

Effectiveness of an educational program on reproductive health knowledge among secondary school female students in Al-Kut city / Iraq

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Abstract:

Background: Reproductive health is characterized as a condition of comprehensive physical, mental, and social well-being concerning all facets of the reproductive system and its functions, surpassing the mere absence of illness or impairment. This study aimed to evaluate the effectiveness of an educational program on knowledge related to reproductive health among secondary school female students in Al-Kut City.

Methods: A quasi-experimental study employing a pre-test-post-test control group design was conducted in governmental female secondary schools in Al-Kut City, Iraq, between November 2025 and April 2026. A purposive sample of 200 female students was recruited and equally assigned into two groups: an intervention group (n = 100) and a control group (n = 100). Female students from the fourth and fifth secondary grade levels were included in the study. The required sample size was calculated using G*Power software, version 3.1.9.7.

Data were collected using a structured self-administered questionnaire consisting of two parts: sociodemographic characteristics of the students and their parents, and questions assessing knowledge related to reproductive health. Data analysis was performed using the Statistical Package for Social Sciences (SPSS), version 26.0. Both descriptive and inferential statistical analyses were applied, and a p-value of ≤ 0.05 was considered statistically significant.

Results: The findings showed a highly significant improvement in knowledge related to reproductive health among female secondary school students in the study group following the educational program. The mean knowledge score increased markedly from 13.14 ± 2.72 at pre-test to 19.66 ± 0.78 at post-test ($p < 0.001$). The study group demonstrated a significant difference in knowledge level, reaching "Good" scores for the majority of items in the post-test, specially related to the definition of STDs; mode of transmission and regarding syphilis and genital herpes as STDs. Furthermore, the study group showed substantial improvement in their knowledge of premarital screening, with most post-test scores reaching a "Good" level.

Conclusion: The educational program demonstrated a significant improvement in students' knowledge among the study group compared with the control group, particularly in relation to sexually transmitted diseases (STDs) and premarital screening. Moreover, statistically significant relationships were found between post-test knowledge scores and students' academic grade, number of family members, and father's educational level.

Recommendations: Implementation of similar school-based educational programs, supported by informative brochures and posters, is recommended to improve adolescents' knowledge and promote positive reproductive health outcomes. Continuous health education initiatives within schools may further strengthen awareness and healthy practices among secondary school students.

Keywords: Reproductive Health, education program, Knowledge, Secondary School Female Students, Al-Kut City

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INTRODUCTION

Reproductive health is more than just being free from disease or infirmity; it is a condition of complete physical, mental, and social well-being in all areas related to the reproductive system and its operations and activities. (1). Youth reproductive health is considered one of the main cornerstones of sustainable development. Students are therefore more susceptible to risks and problems associated with reproductive health. (2) Significant physical, psychological, and social changes occur during puberty, a crucial developmental stage that signifies the passage from childhood to adulthood. Programs for school-based education are essential for giving teenagers the information and abilities they need to deal with these transitions with confidence. (3) To avoid potentially harmful reproductive health issues, it is crucial to raise teenagers' awareness of and attitudes about reproductive health. (4) Many teenage girls, especially those from low-income families, start puberty without enough knowledge, which causes misconceptions, worry, and a lack of readiness. (5) Premarital screening programs are crucial for identifying and counselling couples who are at risk of spreading sexually transmitted illnesses or genetic diseases. (6) Sexually transmitted diseases, or STIs, are one of the worst problems in public health. Approximately one million STIs are found globally each day. (7) Due to decades of violence, economic sanctions, and political unrest, Iraq faces particular difficulties with adolescent health, particularly with regard to managing menstrual hygiene. Iraq's healthcare system is already beset by ongoing conflicts and deteriorating political and economic circumstances, which results in underfunding of programs for reproductive health services and health education. (8) To the best of the researcher's knowledge, this study is the first of its kind in Iraq because previous studies have only looked at the attitudes and knowledge of teenagers regarding reproductive health, without evaluating the effects of a structured health education program. One of the basic health concerns that directly impacts people's and communities' well-being, particularly for teenagers, is reproductive health. According to surveys, most Iraqi female secondary school students are ignorant about reproductive health issues, which puts them at risk for a number of social and medical disorders. 287 students between the ages of 14 and 23 lack enough information about reproductive health, according to a survey done in the Basra Governorate. This highlights the urgent need to establish health education programs to increase this awareness. (9) Therefore, the current study aimed to evaluate the Impact of an educational program related to reproductive health and puberty knowledge among secondary school female students in Al-Kut city

Materials and Methods

Study Design and Setting

A quasi-experimental study design was carried throughout the application of pre-test, post-test for both groups and implementation an educational program only for the study (intervention) group regarding reproductive health knowledge at the governmental female secondary schools in the city of Al-Kut, Iraq, from November 2025 to April 2026. Al-kut is the capital city of Wasit governorate, located in eastern of Iraq, and approximately 180 kilometres southeast of Baghdad. (10)

Participants and Sampling

A non-probability purposive sampling Carried out in four governmental female secondary schools in AL-kut city, 200 female were equally allocated into two groups: the intervention group (n = 100) and the control group (n = 100). The sample size was determined using G*Power software (version 3.1.9.7). The minimum required sample size was 176 participants (88 per group). To enhance statistical power, the sample size was increased to 200 participants, with equal allocation to the intervention and control groups. The data collected by Distribution of questionnaire forms for the participants in grouping for self-filling technique. The study sample comprised of 50 female students from each; Al Kut, Al Noor, Al Amal, and from Khawla bint al-Azwar secondary schools in Al Kut city. Married students and those who are not willing to participate and not available during the data collection were excluded.

Study Instrument

Data Collection was conducted using the self-report technique consists of two main parts. Part one: that represent the Socio-demographic characteristics of the students and parents which included: (Age, grade, Residency, the students live with, number of family members, source of information, level of education of mother and father, Occupation of

father and mother, Parents' marital status). Part two: Knowledge Related to Reproductive Health. This part is composed of (14) items divided in to (3) categories: **A.** knowledge related to puberty (8) items, **B.** Knowledge Related to Sexually Transmitted Diseases (3) items, **C.** knowledge related to Premarital Screening (3) items. Knowledge items were assessed using multiple _choice format, each correct answer received a score of (1) while in correct answers received (0). Total scores were categorized in to three levels: poor (0.00_0.33), Average (0.34_0.67) and good (0.68-1.00).

Education program

Prior to the implementation of the reproductive health educational program, a pre-test was administered to assess students' foundational knowledge of reproductive health. The educational program was exclusively offered to the study group. Before implementation, coordination was conducted with school administrations, and participants were informed of the study's objectives and procedures. The program was conducted through direct, in-person sessions in the educational setting. Each school received the program separately over the span of one week. The educational resources included a lecture booklet, illustrative posters, and a classroom board. The intervention consisted of five structured educational sessions conducted over five consecutive days, with one session delivered each day from Sunday to Thursday. Each session lasted approximately one hour, from 9:00 a.m. to 10:00 a.m. The instructional sessions covered the following subjects: * Initial session: Definition of reproductive health and the anatomy of the female reproductive system. Second session: Functions of the reproductive system and comprehension of the structure and functions of the internal and external female reproductive organs. * Third session: Puberty indicators. Fourth session: Sexually transmitted diseases (STDs), including classifications and complications related to STDs. Fifth session: Modes of transmission, prevention of sexually transmitted diseases, and premarital screening. One week after the completion of the educational program, a post-test was administered to evaluate the effectiveness of the intervention.

Pilot Testing and Reliability

A pilot study was conducted on (10) female student's selected from one female secondary school in Wasit City, (excluded from the original sample of the study). The internal consistency of the instrument was evaluated using Cronbach's alpha values for the pilot sample (N = 10). The results show that knowledge scale ($\alpha = 0.706$) demonstrate good internal consistency, indicating that their items reliably measure their intended constructs. Reliability Analysis of the Instruments (Test- retest)based on Pearson correlation coefficient values show that scales; knowledge ($\alpha = 0.739$) demonstrate good test-retest consistency, indicating that their items reliably measure their intended constructs.

Data Collection and Analysis

Data were collected by using a structured self-administered questionnaire from December 1, 2025, to January 6, 2026. Prior to initiating the data collection process Parental consent was secured before the students participated in the study. Data analysis and interpretation through use of the application of Statistical Package for Social Sciences (SPSS), version 26.0. Descriptive Statistical Tests (Frequency, Percentage (%), Mean (M), and Standard Deviation). summarised sample characteristics. Inferential Statistical Tests (Cronbach Alpha (α), Kolmogorov Smirnov Test, Levene's test, The Mann-Whitney U test, Wilcoxon Signed Ranks, Spearman's rank correlation coefficient, the effect size (r), It used to determine the effect size of effectiveness of educational program on knowledge and self-care practices. A p-value ≤ 0.05 was considered statistically significant.

Results

Of the 200 Female students enrolled in the study in both groups, the average age refers to 16 ± 1.9 years in the study group and 16 ± 0.9 years in the control group, the higher proportion within age group of 14-16 years in both groups (study= 60% and control= 67%). The variance test indicates no significant difference ($\Lambda = 1.052$, $P = .306$) between groups. The academic grade shows no significant difference ($\Lambda = 0.000$, $P = 1.000$) between groups as equal proportion has reported in each group. The current living status indicates that students living with their parents as reported in the study group (83%) and control group (94%). The variance test indicates no significant difference ($\Lambda = 3.896$, $P = .055$) between groups. The number of family member refers to 4-6 in the study group (64%) and 7 – 9 in the control group (60%). The variance test indicates high significant difference ($\Lambda = 8.655$, $P = .004$) between groups based on number of

family members. The higher proportion regarding sources of information refers to “internet and social media” in both groups; study (46%) and control (26%). The variance test indicates a significant difference ($\Lambda = .420$, $P = .518$) between groups based on source of information. (Table 1)

The findings related to the overall assessment of students’ knowledge about reproductive health revealed a significant improvement in the study group after exposure to the education programme. At the pre-test, 53% of students in the study group had an average level of knowledge, while 47% had a good level of knowledge. Following the intervention, all students (100%) had a good level of knowledge. Achieved a good level of knowledge. The mean score rose from 13.14 (± 2.718) during the pre-test to 19.66 ($\pm .781$) during the post-test after engagement in an educational programme. In contrast, the students in the control group show no clear change in mean score during the pre-test (12.35 \pm 3.023) and post-test (12.68 \pm 2.933); a higher proportion demonstrate a poor level of knowledge during the pre-test (83%) and post-test (81%). According to the study group's findings, there is a strong correlation between the total knowledge score and the students' academic grade ($P = .030$) and number of family members ($P = .009$), indicating that students in the fourth academic grade and those with fewer family members exhibit greater levels of knowledge. There is no discernible correlation between the knowledge score and sociodemographic characteristics of female students in the control group. there is significant negative relationship in the study group between overall knowledge score and students’ father level of education ($r = -0.233$, $p = 0.020$) suggesting that students whose fathers had lower levels of education tended to have lower knowledge scores. The findings in the control group show no significant relationship between knowledge score and socio demographic variables of parents among female students.

Table 1: Socio-demographic characteristics of All Participants according to Female Students and Parents (N=200)

No.	Characteristics	Study group		Control group		Variance test	
		F	%	F	%		
1	Age (year)	14 – 16	60	60	67	67	$\Lambda = 1.052$ $P = .306$ $\text{Sig} = \text{N.S}$
		17 – 19	40	40	33	33	
		Total	100	100	100	100	
		M\pmSD	16\pm1.9		16\pm0.9		
2	Academic grade	Fourth	50	50	50	50	$\Lambda = .000$ $P = 1.000$ $\text{Sig} = \text{N.S}$
		Fifth	50	50	50	50	
		Total	100	100	100	100	
3	Current Living with	Both parent	83	83	94	94	$\Lambda = 3.896$ $P = .055$ $\text{Sig} = \text{N.S}$
		Mother only	15	15	4	4	
		Father only	2	2	2	2	
		Total	100	100	100	100	
4	Number of family members	≥ 3	2	2	5	5	$\Lambda = 8.655$ $P = .004$ $\text{Sig} = \text{H.S}$
		4 – 6	64	64	35	35	
		7 – 9	34	34	60	60	
		Total	100	100	100	100	
5	Sources of information about reproductive health	None	37	37	54	54	$\Lambda = .420$ $P = .518$ $\text{Sig} = \text{S}$
		Internet / S.M	46	46	26	26	
		Parents/sib.	10	10	9	9	
		School	6	6	9	9	
		H.C. Provider	1	1	2	2	
		Total	100	100	100	100	
Parent’s Characteristics for Both Groups							
1	Father’s level of education	Illiterate	2	2	4	4	$\Lambda = .947$ $P = .332$ $\text{Sig} = \text{N.S}$
		Read & write	11	11	20	20	
		Primary school	25	25	18	18	
		Secondary sch.	17	17	15	15	
		Institute	26	26	25	25	
		College +	19	19	18	18	
		Total	100	100	100	100	
2	Mother’s level of education	Illiterate	10	10	14	14	$\Lambda = 7.616$ $P = .006$
		Read & write	15	15	26	26	
		Primary school	21	21	23	23	

		Secondary sch.	23	23	19	19	Sig= S
		Institute	16	16	12	12	
		College +	15	15	6	6	
		Total	100	100	100	100	
3	Father's occupation	Self-employed	30	30	37	37	Λ= .000 P= 1.000 Sig= N.S
		Gov. employee	58	58	46	46	
		Retired	9	9	12	12	
		Unemployed	3	3	5	5	
		Total	100	100	100	100	
4	Mother's occupation	Housewife	70	70	79	79	Λ= 3.292 P= .071 Sig= N.S
		Self-employed	1	1	5	5	
		Gov. employee	28	28	15	15	
		Retired	1	1	1	1	
		Total	100	100	100	100	
5	Parents' marital status	Married	83	83	95	95	Λ= 5.738 P= .018 Sig= S
		Separated/Div.	7	7	1	1	
		Widowed	10	10	4	4	
		Total	100	100	100	100	
6	Family economic status	Insufficient	10	10	15	15	Λ= .168 P= .682 Sig= N.S
		Barely sufficient	44	44	39	39	
		Sufficient	46	46	46	46	
		Total	100	100	100	100	

No: Number, f: Frequency, %: Percentage, Λ= Levene's Test, P: Probability value, Sig: Significance, N.S: Not significant, S: Significant

Table (1) presents the comparative description of sociodemographic variables for students in both groups; the average age refers to 16±1.9 years in the study group and 16±0.9 years in the control group, the higher proportion within age group of 14-16 years in both groups (study= 60% and control= 67%). The variance test indicate no significant difference (Λ= 1.052, P= .306) between groups. The academic grade shows no significant difference (Λ= 0.000, P= 1.000) between groups as equal proportion has reported in each group. The current living status indicates that students living with their parents as reported in the study group (83%) and control group (94%). The variance test indicate no significant difference (Λ= 3.896, P= .055) between groups. The number of family member refers to 4-6 in the study group (64%) and 7 – 9 in the control group (60%). The variance test indicate high significant difference (Λ= 8.655, P= .004) between groups based on number of family members. The higher proportion regarding sources of information refers to “internet and social media” in both groups; study (46%) and control (26%). The variance test indicate a significant difference (Λ= .420, P= .518) between groups based on source of information.

indicates that students' fathers graduated from institute as reported by highest percentage in the study (26%) and control (25%) groups. For mothers, the higher proportion (23%) in the study group graduated from secondary schools, while higher proportion (26%) in the control group were read and write. The variance test indicates no significant difference between groups based on father's education (Λ= .947, P= .332) but significant difference is reported based on mother's education (Λ= 7.616, P= .006). The occupational status indicates that higher proportions of fathers are governmental employee as reported in the study (58%) and control (46%) group. The higher proportions of mothers were housewives in both groups; study (70%) and control (79%). The variance test indicate no significant difference based on father's occupation (Λ= 0.000, P= 1.000) and mother's occupation (Λ= 3.292, P= .071).

The marital status refers to ‘married’ among 83% of students in the study group and 95% of students in the control group. The variance test show significant difference (Λ= 5.738, P= .018). The family monthly income indicates that students in both groups perceive sufficient monthly income as reported among 46% in each group. The variance test indicates no significant difference (Λ= .168, P= .682) between group.

Table (2): Mean Scores Assessments of Items of Knowledge about “Reproductive health among Female Students in Study and Control Groups

Puberty														
Items Score		Group s	Study (N=100)						Control (N=100)					
			Pre-test			Post-test			Pre-test			Post-test		
			f(%)	Mean	Assess	f(%)	Mean	Assess	f(%)	Mean	Assess	f(%)	Mean	Assess
1	Reproductive health refers to state of complete physical, psychological, and social well-being related to the reproductive system and its functions	Incorrect	41(41)	.59	Average	0(0)	1.00	Good	52(52)	.48	Average	51(51)	.49	Average
	Correct	59(59)	100(100)			48(48)			49(49)					
2	The primary function of the female external genital organs is protection of the internal reproductive organs	Incorrect	75(75)	.25	Poor	8(8)	.92	Good	78(78)	.22	Poor	73(73)	.27	Poor
	Correct	25(25)	92(92)			22(22)			27(27)					
3	The structures that surround the vaginal opening are Labia majora and labia minora	Incorrect	17(17)	.83	Average	0(0)	1.00	Good	29(29)	.71	Good	29(29)	.71	Good
	Correct	83(83)	100(100)			71(71)			71(71)					
4	The function of the vagina is muscular canal connecting the cervix to the external body and allowing passage of the baby during childbirth	Incorrect	23(23)	.77	Good	2(2)	.98	Good	34(34)	.66	Average	33(33)	.67	Average
	Correct	77(77)	98(98)			66(66)			67(67)					
5	The function of the fallopian tubes is Fertilization of the ovum and transport to the uterus	Incorrect	52(52)	.48	Average	1(1)	.99	Good	66(66)	.34	Average	62(62)	.38	Average
	Correct	48(48)	99(99)			34(34)			38(38)					
6	Uterus is organ carries the fetus during pregnancy	Incorrect	7(7)	.93	Good	1(1)	.99	Good	8(8)	.92	Good	8(8)	.92	Good
	Correct	93(93)	99(99)			92(92)			92(92)					
7	The function of the ovary is Production of ova and hormones	Incorrect	50(50)	.50	Average	3(3)	.97	Good	65(65)	.35	Average	60(60)	.40	Average
	Correct	50(50)	97(97)			35(35)			40(40)					

8	Labia majora and labia minora and Vaginal opening are external female reproductive organs	Incorrect	38(38)	.62	Average	2(2)	.98	Good	29(29)	.71	Good	29(29)	.71	Good
		Correct	62(62)			98(98)			71(71)			71(71)		
Total			.62	Average	.98	Good	.54	Average	.56	Average				

Sexually Transmitted Diseases														
Groups		Items Score	Study (N=100)						Control (N=100)					
			Pre-test			Post-test			Pre-test			Post-test		
			f(%)	Mean	Assess	f(%)	Mean	Assess	f(%)	Mean	Assess	f(%)	Mean	Assess
1	Sexually transmitted diseases are Diseases caused by microorganisms transmitted through sexual contact and affecting the reproductive organs or the body	Incorrect	16(16)	.84	Good	0(0)	1.00	Good	24(24)	.76	Good	21(21)	.79	Good
		Correct	84(84)			100(100)			76(76)			79(79)		
2	Common modes of transmission of STDs include Unprotected sexual intercourse	Incorrect	30(30)	.70	Good	1(1)	.99	Good	22(22)	.78	Good	22(22)	.78	Good
		Correct	70(70)			99(99)			78(78)			78(78)		
3	Syphilis, genital herpes are considered sexually transmitted diseases	Incorrect	59(59)	.41	Average	1(1)	.99	Good	69(69)	.31	Poor	66(66)	.34	Average
		Correct	41(41)			99(99)			31(31)			34(34)		
Total			.65	Average	.99	Good	.61	Average	.64	Average				

Premarital Screening														
Groups		Items Score	Study (N=100)						Control (N=100)					
			Pre-test			Post-test			Pre-test			Post-test		
			f(%)	Mean	Assess	f(%)	Mean	Asses	f(%)	Mean	Assess	f(%)	Mean	Assess
1	Premarital screening is medical examination for couples intending to marry to detect genetic or infectious diseases	Incorrect	31(31)	.69	Good	6(6)	.94	Good	28(28)	.72	Good	27(27)	.73	Good
		Correct	69(69)			94(94)			72(72)			73(73)		
2	Men, Women, and Adolescents should undergo premarital screening	Incorrect	6(6)	.94	Good	1(1)	.99	Good	9(9)	.91	Good	9(9)	.91	Good
		Correct	94(94)			99(99)			91(91)			91(91)		

3	Diseases included in premarital screening include HIV, and Thalassemia and sickle cell anaemia	Incorrect	42(42)	.58	Average	2(2)	.98	Good	54(54)	.46	Average	50(50)	.50	Average
		Correct	58(58)			98(98)			46(46)			50(50)		
Total				.73	Good		.97	Good		.69	Good		.71	Good

No: Number, %: Percentage, M: Mean, Poor= 0.00 – 0.33, Average= 0.34 – 0.67, Good= 0.68 – 1.00

Table (2) exhibits the study sample demonstrated significant improvement for most items from pre-test period to post-test period, and many students were achieving at the level of "Good" following educational program. Significant differences were also noted in knowledge application of the reproductive health, in purpose for genital organs, and in structure around vaginal orifice (most pre-test "average" to "poor" scores improved to "good" after receiving educational program). In contrast, most items in the control group presented with less or no improvement where were rated at an "Average" level of understanding between pre- and post-tests.

About STD The study group presented a significant difference in their knowledge, reaching "Good" scores for the majority of issues in the post-test, specially related to the definition of STDs; transmission forms and regarding syphilis and genital herpes as among STDs. In contrast, the control group showed more modest changes with post-test scores still in the "Average" to "Good" range.

The study group showed substantial improvement in their knowledge of premarital screening, with most post-test scores reaching a "Good" level. For example, awareness about the definition of premarital screening, its necessity for men, women, and adolescents, and the diseases included in the screening (such as HIV, Thalassemia, and sickle cell anaemia) saw significant improvement, with post-test scores increasing from "Average" or "Good" pre-test results to "Good."

Table (3): Overall Assessment of Knowledge about Reproductive Health among Female Students in the Study and Control Groups

Groups		Study						Control					
		Pre-test			Post-test			Pre-test			Post-test		
		No	%	M±SD	No	%	M±SD	No	%	M±SD	No	%	M±SD
Overall knowledge	Poor	0	0	13.14 ± 2.718	0	0	19.66 ± .781	83	83	12.35 ± 3.023	81	81	12.68 ± 2.933
	Average	53	53		0	0		17	17		19	19	
	Good	47	47		100	100		0	0		0	0	
	Total	100	100		100	100		100	100		100	100	

No: Number, %: Percentage, M: Mean of total score, SD: Standard deviation

Poor= 0.00 – 6.66, Average= 6.67 – 13.33, Good= 13.34 – 20.00

Table (3) presents the overall assessment of students' knowledge about puberty and reproductive health; the findings in the study group indicate that students during pre-test demonstrate average (53%) to good (47%) level of knowledge that increase to good level during the post-test among all participants (100%). The mean score rose from 13.14(±2.718) during the pre-test to 19.66 (±.781) during the post-test after engagement in an educational program. In contrast, the students in the control group show no clear change in mean score during the pre-test (12.35±3.023) and post-test (12.68±2.933), higher proportion demonstrate poor level of knowledge during pre-test (83%) and post-test (81%).

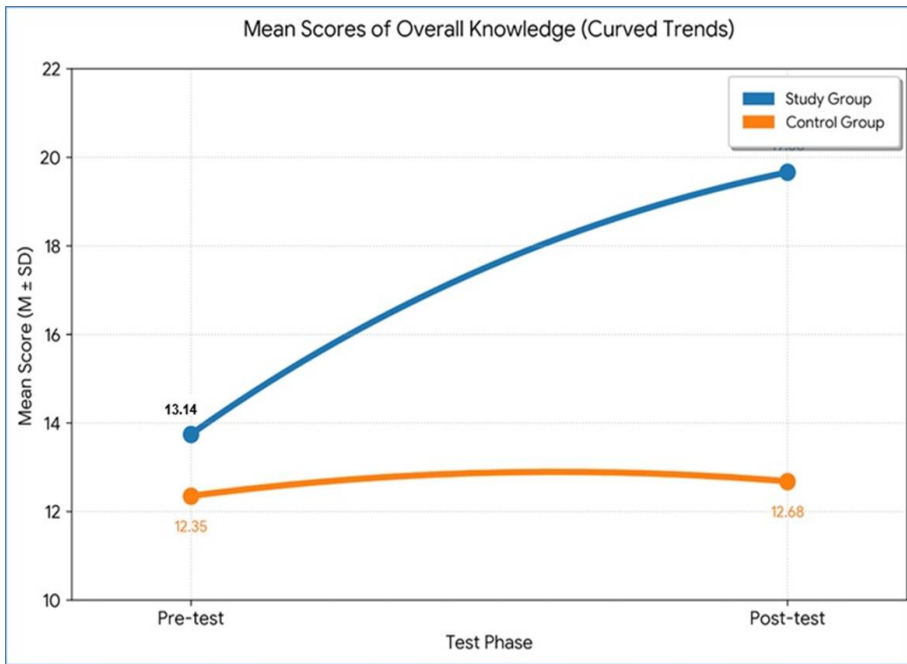


Figure (1) shows the noticeable increasing in mean score of knowledge in the study group from 13.14 to 19.66 indicating the effectiveness of educational program in improving knowledge among female students. However, no clear change has shown in mean score of knowledge in the control group.

Figure (1): Overall Level of Knowledge about Puberty and Reproductive Health

Table (4): Relationship between Overall Knowledge Score and Sociodemographic Variables of Female Students in the Study and Control Groups (Post-test)

Variables	Overall Knowledge						
	Study group (N=100)			Control group (N=100)			
	Mean	R	Sig	Mean	r	Sig	
Age (year)	14 – 16	19.70	.164	.103	12.58	.068	.502
	17 – 19	19.60			12.88		
Academic grade	Fourth	19.72	.217	.030*	12.12	.077	.446
	Fifth	19.60			13.24		
Current Living with	Both parent	19.65	.060	.555	12.56	.174	.083
	Mother only	19.87			14.00		
	Father only	18.50			15.50		
Number of family members	≥ 3	20.00	.261	.009*	13.40	.035	.730
	4 – 6	19.81			12.37		
	7 – 9	19.35			12.80		
Sources of information about reproductive health	None	19.54	.181	.071	12.48	.094	.353
	Internet / S.M	19.67			13.35		
	Parents/sib.	19.80			10.33		
	School	20.00			14.11		
	H.C.	20.00			13.50		
	Provider						

r: Spearman Correlation coefficient, Sig: Significance, *Significant at p-value= 0.05, **Significant at p-value= 0.01

Table (4) reveals that findings in the study group show significant relationship among overall knowledge score and students' academic grade (P= .030) and number of family members (P=.009) suggesting that students in the fourth academic grade and low family member demonstrating higher level of knowledge.

The findings in the control group show no significant relationship between knowledge score and sociodemographic variables of female students.

Discussions

The present study showed that (N=200) Female students enrolled in the study the finding reveals that average age is 16 ± 1.5 years, 63.5% of students fell within age group of 14 – 16 years while 36.5% within age group of 17 – 19 years. Regarding residency, all participant students (100%) were residing in urban and none of them was reside in the rural. 36% got their information from internet and social media, this result validates past research conducted in Iraq (9), who found that 62.5% of participants said that their primary source of information is internet browsing, and 92% of participants live in urban areas. The study sample demonstrated significant improvement for most items from pre-test period to post-test period, and many students were achieving at the level of “Good” following educational program. Significant differences were also noted in knowledge application of the reproductive health, in purpose for genital organs, and in structure around vaginal orifice (most pre-test "average" to "poor" scores improved to "good" after receiving educational program). In contrast, most items in the control group presented with less or no improvement where were rated at an "Average" level of understanding between pre- and post-tests. The study group shows significant improvement during the post-test as seen with high mean score (0.98). These results corroborate a previous study conducted in Indonesia (11), which found that adolescents' knowledge of reproductive health increased following participation in a health education program as compared to those who did not. Regarding sexually transmitted diseases, the participants in the study group presented a significant difference in their knowledge, reaching "Good" scores for the majority of issues in the post-test, specially related to the definition of STDs; transmission forms and regarding syphilis and genital herpes as among STDs. In contrast, the control group showed more modest changes with post-test scores still in the "Average" to "Good" range. This outcome is in line with a study conducted in Egypt (12), which found that students' understanding of STIs considerably improved immediately following the session (p-value 0.001). It is considerably more than the level prior to the intervention (p-value 0.001). This study revealed that the study group showed substantial improvement in their knowledge of premarital screening, with most post-test scores reaching a "Good" level. For example, awareness about the definition of premarital screening, its necessity for men, women, and adolescents, and the diseases included in the screening (such as HIV, Thalassemia, and sickle cell anaemia) saw significant improvement, with post-test scores increasing from "Average" or "Good" pre-test results to "Good." These results support the findings of a study conducted in Iraq (13), which highlighted the need for increased health education and awareness of premarital screening among Iraqi students. The majority of the post-test results indicated that the study group's comprehension had improved to a good degree. After exposure to the educational program, the study group's overall assessment of students' knowledge regarding reproductive health showed a considerable improvement. 53% of the study group's students had an average level of knowledge at the pre-test, whereas 47% had an excellent level. After the intervention, all students (100%) showed a high degree of knowledge. These results are consistent with the findings of a study conducted in Indonesia on the impact of health education on adolescents' understanding of reproductive health. (14) which reported The knowledge levels before and after education change significantly, according to statistical analysis findings. Prior to the intervention, the average knowledge score was 17.320 with a 1.550 standard deviation. Following the intervention, it rose to 19.610 with a 0.700 standard deviation. This difference is highly significant if the p-value is 0.000. According to the study group's findings, there is a strong correlation between the total knowledge score and the students' academic grade ($P=0.030$) and number of family members ($P=0.009$), indicating that students in the fourth academic grade and those with fewer family members exhibit greater levels of knowledge. These findings align with the research performed at Baghdad University, which evaluated the understanding of reproductive health among secondary school female students in Al Basra City (9). The study indicated a substantial correlation between students' knowledge and their siblings, as well as the source of information from the internet, while no significant relationship was found between students' knowledge and their age or living conditions at $P \leq 0.05$ level.

Study limitations

Although this study demonstrates the effectiveness of the educational program in improving schoolgirls' knowledge of reproductive health, several limitations must be considered. First, the study was conducted in a limited number of schools, which may limit the generalizability of the results to students in other areas of Iraq. Second, although the study used a pre- and post-test design, the short follow-up period does not allow for conclusions regarding long-term knowledge retention.

Conclusion

The present intervention study showed a highly significant improvement in knowledge related to reproductive health among female secondary school students in the study group following the educational program. The study sample demonstrated significant improvement for most items from pre-test period to post-test period, and many students were achieving at the level of "Good" following educational program. The study group showed substantial improvement in their knowledge of premarital screening, with most post-test scores reaching a "Good" level. The study group presented a significant difference in their knowledge, reaching "Good" scores for the majority of issues in the post-test, specially related to the definition of STDs; transmission forms and regarding syphilis and genital herpes as among STDs. Based on the study's findings and its importance in increasing students' knowledge about reproductive health, further research on this topic is recommended and continuous health education initiatives within schools may further strengthen awareness and healthy practices among secondary school students.

Declarations

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Scientific Committee (Research Ethics Committee) of the College of Nursing, University of Kirkuk (Issue No. 1, 2025). Authorisation to conduct the research was also granted by Directorate of Education in Wasit Governorate (Issue No. 68081, 2025). Written consent was obtained from the parents of the female students participating in the educational program, the voluntary nature of participation, and assurances of confidentiality and anonymity were informed.

Availability of Data and Materials

The datasets generated and analysed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

Both authors contributed to the study's conceptualisation, design, data collection, analysis, and interpretation. They also participated in drafting and critically revising the manuscript. All authors read and approved the final version of the manuscript.

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References

1. Timilsina, A., Bhandari, B., Johns, A., & Thapa, S. (2024). Barriers and facilitators to self-care practices for sexual and reproductive health among women of reproductive age. *PLOS ONE*, 19(5), e0303958. <https://doi.org/10.1371/journal.pone.0303958>
2. AbdiShahshahani, M., Hashemi, M., & Kohan, S. (2023). The effect of the reproductive health self-care educational booklet on the self-care ability of female university students. *Iranian Journal of Nursing and Midwifery Research*, 28(6), 659–664. https://doi.org/10.4103/ijnmr.ijnmr_8_22
3. Nworu CS. Exploring the therapeutic potentials of African medicinal plants in the management of metabolic syndrome. *Afr. J. Biomed. Res.* 2024; 27(1): 1-15. Available from: <https://africanjournalofbiomedicalresearch.com/index.php/AJBR/article/view/7703>
4. Sons, A., & Eckhardt, A. L. (2023). Health literacy and knowledge of female reproduction in undergraduate students. *Journal of American College Health*, 71(3), 836–843. <https://doi.org/10.1080/07448481.2021.1920598>
5. Gao, X., Wu, J., Zhang, Y., et al. (2024). Global, regional, and national burden of chronic kidney disease attributable to high systolic blood pressure from 1990 to 2019: a systematic analysis for the Global Burden of Disease Study 2019. *Front. Public Health*, 12:1449420. <https://doi.org/10.3389/fpubh.2024.1449420>

6. Mahmood KA, Sadraldeen GS, Othman SM, Shabila NP, Saleh AM, Ismail KH. Knowledge, perception, and attitude toward premarital screening among university students in Kurdistan region-Iraq. *PLOS Glob Public Health*. 2024 Nov 18;4(11):e0003515. doi: 10.1371/journal.pgph.0003515. PMID: 39556602; PMCID: PMC11573136.
7. herbiny NA, Hamed NS, Eid SS, Elsary AY. The effect of sexually transmitted infections health education on youth knowledge and attitudes: a pre-post interventional study. *BMC Public Health*. 2025;25:2991. doi:10.1186/s12889-025-23796-9. Available from: <https://doi.org/10.1186/s12889-025-23796-9>.
8. Lafta R, Aflouk NA, Dhiaa S, Lami F, Othman N, Ridha A, et al. Knowledge, attitudes and practices towards family planning among women in Iraq. *East Mediterr Health J*. 2019 Jul;25(7):467-75.
9. Al-Hamdi NA, Al-Hamdi SA. Assessment of secondary school female students' knowledge about reproductive health. University of Basrah; 2019. Available from: <https://faculty.uobasrah.edu.iq/uploads/publications/1642527412.pdf>
10. Al-Jameel H, Al-Rammahi A. Evaluation of the transportation system efficiency in Wasit Governorate. *E3S Web Conf*. 2024;488(08019):5-12. Available from: <https://doi.org/10.1051/e3sconf/202448808019>
11. Yuniarti S, Yustanta BF, Kowaas IN, Nurrachmawati A, Rahmawati S The effect of health education programs on adolescents' knowledge and attitudes regarding reproductive health. *Journal of World Future Medicine, Health and Nursing*. 2024;2(2):325–338. doi:10.70177/health. v2i2.820
12. El-Sherbiny NA, Hamed NS, Eid SS, Elsary AY. The effect of sexually transmitted infections health education on youth knowledge and attitudes: a pre-post interventional study. *BMC Public Health*. 2025;25:2991. doi:10.1186/s12889-025-23796-9
13. Mahmood KA, Sadraldeen GS, Othman SM, Shabila NP, Saleh AM, Ismail KH. Knowledge, perception, and attitude toward premarital screening among university students in Kurdistan region-Iraq. *PLOS Glob Public Health*. 2024 Nov 18;4(11):e0003515. doi: 10.1371/journal.pgph.0003515. PMID: 39556602; PMCID: PMC11573136.
14. Rosmala D, Al Rajab M, Sugarmi M, Wulandari BA, Khoiriyah R, Hasiu TS. The impact of health education on adolescents' understanding of reproductive health. *Magna Scientia Advanced Research and Reviews*. 2025;13(02):001-007. Available from: <https://doi.org/10.30574/msarr.2025.13.2.0038>