Effectiveness of Structured Teaching Program on Staff Nurses Knowledge and Preventive Measures Regarding Ovarian Hyperstimulation Syndrome

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Abstract:

Background Ovarian hyperstimulation syndrome is a potentially life threatening complication of treatment with ovulation induction medications. **Aim** of the study was to assess the effectiveness of structured teaching program on staff nurses knowledge and preventive measures regarding Ovarian Hyperstimulation Syndrome. **Research design:** A quasi-experimental research design with pre/posttests and follow up was used. **Setting**: the present study was carried out at Gynecology ward and Laparoscopic unite at Zagazig University hospitals. **Sampling and Subject:** a purposive sample of 50 nurses was recruited for this study. **Tools of data collection**: **Tool I:** a structured interview sheet. **Tool II:** Observational checklist for nurses regarding preventive measures of OHSS. ***Results;*** A statistically significant improvements was observed in total level of knowledge score after program implantation compared to its level before intervention, where 90.0 % of the studied nurses had poor knowledge in pretest which declined to 14.0% and 18.0% at immediately post and after one month of interventions respectively. Also statistically significant improvement was revealed in total score of good practice (88.0%) in favor of the post-test compared to (10.0%) in pretest and (78.0%) in follow up phase. **Conclusion:** Implementation of the structured teaching program was effective in increasing the knowledge level and utilization of preventive measures regarding OHSS. **Recommendations:** Implementation of structured teaching program with a learning booklet for nurses on other health center for IVF should be conducted in order to increase their level of knowledge and practice regarding Ovarian Hyperstimulation Syndrome.

Keywords: Structured Teaching Program, Staff Nurses, Knowledge, Ovarian Hyperstimulation Syndrome.

Introduction

Worldwide, infertility affects 8.0% to 12.0% percent of reproductive-age couples. However, the infertility rates are much higher in some regions of the world, reaching 15.0% in Egypt. So it is a major complication in Egypt nowadays ***(Ghraib and Khait, 2017).*** One of the major causes of infertility is ovulatory failure so many women undergo induction of ovulation to stimulate their ovaries to produce ova as part of their fertility treatment. Ovarian hyper stimulation syndrome (OHSS) is the serious consequences seen in those women who take fertility medicines resulting in deaths in some cases ***(Devi and Upashe, 2019).***

Risk factors associated with OHSS include, young age (30 years old), low-body weight, polycystic ovary syndrome (PCOS) or high basal antral follicle count

(AFC), elevated or rapidly increasing serum estradiol levels during ovarian stimulation (OS), history of an elevated response to gonadotrophins (prior hyperresponse or OHSS), a large number of small follicles (8–12 mm) during OS, the use of hCG instead of progesterone for luteal phase support after In vitro fertilization (IVF), a large number of oocytes retrieved (>20) ,early pregnancy and high basal anti-Mu¨llerian hormone(AMH) concentrations ***(Humaidan et al., 2010)***. Based on the onset of OHSS occurrence, it divided into two types. Early onset which appears within 10 days after administration of HCG. Late onset appears ≥10 days after oocyte retrieval ***(Humaidan et al., 2016)***.

According to the severity of symptoms, signs, and laboratory results, OHSS is classified into 4 categories. **Mild OHSS:** It is an enlargement of bilateral ovaries with multiple follicular and corpus luteal cysts, measuring up to 8 cm and accompanied by abdominal bloating and mild abdominal pain. **Moderate OHSS** characterized by the enlargement of the ovaries up to 12 cm, accompanied by abdominal bloating as well as ultrasound evidence of ascites. A rapid weight gain of over 3 kg might be the initial sign of moderate hyperstimulation. Severe OHSS: about 2.0% of OHSS cases, described by the presence of large ovarian cysts (>12×12 cm), clinical ascites with or without hydrothorax, hyperkalemia, hypernatremia, hypo-osmolality, hypoproteinemia, oliguria, creatinine 1.1–1.5 mg/dL, and hypovolemic shock. Hemoconcentration with hematocrit >45.0%, white cell count >15000, liver dysfunction, increased blood viscosity and thromboembolic events occurs in the most severe cases. Critical ovarian OHSS is diagnosed when there is severe ascites or hydrothorax, hematocrit >55.0%, white cell count >25000/mL, oliguria or anuria, creatinine ≥1.6 mg/dL, creatinine clearance <50 mL/min, thromboembolism, or acute respiratory distress syndrome ***(Jahromi et al., 2018).***

The treatment of OHSS depends on its severity, complications, and absence or presence of pregnancy. It involves dealing with electrolytic imbalance, hemodynamic changes, liver dysfunction, pulmonary manifestations, hypoglobulinemia, febrile morbidity, thromboembolic events, adnexal torsion, and neurological manifestations. The most effective treatment is prevention. Complete prevention does not seem possible without cycle cancellation and continuation of GnRH agonist in patients stimulated using a long GnRH agonist protocol. Nurses Knowledge can have a profound impact on the quality of healthcare received to patients undergoing OHSS. There is nonetheless an increasing awareness among nurses regarding the different measures to prevent OHSS which, in careful hands, will reduce its incidence to a minimum ***(Aboulghar and*** Mansour, 2011).

Significance of the study:

Ovarian stimulation in IVF is considered to be a critical factor for clinical outcomes. OHSS is one of serious problems and has been estimated to occur in 9.0% to 24.0% of women with IVF that can result in cycle canceling ***(Anwar and Anwar, 2016).*** The maternity nurse who is the first one who contact with the couples, nurse is responsible for providing holistic care about infertility problems. Nurses play a vital role in IVF cycle; they are well placed to monitor the patients' response to IVF treatments. Also they are the source in alerting the responsible physician about possible complications. Therefore nurse should have good knowledge and practice of infertility drugs and its complications as OHSS.

Aim of this study

Was to assess the effectiveness of structured teaching program on staff nurses knowledge and preventive measures regarding OHSS.

Research hypothesis: Implementation of the structured teaching program will be effective in increasing the knowledge level and utilization of preventive measures regarding Ovarian Hyperstimulation Syndrome**.**

Subjects and methods: The methodology was presented under the following four designs: technical, administrative, operational and statistical designs.

Technical design: It included description of the research design, study setting, sample, and tools for data collection.

Research design: A quasi experimental study design for nurses in one group utilizing pre/posttest and follow up.

Setting: the present study was carried out at Gynacology ward and Labaroscpic unite at Zagazig University hospital. The above mentioned setting chooses because it was main the Zagazig's health center where women attend for induction of ovulation.

Sampling: Non probability purposive sampling technique was utilized. The study population consisted of all staff nurses (50) working in the above mentioned setting who agreed to participate in the program.

Tools of data collection:

Tool I: A structured Interview questionnaire: It was developed by the researchers after reviewing related literature. **It consisted of two parts:**

Part I: Socio-demographic data about nurses

Part II: Staff nurses' knowledge about OHSS Part.

Part I: Socio-demographic data about nurses: It includes 8 questions as age, professional qualification, years of experience and if they received similar teaching program about OHSS

Part II: Staff nurses' knowledge about OHSS: This part includes 11 open ended questions designed by the researchers to assess nurses' knowledge about OHSS as definition, signs and symptoms…..etc. **Appendix I** was used as pre-test, immediate post-test and follow up tests “at the end of the first month” to assess the effectiveness of structured teaching program on staff nurses' knowledge.

Tool II: Observational Checklist for Nurses Regarding Preventive Measures of OHSS: It was designed by the researchers. It has 36 practices about preventive measures that must the nurses acquire it. The researchers divided the designed checklist into three parts:-

Part I: Preventative measures before ovarian stimulation: It includes three practices that the nurse should mad before ovarian stimulation as:-

1.Identify risk factors for OHSS by taking complete history.

2.Individualizing ovulation induction regimens, using the minimum dose and duration of gonadotrophin therapy necessary to achieve the therapeutic goal.

3.Receive antagonist to women identified as high-risk prior to treatment

as it is proven to reduce of OHSS by 43.0%.

Part II: Preventative measures During Ovarian stimulation: It includes eight practices that the nurse should perform during ovarian stimulation as:-

1.Cancellation of cycle treatment and continuation of down regulation until next period.

2.Coasting and monitoring follicular development as well as E2 levels. Triggering with a low dose HCG only is E2.

3.Withholding the ovulatory trigger (HCG), if ovarian response is significantly high.

4.Reducing the dose of the HCG trigger to 5,000 IU instead of the standard 10,000 IU.

5.Administer intravenous prophylactic 25.0% albumin (20-50g) at the time of oocyte retrieval in high-risk cases.

6.Instruct woman who at risk for OHSS that frozen cycles of therapy reduce the risk of late OHSS.

7.Provide woman with written information about OHSS including risks, symptoms and a 24hour contact number with prompt access to a suitably informed professional with expertise in the diagnosis and management of OHSS.

8.Reassure woman that pregnancy may continue normally despite OHSS, and there is no evidence of an increased risk of congenital abnormalities.

Part III: Prevention of late grad of OHSS (Supportive management): This part includes five main sections. Each section has underlying practices that the nurse must be aware of it.

1.Prevention of thromboembolism (TE) (2 practices).

2.Hydration (Nursing role in fluid management in patients with severe OHSS (6 practices).

3.Drainage of ascites (5 practices).

4.Pain relief (2 practices).

5.Nursing observations (10 practices).

Scoring system for knowledge and practice parts: The nurses' answers concerning to knowledge and practice were record and calculated. Approbate to the answers, nurses' responses were estimated utilizing the model key answer sheet that was prepared previously by the researchers. All nurses were tested using the same format for the pre, post-test and follow up test using the following score:

For each area of knowledge and practice, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score, means and standard deviations were computed. Knowledge or practice was considered satisfactory if the percent score was 50.0 % or more and unsatisfactory if it was less than 50.0%.

Operational design: It includes preparatory phase, validity, reliability and fieldwork. **Preparatory phase:** The researchers undertook a review of past and current available literature relevant to the study topic in order to acquire in-depth theoretical knowledge of the various aspects of the problem. This was done using books, journals, textbooks, articles in scientific periodicals internet, newspapers and magazines. This helped

in the selection of the pertinent and validated data and collection tools.

Content validity and reliability: The two tools and the teaching program were reviewed for comprehensiveness, suitability and legibility by an expert panel of jury of five experts in the field of obstetrics and gynecologic nursing and also obstetric and gynecologic medicine specialty experts. The panel ascertained the face and content validity of the tools. Minor needful modifications were done mainly in the form of rephrasing some sentences and changing some items. The reliability of tools was tested by using Alpha Cronbach test. Cronbach's Alpha for knowledge (0.485). Percent of improvement = (pre intervention score-post intervention score)/ pre intervention score multiply by 100.0%.

Administrative Design: An official permission was given by sending an official letter from Faculty of Nursing Zagazig University to the study setting's responsible authorities for obtaining their data collection permit.

Ethical consideration:

In all phases of the study all ethical concerns were taken into consideration; the researchers maintained the subject's anonymity and confidentiality. They introduced themselves to the nurses and briefly explained to every nurse the scope and aim of the study before attendance and nurses were voluntarily enrolled after the oral agreement process. Nurses were also informed that all information gathered during the study was confidential and used exclusively for research purposes and had the ability to withdraw from the study whenever they wished.

Pilot study was carried out on 10.0% (5 nurses) who were excluded from the sample. The main purpose of the pilot study was to assess the clarity, feasibility, applicability of the data collection tools, arrangements of items and estimate the time needed for each form.

The field study of this work was on two phases:

1- First phase: data collection took a period of 3months, from the 1st of July to the end of September. The researchers collected data daily during the whole week.

2- Second phase: the researchers prepared the contents of the teaching sessions about the standard nursing guidelines about OHSS and methods of teaching. **A self-learning booklet** was prepared by the researchers using the recent and evidence based information about OHSS. It was used as a guide for them to upgrade their knowledge and practice. The time used for answering the study questionnaire ranged from 20-25minutes. The teaching program consisted of 5 sessions and the total time of the sessions was 5 hours. The number of nurses in each session was only 5 nurses in order to facilitate the learning process and allow every nurse to participate in the discussion as well as ensure adequate supervision. Sessions were conducted for nurses during the afternoon shift. The session started at 12pm and end at 2 PM. It was the most suitable time for the nurses after they have completed their duties. The theoretical and training session were conducted together with a demonstration and re demonstration for each element of care using simulation in the faculty of nursing lab or utilizing the available resources. Sessions were conducted in English because nurses elected were graduates.

The general objective of the program was to upgrade nurse's knowledge and practice in preventive measures pertaining to OHSS.

Specific objectives*:* By the end of the intervention, the nurses should be able to:-

- Recognize all information about OHSS.
- Acquire preventative measures for ovarian stimulation.
- Deliver proper nursing care for the woman during management of OHSS.

The researchers divided the nurses into small groups each group contains 5 nurses and then held a meeting with each group. The intervention was implemented for five interactive sessions for each group and each session was conducted for one hour. Health educational sessions were given to the nurse in the form of lectures and group discussion by using audio-visual aids. At the beginning of the first meeting an orientation to the educational intervention such as; the rationale, importance of the topics, contents, time and location were elaborated in order to establish the best connection.

The lectures included information about definition of OHSS, signs and symptoms, risk factors, causes, prevention and treatment. To certain that the students understood the content each session was began by an outline around what was given during the previous session, followed by the objectives of the new one. Moreover, an additional 15 minutes were assigned at the end of the session for an open discussion with the students about this topic. An educational intervention containing brief points about OHSS was distributed to nurse at the end of session.

Evaluation phase: Evaluation of nurse's knowledge and practice in preventive measures regarding OHSS was done after the end of the program (immediately post-test) and then repeated at the end of the first month to estimate the retention of the information and working with the program and the result was obtained using the above mentioned score.

All prevention steps regarding awareness before and during OHSS were explained in details in learning booklet and checklist to evaluate nursing response after implementation of the program.

Statistical analysis: All data were collected, tabulated and statistically analyzed using SPSS 20.0 for windows **(SPSS Inc., Chicago, IL, USA 2011)).** Quantitative data were expressed as the mean ± SD and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Percent of categorical variables were compared using Chi-square test or Fisher's exact test when appropriate. Wilcoxon Signed Ranks Test was used to compare two dependent Quantitative variables. Spearman rank correlation coefficient was calculated to assess relationship between various study variables, (+) sign indicate direct correlation & (-) sign indicate inverse correlation, also values near to 1 indicate strong correlation & values near 0 indicate weak correlation. All tests were two sided. p-value < 0.05 was considered statistically significant (S), p-value < 0.001 was considered highly statistically significant (HS), and p-value ≥ 0.05 was considered statistically insignificant (NS).

Results:

Table 1: Illustrates distribution of nurses according to their sociodemographic characteristics. According to age, more than half (52.0%)

of nurses were older than 25 years. Moreover, 58, 0% of them were high qualified nurses graduated either from technical institute or have bachelor degree of nursing. Meanwhile, nearly one fifth (18.0%) of them had and acquired practical experience last for 10 years and more. even though, 72.0% of the studied nurses hadn't received previous knowledge about OHSS.

Table 2 shows a statistical significant improvements in all areas of knowledge at both post intervention by range from 126.04 regarding critical to 541.67 regarding definition of OHSS with total mean score (35.62±9.7) and follow up phase which still high with total mean score (32.4 ±10.1) with statistical significant difference in item related to risk factor of OHSS with mean score (5.5±2.38) which reflect nurses awareness toward early detection of ovarian hyper stimulation syndrome among susceptible cases still need confirmation.

Concerning nurses practice regarding OHSS, **table 3** points to statistically significant improvements at all practice acquired in the post intervention (<0.001) after application of the program by range from 83.56% regarding Preventive measure during OHSS to 533.3% regarding Preventive thromboembolism with total mean practice score (24.14±6.8) . Thus, despite the observed some decline, the level at the follow-up phase was still higher than the pre-program levels with total mean practice score (22.56±7.5).

Figure 1 displays the result of the nurse's total knowledge score about OHSS throughout the program phases. It points to statistically significant improvements at both the post and follow-up phases from10.0% at the pretest to 86.0% and 82.0% at the posttest and follow up phases.

Figure 2 illustrates the change in the score of nurse's practice before and after the program implementation. It is evident that the total score of practice was low before the program (10.0%). After the program implementation statistically significant improvement was revealed in total score of good practice (88.0%) in favor of the post-test. At the follow-up phase, the percentages of nurses with satisfactory practice declined in all areas (78.0%), but remained higher than the pre-program levels in almost all areas, also with statistical significant difference ($p<0.05$).

Table 4 explain significant Correlation between practice score as a positive parameter and knowledge score in the above mentioned matrix throughout the study phases ($p<0.05$). Meanwhile, Experience maternal years represent combined parameter in the pre intervention that shows significant correlation with both knowledge score (0.008) and practice score (0.016).

Table 5 illustrates significant relation between nurses' knowledge level and qualification during pre-intervention study phase ($p=0.004$).

Table (1): Socio-Demographic Data of Studied Nurses (n=50).

Socio-Demographic Characteristics	N= (50)	%
Age per years		
≤25	23	46.0
>25	27	52.0
Qualification		
Nursing school	21	42.0
Technical institute	22	44.0
Bsc Nursing	7	14.0
Experience		
Less than 5 years	18	36.0
5 -10 years	23	46.0
More than 10 years	9	18.0
Previous knowledge		
No	36	72.0
Yes	14	28.0

Table 2: Mean of Nurses Knowledge Regarding Ovarian Hyper Stimulation Syndrome throughout Study Phases (n= 50).

Nurses Knowledge Regarding OHSS	Time			Percent of change		p	
	Pre Intervention Mean ± SD	Post Intervention Mean ± SD	Follow up phase Mean ± SD	Pre& Post	Post& Follow up phase	Pre& Post	Post& Follow up phase
Definition	0.24±0.66	1.54±0.7	1.48±0.76	541.67	3.90	<0.001	.453
Feature	0.36±0.59	1.52±0.64	1.84±2.02	322.22	-21.05-	<0.001	.971
Risk factor	2.08±1.79	6.74±2.58	5.5±2.38	224.04	18.40	<0.001	<0.001
Symptoms and sign	1.04±1.04	2.98±1.08	2.66±1.06	186.54	10.74	<0.001	.070
Prevention	1.3±1.09	3.06±1.1	2.64±1.2	135.38	13.73	<0.001	.012
Management	1.86±1.26	4.38±1.22	4.±1.38	135.48	8.68	<0.001	.048
Classification mild	1.14±1.21	3.06±1.05	2.78±1.18	168.42	9.15	<0.001	.075
Classification moderate	0.9±0.81	2.56±0.97	2.62±1.44	184.44	2.34	<0.001	.835
Classification severe	1.34±1.09	4.±0.76	3.76±0.98	198.5	6	<0.001	0.07
What done	2.54±0.91	5.78±1.2	5.7±1.26	127.6	1.38	<0.001	0.32
Critical	1.92±1.26	4.34±1.27	3.98±1.42	126.04	8.29	<0.001	0.08
Knowledge Score	13.76±7.81	35.62±9.7	32.4 ±10.1	158.43	8.83	<0.001	<0.001

* maximum score Wilcoxon Signed Ranks Test

Table 3: Mean of Nurses Practice Regarding Ovarian Hyper Stimulation Syndrome throughout Study Phases (n= 50).

Nurses Practice Regarding OHSS	Time			Percent of change		p	
	Pre Intervention Mean ± SD	Post Intervention Mean ± SD	Follow up phase Mean ± SD	Pre& Post	Post& Follow up	Pre& Post	Post& Follow up phase
Preventive .measure before	1.02±0.91	2.16±0.76	1.92±0.89	111.76	11.1	<0.001	.022
Preventive measure during	2.92±1.52	5.36±1.66	5 ±1.8	83.56	6.72	<0.001	.054
Preventive thromboembolism	0.24±0.65	1.52±0.73	1.48±0.76	533.3	2.63	<0.001	.516
Hydration	1.88±1.28	4.26±1.35	3.88±1.5	126.6	8.92	<0.001	.119
Drainage ascites	1.48±1.35	3.72±1.14	3.5±1.21	151.35	5.91	<0.001	.127
Relief pain	0.4±0.76	1.54±0.71	1.5±0.73	285	2.60	<0.001	.557
Nursing observation	2.1±1.83	5.64±2.3	5.3±2.5	165.7	5.38	<0.001	.282
Practice score	10.±6.23	24.14±6.8	22.56±7.5	141.4	6.55	<0.001	.064

* maximum score Wilcoxon Signed Ranks Test

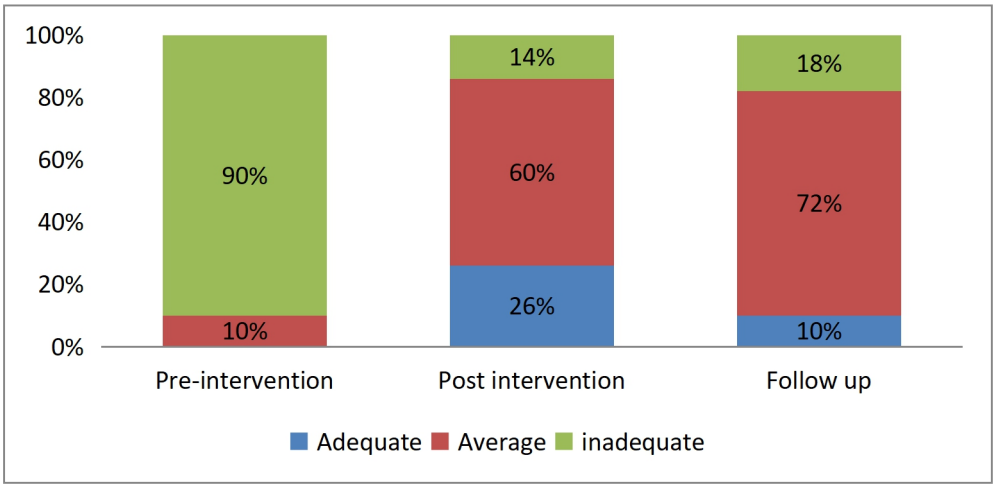

Figure (1): Percent of Knowledge Level throughout Study Phases among Study Nurses

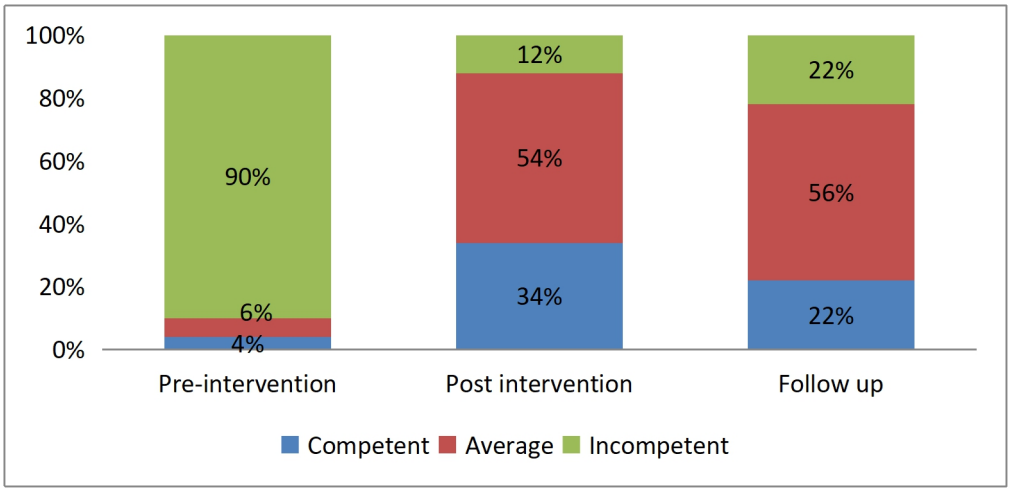

Figure (2): Percent of Practice Level throughout Study Phases among Study Nurses.

Table 4: Correlation Matrix between Nurses' Practice, Knowledge, Age of Nurses and Experience Years throughout Study Phases (n=50)

Parameters		Knowledge score		Practice score	
		(r)	P	(r)	P
Pre	**practice score**	.61**	0.0001	1	.
	Age per year	0.051	0.725	-.032	0.825
	Experience maternal years	-0.37**	0.008	-.34*	0.016
	Experience infertility years	0.033	0.82	0.021	0.883
Post	**Practice score**	.76**	0.0001	1	.
	Age per year	0.092	0.526	0.174	0.227
	Experience maternal years	0.144	0.317	0.203	0.158
	Experience infertility years	0.06	0.678	0.061	0.673
Follow up	**practice score**	.81**	0	1	.
	Age per year	-.066-	0.651	0.023	0.873
	Experience maternal years	0.102	0.48	0.053	0.714
	Experience infertility years	-.160-	0.267	-0.064	0.661

(r) Correlation coefficient * p<0.05 significant ** p<0.05 significant

Table 5: Relation between Nurses' Knowledge Level about Ovarian Hyper Stimulation Syndrome and their Qualification Pre Intervention Study Phase (n=50).

Variables	Pre knowledge studied group				n.	χ^2	p
	Average N=5		Inadequate N=45				
	No.	%	No.	%			
Qualification	.	.	.	.			
Nursing school	**2**	9.5	19	90.5	21	10.8	0.004(S)
Technical institute	**0**	.0	22	100.0	22		
Bsc Nursing	**3**	42.9	4	57.1	7		

χ^2 = Chi square test f =Fisher exact test of significant (S) p<0.05 significant

Discussion:

Ovarian hyper stimulation syndrome (OHSS) is a complication of fertility treatment, which uses pharmacological ovarian stimulation to increase the number of oocytes and therefore embryos available during assisted reproductive technology (ART). In a minority of women undergoing treatment, the ovarian response exceeds that aimed for and results in a clinical condition with a specific pathophysiology. OHSS is associated with significant physical and psychosocial morbidity and has been associated with maternal death. However, in most cases OHSS is self-limiting and requires supportive management and monitoring while awaiting resolution. Women with more severe OHSS may require inpatient treatment to manage the symptoms and reduce the risk of further complications.

The key principles of OHSS management therefore are early recognition and the prompt assessment and treatment of women with moderate or severe OHSS ***(Royal College of Obstetricians and Gynaecologists, 2016)***. Nurses' knowledge and core competencies are being increasingly regarded as a vital component in improving the delivery of quality healthcare, as well as increasing the level of satisfaction with the nursing care and prevention of OHSS. Little is known about the effect of instructional guideline on nurses' knowledge and practice regarding OHSS, which is required to contribute to body of research. So, the aim of this study was to assess the effectiveness of structured teaching program on staff nurses knowledge and preventive measures regarding Ovarian Hyper stimulation Syndrome**.**

The current study findings illustrate distribution of nurses according to their sociodemographic characteristics. Regarding age, more than half of nurses were older than 25 years. Moreover, 58.0% of them were high qualified nurses graduated either from technical institute or have bachelor degree of nursing. Meanwhile, nearly one fifth (18.0%) of them had and acquired practical experience last for 10 years and more. even though, 72.0% of the studied nurses hadn't received previous knowledge about ovarian hyper stimulation syndrome. In this regard, ***Devi and Upashe, (2019)*** study in India " Staff Nurses Knowledge Regarding Ovarian Hyperstimulation Syndrome - Effectiveness of Structured Teaching Programme" Found that, two thirds (66.0%) of responders belong to the age group of 21-30 years and nearly quarter (24.0%) of them belong to the age group of 30-40 years. moreover, 34.0% completed Basic BSc nursing and 16.0% PB B.Sc (Nursing). Meanwhile, more than one fifth (22.0%) of respondents had more than 10 years of clinical experience and 60.0% respondents hadn't previous knowledge about ovarian hyper stimulation syndrome.

Similarly, ***El-Adham and Shaban, (2020)*** confirmed that age of studied group ranged from 21- 46 years with mean and SD (29.11+6.95)and 35.6% of them have total 5-10 years of experience with a range of 1- 26, and a mean and SD (9.33+6.82). Also, ***Smith et al., (2014)*** who stated that sixty-seven percent of the study participants had been in practice for more than 20 years and one fifth of them in practice for 10 years or less. In addition to ***Obioha et al., (2014)*** who proved that the mean age of the respondents was 35.6 years; sixty-three nurses have been in practice for more than 5 years. Job burdens may act as a barrier against updating and renewing nursing practice.

The current study finding reveals a statistical significant improvements in all areas of knowledge at both post intervention by range from 126.04 regarding critical to 541.67 regarding Definition of OHSS with total mean score (35.62±9.7) and follow up phase which still high with total mean score (32.4 ±10.1) with statistical significant difference in item related to risk factor of OHSS with mean score (5.5±2.38) which reflect nurses awareness toward early detection of ovarian hyper stimulation syndrome among susceptible cases still need confirmation.

Similar findings were confirmed by ***El-Adham and Shaban, (2020)*** who reported that there was a statistically significant difference between the studied nurses regarding the instruction guidelines before and after the intervention as this instructional guideline highlighted many aspects that nurses should consider during care of women undergoing infertility treatment especially that concerned with ovulation induction. Similarly, ***Judith et at., (2013)*** *and* ***Morris, (2009)*** who aligned that the nurses' role starts with ovulation induction and extends beyond the embryo transfer as they guide couples, counsel them and coordinate their care and treatment plans to promote successful rate and prevent side effects and complications like OHSS.

Concerning nurses practice regarding Ovarian Hyper stimulation Syndrome, the present study findings point to statistically significant improvements at all practice acquired in the post intervention (<0.001) after application of the program by range from 83.56% regarding Preventive measure during OHSS to 533.3% regarding prevention of thromboembolism with total mean practice score (24.14±6.8). Thus, despite the observed some decline, the level at the follow-up phase was still higher than the pre-program levels with total mean practice score (22.56±7.5). In the same line ***Afolabi et al., (2018)*** added that fertility nurses will have more effective role if they have adequate knowledge and training. Moreover, ***Morris, (2009)*** presented that nurses' role can be extended to allow more continuity of care and better understanding of patients' needs. They can provide clinical competence standardized quality of care to enhance the ART practice including knowledge, skills and attitudes; and in turn would result in a significant and positive impact on the lives and outcomes for couples accessing ART services.

Regarding implementation of the program and nursing response throughout phases of intervention, in the current study displays the result of the nurse's total knowledge score about OHSS throughout the program phases. It points to statistically significant improvements at both the post and follow-up phases from10.0% at the pretest to 86.0% and 82.0% at the posttest and follow up phases.

These findings correspond well with ***Devi and Upashe, (2019)*** that indicate that the majority of respondents

42 (84.0%) have adequate knowledge, 8(16.0%) respondents have moderate knowledge and none of them have inadequate knowledge on ovarian hyper stimulation syndrome after implementation of the program. On the other hand, ***Judith et al .,(2013)*** stated that the research participants lack knowledge and were in great need for specific knowledge related to ART practice such, as treatment protocols; complications of ovulation induction, patient instructional guidelines supportive counseling strategies and preventive measures toward OHSS.

The present study reveals significant Correlation between practice score as a positive parameter and knowledge score throughout the study phases ($p<0.05$). Meanwhile, Experience in the maternity unit represent combined parameter in the pre intervention that shows significant correlation with both knowledge score (0.008) and practice score (0.016). Also there is a significant relation between nurses' knowledge level and qualification during pre-intervention study phase ($p=0.004$) and post intervention ($p=0.023$). These results are partially correspond with ***El Adham and Shaban , (2020)*** who was found that there was a significant relation between nurses knowledge and educational level but no statistically significant relation between the studied nurses' knowledge and attitude in relation to years of experience before, immediately and three months after the intervention.

Conversely, ***Devi and Upashe, (2019)*** reported that there is significant association with the variables like clinical experience in infertility centers, previous knowledge about the topic. And there is no association with variables like age, professional qualification, total years of clinical experience and clinical experience in maternity ward.

Limitations of this study include limited number of the studied nurses from particular geographical area in Zagazig. Therefore, to strengthen the study, other groups of health care providers should be included, such as large number of nurses and health care providers.

Conclusions

The finding of the study concludes that:

Implementation of the structured teaching program was effective in increasing the knowledge level and utilization of preventive measures regarding OHSS.

Recommendations:

Based on the results of the present study, the researchers suggested the following recommendations:

Implementation of structured teaching program with a learning booklet for nurses on other health center for IVF should be conducted in order to increase their level of knowledge and practice regarding Ovarian Hyperstimulation Syndrome.

More studies should be conducted in other centers to re-confirm the reliability and validity of nursing knowledge and practice toward OHSS.

Conflict of interest

There were no conflicts of interest.

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