Educational Intervention on Menstrual Hygiene Knowledge and Attitude among Adolescent Girls in Dehradun: A Quasi-Experimental Study

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Abstract: Adolescence embodies the complex biological changes of human growth, featuring swift physical and psychological maturation toward adult form. Remarkably, many girls undergo puberty before seven, with black girls often experiencing it earlier than white peers. The study aims to assess the impact of educational intervention on knowledge and attitude regarding menstrual hygiene among adolescent girls at selected schools in Dehradun, Uttarakhand. The study revealed that the pretest knowledge score had a mean of 15.94 with a standard deviation 5.55. In contrast, the post-test knowledge score significantly increased, with a mean of 17.66 and a standard deviation of 5.35. The mean difference of 1.722 between the pretest and post-test scores was statistically significant, as indicated by the t-value of 19.259 (p < 0.01). The pretest attitude score had a mean of 12.56 with a standard deviation of 2.48. In contrast, the post-test attitude score exhibited a notable increase, with a mean of 15.38 and a standard deviation of 3.26. The mean difference (MD) of 2.82 between the pretest and post-test scores was found to be highly statistically significant, as indicated by the t-value of 10.759 (p < 0.001). Hence, the null hypothesis is rejected, and the alternate hypothesis is accepted. Notably, fathers' educational status and family income emerged as significant factors. Furthermore, habitat and fathers' educational status emerged as significant influencers of attitudes.

Keywords: Menstrual Hygiene; Adolescent Girls; Attitude Educational Intervention; Disability Adjusted Life Years (DALYS); Educational Status of Mother; A Quasi-Experimental Study.

1. Introduction

Adolescence, at its core, represents the intricate biological processes of this transformative stage in human development. It constitutes a period marked by rapid physical and psychological maturation, during which individuals acquire a nearly complete adult physique [5]. Notably, a substantial number of females experience pubertal modifications before reaching the age of seven, with these transformations manifesting earlier in black girls compared to their white counterparts. Gynecological concerns during adolescence stand apart within the spectrum of gynecological conditions affecting individuals of all ages [6]. This distinction arises from the distinctive and age-specific physical challenges involved and the interconnected psychological

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factors that substantially influence the maturation process and emotional adaptation as one transition from adolescence to adulthood [7]. Notably, more than half of the global adolescent population is concentrated in Asia. In terms of sheer numbers, South Asia, along with other regions, hosts over 350 million adolescents, some figures surpassing most other regions. East Asia and the Pacific are closely followed, with an approximate count of 300 million adolescents. These regions exhibit a higher concentration of adolescents compared to anywhere else in the world [8].

However, it's essential to acknowledge that sub-Saharan Africa stands out as the region where teenagers constitute the highest proportion of the population, comprising nearly 23 percent of its inhabitants aged 10–19. The variations in the socio-economic landscape across regions regarding the percentage of young girls can be attributed to a demographic transition characterized by declining mortality rates followed by reductions in fertility rates [9]. This transitional phase, marked by lower mortality but continued fertility rates, leads to a significant youth population within a society, often referred to as a 'youth bulge.' As fertility rates decline, a favorable age structure can be created in these countries and regions, featuring a growing working-age population and fewer dependents [10]. The transition from infancy to adulthood encompasses significant transformations in physical, sexual, psychological, and social development that unfold simultaneously, offering opportunities for growth while posing threats to their health and well-being [11]. Contrary to common misconceptions, adolescents confront notable public health challenges. In 2015, the region witnessed the loss of approximately 1.7 million adolescents, with leading causes of mortality encompassing self-harm, such as suicide, traffic accidents, and maternal mortality in women 12].

Furthermore, the region registers substantial morbidity among adolescents, accounting for a staggering loss of 21,783 Disability Life Years (DALYs) per 100,000 adolescents due to issues like self-harm, iron deficiency anemia, mental disorders, road traffic accidents, and diarrheal diseases [13]. It's crucial to recognize that investments in adolescent health yield triple benefits, encompassing enhancements in adolescent well-being, adult health (by mitigating risk factors for chronic diseases like non-communicable diseases), and the health of future generations. Menstrual irregularities represent a common concern among adolescent girls, often giving rise to discomfort and distress [14]. It's not unusual for young girls to encounter issues with their menstrual cycles, experiencing irregularity, pain, and excessive flow, particularly during the initial years following menarche. While severe medical conditions are infrequent, menstrual problems typically lessen with age. Providing reassurance and offering basic guidance, including mild pain relievers, can frequently alleviate these symptoms. General practitioners are well-qualified to offer such care, and referrals to specialists are usually unnecessary. Although menstrual dysfunction is relatively uncommon, its impact on daily life and the potential for school absenteeism should not be underestimated. Numerous therapeutic approaches are available for adolescents, and while their safety is established, their effectiveness is often extrapolated from research conducted with adults [15].

During the early stages of adolescence, young girls often endure considerable discomfort with each menstrual cycle. Given the susceptibility of this age group, it becomes apparent that tailored therapeutic approaches are warranted. Adolescent females are notably prone to experiencing dysmenorrhea and menstrual irregularities, accompanied by common symptoms like fatigue, back pain, and headaches. It's worth noting that the prevalence of dysmenorrhea seems to be on the rise within the population, potentially exerting an adverse impact on female productivity. Consequently, implementing a comprehensive school-based educational program addressing menarche and menstrual issues can empower girls to manage these challenges better and seek appropriate medical assistance when needed. Lifestyle modifications, including the consumption of unhealthy food and reduced physical activity, can significantly impact women's menstrual cycles. Therefore, promoting health education initiatives within elementary schools that underscore the importance of adopting healthy dietary habits, regular physical exercise, and a comprehensive understanding of menstrual hygiene is imperative. Enhancing menstrual health assumes paramount importance as it serves as a preventive measure against a spectrum of present and future gynecological complications, encompassing conditions such as infertility, obesity, and polycystic ovaries.

1.1. Research Statement

The Impact of Educational Intervention on Knowledge and Attitude Regarding Menstrual Hygiene among Adolescent Girls at Selected Schools in Dehradun, Uttarakhand: A Quasi-Experimental Study.

2. Literature Review

Nastiti et al. [1] conducted a quasi-experimental study in Sampit, Kalimantan, Indonesia, following ethical approval from the Nursing University of Airlangga's review committee in Surabaya, East Java, Indonesia. Their research cohort comprised female grade VII students attending a public junior high school in Sampit. They were subsequently divided into intervention group A and control group B. Group A received an extensive health education intervention delivered through two video conference sessions, each with a 90-minute educational leaflet. Meanwhile, the control group received solely the leaflet. The study encompassed 70 participants, evenly distributed with 50% in each group. The age spectrum ranged from 12 to 14 years, with 71.4% of individuals in Group A and 80% in Group B being 13 years old. Notably, the age of menarche was 12 years for 48.6%

of subjects in both groups. After the intervention, group A exhibited a statistically significant increase in knowledge levels, whereas group B showed no significant difference.

Salama and Elbana [2] conducted a quasi-experimental study aimed at assessing the efficacy of a health intervention program. Their research involved 578 students, encompassing intervention and control participants, selected from 12 schools within Tehran Province, Iran, employing a rigorous multistage random sampling approach. The intervention program consisted of seven comprehensive 2-hour educational sessions. Following the establishment of the researcher-made questionnaire's reliability and validity, this instrument was employed for data collection, and both groups were subsequently monitored for six months. After the educational intervention, noteworthy outcomes emerged, with the intervention group exhibiting significantly higher mean scores in menstrual health-related knowledge and constructs of the theory of planned behavior compared to the control group (p<0.001 for all dimensions). These findings underscore the remarkable effectiveness of menstrual health interventions within school settings, and they serve as a compelling call to action for health policymakers to champion initiatives to enhance performance in schools.

Williams and Creighton [3] investigated to identify a range of gynecological concerns prevalent among adolescent girls seeking medical care in outpatient departments. Their research encompassed adolescent females falling within the age bracket of 10 to 19. A comprehensive assessment of various gynecological issues was undertaken, documenting 824 cases, representing 8.33 percent of teenage girls seeking treatment in the outpatient gynecology department (GOPD) during the study's duration. The most commonly reported grievance was related to menstrual irregularities, accounting for a substantial 67.11 percent of cases, trailed by concerns regarding vaginal discharge at 18.68 percent and urinary tract infections (UTI) at 9.8 percent. Within the spectrum of menstrual problems, the issues spanned from irregular menstruation (55.15 percent) and dysmenorrhea (30.74 percent) to amenorrhea (14.10 percent). Notably, the primary underlying cause of menstruation irregularities was identified as polycystic ovarian disease (PCOD). In a minority of instances, occurrences of teenage pregnancy (0.84 percent) and ovarian tumors (0.60 percent) were also detected.

Parasuraman et al. [4] conducted a comprehensive systematic evaluation of the existing body of evidence concerning menstrual hygiene management (MHM) in schools across India, with a concurrent focus on government-driven initiatives to address this issue. From an initial pool of 1125 articles identified in the search, 183 papers were selected for inclusion in this review, utilizing a predefined data-extraction template. Employing meta-analysis techniques, the study aimed to ascertain MHM's pooled prevalence (PP) within school settings. The findings revealed that less than half of the surveyed girls were aware of menarche menstruation (PP 0.45, 0.39 to 0.51, I2=100.0 percent, n=122). Furthermore, the study highlighted that teachers played a relatively limited role as a source of menstruation-related knowledge for girls (PP 0.07, 0.05 to 0.08, I2=100.0 percent, n=86). Approximately 50 percent of schools featured segregated restroom facilities for female students (PP 0.56, 0.42 to 0.75, I2 100.0 percent, n=11).

3. Material and Methods

For the present study, a quantitative approach was adopted to assess the knowledge regarding menstrual hygiene Among Adolescent Girls at Selected Schools in Dehradun. In the context of the study at hand, a quasi-experimental research framework has been deployed to fulfill the stated investigative objectives. The present study was conducted at selected schools in Dehradun, and the accessible population was adolescent girls at selected schools in Dehradun. A total of 90 adolescent girls were selected using a non-probability purposive sampling technique from selected schools in Dehradun.

The tool was developed by keeping in mind the study's objectives and prepared after an extensive review of literature and internet sources and through discussion with guide, co- guide, and opinions of various Obstetrics and Gynecological Nursing and pediatric nursing experts. The tool's reliability was assessed by Cronbach's alfa method (r=0.77). The tool was found to be reliable. The analytical scrutiny of the amassed data was executed in alignment with the specified research objectives, employing descriptive and inferential statistical methodologies. Specifically, frequency, percentage, median, and standard deviation measures were computed to elucidate the data set's characteristics. Additionally, independent and dependent 't' tests and Chi-square tests were invoked to ascertain any associations between variables.

3.1. Description of Tool

The provided tool consists of three main parts, each focusing on gathering different types of information related to adolescent girls' socio-demographic background, their knowledge of menstrual hygiene, and their attitudes towards menstrual hygiene management.

Part A: Socio-Demographic Profile This section is designed to collect essential background information from adolescent girls, including variables such as age, religion, class, habitat, type of family, father's educational status, mother's educational status,

family income, and the occupations of both parents. This data provides insight into the social and economic factors that could influence the girls' knowledge and attitudes toward menstrual hygiene. Collecting this information is critical as it allows for a nuanced understanding of the background influences on the girls' perceptions and practices related to menstruation.

Part B: Pre-Designed Knowledge Questionnaire This section focuses on assessing the adolescent girls' knowledge of menstrual hygiene. It consists of 30 items, each aimed at gathering information on menstrual hygiene practices, basic information about menstruation, and its management. For scoring, each correct response is awarded one point, while no points are given for incorrect responses. The knowledge level is categorized into three groups:

- Good: A score between 24 and 30, equivalent to more than 75% correct answers.
- Average: A score between 15 and 23, which corresponds to 50-75% correct answers.
- Below Average: A score of less than 15, corresponding to less than 50% correct answers. This section allows researchers or educators to gauge the overall knowledge levels of participants and identify gaps that may need to be addressed through education or intervention programs.

Part C: Self-Structured Three-Point Likert Scale This section is designed to assess attitudes towards menstrual hygiene. It consists of 15 items that help identify the perceptions and management practices of menstrual hygiene among adolescent girls. The scoring criteria for attitude are based on the total score out of 30 points, categorized into:

- Positive Attitude: Scores between 16 and 30, representing more than 50% of the total possible points.
- Neutral Attitude: A score of 15, exactly 50% of the total points.
- Negative Attitude: Scores between 1 and 14, representing less than 50% of the total possible points. This section highlights the participants' emotional and psychological perspectives towards menstruation and menstrual hygiene management.

This tool, by combining socio-demographic data, knowledge assessment, and attitude evaluation, offers a comprehensive means to understand and address menstrual hygiene management among adolescent girls.

4. Analysis and Interpretation

The socio-demographic profile of 90 adolescent girls from selected schools in Dehradun, Uttarakhand, reveals a diverse range of backgrounds. The data collected includes key information such as the girls' age, religion, class, and habitat. Additionally, details regarding family type, the father's educational status, the mother's educational status, and the occupations of both parents were gathered. Family income was also considered to provide a broader context of the economic conditions in which these adolescents live. By analyzing these socio-demographic factors, we can gain a better understanding of the environmental and familial influences that might affect the girls' knowledge and attitudes toward menstrual hygiene management in the region. This comprehensive profile forms the foundation for further analysis and comparison of the knowledge and attitudes assessed in the subsequent parts of the study (Table 1).

Table 1: Socio-demographic Profile of adolescent girls at selected schools in Dehradun, Uttarakhand (N=90)

S.No.	Variables	f	%
1.	**Age (years)**		
	≤12	21	23.3
	13-14	38	42.2
	15-16	31	34.4
2.	**Religion**		
	Hindu	38	42.2
	Sikh	20	22.2
	Muslim	19	21.1
	Christen	13	14.4
3.	**Class**		
	7th-8th	18	20.0
	9th-10th	42	46.7
	11th-12th	30	33.3
4.	**Type of family**		
	Nuclear	53	58.9

|			
	Joint	37	41.1
5.	**Habitat**		
	Rural	70	77.8
	Urban	20	22.2
6.	**Educational status of the father**		
	Informal	14	15.6
	upto 10th	25	27.8
	upto 12th	22	24.4
	Graduate and above	29	32.2
7.	**Educational status of the mother**		
	Informal	25	27.8
	upto 10th	18	20.0
	upto 12th	39	43.3
	Graduate and above	8	8.9
8.	**Occupation of father**		
	Govt. job	14	15.6
	Pvt job	33	36.7
	Business	14	15.6
	Others	29	32.2
9.	**Occupation of mother**		
	Housewife	62	68.9
	Govt job	11	12.2
	Pvt job	17	18.9
10.	**Family income (Rs./month)**		
	<15000	6	6.7
	15000-30000	9	10.0
	31000-45000	30	33.3
	>45000	45	50.0
11.	**Source of Information**		
	Social Media	25	27.8
	Printed Media	19	21.1
	Television	46	51.1
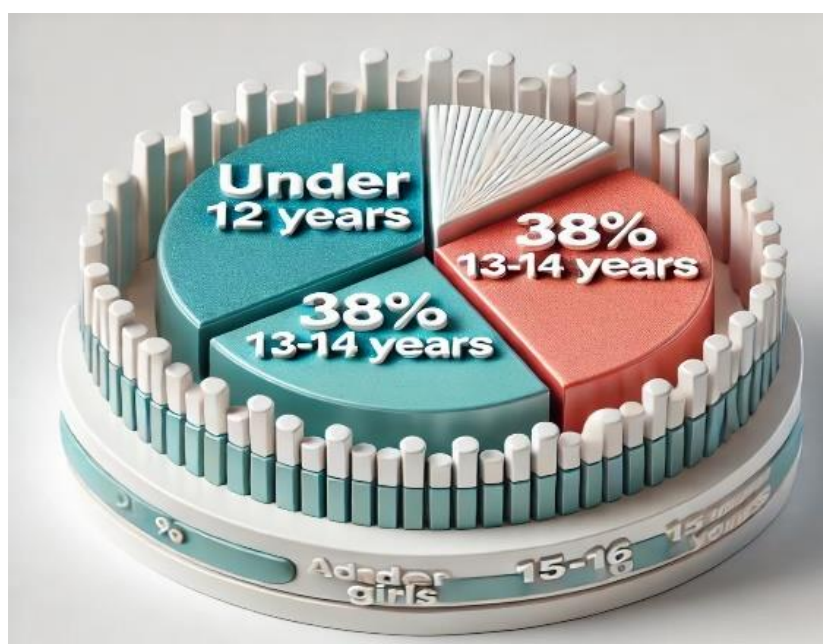
Figure 1: Pie chart to show the distribution of age in years among adolescent girls

Age: The age distribution of the participants reveals that the majority (42.2%) fall within the age group of 13-14 years, followed by 34.4% in the 15-16 years category and 23.3% aged 12 years or younger. This indicates a fairly even distribution of air across these age groups (Figure 1).
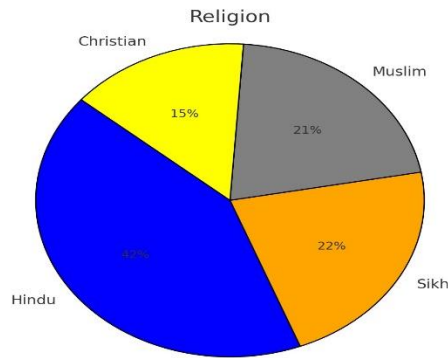

Figure 2: Pie-Chart to show the percentage of religion

Religion: In terms of religion, the majority of the adolescent girls are Hindu (42.2%), followed by Sikh (22.2%), Muslim (21.1%), and Christian (14.4%). This diversity in religious backgrounds reflects the multicultural nature of the study population in Dehradun (Figure 2).
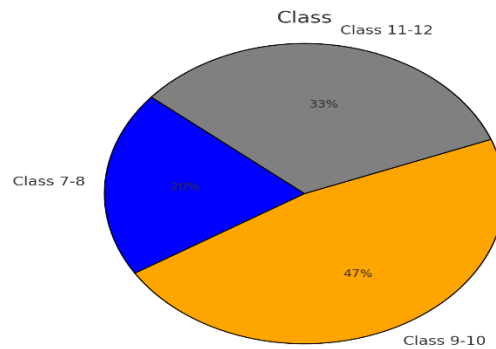

Figure 3: Pie chart to show the distribution of girls in different classes.

Class: The distribution of participants across different classes shows that 46.7% are in 9th-10th grade, 33.3% are in 11th-12th grade, and 20% are in 7th-8th grade. This suggests a relatively higher representation of middle and high school girls (Figure 3).
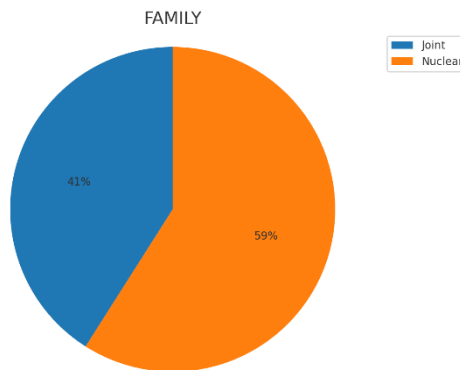

Figure 4: Pie-Chart to show the status of the family

Type of Family: Most girls come from nuclear families (58.9%) compared to joint families (41.1%). This may have implications for these adolescents' family dynamics and support systems (Figure 4).
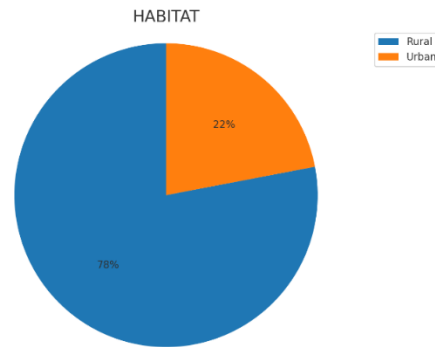

Figure 5: Pie chart to show the habitat of adolescent girls

Habitat: The study reveals that a significant proportion of the participants reside in rural areas (77.8%) compared to urban areas (22.2%), indicating the predominance of a rural population among the selected schools (Figure 5).
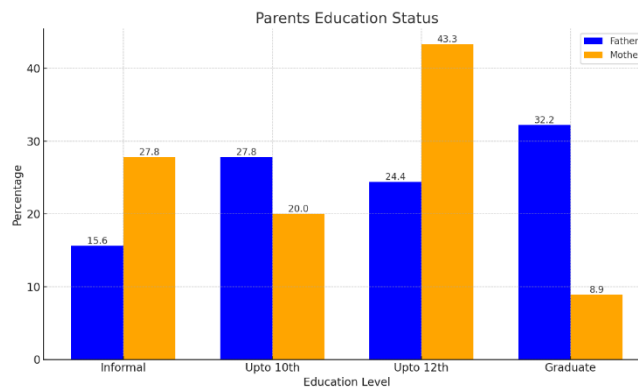
Figure 6: Bar Diagram to Represent the Parent's Education Status

Educational Status of Parents: The educational status of both fathers and mothers varies considerably (Figure 6). Fathers' educational levels show that 32.2% have graduated and above, 27.8% have education up to the 10th grade, 24.4% up to the 12th grade, and 15.6% have informal education. Meanwhile, mothers' educational levels show a different pattern, with 43.3% having education up to the 12th grade, 27.8% having informal education, 20% having education up to the 10th grade, and only 8.9% having graduated and above. These varying parental education levels can significantly influence the girls' educational aspirations and outcomes.

Figure 7: Bar diagram to represent the occupation status of parents

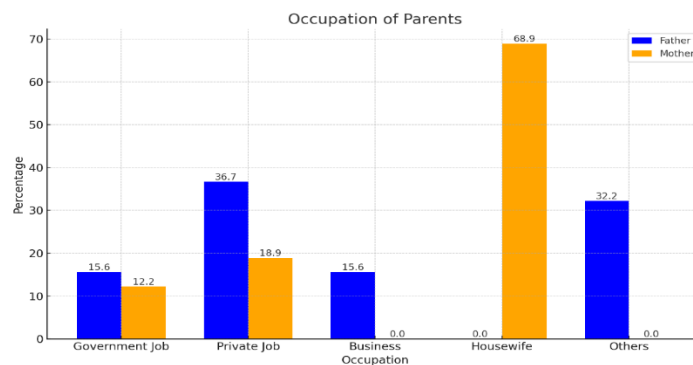Occupation of Parents: Fathers' occupation reveals a diverse distribution, with 36.7% employed in private jobs, 32.2% in other occupations, 15.6% in government jobs, and 15.6% in business (Figure 7). On the other hand, the majority of mothers (68.9%) are homemakers, while 18.9% are in private jobs, 12.2% in government jobs, and 68.9% in other occupations. These employment patterns highlight the economic diversity within the families of adolescent girls.
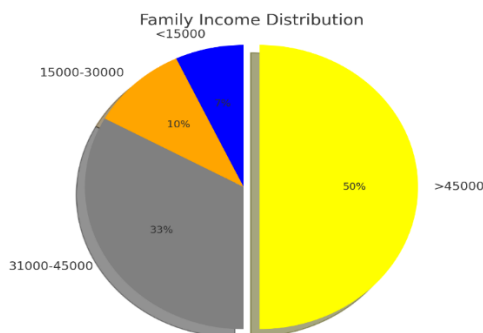

Figure 8: Pie Chart to show the family income levels

Family Income: Family income levels vary significantly among the participants, with 50% reporting a monthly income of more than Rs. 45,000, 33.3% falling in the income range of Rs. 31,000 to Rs. 45,000, 10% earning between Rs. 15,000 and Rs. 30,000, and a minor portion (6.7%) having an income less than Rs. 15,000. These family income variations may influence the girls' resources for education and other needs (Figure 8).
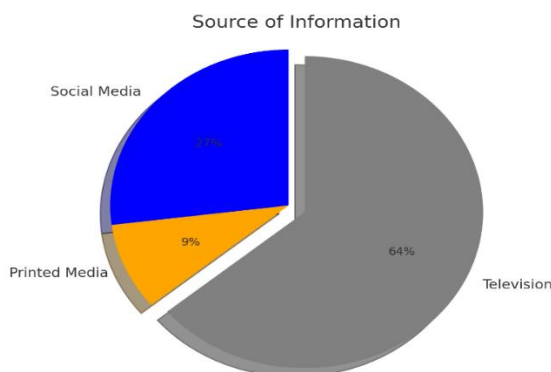
Figure 9: Pie chart to show the source of information

Source of Information: The main sources of information for adolescent girls include television (51.1%), social media (27.8%), and printed media (21.1%). This Indicates a high reliance on electronic and visual media for information dissemination among the study population (Figure 9).

Section II: Findings related to assessing the pretest and post-test level of knowledge and attitudes regarding menstrual hygiene among adolescent girls.

Table 2: Pretest and post-test level of knowledge regarding menstrual hygiene among adolescent girls (N=90)

S. No.	Level of Knowledge	Pretest		Post-test	
		f	%	f	%
1.	Good	13	14.4	20	22.2
2.	Average	41	45.6	36	40.0
3.	Below average	36	40.0	34	37.8

Figure 10: Bar representation for pretest and post-test level of knowledge regarding menstrual hygiene among adolescent girls

Table 2 and Figure 10 present the pretest and post-test levels of knowledge regarding menstrual hygiene among the 90 adolescent girls participating in the study. Before any intervention, 14.4% of the girls exhibited a "good" level of knowledge, 45.6% had an "average" level, and 40.0% had a "below averag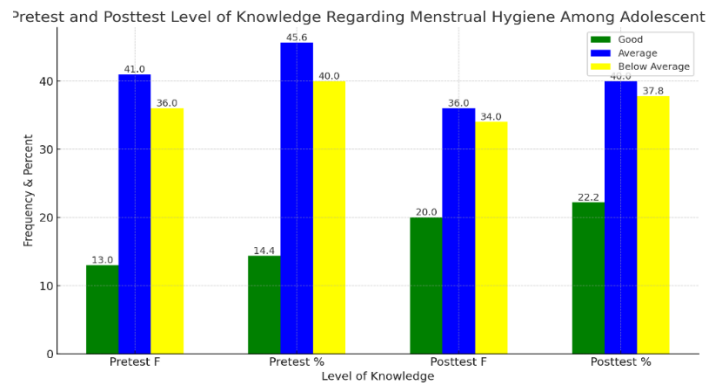e" level of knowledge. Following the intervention, there was a noticeable improvement in knowledge, with 22.2% now categorized as having a "good" level, 40.0% maintaining an "average" level, and 37.8% retaining a "below average" level. These results suggest that the intervention positively enhanced knowledge about menstrual hygiene, as evidenced by the increase in the percentage of girls with a "good" level of knowledge. However, a substantial portion of the participants still falls within the "below average" category, indicating a need for continued educational efforts to further improve awareness and understanding of menstrual hygiene among adolescent girls.

Table 3: Pretest and post-test level of attitude regarding menstrual hygiene among adolescent girls (N=90)

S. No.	Attitude	Pretest		Posttest	
		f	%	f	%
1.	Positive	14	15.6	45	50.0
2.	Neutral	14	15.6	8	8.9
3.	Negative	62	68.9	37	41.1
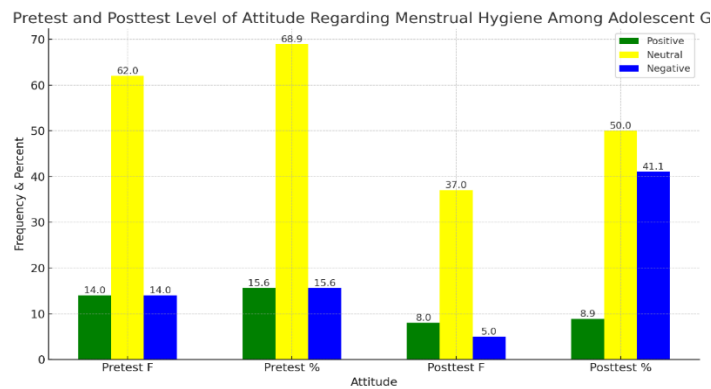
Figure 11: Pretest and post-test level of attitude regarding menstrual hygiene among adolescent girls.

Table 3 and Figure 11 illustrate the pretest and post-test levels of attitude regarding menstrual hygiene among the 90 adolescent girls in the study. Before the intervention, a significant majority of the girls (68.9%) held a "negative" attitude, while only 15.6% had a "positive" attitude, and the remaining 15.6% were categorized as "neutral" in their attitudes. Following the intervention, a substantial positive shift in attitudes is observed, with 50.0% of the girls now exhibiting a "positive" attitude, 41.1% retaining a "negative" attitude, and a smaller proportion (8.9%) remaining "neutral." These findings indicate a substantial improvement in the girls' attitudes toward menstrual hygiene after the intervention, with a noteworthy increase in the percentage of girls holding a "positive" attitude. While the shift is encouraging, the persistence of a "negative" attitude among a significant portion highlights the importance of continued efforts to address and transform attitudes surrounding menstrual hygiene among adolescent girls.

Section III: Findings related to assessing educational intervention's impact on adolescent girls' knowledge and attitude regarding menstrual hygiene.

Table 4: Impact of educational intervention on knowledge regarding menstrual hygiene among adolescent girls (N=90)

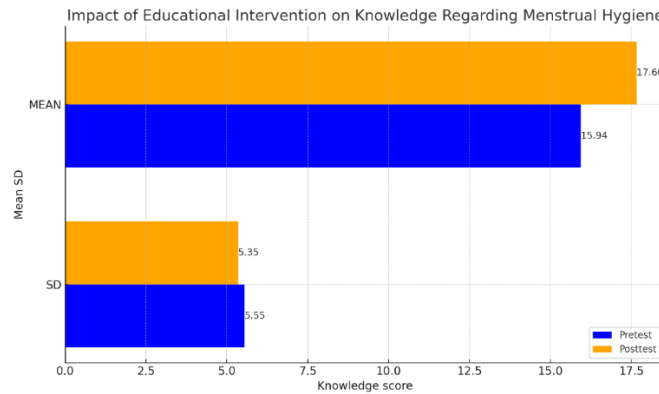| No.	Knowledge Score	Mean	SD	MD	t value	df	*p*-value
1.	Pretest	15.94	5.55	1.722	19.259	89	.001*
2.	Posttest	17.66	5.35				
*NB: SD= Standard deviation, MD=Mean difference, df= degree of freedom, *=significant at 0.01 level*							

Figure 12: Impact of educational intervention on knowledge regarding menstrual hygiene among adolescent girls.

Table 4 and Figure 12 present the impact of the educational intervention on the knowledge regarding menstrual hygiene among the 90 adolescent girls in the study. The pretest knowledge score had a mean of 15.94 with a standard deviation of 5.55, while the post-test knowledge score showed a significant increase with a mean of 17.66 and a standard deviation of 5.35. The mean difference of 1.722 between the pretest and post-test scores was statistically significant, as indicated by the t-value of 19.259 ($p < 0.01$). These results demonstrate that the educational intervention had a substantial positive impact on improving the knowledge of adolescent girls regarding menstrual hygiene. The statistically significant difference underscores the effectiveness of the intervention in enhancing their knowledge, emphasizing the significance of such interventions in addressing menstrual hygiene-related issues among adolescent girls, thereby contributing to their overall well-being and health.

Table 5: Impact of educational intervention on attitude regarding menstrual hygiene among adolescent girls (N=90)

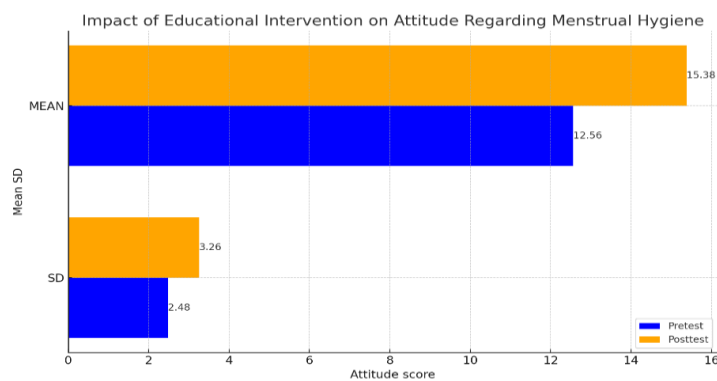| No.	Attitude Score	Mean	SD	MD	t value	df	*p*-value
1.	Pretest	12.56	2.48	2.82	10.759	89	.001*
2.	Posttest	15.38	3.26				
NB: SD= Standard deviation, MD=Mean difference, df= degree of freedom, NS= non-significant at 0.05 level							

Figure 13: Impact of educational intervention on attitude regarding menstrual hygiene among adolescent girls

Table 5 and Figure 13 show the impact of the educational intervention on the attitudes regarding menstrual hygiene among the 90 adolescent girls in the study. The pretest attitude score had a mean of 12.56 with a standard deviation of 2.48. In contrast, the post-test attitude score exhibited a notable increase, with a mean of 15.38 and a standard deviation of 3.26. The mean difference (MD) of 2.82 between the pretest and post-test scores was found to be highly statistically significant, as indicated by the t-value of 10.759 ($p < 0.001$). These findings demonstrate that the educational intervention had a substantial and positive impact on improving adolescent girls' attitudes regarding menstrual hygiene.

Section IV: Findings related to the relationship between post-test knowledge scores and attitude regarding menstrual hygiene among adolescent girls.

Table 6: The post-test relationship between knowledge and attitudes regarding menstrual hygiene among adolescent girls (N=90)

Variables	r value	P value
Knowledge	.482**	0.001
Attitude		
*NB: **. Correlation is significant at the 0.01 level (2-tailed).*		

Table 6 depicts the post-test relationship between knowledge and attitudes regarding menstrual hygiene among 90 adolescent girls; a significant positive correlation was identified. The Spearman's rho correlation coefficient of 0.482** indicates a strong and statistically significant relationship between post-test knowledge scores and attitude scores ($p < 0.01$, 2-tailed). This finding suggests that as adolescent girls' knowledge about menstrual hygiene increases, their attitudes towards it also tend to become more positive. This outcome underscores the importance of educational interventions aimed at improving knowledge about menstrual hygiene, as they appear to have a favorable impact on attitudes, potentially contributing to better menstrual health practices among this demographic.

Section V: Findings related to the association between the level of knowledge regarding menstrual hygiene and socio-demographic variables of adolescent girls.

Table 7: Association between pretest level of knowledge regarding menstrual hygiene among adolescent girls with selected socio-demographic variables (N=90)

S. No.	Variables	Level of Knowledge			χ^2 value	df	p-value
		Good	Average	Below average			
1.	**Age (years)**						
	≤12	2	9	10	3.05	4	0.603 NS
	13-14	4	18	16			
	15-16	7	14	10			
2.	**Religion**						
	Hindu	8	15	15	7.01	6	0.277 NS
	Sikh	3	10	7			
	Muslim	0	12	7			
	Christen	2	4	7			
3.	**Class**						
	7th-8th	1	10	7	1.73	4	0.819 NS
	9th-10th	7	18	17			
	11th-12th	5	13	12			
4.	**Type of family**						
	Nuclear	8	24	21	0.04	2	1.00 NS
	Joint	5	17	15			
5.	**Habitat**						
	Rural	10	30	30	1.15	2	0.576 NS
	Urban	3	11	6			
6.	**Educational status of father**						

					χ²	df	p-value
	Informal	3	7	4	23.81	6	0.001^S
	upto 10th	6	15	4			
	upto 12th	1	14	7			
	Graduate and above	3	5	21			
7.	**Educational status of mother**						
	Informal	4	12	9	4.53	6	0.649 ^{NS}
	upto 10th	3	10	5			
	upto 12th	6	14	19			
	Graduate and above	0	5	3			
8.	**Occupation of father**						
	Govt. job	2	7	5	2.03	6	0.914 ^{NS}
	Pvt job	6	12	15			
	Business	2	7	5			
	Others	3	15	11			
9.	**Occupation of mother**						
	Housewife	10	25	27	3.05	4	0.566 ^{NS}
	Govt job	2	6	3			
	Pvt job	1	10	6			
10.	**Family income (Rs./month)**						
	<15000	0	4	2	10.73	6	0.078 ^{NS}
	15000-30000	2	2	5			
	31000-45000	4	9	17			
	>45000	7	26	12			
11.	**Source of Information**						
	Social Media	4	8	13	4.23	4	0.349^{NS}
	Printed Media	4	10	5			
	Television	5	23	18			

NB: df=degree of freedom, NS=Non-significant, S=Significant level at 0.05

Table 7 presents the associations between the pretest level of knowledge regarding menstrual hygiene among 90 adolescent girls and various socio-demographic variables, highlighting both significant and non-significant findings. In terms of age, the analysis revealed a non-significant association between age groups and knowledge levels (χ^2 = 3.05, df = 4, p = 0.603), indicating that knowledge levels did not significantly differ among girls of different ages. Regarding their religion, similarly, there was a non-significant association between religion and knowledge levels (χ^2 = 7.01, df = 6, p = 0.277). This implies that girls from diverse religious backgrounds had similar knowledge levels regarding menstrual hygiene. Regarding their class, the chi-square test

They have yielded a non-significant association between class and knowledge levels (χ^2 = 1.73, df = 4, p = 0.819), suggesting that the girls' grade levels did not significantly influence knowledge. The type of family did not exhibit a significant association with knowledge levels (χ^2 = 0.04, df = 2, p = 1.00), indicating that family structure did not play a significant role in determining knowledge about menstrual hygiene. A non-significant association was observed between habitat (rural or urban) and knowledge levels (χ^2 = 1.15, df = 2, p = 0.576), suggesting that knowledge levels were similar irrespective of the girls' place of residence. In contrast, a significant association was found between the educational status of fathers and knowledge levels (χ^2 = 23.81, df = 6, p = 0.001). Girls whose fathers had informal education displayed lower knowledge levels than those with fathers with higher educational attainment.

The educational status of mothers, however, did not significantly associate with knowledge levels (χ^2 = 4.53, df = 6, p = 0.649), indicating that maternal education did not significantly influence knowledge about menstrual hygiene. The occupation of fathers (χ^2 = 2.03, df = 6, p = 0.914) and mothers (χ^2 = 3.05, df = 4, p = 0.566) did not significantly affect knowledge levels. Although the association between family income and knowledge levels was non-significant (χ^2 = 10.73, df = 6, p = 0.078), a noticeable trend suggested that girls from higher-income families tended to have better knowledge about menstrual hygiene. Finally, the source of information did not exhibit a significant association with knowledge levels (χ^2 = 4.23, df = 4, p = 0.349), indicating that knowledge levels were similar among girls who obtained information from different sources.

Section VI: Findings related to the association between the level of attitude regarding menstrual hygiene and socio-demographic variables of adolescent girls.

Table 8: Association between pretest level of attitude regarding menstrual hygiene among adolescent girls with selected socio-demographic variables (N=90)

S. No.	Variables	Level of Attitude			χ^2 value	df	p-value
		Positive	Neutral	Negative			
1.	**Age (years)**						
	$\leq$12	1	2	18	6.36	4	0.203[NS]
	13-14	5	6	27			
	15-16	8	6	17			
2.	**Religion**						
	Hindu	9	6	23	4.52	6	0.723[NS]
	Sikh	2	4	14			
	Muslim	2	3	14			
	Christen	1	1	11			
3.	**Class**						
	7th-8th	1	2	15	2.920	4	0.642[NS]
	9th-10th	7	8	27			
	11th-12th	6	4	20			
4.	**Type of family**						
	Nuclear	9	10	34	1.49	2	0.473[NS]
	Joint	5	4	28			
5.	**Habitat**						
	Rural	14	8	48	7.45	2	0.016[S]
	Urban	0	6	14			
6.	**Educational status of father**						
	Informal	3	4	7	16.50	6	0.004[S]
	upto 10th	5	8	12			
	upto 12th	3	2	17			
	Graduate and above	3	0	26			
7.	**Educational statusof the mother**						
	Informal	2	6	17	4.32	6	0.608[NS]
	upto 10th	4	1	13			
	upto 12th	6	6	27			
	Graduate and above	2	1	5			
8.	**Occupation of father**						
	Govt. job	0	3	11	4.97	6	0.514[NS]
	Pvt job	5	4	24			
	Business	4	2	8			
	Others	5	5	19			
9.	**Occupation of mother**						
	Housewife	7	12	43	7.69	4	0.153[NS]
	Govt job	1	1	9			
	Pvt job	6	1	10			
10.	**Family income (Rs./month)**						

	<15000	0	2	4	3.60	6	0.814 NS
	15000-30000	1	1	7			
	31000-45000	5	3	22			
	>45000	8	8	29			
11.	**Source of Information**						
	Social Media	2	4	19	3.036	4	0.594 NS
	Printed Media	5	2	12			
	Television	7	8	31			
	NB: df=degree of freedom, NS=Non-significant, S=Significant level at 0.05						

Table 8 examines the associations between the pretest level of attitude regarding menstrual hygiene among 90 adolescent girls and various socio-demographic variables, highlighting both significant and non-significant findings. The analysis indicated a non-significant association between age groups and attitude levels ($\chi^2 = 6.36$, df = 4, p = 0.203), suggesting that age did not significantly influence attitudes toward menstrual hygiene among the girls.

Regarding their religion, there was no significant association between religion and attitude levels ($\chi^2 = 4.52$, df = 6, p = 0.723), indicating that girls from different religious backgrounds exhibited similar attitudes regarding menstrual hygiene. Regarding their class, the chi-square test revealed a non-significant association between class and attitude levels ($\chi^2 = 2.920$, df = 4, p = 0.642), implying that grade levels did not significantly affect attitudes toward menstrual hygiene. Their type of family (nuclear or joint) showed no significant association with attitude levels ($\chi^2 = 1.49$, df = 2, p = 0.473), indicating that family structure did not significantly influence attitudes regarding menstrual hygiene.

A significant association was found between habitat (rural or urban) and attitude levels ($\chi^2 = 7.45$, df = 2, p = 0.016). Girls from rural areas tended to have more positive attitudes than their urban counterparts. Regarding the educational status of their parents, a significant association was observed between the educational status of fathers and attitude levels ($\chi^2 = 16.50$, df = 6, p = 0.004). Girls whose fathers had informal education displayed less positive attitudes than those with fathers who had completed higher levels of education.

However, the educational status of mothers did not significantly associate with attitude levels ($\chi^2 = 4.32$, df = 6, p = 0.608), suggesting that maternal education did not significantly influence attitudes regarding menstrual hygiene. Regarding their parents' occupation, Neither fathers' occupation ($\chi^2 = 4.97$, df = 6, p = 0.514) nor mothers ($\chi^2 = 7.69$, df = 4, p = 0.153) showed any significant association with attitude levels. The association between family income and attitude levels was non-significant ($\chi^2 = 3.60$, df = 6, p = 0.814), indicating that family income did not significantly affect attitudes toward menstrual hygiene. Regarding the source of information, the source of information also did not exhibit a significant association with attitude levels ($\chi^2 = 3.036$, df = 4, p = 0.594), suggesting that attitudes were similar among girls who obtained information from different sources.

5. Discussion

The present study was to assess the Impact of Educational Intervention on Knowledge and Attitude Regarding Menstrual Hygiene Among Adolescent Girls at Selected Schools in Dehradun, Uttarakhand. An experimental study was adopted for this study. A purposive sampling technique was used to enroll the study subjects. Ninety adolescent girls were selected for the study based on inclusion criteria. Data was collected through a socio-demographic profile of adolescent girls, a pre-designed knowledge questionnaire, and a self-structured three-point Likert scale on menstrual hygiene. Data were collected from the adolescent girls. The data collected was analyzed using descriptive and inferential statistics and is arranged based on the study's objectives.

The present study showed pretest and post-test knowledge levels regarding menstrual hygiene among the 90 adolescent girls participating in the study. Before any intervention, 14.4% of the girls exhibited a "good" level of knowledge, 45.6% had an "average" level, and 40.0% had a "below average" level of knowledge. Following the intervention, there was a noticeable improvement in knowledge, with 22.2% now categorized as having a "good" level, 40.0% maintaining an "average" level, and 37.8% retaining a "below average" level. Before the intervention, a significant majority of the girls (68.9%) held a "negative" attitude, while only 15.6% had a "positive" attitude, and the remaining 15.6% were categorized as "neutral" in their attitudes. Following the intervention, a substantial positive shift in attitudes is observed, with 50.0% of the girls now exhibiting a "positive" attitude, 41.1% retaining a "negative" attitude, and a smaller proportion (8.9%) remaining "neutral.

6. Conclusion

In Menstrual Hygiene among Adolescent Girls, this study heralds a transformative epoch. Its resounding denouement resonates with a clarion call for educational interventions. It has unveiled a stark reality with meticulous precision: a shortage of knowledge envelops the adolescent cohort concerning menstrual hygiene. In this formidable narrative, nurses emerge as the custodians of enlightenment and empowerment, their pivotal role writ large on the canvas of female well-being. The study's profound implications reverberate through the corridors of healthcare and education, underscoring the imperative for concerted efforts. It is an appeal to bridge the chasm of ignorance and misconceptions that shroud menstrual hygiene. Through targeted interventions and judicious dissemination of knowledge, nurses wield the scepter of transformation, charting a course toward heightened awareness and improved management of menstrual disorders among adolescent girls. In conclusion, this study bespeaks not only the urgency but also the profound potential for change. It underscores the enduring significance of enlightened healthcare practitioners in enlightening and empowering the future generation, casting a luminous beacon toward a brighter, healthier, and more informed tomorrow.

Conflicts of Interest Statement: The authors declare no conflicts of interest related to this study.

Ethics and Consent Statement: This study was conducted by ethical standards and approved by the relevant institutional review board. Informed consent was obtained from all participants before their involvement in the study.

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