who were admitted met the diagnostic criteria for PRAKI, yielding an incidence of 0.59% (78/13050). Sepsis and pre-eclampsia were the most frequent causes of PRAK (***Elshinnawy, et al.,2020).*** Additionally, ***(Ismael et al., 2023)*** reported in their research that conducted in "Department of Obstetrics and Gynecology, Mansoura University, Mansoura, Egypt"; over the 1.5-year study period, there were 4390 deliveries, and there were 18 patients with PR-AKI admitted to MUH, representing a cumulative incidence of 4.1 per 1000 deliveries. Out of the 18 patients with PR-AKI, 10 patients (55.6%) required dialysis while the other 8 patients (44.4%) did not require dialysis**.**

According to recent research, integrating motivation-based instruction with instructional standards can improve learning outcomes and support the application of motivating strategies. Therefore, the health behavior and feto-maternal outcomes of pregnant women with acute kidney injury may be improved by motivation-based instructional instructions. The impact of

motivation-based instructional guidelines on health behaviors and feta-maternal outcomes among women with pregnancy-associated kidney injury at Benha University hospitals was also observed to have not been studied. Therefore, this work could serve as a foundation for future studies on this particular subject.

Aim

The study aimed to examine the effect of motivation-based instructional guidelines on health behaviors and feto-maternal outcomes among women with pregnancy-associated kidney injury.

Research Hypotheses:

H1: Pregnant women with PR-AKI who will receive motivation-based instructional guideline will exhibit improved knowledge than those who will not receive it.

H2- Pregnant women with PR-AKI who will receive motivation-based instructional guideline will experience healthier behavior than those who will not receive it.

H3: Pregnant women with PR-AKI who will receive motivation-based instructional guideline will have better feto-maternal outcomes than those who will not receive it.

Operational definitions:

Motivation: is described as "the action that compels or urges an individual to assume an attitude generally favorable toward his work, leading him to perform satisfactorily."

Instructional guideline: These methods of caring for women are compatible with human cognitive architecture and provide knowledge that thoroughly explains the concepts and procedures that women need to understand.

Pregnancy-related acute kidney injury (PR-AKI): The Kidney Disease: Improving Global Outcomes (KIDGO) creatinine and urine output criteria were used to identify AKI caused by obstetric causes when any of the following parameters were present: 1) an increase in serum creatinine of at least 0.3 mg/dl within 48 hours; 2) an increase in serum creatinine of at least 1.5 times baseline that is known or assumed to have happened within the previous seven days; or 3) a urine volume of less than 0.5 ml/kg/h for six hours

Subjects and method

Research Design:

A quasi-experimental research design (two groups "control/study") was utilized to achieve the aim of this research.

Research Setting:

The research was carried out in the obstetrics and gynecological department at two hospitals (Benha University Hospitals and Benha Teaching Hospital) in Al- Qaliobya governorate of Egypt, as well as in the outpatient clinics of both departments in cooperation with the internal medicine department (nephrology unit).

These two hospitals were picked because they are the two primary hospitals in Benha city, offering medical care to all residents of Benha, its villages and suburbs, and people from different cultural backgrounds, irrespective of their social

qualities. As a result, researchers have access to the most cases.

Sampling:

Sample type, size, criteria and technique: The following inclusion and exclusion criteria were used to select a purposive sample of 46 pregnant women with a medical *diagnosis* of pregnancy-related acute kidney injury from the aforementioned research settings for 1.5 years or 18 months***:***

Inclusion criteria were:

- Pregnant women who were admitted to the hospital due to pregnancy-related AKI.
- A neurologist verified the obstetrician's medical diagnosis of PR-AKI.
- Having smartphones allows researchers to quickly set up a Whats-app group to encourage and remind women to adhere to the guidelines

Exclusion criteria were: Renal insufficiency or preexisting kidney disease prior to pregnancy (PR-AKI owing to non-obstetric etiology).

Sample Technique:

The sample was split into two groups at random: 23 women in the ***study group*** received routine hospital treatment together with motivation-based instructional guidelines, while 23 women in the ***control group*** received simply normal hospital care. The women were assigned to a study group throughout the months of the first half of the research period in order to prevent bias in data collecting. The women were placed in the control group for the second half of the research period.

Tools of data collection: Four instruments were employed to gather data:

Tool I: A structured Interviewing questionnaire: It was constructed by researchers after reviewing a related literature and translated into Arabic language. It included three parts

Part (1): **Personal characteristics of studied women:** It comprised of 6 items which were (age, residence, level of education, occupation, socioeconomic class and sources of information).

Part (2): **Obstetric history of studied women:** It comprised of 5 items which were (current gestational age, gestational age at diagnosis, gravidity, mode of conception and mode of termination of current pregnancy).

Part (3): **Clinical characteristics of studied women:** It comprised of3 items which were (differential causes of pregnancy-related acute kidney injury, stage and treatment modalities).

Tool II: women's knowledge questionnaire: After reviewing pertinent literature ***(Shah and Verma, 2023; Yadav et al., 2022; Gillis et al., 2021),*** researchers created it to gauge women's awareness of acute renal damage during pregnancy. The definition of pregnancy-related acute renal injury, causes, risk factors, signs and symptoms, diagnosis, grades, maternal complications, fetal complications, long-term repercussions, prevention, and therapy were among the eleven questions.

Scoring System:

"1" was given to the right response and "0" to the wrong one. The sum of the answers to each question was used to determine the overall knowledge score. The higher grades indicated a greater understanding of acute renal damage associated with pregnancy. ***The total knowledge score was classified as the following:***

- Inadequate knowledge: < 60% = 0-6 score
- Adequate knowledge: 60% to 100% = 7-11 score

Tool III: Health-related behaviors questionnaire: It was designed by the researchers after reviewing the related literature ***(International kidney Foundation 2024; Wiles et al., 2019 and Vause, 2018)*** to assess self-reported health behaviors that women were practiced to manage pregnancy-related acute kidney injury. It comprised 22 items divided within 5 sub- domains as following:

- ***Monitoring and controlling*** as (monitoring the consumed amount of fluids and minerals, monitoring blood pressure regularly, measuring weight daily…etc).
- ***Rest, sleep and exercises*** as (having adequate sleep hours at night and taking naps, having ***adequate*** rest …etc).
- ***Health habits*** as (personal hygiene practices, avoiding active and passive smoking …etc).
- ***Commitment to treatment & follow up*** as (commitment to follow-up antenatal visits, taking medications as prescribed by doctor, compliance with prescribed supplementation only…etc).

Scoring system:

Each item was rated based on a three-point Likert scale; always (score 2), sometimes (score 1), and never (score 0). Mean score for each domain was calculated. The overall obtained score was ranged between 0 and 44, with higher scores indicating more engagement in health behaviors. ***The total health behaviors score was classified as the following:***

- Unsatisfactory level: < 75% = 0-32 score
- Satisfactory level: 75% to 100% = 33-44 score

Tool IV: Maternal and fetal outcomes questionnaire: It was constructed by researchers after reviewing a related literature ***(Ismael et al., 2024; Rage et al., 2023 and Sachan et al., 2022).*** It included two parts:

Part I: Maternal outcomes questionnaire It comprised of following outcomes:

- ***Hospital admission*** (No admission, Admission to inpatient ward or Admission to intensive care unit).
- ***Duration of hospital stay***.
- ***Prognosis*** (Complete Recovery, Partial recovery, Irreversible renal failure, Mortality).
- ***Anemia***
- ***Psychological stress.***

Part II: Fetal and perinatal outcomes questionnaire: It comprised of following outcomes:

- ***Fate of pregnancy*** (live birth, abortion, intrauterine fetal death, early neonatal death).
- ***Maturity*** (full term or preterm).
- ***Fetal outcomes*** (intrauterine growth retardation and intrapartum fetal distress).
- ***Neonatal out comes*** (low birth weight and Admission to neonatal intensive care unit

Tools validity:

The validity of the questionnaires was assessed by a panel of five jury specialists in the fields of obstetrics and gynecological nursing and internal medicine "nephrologist" at Benha University to guarantee the instruments' application, comprehensiveness, relevance, and clarity. No changes were needed. The tools were regarded as legitimate by the experts.

Tools reliability:

Tools	Cronbach's alpha value
Tool II: women's knowledge questionnaire.	Internal consistency (α =0. 89) .
Tool III: Health-related behaviors questionnaire.	Internal consistency (α =0. 90) .
Tool IV: Maternal and fetal outcomes questionnaire.	Internal consistency (α =0. 75) .

The Cronbach's Alpha coefficient test was used to assess the tools' dependability, and the results showed that the research tools' internal consistency was as follows:

Ethical consideration:

The following ethical considerations will be taken into account before the research begins: The scientific research ethical committee of Benha University's nursing department granted the research approval for completion **(REC.OBSN.P52)**. For the research to be completed, official approval was required from the chosen research settings. Prior to using the instruments, the researchers gave women an explanation of the purpose and significance of the research in order to win their trust and confidence. women gave their formal agreement to participate in the research, and confidentiality was guaranteed. The women in the research were not at risk in any way—physically, socially, or psychologically. To protect the privacy of the participating women, all data collection instruments were burnt following statistical analysis. The research instruments ensured that the research respected human rights and contained no unethical remarks. The women could leave their studies at any moment.

Pilot research:

Three women were recruited for the pilot research, which lasted 10% of the entire sample period (1.5 months), in order to test the tools' clarity, objectivity, feasibility, and applicability as well as to identify potential roadblocks and issues that could impede data collection and identify any issues unique to the statements' clarity and question sequence. Estimating the amount of time required for data gathering was also helpful. Based on the pilot results, no changes were made. Because of the comparatively limited number of cases, the pilot sample was included in the research.

Field work:

The research was conducted for eighteen months, starting in January 2024 and ending in

June 2025. The researchers went to the aforementioned location three times a week (Mondays, Tuesdays, and Wednesdays) from 9:00 a.m. to 2:00 p.m. till the allotted time was over.

Within 24 hours after admission or, for those who had previously been stable in the wards, following a documented change in condition, the researchers evaluated women for eligibility. New admissions were identified using the admission record, and women who acquired PR-AKI while in the ward were identified using the nurses' hands-over book, which included daily female reports.

Women's medical records were then evaluated for test results of renal functions or to confirm the diagnosis of PR-AKI. The operational definition of PR-AKI was applied to the results. After that, those who qualified were contacted to sign up for the research. The researchers conducted one-on-one or small-cohort interviews with the women prior to or following obstetric or medical consultations. In order to spread the advantage, the handout (booklet) was left in the research setting at the conclusion of the research to be given to all women with PR-AKI.

Each woman or her guardian received an explanation of the research requirements. In order to enroll in the research, those who agreed to participate had to sign an informed consent form. The current research was carried out in five stages: preparation, motivation, volition, motivation-based implementation, break, and evaluation.

Preparatory phase:

The researchers evaluated relevant local and worldwide literature about the research subject during the preliminary phase, which is the initial stage of the research. This assisted the researchers in understanding the scope and gravity of the issue and directed them in setting up the necessary instruments for gathering data.

Five jury experts from Benha University's internal medicine "nephrologist" and obstetrics and gynecological nursing departments received the tools, and no changes were suggested.

Motivation phase:

It is the second stage, which must be developed before women change bad habits and before goals are established. In this stage, the women were evaluated through interviews. The researchers greeted the female and her guardian at the start of the interview, introduced themselves, explained the goal and specifications of the research, gave the women in the study group all the information regarding the quantity and frequency of motivation-based educational sessions to ensure their adherence to interventions, and obtained signed consent to participate in the research.

The woman was interviewed to evaluate her obstetric history and personal traits before confirming her clinical traits (Tool: I). Following that, their PR-AKI knowledge was evaluated using (Tool: II). In order to ascertain women's health behavior with reference to PR-AKI, the researchers

then distributed (Tool: III). However, from the first moment until three months after delivery, the fetal and maternal outcomes were prospectively examined using (Tool: IV). It took an average of ten to twenty minutes to complete each questionnaire.

Volition phase:

It comes after motivation, which is essential for making plans to change health-related behaviors. Women learned how to establish priorities, make thorough plans, and translate their action plans into behaviors throughout this phase. The researchers created instructional sessions regarding pregnancy-related acute kidney damage in the form of a printed booklet with colorful illustrations based on findings from the motivation phase. The brochure was created especially in basic Arabic to accommodate their comprehension level and address the information gaps of the women under research. The number of sessions and their contents, various teaching strategies, and educational materials are established. The goals were designed to be achieved once the intervention was over. The overall goal was for each female to leave the educational sessions with a solid understanding of acute kidney injury during pregnancy and the health behaviors associated with it, which would improve feto-maternal outcomes.

Motivation-based implementation phase:

Women in the study group received motivation-based instructional guidelines based on regular care during the intervention, which was carried out in a suitable, well-prepared room. Following the conclusion of the motivation phase, the intervention was implemented over the course of four scheduled sessions spread over four consecutive weeks (one session per week). Each session lasted 45 to 60 minutes, depending on the women's achievement and feedback. In order to maintain greater secrecy, each female attended all four sessions in a private, prepared room. Interviews were conducted either individually or in cohorts, depending on the lady's option (two to three women can attend each session).

Women were introduced to the session's topics at the start of the first session. In order to accommodate women's comprehension levels, the next session began with a review of the preceding session and its goals in plain Arabic. Women were given a few minutes at the conclusion of each session to ask questions in order to get clarification on the topics covered and to clear up any misunderstandings. The next session's timing was communicated to each woman.

1st session: was about (definition of acute renal damage related to pregnancy, causes, risk factors, symptoms, diagnosis, grades).

2nd session: was about preventing and treating pregnancy-related acute kidney damage, long-term effects, fetal problems, and maternal difficulties.

3rd session: was on the need of monitoring and controlling (such as "monitoring the consumed

amount of fluids and minerals, monitoring blood pressure regularly, measuring weight daily…etc") and the recommended nutrition pattern that allowed and prohibited nutritional supplements.

4th sessions: about adopting healthy habits such as "personal hygiene practices, avoiding active and passive smoking and ways to manage stress and psychological pressures" and the significance of adhering to the recommended treatment regimen and follow-up, as well as the importance of resting, getting enough sleep, and engaging in light exercise.

A variety of educational techniques were employed, including brainstorming, problem-solving, cohort discussions, lectures, and downloaded films. In order to accomplish its goals, the booklet was given to every recruited woman from the first session, along with useful resources like laptops and PowerPoint presentations. Additionally, stickers and flyers that highlight and reinforce the motivation-based instructional guideline were employed by the researchers as supportive tools that serve as stimulus control to encourage desired changes.

The break phase:

In order to ensure that the women adhered to the instructional guidelines, the researchers followed up with them via phone calls or social media messages, such as WhatsApp messages, during the interim between the implementation and evaluation phases. They also used these methods to address the women's inquiries and improve the delivery of educational sessions. Additionally, the women in the control group were monitored over the phone to prevent their withdrawal from the research, but they received no particular attention to avoid research bias.

Evaluation phase:

Using the same pretest methodology (Tool II & III), the impact of the motivation-based instructional guideline was assessed. A post-test was initially administered to the study group, followed by the control group; this was done two months after the last health behavior education session and one month after the final knowledge education session. Up to three months after the pregnancy was terminated, postnatal visits or phone calls and WhatsApp were used to monitor the results for both the mother and the fetus. Additionally, after the research was finished, the women in the control group received the booklet that the researchers had created in accordance with research ethics.

For control group

Without any extra assistance from the researchers, women in the control group received hospital standardized regular care services for women with PR-AKI from responsible healthcare professionals. The women in the control group were monitored and assessed in the same way as those in the study group. Additionally, after the research was finished, the women in the control group received the booklet that the researchers had created in accordance with research ethics.

Statistical analysis:

Before being entered into a computer, the data was checked. The gathered data will be processed, coded, arranged, and examined using the proper statistical techniques and tests. SPSS version 25.0, the Statistical Package for Social Sciences, was utilized. Means, standard deviations, and frequencies and percentages were examples of descriptive statistics. The research hypotheses were tested using inferential statistics, such as the independent t-test and Chi-square test. The relationship between the total scores of the research variables was examined using the correlation coefficient. A statistically significant difference was indicated by a p-value > 0.05, a statistically significant difference was shown by a p-value ≤0.05, and a highly statistically significant difference was indicated by a p-value P < 0.001 for all statistical tests.

Result

Table (1): demonstrates that 60.9% and 65.2% of the control and study groups, respectively, were in the same age range (25–34 years), with mean ages of 28.96±4.74 and 30.26±4.45 years. In terms of where they lived, 69.6% and 56.5% of the control and study groups, respectively, were in rural areas. In terms of educational attainment, it was shown that 56.5% and 52.2% of the control and study groups, respectively, had completed secondary school. Housewives made comprised 82.6% and 91.3% of the control and study groups, respectively. Furthermore, the middle socioeconomic class comprises 65.2% and 60.9% of the control and study groups, respectively. As a result, there was no statistically significant difference in personal traits (p > 0.05) between the control and study groups, indicating cohort homogeneity.

Figure (1): shows that the majority of the studied sample (73.9% & 69.6%), (43.5% & 52.2%), and (34.8% & 30.4%) of the control and study groups, respectively, get their information from the internet, friends or family, and medical professionals or nurses.

Table (3): explains that severe preeclampsia or eclampsia followed by hemorrhage was the cause of pregnancy-related acute kidney injury in 43.5% and 47.8% of the control group and 30.4% and 21.7% of the study group, respectively. In terms of PR-AKI stage, 43.5% and 47.8% of the control and study groups, respectively, were found to have stage II PR-AKI. Additionally, conservative treatment was administered to 60.9% and 65.2% of them, respectively. As a result, there was no statistically significant difference in clinical features (p > 0.05) between the control and study groups, indicating cohort homogeneity.

Table (4): shows that all categories of knowledge on pregnancy-related acute kidney injury before to intervention did not change statistically significantly between the study and control groups (P > 0.05). After the intervention, the majority of knowledge items showed a very

statistically significant difference between the study and control groups (P < 0.001).

Figure (2): shows that prior to intervention, 39.1% and 34.8% of the study and control groups, respectively, had sufficient awareness of pregnancy-related acute kidney injury. In the meantime, following the intervention, 82.6% and 43.5% of the study and control groups, respectively, had sufficient information of acute kidney injury related to pregnancy.

Table (5): shows that, prior to intervention, there was no statistically significant difference between the study and control groups in any of the domains of health behaviors related to pregnancy-related acute kidney injury (P > 0.05). In the meantime, all dimensions of health behaviors following intervention showed a very statistically significant difference between the study and control groups (P < 0.001).

Figure (3): demonstrates that, before to intervention, 21.7% and 26.1% of the study and control groups, respectively, exhibited adequate levels of health behaviors regarding pregnancy-related acute kidney injury. Following the intervention, the study and control groups had satisfactory levels of health behaviors related to pregnancy-related acute kidney injury (73.9% and 30.4%, respectively).

Table (6): shows that there was a statistically significant difference between the study group and the control group in terms of maternal outcomes such as hospital admission, length of hospital stay, prognosis anemia, and psychological stress; for example, 65.2% and 26.1% of the study group's women did not have a hospital admission; the mean length of hospital stay was 10.57±16.23 in the study group compared to 23.78±19.00 in the control group; 87.0% of the study group experienced complete recovery compared to the control group; 52.2% of the study group experienced anemia; and finally, 43.5% of the study group experienced psychological stress.

Table (7): shows that there was a statistically significant difference between the study and control groups in terms of fetal and perinatal outcomes such as maturity, intrauterine growth retardation, intrapartum fetal distress, low birth weight, and admission to the neonatal intensive care unit. Specifically, 18.8.0% of the fetuses in the study group were preterm, 4.3% of the fetuses in the study group suffered from IUGR, and 8.7% of the fetuses in the control group suffered from intrapartum fetal distress. Only 18.8% of newborns in the study group were admitted to neonatal intensive care, compared to 62.5% in the control group, and 12.5% of newborns in the study group were LBW, compared to 50.0% in the control group.

Table (8): explains that, both before and after the intervention, there was a statistically significant positive connection (P≤ 0.001) between the overall knowledge score and the total health behaviors score.

Table (1) Distribution of the studied women in both groups (control and study) according to their personal characteristics (n.=46).

Personal characteristics	Control group n.=23		Study group n.=23		X^2/FET	P- value
	No.	%	No.	%		
Age (years):						
<25	4	17.4	2	8.7		
25-	14	60.9	15	65.2	**0.792**	**0.673**
≥35	5	21.7	6	26.1		
Mean ± SD =	**28.96±4.74**		**30.26±4.45**		**Independent t= 0.961**	**0.342**
Residence:						
Rural	16	69.6	13	56.5	**0.840**	**0.359**
Urban	7	30.4	10	43.5		
Level of education:						
Basic education	3	13.1	5	21.7		
Secondary education	13	56.5	12	52.2	**0.617**	**0.735**
University education	7	30.4	6	26.1		
Occupation:						
Housewife	19	82.6	21	91.3	**0.767**	**0.381**
Working	4	17.4	2	8.7		
Socioeconomic class:						
High socioeconomic class	0	0.0	2	8.7		
Middle socioeconomic class	15	65.2	14	60.9	**2.10**	**0.350**
Low socioeconomic class	8	34.8	7	30.4		

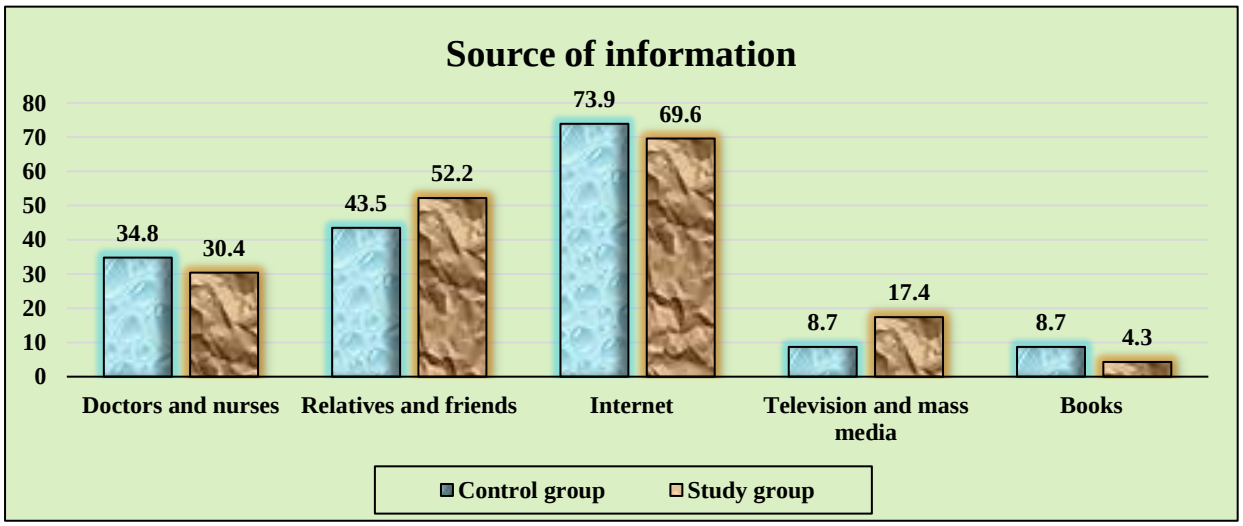

Figure (1): Distribution of studied women according to their source of information regarding pregnancy-related acute kidney injury in both groups before intervention (n.=46).

Table (2) Distribution of the studied women in both groups (control and research) according to their obstetrics history (n.=46).

Obstetrics history	Control group n.=23		Study group n=.23		X^2/FET	P value
	No.	%	No.	%		
Current gestational age:						
1st trimester	1	4.3	0	0.0		
2nd trimester	11	47.8	13	56.5	**1.21**	**0.545**
3rd trimester	11	47.8	10	43.5		
Mean ± SD =	25.78±4.90		26.39±4.03		-	-
Gestational age at diagnosis in weeks:						
<20 weeks	3	26.7	2	24.4	**0.224**	**0.636**
≥20 weeks	20	73.3	21	75.6		
Gravidity:						
Primigravida	7	30.4	10	43.5	**0.840**	**0.0359**
Multigravida	16	69.6	13	56.5		
Mode of conception:						
Spontaneous	21	91.3	22	95.7	**0.357**	**0.550**
In vitro fertilization (IVF)	2	8.7	1	4.3		
Mode of termination of current pregnancy (TOP):						
Mid-trimester abortion MTA	2	8.7	1	4.4		
Vaginal delivery VD	4	17.4	9	39.1	**2.79**	**0.248**
Cesarean section CS	17	73.9	13	56.5		

Table (3) Distribution of the studied women in both groups (control and research) according to their clinical characteristics (n.=46).

Clinical characteristics	Control group n.=23		Study group n.=23		FET/X^2	P value
	No.	%	No.	%		
Differential causes of Pregnancy-Related Acute Kidney Injury:						
Hyperemesis gravidarum	1	4.3	1	4.3		
Severe preeclampsia or eclampsia	10	43.5	11	47.8		
Hemorrhage	7	30.4	5	21.7	**1.78**	**0.879**
Sepsis (infections)	2	8.7	3	13.0		
HELLP syndrome	2	8.7	3	13.0		
Acute fatty liver of pregnancy (AFLP)	1	4.3	0	0.0		
Stage of PR-AKI:						
Stage I	5	21.7	3	13.1		
Stage II	10	43.5	11	47.8	**0.606**	**0.738**
Stage III	8	34.8	9	39.1		
Treatment modalities:						
Conservative treatment	14	60.9	15	65.2	**0.093**	**0.760**
Dialysis	9	39.1	8	34.8		

Table (4): Distribution of the studied women in both groups according to their knowledge regarding Pregnancy-Related Acute Kidney Injury before and one month after the intervention (n.=46).

Groups / Items	Before intervention				X^2	P value	One month after intervention				X^2	P value
	Control group n.=23		Study group n.=23				Control group n.=23		Study group n.=23			
	Correct answer		Correct answer				Correct answer		Correct answer			
	No.	%	No.	%			No.	%	No.	%		
Meaning of Pregnancy-Related Acute Kidney Injury (PR-AKI).	13	56.5	11	47.8	**0.348**	**0.555**	13	56.5	23	100.0	**14.45**	**0.000****
Causes of PR-AKI.	10	43.5	9	39.1	**0.090**	**0.765**	10	43.5	20	87.0	**9.58**	**0.002***
Risk factors of PR-AKI.	10	43.5	8	34.8	**0.365**	**0.546**	11	47.8	21	91.3	**11.26**	**0.001****
Signs and symptoms of PR-AKI.	14	60.9	16	69.6	**0.383**	**0.536**	15	65.2	23	100.0	**9.86**	**0.002***
Diagnosis of PR-AKI.	14	60.9	12	52.2	**0.354**	**0.552**	14	60.9	23	100.0	**20.12**	**0.000****
Grades of PR-AKI.	8	34.8	7	30.4	**0.099**	**0.753**	9	39.1	23	100.0	**11.18**	**0.001****
Maternal complications of PR-AKI.	15	65.2	14	60.9	**0.093**	**0.760**	15	65.2	22	95.7	**6.76**	**0.009***
Fetal complications of PR-AKI.	11	47.8	10	43.5	**0.088**	**0.767**	11	47.8	21	91.3	**10.26**	**0.001****
Long term consequences of PR-AKI	5	21.7	6	26.1	**0.119**	**0.730**	6	26.1	19	82.6	**14.80**	**0.000****
Prevention of PR-AKI.	7	30.4	6	26.1	**0.107**	**0.743**	8	34.8	22	95.7	**18.78**	**0.000****
Treatment of PR-AKI.	15	65.2	16	69.6	**0.099**	**0.753**	16	69.6	23	100.0	**8.25**	**0.004***

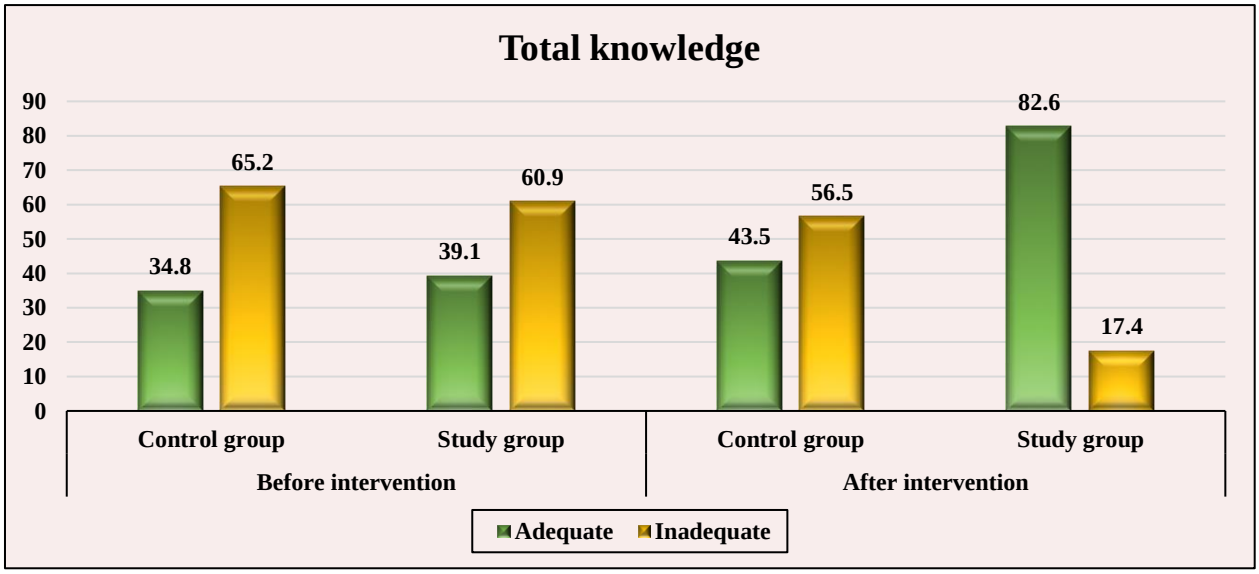

Figure (2): Distribution of studied women according to their total knowledge score regarding Pregnancy-Related Acute Kidney Injury in both groups before and after intervention (n=46).

Table (5): Distribution of the studied women in both groups according to their health behaviors regarding Pregnancy-Related Acute Kidney Injury before and two months after the intervention (n.=46).

Health behaviors domains and items	Min/Max scores	Before intervention		Independent t-test	P value	Two months after intervention		Independent t-test	P value
		Control group n.=23	Study group n.=23			Control group n.=23	Study group n.=23		
		Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Nutrition and supplementation:									
Reducing salt intake in food to reduce rates of fluid retention, swelling, and high blood pressure.	**0/12**	6.26±2.02	6.09±2.08	**0.287**	**0.776**	6.57±1.92	9.78±1.65	**6.08**	**0.000****
Reducing protein and potassium consumption in food to slow the accumulation of waste in the blood.									
Restricting the foods rich in phosphorus, such as dairy products, liver, legumes and nuts.									
Preventing the consumption of soft drinks.									
Maintaining good nutrition and follow a kidney-friendly diet.									
Avoid taking nutritional supplements that contain sodium, phosphorus, potassium, and magnesium, which can accumulate in the body.									
Monitoring and controlling:									
Monitoring the consumed amount of fluids and minerals.	**0/10**	1.78±1.27	1.65±1.33	**0.339**	**0.737**	2.22±1.20	6.78±1.38	**11.59**	**0.000****
Monitoring blood glucose level.									
Monitoring blood pressure regularly and keeping it within a normal range.									
Measuring complete blood count regularly to detect anemia.									
Measuring weight daily because the change in weight is a good indicator of the amount of fluid in the body.									
Maintaining a healthy weight.									

Health behaviors domains and items	Min/Max scores	Before intervention		Independent t-test	P value	Two months after intervention		Independent t-test	P value
		Control group n.=23	Study group n.=23			Control group n.=23	Study group n.=23		
		Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Rest, sleep and exercises:									
Having adequate sleep hours at night and taking naps.	**0/6**	3.78±1.41	3.57±1.30	**0.541**	**0.591**	4.17±1.37	5.48±0.89	**3.81**	**0.000****
Having adequate rest .									
Practicing light physical activity as walking and avoiding excessive activity.									
Health habits:									
Maintaining good personal hygiene practices, such as washing hands frequently to prevent infection	**0/6**	4.57±0.89	4.83±0.83	**1.02**	**0.312**	4.87±0.92	5.74±0.54	**3.60**	**0.000****
Avoiding active and passive smoking.									
Managing stress and psychological pressures, through relaxation techniques, exercise, or hobbies									
Commitment to treatment & follow up:									
Complete commitment to follow-up antenatal visits.	**0/10**	6.48±1.92	6.57±1.64	**1.65**	**0.870**	6.87±2.05	9.13±0.69	**5.00**	**0.000****
Taking medications as prescribed by doctor.									
Compliance with prescribed supplementation only.									
Avoiding using medications such as (analgesics, laxatives, vitamins…etc.) without consulting a doctor.									
Seeking medical care when having any risk during pregnancy									
Total score	**0/44**	**22.86±4.22**	**22.69±2.86**	**0.163**	**0.871**	**24.69±4.31**	**36.91±2.66**	**11.56**	**0.000****

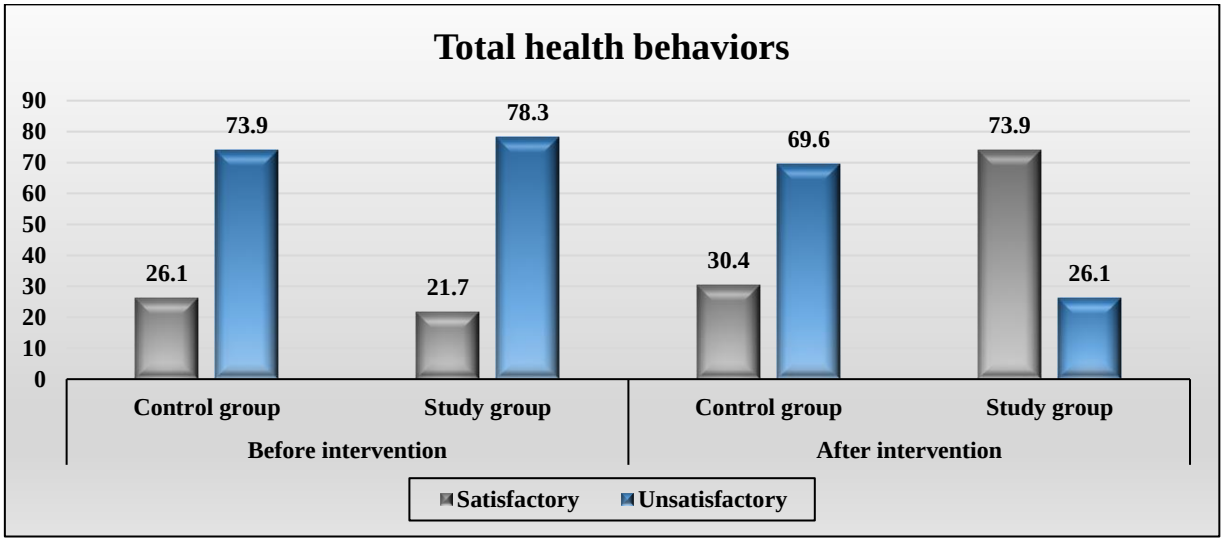

Figure (3): Distribution of studied women according to their total health behaviors score regarding Pregnancy-Related Acute Kidney Injury in both groups before and after intervention (n=46).

Table (6): Distribution of the studied women in both groups according to their maternal outcomes arising from Pregnancy-Related Acute Kidney Injury (n.=46).

Maternal outcomes	Control group n=23		Study group n=23		FET/X2	P-value
	No.	%	No.	%		
Hospital admission:						
No admission	6	26.1	15	65.2	**7.11**	**0.029***
Admission to inpatient ward	9	39.1	4	17.4		
Admission to intensive care unit (ICU)	8	34.8	4	17.4		
Duration of hospital stay (days):	**n=17**		**n=8**			
Mean ± SD =	23.78±19.00		10.57±16.23		**Independent t=2.53**	**0.015***
Prognosis:						
Complete recovery	12	52.2	20	87.0	**6.60**	**0.037***
Partial recovery	8	34.8	2	8.7		
Irreversible renal failure	3	13.0	1	4.3		
Mortality	0	0.0	0	0.0		
Anemia:						
Yes	19	82.6	12	52.2	**4.84**	**0.028***
No	4	17.4	11	47.8		
Psychological stress:						
Yes	20	87.0	10	43.5	**9.58**	**0.002***
No	3	13.0	13	56.5		

Table (7): Distribution of the studied women in both groups according to fetal outcomes arising from Pregnancy-Related Acute Kidney Injury (n =46).

Fetal and perinatal outcomes	Control group n.=23		Study group n.=23		FET/X2	P-value
	No	%	No	%		
Fate of pregnancy:						
Live birth	13	56.5	15	65.2	**1.56**	**0.667**
Abortion	2	8.7	1	4.4		
Intrauterine fetal death (IUFD)	5	21.7	6	26.0		
Early neonatal death (END)	3	13.1	1	4.4		
Maturity:	**n.= 16**		**n.= 16**			
Full term (≥37 weeks of gestation)	4	25.0	13	81.2	**11.97**	**0.003***
Preterm (<37 weeks of gestation)	12	75.0	3	18.8		
Fetal outcomes:						
Intrauterine growth retardation (IUGR)						
Yes	7	30.4	1	4.3	**5.44**	**0.020***
No	16	69.6	22	95.7		
Intrapartum fetal distress						
Yes	11	47.8	2	8.7	**8.68**	**0.003***
No	12	52.2	21	91.3		
Neonatal outcomes:	**n.= 16**		**n.= 16**			
Low birth weight (LBW)						
Yes	8	50.0	2	12.5	**5.23**	**0.020***
No	8	50.0	14	87.5		
Admission to neonatal intensive care						
Yes	10	62.5	3	18.8	**8.91**	**0.012***
No	6	37.5	13	81.2		

Table (8): Correlation between total knowledge score and total health behaviors score before and after intervention (n=46).

Variables	Total knowledge score							
	Control group (n=23)				Study group (n=23)			
	Before intervention		After intervention		Before intervention		After intervention	
	r	P-value	R	P-value	r	P-value	R	P-value
Total health behaviors score	0.439	0.000**	0.523	0.000**	0.419	0.000**	0.620	0.000**

Discussion

Because it can cause serious feto-maternal morbidity and death, acute kidney injury (AKI) during pregnancy is a major problem in obstetrics and nephrology. Fetal and maternal outcomes as well as the prognosis of the disease would benefit by instructional recommendations, bettering pregnant women's behaviors and practices, and increasing women's adherence to prescribed drugs ***(Mohammed, 2023).***

The current research looked at how motivation-based instructional guidelines affected health behaviors and feto-maternal outcomes in women who had acute kidney injury during pregnancy

In terms of personal characteristics, the results of the current research showed that, with average ages of 28.96±4.74 and 30.26±4.45, respectively, less than two-thirds of the control and study groups were in the same age bracket (25–34 years). More than two-thirds and more than half of the control and study groups, respectively, lived in rural areas. In terms of educational attainment, over half of the study and control groups had finished secondary school. In terms of occupation, housewives made up the majority of both the control and study groups. Additionally, about two-thirds of the study and control groups are from the middle socioeconomic class. Consequently, there was no statistically significant difference in personal characteristics between the study and control groups ($p > 0.05$), indicating a similarity between the two cohorts.

These results corroborated those of ***El-Kashif and Elgazzar (2021),*** who discovered that three-fifths of the women had an average age of 26.26±5.94 and were between the ages of 20 and 35. More than three-fifths of the women in the analysis were residents of rural areas. The majority of women were housewives based on their work. Approximately three-fifths of them have moderate household incomes. The control and study groups' personal characteristics did not differ statistically significantly ($p > 0.05$). The fact that both investigations were carried out in Egypt could be the reason for these comparable findings.

The present research increasingly agrees with the findings of ***Muhammad and Liaqat (2024),*** who found that the average age of the women under research was 27 ±5.23 years. Less than three-quarters of them had finished secondary school, and more than half of them lived in rural areas. Over 75% of the women in the research did not work, and the majority of them had insufficient household income. The cultural similarities between the two nations and the research locations could be the cause of this convergence in the results.

In terms of information sources, the results of this research showed that less than three-quarters and more than two-thirds, more than two-fifths and over half, and more than third and less than third of the control and study groups, respectively, get their information from the internet, friends or family, and doctors or nurses. That reflected current reality, since the internet has taken over as our society's primary source of information due to its constant availability and

effortless accessibility. In a similar vein, ***Shemies et al., (2023)*** showed that over half of the sample under research obtained information from the internet, two-fifths from family, and a small percentage from medical professionals.

Conversely, ***Reynolds et al., (2023)*** reported findings that differed from those of the current research, with slightly less than two-fifths and three-fifths, less than half and less than three-fifths, quarter and one-fifth, respectively, of any complicated pregnancies and only uncomplicated pregnancies cohort obtaining information from health care providers, relatives or friends, and the internet or social media, respectively. These variations could be linked to variations in the research samples' educational backgrounds, attitudes toward community health, and overall culture.

The current research found that, in relation to obstetric history, the mean current gestational age of the control and study groups was 25.78±4.90 and 26.39±4.03 weeks, respectively; the gestational age at diagnosis of less than three-quarters and more than three-quarters of the control and study groups, respectively, was ≥20 weeks. More than two-thirds and more than half of the control and study groups, respectively, were multigravida. Additionally, the majority of women in both groups became pregnant on their own. Less than three-quarters and more than half of the control and study groups, respectively, underwent cesarean sections as the method of ending their current pregnancies. Thus, there was no statistically significant difference in obstetric history between the control and study groups ($p > 0.05$), suggesting that the two cohorts were similar.

Our research results were consistent with those of ***Conti-Ramsden et al., (2020),*** who showed that the mean current gestational age of PR-AKI related to eclampsia and PR-AKI cohort was (26.98±3.74) and (28.39±2.17) weeks, respectively; and the gestational age at diagnosis was ≥24 weeks for the majority of both the control and study groups. More over two thirds and three quarters of the control and study groups, respectively, were multigravida. More than three quarters and more than half of the control and study groups, respectively, had cesarean sections as their method of ending the current pregnancy. However, in contrast to the current research's findings, 25% and 33% of the women, respectively, became pregnant using IVF. Consequently, there was no statistically significant difference in the obstetric history between the PR-AKI cohort and the PR-AKI related to eclampsia ($p > 0.05$).

The results of the current research were compared to those of ***Brahmbhatt et al., (2023),*** who found that the mean gestational age was 25.93±5.83 weeks. Less than 25% of women conceived naturally, and two thirds of women were primigravida. All women were diagnosed between 28 and 32 weeks of gestation. Over two thirds of them give birth vaginally to end their pregnancies. That might be connected to various sampling and inclusion criteria.

Because the study and control groups had nearly identical sociodemographic characteristics

and obstetric histories, the researchers reasoned that this helped minimize irrelevant factors that would compromise the efficacy of the instructions.

Regarding the clinical features of the control and study groups, our research revealed that severe preeclampsia or eclampsia followed by bleeding was the cause of PR-AKI in roughly two-fifths and less than half of the control and study groups, respectively, and less than a third and more than a fifth. About two-fifths and fewer than half of the control and study groups, respectively, were diagnosed with stage II of PR-AKI. Additionally, less than two-thirds of them were treated conservatively. Consequently, there was no statistically significant difference ($p > 0.05$) in clinical characteristics that represented cohort homogeneity between the control and study groups, respectively.

Ismael et al., (2024) supported the existing findings about the etiology of PR-AKI by clarifying that severe preeclampsia was the most common cause in around half of the examined women, followed by bleeding in less than a third and sepsis in less than a fifth. Furthermore, preeclampsia and obstetric hemorrhage were the most frequent causes of PR-AKI in prior research by ***Gaber et al., (2021)*** at Mansoura that included 40 patients with the condition. Preeclampsia is also the most frequent cause of PR-AKI, accounting for fewer than half of cases, according to ***Rakarnvanic et al., (2022).*** More than one-third of cases involved sepsis and obstetric hemorrhage. Additionally, the results of the current research differ slightly from those of ***Choudhary et al., (2024),*** who found that puerperal sepsis was the cause of less than third, less than quarter, less than fifth, more than fifth, and less than tenth of AKI in pregnancy, respectively. Preeclampsia/eclampsia, hemorrhagic shock, septic abortion, and hyperemesis were the next most common causes.

In terms of phases and treatment approaches, the current research is consistent with ***Gama et al., (2021),*** who showed that less than 25% of the women in the research were AKI stage 1, more than two thirds were AKI stage 2, and less than 10% were AKI stage 3. ***Thongprayoon et al., (2020)*** found that about two-fifths of the studied sample had PR-AKI stage 2, less than three-quarters of them received conservative treatment, and more than a quarter needed dialysis and other forms of treatment. These results are consistent with the findings of current research.

Prior to intervention, there was no statistically significant difference between the two cohorts' awareness of PR-AKI about pregnancy-related acute kidney injury ($P > 0.05$). However, after the intervention, most knowledge items showed a highly significant difference between the study and control groups ($P < 0.001$). According to recent research, less than two-fifths and more than a third of the women in the research and control groups, respectively, had sufficient awareness of pregnancy-related acute kidney injury prior to intervention. Following the intervention, the majority of the study group and nearly two-fifths of the control group, respectively, had sufficient information of Pregnancy-Related Acute Kidney Injury.

The aforementioned findings corroborated those of ***Thanapongsatorn et al., (2024),*** who explained that the majority of patients reported poor levels of perceived AKI knowledge prior to joining the multidisciplinary post-AKI clinic. In particular, the majority of patients had average understanding of AKI, with less than 10% having strong knowledge. No characteristics were found to be related with low perceived knowledge among post-AKI patients, although individuals who were aware of their AKI had considerably higher perceived AKI knowledge. Significantly, patients' perceived AKI knowledge increased from a mean score of 1.5 ± 0.7 to 3.9 ± 0.7 ($p < 0.001$) following the comprehensive post-AKI clinic education program; no patient reported having low perceived AKI knowledge. Additionally, ***Bonfield (2022)*** demonstrated that patients felt reasonably secure in preventing future AKI and were more educated after attending the clinic. Two months after the intervention, there was a highly significant difference in knowledge between the study and control groups ($P < 0.001$).That demonstrated how any educational program and motivating guidelines would improve patient awareness and compliance with therapy, which would improve their prognosis and results.

Noble et al. (2020), who found that fewer than a third and less than a fifth of the intervention and non-intervention cohorts, respectively, had sufficient knowledge about acute renal injury prior to intervention, supported the aforementioned findings. The majority of patients and fewer than one-third of the intervention and non-intervention cohorts, respectively, had sufficient information of acute renal damage following intervention. Furthermore, ***Diamantidis et al., (2022)*** shown that the majority of AKI survivors were unaware of their diagnosis upon release. Concerns over expectations for self-management at home, a lack of knowledge about AKI awareness prior to discharge, and a poor understanding of the causes and effects of AKI were also mentioned. Following the implementation of the counseling program, most participants showed strong knowledge after three months of intervention and adequate understanding after one month. The first research hypothesis, which predicted that pregnant women with PR-AKI who would get motivation-based instruction guidelines would show better knowledge than those who would not, was supported by the results mentioned above.

The current research's findings demonstrated that, prior to intervention, there was no statistically significant difference between the study and control groups in any category of health behaviors associated to pregnancy-induced acute kidney damage ($P > 0.05$). In the meantime, all dimensions of health behaviors following intervention showed a very statistically significant difference between the study and control groups ($P < 0.001$). According to recent research, before to intervention, more than a fifth and more than a quarter of the research and control groups, respectively, demonstrated appropriate levels of health behaviors regarding pregnancy-related acute kidney damage. In the meantime, following the intervention, less than one-third and less than three-quarters of the research and control groups, respectively, had adequate levels of health

behaviors associated to acute kidney injury during pregnancy.

The aforementioned findings were consistent with those of ***Li et al., (2020),*** who found that there was no discernible difference between the intervention and control groups in the baseline health behavior and self-management scores. All five subscales showed a significant difference in the intervention cohort's health behavior and self-management scores following the 90-day intervention. Furthermore, the current research is consistent with the findings of ***Ahn et al. ,(2022),*** who found that most areas of health behaviors related to acute renal injury prior to intervention did not alter statistically significantly between the intervention and non-intervention cohorts ($P > 0.05$). In the meantime, all dimensions of health behaviors showed a highly significant difference between the intervention and non-intervention cohorts three months after the intervention ($P < 0.001$). This can be explained by the fact that PR-AKI management necessitates a high degree of female participation in both decision-making and care delivery. Improving women's health behavior often aims to lower health care expenditures, promote self-sufficiency, comply with treatment, and decrease the need for dialysis and critical care unit hospitalization.

Similarly, ***He et al., (2022)*** found that less than 25% of the patients exhibited adequate health behaviors addressing kidney injury before to intervention, which is consistent with the findings of the current research. In the meantime, one month and three months following intervention, almost three quarters and the majority of patients, respectively, showed adequate levels of health behaviors for acute renal injury ($P < 0.001$). Patients' disease cognition and self-management knowledge should be improved in order to boost their commitment to self-management activity. This will enable them to understand the causes of the illness and follow their doctor's recommendations.

The second research hypothesis—that pregnant women with PR-AKI who get motivation-based instruction guidelines will behave better than those who do not—is supported by the aforementioned findings.

In terms of maternal outcomes, there was a statistically significant difference between the study and control groups in terms of hospital admission, length of hospital stay, prognosis anemia, and psychological stress; nearly two thirds and more than a quarter of the women in the research and control groups, respectively, did not have hospital admission, and the mean length of hospital stay was 10.57±16.23 in the study group compared to 23.78±19.00 in the control group, More than half of the women in the study group experienced full recovery compared to more than half in the control group; more than half of the women in the study group experienced anemia compared to the majority in the control group; and more than two-fifths of the women in the study group experienced psychological stress compared to the majority in the control group. According to recent research, the motivational instructional guidelines improved knowledge and behaviors, which had a favorable impact on maternal outcomes. women in the study group had better

and more desirable outcomes than women in the control group.

Khattak et al., (2020), who found that over 75% of moms with pregnancy-related AKI recovered completely, provided support for the current investigation. A fifth of them, however, had some form of azotaemia, and several of them needed long-term renal replacement therapy. Significantly, a small percentage of women (3 out of 160 cases) passed away from renal insufficiency-related causes. Mothers without AKI spent slightly more than 4 days in the hospital, while patients with AKI spent an average of 13 days. There was a statistically significant change (P value < 0.05). Increasingly, ***Darwin et al., (2024)*** found that three-fifths of women in the intervention cohort and fewer than three-quarters in the non-intervention cohort suffer from anemia, and that one-third and almost two-fifths of women in the intervention and non-intervention cohorts, respectively, were admitted to the hospital. According to the same premise of the current research, the aforementioned findings demonstrated that the PR-AKI intervention cohort that received an educational program or treatment plan had superior maternal outcomes than the non-intervention cohort.

Regarding fetal outcomes current research illustrates that, a statistically significant difference was found between the study and control groups in terms of fetal and perinatal outcomes, such as maturity, intrauterine growth retardation, intrapartum fetal distress, low birth weight, and admission to the neonatal intensive care unit; less than half of the study group's fetuses suffered from intrapartum fetal distress, less than a fifth of the study group's fetuses suffered from IUGR, and less than a tenth of the study group suffered from intrapartum fetal distress. fewer than half of the newborns in the study group were admitted to neonatal intensive care, compared to fewer than two-thirds in the control group, and more than ten percent of the newborns in the study group were LBW.

In terms of fetal and perinatal outcomes such as maturity, intrauterine growth retardation, birth weight less than 2500 gm, and admission to the neonatal intensive care unit, where more than fifth, less than quarter, and more than half of fetuses were preterm, the current research concurred with ***Sachan et al., (2022)***, less than half of neonates in stage I compared to less than half in stage II and less than three-fifths in stage III were LBW, and less than a quarter in stage I, nearly half in stage II, and three-thirds in stage III were admitted to the neonatal intensive care unit. Less than a fifth of fetuses in stage I compared to less than two-fifths in stage II and nearly two-fifths in stage III had IUGR.

Additionally, the results of the current research were consistent with those of ***Ma et al., (2024),*** who found that the intervention cohort and the non-intervention cohort differed significantly in terms of fetal and neonatal outcomes, including IUGR, birth weight, Apgar scores at the first and fifth minutes, growth measurements, and admission to the neonatal intensive care unit. According to the researchers, all of these findings about maternal and fetal outcomes highlight how crucial it is to conduct informational and

behavioral support sessions for pregnant women in order to achieve the best possible health outcomes for both them and their fetus or newborn.

The final research hypothesis—that pregnant women with PR-AKI who get motivation-based instruction guidelines will have better feto-maternal outcomes than those who do not—is supported by the aforementioned findings.

The overall knowledge score and total health behaviors in both groups prior to and during the intervention showed a highly significant statistical positive link, according to the current research. The urgent need for motivational awareness initiatives is reinforced by the fact that women's knowledge grows along with their information, indicating a positive and direct association between information acquisition and better health habits.

Conclusion:

According to the findings of the current research, there was a highly statistically significant difference between the research and control groups, and the motivation-based instructional guidelines had a great positive impact on improving knowledge, enhancing health behaviors, and achieving better fetal and maternal outcomes. Additionally, both groups ' total knowledge and total health behaviors ratings showed a statistically significant beneficial association before and after the intervention. ($P \leq 0.001$). Thus, the research goal was achieved and the research hypotheses were approved.

Recommendations:

Based on research findings, it was recommended that:

- In order to increase awareness and enable pregnant women with renal illness to receive the greatest care and assistance at the appropriate time, all maternity facilities should distribute motivational instructional instructions .
- Establish multidisciplinary obstetric-nephrology clinics in tertiary facilities to provide PR-AKI women with counseling and follow-up.
- Early referral of at-risk cases to specialized tertiary centers, where multidisciplinary teams are available to manage and monitor those cases.
- Promoting and assisting women who suffer from acute kidney injury during pregnancy in accordance with the Sustainable Development Goals (SDGs) concerning women's health in Egypt.

Further researches:

- Undergraduate nursing students' knowledge and skills may be enhanced by include PR-AKI and its management in their curricula.
- The research can be used to many healthcare situations, such as women with acute renal injury at different stages of their lives.
- To guarantee that the results are more broadly applicable, repeat the research on a sizable representative probability sample.

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