



Original Research Article

Prevalence of common urogenital infections among menstrual cup users

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ABSTRACT

Background: There has been an increased awareness among girls and women in India, especially from middle and higher income group on menstrual cup, due to health or environmental reasons. Use of various sanitary products during menstruation can impact menstrual health with incidence of urogenital infection like rashes, irritation etc. being common among women.

Objective: To determine prevalence of symptoms related to urogenital infections before and after switching to menstrual cups.

Materials and Methods: In this retrospective self-reported study, females using menstrual cup were administered a questionnaire consisting of questions related to symptoms of urogenital infections in their lifetime.

Results: A total of 301 menstrual cup users were included in this study. The most common symptom reported by the respondents included rashes (48%), itching (48%), abdominal pain (40%), foul smelling white discharge (22%), excessive white discharge (20.6%) and burning sensation while passing urine (15%). The prevalence of the symptoms was lower after switching to menstrual cups. Among the most common symptoms, 92% women were relieved from rashes, 79% from symptoms of itching and 42% from abdominal pain. Approximately, 1-5% women reported symptoms only after switching to menstrual cups.

Conclusion: The results demonstrate lower prevalence of symptoms of urogenital infections among women when compared to their previously used menstrual product. Symptoms of urogenital infections did not affect the acceptance and continuance of menstrual cups usage. Additional clinical studies will be required to compare changes in occurrence of symptoms post switching to menstrual cups and develop linkage between these symptoms with usage of menstrual cup.

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1. Introduction

According to World Health Organization, a person aged 10–19 years is considered as an adolescent.¹ During this period, physical, psychological, and biological development of the child occurs.² Menarche is an important biological milestone in a woman's life as it marks the onset of the reproductive phase of her life. The average age at menarche is mostly consistent across the populations that is, between 12 and 13 years of age.³ Girls and women need

effective, safe, and affordable menstrual products. Globally, an estimated 1.9 billion women, i.e. around 26% of the population were of menstruating age in 2017, spending on average 65 days in the year dealing with menstrual blood flow.⁴ Menstruation is a natural process but it is still a taboo in Indian society as it is considered unclean and dirty. In 2019, menstrual hygiene alliance of India (MHAI) has approximated that there are 336 million menstruating women in India, of which 36 per cent or 121 million women use disposable sanitary napkins.⁵ As per the latest 2019-20 National Family Health Survey-5 (NFHS-5), 82.6 per cent of women in the 15-25 years of age in the 22 states/UTs use locally prepared napkins, sanitary napkins, tampons,

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and menstrual cups as hygienic methods of protection. This has increased from 70.4 for the same states and UTs in the NFHS-4 survey 2015-16.⁶

Though sanitary product is the most common used sanitary product, reusable alternatives like cloth pads and menstrual cups are gaining popularity too. Globally the choice of sanitary product made by women vary greatly due to the personal preferences, availability of resources, economic status, cultural traditions and beliefs, education status, and knowledge about menstruation. The findings from various studies^{7,8} suggest that media awareness about personal hygiene has significant contribution in use of hygienic methods during menstruation. Practices related to menstruation hygiene are of major concern as unhygienic practices can lead to infections in the genital area and can cause urinary tract and reproductive tract infections. A strong and consistent positive association has been found between prevalence of lower reproductive tract infections (RTIs) and poor menstrual hygiene practices (e.g., using reusable old cloths, changing an absorbent outside a toilet facility, changing once per day, washing only once per day, keeping dried reusable old cloths inside the house, storing reusable cloths in a toilet).⁹ While usage of sanitary pads has been associated with allergic contact dermatitis across various studies,^{10,11} AE Hochwalt in 2015, found no significant risk of adverse effects with the use of sanitary pads, as only one health complaint was reported per two million products shipped to the market.¹²

Menstrual cup is a device for menstrual flow management and is claimed to be a health and environment friendly alternative to the conventional menstrual sanitary protections. Early vaginal cups used specifically for menstrual collection have never achieved widespread use, even though they have been available in developed countries for many decades. Reusable menstrual products (including menstrual cups) are more economical than disposable ones. The menstrual cup has been explored as a means of menstrual hygiene management in developing countries like India. It is manufactured using health-grade non-toxic non-allergic silicone. Menstrual cup is made of high grade medical grade silicone, rubber, latex or elastomer, these bell-shaped receptacles collect menstrual flow when inserted into the vaginal canal. The menstrual cup should be emptied every 4–12 h, depending on menstrual flow and sterilised by boiling at the end of a cycle. There are relatively few study reports that evaluate safety and acceptability of cups with actual use during menses. A study in Kenya that detected lower bacterial vaginosis in users of a menstrual cup than in those who used sanitary pads postulated that the inert material of the menstrual cup might assist in maintaining a healthy vaginal pH and microbiome¹³ Laboratory studies have shown contradicting results on the possibility of development of Toxic Shock Syndrome Toxic-1 in the presence of menstrual cups,¹⁴

but clinical data in humans using cups have so far not shown reason for concern.¹⁵ The study by Ejik et al.¹⁶ which involved systematic review of papers on experiences and leakage associated with menstrual cups, out of more than 3000 participants, five women reported severe pain or vaginal wounds, six reported of allergies or rashes, nine of urinary tract complaints, and five of toxic shock syndrome after use of the menstrual cup. A study in Gujarat undertaken by gynaecologists across 150 participants similarly reported rash, dryness and infection in less than 2% cases.¹⁷

Exploring existing literature clearly highlighted that there is a lack of research on the incidence rate of allergies, rashes and any other infection in the lifetime of menstrual cup user.

2. Objective

The primary objective of this study was to determine prevalence of common urogenital infections, before and after usage of menstrual cups among girls and women through a random self-reported questionnaire survey. The secondary objectives were to understand uptake and usability across various age groups, occupation status and sexual and menstrual health status.

3. Materials and Methods

A cross-sectional, questionnaire based study was carried out through a questionnaire survey method. The questionnaire consisted of questions related to demographics and menstruation related information. For the ease of sharing the survey and managing the response, Google Forms was used. The form was prepared in a bi-lingual format (English and Hindi languages) so that more number of menstrual cup users can comprehend and fill this form. The form mentioned the purpose of the study before the questionnaire began, so it can be assumed that the respondents have given their consent to use their personal information for the study purpose. Answers to the questions related occupation and sexual activity were made optional, to respect the privacy of the respondents. The form was shared in whatsapp groups of menstrual cup users, menstrual health educators and users of popular menstrual cup brands in India. The form was in circulation for one month, before it was withdrawn for response analysis.

In order to understand the menstrual health status of the respondents, the questionnaire included the questions regarding the regularity of menstrual cycle, bleeding pattern, sanitary product used before switching to menstrual cup and their experience with vaginal processes (sexual intercourse, vaginal birth and usage of intra-uterine device). In order to understand the usability of cups among the respondents, questions pertaining to the duration of use, learning cycle (number of cycles needed to start using the cup comfortably)

and need for replacement of cup were included. To see any correlation on type of sanitary product used among women with their symptoms, the occurrence of the symptom was studied during two stages- before switching and after switching to menstrual cup.

Prevalence of menstrual health related symptoms and learning curve duration of use were evaluated. Age, occupation, menstrual history etc., were considered as key explanatory variables. In order to understand the association of prevalence of symptoms of females with factors like duration of use of cup, learning curve, regularity of menstruation and vaginal delivery were checked using statistical test of association.

3.1. Statistical analysis

SPSS version 22.0 statistical software package for Microsoft Windows (SPSS Inc., Chicago, IL) and MS-Excel were used for data analysis. Statistical Fisher's Chi-square exact test was applied to achieve inter-group comparisons and identify the association if any. P values less than 0.05 was considered as significant value.

4. Results

4.1. Demographics and menstrual health characteristics

A total of 301 menstrual users responded to the survey. The mean age of respondents was 33.75 years, with 49.5% belonging to the age group of 30 to 39 years. Maximum (68%) respondents were working professionals, 16% were not employed and 10% were students, while the rest did not reveal their professional identity.

A total of 88.4% females confirmed to have regular menstrual cycle with 18.3% and 8% participants experiencing heavy and light menstrual bleeding respectively. Before switching to menstrual cups, 254 (84.4%) women were using disposable sanitary pad and 33 (11%) were using tampons, while the rest (5%) were using cloth pad for managing their menstruation. 76% females confirmed that they are sexually active while 12% are not active. The remaining 12% did not disclose their sexual activity. Only 34% of respondents have undergone vaginal delivery and only 5% were using intra-uterine device. (Table 1)

4.2. Cup usage

Approximately 50% female respondents are using cup for more than one year. For majority (80%) users, learning curve for menstrual cup was within 3 cycles. 76% are reported to be satisfied with their current cup and have not replaced it. 24% who replaced the cup gave reasons as follows: 5.6% gave the reason of size of cup, 4.3% gave the reason of leakage, 3% gave the reason of cup worn out

and 17% cited other reasons besides the above three listed reasons in the survey form. (Table 2)

4.3. Prevalence of symptoms

The prevalence of various symptoms of urogenital infections experienced by women during their lifetime were as follows. A total of 15% of the respondents reported burning sensation while passing urine, 20.6% females complained of excessive white discharge, 22% reported foul smelling white discharge. The most common symptom reported by the respondents included rashes (48%) and itching (48%), followed by abdominal pain (40%; Figure 1)

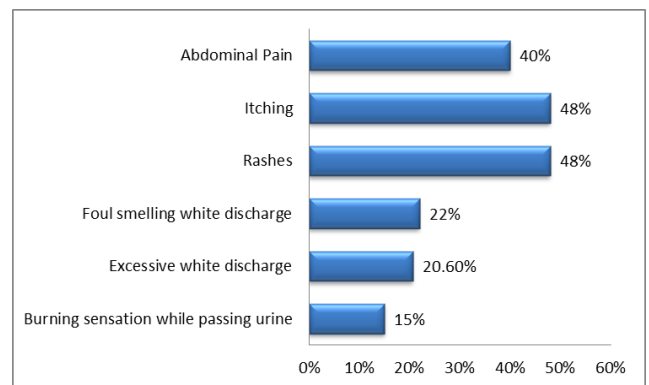


Fig. 1: Prevalence of symptoms among the respondents

In case of rash, of the 48% females who suffered from this problem, 44% experienced rashes before using cup but did not report after switching to cup, for 2.7% females, symptoms persisted even after switching to cup while another 1.3% developed the symptom only after using the cup. Similarly the prevalence was studied for all other five symptoms (Table 3).

4.4. Treatment and case of repeated illness

Majority of the respondents (50.2%) did not complete their treatment for their symptoms prior to switching to menstrual cups and of them 28.2% respondents repeatedly suffered from the condition. Among those who developed the symptoms or continued their symptoms, after switching to menstrual cups, most of them (49.5%) did not complete their treatment, even though less (11.3%) respondents suffered from repeated illness (Table 4).

4.5. Bivariate analysis

Learning curve with burning sensation ($p= 0.001$) and vaginal birth with abdominal pain ($p= 0.005$) showed significant association.

Table 1: Demographics and menstrual health characteristics of the respondents

Characteristic	Group	No. (%)
Age(years)	10-19 years	10 (3.3%)
	20-29 years	74 (24.6%)
	30-39 years	149 (49.5%)
	40-49 years	62 (20.6%)
	50-59 years	6 (1.99%)
Occupation	Working professional	205 (68%)
	Not employed	48 (16%)
	Student	30 (10%)
Regularity of Menstrual Cycle	Did not reveal	18 (6%)
	Regular	266 (88.4%)
	Irregular	35 (11.6%)
Bleeding Pattern	Light	24 (8%)
	Medium	222 (73.8%)
	Heavy	55 (18.3%)
Sanitary Product used before switching to Menstrual cup	Disposable Sanitary Pad	254 (84.4%)
	Tampon	32 (11%)
	Cloth Pad	15 (5%)
Sexual Activity	Active	(76%)
	Inactive	(12%)
	Did not reveal	(12%)
Vaginal Childbirth	Yes	(34%)
	No	(66%)
Use of Intra-Uterine Device	Yes	15(5%)
	No	286(95%)

Table 2: Usability of menstrual cup among the respondents

Characteristic	Group	No. (%)
Duration of use of cup	Less than 6 months	70 (23.3%)
	6 months-12 months	72 (23.9%)
	1-3 years	91 (30.2%)
	3-5 years	46 (15.3%)
	5-10 years	17 (5.6%)
Learning Curve	More than 10 years	5 (1.7%)
	Less than 3 cycles	241 (80%)
	More than 3 cycles	60 (20%)
Replacement of cup	Yes	71 (23.6%)
	No	230 (76.4%)
Reason for Replacement	Size of Cup	17 (5.6%)
	Leakage	13 (4.3%)
	Worn Out	8 (2.7%)
	Other reason	51 (16.9%)

Table 3: Prevalence of urogenital infection symptoms in the lifetime of menstrual cup users

Condition	Never Experienced	Only Before switching to Menstrual Cup	Before and After switching to Menstrual Cup	Only After switching to Menstrual Cup
Burning Sensation	257(85.4%)	33(11%)	3(1%)	8 (2.7%)
Excessive White Discharge	239(79.4%)	33 (11%)	15 (5%)	14 (4.7%)
Foul smelling White Discharge	236 (78.4%)	47 (15.6%)	12 (4%)	6(2%)
Rashes	156 (51.8%)	133 (44.2%)	8 (2.7%)	4 (1.3%)
Itching	156 (51.8%)	114 (37.9%)	15 (5%)	16 (5.3%)
Pain in the Abdomen	182 (60.5%)	50 (16.6%)	56(18.6%)	13 (4.3%)

Table 4: Treatment status of menstrual cup users for various symptoms

	Complete treatment of the symptom			Case of Repeated Illness		
	Yes	No	Did not respond	Yes	No	Did not respond
Before switching to Menstrual Cup	16.6%	50.2%	33.2%	28.2%	41.9%	29.9%
After switching to Menstrual Cup	14.3%	49.5%	36.2%	11.3%	55.5%	33.2%

Table 5: Association of symptoms with various factors

	Statistics parameters	Burning Sensation	White discharge excessive	Foul Smell	Rashes	Itching	Abdominal pain
Duration of use of cup	chi-square vale	20.005	17.944	8.071	20.789	21.758	9.198
	Significance p-value	0.172	0.266	0.921	0.144	0.114	0.867
	Correlation Coefficient (r)	-0.005	-0.083	0.004	-0.126	-0.117	0.028
Learning curve	chi-square vale	23.335	5.578	10.556	4.618	10.111	3.957
	Significance p-value	0.001*	0.472	0.103	0.594	0.12	0.683
	Correlation Coefficient (r)	-0.071	0.118	-0.021	0.031	0.008	-0.009
Regularity of menstruation	chi-square vale	1.824	1.489	1.851	2.02	4.526	1.967
	Significance p-value	0.61	0.685	0.604	0.568	0.21	0.579
	Correlation Coefficient (r)	-0.024	-0.036	-0.073	-0.012	0.097	0.018
Vaginal birth	chi-square vale	1.613	1.577	3.153	1.476	3.68	13.047
	Significance p-value	0.656	0.665	0.369	0.688	0.298	0.005*
	Correlation Coefficient (r)	-0.031	0.038	0.06	-0.067	0.024	0.066

5. Discussion

A total of 76% of the total respondents reported being sexually active, which suggest that acceptability of menstrual cup among sexually active women is higher over those who are inactive. Approximately 50% of the respondents belong to the age group of 30-39 years. This indicates that women in the said age group in India are ideal population to introduce menstrual cup, due to the higher possibility of women being sexually active. In the age group of 40-49 years, with onset of menopause or menopausal symptoms, the uptake maybe lower. The adoption is lowest among girls in the age group of 10-19 years, perhaps due to fear of insertion or cultural taboos regarding hymen.

The majority of the respondents were working women, which let us assume that working professionals may have higher exposure to reusable alternatives like menstrual cup. Further, there is greater autonomy in making a purchase decisions when a woman is financially independent with disposable income in hand.^{18,19} Pedrini and Ferri²⁰ found that those with a higher income and post-secondary

education were more likely to be socially conscious consumers, but it is not clear in this research whether the consumer's income or their education, or indeed both, was the reason for this heightened desire to purchase more environmentally-friendly products.

While most respondents were sanitary pad users before switching to menstrual cups, a very small proportion of women (5%) transitioned from reusable cloth pads. Fear of use has been studied as the most common reason for women to not use menstrual cups.^{16,21} Since reusable cloth pads are safe for health and does not cause environmental pollution, women wanting to change their menstrual product for either of the above reasons may have initially opted for the easier alternative of cloth pad.

A total of 80% of the respondents were comfortable in using menstrual cup within three cycles. These findings are consistent with menstrual cup acceptability study undertaken in Gujarat, India, by Kakani CR et al. suggesting that a woman may need upto three cycles to become a satisfied cup user.¹⁷ Another study involving acceptability of a menstrual cup among adolescent school girls in Nepal

reports rapid adoption of cup use, with 60% using cups by 6 months and continuing use for the length of the study.²² It is thus essential for doctors, cup brands or initiatives promoting menstrual cups to handhold and extend support for minimum three cycles to reduce any drop-outs. As no age group had similar population size, the possibility of any correlation between the age of a female and her learning curve could not be verified.

While only 24% females have replaced the menstrual cup in their lifetime, most (17%) cited their reasons as other. The survey was designed specifying possible reasons for replacement as size issue, leakage or wear and tear, however based on the survey results it can be inferred there are other reasons too for changing the cup, which could not be captured in this study.

Except for rashes and itching, which was experienced by 52% women respectively, majority of the respondents have not reported the stated symptoms at any stage of their life (before or after switching to menstrual cup) suggesting good menstrual health among these women. Our study suggests that the most common menstrual health symptom prevalent among women using various sanitary products was rashes and itching, postulating/confirming various studies undertaken in the past.^{10,11}

The prevalence of health symptoms has been lower for most symptoms after switching to menstrual cups, with significantly less number of these women suffering from rashes (92%) and itching (79%). The incidence of rashes and itching, earlier due to usage of synthetic sanitary pad may have reduced with use of menstrual cup, which is an intra-vaginal product.

This is in agreement with a study by African Population and Health Research Centre undertaken in 2010 with 39 girls and women which reported that participants after using menstrual cup did not experience any health issues normally experienced with other methods, namely sanitary pads or pieces of cloth include skin irritations leading to scratching and bruising the skin on the thighs.²¹

The reduction rates for other symptoms are as follows: burning sensation (75%), foul smelling white discharge (72%), excessive white discharge (53%) and abdominal pain (42%). However, approximately, 1-5% women reported developing symptoms only after switching to menstrual cups. Additional clinical studies by gynaecologist with larger sample sizes and follow-up are required to compare changes in occurrence of symptoms post switching to menstrual cups and develop linkage between these symptoms with usage of menstrual cup.

Before using menstrual cup, 50.2% of the respondents did not seek or complete their treatment, despite suffering from one of these menstrual symptoms and the repeated incidence rate of illness has been around 28%. While after switching to menstrual cup, 49.5% of the respondents reported not seeking or not completing their treatment and

11.3% repeatedly suffered from one of the said symptoms. The trend suggests that women either aren't recognizing the need for treating the symptom or not completing their course of treatment due to various reasons. Some patients with vaginal symptoms seek medical consultation when the discharge interferes with functioning – either sexual relations or the ability to go to work or attend school.²³ This highlights the need for gynecologists to actively promote general menstrual health and hygiene among women in the community. The reduction in the rate of repeated incidence of illness after switching to cup could be attributed to any treatment that the women may have undergone as well as menstrual cup's ability to manage some of these symptoms. Further clinical investigation needs to be carried out to postulate this finding.

The result shows a correlation between learning curve and burning sensation ($p=0.001$), the possibility of which cannot be neglected. During initial stage of learning, the repeated attempts to insert or remove menstrual cup can cause irritation of the urethra and thereby burning sensation when passing urine, however a comprehensive study needs to be undertaken to investigate this relationship. In the study undertaken by Regie C et al., association of significance was proved between fear of using menstrual cup and infection/allergy/irritation.²⁰

Although a statistical association was observed ($p=0.005$), there is no clinical evidence that women who underwent vaginal delivery will experience abdominal pain during menstruation.

6. Conclusion

The menstrual cup is a satisfactory alternative to women when compared to their previously used menstrual product for symptom management. With regard to the usability of cup, the key to increase acceptability is to ensure support during the first three cycles. The correlation between the age and sexual activity of a woman with learning curve was inconclusive owing to limited sample size. The limitation of this study is that it's a self-reported study and hence the responses received were subject to discretion of the responder and could not be confirmed. Also the study was undertaken for a random sample instead of a controlled sample size, thus reduction in incidence rate of certain symptoms could not be attributed to menstrual cups only. Additional reasons like medical treatment, improvement in menstrual hygiene behaviour, change of dietary habits, change of place etc. would have also played a role in symptoms reduction.

The future direction of the study could be through clinical examination studies of women both pre and post use of menstrual cups to determine a more definitive conclusion towards the incidence of urogenital infections related to menstrual product use.

7. Source of Funding

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8. Conflict of Interest

None.

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