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Original Article

Information Motivation Behavior Skill Model: It's Effect on Knowledge and self-Efficacy of Women with Ovarian Hyperstimulation Syndrome

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ABSTRACT

Background: Ovarian hyperstimulation syndrome (OHSS) stands as the most severe complication arising from fertility treatment. Health information, patients' motivation, and their behavioral skills are critical determinants of healthy behavior and results, according to the Information Motivation Behavior Skill Model (IMB). **Aim:** The study aimed to evaluate the effect of information motivation behavior skill model on knowledge and self-efficacy of women with ovarian hyperstimulation syndrome. **Methods** A quasi-experimental study (single group pre/posttest) design was used in this study that was carried out at invitro fertilization (IVF) unit of Ain Shams University Maternity Hospital on a purposive sample of 80 women with ovarian hyper stimulation syndrome. The study utilized a structured interview questionnaire; a women's knowledge assessment questionnaire, and a self-efficacy scale to collect the study's data. **Results:** The current study shows that 13.7% of the participants demonstrated an adequate level of knowledge before the intervention, which increased to 83.7% at the first follow-up assessment and 73.7% at the second assessment after the intervention, with highly significant differences between them ($P < 0.001$). Additionally, the total mean score self-efficacy score improved from 37.13 ± 5.83 to 55.14 ± 2.08 at the first follow-up and 54.13 ± 4.07 at the second follow-up assessment, revealing highly significant differences between the two phases ($P < 0.001$). **Conclusion:** The current study augmenting that the application of IMB skill model proved to be effective in enhancing the knowledge and self-efficacy of women with ovarian hyper stimulation syndrome. **Recommendations:** The application of IMB skill model should be integrated as a routine nursing intervention for women with ovarian hyperstimulation syndrome.

Keywords: Self-efficacy, Information Motivation Behavior Skill Model, Ovarian Hyperstimulation Syndrome

Introduction

One significant side effect of ovulation induction is ovarian hyperstimulation syndrome (OHSS), typically arising following gonadotropin stimulation and subsequent administration of human chorionic gonadotropin (HCG) for infertility treatment. It is presented by many ovarian cysts, accompanied by heightened vascular permeability, that induce hypovolemia and hemoconcentration due to shifting of fluid out of the vascular space to the extravascular space **(Al-Gendy et al., 2022)**.

Risk factors linked to OHSS encompass young age below thirty, early pregnancy, low body weight, a history of a higher response to gonadotropins (previous hyper-response or OHSS), polycystic ovary syndrome (POS) or a high basal antral follicle count. Besides, a significant number of small follicles that measure between 8–12 mm, elevated or rapidly rising serum estradiol levels during ovarian stimulation. In addition to the utilization of HCG rather than progesterone for supporting luteal phase following in vitro fertilization (IVF), high anti-Müllerian hormone (AMH) concentrations, a substantial number of oocytes retrieved is more than twenty **(Ma et al., 2020)**.

Human chorionic gonadotropin (HCG) is linked to two distinct clinical manifestations of OHSS. They are early onset form and late onset form. The early-onset form appears within the first eight days of exogenous HCG administration. The late-onset form appears nine or more days after HCG administration and is frequently linked to pregnancy-induced HCG production. OHSS can be effectively prevented and managed during its initial stages. Symptoms of ovarian hyperstimulation syndrome typically manifest within one week following the use of injectable medications to stimulate ovulation, although in some cases, symptoms may take two weeks or longer to appear. These symptoms can vary in severity and may either worsen or improve over time **(Henshaw et al., 2022)**.

Based on the severity of clinical manifestations, and laboratory test results, OHSS is categorized into four groups. The symptoms of mild OHSS entail ovarian enlargement in both ovaries, accompanied by numerous corpus luteal and follicular cysts, typically measure up to eight cm. It is associated with abdominal distension and mild discomfort. Moderate class of OHSS is featured by ovarian enlargement that measures up to 12 cm, along with abdominal distension and ascites. A sudden weight gain exceeding three kg may initially indicate moderate OHSS **(Radwan & Ahmed, 2021)**.

The severe form of OHSS is characterized by the existence of large ovarian cysts that measure >12×12 cm with clinical signs of ascites that might present without or with hydrothorax, increased sodium and potassium levels, hypoproteinemia, oliguria, hypo-osmolality, hypovolemic shock, and creatinine levels ranging from 1.1 to 1.5 mg/dL. In the most severe cases, leukocytosis with WBCs reaching over 15000/mL and hemoconcentration with a hematocrit count exceeding 45.0%. There could be thromboembolic episodes, elevated blood viscosity, and liver impairment. A critical OHSS category diagnosed with severe ascites or presence of hydrothorax, along with a hematocrit level exceeding 55.0%, leukocyte count surpassing 25000/mL.. Oliguria or anuria, with elevated creatinine levels that equal or exceed 1.6 mg/dL, thromboembolism, or respiratory distress syndrome **(Radwan & Ahmed, 2021)**.

Severe complications of OHSS can encompass electrolyte disturbances, ascites, hydrothorax, acute respiratory distress syndrome, hypovolemic shock, and acute renal failure. Severe cases may result in venous thrombotic occlusion and even death **(Liu et al., 2021)**.

The management of OHSS is contingent upon its severity. Mild cases of OHSS may resolve spontaneously, while severe category may necessitate hospitalization and additional interventions. In mild OHSS cases, women should have outpatient monitoring for a minimum of two weeks or until the onset of menstrual bleeding., with attention to an increase in abdominal girth, abdominal discomfort, and acute weight gain **(Braam et al., 2020)**. Treatment for moderate OHSS typically involves bed rest, close observation, adequate fluid intake, and regular sonographic assessments to monitor cyst size. Additionally, creatinine, serum electrolyte levels, and hematocrit should be closely monitored. Conversely, early identification of progression to severe OHSS is characterized by continuous weight gain (>2 lb/d), worsening of existing symptoms, or the emergence of new symptoms such as diarrhea, vomiting, or dyspnea **(Xia & Zheng, 2021)**.

Hospitalization is necessary for severe and critical cases of OHSS, and thorough history-taking and physical examination are essential upon admission. Bed rest is typically prescribed for patients in most clinical scenarios, and a daily physical examination should include measurements of the patient's abdominal girth and weight. Fluid balance should be closely monitored every 4 hours. Medical management of severe hyperstimulation aims to maintain intravascular blood volume while preventing thromboembolic episodes, addressing disrupted fluid and electrolyte balance, and alleviating secondary complications of ascites and hydrothorax **(Liu et al., 2021)**.

The information-motivation-behavioral skills (IMB) model serves as a structure utilized by nurses to enhance adherence to treatment and promote healthy lifestyle behaviors **(Liu & Yan, 2022)**. According to this model, successful performance of health behaviors is determined by the integration of three key constructs: information, motivation, and behavioral skills. These constructs are described as follows: Information refers to having precise knowledge relevant to the behavior being discussed. Motivation includes both personal and social motivation. Personal motivation reflects person's beliefs or attitudes, which is influenced by their sense of social support. Behavioral skills encompass a person's concrete abilities and self-efficacy needed to carry out a behavior **(Zahmatkeshan et al., 2021).**

Self-efficacy denotes one's subjective assessment of their capability to execute required actions when faced with potential circumstances. It exerts influence across various domains of human activity and plays a pivotal role in shaping individuals' ability to effectively navigate challenges and the decisions they are inclined to make **(Safdar et al., 2021)**. The association between self-efficacy and proficient performance can bolster one's motivation and confidence to engage in demanding self-care tasks. Previous research has indicated strong associations between knowledge about OHSS, self-efficacy, health beliefs, and health-related behaviors. Self-efficacy is believed to act as a predictor that helps with the creation of behavioral intentions, action plans, and proactive measures **(Selter et al., 2019)**.

Nurses play a crucial role in supporting women affected by OHSS who possess adequate information, personal motivation, and healthy behavioral skills necessary for effective action. Such individuals are more likely to adopt and sustain health-promoting behaviors, such as daily monitoring of weight and abdominal girth, symptom tracking, fluid intake and output documentation, adhering to fluid intake recommendations, reducing salt consumption, consuming a protein-rich diet, engaging in regular movement to mitigate the risk of blood clot formation, and avoiding strenuous physical activity, leading to favorable health outcomes. Conversely, women lacking sufficient knowledge, motivation, and behavioral skills may practice health-compromising behaviors and encounter adverse health consequences. Therefore, enhancing women's understanding of OHSS stands as a critical component of preventive measures and treatment interventions **(Liu, Yan, 2022)**.

Justification of the problem:

With an estimated overall prevalence of 23.3%, OHSS is a common side effect seen by infertile women receiving superovulation treatment with assisted reproductive technology. When it comes to in vitro fertilization (IVF)-induced ovulation cycles, mild OHSS is found in 2.1% to 6% of cases, and severe OHSS is found in 0.1% to 0.2% of cases. Patients with moderate-to-severe OHSS may exhibit symptoms like pleural effusion, hematocrit elevation, ascites (a build-up of fluid in the abdomen), electrolyte imbalances, oliguria (reduced urine output), impaired liver and kidney functions, and thrombosis. In severe cases, these symptoms may even be fatal. Moreover, concerns regarding the impact on pregnancy or fetal well-being, as well as overall life safety post-pregnancy, further exacerbate the distress experienced by affected individuals. OHSS can result in significant discomfort and may contribute to infertility concerns **(Palomba et al., 2023).**

Additionally, these adverse circumstances exert significant stress on affected women, adversely affecting their physical, mental, and emotional well-being, as well as hindering effective communication. Furthermore, the economic ramifications of OHSS are considerable, stemming from work absenteeism, prolonged bed rest, frequent hospitalization, with exhaustive medical interventions required for critical cases. Consequently, women grappling with infertility compounded by OHSS often experience feelings of pessimism, anxiety, and fear. However,

research indicates that a majority of OHSS-affected women lack comprehensive knowledge about the condition and frequently fail to adhere to prescribed nursing protocols, as per medical professionals' recommendations, leading to suboptimal compliance and a detrimental impact on treatment outcomes **(El-Adhamn & Shaban, 2020)**.

IMB skill model integrates several behavioral change theories and models, emphasizing the modification of high-risk behaviors. It centers on three key determinants: information, motivation, and behavioral skills. This model has emphasized efficacy in addressing mild to severe cases of ovarian hyperstimulation syndrome (OHSS) **(Liu & Yan, 2022)**. Therefore, the purpose of this study is to evaluate how the IMB model affects the knowledge and self-efficacy of women who have been diagnosed with OHSS.

Aim of the study

This study aimed to evaluate the effect of IMB model on knowledge and self-efficacy of women with OHSS. The following goals were achieved in order to fulfill this aim:

1. Assessing women's knowledge about ovarian hyperstimulation syndrome.
2. Assessing self-efficacy of women with ovarian hyperstimulation syndrome.
3. Applying IMB skill model for women with ovarian hyperstimulation syndrome.
4. Evaluate the effect of applying the IMB skill model on knowledge and self-efficacy of women with ovarian hyperstimulation syndrome.

Research Hypothesis:

- Implementation of an IMB skill model will improve the knowledge of women about ovarian hyperstimulation syndrome.
- Implementation of an IMB skill model will enhance the self-efficacy of women with ovarian hyperstimulation syndrome.

Subjects and Methods

Study design:

The study used a quasi-experimental (one group pre/posttest) design to fulfill its objectives. Quasi-experimental designs aim to explore potential causal relationships between independent and dependent variables, similar to typical experimental designs or randomized controlled trials. However, they lack random assignment to treatment or control groups, distinguishing them from traditional experimental designs **(Loewen & Plonsky, 2016)**.

Study setting:

The data were collected from Ain Shams University Maternity Hospital in vitro fertilization (IVF) unit, which caters to a large population and experiences a significant influx of patients at a reasonable cost. The hospital offers a wide variety of services to large sector of women, embracing outpatient clinics covering family planning services, gynecology, antenatal care, and breastfeeding counseling. Additionally, it provides delivery services, early detection units, intensive care facilities, gynecological surgeries, specialized units for high-risk pregnancies, postoperative care, postnatal wards, and an IVF department dedicated to treating infertile couples.

Study subjects

A purposive sample was selected based on specific criteria: participants were women undergoing infertility treatment and diagnosed with OHSS, the sample included women of varying ages and educational backgrounds. Exclusion criteria comprised women had any other chronic illness like DM or cardiovascular disorder, those with infertility due to uterine abnormalities, congenital factors, or systemic issues, as well as those with other gynecological issues such as uterine fibroids, menstrual disorders, uterine prolapse, or pelvic inflammatory disease. Women who have a history of mental illnesses were also not allowed to participate in the study.

Sample size:

The study involved 80 women diagnosed with OHSS. The sample size determination was based on power analysis. Type I error (α) of 0.05 and a confidence level of 95%, alongside a Type II error (β) of 10%, yielding a power test (1-β) of 0.90. The formula for comparing two means, which was developed from (**Gupta et al, 2016)**, was used to calculate the sample size.

$$n = 2\,(Z_{\alpha} + Z_{[1-\beta]})^2 \times SD^2 / d^2$$

Sample size (n), standard deviation (SD) from a prior study **(Liu & Yan, 2022)**, effect size (d), and constant values (Zα and Z (1-β) for α and β values, respectively, are as follows: Zα = 1.96 when α = 0.05 and Z (1-β) = 1.28 when β = 0.10.

$n = 2\ (1.96 + 1.28)^2 \times 9.76^2 / 5^2 = 79.9$

So, the least sample size equal =**80 participants**.

Tools for data collection

I) A structured interviewing questionnaire:

The questionnaire utilized in this study was crafted by the researcher subsequent to an exhaustive review of pertinent literature **(Braam et al., 2020)** in alignment with the study's objectives. The questionnaire was developed in Arabic and comprised two sections, totaling 10 multiple-choice questions. The first section was concerned with gathering demographic features of the study participants, encompassing variables such as age, marital status, education, employment, income, and place of residence. Meanwhile, the second section delved into the participants' infertility history, encompassing details regarding the type and etiology of infertility, the duration of infertility treatment, and any symptoms indicative of (OHSS). Administration of the questionnaire required approximately 5-10 minutes and was facilitated by the researcher.

II) Women's Knowledge Assessment Questionnaire:

It was adapted from **Radwan and Ahmed. (2021)** and subsequently customized by the researcher to evaluate women's knowledge about (OHSS). Comprising 14 multiple-choice questions, the questionnaire covered a range of topics, including the definition, risk factors, causes, classifications, clinical manifestations, complications, diagnostic measures, treatment, preventive measures, and self-care management related to OHSS. Administering the questionnaire typically required approximately 10-15 minutes and was facilitated by the researcher.

Scoring system:

Three points were given for a correct-complete answer, two points for an incomplete correct answer, and one point for an incorrect answer. The total score was between 1 and 42. The overall knowledge score was then divided into percentages and categorized as follows:

Adequate ≥ 60 % (25-42 scores)

In adequate < 60% (1-24 scores)

Tool (III): Self-Efficacy Scale:

It was adapted from **Khadivzadeh et al. (2016), Polat and Avdal . (2020)** and adapted by the researcher to evaluate women's' self-efficacy concerning OHSS, The scale included 23 items with four subdimensions, including; patients' daily life (5 items), health behaviors (7 items), medical compliance behaviors (5 items). and symptom management (6 items). This tool needs about 10-15 minutes to be completed by the researcher.

Scoring system:

Every item was assigned a three-point Likert scale rating: rare received a score of one, sometimes received two, and always received three. The total score for each dimension was added up to determine the overall self-efficacy score; a higher average score denotes better levels of self-efficacy.

Validity and reliability

The tool's relevance, clarity, simplicity, applicability, and completeness were evaluated by a group of five experts: two experts from community health nursing departments and three experts from maternity and neonatal health nursing departments. The tools were altered, some items removed and some rephrased, in response to their input. The women's knowledge questionnaire had a coefficient of 0.84, the self-efficacy scale had a coefficient of 0.86, and the structured interview questionnaire had a coefficient of 0.82, according to reliability analysis using the Cronbach Alpha coefficient.

Pilot Study:

To determine the viability of the study techniques and to appraise the instruments' clarity, validity, and comprehensiveness, a pilot study was conducted. This phase lasted three weeks and involved ten percent of the total sample size, comprising eight women. Following the pilot study's results, adjustments were made, including the addition, deletion, or reformulation of certain questions to enhance content strength or improve simplicity and clarity. The participating women involved in pilot testing were subsequently dropped from the main sample to prevent any potential contamination.

Administrative design:

A formal written authorization letter outlining the research title, objectives, and setting of the research was acquired from both the Dean of the Faculty of Nursing at Ain Shams University and the director of Ain Shams Maternity University Hospital.

Ethical considerations:

Before commencing the data collection, ethical clearance was secured from the Committee of Scientific Research and Ethics at the Faculty of Nursing, Ain Shams University. Participants provided informed consent after being briefed on the study's objectives. No harmful procedures were applied to the participants. They were allowed to leave the study at any point. Human rights were safeguarded throughout the study, and confidentiality of information was ensured through encryption.

Fieldwork:

The study commenced in September 2023 and concluded in April 2024, spanning a duration of eight months. During morning shift, they made three weekly visits to the clinical setting. The study comprised four distinct phases: preparatory, assessment, implementation, and evaluation.

Preparatory phase:

This phase involved an extensive reviewing of relevant literature pertaining to different facets of the research problem. This process enabled the researcher to gain familiarity with the scope and significance of the issues at hand, guiding the development of necessary data collection tools and the creation of educational materials.

The e researcher created an Arabic booklet as an educational resource, after thoroughly examining the pertinent literature **(Sáncheza et al., 2023; Schmidt et al., 2020; Ali& Mathur, 2023)** regarding OHSS to improve women's understanding and self-efficacy regarding OHSS. The booklet was crafted in straightforward Arabic language and supplemented with various illustrative images to aid comprehension. It comprised two main sections: The first section covered fundamental aspects of OHSS, including its definition, risk factors, classification, causes, clinical manifestations, complications, diagnostic measures, preventive measures, and medical management. The second section focused on self-care strategies related to OHSS.

Assessment phase:

At the outset of the interview session, the researcher presented herself to the participated women and provided a comprehensive explanation about the study's purpose, duration, and procedures to establish rapport and build trust with the participants. Before the interview could begin, each woman's verbal and written agreement was sought. Each woman was interviewed individually in a designated private room within the department to ensure the confidentiality of their information. The researcher began by assessing the women's general characteristics and infertility history using Tool (I). Subsequently, the women's knowledge and self-efficacy regarding OHSS were evaluated using Tool (II) and Tool (III) respectively. On average, each woman's interview lasted approximately 30-40 minutes. The researcher conducted interviews with three to four women per day until the desired sample size was achieved. The information gathered in this stage acted as the standard against which later comparisons to evaluate the IMB intervention's efficacy were made.

Implementation phase:

The educational intervention was structured around the three components of the IMB model: informational, motivational, and behavioral interventions. The participated women were distributed on ten groups. Each one including eight women. Over the course of three weeks, each group attended six educational sessions, with two sessions held weekly. These sessions were conducted in a quiet setting within the in vitro fertilization (IVF) unit, and each session lasted between 20 to 45 minutes. The content of the initial two sessions focused on augmenting knowledge pertaining to OHSS. Subsequently, the third and fourth sessions were dedicated to addressing negative attitudes and fostering motivation towards adopting self-care behaviors related to ovarian hyperstimulation syndrome. Finally, the fifth and sixth sessions were designed to cultivate positive behavioral skills associated with managing ovarian hyperstimulation syndrome.

Intervention based on IMB skill model:

Informational intervention:

- According to the assessment of women's knowledge about ovarian hyperstimulation syndrome, health instruction was conducted utilizing the gathered data.
- The researcher provided basic knowledge about ovarian hyperstimulation syndrome, including definition, causes, classification, complications, diagnosis, treatment, and self-care management for each group in two sessions, each educational session consumed around 30 to 45 mins. The researcher distributed the educational booklet for every woman at the first session.

Motivation intervention:

- Its objective was to diminish negative perceptions and boost motivation concerning self-care practices and adopting a healthy lifestyle in relation to ovarian hyperstimulation syndrome.
- The researcher conducted two interviews with each group, each lasting 20–25 minutes. During these sessions, the researcher engaged with the participants in a friendly manner, encouraged open communication, patiently listened to their concerns, demonstrated empathy, and provided detailed answers to their questions regarding the condition. Through these interactions, a sense of trust between the researcher and the women was established.
- The strategies employed during the training sessions to bolster motivation included identifying patients' reasons for wanting to make changes, fostering both personal and social motivations for self-care and treatment adherence, promoting self-reinforcement among patients over time, and employing techniques such as open-ended questioning, empathetic listening, affirmation, and feedback provision. The researcher also assisted women in realizing the link between a better prognosis for ovarian hyperstimulation syndrome and self-management of the ailment. In addition, initiatives were taken to raise the women's awareness of the significance of preserving their health, to empower them to take charge of their well-being and increase their self-assurance in recovering from illnesses, and to motivate patients to actively participate in their care by adopting positive attitudes and behaviors.

***Behavior intervention*:**

- The researcher focused on educating women on self-care measures and healthy lifestyle behaviors related to ovarian hyperstimulation syndrome in two sessions, each session lasting about 30-45 minutes. These sessions included the following:

- Diet management: the researcher educated the women for maintaining a regular small frequent diet with high protein content, easily digested, high fiber, and semi-liquid foods that is light and contain low salt. The women's diet should contain at around 1.5 to 2 liters (10 to 12 glasses) of fluid throughout the day (especially drinks that contain electrolytes) and void caffeinated beverages (such as colas or coffee) and alcohol.
- **Physical activity:** the researcher instructed the women about the importance of light activity, the avoidance of vigorous exercise and avoidance pressure on the abdominal and pelvic cavity, avoiding overworking, and taking adequate rest and sleep time.
- **Symptoms management:** the researcher educated the women about self-care management regarding symptoms of ovarian hyperstimulation syndrome such as nausea, vomiting, diarrhea, weight gain, and dyspnea.
- **Medication management:** the researcher educated women on strict adherence to treatment plan by using methods such as detailed schedules, using timers and alarms, medication adherence assessments, medication boxes, and medication diaries. Besides, explaining probable side effects for each drug and ways to manage these side effects. Furthermore, In order to improve medication management, the researcher advised women to develop communication between their family and medical team.
- The researcher instructed the women on how to monitor and document their fluid intake and output over a 24-hour period, as well as how to measure their body weight and abdominal

circumference daily and log the results. Each session began with a recap of the previous session's content and an outline of the learning objectives for the new session, presented in simple Arabic. At the conclusion of each session, a summary of the key points covered was provided, followed by a discussion to address any feedback or questions from the women, ensuring maximum understanding. Various teaching techniques were employed, including lectures, discussions, demonstrations, and re-demonstrations, complemented by appropriate teaching aids such as PowerPoint presentations, video clips, and educational booklets. Additionally, the researcher maintained regular communication with the women through weekly telephone calls or WhatsApp messages to provide further clarification, guidance, motivation, and reinforcement.

Evaluation Phase:

The effect of implementing the information motivation behavior skill model was assessed by measuring changes in women's knowledge and self-efficacy concerning ovarian hyperstimulation syndrome. This evaluation involved comparing their levels of knowledge and self-efficacy before the intervention to those recorded at two subsequent points: one month (first follow-up) and two months (second follow-up) after the commencement of data collection. Data collection took place either at the in vitro fertilization (IVF) unit or via phone interviews, utilizing the same tools employed prior to the intervention.

Statistical Analysis:

Data collection was conducted and subsequently analyzed employing Statistical Package for the Social Sciences (SPSS) version 27 and Microsoft Excel version 2016. Quantitative data were presented in terms of mean and standard deviation (SD), while qualitative data were represented as frequency and percentage. Data distributions were assessed by the Shapiro-Wilk test. To evaluate the relationship between independent categorical variables, Fisher exact test (FET) and Chi-Square ($\chi 2$) test and were employed. The Stuart–Maxwell Test was utilized to identify statistically significant differences in categorical variables with more than two categories across three related measures (3×3 contingency table). Cochran's Q test was applied to detect statistically significant differences in dichotomous categorical variables among three related measures. Friedman Test (Friedman's two-way ANOVA) was used to identify statistically significant differences in continuous variables across three related measures. Spearman correlation coefficient was used to assess the strength and direction of correlation between two continuous variables. Statistical differences or relationships were classified as non-significant (NS) when P-value > 0.05, significant (S) when P-value ≤ 0.05, and highly statistically significant difference when $P \leq 0.001$.

Results

Table 1 illustrates that 47.5% of the participants were aged between 25 and 35 years, A mean age of 32.2±8 years was revealed. Additionally, 36.2% of the participants had completed secondary education, and all participants were married. Regarding occupation, 80% of the sample consisted of housewives, while 56.2% reported having a fairly adequate income.

Table 2 demonstrates that 61.3% of the women had primary infertility, 40% had ovarian dysfunction as a cause of the current infertility, and 53.8% of them had a duration of treatment ranging from 1 to 5 years.

Table 3 indicates that 93.8%, 52.5%, 48.8%., 30% of the studied sample had mild abdominal distention, weight gain, severe nausea and vomiting, and abdominal pain, respectively.

Table 4 demonstrates a highly statistically significant improvement in all aspects of knowledge about ovarian hyperstimulation syndrome at first and second follow-up after intervention than before ($P < 0.001$).

Figure 1 clarifies that 11.3% of women had an adequate level of knowledge pre-intervention, reaching 81.3% at first follow up assessment, and 73.7% at the second assessment after IMB model implementation, alongside a highly statistically significant difference between pre intervention, 1^{st} , and 2^{nd} follow up assessment ($P < 0.001$).

Table 5 shows a highly statistically significant differences between pre, first, and second follow up of interventions concerning mean scores in each domain of self-efficacy, including daily life activities, health behavior, symptoms management, and compliance to medical treatment. In addition, the

total mean score of self-efficacy was 37.13±5.83, improved to 55.14±2.08, and 54.13±4.07 at 1st and 2nd follow-up assessments after IMB model application respectively, with highly statistically significant differences between them (P<0.001).

Table 6 demonstrates a statistically significant positive correlation between the total knowledge score about ovarian hyperstimulation syndrome and their self-efficacy at 1st , and 2nd follow-up after IMB model application (P<0.001).

Table (1): Frequency and percentage distribution of women's demographic characteristics (no=80).

demographic characteristics	**Study group**	
	No	**%**
Age/ year		
20< 25 years	24	30
25 <35 years	38	47.5
< 35 years	18	22.5
Age (Mean± SD)	**32.2±8.4**	
Educational level		
Read and write	11	13.8
Basic education	23	28.8
Secondary education	29	36.2
Higher education	17	21.2
Marital status		
Married	80	100.0
Occupation:		
working	16	20.0
housewife	64	**80.0**
Income level:		
Not enough	19	23.8
Fairly enough	45	56.2
Enough	16	20.0
Resident:		
Urban	69	86.2
Rural	11	13.8

Table (2): Frequency and percentage distribution of women's current infertility history: (n=80).

Current infertility data	**Study group**	
	No	**%**
Type of infertility		
Primary infertility	49	61.3
Secondary infertility	31	38.7
Causes of the current infertility		
Ovarian dysfunction	32	40.0
Blockage of the fallopian tubes	10	12.5
Congenital defect	2	2.5
Male factor	23	28.8
Other	13	16.2
Duration of infertility treatment:		
< 1year	21	26.2
1year-<5 years	43	53.8
5 years-<10 years	10	12.5
10 years +	6	7.5

Table (3): Frequency and percentage distribution of the studied women's symptoms of ovarian stimulation medications: (n= 80)

Symptoms	Yes		No	
	No	%	No	%
Mild distention	75	93.8	5	6.2
Severe nausea and vomiting	39	48.8	41	51.2
Abdominal pain	24	30.0	56	70.0
Ascites	4	5.0	76	95.0
Diarrhea	0	0.0	80	100.0
Less than 300 cm of urine per day	1	1.2	79	98.8
Shortness of breath	0	0.0	80	100.0
Weight gain	42	52.5	38	47.5

Table (4): Comparison of women's knowledge about OHSS at pre, first, and second follow- up after IMB intervention :(n=80):

Items	Pre- intervention		1st Follow up		2nd Follow up		Stuart–Maxwell Test	P-value
	No	%	No	%	No	%		
Definition								
Complete correct	16	20.0	69	86.25	61	76.25	1.393	**0.001****
Incomplete correct	37	46.25	11	13.75	12	15.0		
Incorrect	27	33.75	0	0.0	7	8.75		
Symptoms								
Complete correct	9	11.25	65	81.25	64	80.0	1.933	**0.001****
Incomplete correct	9	11.25	13	16.25	13	16.25		
Incorrect	62	77.5	2	2.5	3	3.75		
Classification								
Complete correct	11	13.75	65	81.25	63	78.75	1.791	**0.001****
Incomplete correct	9	11.25	13	16.25	13	16.25		
Incorrect	60	75.0	2	2.5	4	5.0		
Causes								
Complete correct	15	18.75	66	82.5	60	75.0	1.328	**0.001****
Incomplete correct	9	11.25	10	12.5	17	21.25		
Incorrect	56	70.0	4	5.0	3	3.75		
Complications								
Complete correct	10	12.5	67	83.75	56	70.0	1.312	**0.001****
Incomplete correct	17	21.25	9	11.25	19	23.75		
Incorrect	53	66.25	4	5.0	5	6.25		
Risk factors								
Complete correct	7	8.75	68	85.0	59	73.75	1.346	**0.001****
Incomplete correct	11	13.75	7	8.75	15	18.75		
Incorrect	62	77.5	5	6.25	6	7.5		
Diagnosis								
Complete correct	5	6.25	63	78.75	58	72.5	1.421	**0.001****
Incomplete correct	9	11.25	11	13.75	12	15.0		
Incorrect	66	82.5	6	7.5	10	12.5		
Preventive measures								
Complete correct	5	6.25	64	80.0	57	71.25	1.375	**0.001****
Incomplete correct	7	8.75	10	12.5	15	18.75		
Incorrect	68	85.0	6	7.5	8	10.0		
Management								
Complete correct	3	3.75	57	71.25	55	68.75	2.093	**0.001****
Incomplete correct	8	10.0	20	25.0	20	25.0		
Incorrect	69	86.25	3	3.75	5	6.25		

Figure (1): Percentage distribution of women's total knowledge score about OHSS at pre, first, and second follow -up after IMB intervention: (n=80)

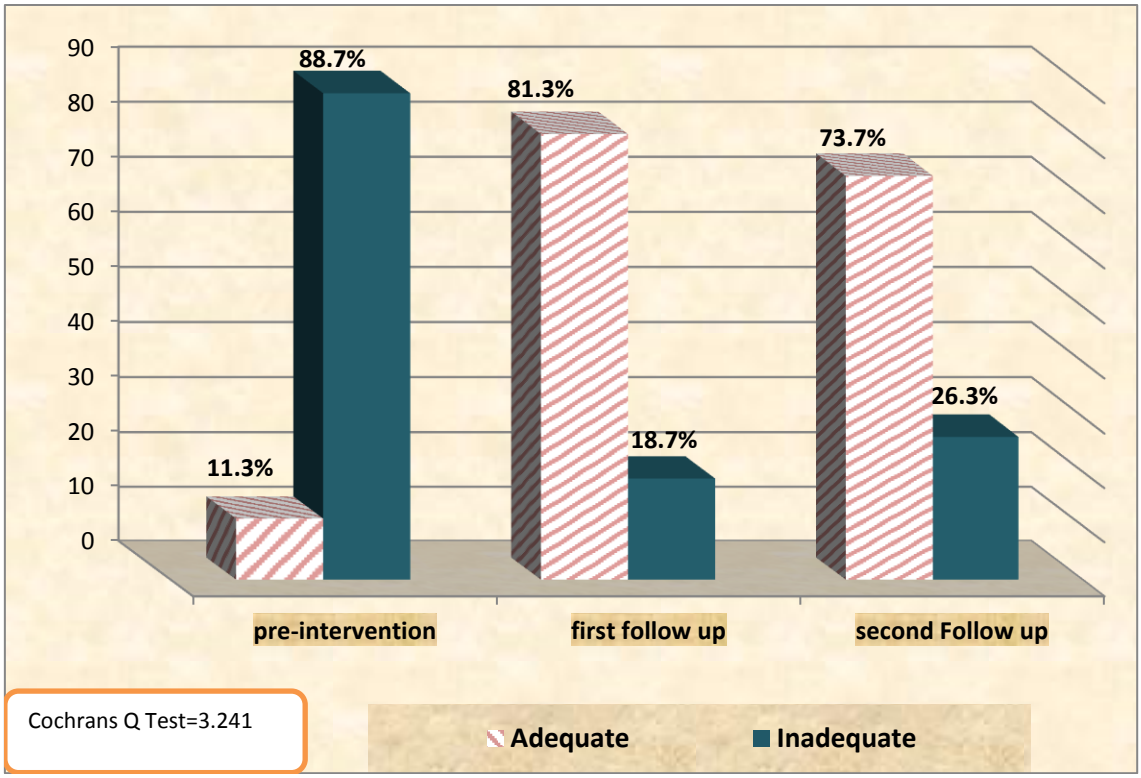

Table (5): Comparison of women's score of self-efficacy regarding OHSS at pre, first , and second follow up after IMB intervention (n=80).

Items	Pre-intervention	1st Follow up	2nd Follow up	Friedman Test	P Value
	Mean± SD	Mean± SD	Mean± SD		
Daily life	8.66±1.38	12.60±1.41	11.81±0.16	12.641	0.001**
Health behavior	13.73±4.21	18.58±1.41	17.63±1.15	9.537	0.001**
Symptoms management	8.04±1.89	11.38±0.78	10.32±53	13.324	0.011**
Medical treatment compliance	7.60±1.63	12.48±1.281	11.08 ±1.25	12.810	0.003**
Total mean score	37.13±5.83	55.14±2.08	54. 13±4.07	10.239	0.006**

Table (6): Correlation between the studied sample total knowledge and self-efficacy regarding OHSS at first and second follow up of intervention: (n=80):

Variables	Total knowledge level	
	1st Follow up	2nd Follow up

	r	P-value	r	P-value
Total level of Self-efficacy	0.566	**0.033***	0. 648	**0.000****

Discussion

Ovulation induction is a common fertility treatment that stimulates the ovaries and increases ova production in many women, as ovulatory failure is the main cause of infertility. A side effect of fertility treatments that use pharmacological ovarian stimulation to increase the number of oocytes and, thus, embryos available for assisted reproductive technology (ART) is known as ovarian hyperstimulation syndrome (OHSS). OHSS implies substantial physical and mental repercussions and has even been connected to maternal mortality **(Radwan and Ahmed., 2021)**. The fundamental principles of OHSS management involve the timely detection, assessment, and intervention of women who are suffering from mild to severe OHSS. Improved self-care practice can lessen the chance of illness, easing the burden on healthcare systems **(Grynberg et al., 2022)**.

The Information Motivation Behavior Skills (IMB) model stands as a significant structure in clinical interventions, emphasizing the necessity for patients to possess adequate information, personal motivation, and healthy behavior to embrace, execute, and sustain favorable healthy behaviors. Through motivational interviews, the IMB model aims to address and elucidate patients' existing health issues, while also equipping them with accessible support resources and knowledge to modify unfavorable health behaviors and routines **(Li and Zhu, 2022)**.

Concerning the studied women's demographic characteristics, with a mean age of 32.2±8.4, the results showed that slightly less than half of the sample was between the ages of 25 and 35. About one-third of the women had finished their secondary schooling. and the majority identified as housewives. In terms of income, slightly over half of the participants reported having a fairly sufficient income. Moreover, a majority of the participants resided in urban areas. These results underscore the imperative for these women to receive comprehensive guidance, support, and education from healthcare teams regarding prevalent health issues such as OHSS.

These results align with those of **Selter et al. (2019)**, who investigated 11,562 women in New York to identify contributing factors that lead to life-threatening complications among women with severe OHSS across the United States. Their findings disclosed that most participants fell within the age category between 25 to 39 years. Similarly, **Sánchez et al. (2023)** conducted a study assessing the occurrence and severity of OHSS among high responders following GnRH agonist triggers in a "freeze-all" strategy. They reported a mean age of 32.3 ± 3.5 years among the women studied. This observation may be attributed to the fact that this age range corresponds to the typical reproductive years when individuals are actively pursuing fertility and pregnancy.

These results were consistent with those of **Hassan & Farag (2019)**, who investigated 300 women in Egypt to examine the phenotypic traits of women with PCOS and found that a significant proportion of the participants were housewives. Conversely, **Braam et al. (2020)** found that less than half of the women surveyed had a high household income. The researchers explore the perspectives of women at elevated risk of OHSS regarding the burden and safety of IVF. Differences in the demographics of the samples used in each study may be the cause of the variations seen between the two studies.

According to the study's infertility history findings, slightly fewer than two-thirds of the women had primary infertility, with about two-fifths attributing ovarian dysfunction as the cause. Additionally, slightly more than half of the participants reported undergoing infertility treatment for a duration of 1 to 5 years. The findings were aligned with those of **Sun et al. (2020)**, who examined variables associated with the intensity of OHSS in women undergoing IVF and diagnosed with polycystic ovary syndrome. The results of their investigation showed that primary infertility affected almost two thirds of the individuals, with no statistically significant differences was revealed between the control and study groups. The congruity between the results of

both studies may be ascribed to the strong desire of women to become mothers for the first time, prompting them to earnestly pursue treatment and thereby potentially increasing the success rate of assisted reproductive technology interventions for infertility.

In contrast to the findings of **Jennifer et al. (2021)**, whose research in China aimed to compare between Caucasian and Chinese women regarding the oocyte yield after IVF with a standardized stimulation protocol, this study revealed that a minority of participants experienced primary infertility, with only a small portion undergoing treatment for a duration ranging from 3 to 6 years. This result may be interpreted by elevated woman awareness in these developed countries with easily to access to information technology and medical treatment using evidence assisted reproductive technology.

The result of this study demonstrates a significant enhancement in women's knowledge about OHSS during the 1st and 2nd follow-up assessments following the implementation of the IMB model, than before application of IMB model. Initially, most participants exhibited an insufficient level of overall knowledge about OHSS. However, by the 1st follow-up, most participants had achieved an adequate level of knowledge, with slightly fewer maintaining this level by the 2nd follow-up. The lack of knowledge observed before the intervention may be attributed to the insufficient information provided to women about OHSS and its management by healthcare providers during their previous visits. The subsequent improvement in knowledge following the intervention underscores the effectiveness of applying the IMB model and supportive guidelines in enhancing women's awareness of OHSS. Thus, these findings support the initial research hypothesis.

These results echoed that of **Ameri et al. (2020)**, who examined the impact of the IMB model on drug adherence, dietary habits, and activity among HIV/AIDS patients. Their study demonstrated that post-intervention, there was a notable enhancement in disease-related knowledge and personal motivation towards health behaviors, consequently leading to improved treatment adherence and medication compliance. This enhancement could be attributed to the effective educational methods employed, including ongoing training sessions, patient motivation initiatives, streamlining care processes, and offering feedback, all of which were facilitated by the implementation of the IMB model.

In a similar vein, a study conducted by **Inkaya et al. (2022)** employed an experimental design with a nonrandomized control group to evaluate the impact of health teaching grounded in the IMB model on self-care of diabetic patients. The study involved 90 individuals diagnosed with diabetes mellitus, with 90 participants divided equally into experimental ad control group. While the control group received standard diabetic education, the experimental group received health education grounded on the IMB model. Over a six-month period, the study observed a notable increase in the total mean knowledge score among the intervention group (23.67±3.71) compared to the control group (17.84±4.10), with statistically significant differences observed between the two groups ($P \leq 0.001$). These results highlight the value of using educational strategies like the IMB model, which places an emphasis on thorough health education during the information phase of intervention and helps patients better comprehend their illness.

Concerning women’s self-efficacy about OHSS, this study illustrated a statistically significant improvement in the total self-efficacy mean score at 1st and 2nd follow-up assessment after implementing the IMB model as compared to their pre-model application, including daily life, health behavior, symptoms management, and medical treatment compliance domains of self-efficacy. These results may be ascribed to the IMB model's notable influence, which highlights the idea of "self-efficacy" that is based on social cognitive theory. By using motivational treatments to encourage patients to change their behavior and improve their prognosis, this technique builds confidence in patients. Furthermore, the IMB model helps patients with OHSS better understand their illness and emphasizes the value of taking an active role in their treatment by providing them with disease-related information. The IMB model decreases the length of illness, increases self-efficacy, increases treatment adherence, and raises confidence by raising patients' knowledge of OHSS and encouraging their participation in their care.

These results are aligned with the research conducted by **Ouyaba et al. (2021)**, which examined the impact of an IMB based intervention on the intention of young females to receive vaccination against the Human Papilloma Virus (HPV). The study employs pre/post-test design for both study and control groups, the intervention focused on enhancing motivation and developing appropriate behavioral skills among the study participants, while the control group received a traditional approach. The results revealed significant increases in the mean scores of various factors, including information, motivation, health behavior skills, self-management, self-efficacy, and health outcomes, in the study group compared to the control group. These findings are matched with the IMB model's hypothesis, which holds that knowledge and motivation work together to promote healthy behaviors that are reinforced by the development of useful behavioral skills. Overall health outcomes, self-efficacy, and self-management practices are improved by this integrated strategy.

These results are agreed with a study conducted by **Liu and Yan (2022)**, who explored the impact of IMB model on women with moderate to severe ovarian hyperstimulation syndrome (OHSS). Their study concluded that the IMB model can notably enhance patients' cognitive understanding of moderate and severe OHSS, encourage adherence to recommended behaviors, elevate self-efficacy levels, alleviate feelings of negative emotions, anxiety, and depression, that ultimately enhance the overall quality of life for these women.

Li and Zhu (2020) corroborated similar findings when they investigated the implementation of IMB model among patient undergoing cardiac rehabilitation after acute coronary syndrome. According to their research, patients' self-efficacy could be strengthened, physical fitness could be increased, and cardiopulmonary function could be improved by using IMB based intervention strategies. These results underscore the efficacy of educational strategies, such as the IMB model, which comprehensively address various dimensions of the disease, including pathophysiology, psychological aspects, current challenges, and patient needs. By tailoring intervention plans based on individual evaluations, providing disease-specific information, and nurturing internal motivation, the IMB model empowers patients to integrate motivation resources, engage in rehabilitation behaviors, foster positive psychological expectations, and enhance self-efficacy.

Furthermore, these findings were corroborated by **Tsamlag et al. (2020)**, who investigated the factors influencing self-management behaviors among osteoporosis patients (OP) and their pathways of interaction using the IMB model. They concluded that the IMB model is effective in enhancing knowledge related to osteoporosis, thereby influencing patients' perceptions and bolstering their self-confidence (self-efficacy) to engage in effective self-management behaviors. Hence, the IMB model holds significant promise for health management. Similarly, **Xu et al. (2023)** demonstrated that the IMB model is particularly effective in improving the emotional and psychological well-being of postpartum women undergoing cesarean section, enhancing their self-efficacy, reducing the frequency of complications, and facilitating recovery after delivery.

The current findings revealed a substantial positive association ($P < 0.001$) between the participants' self-efficacy and their total knowledge regarding OHSS at both the first and second follow-ups of the intervention. This is consistent with research by **Adeleye et al. (2022)**, who conducted a randomized control trial examined the effect of learning from online videos on infertile women confidence in treatments. According to their research, watching instructional videos on fertility drugs improved participants' scores on the Infertility Self-Efficacy Scale (ISES) and decreased their rate of medication mistakes during the first round of ovarian stimulation.

In conclusion, the IMB model offers valuable guidance for women dealing with OHSS by facilitating a better understanding of existing challenges and encouraging them to address daily maintenance tasks. While this may not directly impact psychological well-being, it can significantly boost confidence and self-efficacy in managing daily life, adhering to health behaviors, effectively managing symptoms, complying with medical treatments, reducing medication errors, preventing complications early on, and efficiently managing various concerns. Additionally, the IMB model aids in identifying the root causes of negative psychological emotions among women, fostering effective communication with patients, and alleviating anxiety.

The study's limitation includes the scarcity of national and international research on the topic under investigation.

Conclusion

In conclusion, the study findings successfully met the research objectives and corroborated the research hypotheses, indicating that the adoption of an information motivation behavior skill model yielded beneficial outcomes in augmenting the knowledge and self-efficacy of women diagnosed with ovarian hyperstimulation syndrome. Furthermore, a noteworthy positive correlation was observed between the participants' overall knowledge scores and their self-efficacy during the post-intervention and follow-up periods.

Recommendations

Considering previous study findings, the current study recommends:

- The incorporation of the information motivation behavior skill model should be standardized as a regular nursing intervention aimed at enhancing women's understanding and self-efficacy concerning ovarian hyperstimulation syndrome.
- Continuous educational initiatives remain essential for women to continually enhance, revise, and reinforce their comprehension and self-care practices related to OHSS.
- Replicating this study with larger representative samples across diverse geographical areas is imperative to ensure the broader applicability of the findings.
- Future research endeavors should explore the impact of the IMB model on women's self-efficacy in managing various other gynecological conditions.

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