



A COMPARATIVE STUDY OF MENSTRUAL CUPS AND SANITARY PADS IN MAINTAINING MENSTRUAL HYGIENE

Obstetrics & Gynaecology

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ABSTRACT

Background: In many parts of the world, menstrual hygiene management remains a significant challenge, particularly for women in low and middle-income countries. Concerns have been raised about their environmental impact, cost-effectiveness, and potential adverse effects such as vaginal discomfort, skin irritation, and leakage. The present study is aimed to assess the impact of uses of menstrual cups and conventional sanitary pads during menstruation for maintaining menstrual hygiene. **Methodology:** 200 women in child bearing age group of 18-45 years including medical staff and women attending Gynaecology OPD were chosen for study. 100 Women were advised, counseled and trained in using menstrual cups, mainly about insertion, cleaning and emptying by demonstration. Other 100 women are advised to use sanitary pads, for 3 menstrual periods for 3 months. Review taken during each menstrual cycle using questionnaire. Telephonic review taken in each cycle and difficulty regarding its uses were noted and solved. **Results:** The women had a mean age of 24.5years (sd 0.89) at baseline. Two-thirds of the women reported experiencing cramps during menstruation, and a quarter of them stated that their menstruation was heavy. Women who reported recent sanitary pad use stated that they used an average of 8 pads per menstrual cycle, averaging 2 pads per day over the course of 4 days of menstruation. The reported uptake and use of cups by the women increased from 39% after one month to 80% by the end of 3 months. The aggregate mean acceptability score for the five measures increased significantly from 73 to 81 out of 100 (F 17.2; $p < 0.001$) over the study period among women who reported being able to and using the cup. For women allocated pads, the aggregate acceptability score among those who reported being able to and using pads increased from 83 to 89 out of 100 (F 32.5; $p < 0.001$) over the study duration. The aggregate score of acceptability measures among women reporting being able to use the cup or pad and women reporting not being able to use them. Insertion was slightly less problematic, with 9% of women reporting difficulties at 3 months, which dropped to 5% by the end of the study. **Conclusion:** This study demonstrates that both menstrual cups have better acceptability as compared to sanitary pads among primary women in this population as menstrual cups are easy to use, easy to dispose and easily available. Although the proportion of women initially experiencing problems was higher among cup users but later after proper instructions, most of these issues were resolved within the first few weeks of use and acceptability increased for cups.

KEYWORDS

Menstrual Hygiene, Menstrual Cups Sanitary Pads, Acceptability, low and middle-income countries

INTRODUCTION:

In many parts of the world, menstrual hygiene management (MHM) remains a significant challenge, particularly for women in low and middle-income countries (LMIC). Insufficient access to adequate and affordable menstrual hygiene products can lead to various physical and psychosocial issues, impacting women's overall well-being, health, and daily activities⁽¹⁻³⁾. Menstrual cups and sanitary pads are two commonly used products for managing menstrual flow. Understanding the comparative efficacy and acceptability of these products is crucial in developing effective strategies for promoting menstrual hygiene and improving the overall quality of life for women in the reproductive age group.

Menstrual cups are bell-shaped, reusable devices made of medical-grade silicone or latex that are inserted into the vagina to collect menstrual blood⁽⁴⁾. They have gained increasing attention as a sustainable and cost-effective alternative to disposable sanitary pads or tampons⁽⁵⁾. Menstrual cups offer several potential advantages over traditional sanitary pads, including longer wear time, reduced environmental waste, and lower lifetime costs^(6,7). Additionally, cups provide the freedom to engage in physical activities and can be worn overnight without the need for frequent changes, allowing for better management of menstruation^(8,9). On the other hand, disposable sanitary pads are widely used and readily accessible in many regions. These pads are designed to absorb menstrual blood and provide a convenient and disposable option for managing menstruation⁽¹⁰⁾. However, concerns have been raised about their environmental impact, cost-effectiveness, and potential adverse effects such as vaginal discomfort, skin irritation, and leakage^(11,12).

These studies have investigated various aspects, including effectiveness, comfort, user satisfaction, hygiene, and potential health risks. However, there is a need for a comprehensive comparative analysis of these products specifically focusing on women aged 15 to 45 years in order to provide evidence-based recommendations and insights for promoting menstrual hygiene in this population.

The present study is aimed to assess the impact of uses of menstrual cups and conventional sanitary pads during menstruation for maintaining menstrual hygiene and to compare advantages of menstrual cups and sanitary pads regarding their Comfort, Cost, Environmental impact, Hygiene, Odour and Creation of awareness about menstrual hygiene.

MATERIALANDMETHODS:

After getting approval from Institutional Ethics Committee, study was started. Informed consent of the participants was taken. The present Prospective non-randomized comparative study was conducted on 200 women. Women with Mullerian anomalies of uterus, Septate uterus and Uterine didelphis with two cervixes were excluded.

Women in child bearing age group of 18-45 years including medical staff and women attending Gynaecology OPD in CPR Hospital, Kolhapur were chosen for study. Duration of study was 3 months. Out of 200 participants, 100 Women are advised, counseled and trained in using menstrual cups, mainly about insertion, cleaning and emptying by demonstration and also provided with video. Other 100 women are advised to use sanitary pads, for 3 menstrual periods for 3 months.

Menstrual cup of sizes, Small, Medium, Large were advised according to parity. Prescribes sizes were Small for unmarried women with scanty menses Medium for married women with low flow Large for heavy flow/multiparous women.

Review taken during each menstrual cycle using questionnaire. Detailed questionnaires were distributed and filled. Baseline data regarding name, Age, Occupation, Socio-economic status, Height, Weight, Marital status, Parity/obstetric, score, Menstrual history was taken. Also details about Cramps during Menses, Heavy Menses, Any previous Pad use was also taken. Telephonic review taken in each cycle and difficulty regarding its uses were noted and solved.

Statistical Analysis:

Continuous variable was presented as Mean $\pm$ S.D. Categorical variable like smoking, hypertension, diabetes mellitus was expressed in percentage (%). Univariate analysis was performed versus association of various. $p < 0.05$ was considered as statistically significant. Statistical software STATA version 10.0 was used for data analysis.

RESULTS:

Demographic and Menstrual Variables:

A total of 200 women were included in the study, who completed a baseline survey. Out of these, 100 were allocated cups, and 100 were allocated pads. The follow-up evaluation was conducted over a period of 3 months.

The women had a mean age of 24.5 years (sd 0.89) at baseline, with two-thirds of them being in higher classes (7 and 8). Approximately 31.5% of the women belonged to the poorest two socio-economic quintiles, and there were no differences in socio-economic status between the study arms (Table 1). The mean age at menarche was 12.5 years (sd 0.75), and the average duration of women's menstruation was 3.5 days (sd 1.1). Two-thirds of the women reported experiencing cramps during menstruation, and a quarter of them stated that their menstruation was heavy (Table 1). Around 81% of the women claimed to have ever used pads, with a significantly lower proportion among the pad arm compared to those allocated cups (79% vs. 84%, $p = 0.007$, Table 1). Women who reported recent sanitary pad use stated that they used an average of 8 pads per menstrual cycle, averaging 2 pads per day over the course of 4 days of menstruation. On a scale of 1 to 5, women reported a mean score of 2.50 (sd 0.73) for comfort with their sanitary hygiene material at baseline, with no significant difference between the study arms (2.22 vs. 2.36, $p = 0.41$).

Table 1: Demographic and menstrual characteristics of study population by intervention allocation at baseline.

Characteristics		Pad (n=100)	Cup (n=100)	p-value
Socio-demographic				
Age at enrolment	Mean (sd)	24.49 (0.76)	25.13 (0.82)	0.58
Class	5 or 6	30 (30%)	33 (33%)	0.94
	7 or 8	71 (71%)	69 (69%)	
Socio-economic status	Poorest	29 (29%)	23 (23%)	0.58
	Less poor	72 (72%)	76 (76%)	
	unknown	16 (16%)	15 (15%)	
Menstrual History				
Age at menarche	Mean (sd)	12.8 (0.75)	13.8 (0.72)	0.47
Total days per menses	Mean (sd)	4.1 (1.1)	3.9 (0.9)	0.73
Cramps during menses	Yes	67 (67%)	65 (65%)	0.56
Menses heavy	Yes	24 (24%)	22 (22%)	0.31
Ever used sanitary pads	Yes	79 (79%)	84 (84%)	0.007

Use of Cups over Study Follow-up:

The reported uptake and use of cups by the women increased from 39% after one month to 80% by the end of 3 months. There was a significant linear relationship between the duration of use and the reported uptake (χ^2 linear trend 66.2, $p < 0.001$). In a multivariate analysis examining cup user characteristics at the end of month 3 to assess early usage, it was found that 79% of the poorest socio-economic group reported using cups compared to 69% of the less poor group (Relative risk [RR] 0.86, 95%; Table 2). A higher proportion of 18–25-year-old women (71%) reported cup use compared to older women (68%, RR 1.65). Menstrual health and experience of using pads also appeared to influence reported cup use. Among women experiencing menstrual cramps, 70% reported using cups compared to 79% who did not have cramps (RR 0.96). Those reporting heavy periods had a slightly higher rate of reported cup use compared to those not reporting heavy periods (74% vs. 72%; RR 1.67).

Use of Pads over Study Follow-up:

The uptake and use of pads increased from 84% after one month to 93% by month 3. There was no significant linear relationship between the use of pads and the duration of the study (χ^2 linear trend 1.87, $p = 0.64$). By month 3, reported use of pads was proportionately lower among women with heavy periods (81%) compared to those with lighter menses (91%), but this difference was not significant in multivariate analysis (RR 0.81). No other differences in characteristics

were observed (Table 2). Women in the pad arm reported using an increasing number of pads over the course of the study, from a mean of 2.17 (sd 0.76) in month 1 to 4.1 in 3 months (sd 1.9, $p < 0.001$). About a quarter of the women reported wearing their pad intravaginally at least some of the time.

Comparison of Cup and Pad Acceptability Scores over Follow-up:

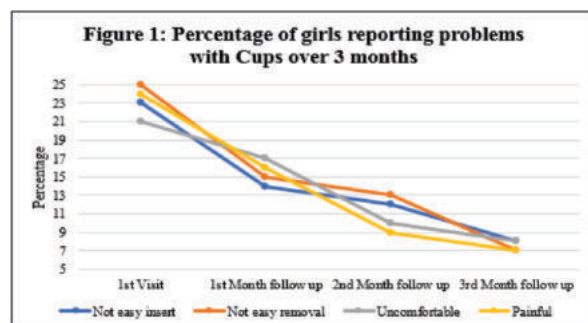
The aggregate mean acceptability score for the five measures increased significantly from 73 to 81 out of 100 (F 17.2; $p < 0.001$) over the study period among women who reported being able to and using the cup. For women allocated pads, the aggregate acceptability score among those who reported being able to and using pads increased from 83 to 89 out of 100 (F 32.5; $p < 0.001$) over the study duration. The aggregate score of acceptability measures among women reporting being able to use the cup or pad and women reporting not being able to use them.

Table 2: Multivariate analysis of characteristics associated with cup or pad use at 3 months.

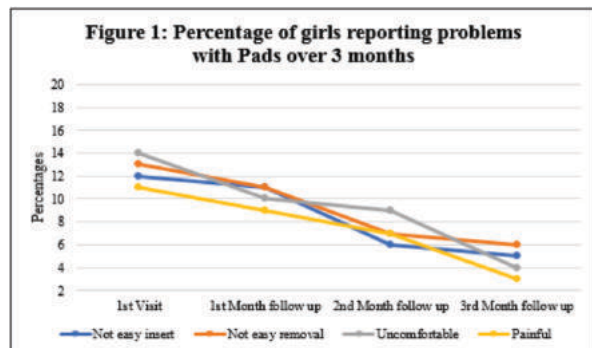
Characteristics		Cup use at month 3 (n=100)		Pad use at month 3 (n=100)	
		N cup use (n=72)	RR, p-value	N pad use (n=93)	RR, p-value
Socio-demographic					
Age at enrolment	18-25 years	71	1.65, 0.001	89	1.89, 0.56
	26-30 years	78	1.85, 0.008	92	1.58, 0.52
	>30 years (ref)	68	1	93	1
Socio-economic status	Less poor	69	0.86, 0.005	93	1.24, 0.75
	unknown	83	1.33, 0.23	87	1.78
	Poorest (ref)	79	1	92	1
Menstrual					
Cramps during Menses	Yes	70	0.96, 0.007	89	0.82, 0.82
	No (ref)	79	1	93	1
Heavy Menses	Yes	74	1.67, 0.003	81	0.81, 0.73
	No (ref)	72	1	91	1
Previous Pad use	Yes	71	1.98, 0.56	92	1.87, 0.68
	No (ref)	60	1	89	1

The five acceptability measures indicated that reported problems differed between the study arms but decreased over time for both groups. In the cup group, the greatest problems during early use (prior to and including month 3) were pain (23%) and discomfort (22%). However, these numbers dropped to 2% and 7%, respectively, by the end of the study (3 months). Insertion was slightly less problematic, with 9% of women reporting difficulties at 3 months, which dropped to 5% by the end of the study. Soreness was rarely reported. Among women who tried using the cups but were unable to do so successfully, a quarter of them reported problems with insertion, removal for emptying, and discomfort until month 6, while problems with pain were mostly resolved by month 4.

Pad users reported few problems. The greatest problem reported (although below 10%) was difficulty in removing the pads after use, with 4–8% of women reporting problems with placing the pad or experiencing pain or discomfort. Among women who reported trying but not being able to use pads in their previous menstrual cycles, problems with placement, discomfort, and pain were most frequently reported.



each by the end of 3 months (Figure 1). Problems were reported by pad were: the greatest problem was discomfort (14%) and difficulty removing the pads after use (12%), with between 12% reporting either having problems placing the pad or having pain (13%) (Figure 2).



DISCUSSION:

To the best of our knowledge, there has been no previous study that specifically examines women's reported experience and problems associated with the use of menstrual cups or sanitary pads on an international scale. The findings of this study show that the reported use of pads remained consistently high throughout the study period, while the proportion of women reporting cup use increased significantly over time after initial difficulties. Both cup and pad users reported some acceptability issues, although the number of pad users experiencing problems did not decrease over time. A small proportion of women reported unsuccessful attempts to use either the cup or the pad during the study, citing difficulties with insertion/placement, emptying, comfort, or pain.

The study found that the number of women using their cup each month increased significantly from 39% to 80% over the course of 3 months. Women from lower socioeconomic backgrounds and those with heavy bleeding showed a higher rate of cup adoption within three months, while older women and those experiencing menstrual cramps had a lower uptake. Previous studies have also highlighted the importance of a learning curve and peer influence in successfully adopting the cup among women⁽¹²⁾. In Nepal, cup use among women reached 60% within six months, with the majority of women continuing to use the cup once they initiated its use. Similarly, a study in South Africa found that at least 93% of women were the cup for their entire menstrual cycle during a three-month trial⁽¹³⁾.

In terms of acceptability, the composite score increased over time for both cup and pad users, reflecting improvements in individual attributes. Pad users had higher aggregate and individual acceptability scores compared to cup users, especially among early adopters. Previous studies comparing menstrual products in crossover trials have also shown a preference for cups among adult women, with high ratings for comfort, quality, and overall preference⁽¹⁴⁾. Qualitative findings from this study indicated that women who had previously used pads overwhelmingly expressed a preference for the cup after approximately six months, citing advantages such as improved comfort, leakage prevention, reduced fear of movement, cost-effectiveness, and sustainability.

Regarding pad usage, at baseline, women reported using an average of two pads per day, likely due to cost constraints. This suggests that some women may wear a single pad for extended periods, leading to potential discomfort, chafing, leakage, and odor⁽¹⁵⁾. Women gradually increased the number of pads used per day over the study period, indicating increased confidence in managing their menstrual needs. However, it is important to note that access to facilities, time constraints, and overall infrastructure can influence timely pad changes, particularly among women⁽¹⁶⁾. Laboratory evaluations in this study also found a higher prevalence of bacterial vaginosis among women provided with pads compared to those provided with cups, suggesting potential hygiene-related issues associated with prolonged pad use.

Although nearly all women provided with pads reported wearing them during their menstrual periods, a small proportion (<5%) did not. Issues such as vaginal discharge, leaking, and disposal have been reported as possible reasons for non-usage. Additionally, some women

reported difficulties with pad placement and removal despite initial training, which may be attributed to a lack of suitable underwear^(17,18).

Furthermore, a quarter of women in the pad group reported wearing pads internally, and this practice was more prevalent among women with no prior experience using pads. This highlights the need for adequate training and consideration of underwear availability when providing sanitary pads, especially as some ministries are considering national pad programs for adolescent women^(19,20).

It is important to acknowledge the limitations of the study. Self-reported data from the participants may be prone to exaggeration, and discrepancies were observed between self-reported cup usage and observed cup color changes⁽²¹⁾. However, self-reporting is the common method used to monitor and measure cup program success. The equal weighting assigned to the different components in the acceptability score may not fully capture the relative importance of each problem according to the participants' perspectives. Additionally, logistical reasons led to the exclusion of participants who were followed up only once or twice, and a 12-month follow-up cutoff was implemented, which may have influenced the duration under study and the analysis of proportions among small numbers.

CONCLUSION:

This study demonstrates that both menstrual cups have better acceptability as compared to sanitary pads among primary women in this population as menstrual cups are easy to use, easy to dispose and easily available. Although the proportion of women initially experiencing problems was higher among cup users but later after proper instructions, most of these issues were resolved within the first few weeks of use and acceptability increased for cups. Few women reported issues of discomfort, pain, insertion or removal difficulties with use of pads. The study suggests that with adequate instruction, support, and persistence women in low- and middle-income countries can successfully and comfortably use either menstrual cup.

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