

# Evidence Based Care Journal

<http://ebcj.mums.ac.ir/>

---

## Effect of Jigsaw Technique on the Education of Menstrual Self-care Behaviour to Female Adolescents

Tetti Solehati, Cecep Eli Kosasih

The online version of this article can be found at

[http://ebcj.mums.ac.ir/article\\_15277.html](http://ebcj.mums.ac.ir/article_15277.html)

---

Evidence Based Care Journal 2020 10:07 originally published  
online April 2020

DOI: 10.22038/ebcj.2020.43801.2185

Online ISSN: 2008-370X

**Address:** Mashhad Nursing and Midwifery School, Ebn-e-Sina St., Mashhad, Iran

**P.O.Box:** 9137913199

**Tel.:** (098 51) 38591511-294

**Fax:** (098 51) 38539775

**Email:** [EBCJ@mums.ac.ir](mailto:EBCJ@mums.ac.ir)

EVIDENCE BASED CARE



## Effect of Jigsaw Technique on the Education of Menstrual Self-care Behaviour to Female Adolescents

Tetti Solehati<sup>1\*</sup>, Cecep Eli Kosasih<sup>1</sup>

Received: 23/10/2019

Accepted: 17/03/2020

Evidence Based Care Journal, 10 (1): 7-14

### Abstract

**Background:** It is essential to keep the reproductive organs and surrounding areas hygienic during menstruation to prevent health issues. Inadequate menstrual self-care knowledge, poor attitudes, and behavior among female adolescents can lead to increased morbidity and other complications among them, such as reproductive tract infections.

**Aim:** This study aimed to investigate the effect of the jigsaw technique on menstrual self-care knowledge, attitude, and behavior among adolescents.

**Method:** This quasi-experimental research was performed on 100 female students who were divided into control (n=50) and intervention (n=50) groups (jigsaw intervention) in Al-Musaddadiyah boarding school in Garut, in 2016. The jigsaw technique was performed by dividing the students into small groups of 5-6 where students worked together using interdependent and responsible independent methods to receive education on menstrual self-care. The required data were collected using a questionnaire about knowledge, attitude, and behavior and they were analyzed using independent and paired t-test. A p-value of less than 0.05 was considered statistically significant.

**Results:** Based on the results, mean difference of the intervention group before and after the intervention regarding the level of knowledge, attitude, and behavior were -7,08 (P=0.001), -11.54 (P=0.001), and -16.62 (P=0.001), respectively. While the mean difference of the control group, before and after the intervention regarding the level of knowledge, attitude, and behavior were -0.240 (P=0.06), -0,180 (P=0.37), -3,4 (p=0.21), respectively.

**Implications for Practice:** The jigsaw method could be effective in increasing menstrual self-care knowledge, attitude, and behavior among female adolescents.

**Keywords:** Adolescents, Educational, Jigsaw technique, Menstrual self-care

---

1. Associate Professor of Nursing, Faculty of Nursing Padjajaran University, West Java, Indonesia

\* Corresponding author, Email: tetti.solehati@unpad.ac.id

## Introduction

Every female adolescent who goes through puberty will experience menstruation. It is a physiological condition that indicates the functionality of their reproductive systems. At the time of menstruation, they need to keep their reproductive organ and its surrounding areas hygienic in order to prevent health issues, namely leucorrhoea as well as abrasions and itching in the related areas. Therefore, they need to learn how to perform self-care behavior during menstruation which will influence their attitudes. Based on the results of a research performed (1) on Egyptian female adolescents, their knowledge regarding menstruation had a great impact on their attitudes.

According to the previous research (2, 3), menstrual self-care behavior is an attempt for the improvement and maintenance of health during menstruation. Moreover, it is considered useful in determining the health status of adolescents in the future. Based on the results of the previous research (4, 5), self-care during menstruation includes personal hygiene, daily bath, regular change of the pad every 3-4 h, washing the genital area after urination, regular change of clothes and underpants, the continuation of normal daily activities (going to school, having physical activities, exercising), balanced intake of nutrients, and usage of medications prescribed by doctors. Self-care during menstruation is influenced by several factors, including knowledge and attitude. According to the previous research performed in this regard (6) knowledge has a tremendous influence on hygiene behavior.

Inadequate knowledge, poor attitudes, and inappropriate behavior regarding menstrual self-care can increase morbidity in adolescents and cause other complications among them. Inadequate self-care behaviors during menstruation were among the main determinants of morbidity in adolescents, such as pruritus vulvae, genital area irritation, urinary tract infections, reproductive tract infections, vaginitis, vulvovaginitis, whiteness (flour albus) with itching, irritation, unpleasant odor, stinging caused by one organism such as *Candida Albicans*, and *trichomonas vaginalis* can even cause cancer Cervix in the future (7-9). Lack of proper information about menstruation leads to negative attitudes and misconceptions about this normal physiological process and prevents women from performing hygienic behavior during menstruation (10).

Lack of self-care behavior during menstruation is due to a lack of awareness and adequate information on how to maintain hygiene during this period. In addition, the lack of education by parents and the society in this regard is a barrier for adolescents to obtain adequate information in this regard (11). A study conducted (12) on nursing students in Saudi Arabia in addition to another research (13) found that a considerable percentage of female adolescents did not have the required knowledge and beliefs about menstruation. Furthermore, socio-cultural beliefs affect the self-care behavior of female adolescents during menstruation. Based on the findings of a research (5) carried out on female adolescents in Lebanon, 20% of women avoid foods with vitamin C to reduce the risk of amenorrhea, 18.2% do not participate in social activities or refuse to do their homework, 70.3% avoid physical activities to prevent hypermenorrhea during menstruation. Moreover, another research (14) on female adolescents in Nablus district found that 52% of them believed that the consumption of salty food during menstruation has a negative effect on their health, 38% of them did not change the quality or quantity of their food during menstruation, and 63% of them used analgesics.

West Java has a large population of female adolescents while the level of knowledge about self-care is low, and Garut regency is no exception. National Family Planning Coordinating Board of West Java Province stated that adolescents in Garut district are at the risk of reproductive health issues. Many pesantrens (Islamic boarding schools) are established in Regency of Garut and one of them is Al-Musaddadiyah. This study was conducted in pesantren since pesantren students are different from those who attend public schools. Due to the provision of limited health education, it is difficult for students to solve their problems in such a strict environment. Therefore, they receive no information regarding self-care behaviors during menstruation.

Chairman of school public health (UKS) in Al-Musaddadiyah Pesantren in Garut said that in the last 5 months, 28 adolescents complained about the odor of their vaginal discharge and itching in the vaginal area. According to the findings of recent studies on santriwati (Islamic female student), 1 of them said that she often experiences vaginal itching, has white or yellow vaginal discharge, and changes her underpants once a day. Moreover, 4 of them said that they often experienced yellow vaginal discharge and itching, changed their pads after 6 h or more, cleaned their vagina with soap, sometimes washed their hands before cleaning the pee. In addition, 2 students said that they often

experienced itching, clear vaginal discharge, changed their underpants twice a day, did not dry their vagina after urination, and 1 student said she had clear vaginal discharge with odor.

Lack of knowledge of female adolescents can be overcome by educating them about self-care during menstruation. It will increase their level of awareness and provide them with a good attitude to perform proper self-care behaviors in order to reduce the level of morbidity in them. Knowledge and attitudes about the health of reproductive organs are important factors in determining the hygiene behavior of women during menstruation. One method for the improvement of knowledge on self-care during menstruation is to provide health education for female adolescents. According to the studies performed in Burkina Faso, health education on personal hygiene can lead to healthy behaviors (15). Health education can be offered either individually or in groups; however, it is usually done in groups through the lecture method. The lecture method has some disadvantages, such as being boring and passive for the learners. Another health education strategy is using cooperative learning methods, such as the jigsaw technique. Jigsaw is one of the cooperative learning techniques in which students can work in small groups so that they are responsible for each other's education. Moreover, they have the chance to express themselves. In previous studies, the jigsaw method was used to improve the self-efficacy of the students (16). Provision of health education through the Jigsaw method can attract the attention of the learners in order to improve the knowledge and attitude of the learners regarding the self-care behaviors of female adolescents during menstruation. However, this method has a weakness (which is saturation) if it conducted continuously. Therefore, a modification is needed by using a mixture of educational methods. The jigsaw method is suitable for the age range of adolescence since it includes an interactive mix of educational methods and animation videos; therefore, it is fun and does not bore the learners. Incorporation of effective educational methods improved the behavior of the students (17, 18).

There were no studies that explored the educational methods performed for santriwati in the Islamic boarding schools. Therefore, there was a need to investigate the effect of the jigsaw technique on menstrual self-care knowledge, attitude, and behavior among adolescents (santriwati) in Islamic boarding schools.

## Methods

The present study was conducted during May-December 2016 at Al-Musaddadiyah Pesantren in Garut, Indonesia. This quasi-experimental research was conducted based on a pretest-posttest design with a control group. The statistical population was all the female adolescents studying at the grade of VIII-IX at Al-Musaddadiyah Pesantren in Garut (n=100). The inclusion criteria consisted of 1) female gender, 2) age range of 10–18 years old, 3) experience of menstruation, and 4) willingness to join the study. On the other hand, the exclusion criteria were living outside of the school dormitory and having severe diseases. The samples were selected using the total population sampling method and were divided into two groups of intervention (n=50) and control (n=50). For the purpose of discussion, the students were divided into small groups of 5-6 students where they were required to work together using positive interdependence and responsible independent methods to better understand the content. The required data were collected through three questionnaires. The first one measured the level of knowledge in the form of a multiple-choice test in which the correct and wrong answers were scored 1 and 0, respectively. In this questionnaire, The higher the total score indicated the better knowledge of the participants. If the score was less than 76% of the total score which was 18, it was categorized as good. If the score was less than 75% of the total score it was categorized as not desirable. The second one was the attitude questionnaire which was scored based on a Likert scale ranging from strongly agree to strongly disagree. The third one was a menstruation self-care behavioral checklist questionnaire which included options, such as personal hygiene, diet, usage of sanitary napkins, as well as exercise and relaxation. This questionnaire was scored based on a Likert scale ranging from never to always.

To test the reliability of the questionnaires, the researchers distributed the questionnaire among 15 santriwati in Pesantren Darussalam in Garut which has the same characteristics as the Pesantren Al-Musaddadiyah. Chronbach's Alfa coefficient was obtained at 0.78 which is desirable.

The study began after the research proposal was approved, both by the research funder and the school where the research was conducted (Al-Musaddadiyah Pesantren in Garut and the Ministry of Religion in Garut). Researchers and teachers identified the potential participants and divided them into

intervention and control groups. Group allocation was random so that the students chose a piece of numbered paper and those who got the odd number entered the intervention group, while those who got the even number entered the control group. Then the researchers met the participants, introduced themselves, and explained the purpose and procedure of the study. When the participants agreed to participate in this research, they were asked to sign the written informed consent.

The research process consisted of several steps. The control group received regular education according to the routine services offered by the boarding school teachers. In the first session, data were collected on the level of knowledge, attitude, and behavior of the control group through the first, second and third questionnaires, respectively. The posttest stage was conducted by using the first and second questionnaires in the control groups before and after receiving the regular education of the boarding school. Moreover, the third questionnaire was given to them 1 month after their education.

In the first session of the intervention group, the data was collected on the level of knowledge, attitude, and behavior using the first, second, and third questionnaires, respectively. Afterward, the intervention group received intervention based on the jigsaw technique. The education was provided by the researchers in 60-min sessions. The posttest stage was performed by distributing the first and second questionnaires among both groups before and after the intervention. Furthermore, the level of behavior was evaluated using the third questionnaire one month after the intervention. In the jigsaw technique, the students worked in a heterogeneous team. The intervention group was divided into 15 smaller groups of 5-6 students who were asked to sit outside of their groups. Then each member in each group was encouraged to take a paper that had been numbered by researchers from 1 to 5. Subsequently, those who had the paper with the same number were encouraged to join into a large group to discuss the content on the menstrual self-care that was provided by the researchers. The content of the discussion consisted of 5 topics. The first one was about understanding, purpose, and impact of menstrual care. Number two was about personal hygiene. Number three was about the usage of pads. Number four was about activities and sports. Number five was about nutrition. Then they were encouraged to discuss the topic in depth with their friends in their new groups for 10 min. After 10 min they were encouraged to return to the small (original) groups to share the knowledge they had discussed within the larger groups. Therefore, they shared their knowledge and frequently asked questions in the smaller groups which continued for 30 min. After the discussion, they watched a 5-min educational animation video to improve their comprehension of menstruation care. Clarification or question and answer were conducted to ensure that all of their questions were answered and their doubts about the answers are resolved. This went on for 15 min. The discussion ended with a 5-minute quiz.

After the data were collected, they were analyzed using bivariate analysis (percentage, independent t-test, and paired t-test).

The descriptive data were expressed as mean±standard deviation. The comparison between two groups of means was conducted using an independent sample t-test. The intergroup comparison was conducted using a paired t-test. A p-value of less than 0.05 was considered statistically significant.

## Results

The general information of the two groups of the research is shown in Table 1.

According to Table 1, there was no age difference between the control and intervention groups ( $P>0.5$ ). The mean ages of the control and intervention groups were 14.90 and 14.84, respectively. Most of the students were within the age range of 15-17 years old. Moreover, the majority of them obtained information about the health of the reproductive organs from their mother (control group: 74% and intervention group: 90%).

Based on Table 2, the mean scores of the level of knowledge before and after the intervention in the intervention group were 11.88 and 18.96, respectively. Moreover, in the control group, the mean scores of the level of knowledge before and after receiving the regular education were 12.64 and 12.88, respectively. Table 2 also shows that there was no significant difference in the pre-intervention level of knowledge between the two groups ( $P=0.16$ ). Nevertheless, a significant difference was observed in the post-intervention stage between the intervention and control groups ( $P<0.001$ ).

Furthermore, the mean scores of the level of attitude before and after the intervention in the intervention group were 135.14 and 146.68, respectively. Moreover, in the control group, the mean scores of the level of attitude before and after receiving the regular education were 134.62 and 134.80,

**Table 1. Demographic characteristics of the participants**

Demographic characteristics	Control group (n=42)		Intervention group (n=42)		P
	f	%	f	%	
Age (years)	<i>M±SD</i> 14.9±1.1		<i>M±SD</i> 14.8±1.7		.84
Age Range					
12-14 years old	16	32.0	31	62.0	.37
15-17 years old	34	68.0	19	38.0	
Source of information on sexual reproduction					
Mother					
Yes	37	74.0	45	90.0	.74
No	13	26.0	5	10.0	
Television					
Yes	12	24.0	12	24.0	.92
No	38	76.0	38	76.0	
Internet					
Yes	16	32.0	23	46.0	.31
No	34	68.0	27	54.0	
Teacher					
Yes	23	46.0	28	56.0	.52
No	27	46.0	22	44.0	
Friends					
Yes	23	46.0	35	70.0	.23
No	27	54.0	15	30.0	

**Table 2. Comparison of the level of knowledge, attitudes, and behavior between two groups (n=100)**

Variable	Period	Intervention group (n=50)	Control group (n=50)	P-value
		Mean± SD	Mean± SD	
Knowledge	Pre-intervention	11.8+2.8	12.6+2.6	0.16
	Post-intervention	18.9+2.8	12.8+2.3	<0.001
Attitude	Pre-intervention	135.1+32.9	134.6+33.0	0.93
	Post-intervention	146.6+21.5	134.8+32.3	0.03
Behaviour	Pre-intervention	141.6+16.0	145.3+12.6	0.21
	Post-intervention	158.3+9.2	148.7+14.9	<0.001

respectively. Table 2 also shows that there was no significant difference in the pre-intervention level of attitude between the two groups ( $P=0.93$ ). Nevertheless, a significant difference was observed in the post-intervention stage between the intervention and control groups ( $P=0.03$ ).

In addition, the mean scores of the level of behavior before and after the intervention in the intervention group were 141.68 and 158.3, respectively. Moreover, in the control group, the mean scores of the level of behavior before and after receiving the regular education were 145.3 and 148.7, respectively. Table 2 also shows that there was no significant difference in the pre-intervention level of behavior between the two groups ( $P=0.21$ ). In the post-intervention stage, there was a significant difference between the intervention and control groups ( $P=0.001$ ).

According to Table 3, the mean difference in the level of knowledge, attitude, and behavior in the intervention group before and after the intervention were -7.080, -11.540, and -16.62, respectively. Therefore, it can be concluded that the jigsaw technique had a significant influence on the level of knowledge ( $t=-15.057$ ,  $P=0.001$ ), attitude ( $t=-6.318$ ,  $P=0.001$ ), and behavior ( $t=-6.656$ ,  $P=0.001$ ) of the subjects.

Table 4 showed that the mean differences in the level of knowledge, attitude, and behavior in the

**Table 3. Mean difference in the level of knowledge, attitude, and behavior in the intervention group (n=50)**

Comparison	Mean difference	t	df	P
Pre- and post-intervention knowledge	-7.08	-15.057	49	<0.001
Pre- and post-intervention attitude	-11.54	-6.318	59	<0.001
Pre- and post-intervention behaviour	-16.62	-6.656	49	<0.001

**Table 4. Mean difference in the level of knowledge, attitude, and behavior levels in the control group (n=50)**

Comparison	Mean difference	t	df	p
Pre- Post intervention knowledge	-0.240	-1.899	49	0.06
Pre- Post intervention attitude	-0.180	-0.903	49	0.37
Pre- Post intervention behaviour	-3.4	-1.269	49	0.21

control group before and after the intervention were -0.240, -0.180, and -3.4, respectively. Consequently, the regular education offered at the Islamic boarding school had no significant influence on the level of knowledge ( $t=-1,899$ ,  $P=0.06$ ), attitude ( $t=-0.903$ ,  $P=0.37$ ), and behavior ( $t=-1.269$ ,  $P=0.21$ ) of the students.

### Discussion

Based on the results, there was an increase in the level of knowledge, attitude, and behavior in the intervention group who received education in peer-group form through interactive activities that were designed according to their age. They shared the knowledge they received from researchers and did not hesitate to ask questions and explain their experiences of self-care during menstruation. The jigsaw technique is a cooperative learning method that creates a comfortable, interesting, and friendly learning atmosphere so that the students can ask questions from each other and share their experiences. According to previous research (19), the jigsaw technique improves the students' ability to communicate verbally and boosts their confidence.

In contrast, the control group received education from their school teacher in a one-way form which often causes the students to feel bored and awkward to ask their questions since this form of education highlights their status as a student and makes it awkward to ask questions from the teacher. This lecture method was especially less suitable for use in the provision of information about self-care during menstruation in adolescents considering its very personal nature. According to the results of a study (20) performed on 350 female adolescents aged 15-22 years old in India, they were often reluctant to talk about menstruation with their parents and hesitant to seek information on how to solve their menstrual issues. Parents and teachers were dreaded to discuss such personal issues. Incorrect knowledge of menstruation can lead to negative attitudes and misunderstandings that can, in turn, lead to adverse health issues (21).

Through further analysis, it was found that the provision of information using the jigsaw technique had a significant effect on the improvement of knowledge, attitude, and behavior of the students. According to the results of the present study, education through the Jigsaw technique has a good influence on the level of knowledge, attitude, and behavior of female students in taking care of themselves during menstruation. The Jigsaw method is suitable for adolescents since this educational model is interactive, fun, and interesting. Therefore, it can increase the level of knowledge and improve their attitudes. To increase the levels of knowledge, attitudes, and behavior regarding self-care during menstruation, it is expected to decrease the morbidity of female adolescents due to the infections of the reproductive organs. Based on the findings of another research (22) performed on 80 students in Vietnam, the jigsaw method of education contributed to the improvement of the students' knowledge. A study (17) performed on children in India and 18 school children in China (2013) found that the mixed method of education was effective in the improvement of the behavior of the students. Therefore, it can be concluded that the jigsaw technique can improve knowledge, attitude, and behavior.

Jigsaw technique can be performed at schools by the group leader for every spiritual activity since this education technique was effective in improving the knowledge of students in schools (23). Health education programs about menstrual hygiene are essential for adolescents studying at junior school (8). Educational programs, community nurses/health workers, school teachers, and parents have a very important role in transmitting vital messages about true menstrual hygiene to adolescents (21). A

study (12) carried out on 400 female adolescents in Saudi Arabia indicated that it was important to raise their awareness and provide them with accurate information. The above-mentioned study suggested involving schools and health teams to address the self-care issues during menstruation to help the students solve such problems, improve their confidence, and improve their quality of life. Therefore, it is vital to have all the aforementioned components work together for the provision of information about self-care during menstruation to female adolescent with educational methods appropriate to their age.

The results of the present research were in accordance with those of a previous study (21) conducted on 160 adolescents in West Bengal India which concluded that menstrual hygiene was a very important risk factor in causing reproductive tract infections. Provision of correct knowledge for female adolescents is an important, urgent, and neglected need (24). Self-care during menstruation for women is the basic requirement of a satisfying life and self-esteem (2). In order to educate adolescents, many factors should be taken into account, since their characters are still developing. This study aimed to introduce an education method that would make adolescents understand the content of reproductive health more efficiently. Based on the findings, a special educational program (especially regarding menstrual self-care) should be used for the education of female adolescents on reproductive health issues and the government should be more concerned about it (25). Therefore, the jigsaw technique can be used to improve the behavior of teenagers. It is recommended for future studies to explore local resources mostly so that it is more compatible with their culture.

### **Implications for Practice**

The jigsaw method of education could be effective in increasing menstrual self-care knowledge, attitude, and behavior among adolescents. This research can be very useful both for Islamic boarding school students and adolescents in general since the results are expected to improve self-care behavior during menstruation to prevent infections in the reproductive system of young women. It is expected that this study motivates other schools to use the jigsaw technique for the education of the students. In addition, it is recommended for the schools to use the jigsaw method to be able to facilitate the improvement of the understanding and attitude of the students regarding self-care during menstruation.

This model can be taken into consideration as a policy in daily activities at school. Therefore, indirectly it will accelerate the realization of the government's hopes to make West Java Indonesia a "Hygiene Award" Province.

Regarding nursing services, it is hoped that this model can be used by nurses as one of the methods of improving the reproductive health of adolescents and reducing their morbidity due to poor hygiene behavior in female adolescents. regarding the development of nursing, the results of this study are expected to be able to enrich the nursing science, especially in improving health behavior

### **Acknowledgments**

We would like to express our gratitude to the Rector of UNPAD, the Director of Research and Community Service of UNPAD who has funded this research through HPKRD scheme, as well as to all parties who have participated in the completion of this research. This research was approved by the Ethics Committee of Kesbangpol (072/336-Bakesbangpol/ 2016).

### **Conflicts of Interest**

The authors declare that there is no conflict of interest.

### **References**

1. Eswi A, Helal H, Elarousy W. Menstrual attitude and knowledge among Egyptian female adolescents. *J Am Sci*. 2012;8(6):555-65.
2. Adika V, Ayinde M, Jack-Ide I. Self care practices of menstrual hygiene among adolescents school going girls in Amassoma Community, Bayelsa State. *Int J Nurs Midwifery*. 2013;5(5):99-105.
3. Perry AG, Potter PA, Ostendorf W. *Clinical nursing skills and techniques*. New York: Elsevier Health Sciences; 2013.
4. Poursalami M, Osati-Ashtiani F. Assessing knowledge, attitudes, and behavior of adolescent girls in suburban districts of Tehran about dysmenorrhea and menstrual hygiene. *J Int Womens Stud*.

- 2002;3(2):51-61.
5. Santina T, Wehbe N, Ziade FM, Nehme M. Assessment of beliefs and practices relating to menstrual hygiene of adolescent girls in Lebanon. *Int J Health Sci Res.* 2013;3(12):75-88.
  6. Assefa M, Kumie A. Assessment of factors influencing hygiene behaviour among school children in Mereb-Leke District, Northern Ethiopia: a cross-sectional study. *BMC Public Health.* 2014;14(1):1000.
  7. McCaleb A, Cull VV. Sociocultural influences and self-care practices of middle adolescents. *J Pediatr Nurs.* 2000;15(1):30-5.
  8. Haque SE, Rahman M, Itsuko K, Mutahara M, Sakisaka K. The effect of a school-based educational intervention on menstrual health: an intervention study among adolescent girls in Bangladesh. *BMJ Open.* 2014;4(7):e004607.
  9. Leppert PC, Peipert JF. *Primary care for women.* Philadelphia: Lippincott Williams & Wilkins; 2004.
  10. Lamadah SM, Mohamed H, El-Khedr SM. Knowledge, attitude and practices of adolescent females regarding reproductive health at makkah al Mukaramah. *Life Sci J.* 2015;12(3):146-58.
  11. Gharoro LA. Menstrual hygiene practices among junior secondary school students in Benin City. *J Educ Soc Res.* 2013;3(8):129.
  12. Karout N. Knowledge and beliefs regarding menstruation among Saudi nursing students. *J Nurs Educ Pract.* 2016;6(1):23.
  13. Udgiri R, Angadi M, Patil S, Sorganvi V. Knowledge and practices regarding menstruation among adolescent girls in an urban slum, Bijapur. *J Indian Med Assoc.* 2010;108(8):514-6.
  14. Shalabi-Abbas E, Dweikat S, Al Gazawy I, Draghmah S. Knowledge and self-care practices in adolescent girls living in Nablus district during menstruation: a cross-sectional study. *Lancet.* 2018;391(Suppl 2):S10.
  15. Curtis V, Kanki B, Cousens S, Diallo I, Kpozehouen A, Sangare M, et al. Evidence of behaviour change following a hygiene promotion programme in Burkina Faso. *Bull World Health Organ.* 2001;79(6):518-27.
  16. Şengül S, Katranci Y. Effects of jigsaw technique on mathematics self-efficacy perceptions of seventh grade primary school students. *Proc Soc Behav Sci.* 2014;116:333-8.
  17. Biran A, Schmidt WP, Varadharajan KS, Rajaraman D, Kumar R, Greenland K, et al. Effect of a behaviour-change intervention on handwashing with soap in India (SuperAmma): a cluster-randomised trial. *Lancet Global Health.* 2014;2(3):e145-54.
  18. Bieri FA, Gray DJ, Williams GM, Raso G, Li YS, Yuan L, et al. Health-education package to prevent worm infections in Chinese schoolchildren. *N Engl J Med.* 2013;368(17):1603-12.
  19. Crone TS, Portillo MC. Jigsaw variations and attitudes about learning and the self in cognitive psychology. *Teach Psychol.* 2013;40(3):246-51.
  20. Omidvar S, Begum K. Factors influencing hygienic practices during menses among girls from south India-A cross sectional study. *Int J Collaborat Res Internal Med Public Health.* 2010;2(12):411-23.
  21. Dasgupta A, Sarkar M. Menstrual hygiene: how hygienic is the adolescent girl? *Indian J Community Med.* 2008;33(2):77-80.
  22. Tran VD, Lewis R. The effects of jigsaw learning on students' attitudes in a vietnamese higher education classroom. *Int J Higher Educ.* 2012;1(2):9-20.
  23. Solehati T, Susilawati S, Lukman M, Kosasih CE. Pengaruh edukasi terhadap pengetahuan dan skill guru serta personal hygiene siswa SD. *J Kesehatan Masyarakat.* 2015;11(1):135-43.
  24. Thakur H, Aronsson A, Bansode S, Stalsby Lundborg C, Dalvie S, Faxelid E. Knowledge, practices, and restrictions related to menstruation among young women from low socioeconomic community in Mumbai, India. *Front Public Health.* 2014;2:72.
  25. Akther N, Begum N, Chowdhury S, Sultana S. Knowledge on reproductive health issues among the unmarried adolescent girls. *J Fam Reprod Health.* 2012;6(4):169-76.