Effect of Pregnancy Simulator on Midwifery Nursing Students' Experience of Physical Difficulties and Attitude toward pregnant women

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Abstract:

Background: Pregnancy simulations can be used as educational deep learning tools to help students and professionals connect what they know to what they see in real life. **Aim:** This study aimed to assess the effect of pregnancy simulator on midwifery nursing students' experience of physical difficulties and attitude toward pregnant women. **Subjects and Method: Study design:** A quasi-experimental research design was used. **Setting:** This study was carried out at Faculty of Nursing, Mansoura University**. Study subjects:** A non-probability purposive sample of 100 midwifery nursing students was allocated either to the control group taught by traditional lecture or to the intervention group taught by utilizing the Empathy Belly TM Pregnancy Simulator. **Tools:** Three tools were used for data collection**;** a structured interview questionnaire (general characteristics, physical difficulties questionnaire, student's attitude toward pregnant women questionnaire and satisfaction Likert scale. **Results:** After the application of pregnancy simulation, there was a highly statistical significant difference in experience of pregnancy physical difficulties among the control and simulation groups ($p < 0.001$).The students' attitude toward pregnant women was improved before and after intervention among the pregnancy simulation students ($P<0.001$). More than two thirds of the students (68%) were satisfied and reported that the pregnancy simulator was better educational method. **Conclusion:** Applied simulation methods had an optimistic influence on the improvement of student's attitude, and experience of physical difficulties toward pregnant women thus the tested hypotheses were accepted. **Recommendations:** Simulation is an effective teaching method that enables students to improve their attitude toward pregnant women.

Keywords: Pregnancy, Pregnancy simulator, Attitude, Physical difficulties**.**

Introduction

The nursing students of today are the health care providers of tomorrow, so it is essential for nursing educators to prepare the midwifery nursing students for their future work to develop the requisite competence to become skillful and safe practitioners through utilizing different teaching methods[1].

Pregnancy is a powerful and distinct female experience. It is a natural process that causes physiological and psychological changes in expecting mothers. Pregnancy brings about a series of hormonal, immunologic, gastrointestinal and metabolic changes that are necessary for fetal growth and have a great impact on a woman's body. These changes induce uncomfortable feelings and fatigue [2].

Several simulation games have been utilized effectively with nursing students by allowing students to be actively included in the learning activities to improve students' knowledge and attitudes toward pregnant women and increase their motivation to care for them[1, 3, 4].

Before, during and after pregnancy, most mothers seek safety and empathy from their health care professionals. Therefore, negative attitudes towards them could create barriers in the therapeutic relationships and may affect the quality of care provided to them [5]. Although the majority of the midwives had positive attitudes, still several midwives had either negative or neutral attitudes. Other studies on the attitude and quality of care suggest that the more negative the attitude, the poorer the quality of care [6].

The personal experiences with sickness and physical difficulties as well as learning about illness through patient histories, novels, fictional stories, role playing, discussion and paintings have been all recommended as useful methods of teaching [7, 8].

Educational simulations are innovative teaching tools that have been shown to promote critical thinking, equip students with a novel learning strategy

that combines cognitive and affective learning making it easier for them to remember and recall information. Several simulation games have been utilized effectively with nursing students to increase their knowledge and improve their attitude [3].

The Empathy Belly TM Pregnancy Simulator is a "multi-component, weighted "garment that allows female wearers to experience more than twenty normal pregnancy symptoms and effects through accurate simulation like body weight gain, postural changes, enlarged breasts, etc. Wearers explore what it feels like to be pregnant and develop a true grasp of pregnancy situation through this hands-on, experimental method of learning[9].Medical and nursing students studying Maternity Health Care and Education will benefit from the Empathy Belly. They will gain a greater knowledge and their sensitivity to and experience of the pregnant condition will be increased by wearing the Empathy Belly Pregnancy Simulator.

Significance of the study

For the preparation of a distinct generation of nursing caregivers, the midwifery curriculum could be improved to promote professional values, patient-centered and respectful care for women to prepare future competent nursing students who respect, understand feeling, physical and psychological difficulties among pregnant women. So, nurse educators utilize many teaching strategies like traditional lectures, jigsaw methods, problem-solving and simulation. Many studies reflected that simulation of the reality of a clinical environment may promote empathy, understanding and positive attitude towards pregnant women and their fetuses. In addition, patients who are treated with compassion by a professional nurse are more satisfied with the care provided to them [10].There are little researches that explore or investigate students' experience of physical difficulties and attitude toward pregnant women after utilizing of empathy belly pregnancy simulator in their education versus

traditional lecture. Accordingly, the researchers attempted to fill such a gap by conducting this study.

Aim of the study

This study aimed to assess the effect of pregnancy simulator on midwifery nursing students' experience of physical difficulties and attitude toward pregnant women.

Hypotheses of the study:

- Midwifery nursing students who participate in pregnancy simulation exhibit a positive attitude toward pregnant women compared to the lecture method students.
- Midwifery nursing students who participate in pregnancy simulation experience physical difficulties of pregnant women compared to the lecture method students.

Subjects and Method

Design:

A quasi-experimental research design was used.

Setting:

This study was performed at Woman's Health and Midwifery Nursing Department,Faculty of Nursing-Mansoura University.

Sample type:

A non-probability purposive sample was used.

Study subjects:

One hundred midwifery nursing students were enrolled in this study according to the following:

Inclusion Criteria:

(1) Regular undergraduate female nursing students

(2) At the third level

(3) Enrolled in the Professional Midwifery nursing course during the first-semester academic year 2020/2021.

Exclusion Criteria:

Pregnant students or who had a previous pregnancy

Sample size:

Based on data from previous study by**Saleh et al. (2017)**[(1)]to investigate the impact of simulated aging game versus traditional lecture on nursing students' knowledge and attitude

towards elderly. Considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula:$n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}]/$ (mean difference between the two groups)^{2}whereSD = standard deviation $Z_{\alpha/2}$: This depends on level of significance, for 5% this is 1.96 Z_{β}: This depends on power, for 80% this is 0.84 Therefore, $n= [(1.96 + 0.84)^2 \times \{2(2.6)^2\}]/ (1.46)^2=49.7$. Based on the above formula, the sample size required per each group is 50 students.

Recruitment of the sample: The total number of students enrolled in the Professional Midwifery nursing course during the first-semester academic year 2020/2021 was 160 nursing students, 100 of these nursing students were included in the study. The remaining 60 students; 3 refused to participate in the study, 5 were pregnant or had previous pregnancy and male students (52) thus excluded from the study leaving 100 eligible nursing students allocated either to the control or to the intervention group (n=50 per each group). To avoid pollution of the collected data, data were collected from the control group then the intervention group till finishing the required number per each group. Flowchart of the study sample indicated in Figure1

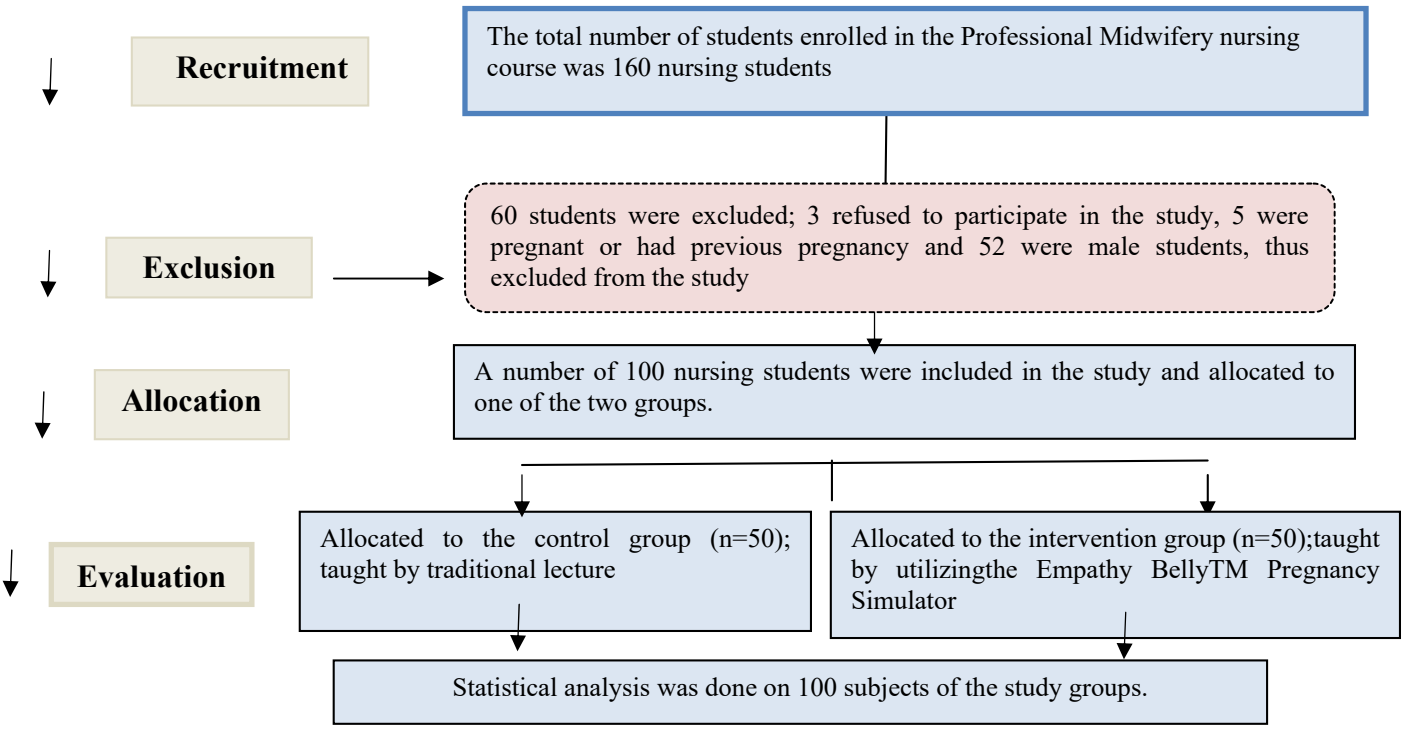

Figure1. Flow chart of the participation in the study

Tools of Data Collection:

To achieve the aim of this study, three tools were used for data collection.

Tool I:Structured interview questionnaire

It was developed by the researchers after extensive review of literatures. It included three parts

Part one: Covered data related to general characteristics of the students as name, age and previous pregnancy.

Part two: Physical difficulties questionnaire: It was adapted from **Yu et al. (2019)**[8]to assess difficulty level of activities during pregnancy. It consisted of five questions like, picking the objects, climbing stairs, putting on and taking off shoes, changing T-shirts, and changing pants. The students were rating it from 1(extremely easy) to 10 (extremely difficult).

Tool II: Student's' attitude toward pregnant women questionnaire: It was adopted from **Yu et al. (2019)**[8].It consisted of 7 questions as; when ideal with a pregnant woman, I feel sympathy to her situation; even simple tasks will be difficult to do while pregnant.….etc. **The scoring system** was calculated as: (1) for strongly disagree, (2) for neither agree nor disagree and (3) for strongly agree. The questionnaire was evaluated giving a score of 7 – 21.

Tool III: Satisfaction Likert Scale:

It was developed by the researchers to assess the students' satisfaction with pregnancy simulation in teaching the physiological changes during the pregnancy. It consisted of five statements using a 3 point Likert scale; start from score (1) for not satisfied, (2) for neutral and (3) for satisfied. **Total score** ranged from5 to 15. The higher score indicated more satisfaction.

Validity of the tool:

The content validity of the developed tools was reviewed by a panel of 3 experts in the maternity nursing specialty before using it to make sure that the questions were consistently conveyed and carried the anticipated meaning they were prepared for. The

suggested modifications were done as rephrasing of some statements.

Reliability of tools:

Cronbach alpha coefficients for internal consistency of physical difficulties questionnaire was0.886. It was 0.927 for attitude scale and 0.877forsatisfaction Likert scale, hence the questionnaires were found to be highly reliable.

Pilot study

A pilot study was performed on 10% (10midwifery nursing students) in order to ensure the feasibility and validity of the tools. Accordingly, in order to achieve the aim of the study, some modifications were done as a rephrasing of some statements.

Ethical consideration:

An ethical approval letter was attained from Research Ethics Committee, Faculty of Nursing, Mansoura University. Official permission from the head of woman's health and midwifery nursing department was obtained. Informed consent was obtained from the enrolled students after clarifying the aim and approach of this study. Participation in the study is voluntary. Each student has the right to withdraw from the study at any time without any consequences.

Procedure:

This study was carried out from October to the end of December 2020.Professional midwifery is a credit hours course. It includes 2hours/ week for theoretical content and 2 hours /week for clinical practice for a period of 14 weeks. The researchers attended the previously mentioned setting once per week, (Thursday) from 10 a.m. to 12 p.m. until the calculated sample size of students was obtained. This work was conducted through four phases; preparatory, assessment, implementation and outcome evaluation.

- **Preparatory phase:** The tools for data collection were prepared after massive reviewing of literature then the contents of the lecture about physiological changes during pregnancy was prepared including Power Point Presentation, illustrative media and The Empathy Belly TM Pregnancy Simulator (EBPS) was prepared.

- **Assessment phase**
- The researchers interviewed students, introduced themselves to them, clarified the aim of the research work. Once eligibility for participation was confirmed, the researchers took the participant's written consent to share in this study. Data regardinggeneral characteristics, and experience of physical difficulties towards pregnant women were collected by using a structured interview questionnaire.
- The Students' attitude towards pregnant women was assessed using attitude questionnaire.

Implementation phase:

The researchers explained how to implement the pregnancy simulation method by utilizing the Empathy Belly TM Pregnancy Simulator (EBPS) to the students. Group one (G 1: "an intervention" n=50 students) accepted to be taught by a new teaching strategy while group two (G 2: "control group" n=50 students) decided to teach by only traditional lecture. Then the researcher gave the traditional lecture about physiological changes of pregnancy for both groups in the same classroom with a power-point presentation.

Control group

The control group (the lecture group) acquired education by only the lecture method plus power point presentation in the lecture room for 2 hours.

Intervention group

After the attendance of the lecture, the intervention group students (pregnancy simulation group) were divided into five subgroups; each subgroup consisted of ten students. The researchers explained how to utilize the EBPS and wear it in front of them, make simple markup to show skin changes like chloasma, then every student wore it and was walking, picking things, climbing stairs, putting on and taking off shoes, changing T-shirt, and changing pants etc.

- **Outcome evaluation phase**:
  - After finishing the

procedure with each group, the researchers gave them post questionnaires immediately to complete it.

Data analysis:

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). All continuous data were normally distributed and were expressed in mean ±standard deviation (SD). Categorical data were expressed in number and percentage. Chi-square test was used for comparison of variables with categorical data. Cronbach's alpha test was performed to test for the internal consistency of the tools used in the study. Statistical significance was set at $p<0.05$.

Results

Table (1) shows the distribution of nursing students according to their general characteristics and experience with pregnancy in both groups. It was observed from the table that the age of the studied students ranged between 18 to 23 years old. More than half students were among 18-20 years old in the control and intervention groups (56% &54% respectively). Two thirds (66%) of students in the control group and more than three quarters (78%) in the intervention group didn't have family or friends who were pregnant at that time. Few students were married in the control and intervention group (10%&14% respectively).No statistically significant difference was observed between both groups regarding all general characteristics.

Table (2) presents that there was a highly statistically significant difference in experiences of pregnancy physical difficulties among control and simulation group ($p < 0.001$). Among the intervention group, it increased significantly before and after intervention ($p < 0.001$).

Table (3)it was clear that the student's attitude toward pregnant woman was improved after intervention compared to before intervention among the pregnancy simulation students and there was a statistical significant difference ($P<0.001$). Also, there was a high statistical significant difference

between the control and intervention groups(P<0.001).

Figure (2) illustrates that around two thirds of students in the pregnancy simulation group were satisfied that the utilized educational method helped them for more awareness of pregnancy changes, increased their empathy, helped them to understand and treat pregnant women, wished more subjects to be conducted in the same manner and helped them for better understanding (68%,64%,70%,70%,68% respectively).

Table (4) shows that there was a significant positive correlation between the students' experience of pregnancy physical difficulties scores and their attitude post intervention (r = 0.511, P = 0.0001)

Table (1): Frequency distribution according to studied sample general characteristics

Characters	Control group (50)		Intervention group (50)		Chi square &Significance test
	No	%	No	%	
Age (years):					
18-20	28	56.0	27	54.0	χ^2=0.040, P0.841
21-23	22	44.0	23	46.0	
Do you have any pregnant relatives or friends?					
- Yes	33	66.0	39	78.0	χ^2=1.786, P0.181
- No	17	34.0	11	22.0	
Have you ever lived or dealt with a pregnant woman in a community setting?					χ^2=1.965, P0.161
Yes	40	80.0	45	90.0	
No	10	20.0	5	10.0	
Have you ever been married?					
Yes	5	10.0	7	14.0	χ^2=0.378, P0.538
No	45	90.0	43	86.0	

Table (2): Comparing the effect of pregnancy simulation versus lecture on the students' experience of pregnancy physical difficulties

Physical difficulties	Time	Control group (50)	Intervention group (50)	Significance test
		Mean ± SD	Mean ± SD	
Picking things	Pre	4.88 ± 1.081	5.14 ± 1.429	t=0.026,P0.260
	Post	5.08 ± 0.986	8.66 ± 0.895	t=19.009,P<0.001
Paired t test		t=1.237,P0.222	t=13.928,P<0.001	
Climbing Stairs	Pre	5.30 ± 0.863	5.56 ± 1.264	t=1.201,P0.233
	Post	5.32 ± 0.683	7.86 ± 1.161	t=13.334,P<0.001
Paired t test		t=0.123,P0.903	t=10.733,P<0.001	
Putting on and taking off shoes	Pre	4.80 ± 1.309	5.26 ± 1.209	t=1.875,P0.071
	Post	5.02 ± 0.852	8.44 ± 1.198	t=17.894,P<0.001
Paired t test		t=1.372,P0.208	t=13.838,P<0.001	
Changing T-shirt	Pre	4.46 ± 1.541	4.78 ± 1.776	t=0.962,P0.320
	Post	5.04 ±1.394	7.60 ± 1.229	t=9.435,P<0.001
Paired t test		t=1.723,P0.089	t=9.137,P<0.001	
Changing Pants	Pre	4.66 ± 1.520	4.44 ± 1.886	t=0.642,P0.522
	Post	5.16 ±1.476	7.94 ± 1.077	t=10.760,P<0.001
Paired t test		t=1.766,P0.084	t=10.456,P<0.001	

Table (3): Midwifery students nurse attitude toward pregnant woman pre – intervention comparing to post-intervention

Attitude statement	Time	Control group (50)	Intervention group (50)	Significance test
		Mean ± SD	Mean ± SD	
When i deal with a pregnant woman, I feel sympathy to her situation	Pre Post	2.34 ± 0.479 2.42 ± 0.499	2.38 ± 0.490 2.94 ± 0.240	t=0.413,P0.681 t=6.646,P<0.001
Paired t test		t=0.850,P0.399	t=7.325,P<0.001	
Even simple tasks will be difficult to do while pregnant.	Pre Post	2.16 ± 0.510 2.26 ± 0.487	2.14 ± 0.452 2.70 ± 0.463	t=0.208,P0.836 t=4.631,P<0.001
Paired t test		t=1.043,P0.302	t=5.621,P<0.001	
Pregnant woman should be given special consideration because of their pregnancy.	Pre Post	2.56 ± 0.577 2.60 ± 0.535	2.54 ± 0.646 3.00 ± 0.000	t=0.163,P0.871 t=5.292,P<0.001
Paired t test		t=0.362,P0.719	t=5.039,P<0.001	
I would be aware of a pregnant woman's difficulties and treat herwith great care.	Pre Post	2.45 ± 0.579 2.56 ±0.501	2.52 ± 0.646 3.00 ± 0.000	t=1.151,P0.253 t=6.205,P<0.001
Paired t test		t=0.184,P0.855	t=5.250,P<0.001	
My way of life would vary if I or a friend became pregnant	Pre Post	2.00 ± 0.350 2.12 ±0.558	2.10 ± 0.505 2.58 ± 0.499	t=0.642,P0.522 t=4.345,P<0.001
Paired t test		t=1.288,P0.204	t=5.250,P<0.001	
My respect of life will increase when I feel fetal movement.	Pre Post	2.50 ± 0.647 2.58 ±0.538	2.52 ± 0.505 3.00 ±0.000	t=0.172,P0.863 t=5.521,P<0.001
Paired t test		t=0.704,P0.485	t=6.725,P<0.001	
My physical activity will be severely limited when I feel fetal movement.	Pre Post	1.86 ± 0.729 1.98 ±0.622	1.84 ± 0.650 2.58 ±0.609	t=0.145,P0.885 t=4.872,P<0.001
Paired t test		t=1.030,P0.308	t=7.537,P<0.001	

Figure (2): Midwifery student nurse satisfaction post-intervention among pregnancy simulation group

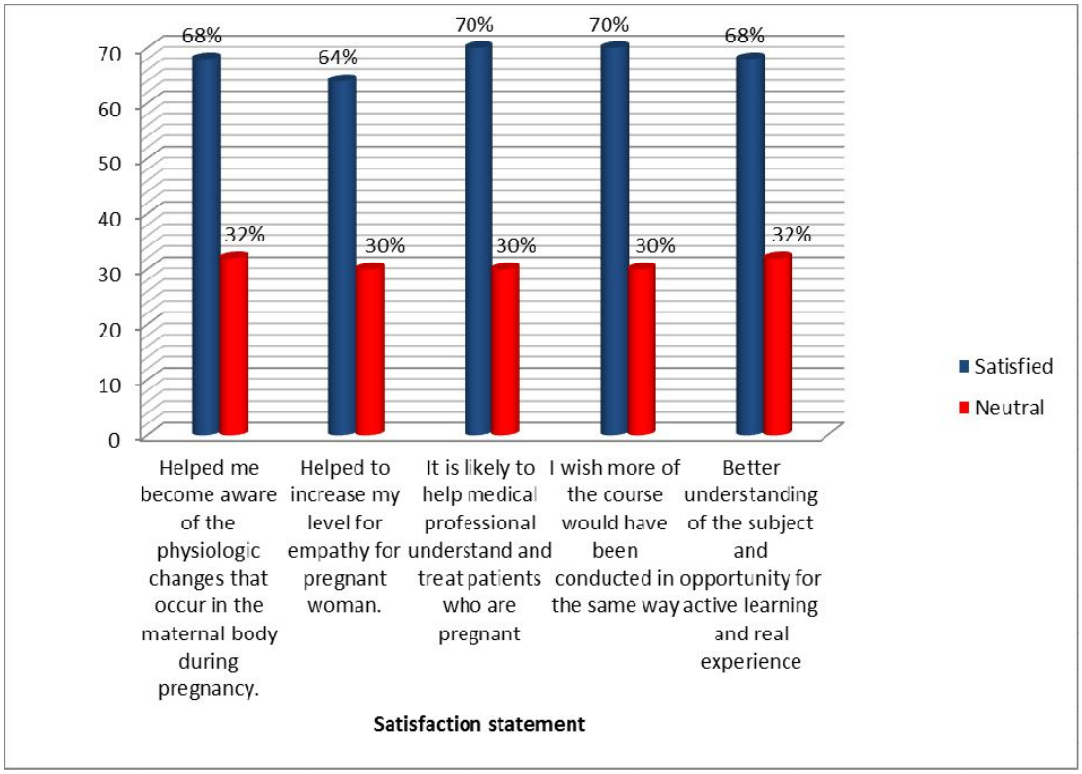

Table (4): Correlation coefficient between the students' total score of the experience of pregnancy physical difficulties and total score of attitude post-intervention among the intervention group

	Total score of the experience of pregnancy physical difficulties pre-intervention	**Total score of the experience of pregnancy physical difficulties post-intervention**
Total attitude scores pre-intervention	r= 0.201, p = 0.161	
Total attitude scores post-intervention		r= 0.511, p = 0.0001**

Discussion

This study aimed to assess the effect of pregnancy simulator on midwifery nursing students' experience of physical difficulties and attitude toward pregnant women. This aim was accomplished through the present study findings which revealed that, there was a highly statistical significant difference in experiences of pregnancy physical difficulties, and attitude post-intervention in the simulation group compared to control group. Therefore, the hypotheses of current study "midwifery nursing students who participate in pregnancy simulation exhibit a positive attitude and experience physical difficulties toward pregnant women compared to the lecture method students" were reinforced.

Simulation is a tool that is becoming more widely practiced in education and it is regarded as a suitable method for teaching. Better nursing education requires changes in the method of teaching in order to enhance students learning. Simulation games are one of the most widespread learning approaches used with students. The present study findings showed that, there was a highly statistical significant increase in student's experiences of pregnancy physical difficulties among simulation than control group. This can be attributed to participation in pregnancy simulation activity appeared to be helpful for the nursing students in increasing their experiences about pregnancy and understanding of the problems that pregnant women face .In congruent with the present study findings, **Yu et al. (2019)**[8]conducted a study on 189 medical and nursing students and their professional peers to analyze if a pregnancy experience program (PREP) that simulates mothers' physiological changes during the third trimester of pregnancy will promote students and professional peers' understanding and positive attitude. They claimed that following PREP, the overall group's physical difficulty score improved

significantly (p 0.001), showed better understanding of pregnant women after participating in the pregnancy experience program (PREP). this can be explained by the fact that learning by doing and role-play through using the Empathy Belly TM Pregnancy Simulator enhance the students' experience of pregnancy physical difficulties compared with the superficial responses obtained from traditional lectures.

The simulation learning activity aimed at changing attitudes by having students personally experience related changes affecting pregnant women. The present study findings reported an improvement in attitude toward pregnant women after application of the simulation game compared to pre intervention in the simulation group than the lecture group. Parallel with the present study finding, another study to evaluate the impact of simulated aging game versus traditional lecture on nursing students' knowledge and attitude towards elderly concluded that, after the application of the simulation game, students' attitude changed to positive toward elderly in the simulation group than the lecture group[(1)].Another quasi-experimental study reported that negative attitude decreased significantly after simulation in the study group[(11)]. In addition, **Lewis et al. (2016) [(12)]** concluded that the simulation teaching enhance the attitude of nursing students towards end of life. Moreover **Nuraini et al. (2015)[(13)]** support the same idea that the general attitude of nursing students improved with utilizing the simulation as teaching method.

The present study findings revealed that, around two thirds of students in the pregnancy simulation group were satisfied with the utilized educational method. Parallel with the present study findings, study conducted by **Marzouk (2015)**[(14)]to investigate the perception of 117 nursing students on their satisfaction and self-confidence after engaging in clinical simulation and concluded increasing their knowledge level because the used simulation methods were effective and gave them

clear ideas of what was expected of them. Their self-confidence and satisfaction were increased as a result of knowledge acquisition abilities.

In addition, this finding was congruent with a study aimed to assess nursing student's satisfaction with different teaching strategies including simulation based learning strategy and indicated that, following exposure to simulation based learning, the overall learning satisfaction levels were significantly improved [15].Additionally, study by **Abd El Fattah et al. (2019)**[16]found that the majority of students agreed that "the simulation affords students with a variety of learning materials and activities to support the learning curriculum". Also, students in the simulation sessions took opportunity to be prepared for real-life experience.

Tabatabaeian et al. (2018)[17] supported the present study finding, evaluated the impact of simulation based education about preeclampsia and eclampsia and reported that the satisfaction level with the educational method in the simulation group was significantly higher than that of the lecture group among midwives. In addition to **Marzouk.(2015)**[14]who concluded that practicing simulation as a clinical education technique improves students learning satisfaction and promotes their self-confidence as simulation allows nursing students to participate actively in their learning. In addition, simulation training provides self-paced learning and allows nursing students to make mistakes and learn from them, which may be not allowed in the clinical setting. Furthermore, by allowing active participation, simulation training can provide standardized learning experiences for all nursing students.

Additionally, the study findings revealed that there was a significant positive correlation between the student's experience of pregnancy physical difficulties scores and their attitude post intervention. This can be explained as simulation allows students to go through the real physical experience of pregnant women thus

increase their feeling and improve their attitude toward them. These findings agreed with the study done in Korea among dental students who supported the idea that education programs should focus on emphasizing positive attitudes among medical students[5].

Simulation is an effective method of teaching that can increase nursing student's experience of pregnant women's physical difficulties, and decrease their negative attitudes toward them.

Limitation of the study

There was lacking of the necessary national and international references in maternity field so, the researchers had difficulties in discussing the research topic.

Conclusion and Recommendations

Based on the present study results, the midwifery nursing students who participated in pregnancy simulation exhibited a positive attitude towards pregnant women. Also, they feel physical difficulties among pregnant women compared to the students who received the traditional lecture. In addition, the midwifery nursing students were satisfied with pregnancy simulation teaching method.

Findings incite the following recommendations:

- Simulation-based teaching should be integrated into the practice training for students before their contact with the actual women in the antenatal unit.
- The simulation games should be used as an effective teaching method that improves the attitude of nursing students toward pregnant women.
- Further researches exploring the effect of simulation on different learning programs are required to confirm the importance of simulation games on student's development.

Conflicts of interest disclosure

The authors declare that there is no conflict of interest.

References

1. Saleh N, Elsayed E, Mohamed H, El-Gilany A. Effect of simulated aging game versus traditional lecture on nursing students' knowledge and attitude towards Elderly. ASNJ. 2017; 19(1):163-176
2. Catherine C. Motosko, BS, Amy Kalowitz Bieber MD, Kathryn J. Martires MD. Int. J Womens Dermato.2017; l3(4): 219-224.
3. Strickland H, Kaylor S. Bring you're a game: Educational gaming for student success. Nurse Education. 2016; 40: 101-103.
4. Cohen H, Sandel M, Thomas C. Using focus groups educational methodology: Deconstructing stereotypes and social work practice misconceptions concerning aging and older adults. Educ Gerontol.2004; 30(1):329–346. Available at: http://www.google.com. Retrieved on: 12-5-2020.
5. Lee M, Jungjoon I. Empathy and attitude towards communication skill learning as a predictor of patient-centered attitude: A cross-sectional study of dental students in Korea. 2020. Available at:http://dx.doi.org/10.21203/rs.3.rs-47583/v1.
6. Agu F, Rae T, Pitter C. Attitudes of midwives towards teenage pregnancy and motherhood in an urban hospital in Kingston. International Journal of Nursing.2017; 4(2): 29-39.
7. Wündrich M, Schwartz C, Feige B, Lemper D, Nissen C, Voderholzer U. Empathy training in medical students - a randomized controlled trial. Med. Teach. 2017; 39(1):1096–8.
8. Yu J, Chung Y, Lee J, Suh D, Wie J, Ko H, et al. The educational effects of a pregnancy simulation in medical/nursing students and professionals. BMC Medical Education.2019; 19(1):168.Available

at:https://doi.org/10.1186/s12909-019-1589-8.

9. Fomerly Birthways Childbirth Resource Center. The Empathy Belly Instructor Training Manual. 2013. [Internet] Copyright 2016 Updated 06/04/2019. Available from: https://www.empathybelly.org/downloads.
10. Bertram K, Randazzo J, Alabi N, Levenson J, Doucette JT, Barbosa P. Strong correlations between empathy, emotional intelligence, and personality traits among podiatric medical students: A cross sectional study. Educ. Health, 2016; 29 (3). Available from: https://www.ncbi.nlm.nih.gov/pubmed/28406102.
11. Lee Y, Shin S, Greiner P. Can education change attitude toward aging? A quasi-experimental design with a comparison group. Journal of Nursing Education and Practice. 2015; 5 (9): 90-99.
12. Lewis, C., Reid, J., McLernon, Z., Ingham, R., & Traynor, M. (2016). The impact of a simulated intervention on attitudes of undergraduate nursing and medical students towards end of life care provision. BMC Palliative Care, 15(1), 1-6
13. Nuraini, T., Afifah, E., Agustini, N., Pujasari, H., Masfuri, M., & Milanti, A. (2015). Human patient simulation to improve the attitude of the nursing students. Journal of Nursing Education and Practice, 5(4), 52.
14. Marzouk T. Nursing students' perceptions of satisfaction and self confidence with clinical simulation experience, Journal of Education and Practice.2015; 8(5): 131-136. DOI: 10.5430/jnep.v5n8p51.
15. Hung C, Kao S, Liu C, Liang F, Chu P, LeeO. Effects of simulation-based learning on nursing students' perceived competence, self-efficacy, and learning satisfaction: A repeat measurement method. Nurse

Education Today.2021; 97(1): 104725.

16. Abd El fattah N, EL-Kholy G, Omran A, Hassan H. Effect ofsimulation on students' achievement in normal labor modules. Menoufia Nursing Journal. 2019; 4 (1): 87-103. ISSN: 2735-3974.
17. Tabatabaeian M, Kordi M, Dadgar S, Esmaeily H, Khadivzadeh T. Comparing the effects of simulation-based training, blended, and lecture on the simulated performance of midwives in preeclampsia and eclampsia. Journal of Education and Health Promotion. 2018; 7(1): 110.Available from: https://doi.org/10.4103/jehp.jehp_116_17.