

Effect of jigsaw cooperative learning strategy on obstetric nurses' knowledge and information retention of emergency contraceptive methods

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Abstract

Background: Despite the availability of highly efficient contraception, approximately one third of all pregnancies in the world are still unintended. These pregnancies may be associated with a high risk of morbidity and mortality; particularly in areas where safe abortion is inaccessible or where quality obstetric services are unavailable for those women continuing a pregnancy to term. Every year, 210 million women around the world become pregnant. Of these, 80 million pregnancies are unplanned. Out of these, 46 million pregnancies are terminated each year, and 19 million are ended with unsafe abortion. More than 97% of unsafe abortions occur in developing nations. Most of these results are from nonuse of contraception or from noticeable contraceptive failure, all of which may be avoided by the use of emergency contraception methods. **Aim of the study:** The present study aimed to determine the effect of jigsaw cooperative learning strategy (independent variable) on obstetric nurses' knowledge and information retention (dependent variable) of emergency contraceptive methods. **Methods** A quasi experimental research design was used in this study. This study was carried out at El Shatby Maternity University Hospital, in Alexandria governorate, Egypt. A convenient sample of 150 maternity nurses were recruited from the above-mentioned setting. Three tools were used for data collection; (1) socio-demographic characteristic and academic data questionnaire, (2) Emergency Contraceptive Methods Knowledge and Information Retention questionnaire, (3) Nurses' Satisfaction with Jig Saw Educational Technique **Results:** Immediately after applying jigsaw strategy the vast majority (97.30%) of the study group had good score of knowledge compared to 74.70 % of control group. Twenty-one (21) days later, a slight decline in knowledge score among the study group was observed with 93, 30% achieving a good total score, while a sharp drop in total score of knowledge among the control group was noticed where 42% of them had good score of knowledge. A statistically significant difference between both groups were found immediately and 21 days after providing teaching session, p (0.000 & 0.000) respectively, where nurses of the study group had better knowledge immediately after providing teaching session. The majority (93.30%) of the study group was highly satisfied with the jigsaw strategy as a new teaching method. **Conclusion:** Interactive learning environment such as jigsaw cooperative learning strategy was effective teaching methods which facilitated independence and self- directed learning. **Recommendation:** Jigsaw cooperative learning strategy should be incorporated in obstetric nursing education.

Keyword: Emergency contraceptive methods, jigsaw strategy, maternity nurses.

Introduction

Pregnancy is a mature developmental phase that takes place after conception. Despite the availability of highly efficient contraception, approximately one third of all pregnancies in the world are still unintended. These pregnancies may be associated with a high risk of morbidity and mortality; particularly in areas where safe abortion is

inaccessible or where quality obstetric services are unavailable for those women continuing a pregnancy to term (**International Consortium for Emergency Contraception [ICEC] & International Federation of Gynecology & Obstetrics [FIGO], 2012**). Every year, 210 million women around the world become pregnant. Of these, 80 million pregnancies are unplanned. Out of these, 46 million pregnancies are terminated each year, and 19

million are ended with unsafe abortion. More than 97% of unsafe abortions occur in developing nations. Most of these results are from nonuse of contraception or from noticeable contraceptive failure, all of which may be avoided by the use of emergency contraception methods (Gangwal et al., 2016; Gebremedhin et al., 2018).

Emergency contraception (EC) refers to methods that the woman can use to avoid pregnancy following unprotected sexual contact. It is a safe and extremely effective method to decrease the rate of unintended pregnancies, induced abortion and unwanted births. Despite the fact that the EC has been approved by the U.S. Food and Drug Administration (FDA) since 1997, it is still under prescribed and underused. The two forms of emergency contraception currently available are Copper-bearing intrauterine devices (IUDs) and emergency contraceptive pills (ECPs). A Copper-bearing IUD is more than 99% effective in preventing pregnancy if inserted within 5 days of unprotected sexual intercourse. However, emergency contraceptive pills include progesterone only pills and combined oral contraceptive pills which are more effective between 72 and 120 hours of unprotected sex (Chung-Park, 2008; Gangwal et al., 2016; World Health Organization [WHO], 2018).

Emergency contraception can be used when no contraception has been used during sexual act, contraceptive failure or incorrect use or in case of sexual assault in a woman which was not protected by contraception. It prevents conception by preventing or delaying ovulation and they do not induce an abortion. The copper-bearing IUD prevents fertilization by inducing a chemical change in sperm and egg before they meet, and it can't affect a developing embryo or disrupt an existing pregnancy (Gangwal et al., 2016; World Health Organization [WHO], 2018).

According to WHO, any woman at reproductive age may need emergency contraception to avoid an unplanned pregnancy. There are no absolute medical contraindications for EC and there are no age limitations. The same eligibility requirements that apply to general use of a copper IUD apply

to emergency use. However, several reasons have been identified as barriers to its use or prescription. The public's lack of information and understanding is a major explanation for EC underutilization in the United States and other countries (Chung-Park, 2008; World Health Organization [WHO], 2018).

Nursing staff is an important aspect of any health-care system. They serve as reliable source of information for the general public who are exposed to them. Nursing personnel's awareness and attitude toward contraception may have a direct effect on the community's contraceptive practices. Lack of knowledge, misconceptions and negative attitude towards emergency contraception in nursing personnel may serve as an obstacle to their personal use as well as keeping them from promoting emergency contraception to beneficiaries (Nivedita & Shanthini, 2014).

So, using variety of educational strategies may be helpful in improving nurse's knowledge and awareness about emergency contraception and its availability. One of these educational strategies that is perfectly used in group teaching is "cooperative learning" it is an educational approach which aims to organize teaching activities into academic and social learning experiences as learners must work in groups to complete tasks collectively toward learning goals. It has been described as "structuring positive interdependence as unlike individual learning, which can be competitive in nature. Learner cooperatively can capitalize on one another's resources and skills by asking one another for information, evaluating one another's ideas, monitoring one another's work. While the instructor's role changes from giving information to facilitating learning as everyone succeeds when the group succeeds (Singh & Agrawal, 2011).

It has many techniques; one of them is the jigsaw teaching strategy which is a collaborative learning approach, first developed by Elliot Aronson (1971). The main goal of the approach is to study the learning material in groups to achieve specific outcomes. By working in a 'team' or 'cooperative groups' the learner get an opportunity to develop interpersonal skills which will be helpful in their future careers. It encourages learners to

sink or swim together and become responsible for the learning of others as well as themselves (Goyak, 2009; Adams, 2013).

It is believed that each learner is different and as a member of the team he/she contributes uniquely. This strategy draws a direct image of a jigsaw puzzle where each learner represents a piece of the puzzle and the final image of a puzzle constructed from fitting together separate pieces, each learner presents his/her assigned academic tasks to complete the puzzle. Thus, it can be concluded that each learner plays a vital role to complete the assignments given by the teacher (Amador & Mederer, 2013).

Jigsaw has specific process that includes different steps, step one; learners are oriented regarding the principals and practice of the Jigsaw method and the topic parts. Step two; they are divided into many heterogeneous groups which called home groups. Each group is coded with a letter A, B, C, D, E or F and they randomly coded as 1-6 in each group in terms of subtopics. Step 3 by divide the topic into 4-6 parts, and assign one learner in each group to be responsible for a different segment. Step 4 by selecting the learner with the same number code from each home group to form the expert group then, letting them to discuss their segment together. Step 5: returning learners to their original home groups and sharing the segments they have become experts on. During this whole process the instructor facilitates the arrangement of small groups, explaining of roles and timing for each portion, present among the groups and lend support or explanation where necessary (Gupta & Pasrija, 2012; Van Wyk, 2015; Ishtiaq & Hussain, 2017).

Health care workers, especially midwives and family health graduates, have a heavy duty in preserving and promoting the public health and they are the main responsible persons to provide family planning programs. The presence of qualified, competent, cooperative learning methods for maternity nurses will make them deliver high quality maternity care, where nurses can be invaluable in preventing harm to mothers and improving their knowledge. There are very few Egyptian studies that address jigsaw strategy in maternity specialty; therefore, this study was conducted to evaluate the effect of the utilization of cooperative jigsaw learning strategy on

maternity nurses' knowledge and information retention about emergency contraceptive methods

Aim of the study:

This study aimed to determine the effect of jigsaw cooperative learning strategy (independent variable) on obstetric nurses' knowledge and information retention (dependent variable) of emergency contraceptive methods.

Research hypothesis:

- Obstetric nurses who are taught by jigsaw teaching strategy exhibit higher knowledge level regard emergency contraceptive methods than those who are taught by traditional method.
- Obstetric_nurses who are taught by jigsaw teaching strategy exhibit higher information retention level regard emergency contraceptive methods than those who are taught by traditional method.
- Obstetric nurses who are taught by jigsaw teaching strategy exhibit high satisfaction level regard this method.

Materials and Method

Materials

Research design

A quasi experimental research design was used in this study.

Setting

This study was carried out at El Shatby Maternity University Hospital, in Alexandria governorate, Egypt.

Subjects

A convenient sample of 150 maternity nurses was recruited from the above-mentioned setting. The selected subject was assigned equally to either the control or the study group. Each group comprised 75 nurses as following:

- **Study group (jig saw technique):** included 75 nurses who received their teaching about emergency contraceptive methods using jig saw technique.
- **Control group traditional way (lecture):** included 75 nurses who received their

teaching about emergency contraceptive methods using traditional lecture.

Epi info 7 statistical program was used to estimate the sample size using the following parameters:

Population size= 245, Expected frequency=50%, Acceptable error= 5 %, Confidence coefficient= 95%, Minimal sample size= 150

Tools of data collection:

To achieve the aim of the study three tools were used.

Tool I: Socio-demographic Characteristic and Academic Data Questionnaire:

This tool was developed and used by the researcher to elicit the basic data about the subjects as follows:

Socio-demographic characteristics and academic data including age, marital status, residence, level of education, specialty, and years of experience since graduation.

Tool II: Emergency Contraceptive Methods Knowledge and Information Retention Questionnaire.

This tool was developed by the researcher after reviewing the related literature (**Chung-Park, 2008; World Health Organization [WHO], 2018**) and used to assess the nurse's knowledge and information retention about emergency contraceptive methods. It consists of 24 questions which includes multiple choice questions (14 items) and true/false questions (11 items) covering the following areas: definition of EC, indications, types, emergency contraceptive pills and emergency IUD mechanism of action, effectiveness, proper time for use, contraindication, and side effect. Each response for question of knowledge was given a score; correct answer (1) and incorrect answer (0). The total score ranged between (0-24). Accordingly, nurses' knowledge level and information retention was categorized as follows.

- Poor knowledge / retention rate (0-8)
- Fair knowledge / retention rate (9-16)
- Good knowledge / retention rate (17-24)

Tool III: Nurses' Satisfaction with Jig Saw Educational Technique

This tool was developed by the researcher and was used to assess the nurses' satisfaction level about jig saw strategy application. It included 12 statements, 8 positive (benefits) and 4 negative statements (challenges) of jig saw strategy application.

The subject's response to each statement varied according to a 5-point Likert- like scale, ranging from strongly agree to strongly disagree depending on the degree of agreement with the items.

The adopted scoring system for positive statements was:

- Strongly agree = 5
- Agree = 4
- Neutral=3
- Disagree =2
- Strongly disagree =1

This scoring system was reversed for negative statements, where strongly agree was scored strongly agree = (1), agree = (2), neutral = (3), disagree= (4) and strongly disagree = (5). The total score ranged between (12-60) and was interpreted as the following:

- From (12 to less than 28) had low satisfaction
- From (28 to less than 44) had moderate satisfaction
- From (44 to 60) had high satisfaction

Method

The study was executed according to the following steps:

- 1- Approval of Ethical Committee, Faculty of Nursing, Alexandria University was obtained and an official letter from the Faculty of Nursing, Alexandria University was directed to the responsible authority of the study setting to take their permission to collect data after explaining the purpose of the study.
- 2- The Tools used in this study were developed by the researcher after extensive review of recent and relevant literature.
- 3- Tools were translated into Arabic and tested for content validity by a jury of five experts in the field and the necessary modifications were carried out accordingly.

- 4- Tools reliability was tested by Alpha Cronbach test and the result was statistically acceptable. The value of tool (I) was 0.78 and tools (II, III) were: 0.84
- 5- A pilot study was carried out on 15 women (10% of the sample size), who were selected from the study setting to assess the study tools for their applicability and clarity and those not included in the study sample. The necessary modifications were done accordingly.

Data collection

The present study was implemented in three phases (preparation, implementation and evaluation phase)

The preparatory phase:

It includes adequate preparation of the researchers, nurses, content and environment.

Researcher preparation

Before starting data collection, the researchers developed a theoretical and practical foundation about jigsaw educational strategy through reading recent and relevant references.

Nurses' preparation

- The researchers divided the nurses into six groups each group consists of nearly 12 nurses. Then the researchers hold a meeting with each group during one of their free time or between shifts to introduce themselves and briefly explained the nature and the purpose of the study. After obtaining the acceptance from the nurses to participate in the current study, the researchers provided an overview about jigsaw teaching strategy and discuss with them the participation time and their roles according to their working schedule.

Content preparation

The researchers developed segmented outline content with list of references about the emergency family planning methods; progesterone only pills, combined oral contraceptive pills, copper IUD (definitions, indication, mechanism of actions, contraindication, effectiveness, types, complications / side effects and proper time for use).

Environmental preparation

- A quiet room in the hospital (library) was used as a teaching class for nurses and was equipped with enough chairs, desks, and blackboard.

The Implementation phase:

In this phase the researcher performed pretest for both the study and control groups using tool II to assess the obstetric nurses' knowledge about the emergency contraceptive methods. For the study group (Jigsaw group) the application of the jigsaw strategy took 3sessions, 1session for each group in a week for 3 weeks; each session was repeated for each subgroup according to their working schedule and each session lasted for about 60 minutes. The training program was based on the integration between the jigsaw strategy steps and theoretical content of emergency family planning methods.

In the first week, the researchers give codes to the already divided 6 groups (each group consists of nearly 12 nurses) started from A1 to A12, B1 to b12, C1 to C12, D1 to D12, E1 to E12 and F1 to F12 to form home groups .The researcher distributed the segmented outline as the following for each home group(A1: definition of EC, A2: indications ,A3: types, A4: pills mechanism of action,A5: effectiveness of pills ,A6: pills contraindication& time of use A7: pills complications / side effects, A8: EIUD mechanism of action, A9:IUD contraindications, A10:IUD time of insertion & effectiveness of EIUD, A11: post insertion counseling ,A12:IUD complications / side effects. The same distribution was applied for all the six groups. Each similar member in each home group started to read about her part.

In the second week (expert group discussion), the researcher formed expert groups that consisted of each similar member from each home group as the following (A1, B1, C1, D1, E1, F1) and the same distribution was applied for all the six groups. Each nurse in the expert groups started to discuss the same topics interactively with each other according to the segmented outline and followed by brief presentation by all the six groups.

In the third week (jigsaw groups discussion), each nurse in the expert group returned to their original home group and

discussed their own parts with the group with brief presentation.

A team leader from nurses was assigned to each group. Their function was to facilitate group discussion and sharing.

For the control group (lecture group): The nurses in the control group were divided into six subgroups according to their working schedule. The Researchers presented scientific content in form of one lecture for each subgroup; every lecture took about one hour for each group, two groups in a week for three weeks according to the working schedule of each group. The lecture was presented for nurses as PowerPoint presentations. The researchers conducted a classroom group discussion for all nurses to clarify any missing point of contents. And at the end of the lecture, the main points of content were summarized.

The Evaluation phase:

In this phase the researchers assessed the maternity nurse's knowledge about emergency contraceptive methods in both study and control groups using tool II immediately after the application of teaching sessions and using tool III to evaluate study group satisfaction about the strategy. After 21 days from ending the application of teaching sessions the researcher assessed the nurse's information retention about emergency contraceptive methods using tool II.

Then a comparison between the two groups (jigsaw group and lecture group) was done to evaluate the effect of two teaching strategies in order to investigate the research hypotheses.

Data were collected over a three months consecutive period extending from beginning of January to end of March 2020

Three days per week were specified for data collection and the researchers used to attend in morning and evening shifts in these days.

7- Ethical considerations

For each recruited subject the following issues were considered: Securing the subject's informed consent, keeping the subject's privacy, assuring the subjects data

confidentiality, and the right to withdraw at any time.

8. Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. Quantitative data were described using mean, standard deviation. Fisher's Exact test, Chi-Square test and Wilcoxon signed rank test were used for test of significance. The 0.05 level was used as the cut off value for statistical significance (e.g., significant at $p > 0.05$).

Result

Table (1) illustrates the socio-demographic characteristics and academic data of the study subjects. Regarding age, it was observed that the mean age was almost the same (38.76 ± 10.15 and 38.69 ± 10.05 years) among the control and study groups respectively. The table also shows that 80% & 84% of the control and study groups respectively were married. The vast majority (97.33%) of the control group and all the study group (100%) were urban dwellers and, 93.34% & 92% of control and study groups had secondary education level respectively. In addition, 34.66% & 32.00% of both groups respectively worked in natal ward. Finally, in relation to years of experience it was noticed that 37.33% & 38.67% of control and study group respectively had more than twenty years of experience.

No statistically significant differences were found between the study and control group in relation to their socio-demographic characteristics and academic data.

Table 2 shows distribution of the control and study groups according to their total score of knowledge about emergency contraceptive methods. before applying the teaching sessions (jigsaw strategy and traditional lecture) it was observed that more than three fifths (64%, 61.30%) of the control and study groups respectively had poor score of knowledge and none of the two groups had good knowledge with no statistically significant difference was found between the control and study groups in

their total score of knowledge where $P=(0.044)$.

Immediately after applying jigsaw strategy, the table shows that the vast majority (97.30%) of the study group had good score of knowledge compared to 74.70 % of control group and none of the two groups had poor knowledge. Moreover, twenty-one (21) days later, a slight decline in knowledge score among the study group was observed with 93, 30% achieving a good total score, while a sharp drop in total score of knowledge among the control group was noticed where 42% of them had good score of knowledge.

A highly statistically significant difference was observed between both groups immediately and 21 days after providing teaching sessions. Where ($P = < 0.000$). However, another highly significant difference was also detected within the nurses of the study group before & immediately and 21 days after applying jigsaw strategy. In other words, jigsaw teaching strategy seemed to have significant effect in improving and maintaining retention of the nurses 'knowledge among the study group compared to the control group.

Table (3) illustrates the distribution of the study group according to their level of satisfaction regarding jigsaw strategy application.

In relation to benefits of jigsaw strategy, It was found that more than three fifth (64%) of the study group agreed that jigsaw strategy helped them to concentrate, while 2% strongly disagreed about the statement. The table also shows that almost the same percent (80.00%, 82.70%) of the study group agreed that strategy help them to concentrate and to know their abilities respectively. Also, it was observed that 78.70% of them agreed that strategy helped them to know their learning style. Moreover, 81.30 % of the study subjects reported that the jigsaw strategy helped them to increase their self-confidence. More than three quarter (77.30 %, 76%) of the study subjects reported that this strategy helped in the information retrieval and in stimulation of their brain respectively. In addition, more than one half (54.70%) of the

study subjects agreed that jigsaw strategy helped them to return their attention span.

As regard challenges of jigsaw teaching strategy, it was observed that 70.70% of the study subjects strongly disagreed about the statement which indicates that learning with jigsaw strategy needs more time in application while 2.70% of them agreed about the statement. More than two fifth (41.30%, 48%) of them disagreed that this strategy needs more effort, and it is boring teaching method respectively. Moreover, 64 % of them strongly disagreed that this strategy was not beneficial for them.

Figure (1) shows the percent distribution of study group according to their total score of satisfaction regarding jigsaw strategy application. It was observed that the majority (93.30%) of nurses in the study group were highly satisfied with jigsaw strategy as a new learning method and 4% were moderately satisfied, while only 2.70 % of them had low satisfaction level with the strategy

Table (4) shows the relationship between the control and the study group total score of knowledge about emergency contraceptive methods and their socio-demographic data. No statistical significance correlation was found between the two groups' total score of knowledge and their age, marital status, residence, and years of experience where $P=(0.662 \text{ \& } 0.180)$, $(0.322 \text{ \& } 0.379)$, $(0.676 \text{ \& } 1.000)$, $(0.254 \text{ \& } 0.33)$ respectively.

On the other hand, a statistical correlation was observed between the nurses level of education as well as their speciality in both groups and their total score of knowledge that to say the nurses with higher level of education had better knowledge than the other nurses where $P=(0.0345 \text{ \& } 0.001)$ respectively and all those who worked in the family planning clinics had fair total knowledge score where $P=(0.103 \text{ \& } 0.000)$ respectively.

Table (1): Number and percent distribution of the control and study groups according to their Socio-demographic characteristics and academic data

Socio-demographic data	Control Group (Traditional Method) (no=75)		Study group (jig saw technique) (no=75)		FET/ X2 (P)
	No	%	No	%	
Age in years:					
-20-30	15	20.00	18	24.00	X2 = 1.03 P= 0.793
->30-40	24	32.00	22	29.00	
->40-50	27	36.00	29	38.70	
->50	9	12.00	6	8.00	
Min-Max	20-56		22-54		
Mean ± SD	38.76 ±10.15		38.69 ± 10.05		
Median	40		40		
Marital status:					
-Single	15	20.00	12	16.00	X2= 0.41 P= 0.524
-Married	60	80.00	63	84.00	
Current residence:					
-Urban	73	97.33	75	100	FET P= 0.497
-Rural	2	2.67	0	0.00	
Level of education:					
-Diploma of Secondary School of Nursing	70	93.34	69	92.00	X2= 0.09 P= 0.75
-Bachelor's degree of Nursing	5	6.67	6	8.00	
Specialty :					
-Antenatal	20	26.67	20	22.70	X2= 1.02 P= 0.907
-Natal	26	34.66	24	32.00	
-Postnatal	15	20.00	14	16.00	
-Family planning	2	2.67	1	8.00	
-Gynecology	12	16.00	16	21.30	
Years of experience since graduation:					
- > 10 years	12	16.00	12	16.00	X 2= 9.80 P= 0.081
-From 11-20 years	35	46.67	34	45.33	
-More than 20 years	28	37.33	29	38.67	
Min-Max	2-29		3-29		
Mean ± SD	18.20± 7.69		17.69 ±7.89		

Table (2): Number and percent distribution of the control and study groups according to their total score of level of knowledge regarding emergency contraceptive methods

Total score of knowledge	Control group (Lecture by the traditional way) (no=75)						Study group (Jig saw technique) (no=75)						FET/ X2 (P) between control and study groups
	Before		After immediately		After 21 days		Before		After immediately		After 21 days		
	No	%	No	%	No	%	No	%	No	%	No	%	
Poor	4 [^]	64.00	0	0.00	15	20.00	46	61.30	0	0.00	0	0.00	Before intervention P4= 18.704 (0.044)
Fair	27	36.00	19	25.30	28	37.30	29	38.70	2	2.70	5	6.70	
Good	0	0.00	56	74.70	32	42.70	0	0.00	73	97.30	70	93.30	Immediately after P5=63.409(0.000) *
Min-Max	3-13		12-22		8-20		5 - 13		13-24		12- 23		After 21days P6=93.920(0.000) *
Mean ± SD	8.59±2.515		18.05±2.552		15.55±4.205		9.28 ±2.607		21.19±2.442		19.74±2.686		
Z(p)before/after/21 days after within each group	P1c=-7.611(0.000) * P2c=-7.381(0.000) * P3c=-6.110(0.000) *						P1s=-7.750(0.000) * P2s=-7.909(0.000) * P3s=-7.539(0.000) *						

Z: Wilcoxon test X 2 (p): chi-square test & p for X2 * Significant at P ≤0.05

FET (P): Fisher Exact Test & P for FET

(P1c): significance test before and immediately after for the control group

(P2c): significance test before and after 21 days for the control group

(P3c): significance test immediately and after 21 days for the control group

(P1s): significance test before and immediately after for the study group

(P2s): significance test before and after 21 days for the study group

(P3s): significance test immediately and after 21 days for the study group

P4: Significance test before providing teaching session between the control and study groups

P5: Significance test immediately after providing teaching session between the control and study groups

P6: Significance test 21 days after providing teaching session between the control and study groups

Table (3): Number and percent distribution of the study group according to their level of satisfaction feedback regarding jig saw strategy application

Statements	Study Group (jig saw technique)										Mean ± SD
	Strongly agree		agree		Neutral		disagree		Strongly disagree		
	No	%	No	%	No	%	No	%	No	%	
Benefits of jig saw strategy											
It helped me to concentrate	24	32.00	48	64.00	0	0.00	0	0.00	3	4.00	4.20 ±0.805
It helped me in mental achievement	11	14.70	60	80.00	1	1.30	0	0.00	3	4.00	4.01 ±0.726
It helped me to know my abilities and how to develop it	9	12.00	62	82.70	1	1.30	1	1.30	2	2.70	4.00 ±0.658
It helped me to know my learning style	11	14.70	59	78.70	1	1.30	2	2.70	2	2.70	4.00 ±0.717
It helped me to increase my self confidence	9	12.00	61	81.30	1	1.30	2	2.70	2	2.70	3.97 ±0.697
It helped me on information retrieval	12	16.00	58	77.30	1	1.30	2	2.70	2	2.70	4.013 ±0.726
It helped me to stimulate my brain	14	18.70	57	76.00	2	2.70	0	0.00	2	2.70	4.08 ±0.673
It helped me to return my attention span	41	54.70	29	38.70	2	2.70	1	1.30	2	2.70	4.41 ±0.839
Challenges of jig saw strategy											
It needs more time in application	1	1.30	2	2.70	3	4.00	16	21.30	53	70.70	4.57 ±0.808
It needs more effort	1	1.30	1	1.30	4	5.30	38	50.70	31	41.30	4.29 ±0.749
It is boring teaching method	1	1.30	2	2.70	2	2.70	34	45.30	36	48.00	4.36 ±0.782
It was not beneficial for me	2	2.70	2	2.70	1	1.30	22	29.30	48	64.00	4.49 ±0.875

Fig (1): Distribution of the study group according to their total score of satisfaction level regarding jigsaw strategy application

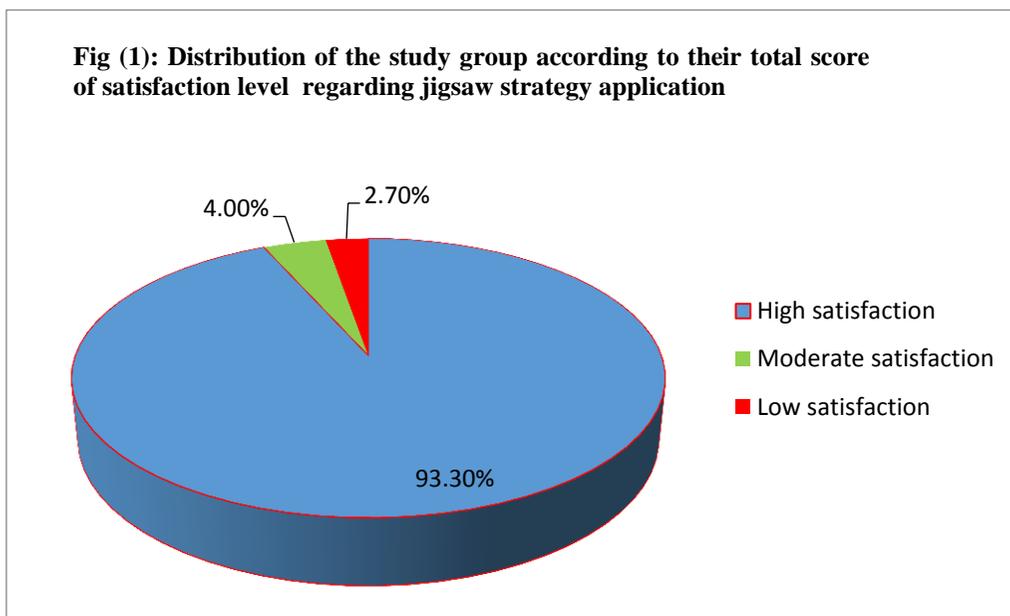


Table (4): Relationship between the control and the study group total score of knowledge about emergency contraceptive methods and their socio-demographic data

Socio-demographic data	Control Group total score of knowledge (Traditional Method) (no=75)				Total (no=75)		Study group total score of knowledge (Jig saw technique) (no=75)				TOTAL (No=75)	
	Poor(n=48)		Fair(n=27)				Poor (n=46)		Fair(n=29)			
	No	%	No	%	No	%	No	%	No	%	No	%
Age in years:												
-20-30	8	16.67	7	25.93	15	20.00	12	26.09	6	20.69	18	24.00
->30-40	15	31.20	9	33.33	24	32.00	12	26.09	10	34.48	22	29.33
->40-50	18	37.50	9	33.33	27	36.00	16	34.78	13	44.83	29	38.67
->50	7	14.58	2	7.40	9	12.00	6	13.04	0	0.00	6	8.00
FET/ X ² (P)	1.589(0.662)						4.890(0.180)					
Marital status:												
-Single	5	10.42	5	18.52	10	13.33	6	13.04	6	20.69	12	16.00
-Married	43	89.58	22	81.48	65	86.67	40	86.96	23	79.31	63	84.00
FET/ X ² (P)	0.982(0.322)						0.774(0.379)					
Current residence:												
-Urban	47	97.92	26	96.30	73	97.33	46	100	29	100	75	100
-Rural	1	2.08	1	3.70	2	2.67	0	0.00	0	0.00	0	0.00
FET/ X ² (P)	0.175(0.676)						(1.000)					
Level of education:												
-Diploma of Secondary School of Nursing	47	97.92	23	85.19	70	93.33	46	100	23	79.31	69	92.00
-Bachelor's degree of Nursing	1	2.08	4	14.81	5	6.67	0	0.00	6	20.69	6	8.00
FET/ X ² (P)	4.501(0.0345)						10.345(0.001)					
Specialty:												
-Antenatal	11	22.92	9	33.33	20	26.67	6	13.04	14	48.28	20	26.67
-Natal	16	33.33	10	37.04	26	34.66	13	28.26	11	37.93	24	32.00
-Postnatal	13	27.08	2	7.41	15	20.00	12	26.09	2	6.89	14	18.67
-Family planning	0	0.00	2	7.41	2	2.67	0	0.00	1	3.45	1	1.33
-Gynecology	8	16.67	4	14.81	12	16.00	15	32.61	1	3.45	16	21.33
FET/ X ² (P)	7.709(0.103)						20.984(0.000)					
Years of experience since graduation:												
-> 10 years	8	16.67	4	14.81	12	16.00	6	13.04	6	20.69	12	16.00
-From 11-20 years	25	52.08	10	37.04	35	46.67	24	52.18	10	34.48	34	45.33
-More than 20 years	15	31.25	13	48.15	28	37.33	16	34.78	13	44.83	29	38.67
FET/ X ² (P)	6.582(0.254)						10.517(0.33)					

X²: Chi-Square Test * Significant at P ≤0.05

Discussion

According to the results of the current study it can be noticed that nurses of the control and study groups were matching in almost all of their socio-demographic characteristics and academic data including age, marital status, current residence, level of education, specialty and years of experience since graduation (Tables 1). This consistent profile of participants was useful in limiting extraneous factors, which could interfere with the effect of the intended intervention on nurses' knowledge about emergency contraceptive methods. It also helped in understanding and securing the reliability and

relevance of the forthcoming results of the current study.

Further matching was also observed in relation to their total score of knowledge before the teaching session, as almost a similar proportion of both groups had poor score of knowledge regarding emergency contraceptive methods with no statistically significant difference between them. However, a highly significant difference was obviously monitored between the two groups in relation to knowledge score immediately and 21 days after the teaching session. This was clearly demonstrated when the score of nurses' knowledge increased

immediately for both control and study groups after providing teaching session. This could reflect the impact of both teaching methods on learning process of such topic (table 2). However, the majority of study group had good total score of knowledge compared to a sizable proportion of the control group. This finding may be attributed to the fact that the learners in the traditional group tended to have a passive role which was noticed as their concentration fades off after 15-20 minutes. On the other hand, jigsaw method tended to encourage sharing and learning of specific content. It helped the learners to create peer support, develop critical thinking, deal with their group members and provides equal opportunities to engage in thinking and problem solving.

The finding of the current study coincides with thesis of **Kritpracha et al. (2018)** about **“the development of cooperative learning using jigsaw activities for learning achievement and self-directed learning behaviors of master nursing students”** They reported that master nursing students had a statistically significantly higher learning achievement after participating in cooperative learning using jigsaw activities.

The current finding also matches with the study of **Yemi et al. (2018)**, titled **“ effect of jigsaw strategy of cooperative learning on mathematics achievement among secondary school students”** where they observed that the teaching via the Jigsaw strategy was more effective than the traditional teaching method in increasing academic achievement.

Moreover, the result of the current study is similar to the study of **Renganathan (2013)**, on **“Effect of Jigsaw Puzzle Method among nursing students’ academic level of performance at Oman Nursing Institute, Muscat”** the result indicates that the jigsaw puzzle method is effective by improving the all student’s academic scores.

Again, the present finding is supported by **Bagheri et al. (2018)**, in their study about **“Evaluating the impact of jigsaw (Puzzle) cooperative learning model as a new model of education on clinical competency of nursing students”** The results revealed that the jigsaw cooperative learning method is effective in improving students' knowledge and skills.

Sousa (2006) found that the average percentage of material retained 24 hours after receiving instruction via different learning methods. The average knowledge retention after a "lecture" is only 5%. This is unsurprising because a lecture usually only requires limited active participation or mental rehearsal from students. Other approaches, such as reading, have a retention rate of 10%; audio-visual has a retention rate of 20%; demonstration has a retention rate of 30%; and a discussion group has a retention rate of 50%. Methods that require students to practice by doing and teach others result in content retention rates of 75 to 90 percent. Cooperative learning is characterized by teaching others and developing on ideas. As a result, it has been suggested that when students are given more explanation and elaboration in cooperative situations, they remember more knowledge.

Regarding information retention, the finding of the present study revealed that a slight decline was observed in knowledge score among the study group **21days later** after application of jigsaw strategy while, a sharp drop in total score of knowledge was noticed among the control group. The current finding is also in harmony with the study carried out by **Van Dat (2016)**, who investigated **“the effects of Jigsaw Learning on students’ knowledge retention in Vietnamese higher education in a course of Management of Education and Administration”**. They found that a month after the experiment, students in the jigsaw group had greater long-term achievement than those did in the lecture group.

Moreover, the study of **Tran and Lewis (2012)** in Australia, which aimed to determine the **“ effects of jigsaw cooperative learning on the achievement and information retention of 80 final-year Vietnamese mathematics students, as well as reporting their attitudes toward this form of learning”** It was found that students who participated in jigsaw learning had greater retention of information than those who had lecture-based teaching.

Furthermore, the present finding is supported by **Eachempati et al. (2017)** who conducted a study in Malaysia. The aim of this study was **“to compare the jigsaw cooperative learning technique to the traditional lectures**

for learning cast partial denture designing.” post-test and retention scores were better for jigsaw group with statistical significance.

The current result come in congruence with study of **Şahin (2010)** who mentioned that jigsaw group t-tests outscored on the achievement test either immediately or after 21 days from the application ($p < .001$) than traditional lecture group ($p = 0.86$) and they had greater long-term achievement on the delay test ($p < .05$) than those in the Control Group ($p = 0.69$).⁹ In addition, the present finding is in line with the study of **Abd El Aliem et al. (2019)**, about “**Utilization of Jigsaw Cooperative Learning Strategy on Maternity Nursing Students' Attitude and Achievement**” in Egypt, which indicated that there was a statistically significant difference between both groups in follow up test with $p\text{-value} \leq 0.001$.

On the other hand, the current finding does not fit with the study of **Maden (2011)** in turkey, which aimed to “**compare the effects of Jigsaw I technique from the cooperative learning methods and traditional teaching method on academic achievement and retrieval of Turkish teacher candidates in the matter of written expression**”. It was found that a little variation between success of the test group students, who were taught by the jigsaw technique, and success of those, who were taught by traditional method in the control group.

Regarding the satisfaction of study group toward the jigsaw strategy, the present finding demonstrated that the most of the Jigsaw group had high satisfaction level regarding the strategy application (fig1). This result came in congruence with the study of **El-Said (2015)**, he found that students who taught how to teach physical education lesson through the Jigsaw cooperative learning strategy more satisfied with the strategy than those who were taught through the conventional or traditional teaching methods. Also, the present finding is supported by **Shahri et al. (2017)**, in their study about “**Effectiveness of teaching: Jigsaw technique versus lecture for medical students' Physics course**” they observed that more than 80% of the participants agreed with all the items that assessed their satisfaction with what they had learned in Jigsaw class.

Moreover, the same result matches with the finding of a previously mentioned study conducted by **Abd El Aliem et al. (2019)**, they found that the students in the jigsaw group exhibited a more positive attitude regarding the jigsaw strategy than the students in the lecture group.

Also in the current study majority of students agreed that; this strategy increased their concentration, mental achievement, self-confidence, information retention, attention span .Also helped them to know and develop their abilities, their learning style and stimulated their brain (table3). These results came in congruence with the study of **Tran (2014)**, which aimed to determine “**effects of cooperative learning on the achievement and knowledge retention of 110 first-year primary education students toward the psychology subject over the eight weeks of instruction at An Giang University**” who explained that through interaction in jigsaw learning, the learners’ attention span was increased and they became more focused on the learned content.

Furthermore, the current finding also matches with the study of **Jadhav and Jadhav (2016)** titled “**Using the jigsaw cooperative learning technique for nursing students: A systematic review**” they stated that the jigsaw approach improved university students self-concept , motivate them, helped to develop an effective technique to deal with integrated subjects, gain high levels of self-confidence and learning became more interesting. On the same line, **Tran and Lewis (2012)** mentioned that; from 70 to 90% of the study group indicated that; Jigsaw increased their achievement, subject content became easier, permanently acquired knowledge, enhanced self -confidence, improved cooperation and interaction, provided active participation, aroused the aim of knowledge and learning.

The finding of the present study revealed that there is a statistically significant correlation between nurse’s knowledge level about EC and their educational level (table 4). This was in line with the study of **Tuncel (2006)**, in which there is significant relation between learner’s knowledge level and their educational level. moreover the present finding is relatively supported by **Azmin (2016)** and it was found

there was a significant relation between achievement grades and different specialties of nursing students .

Conclusion:

Based on the findings of the present study, it can be concluded that jigsaw cooperative learning strategy and traditional teaching method were effective teaching methods. However, nurses of jigsaw cooperative learning strategy had better knowledge level and information retention than those of the traditional group regarding emergency contraceptive methods immediately and 21 days after of providing teaching session. This means that the hypothesis of the current study was achieved. In addition, Interactive learning environment such as jigsaw cooperative learning strategy facilitated independence and self- directed learning. Furthermore, nurses in the study group were highly satisfied with the use of jigsaw strategy.

Recommendation:

Based on the previous findings, the following recommendations are suggested.

- Jigsaw cooperative learning strategy should be incorporated in obstetric nursing education.
- Training workshops should be conducted for course planners and educators (faculty staff members) to adapt the jigsaw technique as an innovative teaching and learning strategy.
- Nursing programs need to implement many innovative teaching strategies like a jigsaw to make learning more students centered.
- Further research is needed to study the effect of jigsaw learning strategy on clinical achievement, also and to explore the obstacles hindering the implementation of the jigsaw learning strategy in nursing education.

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