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Enhancing adolescent health awareness: impact of online training on medical and community health officers in Andhra Pradesh, India

https://doi.org/10.1515/ijamh-2024-0100
Received June 29, 2024; accepted January 15, 2025;
published online February 12, 2025

Abstract

Objectives: The present study was done to study the knowledge change among Medical Officers (MO) and Community health officers (CHO) regarding menstrual hygiene, early marriages, and HIV/STI with emphasis on adolescents after online training.

Methods: This is a retrospective record-based analysis conducted in the State Adolescent Health Centre, AIIMS Mangalagiri, Andhra Pradesh in 2023–2024 over 10 months. Participants were selected based on their attendance at online training sessions involving MOs and CHOs on menstrual cups, menstrual hygiene, early marriages, and HIV/STI. The data from Google Forms for pretests and post-tests, containing a total of 30 questions in English and Telugu, covering menstrual hygiene, early marriage, and HIV/STI topics was retrieved. The study covered all 26 districts of Andhra Pradesh, India, with online training sessions conducted via Zoom. The proportion of correct responses to individual questions is given with a 95 % confidence interval. Statistical comparisons of scores of individual questions were done using the McNemar test. Statistical comparisons of total scores of pre-test and post-test were done using the paired t-test. A p-value less than 0.05 was considered significant.

Results: Of the total 13,432 MOs and CHOs, 9,897 participated in the training with a response rate of 73.6 %. Among those who participated the training 2,809 (28.38 %) completed both pretest and posttest. The majority were CHOs (85.3 %), females, and aged under 35 years. Statistically significant increases in knowledge were observed across various aspects of menstrual hygiene, early marriages, and HIV/STI. Increase in knowledge regarding menstruation 4.3 % (3.5–5.1 %), p-value:<0.001, first vaginal bleeding (first menstruation) 4.7 % (3.9–5.5 %), p-value:<0.001, complication seen in delivering babies in teen pregnancy 4.9 % (4.1–5.7 %), p-value:<0.001, the symptom of STI 7.0 % (6.1–7.9 %), p-value:<0.001, and others. The total pretest mean score was 16.73 ± 4.44 and the post-test mean score was 18.81 ± 4.39. There was a statistically significant difference between pretest and post-test mean scores p value<0.001.

Conclusions: The training program significantly improved knowledge regarding menstrual hygiene, early marriages, and HIV/STI among the participants indicating the effectiveness of educational intervention in addressing gaps towards adolescent Health.

Keywords: education; training; sexually transmitted infections; HIV; early marriage; menstrual

Introduction

Adolescent health, concerning menstrual hygiene, human immunodeficiency virus (HIV), sexually transmitted infections (STIs), and early marriages, is vital for fostering a healthy transition to adulthood. Proper education on menstrual hygiene is crucial for preventing infections among young girls, reducing school absenteeism, and enhancing their overall quality of life. Awareness and education about HIV and STIs are essential for reducing transmission, encouraging safe sexual practices, and ensuring early diagnosis and treatment, which can significantly impact long-term health outcomes. Addressing early marriages through education and community engagement helps delay marriage and childbirth, mitigating health risks for young mothers and their children. Comprehensive support in these areas will empower adolescents to make informed decisions [1].

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Menstrual cups, a popular, eco-friendly, and sustainable menstrual hygiene product, are gaining popularity worldwide. However, their use in India is limited due to insufficient awareness and preference for sanitary pads [2–4]. They are a better alternative to traditional methods due to their durability and eco-friendliness [5]. Another study on the adaptability and efficacy of menstrual cups in managing menstrual health and hygiene showed that they are a better alternative to current methods of menstrual sanitation, as they are durable and eco-friendly [6]. The participants' satisfaction with using menstrual cups increased over time, and constant training and practice made them comfortable using the cups [7]. Training healthcare workers on menstrual hygiene is crucial for enhancing adolescent health.

India faces a high burden of HIV/acquired immunodeficiency syndrome (AIDS), making it as the world's third highest country with HIV burden [8]. In India has prevalence of four STIs range up to 3.9 % in general population namely syphilis, gonorrhoea, Trichomoniasis and chlamydia [9]. Factors contributing to the spread include unsafe sex, low condom use, multiple partner relationships, high prevalence of STIs, and inadequate healthcare access [10]. Efforts to control the spread of HIV and STI include National AIDS Control Organization initiatives like Behaviour Change Communication, Condom Distribution, Condom Social Marketing Counseling, HIV testing, Linkages/Referrals, STI management and others for targeted population [11]. However, further research and interventions are needed to address these challenges in India [12].

Child marriages are a significant issue in India, with nearly half of girls marrying before 18 years of age. These practices deny girls their rights to education, and health, leading to reduced access to education, health risks, increased HIV/AIDS risk [13], economic implications, and violence and abuse [14]. Efforts to reduce child marriage include legal measures, awareness campaigns, and empowering adolescent girls. The COVID- 19 pandemic has further exacerbated the situation, as desperate families are marrying off their daughters to reduce financial burdens [15].

Healthcare workers trained in these areas can give accurate information, offer good advice, and support adolescents with the right care. They help break myths and remove stigma about menstruation, encouraging better hygiene and reducing health risks. They also educate adolescents on preventing and managing HIV and STIs, promoting safer behaviors and better access to testing and treatment. Additionally, they can speak out against early marriages, explaining their harmful effects, and support policies that delay marriage and encourage girls to stay in school. The present study was done to assess study the knowledge change among Medical Officers (MO) and Community health officers (CHO) regarding menstrual hygiene, early marriages, and HIV/STI with emphasis on adolescents after online training.

Materials and Methods

This is a retrospective record-based analysis conducted in the State Adolescent Friendly Health Resource Center, AIIMS Mangalagiri, Andhra Pradesh in 2023–2024. The state of Andhra Pradesh, India, is divided into 26 districts. Medical officers and community health officers of all the districts were invited to attend the training over a period of 10 months. Each district was covered in one week with two to four training sessions for a maximum of 100 medical officers and community health officers. It was an online training for 2 h with nearly 40 min for each topic via Zoom platform. A pretest was administered half an hour before the start of the training via Google Forms. The post-test was given via Google Forms after the training session in Zoom rooms, email, and WhatsApp group. The MOs and CHOs who have submitted both pre-test and post-test were included in the study and the data was retrieved from their training records. Of the total 13,432 MOs and CHOs, 9,897 participated in the training, 5,078 completed the pretest, 3,295 completed the posttest, and 2,809 completed both the pretest and posttest.

Presentations were prepared on Menstrual Hygiene, Early Marriages and HIV/STI with special emphasis on adolescents. The expert sessions were audio-visual recorded using the presentations. These recordings were used during the online training sessions. Experts were available to participants for answering the queries at the end of the session.

Questions for the pre-test and post-test were designed based on an extensive literature review [16–20] and consultations with experts in the field. Their insights helped us refine the language and content of the questions to avoid any potential cultural insensitivity. The questions in English were translated to Telugu and back-translated into English for grammar and language. A pilot test with 10 participants provided further insights, resulting in additional refinements to the questionnaire based on participant feedback and preliminary analysis. The questions were multiple choice type, with only one correct response. The correct answer scored one mark and the incorrect answer scored zero. There was a total of 30 questions with 13 questions on menstrual hygiene and menstrual cup, 5 on early marriage and its impact, and 12 on HIV/STI (Table 1). The maximum total score possible was

30 and the minimum was zero. Questions were given both in English and Telugu to the participants. Three reminder emails were sent to follow up with the non-respondents to enhance the completion rates. The post-test was given via Google Forms after the training session in Zoom rooms, email, and WhatsApp group.

The trainings were conducted with the support of Rashtriya Kishor Swasthya Karyakram (RKSK), National Health Mission (NHM), United Nations Children's Fund (UNICEF), and Andhra Pradesh State AIDS Control Society (APSACS) to introduce menstrual cups to primary health care providers, strengthen them to address adolescent menstrual hygiene problems, empower them to counsel adolescents to decrease the risk of HIV transmission, STIs, and Early Marriage and its after-effects.

The data of pre-test and post-test was combined using Microsoft Excel 2010, and subsequent data analysis was performed using IBM SPSS Statistics Base v28.0 compatible with Windows. Categorical variables were expressed as frequency and proportions. The proportion of correct responses is given with a 95 % confidence interval. Statistical comparisons of scores of individual questions were done using the McNemar test.

Statistical comparisons of total scores pretest and posttest were done using the paired t-test. A p-value of <0.05 was considered statistically significant. Ethics approval for consent waiver was obtained from Institute Ethics Committee of All India Institute of Medical Sciences, Mangalagiri [AIIMS/MG/IEC/2023-24/41 dated 12-10-2023].

Results

Socio-demographic profile

Of the total 13,432 MOs and CHOs, 9,897 participated in the training with a response rate of 73.6 %. Of these 5,078 (51.3 %) completed the pretest, and 3,295 (33.3 %) completed the

Table 1: Pretest and post test questions.

Questions		
Menstrual hygiene	**Early marriages**	**HIV/STI**
What is puberty?	According to the national family health survey 5 report, how much percent of women aged between 15 and 19 years were already mothers or pregnant?	What are the people having multiple sexual contact with others called?
What is menstruation?	What are the consequences of early marriages?	Which of the following is a symptom of STI in women?
Normally at what age does a girl start to have her first vaginal bleeding (first menstruation)?	What is the complication seen in delivering babies to a pregnant girl who is married at an early age?	Which of the following is not a factor for causing an STI?
In general, how much is the approximate blood loss during menstruation?	What are the consequences of early marriage in a pregnant girl at the time of labor?	Which of the following is a symptom of STI in the oral region?
What are "irregular periods" during menstruation?	All of these are family factors causing early marriages, except?	What are the features of warts?
If at all there are symptoms of premenstrual syndrome, when will they start generally?		What are the features of scabies?
Which of the following is not a technique for menstrual hygiene practices?		What are the features of molluscum contagiosum?
Which is the material that should not be used by girls during menstruation to absorb and collect blood?		All of these are sexual/reproductive health problems faced by a girl child in an early marriage, except?
The menstrual cup is made of which component?		Which of the following fluids can transmit HIV?
For how many hours can females sleep comfortably with a menstrual cup inside?		Which of the following is not a common symptom of AIDS?
Can a person use a menstrual cup with copper T?		When should a person start ART for HIV/AIDS?
Menstrual cups are reusable for how many years?		Which of the following is not a type of transmission of HIV?
What do you think about buying sanitary pads and wrapping them in a newspaper?		

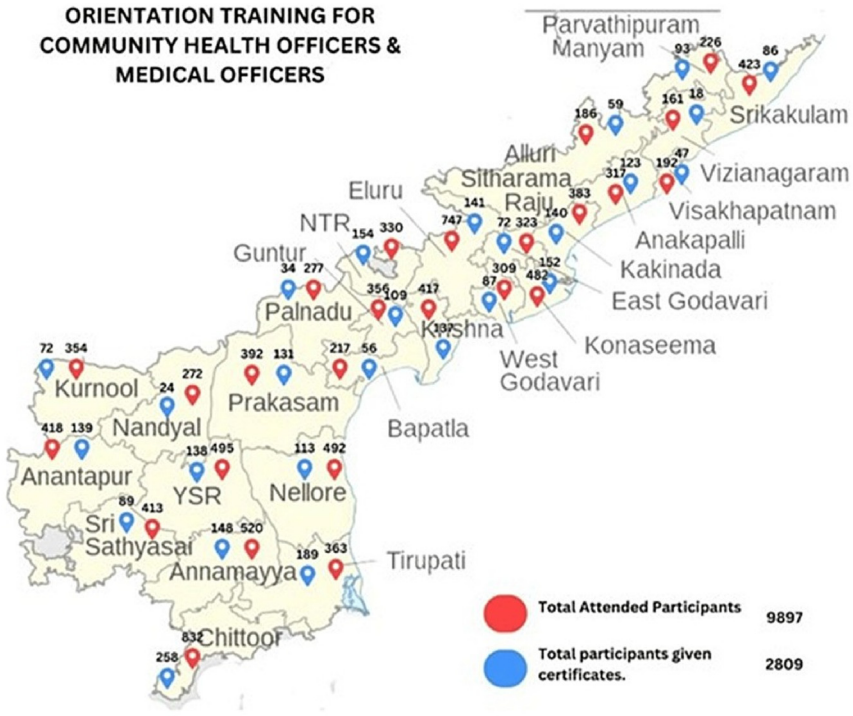

Figure 1: Distribution of medical officers and community health officers who have attended the training on the map of Andhra Pradesh, India.

Table 2: Distribution of medical officers and community health officers by gender and age.

Variable	Category	CHO's		MO's		Total	
		n	n	n	%	n	%
		2,397	85.33	412	14.66	2,809	100
Gender	Male	254	10.59	163	39.56	417	14.85
	Female	2,143	89.40	249	60.43	2,392	85.15
Age in years	<25	667	27.83	11	2.67	678	24.14
	25–29	856	35.71	139	33.74	995	35.42
	30–34	542	22.61	114	27.67	656	23.35
	≥35	332	13.85	148	35.92	480	17.08

posttest. Of the total 2,809 (28.3 %) completed both pretest and post-test (Figure 1).

Of the total 2,809 MOs and CHOs, who completed the pre-test and post-test assessments, majority (85.3 %) were Community Health Officers (CHOs). Females constituted 85.15 % of the studied participants. 35.42 % of the participants belong to age group of 25–29 years (Table 2) Mean age of the participants were 27.01 (SD 8.15) years.

Results by objectives

A statistically significant increase in knowledge was found among the total participants for Menstruation 4.3 % (3.5–5.1 %) (p-value:<0.001), age at first vaginal bleeding (first menstruation), 4.7 % (3.9–5.5 %) (p-value:<0.001), blood loss during menstruation 6.8 % (5.9–7.7 %) (p-value:<0.001) "irregular periods", 5.0 % (4.2–5.8 %), (p-value:<0.001), menstrual cup 7.3 % (6.3–8.3 %), p-value: <0.001) and other(Table 3).

In Early marriages and their implication, a statistically significant increase in knowledge was found among the total participants for complications seen in delivering babies to a pregnant girl who is married at an early age 4.9 % (4.1–5.7 %) (p-value:<0.001), consequences of early marriage in a pregnant girl at the time of labor 7.2 % (6.2–8.2 %) (p-value:<0.001), factors causing early marriages 9.6 % (8.5–10.7 %) (p-value:<0.001) and others(Table 4).

In HIV/STI, a statistically significant increase in knowledge was found among the total participants for symptoms

Table 3: Knowledge of medical officers and community health officers for menstrual hygiene and menstrual cup. (n=2,809).

Question	Community health officer (n=2,378)				Medical officer (n=412)				Total (n=2,809)			
	Pre-test correct response n (%)	Post-test correct response n (%)	Increase in knowledge % (95 % CI)	p-Value	Pre-test correct response n (%)	Post-test correct response n (%)	Increase in knowledge % (95 % CI)	p-Value	Pre-test correct response n (%)	Post-test correct responses n (%)	Increase in knowledge % (95 % CI)	p-Value
What is puberty?	1,881 (78.47)	1,708 (71.26)	7.21 (5.6–9.4)	<0.001[a]	381 (92.48)	381(92.48)	0.00 (−3.6 to 3.6)	<0.001[a]	2,262 (80.6)	2,089 (74.4)	6.2 (5.2–7)	<0.001[a]
What is menstruation?	1,081 (45.10)	1,187 (49.52)	4.42 (1.3–7.0)	<0.001[a]	363 (88.11)	373 (90.53)	2.43 (−1.8 to 6.6)	<0.001[a]	1,444 (51.2)	1,560 (55.5)	4.3(3.5–5.1)	<0.001[a]
Normally at what age does a girl start to have her first vaginal bleeding (first menstruation)?	866 (36.13)	975 (40.68)	4.55 (1.8–7.3)	<0.001[a]	198 (48.06)	222(53.88)	5.83 (−1.0 to 12.6)	<0.001[a]	1,064 (37.9)	1,198 (42.7)	4.7 (3.9–5.5)	<0.001[a]
In general, how much is the approximate blood loss during menstruation?	1,174 (48.98)	1,332 (55.57)	6.59 (3.8–9.4)	<0.001[a]	225 (54.61)	254(61.65)	7.04 (0.3–13.8)	<0.001[a]	1,399 (49.7)	1,586 (56.5)	6.8(5.9–7.7)	<0.001[a]
What are “irregular pe riods” during menstruation?	535 (22.32)	636 (26.53)	4.21 (1.8–6.6)	<0.001[a]	217 (52.67)	255(61.89)	9.22 (2.5–15.9)	<0.001[a]	752 (26.7)	891 (31.7)	5.0 (4.2–5.8)	<0.001[a]
If there are symptoms of premenstrual syndrome, when will they start generally?	1,585 (66.12)	1,619 (67.54)	1.42 (−1.2 to 4.1)	<0.001[a]	330 (80.10)	333 (80.83)	0.73 (−4.7 to 6.1)	<0.001[a]	1,915 (68.2)	1,953 (69.4)	1.2 (0.8–1.6)	0.01[a]
Which of the following is not a technique for menstrual hygiene practices?	1,561 (65.12)	1,752 (73.09)	7.97 (5.4–10.6)	<0.001[a]	351(85.19)	372 (90.29)	5.10 (0.6–9.6)	<0.001[a]	1,912 (68.0)	2,125 (75.6)	7.6 (6.6–8.6)	<0.001[a]
What is the material that should not be used by girls during menstruation to absorb and collect blood?	1,077 (44.93)	1,205 (50.27)	5.34 (2.5–8.2)	<0.001[a]	210 (50.97)	241 (58.50)	7.52 (0.7–14.3)	<0.001[a]	1,287 (45.7)	1,447 (51.4)	5.7 (4.8–6.6)	<0.001[a]
The menstrual cup is made of which component?	2040 (85.11)	2,222 (92.70)	7.59 (5.8–9.4)	<0.001[a]	389 (94.42)	411 (99.76)	5.34 (3.1–7.6)	<0.001[a]	2,429 (86.4)	2,634 (93.7)	7.3 (6.3–8.3)	<0.001[a]
For how many hours can females sleep comfortably with a menstrual cup inside?	1,359 (56.70)	1,778 (74.18)	17.48 (14.8–20.1)	<0.001[a]	284(68.93)	352 (85.44)	16.50 (10.9–22.1)	<0.001[a]	1,643 (58.4)	2,131 (76.0)	17.5 (16.1–18.9)	<0.001[a]
Can a person use a menstrual cup with copper T?	662 (27.62)	863 (36.00)	8.39 (5.5–11.0)	<0.001[a]	185 (44.90)	231 (56.07)	11.17 (4.4–17.9)	<0.001[a]	847 (30.1)	1,094 (39.0)	9.0 (7.9–10.1)	<0.001[a]
Menstrual cups are reusable for how many years?	1,135 (47.35)	1,554 (64.83)	17.48 (14.7–20.2)	<0.001[a]	208(50.49)	325 (78.88)	28.40 (22.2–34.6)	<0.001[a]	1,343 (47.7)	1,880 (66.9)	19.2 (17.7–20.7)	<0.001[a]
What do you think about buying sanitary pads and wrapping them in a newspaper?	1,537 (64.12)	1,570 (65.50)	1.38 (−1.3 to 4.1)	<0.06	280 (11.68)	286 (11.93)	0.25 (−4.9 to 7.8)	<0.06	1,817 (64.7)	1,857 (66.2)	1.6 (1.1–2.1)	0.109

[a]Statistically significant with p-Value <0.05.

Table 4: Knowledge of medical officers and community health officers for early marriages and its impact (n=2,809).

Question	Community health officer (n=2,378)				Medical officer (n=412)				Total (n=2,809)			
	Pre-test correct response n (%)	Post-test correct response n (%)	Increase in knowledge % (95 % CI)	p-Value	Pre-test correct response n (%)	Post-test correct response n (%)	Increase in knowledge % (95 % CI)	p-Value	Pre-test correct response n (%)	Post-test correct responses n (%)	Increase in knowledge % (95 % CI)	p-Value
According to the national family health survey 5 report, how much percent of women aged between 15 and 19 years were already mothers or pregnant?	410 (17.10)	446 (18.61)	1.50 (−0.7 to 3.7)	<0.001[a]	81 (3.38)	101 (4.21)	0.83 (−0.8 to 10.5)	<0.001[a]	491 (17.6)	547 (19.6)	2.0 (1.5–2.5)	0.009[a]
What are the consequences of early marriages?	2,126 (88.69)	2,158 (90.03)	1.34 (0.4–3.1)	<0.001[a]	388(16.19)	393 (16.40)	0.21 (−1.8 to 4.2)	<0.07	2,514 (89.5)	2,551 (90.8)	1.3 (−0.6 to −1.4)	0.174
What is the complication seen in delivering babies to a pregnant girl who is married at an early age?	1,951 (81.39)	2,071 (86.40)	5.01 (2.9–7.1)	<0.001[a]	358 (14.94)	372(15.52)	0.58 (−0.9 to 7.7)	<0.001[a]	2,309 (82.2)	2,444 (87.1)	4.9 (4.1–5.7)	<0.001[a]
What are the consequences of early marriage in a pregnant girl at the time of labor?	1,641 (68.46)	1,796 (74.93)	6.47 (3.9–9.0)	<0.001[a]	287 (11.97)	330(13.77)	1.79 (4.6–16.3)	<0.001[a]	1928 (68.6)	2,127 (75.8)	7.2 (6.2–8.2)	<0.001[a]
All of these are family factors causing early marriages, except?	1,014 (42.30)	1,235 (51.52)	9.22 (6.4–12.0)	<0.001[a]	304(12.68)	349(14.56)	1.88 (5.4–16.4)	<0.001[a]	1,318 (46.9)	1,585 (56.4)	9.6 (8.5–10.7)	<0.001[a]

[a]Statistically significant with p-Value <0.05.

Table 5: Knowledge of medical officers and community health officers for HIV/RTI/STI (n=2,809).

Question	Community health officer (n=2,378)				Medical officer (n=412)				Total (n=2,809)			
	Pre-test correct response n (%)	Post-test correct response n (%)	Increase in knowledge % (95 % CI)	p-Value	Pre-test correct response n (%)	Post-test correct response n (%)	Increase in knowledge % (95 % CI)	p-Value	Pre-test correct response n (%)	Post-test correct responses n (%)	Increase in knowledge % (95 % CI)	p-Value
What are the people having multiple sexual contact with others called?	1,280 (53.4)	1,558 (65.00)	11.60 (8.8–14.4)	<0.001[a]	359 (14.98)	370 (15.44)	0.46(-1.7 to 7.0)	<0.001[a]	1,639 (58.3)	1,929 (68.8)	10.4 (9.3–11.5)	<0.001[a]
Which of the following is a symptom of STI in women?	1,683 (70.21)	1,847(77.05)	6.84(4.4–9.3)	<0.001[a]	361 (15.06)	391 (16.31)	1.25(3.5–11.1)	<0.001[a]	2,044 (72.7)	2,238(79.7)	7.0 (6.1–7.9)	<0.001[a]
Which of the following is not a factor for causing an STI?	621(25.91)	823(34.33)	8.43 (5.8–11.0)	<0.001[a]	146 (6.09)	203 (8.47)	2.38(7.2–20.5)	<0.001[a]	767 (27.2)	1,026 (36.5)	9.3 (8.2–10.4)	<0.001[a]
Which of the following is a symptom of STI in the oral region?	1,947 (81.23)	2,038 (85.02)	3.80 (1.7–5.9)	<0.001[a]	388 (16.19)	401 (16.73)	0.54 (0.4–5.9)	<0.001[a]	2,335 (83.1)	2,439 (86.8)	3.7 (3.0–4.4)	<0.001[a]
What are the features of warts?	872(36.38)	955 (39.84)	3.46 (0.7–6.2)	<0.001[a]	333(13.89)	301 (2.56)	−1.34 (−13.5 to 2.0)	<0.001[a]	1,205 (42.9)	1,256 (44.7)	1.8 (1.3–2.3)	0.079
What are the features of scabies?	1,819(75.89)	1,880(78.43)	2.54 (0.2–4.9)	<0.001[a]	370(15.44)	381(15.89)	0.46 (−1.2 to 6.5)	<0.001[a]	2,189 (78.0)	2,262 (80.6)	2.7 (2.1–3.3)	0.003[a]
What are the features of molluscum contagiosum?	706 (29.45)	936 (39.05)	9.60(6.9–12.3)	<0.001[a]	212 (8.84)	271(11.31)	2.46 (7.7–21.0)	<0.001[a]	918 (32.8)	1,207 (43.0)	10.1 (9.0–11.2)	<0.001[a]
All of these are sexual/ reproductive health problems faced by a girl child in an early marriage, except?	1,502 (62.66)	1,775 (74.05)	11.39 (8.8–14.0)	<0.001[a]	312 (13.02)	347 (14.48)	1.46 (3.1–13.9)	<0.001[a]	1,814 (64.6)	2,123 (75.5)	11.0 (9.8–12.2)	<0.001[a]
Which of the following fluids can transmit HIV?	1,568 (65.42)	1,846 (77.01)	11.60(9.1–14.1)	<0.001[a]	274(11.43)	345 (14.39)	2.96(11.4–23.0)	<0.001[a]	1,842 (65.5)	2,192 (78.3)	12.8 (11.6–14.0)	<0.001[a]
Which of the following is not a common symptom of AIDS?	1,067 (44.51)	1,254 (52.32)	7.80(5.0–10.6)	<0.001[a]	277(11.56)	294(12.27)	0.71 (−2.2 to 10.4)	<0.001[a]	1,344 (47.7)	1,549(55.0)	7.4 (6.4–8.4)	<0.001[a]
When should a person start ART for HIV/AIDS?	155 (6.47)	330 (13.77)	7.30 (5.6–9.0)	<0.001[a]	62(2.59)	108(4.51)	1.92 (5.7–16.6)	<0.001[a]	217 (7.8)	438(15.5)	7.8 (6.8–8.8)	<0.001[a]
Which of the following is not a type of transmission of HIV?	1,585 (66.12)	1,824 (76.10)	9.97 (7.4–12.5)	<0.001[a]	386 (16.10)	401 (16.73)	0.63 (78.5–86.1)	<0.001[a]	1,971 (70.0)	2,226 (79.3)	9.3 (8.2–10.4)	<0.001[a]

[a]Statistically significant with p-Value <0.05.

of STI in women 7.0 % (6.1–7.9 %) (p-value:<0.001), sexual/reproductive health problems faced by a girl 11.0 % (9.8–12.2 %) (p-value:<0.001), body fluids which transmit HIV 12.8 % (11.6–14.0 %) (p-value:<0.001), symptom of AIDS 7.4 % (6.4–8.4 %) (p-value:<0.001), ART for HIV/AIDS 7.8 % (6.8–8.8 %) (p-value:<0.001) and others(Table 5).

The total pretest mean score was 16.73 ± 4.44 and the post-test mean score was 18.81 ± 4.39. There was a statistically significant difference between pretest and post-test mean scores p value<0.001. The mean total scores for Medical Officers (pretest 20.68 ± 3.33, post test 22.10 ± 3.1) and Community Health Officers (pretest 16.05 ± 4.25, post test 18.14 ± 4.3) were significantly improved with value of <0.001.

Discussion

This is a retrospective record-based analysis conducted by the State Adolescent Friendly Health Resource Center, AIIMS Mangalagiri, Andhra Pradesh. The online trainings were conducted for Medical Officers and Community Health Officers from 2023 to 2024 on Menstrual Hygiene and menstrual cups, Early Marriage and its impact, and HIV/STI with special emphasis on adolescents.

The present study found an increase in knowledge of menstrual hygiene and menstrual cups after training among participants ranging from 1.2 % for premenstrual symptoms to 19.2 % for the reuse of menstrual cups. Another study from Andhra Pradesh reported “heard of the menstrual cup” and “ever used/know anyone using menstrual cup,” knowledge among primary healthcare providers at baseline was 36.89 and 11.67 %, respectively. Following the webinar, the highest knowledge gained was about “menstrual cups can be cleaned in the home,” 94.53 % [16]. Another study from Tamil Nadu reported India reported 82 adolescent girls improvement in knowledge of menstruation from 57.5 % at baseline to 90 % after one-month of training sessions [21]. These studies collectively suggest a need for increased awareness and advocacy for menstrual cups among health workers and adolescents. The statistically significant increase in knowledge among the participants suggest that the educational intervention was effective in increasing knowledge across multiple dimensions of menstrual hygiene and menstrual cups. Medical officers and community health officers play pivotal roles in promoting menstrual hygiene, decreasing early marriage, and preventing HIV/STIs among adolescents in India. These healthcare professionals engage in community outreach and education, raising awareness about menstrual health and hygiene. They distribute sanitary products and provide instruction on their use, aiming to dismantle taboos and improve health outcomes for young girls. Point improvement in their knowledge is also very important for a developing country like India.

The present study found an increase in knowledge among participants from 1.3 % consequences of early marriage to 9.3 % family factors leading to early marriage. The statistical findings presented in the present study suggest a significant increase in knowledge concerning various aspects related to early marriages and their implications. Enhanced knowledge about the consequences of early marriage during labor suggests an increased awareness of potential risks to both maternal and child health. This awareness is crucial for promoting safe pregnancies and deliveries. The significant increase in knowledge about family factors causing early marriages, with the identification of an exception, suggests that participants have gained understanding of the socio-cultural context surrounding early marriages. A study from Indonesia also found audiovisual media significantly improved awareness of early marriage of 32 adolescents aged 15–18 years [22]. Lack of knowledge of consequences of early marriage is further exacerbated by poor economic conditions and lack of education [23]. The intersection of early marriage and family planning beliefs and use is a key concern, with social norms and lack of information acting as barriers. The decision-making process for early marriage is complex, with social norms and the loss of a parent playing a significant role [24]. These findings underscore the need for comprehensive interventions that address the social, economic, and educational factors contributing to early marriage and its implications for the health and autonomy of adolescent girls in India. The findings have implications for public health interventions aimed at raising awareness about the risks and consequences of early marriages. This knowledge can inform targeted educational programs and policies. The observed increase in knowledge may contribute to behavioral change among adolescents given health care, as they are more likely to make informed decisions regarding early marriages and pregnancies.

The present study found an increase in knowledge among participants from 1.8 % for features of warts to 12.8 % for body fluids which spreads HIV. The present study document good knowledge of HIV/STI among the participants. A systematic review and meta-analysis of 47 studies from 2010 to 2020 found that the overall level of knowledge about HIV/AIDS among healthcare workers was 74 % [25]. However, National Family and Health Survey (NFHS-5), reported 25.80 % of the general population had comprehensive knowledge of HIV [26]. The statistically significant paired mean differences suggest that the educational intervention

effectively increased knowledge on various aspects of HIV/RTI/STI, reflecting the need for continuous training. The knowledge of health workers for the management of sexually transmitted infections (STIs) varies. A study has highlighted the low level of knowledge and poor practices related to STI management among rural medical practitioners (RMPs) in Bangladesh [27]. A study from Southern India highlights the importance of educating health workers to effectively address STIs among adolescents [28]. Similarly, a study in Brazil emphasized the barriers to clinicians providing post-diagnosis education and counseling, which include a lack of specialized training, counseling skills, and knowledge about STIs [29]. Additionally, a study conducted in Delhi, India emphasized the need to educate women about the symptoms of STIs and their prevention [30].

Several targeted educational strategies can be implemented including interactive online sessions via platforms like Zoom enabled real-time engagement, Q&A with experts, Pre-recorded expert presentations, pretests and post-tests via Google, Interactive multimedia, such as videos, animations, and infographics, Quizzes and polls during sessions, and follow-up Q&A sessions. These methods collectively aimed to provide comprehensive and effective training to enhance the health outcomes for adolescents. Understanding the specific areas where knowledge has increased can guide future health education programs to address specific gaps in information.

While training provided various advantages, the study also has some limitations that may impact the effectiveness of training sessions. Online training may have may be challenging to maintain focus and participation. Participants may not be able to complete pre-test or post-test due to connectivity issues. Data on age is self-reported which can have bias. The primary strength of the study is its coverage of the entire state of Andhra Pradesh. Participants from all 26 districts of Andhra Pradesh could attend the training sessions without the need for travel, saving time and resources. This convenience is particularly beneficial for busy medical and community health officers who can fit training into their schedules more easily.

Secondly, the online format enables the use of recorded expert sessions, ensuring consistent delivery of information and allowing participants to revisit the material as needed. This can enhance understanding and retention of the topics covered. Collaboration with national health programs and local health authorities ensured alignment of training with regional health priorities and operational support. Online platforms like Zoom facilitate interactive elements such as real-time Q&A sessions with experts, fostering engagement and immediate clarification of doubts.

Conclusions

The present retrospective record-based cross-sectional study for 26 districts in Andhra Pradesh assessed the knowledge change among Medical Officers and Community health officers regarding menstrual hygiene, early marriages, and HIV/STI with emphasis on adolescents after online training. The study found statistically significant improvement in knowledge for medical officers and community health officers after online training on menstrual hygiene, early marriages, and HIV/STI. This indicates the use of standardized Zoom-based educational intervention in decreasing gaps in the knowledge of Medical Officers and Community Health Officers. The improvement in knowledge of Medical Officers and Community Health Officers on menstrual hygiene, early marriages, and HIV/STI may contribute to better adolescent health and well-being.

Additional information

Disclosures

Human subjects: This study is a part of larger project supported by CDC PEPFAR UNICEF. Waiver of consent and Ethics approval was obtained specifically for this study from the Institute Ethics Committee of All India Institute of Medical Sciences, Mangalagiri [AIIMS/MG/IEC/2023-24/41 dated 12-10-2023]. Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Acknowledgments: We thank CDC PEPFAR UNICEF for funding the State Adolescent Health Resource Centre under the PARC project. We also thank the Rashtriya Kishor Swasthya Karyakram (RKSK) and Andhra Pradesh State AIDS Control Society teams, Andhra Pradesh for their constant support.

Research ethics: The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics

approval to conduct the study and waiver of consent was obtained from All India Institute of Medical Sciences Mangalagiri ethics committee. [AIIMS/MG/IEC/2023-24/41 dated 12-10-2023].

Informed consent: Not applicable.

Author contributions: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Use of Large Language Models, AI and Machine Learning Tools: None declared.

Conflict of interests: Authors state no conflict of interest.

Research funding: CDC PEPFAR UNICEF for funding the State Adolescent Health Resource Centre under the PARC project.

Data availability: The data that support the findings of this study are available on request from the corresponding author, [AG]. The data are not publicly available due to privacy/ethical/legal/commercialrestrictions.

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