

A Field Experiment on Puberty Education among Iranian Female Adolescents: A Comparison of School-based and Family-based Interventions

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Received: January 25, 2024; Revised: March 11, 2024; Accepted: April 24, 2024

Abstract

Background: It is necessary to enhance understanding and attitudes towards puberty and reproductive health within the framework of the culture and beliefs of the community. The aim of this study was to investigate the effect of school-based education compared with family-based education on puberty health behaviors in teenage girls.

Methods: In 2018, an experimental field study was conducted on 272 high school girl students who were selected through multi-stage sampling method. A questionnaire was used for collecting the data. Face and content validity of the questionnaire was determined by nine health and fertility education experts. Content validity ratio and index were calculated by Lawshe and Walts and Basel methods. The test-retest method and Cronbach's alpha coefficient were used for checking the reliability of the questionnaire. The Cronbach's alpha for knowledge, attitude and behavior was 0.81, 0.92, and 0.73, respectively; also, ICC for all questions was 0.81. The students completed the questionnaire in two stages. Interventions were conducted for mothers, teachers and students through lecture and group discussion. The collected data were analyzed using SPSS version 16. Chi-Square, Paired T-test, ANOVA and ANCOVA were used for data analysis.

Results: The results showed that after the intervention, knowledge, attitude and behavior scores were significantly higher, and the increase in the school-centered group was more than the family-centered group. Also, there was no significant difference in the mean scores in the control group.

Conclusions: School engagement allows for the implementation of effective interventions to enhance menstrual management, ultimately leading to a decrease in negative psychosocial outcomes through improved interactions in the classroom.

Keywords: Puberty, Adolescents, Intervention

How to Cite: Gholami Dastenaee L, Ghaffari M, Rakhshanderou S, Pooresmaeil Dorosteh A. A Field Experiment on Puberty Education among Iranian Female Adolescents: A Comparison of School-based and Family-based Interventions. Int. J. School. Health. 2024;11(4):260-270. doi: 10.30476/INTJSH.2024.101504.1383.

1. Introduction

Adolescence, a phase of life between childhood and adulthood from ages 10 to 19, is a unique stage of human development and an important time for laying the foundations of good health (1). During adolescence, puberty signifies an important phase of change and transformation that holds great significance and is viewed as a turning point in the life of adolescents (2). Teenage girls enter puberty with lack of information and misconceptions about menstruation which endangers their health (3).

Menstrual health studies among Iranian adolescent girls are limited. The significance of puberty and its influence on the future of young girls cannot be overstated. By educating girls about puberty health, valuable information will be disseminated throughout society (4). While adolescent girls are vulnerable groups of the society

regarding their social condition and health (5), there is not much attention given to their specific challenges and problems (6).

Menstruation includes all fields such as psychology, education, politics (7). Poor menstrual hygiene can lead to urinary or reproductive tract infections and affect the well-being of students (8). A large portion of young women do not have a good understanding of menstruation (9). There is little discussion about puberty and its healthcare in the house and school (5).

If girls consider menstruation as a natural phenomenon and have a positive image of their body, they will show positive reaction accordingly. Enough readiness before menarche has important effects on the primary experiences of girls about menarche and menstruation; that is, those girls with enough readiness show likely positive reactions to

menarche (10). In turn, a negative attitude towards changes in this period causes low self-esteem and anxiety in adolescent girls (11). Also, if adolescents have a positive knowledge and attitude about maturity, they will gain more experience (12).

Menarche often frightens the girls and imposes damages because it happens without being aware of it and lack of information before menstruation leads to an unsuitable experience (13). Also, lack of good menstrual health practices can cause many diseases and complications in this age group (14). Problems with puberty can be prevented and is a basic step in eliminating the problems of this health education (15).

Family as the first social unit, has the most important role in the education and transfer of information and health behaviors to adolescents. Mothers' role is very salient in this regard and most adolescent girls learn health behaviors from their mothers (10). Family-based methods can support the growth and development of adolescents by providing knowledge, skill, communication ability, supervision and becoming suitable role models and increase the positive effects on the children (16) and mothers are the most important source of information about menstruation to their daughters (17).

It is recommended that intervention programs were used in the schools in order to increase the awareness of adolescent girls. Because teenage girls in this period need to receive accurate and sufficient information about pubertal health and maintaining health (18) Iran: a randomized controlled clinical trial. 2017;19(2). Presence in the school facilitates the educational interventions, and interactions in the class can increase the ability for effective control of menstruation and reduce the negative social and mental consequences (19). Research has shown that school is the best place to access teenagers and educators can have educational interventions to change the high-risk behavior of adolescents (20). Due to societal taboos surrounding discussions about puberty and related health behaviors, there exists a lack of open communication between parents and their children. This leads to students feeling uncomfortable and hesitant to talk about their puberty-related concerns, particularly in regards to menstruation and overall health, with their mothers and teachers. Therefore, the present study aimed to compare school-based education with family-based education about puberty health

behaviors in adolescent girls with the participation of mothers and teachers in an intervention in Kiar County, Chaharmahal and Bakhtiari Province, Iran. The results can be used to promote the health of students as well as appropriate health behaviors in this period.

2. Methods

2.1. Study Design and Sampling

In this experimental field study, all secondary school female students in urban areas were studied. The study place is one of the cities of Chaharmahal and Bakhtiari Province located 35km away from Shahrkord, the capital city of Chaharmahal and Bakhtiari Province, Iran. The city has a population of 50979 with 4 urban areas, 14 girls' high schools, and a total number of 910 students. The sample size in this study was determined to be 272. Multi-stage sampling method was used in such a way that three areas from four urban areas were randomly selected and then, three areas were randomly selected. In each school, students in grade 8 and 9 were considered. In this study, 93 participants were assigned to the school-centered intervention group, 98 to the family-centered intervention group, and 81 were assigned to the control group.

2.2. Sample Size

The sample size was calculated based on the study by Maleki and colleagues (21) with a significance level of 0.05 and a confidence coefficient of 0.95. Given %5 attrition, 97 participants were assigned to each group.

$$N = \frac{\left[Z_{\left(1-\frac{\alpha}{2}\right)} + Z_{(1-\beta)} \right]^2 (S_1^2 + S_2^2)}{\Delta^2} = 92$$

$$Z_{\left(1-\frac{\alpha}{2}\right)} = 1.96$$

$$Z_{(1-\beta)} = 1.28$$

2.3. Eligible Criteria

Inclusion criteria were

Studying in Grades 8 and 9

Menarche experience

Informed consent and voluntary participation

Written consent from parents and legal guardians

And exclusion criteria were unwillingness to participate in the study at any stage.

2.4. Instrument (Scoring, Validity and Reliability)

The data collection instrument was a questionnaire developed by a team of experts using valid sources and existing questionnaires. The questionnaire has 4 parts and 70 questions. Eight questions of the first part deal with demographic characteristics of the participants, including age, level of education of the student and his/her parents, and family economic status. The second part includes general and nutritional information. Knowledge field has 14 multiple-choice questions about physical changes, puberty time, duration and interval of menstrual periods and health behaviors during menstruation (For example: What is the first physical change in girls during puberty?). Every true answer had 2 scores, false answer had 0 score and "I don't know" has 1 score. There were 9 multiple-choice questions about nutrition and required supplements in this age group that true answer has 2 scores, "I don't know" has 1 score and false answer was 0 (For example: There is no problem in consuming too much salt during menstruation).

Questions related to the attitude of students about puberty, menstruation as well as behavioral and nutritional issues were classified by three-point scale from "I agree" to "I disagree" such that "I agree" has score 3, "no idea" has score 2, "I disagree" has score 1 (I believe, menstruation is a sign of health and normal functioning of the body). Questions related to behavior refers to a set of behavioral and nutritional actions during this period and with a five-point Likert scale from "always" to "never". The scores were 1, 2, 3, 4 and 5 for "always", "most often", "sometimes", "rarely" and "never", respectively (During my period, I take a standing and short bath). The range of scores in general knowledge and nutritional knowledge, attitude and behavior sections were (0-46), (14-42) and (18-90), respectively. Face and content validity of the questionnaire determined by 9 health and fertility education experts. For content validity, content validity ratio (CVR) and content validity index (CVI) were calculated by Lawshe and Walts and Basel methods, respectively (22). Questions

with CVI higher than 0.79 and CVR higher than 0.78 were accepted. Two questions eliminated from 16 knowledge questions, 7 questions from 24 attitude questions, and 7 questions from 25 questions. Test-retest was used to determine reliability (on 20 participants with 15 days interval) and internal consistency. Cronbach's alpha was calculated for knowledge, attitude and behavior as 0.81, 0.92 and 0.73; this indicates good internal consistency for each item up to 0.81 ICC.

2.5. Intervention

The questionnaires were completed in the classroom in the presence of the researcher and teacher and lasted about 20 to 30 minutes. Then, pretest data were analyzed. After educational need assessment of the target group, educational content was prepared using valuable resources.

Intervention was conducted during 8 weeks. One-hour educational session was provided in the school-centered and family-centered intervention groups in lecture form, question-answer form, and using educational media like pamphlet and booklet. These sessions were conducted for two grades (Eighth and Ninth) that include 4 classes and during 4 educational sessions. Two group discussions were hold for each 25-student class divided into two groups (12 people in each group). Totally, 8 group discussion sessions were provided for all students. Two lectures were hold for mothers and teachers (lecture and group discussion) to transfer the teachings to students.

The lectures provided educational content on the definition and steps of puberty, its physical symptoms, menstruation age, and painful menstruation, reducing menstrual pains, nutritional recommendations during menstruation and health messages. In group discussions, some issues were discussed such as "menstruation is the sign of health and natural function of the body, and it is not a sign of disease, "going to bath in menstrual period is not harmful, and refreshes", "the belief that not using iron pill leads to anemia" and "non-observing health may lead to infertility, and vaginal cleaning is necessary".

2.6. Data Analysis

Mean, standard deviation and percentage were used to report descriptive statistics. Chi-square

tests, one-way ANOVA, ANCOVA and paired t-test were used to report inferential statistics. SPSS version 16 was used to analyze the data (pre-test) and determine the effect of education 2 months after the intervention.

3. Results

This study was conducted on 272 female students

aged 13-15 years old. Figure 1 shows the study steps in the CONSORT diagram.

The age range of the adolescents was 13-15 years and the mean age was 13.91. Totally, 57.4% of the students were in grade 8 and 42.6% in grade 9. In the family-centered group, 46.2% were 13-year-old adolescents and in the school-centered group, 50% were 14 years old. In the control group, most of the

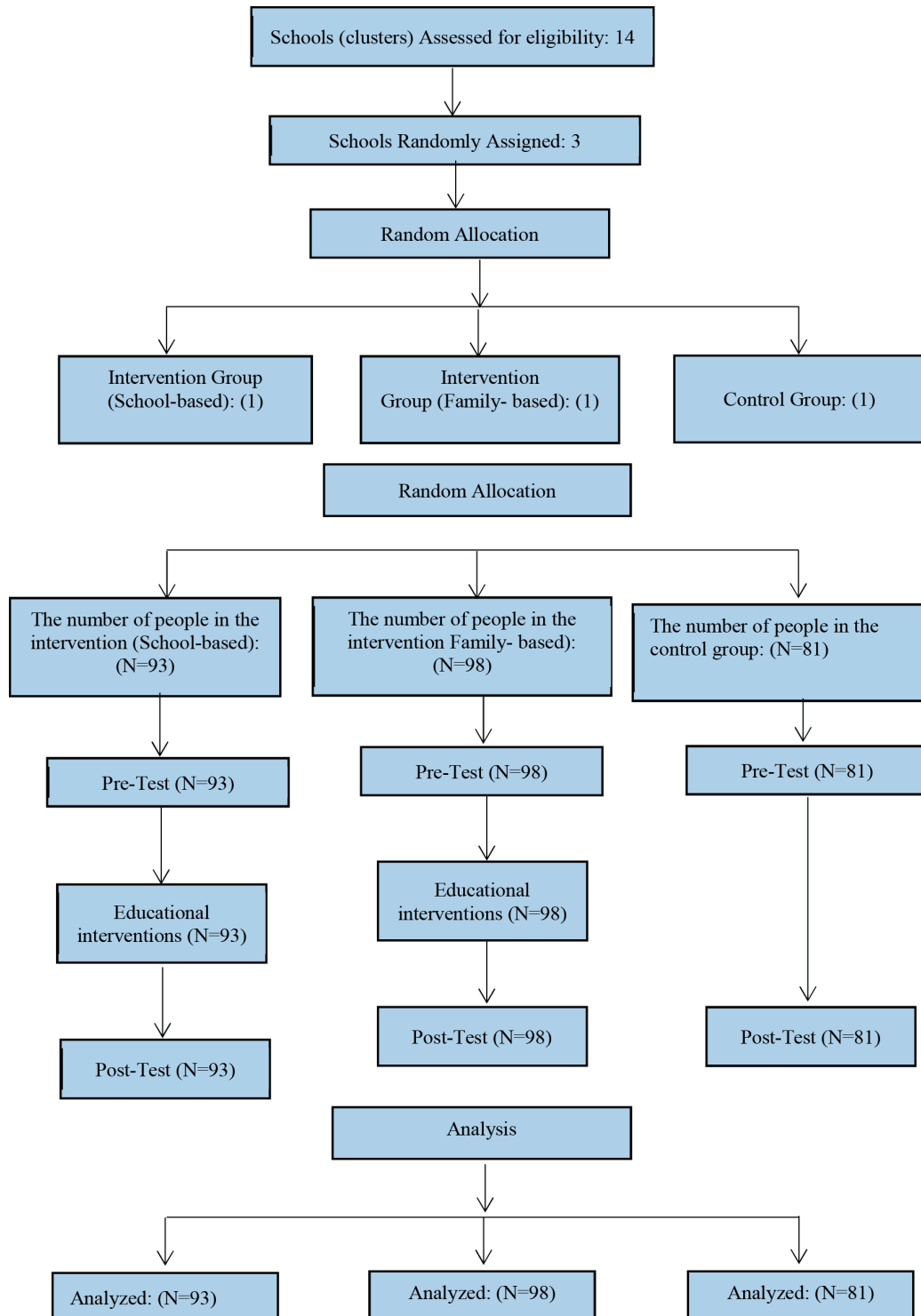


Figure 1: The figure shows the CONSORT flow diagram of study.

participants were 14 years old (30%). The results of Chi-square test showed no significant difference between the three groups in terms of demographic characteristics (Table 1).

Results of paired t-test showed that there is a significant difference between mean knowledge in both school-centered and family-centered groups before and after intervention ($P < 0.001$), but there was no significant difference before and after intervention in the control group ($P = 0.393$). There was a significant difference after the intervention

between the three groups based on one-way ANOVA ($P < 0.001$) (Table 2).

The mean score for knowledge in the experimental (school and family) and control groups before and after the intervention is presented in Figure 2. According to the figure, mean Knowledge in the intervention groups has increased significantly 2 months after the intervention as compared with the control group. The impact was greater in the school-centered group compared with the family-centered group.

Table 1: Demographic characteristics of the study groups

Variables	Sub-Group	Family-based group	School-based group	Control group	P value
		N (%)	N (%)	N (%)	
Age	13	43 (46.2)	27 (27.6)	22 (27.2)	0.061
	14	31 (33.3)	49 (50.0)	30 (37.0)	
	15	19 (20.43)	22 (22.4)	29 (35.8)	
Father's age	35-40	34 (36.6)	36 (36.7)	25 (30.9)	0.611
	41-45	32 (34.4)	45 (45.9)	40 (49.4)	
	>46	27 (29.0)	17 (17.3)	16 (19.8)	
Father's education	< Diploma	49 (52.7)	47 (48.0)	44 (54.3)	0.628
	≥Diploma	44 (47.3)	51 (52.0)	37 (45.7)	
Mother's age	35-40	20 (21.5)	30 (30.6)	25 (30.9)	0.07
	41-45	40 (43.0)	48 (49.0)	34 (42.0)	
	>46	33 (33.5)	20 (20.4)	22 (27.2)	
Mother's education	< Diploma	45 (48.4)	52 (53.1)	57 (70.4)	0.225
	≥Diploma	48 (51.6)	46 (46.9)	24 (29.6)	
Father's job	Employer	17 (18.3)	25 (25.5)	7 (8.6)	0.225
	Worker	24 (25.8)	16 (16.3)	12 (14.8)	
	Others	52 (55.9)	57 (58.2)	62 (76.5)	
Mother's job	Employer	11 (11.8)	7 (7.1)	6 (7.4)	0.091
	Housewife	82 (88.2)	91 (92.9)	75 (92.6)	
Economic status	Moderate	63 (67.7)	68 (69.4)	62 (76.5)	0.115
	Good	30 (32.3)	30 (30.6)	19 (23.5)	

Table 2: Students' knowledge, attitude and behavior about puberty among the study groups before and after intervention

Variables	Groups	Before Intervention Mean±SD	After Intervention Mean±SD	P value*
Knowledge	School-based	68.79±10.16	91.50±11.36	<0.001
	Family-based	65.50±11.84	85.94±10.40	<0.001
	Control	67.96±9.87	67.04±11.27	0.393
	P value**	0.093	<0.001	-
Attitude	School-based	73.13±10.14	82.31±10.53	<0.001
	Family-based	72.61±11.09	80.64±11.73	<0.001
	Control	73.57±9.55	75.27±11.39	0.180
	P value**	0.827	<0.001	-
Behavior	School-based	72.18±10.23	81.18±9.01	<0.001
	Family-based	67.20±12.32	79.31±11.92	<0.001
	Control	73.11±10.87	73.76±11.27	0.645
	P value**	<0.001	<0.001	-
	P value***	-	<0.001	-

*Paired t-test; **Analysis of Variance (ANOVA); SD: Standard Deviation; *Paired t-test; **Analysis of Variance (ANOVA); ***Analysis of Covariance (ANCOVA); SD: Standard Deviation

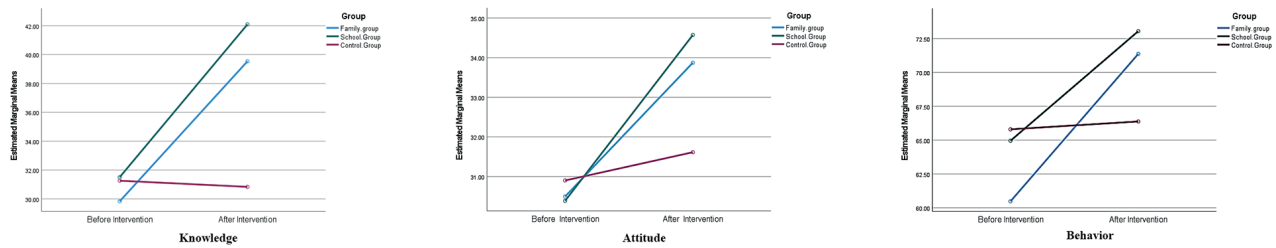


Figure 2: The figure shows the estimated marginal means of knowledge, attitude and behavior.

The result of paired t-test showed that there is a significant difference in terms of attitude in both groups before and after the intervention ($P < 0.001$). But there was no significant difference between mean score for attitude in the control group before and after the intervention ($P = 0.180$). According to ANOVA, mean attitude score is not significantly different in three groups before the intervention ($P = 0.827$) but it increased significantly after the intervention ($P < 0.001$) (Table 2).

The mean score for attitude in the experimental (school and family groups) and control groups before and after the intervention is presented in Figure 2. According to the figure, the mean score for attitude in the intervention groups has increased significantly two months after the intervention as compared with the control group. It is considerable that the impact was greater in the school-centered group as compared with the family-centered group.

The result of paired t-test in the school-centered group showed that the mean score for behavior increased from 72.18 before the intervention to 81.18 after the intervention ($P < 0.001$). There was a significant difference in mean scores for behavior before and after the intervention ($P < 0.001$) but there was no significant difference in the control group ($P = 0.645$). According to ANOVA, the mean score for behavior showed a significant difference before the intervention in the three groups ($P = 0.001$). After the intervention, there was a significant difference between the groups by adjusting pre-test effect based on covariance analysis ($P < 0.001$) which indicates the effect of the intervention on the experimental groups (Table 2).

The mean score for behavior in the experimental (school and family) and control groups before and after the intervention is presented in Figure 2. According to the figure, the mean score for behavior in the intervention groups increased significantly two months after the intervention

as compared with the control group. Notably, the impact was greater in the school-centered group as compared with the family-centered group.

According to post-hoc Scheffe analysis, mean scores for knowledge, attitude and behavior in the three groups are presented. The mean score for knowledge in the school-centered group was significantly higher than that in the family-centered group up to 5.74 ($P = 0.002$) and the control group up to 24.38 ($P = 0.001$). Also, the mean score for attitude in the school-centered group was 1.67 higher than that in the family-centered group but there was no significant difference ($P = 0.589$). The score was +7.12 higher than that in the control group ($P < 0.001$). Mean score for attitude in the family-centered group was +5.45 higher than that in the control group ($P = 0.006$). In addition, the mean score for behavior was determined according to Scheffe analysis in three groups. Mean behavior scores for the family-centered group were -1.99 lower than that in the school-centered group ($P = 0.442$) but +5.42 higher than that in the control group ($P = 0.004$). Mean behavior score in the school-centered group was +7.42 higher than that in the control group ($P < 0.001$) (Table 3).

4. Discussion

The purpose of this study was to compare the effect of family-based education with school-based education on health behaviors during puberty of Iranian adolescent girls. The study results showed that mean score for knowledge in school-centered and family-centered groups had no significant difference as compared with the control group after two months of educational intervention. The only difference was that the results of intervention was higher in the school-centered group as compared with the family-centered group. In this study, 47.3% of girl students in the family-centered group and 43.8% in school-centered group admitted that their information about puberty is enough, while

Table 3: Mean difference of students' knowledge, attitude, and behavior about puberty among the study groups after intervention

Groups		Mean difference of knowledge	Standard error	P value
Family-based	School-based	-5.74	1.59	0.002
	Control	18.64	1.67	0.001
School-based	Family-based	5.74	1.56	0.002
	Control	24.38	1.65	0.001
Control	Family-based	-18.64	1.67	0.001
	School-based	-24.38	1.65	0.001
Groups		Mean difference of attitude	Standard error	P value
Family-based	School-based	-1.67	1.62	0.589
	Control	5.45	1.70	0.006
School-based	Family-based	1.67	1.62	0.589
	Control	7.12	1.68	<0.001
Control	Family-based	-5.45	1.70	0.006
	School-based	-7.12	1.69	<0.001
Groups		Mean difference of behavior	Standard error	P value
Family-based	School-based	-1.99	1.56	0.442
	Control	5.42	1.63	0.004
School-based	Family-based	1.99	1.56	0.442
	Control	7.42	1.61	<0.001
School-based	Family-based	-5.42	1.63	0.004
	Control	-7.42	1.1	<0.001

the score for knowledge, especially during puberty was 67.15 out of 100. The study results showed that school girls have not enough knowledge about puberty changes; therefore, they are not ready to encounter puberty. As puberty can cause various changes in the body, it can be a stressful period for some girls. Since many health habits and behaviors are formed during adolescence, proper health education during puberty is necessary (23).

Study of Thakre and colleagues showed that only 36.95% of the participants had knowledge of menstruation and menarche while, in most cultures, girls' health information about menstruation is limited (24) Nagpur district. J. Clin. Diagn Res. 2011;5(5). In Iran, the prevailing environment and cultural norms within families and society often hinder open discussions about sexual matters, making it difficult for young girls to confide in their mothers for fear of facing criticism and disapproval. In this study, shame was the most common feeling that girls experienced at their menarche. The negative feelings of girls during menstruation, including shame, fear and anxiety indicate that the knowledge and awareness of families about menstrual health should be increased and mothers should have a friendly relationship with their children (25).

In many developing nations, many teenage girls are influenced by the culture of silence and

do not have appropriate information about puberty health (14). The majority of students in this study live with their parents but low knowledge score about puberty is caused by culture and old customs. Urban societies in the study area have maintained their traditional way of life, with the primary catalyst for their transition to cities being population growth. Despite this shift, there has been minimal cultural and social transformation in these areas, as rural customs continue to dominate. The stigma surrounding girls and their limited communication skills suggest that the presence or absence of parents does not significantly impact the health knowledge of young women in these communities. These findings were inconsistent with the study of Habtegiorgis and colleagues that showed there is a significant relationship between health behaviors during puberty and living with parents (26) sanitation, and hygiene research. PLoS One. 2021;16(6).

The comparison of mean attitude score in the school-centered and family-centered groups showed no significant difference but a significant difference was found in the control group. The score for attitude improved significantly by education. In a study by Rani and colleagues, after the educational intervention, the score for attitude improved (27). Knowledge also affects girls' attitudes toward healthy behaviors, making it a crucial factor in determining girls' menstrual health (28).

The study results showed that intervention increased girls' attitude about puberty health. These findings were consistent with the results of previous research (29, 30). In a study by Alekhya and colleagues, students' attitude toward puberty health had a significant increase after education (31).

The response to reaching menarche is linked to how positively menstruation is perceived, with a realization that it is a natural process and a healthy representation of one's body. Some girls may have negative reactions to menstruation based on their perception of it. This perception is closely tied to how well girls understand menstruation. When girls view menstruation in a negative light, their level of preparedness before reaching menarche plays a significant role in their initial experiences with menstruation. Essentially, girls who are unprepared tend to have negative reactions to menarche, while those who are well-prepared exhibit more positive responses (10). Majlessi and colleagues reported that using education interventions through different educational methods can effectively enhance attitudes more significantly than traditional lecture methods (32).

Results of comparing mean health behavior scores in the school-centered and family-centered intervention groups showed that there is a significant difference between behavior score in both groups with the control group, but there was no change in the mean score in the school-centered group as compared with the family-centered group after intervention. Mean behavior scores in the school-centered and family centered groups increased after the intervention but the difference in scores showed the effectiveness of education in increasing health behaviors in the school-centered group.

In a study by Darabi and Yaseri using Theory of Planned Behavior, the performance of the participants showed a significant difference after educational intervention (33). Parasuraman and co-workers showed statistically significant improvements in the knowledge of menstruation, perceived attitude, and practice of good menstrual hygiene from pre to post-test intervention (34) Tamilnadu. *J Family Med Prim Care*. 2022 Sep;11(9). After educational intervention, behavior improved in the school-centered intervention group. Students are increasingly asking their mothers questions about puberty and related issues. In the present study, students took bath standing and in short-time. They use of cotton

bright-colored cloths washing underwear, drying it in the sun, and ironing increased and also, changing tampons every three to four hours increased. They used more iron pills during menstrual period in case of severe pain, and they use ibuprofen and Mefenamic acid. Following the educational intervention, there was a significant improvement in the percentage of students who correctly learned proper cleaning procedures (first genitals, and then, anus). The percentage rose which is consistent with the results of other study (35). Using sour and salty foods reduced after the intervention; using meat, egg and fish increased. Teachers play a crucial role in educating girls about important topics such as underwear, pain management during menstruation, and proper nutrition. This educational information not only enhances their health knowledge but also promotes healthier behaviors among girls (36).

According to the findings of the present study, training courses on physical health during puberty are necessary for girls. Mothers of teenage girls also need further training. The school environment promotes and applies positive changes in the habits of teenagers and their parents. Also, the findings of this study demonstrated that educational interventions raise adolescent girls and their mother's knowledge, change their attitude, and offer them practical knowledge of health in puberty. It is suggested that future research should focus on developing interventions that effectively enhance the understanding and positive outlook of adolescent girls and their mothers towards the health aspects of puberty.

4.1. Limitations

Data collection using self-reported questionnaire was a limitation of this study which is inevitable. The research was limited by focusing on a specific age group, which may restrict its applicability to all adolescents going through puberty. Additionally, the study did not solely examine the attitudes of students. Future research could benefit from incorporating more detailed psychological constructs, like health beliefs, to provide a more comprehensive understanding of the topic (perceived interests, perceived barriers, and perceived self-efficacy).

5. Conclusions

Although education was effective in both groups

but education by teachers is more effective than education by mothers. The results showed that school-centered intervention programs can provide suitable conditions for educating adolescents as compared with family-centered intervention. Educational institutions provide a conducive environment for guiding and shaping the minds of adolescents. Teachers play a crucial role in the lives of young individuals, acting as influential figures after their families. Collaborative efforts between families and schools can lead to positive outcomes by enhancing students' understanding and consciousness. It is imperative for school leaders and educators to engage in ongoing professional development opportunities. Given that adolescence marks the onset of menstruation for many girls, health programs in schools often focus on addressing the specific challenges faced by this age group.

Acknowledgement

This research was extracted from the MSc thesis of Ms. Leila Gholami Dastenaee at Shahid Beheshti University of Medical Sciences. Also, we express our gratitude to all who helped us to conduct this research especially the esteemed students at schools.

Authors' Contribution

Leila Gholami Dastenaee: Substantial contribution to conception and design of the protocol, tools development, coordinated the research team and data collection, drafting the work. Mohtasham Ghaffari: Substantial contribution to conception and design of the protocol, tools development, data analysis and interpretation, developed the first draft of the manuscript and review the manuscript critically for important intellectual content. Sakineh Rakhshanderou: Substantial contribution to conception and design of the protocol, tools development, data analysis and interpretation, developed the first draft of the manuscript and review the manuscript critically for important intellectual content. Ameneh Pooresmaeil Dorosteh: Substantial contribution to conception and design of the protocol, developed the first draft of the manuscript and review the manuscript critically for important intellectual content. All authors approved of the final version to be published, and agree to be accountable for all aspects of the work in ensuring that questions

related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Funding

This work was supported by Shahid Beheshti University of Medical Sciences.

Ethical Approval

The Ethics Review Board of Committee of Shahid Beheshti University of Medical Sciences, approved the present study with the code of IR.SBMU.PHNS.REC.1396.76. Also, written informed consent was obtained from the participants.

Conflict of Interest: None declared.

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