

Level of knowledge, attitude, and practice regarding emergency contraception pills among female undergraduate students at KCMUCo in the Moshi Municipality, Kilimanjaro, Tanzania

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ABSTRACT

Background

Globally, unplanned pregnancies and unsafe abortions are prevalent among young and unmarried women aged 18 years and above. Existing evidence shows widespread use of emergency contraception pills (ECP) may significantly reduce induced abortion-related morbidity and mortality. This study aimed to determine the level of knowledge, attitudes, and practice regarding ECP among female undergraduate students aged 15 years and above at a Medical University in Moshi Municipality in the Kilimanjaro region, Tanzania.

Methods

Using a descriptive cross-sectional study design with multistage random sampling, semi-structured questionnaire data were collected among 314 female students at Kilimanjaro Christian Medical University College (KCMUCo) from July 2024 to August 2024.

Results

Three hundred and fourteen (314) participants were enrolled (response rate 100%). The median age was 22 years (Interquartile range (IQR)= 2 years), the majority, 302 (96.2%) were in the age group of 15-25 years old, 309, (98.4%), were unmarried, 218, (69.4%) were Christians, 169 (53.8%) were enrolled in the Doctor of Medicine program, 44% (n=138/314), had had a sexual experience, and 60% (83/138) had their sexual debut between 14-19 years old. The majority, 87.9% (276/314), had heard about ECP, and 72% (198/276) mentioned the internet as the main source of information on ECP. More than half of participants, 58.8 % (n=168/287), had a high level of knowledge of ECP. More than half of participants, 54.4% (n=156/287), had positive attitudes towards ECP. 62% (85/138), had used ECP in the past, and predictors associated with ECP practices at multivariate analysis include social acceptability for female students to use ECP (Adjusted odds ratio (AOR) = 2.10 [95 % Confidence interval (CI) 1.00-4.31; P= 0.05], intention to use ECP in the future (AOR=3.01[2.30-8.64]; P=0.000), adequate knowledge of ECP (AOR=6.70[2.80-16.0]; P=0.000), fear of side effects as a barrier to ECP use (AOR=0.23[0.11-0.48]; P= 0.05), and the belief that ECP can prevent STD (AOR = 0.32[0.12-0.85]; P=0.02).

Conclusion

Female graduate students had a high level of knowledge, and a positive attitude towards ECP, with the internet as the main source of information. Adequate level of knowledge, social acceptability of female students to use ECP, and intention to use ECP in the future are positively associated with ECP practices. Participants who reported fear of side effects of ECP, and the belief that ECP can prevent STDs, are less likely to use ECP. Despite a high level of knowledge and positive attitude towards ECP, reinforcing the respondent's knowledge of specific details of ECP such as mechanism, efficacy, and typology may be beneficial for improving ECP practices among female undergraduate students at KCMUCo in Moshi Municipality.

Keywords: Cross-sectional study, female undergraduate students, Contraception knowledge, Contraception practices, Kilimanjaro, Tanzania

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INTRODUCTION

One of the main causes of maternal morbidity and mortality among young girls and women aged 15 years and above is unwanted pregnancy leading to unsafe abortions. Unsafe abortion is a major public health problem that many countries in sub-Saharan Africa (SSA) face, including Tanzania⁽¹⁻³⁾. The World Health Organization (WHO) estimates that 99.1 million unintended pregnancies occur annually globally, with 25 million unsafe abortions. Furthermore, around 21.6 million unintended pregnancies occur in Africa and 8.85 million in Eastern Africa every year. The consequences of unsafe abortions include maternal mortality and permanent or temporary disabilities.⁽³⁾ Existing global evidence suggests that a widespread use of ECP may significantly reduce induced abortion-related morbidity and mortality. Emergency contraception (ECP), also known as “post-coital contraception”, is administered after unprotected sexual intercourse to prevent pregnancy. ECPs are indicated for occasional or emergency use only and not as routine contraception⁽¹⁻⁵⁾. ECPs work by delaying or preventing ovulation, hence do not cause an ectopic pregnancy or prevent implantation of a fertilized ovum into the uterus, and do not induce abortion if a woman is already pregnant⁽¹⁻⁵⁾. The effectiveness of the ECP ranges from 72 hours to 120 hours with a failure rate of 0.2 % to 3%. Two split or single doses (e.g., *levonorgestrel* 1.5 mg), and low and mid-doses (25-50 mg) of mifepristone are highly effective with acceptable side effects^(1,3-6). Most ECP distributed in the public and private sectors are WHO-prequalified and procured by the U.S. Agency for International Development and the United Nations Population Fund⁽³⁾.

Indications for ECP vary from failure to barrier methods such as slippage, breakages or misuse of male condoms, sexual abuse, assaults, failed coitus interruptus, consecutive missed oral contraceptive pills, and unplanned sexual intercourse^(3,7-10). High levels of knowledge and a positive attitude towards ECP are key factors associated with promoting ECP practices among female students⁽¹¹⁻¹⁶⁾. Existing evidence from studies in sub-Saharan Africa (SSA), reported the level of knowledge of ECP was associated with having ever heard about ECP, being

sexually active, having a secondary or a higher education level, and having internet access⁽¹¹⁾, knowing the place to get ECP, time to use, and the recommended dose⁽¹⁷⁻²¹⁾. In Tanzania, the evidence on the use of emergency contraception is limited, with anecdotal evidence suggesting that young (less than 30 years) educated female students, single, nulliparous, residing in urban settings are using ECP⁽¹⁸⁾. The ECP available in the country is *Levonorgestrel*. Furthermore, ECP are not sold randomly to seekers without establishing an emergency that needs to be addressed, with pharmacies being the main source of access⁽¹⁸⁾. Despite existing evidence of the effectiveness of ECP in reducing unsafe abortion due to unprotected sexual intercourse, there are gaps still observed in Tanzania, including limited evidence on the level of knowledge, attitude, and practices of ECP, particularly among female graduate students (15 years and above) in both urban and rural settings⁽¹⁸⁾. This study’s objective is to determine the level of knowledge, attitude and practices regarding ECP among female students in the Moshi Municipality, Tanzania.

Methods

Study Design

This descriptive cross-sectional study was conducted in July to August 2024 at the Kilimanjaro Christian University College (KCMUCo), a religious-owned health-allied institution in Moshi Municipality in the Kilimanjaro Region of Tanzania. KCMUCo has three faculties: Medicine, Nursing, and Rehabilitation Medicine. KCMUCo enrolls both undergraduate and postgraduate students. At the time of the study, the student population was approximately 2,640, of which 1,264 (47.9%) were female students. KCMUCo is affiliated with the Kilimanjaro Christian Medical Centre (KCMC), a tertiary referral and consultant hospital, where students have access to family planning services. Such services can also be accessed from several nearby public and private health facilities, and private pharmacies.

Study Participants:

The study population included female

undergraduate students from Doctor of Medicine (years 1-3), Bachelor of Science in Physiotherapy (years 1-2), and Bachelor of Science in Laboratory (years 1-3). The total number of female students from the three programs is 530, and distributed as follows: Medicine (n=288; 54.3%), Physiotherapy (n=58; 11%), and Laboratory Sciences (n=184; 34.7%). Out of 288 female medical students, 101 are in year 1, 94 are in year 2, and 93 are in year 3. Out of 79 female Physiotherapy students, 33 are in year 1 and 25 are in year 2. Out of 184 Laboratory students, 58 are in year 1, 68 are in year 2, and 58 are in year 3.

Eligibility criteria

Female students from the three selected undergraduate programs, aged 15 years and above, who were willing to participate in the study were included. Female students who were absent during data collection, or those undertaking postgraduate programs were excluded from the study.

Sample size and Sampling technique

The sample size was estimated using the formula of Kish and Leslie (Kish & Leslie, 1965) to determine the sample size for this cross-sectional study with precision.

Based on a previous study conducted in the Kilimanjaro region among female university students with 24.4% practising ECP⁽¹⁸⁾. The minimum sample size was estimated to be 283, as shown below.

$$n = \frac{Z^2 P (1-P)}{E^2}$$

n = Minimum sample size required.

E = Marginal error rates 5%

Z = Standard normal deviation (z=1.96) corresponding to 95% CI

P = expected proportion of interest to be studied, which is 24.4% or p = 0.244 which is the percentage of respondents who knew about menstruation before menarche in a study done in the Kilimanjaro region⁽¹⁸⁾.

$$n = \frac{1.96^2 \cdot 0.244 (1-0.244)}{0.05^2} = 283.$$

The final sample size was derived using the following formula:

$$\text{Final sample size} = \frac{\text{Effective sample size}}{(1 - \text{Anticipated non-response rate})}$$

The final sample size $= \frac{283}{(1-0.1)} = 314$. The minimum estimated sample size was 283, and the final sample size was $283 / (1-0.1) = 314$, accounting for a usual 10% drop-out rate. A multistage procedure was deployed in this study. In the first stage, purposive sampling was used to select the study area, Moshi Municipality, among seven districts of the Kilimanjaro Region. In the second stage, three undergraduate programs were conveniently selected. The target sample size was 314 female students from the three selected undergraduate programs. A stratification was done according to years of study, years 1-3 for MD, and years 1-3 for BSc. Laboratory Sciences, and years 1-2 for BSc. Physiotherapy. In the final stage, the primary sample frame was a list of eligible female students from years 1-3 classes forming the sampling units in each selected program. Every class formed a secondary sampling frame. To acquire a truly random sampling, a list of all female students in the secondary sampling frame was randomized before determining the sample frame. A systematic sampling technique was used to select the required eligible participants per class in each program to participate in the study. To decide on the sampling interval, the researcher first calculated the proportion of each class level toward the total population of female students in each program. The results were used to determine the sample size per class. The sampling interval (nth) was calculated by dividing the number of female students in a class (N) by the class sample size (n).

Data collection

The female student's names were organized alphabetically, and the first student was selected blindly using a table of random numbers. Subsequent participants were selected using the sampling interval (nth). This process was repeated sequentially until the estimated sample size of 314 was achieved. The estimated data collection period was four weeks (~28 days), since students are present on weekdays (Monday-Friday), which was equal to 20 days. The total number of adolescent girls who were recruited per day equaled an estimated sample size of 314, which divided by 20 days was equal to 15.7, (~16 adolescents per day). Primary data was collected using a pre-tested self-

administered, semi-structured questionnaire adopted from Mariki et al.⁽¹⁸⁾, and adapted to address the study objective. The questionnaire consisted of 33 questions to assess the level of knowledge, attitudes, and practices of ECP. The questionnaire was administered in English –the language used in teaching at the college. The questionnaire was pre-tested among 20 convenient sampled female students in a non-medical university. Findings from the pre-test were analyzed to identify major issues that may need amendment. As a result, some questions were rephrased, and the question “Using ECP is better than an abortion” was added after realizing that during the pre-testing many female students believed that ECP was a method of abortion.

On the day of data collection, four trained fourth-year female medical students (AAN, MJM, GEF, and JJM), collected data from selected participants who were gathered in a quiet classroom environment. To reduce the non-respondent rate, the study information was not disclosed until all eligible students had gathered in the respective classrooms. Furthermore, students were well-spaced out to avoid communication and minimize response bias. In addition, respondents were requested to ask any questions for clarification of any unclear items in the questionnaire. Participants were provided with unique code numbers instead of using their names on the questionnaire to reinforce anonymity. The questionnaire was administered to the selected participants who voluntarily agreed to participate in the study, after a short description of the study objective and their roles as respondents. The participants self-administered the questionnaire, and the four trained researchers checked the filled questionnaire for completeness. No secondary data was collected or used in this study.

Study Variables

Level of knowledge on ECP

Eight (8) items assessed the level of knowledge on the proper use of ECP (e.g. “What types of ECP do you know?”). The expected responses were either 1 = “Yes”, 2=“No”, or 3 = “I don’t know”. Each correct response was scored 1 point and incorrect and non-response were scored 0 points, with a total score

ranging from a minimum of 0 to a maximum of 8. The scores were added and a mean score was calculated to categorize the level of knowledge into adequate knowledge (i.e., scores > the mean), or inadequate knowledge (i.e., scores < the mean). The reliability scale was Cronbach’s alpha =0.62.

Attitudes towards ECP

Six (6) items assessed attitudes toward the use of ECP (e.g., “ECP prevents Sexually Transmitted Diseases?”). The expected response ranged from 1= “I strongly disagree” to 5 = “I strongly agree”. An inverted Likert scale was used in the analysis of 15 questions assessing attitudes towards ECP to score the responses with 0 points for a neutral response to 5 points for a “strongly agree” response with total scores ranging from a minimum of 0 to a maximum of 30. The scores were added and a mean score was calculated to categorize attitude into positive attitude (i.e. score > than the mean), and negative attitude (i.e. score < than the mean). The reliability scale was Cronbach’s alpha =0.69.

Practice of ECP

Practice of ECP was assessed by one item (e.g., “Have you ever used ECP in your lifetime?”). The expected response was either 1= “Yes” or 2= “No”.

Data management and analysis

Two data entry clerks double-entered data to increase accuracy and ensure data quality. Data was cross-checked for entry errors and range checks before analysis. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 27 (Armonk, NY: IBM Corp., IBM SPSS Statistics for Windows, Version 27.0).

Descriptive analysis

A normal distribution was used to summarize numerical variables using mean (standard deviation), a non-normal distribution for median (Q25-Q75), and results from the cross-tabulations are presented as percentages to summarize categorical variables using frequency.

Internal reliability analysis

An internal reliability test was conducted with a good Cronbach's alpha coefficient cut-off of 0.6 or

higher for all items evaluating the level of knowledge of ECP, attitudes towards ECP, and practices of ECP.

Bivariate and multivariate logistic regression

Bivariate and multivariate logistic regression analysis was used to determine the factors associated with practices of ECP. In the binary analysis responses “I don’t know” were classified as “No” to divide the responses into binary “Yes” and “No”. Additionally, responses “I strongly agree” and “I agree” were classified as ‘agree’, and “I strongly disagree”, and “I disagree”, were classified as ‘disagree’. Factors associated with practices of ECP at the binary logistic regression were added to the multivariable logistic regression model. The results from the regression model are presented as Odds ratio(OR)/ Adjusted Odds ratio(AOR) with 95% confidence intervals(CI). All P-values were two-sided and considered to indicate statistical significance if <0.05. A Hosmer and Lemeshow test, which is the most reliable test of model fit, was conducted with a cutoff greater than 0.05, indicating a good fit for the model. The Cox & Snell R Square and the Nagelkerke R Square values indicate the amount of variation in the dependent variable explained by the model (from a minimum value of 0 to a maximum of approximately 1).

Ethical considerations

Ethical clearance was obtained from the Kilimanjaro

Christian Medical University College Ethics Committee (CRERC Number UG 116/2024). Before data collection, permission was sought from the Dean of Students office. After permission was granted, the consenting process commenced after the description of the study objective, and their right to participate in the study. Participants were assured of their confidentiality and anonymity in participating in the study. Additionally, participants were informed of their right to withdraw from the study without any negative consequences. Written assent to participate in the study was sought from respondents aged less than 18 years. Potential respondents who refused to participate in the study were not forced to do so.

Results

All 314 eligible female undergraduate students from the three selected programs participated in the study, giving a response rate of 100%.The median age of study participants was 22 years old, and the IQR was 2. The majority, 302 (96.2%), were in the age group of 15-25, and 12 (3.8%) were in the age group of 26-35. The majority, 309(98.4%) were unmarried and 5 (1.6%) were married, 218 (69.4%) were Christians, 169(53.8%) of the participants were in Doctor of Medicine, 107(34.1%) were in Bachelor of Science in Laboratory and 38(12.1%) were in Bachelor of Science in Physiotherapy programs, as shown in Table 1.

Table 1: Socio-demographic characteristics of participants (N=314)

Variable	Frequency (N=314)	Percentage (%)
Age(years)		
16-20	67	21.3
21-25	235	74.8
26-30	12	3.9
Year of Study		
First-year	106	33.8
Second -year	106	33.8
Third -year	102	32.4
Course		
Doctor of Medicine	169	53.8
Bachelor of Science in Laboratory	107	34.1
Bachelor of Science in Physiotherapy	38	12.1
Religion		

Muslim	96	30.6
Christian	218	69.4
Marital status		
Unmarried	309	98.4
Married	5	1.6

Table 2 presents the sexual behaviour characteristics of the study participants. 44%(138/314) of participants reported ever having sex in their

lifetime, 60.1% (83/138) had their sexual debut between 14-19 years old, and more than half, 57.9% (85) had sex in the past 3 months.

Table 2: Sexual behaviour characteristics of the participants (N=314)

Variables	Frequency(n)	Percentage (%)
Ever had sex in your lifetime?		
Yes	138	43.9
No	176	56.1
Age of first sexual experience		
14-19	83	60.1
20-25	55	39.9
Ever had sex in the last 3 months (n=138)		
Yes	80	57.9
No	58	42.1
Ever had sex in the last 6 months (n=138)		
Yes	104	75.4
No	34	24.6
Ever had sex in the last 12 months (n=138)		
Yes	117	84.7
No	21	15.3

Level of knowledge of ECP

Table 3 presents the parameters used to assess the level of knowledge of emergency contraception among participants. More than half (58.8%) of the study participants had a high level of knowledge of ECP. However, there was no statistically significant difference between high level and low level of knowledge among adolescent girls in this study.

Parameters assessing their level of knowledge of ECP were related to having ever heard about ECP (87.9%), pharmacy as a place to buy ECP (44.9%), post-rape as an indication of ECP use (28.1%), recommended time to take ECP within 72 hours/three days (29.9%), single-dose as the most recommended (55.1%), and 12 hours is the recommended interval for repeat ECP use (21.4%).

Table 3: Level of knowledge of ECP

Variables	Frequency(N=314)	Percentage (%)
Ever heard of ECP?		
No	38	12.1
Yes	276	87.9
Where to obtain ECP		

Hospitals	186	36.8
Social workers (community workers)	4	0.8
Private clinics	38	17.4
Pharmacy	227	44.9
Other	1	0.2
Indication of ECP use		
Post rape	218	28.1
When a condom breaks	187	24.1
If oral contraceptives are forgotten	167	21.5
Withdrawal fail	106	13.7
Timing miscalculation	74	9.5
No use of other contraception	24	3.1
Time for ECP to be taken (n=276)		
Immediately after sex	74	26.8
At any time before the first day	55	19.9
Within 48 hours\two days	55	19.9
Within 72 hours\ three days	77	29.9
Within 120 hours\five days	2	0.7
I don't know	13	4.7
Recommended dose (n=276)		
One dose	152	55.1
Two doses	35	12.7
I don't know	89	32.2
Recommended interval (n=276)		
Twelve hours	59	21.4
Forty-eight hours	22	8
I don't know	195	70.7
Level of Knowledge		
Adequate knowledge (4-6 scores)	194	62
Inadequate knowledge (0-3 scores)	120	38

Sources of information on ECP

Figure 1 presents the sources of information on the ECP of the study participants. Two-thirds, 198(63%) reported that their source of information is the

Internet, followed by peers-72 (23%), partners-14 (4.6%), health facilities-12 (4%), media-11 (3.2%), and magazine/newspapers-7 (2.2 %).

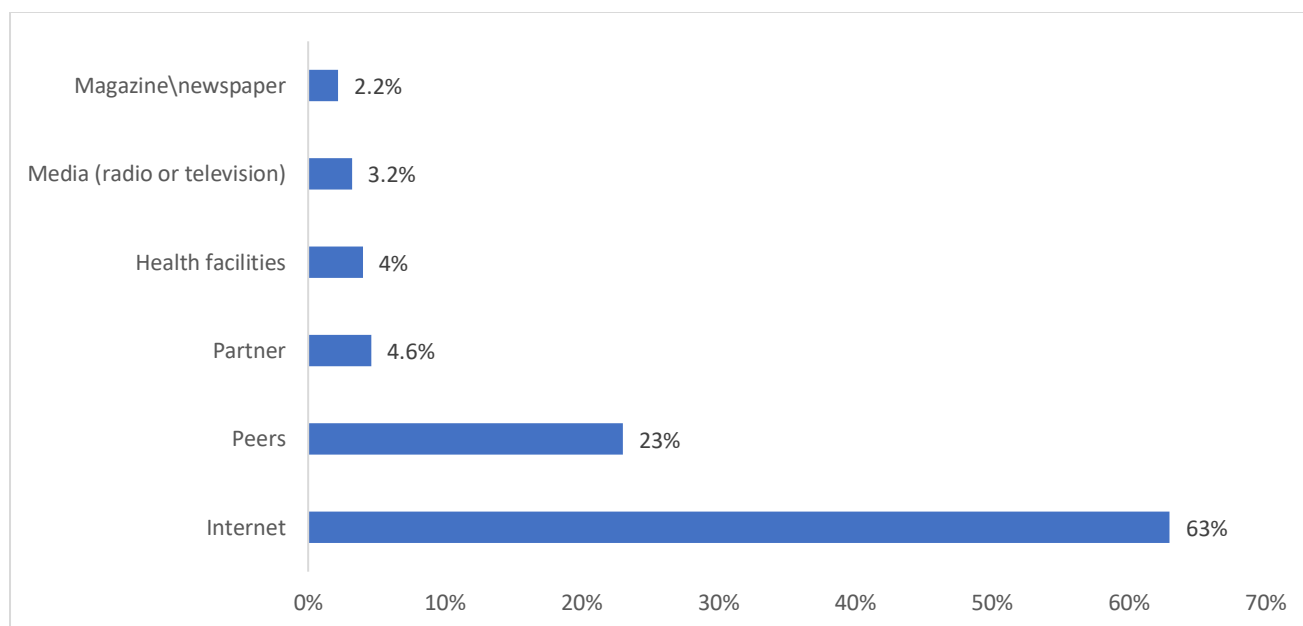


Figure 1: Respondent's main source of information on ECP

Attitude towards ECP

Table 4 presents parameters used to assess attitudes toward ECP among study participants. The majority, 87.9% (n=276/314), of participants had positive attitudes toward ECP compared to 12.1% with negative attitudes. Parameters with a high

proportion in assessing their attitudes toward ECP were those who agreed that accessibility of ECP increases irresponsible sexual behaviors (68.8%), using ECP is better than an abortion (69.9%), and fear of side effects is a barrier to ECP use (49.3%).

Table 4: Attitude of the participants towards ECP

Variable	Frequency(N=314)	Percentage (%)
ECP prevent STDs		
Agree	40	12.7
Disagree	274	87.3
It is acceptable for female university students to use ECP		
Agree	133	42.3
Disagree	181	57.7
Using ECP is better than abortion.		
Agree	210	69.9
Disagree	104	33.1
Fear of side effects		
Agree	155	49.3
Disagree	159	50.7
Social accessibility of ECP increases irresponsible sexual behavior		
Agree	216	68.8
Disagree	98	31.2
Intention for using ECP in the future		
Agree	121	38.5
Disagree	193	61.5
Attitudes towards ECP		



Positive attitude (16-30 scores)	276	87.9
Negative attitude (0-15 scores)	38	12.1

Practice of ECP

The practice of ECP was assessed among 138 participants who reported ever having sexual experiences. Two-thirds, 85/138 (61.6%) of participants reported having used ECP. Of those who used ECP, 29 (34.1%) reported taking ECP

within 48 hours after unprotected sex, 38 (44.7%) used after being recommended by their partner, and 36 (42.4%) reported failure of coitus interruptus as a reason to use ECP. The majority, 83 (97.6%) use single-dose ECP, and 38 (44.7%) reported using ECP 3-5 times a year as presented in Table 5.

Table 5: Participants' practice towards ECP

Variables	Frequency (N 138)	Percentage (%)
Ever used ECP (N=138)		
Yes	85	61.6
No	53	38.4
Time of ECP to be taken(n=85)		
Immediately after sex	25	29.4
At any time before the first day	13	15.3
Within 48 hours	29	34.1
Within 72 hours	18	21.2
Who recommended(n=85)		
Friend	24	28.2
Partner	38	44.7
Counselor	1	1.3
Web page	22	25.8
Reasons for ECP use(n=85)		
No use of other contraception	24	28.2
Timing miscalculation	12	14.1
Condom broke	6	7.0
Forgotten pills	5	5.9
Forced to have sex	2	2.4
Withdrawal fail	36	42.4
Doses of ECP(n=85)		
One dose	83	97.6
Two doses	2	2.4
Frequency of ECP taken in a year(n=85)		
1-3	28	32.9
3-5	38	44.7
>5	19	22.4

Factors associated with the practice of ECP

The primary outcome of this study was the practice of ECP among study participants. In the bivariate analysis, seven (7) predictors: religion ($p=0.03$), marital status ($p=0.008$), ECP can prevent STDs ($p=0.02$), acceptable for female students to use ECP ($p=0.000$), fear of side effects of ECP ($p=0.000$), intention to use ECP in the future ($p=0.000$), level of knowledge of ECP ($p=0.000$), and attitudes toward ECP ($p=0.008$) were significantly associated with practices of ECP. In the multivariate logistic regression analysis, all 7 predictors were included to confirm the observed associations in bivariate analysis. In the final model, four (4) predictors were significantly associated with the practices of ECP.

Participants who agreed that it was acceptable for female students to use ECP were twice as likely to report using ECP (Adjusted odds ratio (AOR) = 2.10 [95 % Confidence interval (CI) 1.00-4.31; $P=0.05$]. Respondents who agreed that fear of side effects is a barrier to ECP use were less likely to report ECP use than those who disagreed (AOR = 0.23[0.11-0.48]; $P=0.05$). Participants who agreed ECP can prevent STDs were less likely to report ECP use than those who disagreed (AOR = 0.32[0.12-0.85]; $P=0.02$). Participants who agreed to the intention to use ECP in the future were three times as likely to report ECP use than those who disagreed (AOR = 3.01[2.30-8.64]; $P=0.000$). Respondents with adequate knowledge were six times more likely to report ECP use than those with inadequate knowledge (AOR = 6.70[2.80-16.0]; $P=0.000$).

Table 6: Factors associated with practices of ECP among respondents (n=314)

Variables	Practices No (n=229)	Yes (n=85)	P value	Unadjusted [95%CI]	OR	P value	Adjusted [95%CI] ^a	OR
Religion								
Muslim	78(34%)	18(21%)	0.03	1		0.08	1	
Christian	151(66%)	67(79%)		1.92[1.10-3.46]			1.97[0.9-4.30]	
Marital status								
Married	2(0.9%)	5(5.9%)	0.000*	1		0.06	1	
Unmarried	227(99.1%)	80(94.1%)		7.10[1.35-37.3]			0.17[0.01-1.10]	
ECP prevent STD								
Disagree	194(84.7%)	80(94.1%)	0.03*	1		0.02*	1	
Agree	40(15.3%)	5(5.9%)		0.35[0.13-0.92]			0.32[0.12-0.85]	
It's acceptable for female students to use ECP								
Disagree	155(68%)	26(30.6%)	0.000	1		0.000	1	
Agree	74(32%)	59(69.4%)		4.75[2.78-8.14]			2.10[1.00-4.31]	
Fear of side effects is a barrier to ECP use.								
Disagree	97(42.4%)	62(73%)	0.000	1		0.05	1	
Agree	132(57.6%)	23(27%)		0.27[0.16-0.47]			0.23[0.11-0.48]	
Intention to use ECP in the future								
Disagree	166(72.5%)	27(31.8%)	0.000	1		0.000	1	
Agree	63(27.5%)	58(68.2%)		5.66[3.38-9.72]			3.01[2.30-8.64]	
Level of Knowledge								
Inadequate (0-3 scores)	109(47.6%)	11(12.9%)	0.000	1		0.000	1	
Adequate(4-6 scores)	120(52.4%)	74(87.1%)		2.54[2.10-3.13]			6.70[2.80-16.0]	
Attitudes category								
Negative attitude	34(14.8%)	4(4.7%)	0.000	1		0.86	1	
Positive attitude	195(85.2%)	81(95.3%)		3.53[1.21-10.3]			1.14 [0.27-4.78]	

^a2Log Likelihood test:218.05; Cox & Snell $R^2 = .484$; Hosmer and Lemeshow test $X^2 = 6.904$; df (7), sig 0.44

*Fisher's exact test

Discussion

This study aimed to determine the level of



knowledge, attitude, and practice of emergency contraception pills (ECP) among female undergraduate students at KCMUCo in Moshi Municipality. The majority of study participants were young and single with a mean age of 22 years, and having experienced an early sexual debut (i.e., 14-19 years). This observation is consistent with similar studies from other settings and underlines the importance of early reproductive health education, including information on ECP before menarche, which is a basic right to information for female adolescent girls before reaching universities.

In this study, most participants had a high level of knowledge of ECP, although the difference with those with a low level of knowledge was not

statistically significant. This observation concurs with similar studies in different settings^(13,14,16,22-24). The most plausible explanation for the current observation is that most participants mentioned the internet as their main source of information about ECP. Accessibility to the internet is documented as a strong predictor of the high level of knowledge of ECP. However, there is a debate on whether the information from the internet is reliable and more accurate than social networks, such as peers, and relatives, which are unreliable with misinformation and misconceptions about ECP safety^(1,5,11,23,24). Existing evidence suggests that medical and informational sources of ECP influence adequate knowledge, which influences ECP practices^(1,5,11,13,23,24).

The majority of the participants had positive attitudes toward ECP practices, which is in line with similar studies in other settings.^(14,15,19,25-27) However, negative attitudes toward ECP in this study were most likely influenced by those who agreed that ECP prevent STDs, social accessibility of ECP increases irresponsible sexual behaviours, fear of side effects as a barrier to ECP use, and ECP is better than abortion. These observations can be attributed to the misinformation, disinformation, and misconceptions associated with its use^(11,20,28).

Misconceptions about the side effects of ECP are widespread in most SSA countries, including

Tanzania^(18,23,29,30). The most common misconceptions about the side effects related to their use are that ECP are a form of abortion, failure to conceive in the future, and risk of cancers of the reproductive organs^(5,11,18,19,23,29,30). Misuse of ECP is widely used among students as an abortifacient, usually administered clandestinely by malpracticing healthcare practitioners, to women who present with amenorrhoea. These observations highlight the importance of providing correct and accurate information about ECP safety, efficacy, and proper use to alleviate the fear of its side effects and increase the ECP practice among this high-risk group^(5,11,18,19,23,29,30). Existing evidence suggests that knowledge about the side effects of contraceptives positively influences their use among women of reproductive age in the general population,^(5,11,18,19,23,29,30) and provides an opportunity to "bridge" users onto regular and more effective contraceptive methods, and other sexual and reproductive health services⁽³¹⁾.

This study indicated that less than half of the study participants reported having sexual experiences, two-thirds of which reported having used ECP. Studies have reported variability of ECP use among women of reproductive age (15-49 years) in SSA ranging from 0% in the Democratic Republic of Congo (DRC) to 54% in Nigeria^(2,21). The high proportion of sexually experienced female students reporting ECP use in this study is contrary to studies that reported low ECP use among sexually experienced female students^(27,29). The observation in the current study is encouraging, because most female students are caught unaware by their partners and coerced to have unprotected sexual intercourse, and exposed to the risk of unwanted pregnancy and unsafe abortion⁽¹⁹⁾. The most probable explanation could be influenced by the respondents' medical training, hence more awareness of ECP, and may have easier accessibility than their non-medical female students^(11,14,22,32).

This study is not exempt from limitations. First, it is a cross-sectional study, so causal inferences about the relationships observed cannot be established. Second, it enrolled participants from only three study programs, so there is selection bias, and the



findings may not represent the experiences of all female undergraduates in this study setting or Tanzania.

Thirdly, response bias may be possible in this study since participants were convened in a class environment where two respondents were seated together on a bench. The seating arrangement may influence the responses of participants if they copy from each other. Additionally, given the sensitive nature of the study topic, it is possible that most participants were too shy to ask for help from the trained research assistants, even though they could not understand a particular question properly. Fourth, recall bias could be a possibility particularly among older participants, since we asked participants about events that had occurred a few years back. Fifth, reporting and social desirability biases could not be excluded from this study because of self-reporting responses and under-reporting or over-reporting of ECP practices. Finally, this study did not assess key components of proper ECP practices such as types of ECP availability, affordability, and cost-effectiveness of types of ECP. Further, the exclusion of male graduate students in this study may be a limitation. Future similar studies

on ECP should include male graduate students. Despite the caveats, this study provides increasing evidence on knowledge, attitudes, and practices of ECP among female undergraduate students in the study setting.

Conclusion

Female undergraduate students had a high level of knowledge, and a positive attitude towards ECP, with the internet as the main source of information. Adequate level of knowledge, acceptability of female students to use ECP, and intention to use ECP in the future are positively associated with ECP practices. Participants who reported fear of side effects of ECP, and the belief that ECP can prevent STDs, are less likely to use ECP. Despite a high level of knowledge and positive attitude towards ECP, reinforcing the respondent's knowledge of specific details of ECP such as mechanism, efficacy, and typology may be beneficial. Understanding intentions of future use of ECP, and changes in existing fear of side effects of ECP are important predictors for improving ECP practices among female undergraduate students at KCMUCo in Moshi Municipality.

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