

Knowledge, Attitude, and Practice of Menstrual Cups in Urban Population in Chennai, South India: A Cross-Sectional StudyDr. Chilaka Monica Brahmani JR*¹, Dr. Prabha Swaminathan², Dr. Abhirami V. R³¹Final year Postgraduate, Department of Obstetrics & Gynaecology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam - 603103, Tamil Nadu, India²Professor, Department of Obstetrics & Gynaecology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam - 603103, Tamil Nadu, India³Assistant Professor, Department of Obstetrics and Gynaecology, Chettinad Hospital and Research Institute, Chettinad Academy of Research and Education, Kelambakkam - 603103, Tamil Nadu, India

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Abstract**Background:** Menstrual cups offer a safe, reusable, and environmentally sustainable alternative to disposable sanitary products, yet their adoption in India remains very low. This study assessed the knowledge, attitude, and practice regarding menstrual cups among the urban population in Chennai, South India.**Methods:** A community-based cross-sectional study was conducted from December 2024 to May 2025 among 270 women aged 18-45 years residing in urban Chennai. A structured, pre-tested questionnaire was administered to collect data on sociodemographic characteristics, menstrual history, knowledge (8 items), attitude (7 items on a 5-point Likert scale), practice, barriers, and facilitators. Knowledge and attitude scores were categorised as adequate/favourable based on median splits. Data were analysed using descriptive statistics and the Chi-square test.**Results:** The mean age of participants was 28.4 years. Adequate knowledge was observed in 45.2% of participants, and favourable attitudes in 50.4%. Ever-use of menstrual cups was 9.6%, and current use was 5.9%. The primary barriers were fear of insertion (58.2%) and lack of knowledge (52.5%). Willingness to try menstrual cups in the future was expressed by 51.1% of participants. Higher education ($p=0.001$) and income ($p=0.005$) were significantly associated with adequate knowledge; younger age ($p=0.007$) with favourable attitudes; and unmarried status ($p=0.012$) with ever-use.**Conclusions:** Knowledge and adoption of menstrual cups remain low among urban women in Chennai despite moderate willingness to try. Interventions addressing insertion fears, providing hands-on training, and dispelling misconceptions about safety are urgently needed to bridge the knowledge-practice gap.**Keywords:** Menstrual cup, menstrual hygiene management, knowledge attitude practice, urban health, Chennai, sustainable menstruation, reusable menstrual products, India**Introduction**

Menstrual hygiene management remains a cornerstone of women's health and reproductive well-being, yet it continues to receive inadequate attention in public health discourse across low- and middle-income countries [1]. In India, approximately 22.2% of the population comprises women in the reproductive age group of 15 to 49 years, each managing menstruation monthly under varying degrees of social constraint, economic pressure, and informational limitation [2]. The menstrual hygiene market in India has long been dominated by disposable sanitary pads, which, despite their widespread acceptance, pose significant environmental hazards due to their non-biodegradable composition, taking between 500 to 800 years to decompose completely [1]. Furthermore, concerns have been raised regarding the potential health implications of prolonged exposure to the chemical constituents of disposable pads, including dioxins and phthalates [1].

Menstrual cups, fabricated from medical-grade silicone, latex, or thermoplastic elastomers, offer a safe, reusable, and cost-effective alternative [3]. A single menstrual cup can last up to ten years, significantly reducing both the financial burden on women and the environmental footprint of menstrual waste [3]. Systematic reviews have demonstrated that menstrual cups are comparable to or better than disposable products in terms of leakage prevention, with no adverse effects on vaginal flora and high rates of continued use among adopters [3]. Despite the demonstrable advantages of menstrual cups, their adoption in India remains strikingly low. A national systematic review and meta-analysis reported a pooled prevalence of menstrual cup knowledge at only 35% among reproductive-age women, with actual usage at a mere 5% [4]. This substantial knowledge-practice gap is particularly concerning in urban centres such as Chennai, where educational attainment and access to information are theoretically higher than in rural areas, yet evidence suggests that even among medical students in Chennai, poor knowledge (56.4%) and unfavourable attitudes (57.6%) toward menstrual cups prevail [2]. The existing literature on menstrual cups in South India has predominantly focused on student populations or healthcare providers, leaving a significant lacuna regarding the general urban population [2,5,6]. Studies from other regions of India have identified barriers such as fear of insertion, cultural beliefs regarding virginity, difficulty in removal, and lack of peer or family support [5,7]. Facilitators have included awareness of environmental benefits, cost savings, and absence of rashes or allergies [6,8]. Chennai, as a major metropolitan hub in South India with a diverse sociodemographic profile, presents an ideal setting to investigate the determinants of menstrual cup adoption. Understanding the specific knowledge deficits, attitudinal patterns, and practical barriers among the general urban population is essential for designing targeted public health interventions. Without such evidence, efforts to promote sustainable menstrual hygiene may continue to rely on assumptions derived from student or clinical populations, which may not generalise to the broader community. The present study, therefore, sought to assess the knowledge, attitude, and practice regarding menstrual cups among the urban population of Chennai and to identify the sociodemographic factors, barriers, and facilitators associated with menstrual cup use.

Objectives**General Objective:** To assess the knowledge, attitude, and practice (KAP) related to menstrual cup use among the urban population in Chennai, South India.**Specific Objectives**

1. To measure the level of knowledge regarding menstrual cups among women aged 18 to 45 years residing in urban Chennai.
2. To evaluate attitudes toward menstrual cup usage using a standardised Likert scale.
3. To estimate the prevalence of menstrual cup use (both ever-use and current use) in the study population.
4. To identify barriers and facilitators to menstrual cup adoption.
5. To analyse associations between sociodemographic factors (age, education, income, marital status) and KAP outcomes.

Materials and Methods**Study Design and Setting:** A community-based cross-sectional descriptive study was conducted among the urban population of Chennai, Tamil Nadu, India. The study was carried out between December 2024 and May 2025. The study setting comprised urban residential communities, including apartments, college campuses, and workplaces across various zones of Chennai Corporation.**Study Population:** The study population consisted of women aged 18 to 45 years who had been residing in Chennai for at least one year. Women were recruited from community settings through a combination of household visits, institutional contacts, and workplace outreach.**Inclusion and Exclusion Criteria:** Women were included if they were female, aged between 18 and 45 years, residing in Chennai for a minimum of one year, and willing to provide informed consent. Pregnant women were excluded due to altered menstrual practices during gestation. Women who had undergone hysterectomy were excluded as they no longer menstruated. Women with cognitive impairments that would preclude completion of the questionnaire were also excluded.**Sample Size Calculation:** The sample size was calculated based on the assumption that the prevalence of menstrual cup knowledge in the urban population was approximately 35%, as reported in a recent systematic review and meta-analysis of Indian studies [4]. Using the formula for cross-sectional studies, $n = Z^2 \times P \times (1-P) / L^2$, where $Z = 1.96$ at 95% confidence interval, $P = 0.35$, and $L = 6\%$ absolute precision, the minimum required sample size was calculated as 243 participants. Accounting for a 10% non-response rate, the final sample size was determined as 270 participants.**Sampling Technique:** A multistage cluster sampling technique was employed. In the first stage, three zones of Chennai Corporation (North, Central, and South) were selected purposively to ensure geographic representation. In the second stage, two wards were randomly selected from each zone. In the third stage, households within each selected ward were chosen using systematic random sampling, with a random starting point and a fixed sampling interval. In each selected household, one eligible woman was invited to participate. In institutional settings (colleges and workplaces), participants were recruited through convenience sampling from the same geographic zones to supplement household recruitment and ensure adequate representation of younger and employed women.**Data Collection Tool:** A structured, pre-tested, self-administered questionnaire was developed for this study. The questionnaire was adapted from validated instruments used in previous Indian studies on menstrual cups [2,5,8]. The tool consisted of six sections:**Section A: Sociodemographic Details** – Age, marital status, educational status, occupation, monthly family income, religion, type of family, and age at menarche.**Section B: Menstrual History** – Average duration of menstrual cycle, average duration of menstrual flow, presence of dysmenorrhoea, and current menstrual hygiene product used.

Section C: Knowledge about Menstrual Cups – Eight items assessing awareness, material composition, reusability, duration of wear, environmental friendliness, safety for unmarried women, infection risk, and source of information. Each correct response was awarded one mark, with a maximum possible knowledge score of 8.

Section D: Attitude towards Menstrual Cups – Seven items measured on a five-point Likert scale (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree). Items assessed perceptions of comfort, hygiene, ease of use, social acceptability, concerns about insertion, cost-effectiveness, and willingness to recommend. Attitude scores ranged from 7 to 35.

Section E: Practice of Menstrual Cup Use – Items assessed ever-use, duration of use, frequency of use, problems faced, and reasons for non-use.

Section F: Willingness and Future Use – Items assessed willingness to try menstrual cups in the future and factors that would encourage adoption.

The questionnaire was initially developed in English and translated into Tamil using forward-backward translation methodology. Content validity was assessed by a panel of five experts from the fields of obstetrics and gynaecology, community medicine, and public health. The questionnaire was pre-tested on 30 women from a non-participating urban area of Chennai, and minor modifications were made to improve clarity and comprehensibility. Cronbach's alpha for the knowledge domain was 0.79, and for the attitude domain was 0.74, indicating acceptable internal consistency.

Data Collection Procedure: Data were collected over a period of six months from November 2025 to March 2026. Trained female research assistants approached potential participants at their residences, educational institutions, or workplaces. The purpose of the study was explained to each potential participant, and the participant information sheet was provided. For participants who agreed to enrol, written informed consent was obtained. The questionnaire was administered either as a paper-based form or as a Google Form, depending on participant preference and internet accessibility. Each questionnaire took approximately 15 to 20 minutes to complete. Completed questionnaires were checked for completeness at the time of collection.

Variables: The independent variables included age (in years, categorised as 18-25, 26-35, and 36-45), educational status (up to secondary school, higher secondary, graduate, postgraduate), monthly family income (categorised as <₹20,000, ₹20,000-40,000, ₹40,001-60,000, >₹60,000), marital status (married, unmarried), occupation (student, homemaker, employed, self-employed, unemployed), and exposure to menstrual hygiene education (yes, no).

The dependent variables included knowledge score (categorised as adequate or inadequate based on the median split), attitude score (categorised as favourable or unfavourable based on the median split), and menstrual cup use status (ever-use, current use).

Operational Definitions

Adequate knowledge was defined as a knowledge score equal to or above the median score of the study population. **Favourable attitude** was defined as an attitude score equal to or above the median score. **Ever-use** was defined as having used a menstrual cup at least once in the past. **Current use** was defined as having used a menstrual cup during the most recent menstrual cycle.

Data Analysis: Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics for Windows, Version 26 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages. Continuous variables were expressed as mean and standard deviation. The median knowledge and attitude scores were calculated for categorisation purposes. Associations between sociodemographic factors and KAP outcomes were assessed using the Chi-square test. A p-value of less than 0.05 was considered statistically significant. Multivariate logistic regression was planned to identify independent predictors of menstrual cup use, subject to the number of users in the sample.

Ethical Considerations: Ethical approval for the study was obtained from the Institutional Ethics Committee of Chettinad hospital and research institute(CHRI IHEC No.:1/129/01/2026). Permission was also obtained from the Chennai Corporation and the respective institutional authorities for data collection at colleges and workplaces. All participants provided written informed consent prior to enrolment. Participants were informed of their right to withdraw from the study at any time without any consequences. Confidentiality of responses was strictly maintained; no identifying information was recorded in the dataset, and data were used solely for research purposes.

Results: A total of 270 women participated in the study, all of whom completed the questionnaire, yielding a response rate of 100%.

KAP Model: Conceptual Framework for Menstrual Cup Adoption

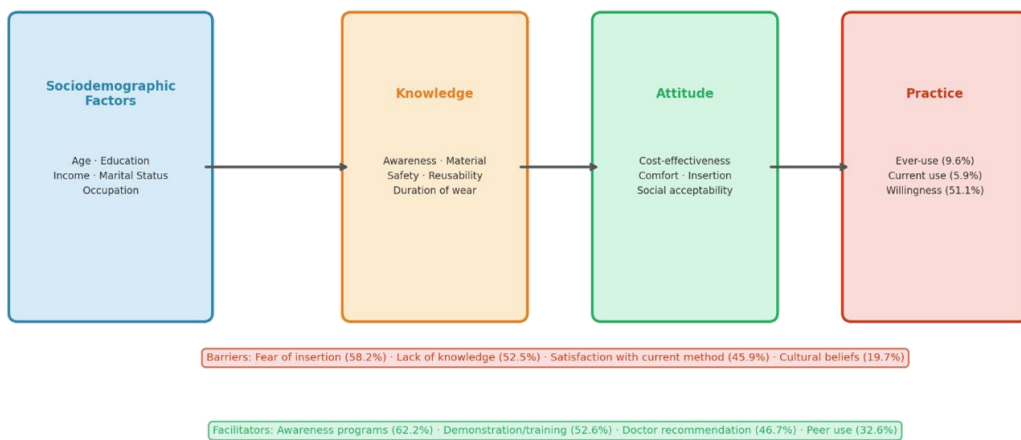
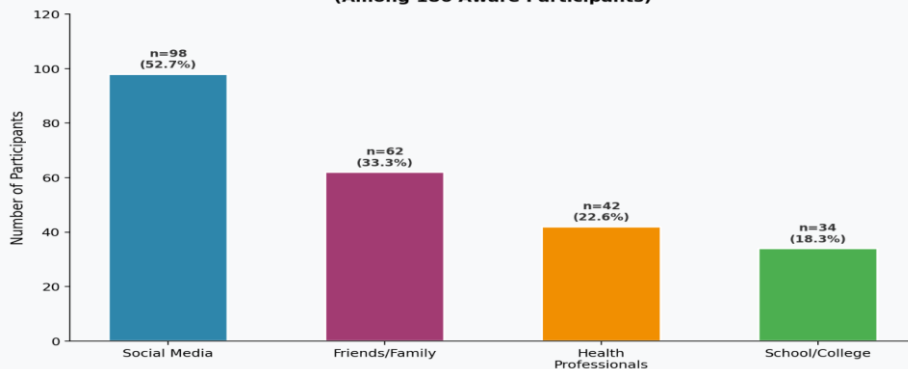


Table 1 presents the sociodemographic characteristics of the study population. The mean age of participants was 28.4 years (SD = 7.2; range 18-45 years). The largest age group was 26-35 years, comprising 116 participants (43.0%). More than half of the participants were married (148, 54.8%), while 122 (45.2%) were unmarried.

Figure 2: Sources of Information about Menstrual Cups (Among 186 Aware Participants)



Regarding educational status, the majority of participants were graduates (112, 41.5%) or postgraduates (78, 28.9%). Only 12 participants (4.4%) had education up to primary school level. In terms of occupation, 86 participants (31.9%) were employed, 74 (27.4%) were students, 62 (23.0%) were homemakers, 32 (11.9%) were self-employed, and 16 (5.9%) were unemployed.

Monthly family income was distributed as follows: 46 participants (17.0%) reported income less than ₹20,000, 72 (26.7%) reported ₹20,000-40,000, 68 (25.2%) reported ₹40,001-60,000, and 84 (31.1%) reported more than ₹60,000. The majority of participants were Hindu (198, 73.3%), followed by Christian (42, 15.6%) and Muslim (30, 11.1%). Nuclear family structure was reported by 162 participants (60.0%), while 108 (40.0%) lived in joint families. The mean age at menarche was 13.2 years (SD = 1.3).

Table 1: Sociodemographic Characteristics of Study Participants (N=270)

Characteristic	Category	Frequency (n)	Percentage (%)
Age group	18-25 years	108	40.0
	26-35 years	116	43.0
	36-45 years	46	17.0
Marital status	Married	148	54.8
	Unmarried	122	45.2
Education	Up to primary school	12	4.4
	Secondary school	28	10.4
	Higher secondary	40	14.8
	Graduate	112	41.5
Occupation	Postgraduate	78	28.9
	Student	74	27.4
	Homemaker	62	23.0
	Employed	86	31.9
	Self-employed	32	11.9
Monthly income	Unemployed	16	5.9
	<₹20,000	46	17.0
	₹20,000-40,000	72	26.7
	₹40,001-60,000	68	25.2
Religion	>₹60,000	84	31.1
	Hindu	198	73.3
	Muslim	30	11.1
	Christian	42	15.6
Family type	Nuclear	162	60.0
	Joint	108	40.0

Regarding menstrual cycle characteristics, 196 participants (72.6%) reported a cycle duration of 21-35 days, 46 (17.0%) reported less than 21 days, and 28 (10.4%) reported more than 35 days. The average duration of menstrual flow was 3-5 days for 178 participants (65.9%), less than 3 days for 42 (15.6%), and more than 5 days for 50 (18.5%). Dysmenorrhoea was reported by 144 participants (53.3%). The current menstrual hygiene product used by participants is shown in Table 2. Sanitary pads were the predominant product, used by 234 participants (86.7%). Cloth was used by 32 participants (11.9%), primarily as a backup or during night-time. Tampons were used by 18 participants (6.7%). Menstrual cups were used by 16 participants (5.9%). Multiple products were used by some participants across different cycles or situations.

Table 2: Current Menstrual Hygiene Product Used (N=270)*

Product	Frequency (n)	Percentage (%)
Sanitary pads	234	86.7
Cloth	32	11.9
Tampons	18	6.7
Menstrual cup	16	5.9

*Multiple responses permitted; percentages sum to more than 100%

The knowledge assessment revealed that 186 participants (68.9%) had heard about menstrual cups. Among those who had heard, the primary sources of information were social media (98, 52.7%), followed by friends or family (62, 33.3%), health professionals (42, 22.6%), and school or college (34, 18.3%).

Table 3 presents the distribution of responses to individual knowledge items. The proportion of correct responses varied considerably across items. While 156 participants (83.9% of those aware) correctly identified that menstrual cups are reusable, only 98 (52.7% of those aware) knew that menstrual cups are made of medical-grade silicone. A substantial proportion of participants held misconceptions regarding the safety of menstrual cups for unmarried women, with 58 participants (31.2% of those aware) incorrectly believing that menstrual cups cannot be used by unmarried women. Similarly, 42 participants (22.6% of those aware) believed that menstrual cups increase the risk of infections.

Table 3: Knowledge about Menstrual Cups (n=186 aware participants)

Knowledge Item	Correct n (%)	Incorrect n (%)	Don't Know n (%)
Menstrual cups made of medical-grade silicone	98 (52.7)	34 (18.3)	54 (29.0)
Menstrual cup can be reused	156 (83.9)	12 (6.5)	18 (9.7)
Can be worn 6-12 hours	124 (66.7)	28 (15.1)	34 (18.3)
Environmentally friendly	142 (76.3)	18 (9.7)	26 (14.0)
Safe for unmarried women	92 (49.5)	58 (31.2)	36 (19.4)
Does not increase infection risk	104 (55.9)	42 (22.6)	40 (21.5)

The mean knowledge score among all participants (including those unaware, who received a score of 0) was 4.2 (SD = 2.8) out of a maximum of 8. When considering only those who had heard about menstrual cups, the mean knowledge score was 6.1 (SD = 1.6). Using the median score among all participants (median = 4) as the cut-off, adequate knowledge was demonstrated by 122 participants (45.2%), while 148 participants (54.8%) had inadequate knowledge.

Figure 3: Distribution of Responses to Knowledge Items (n = 186 Aware Participants)

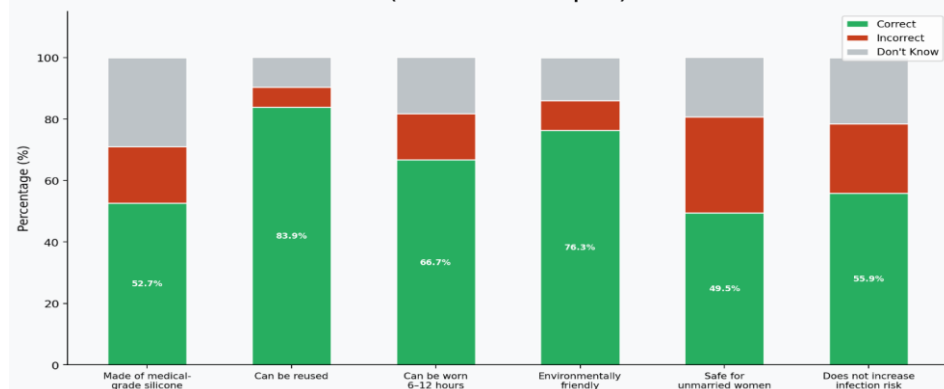


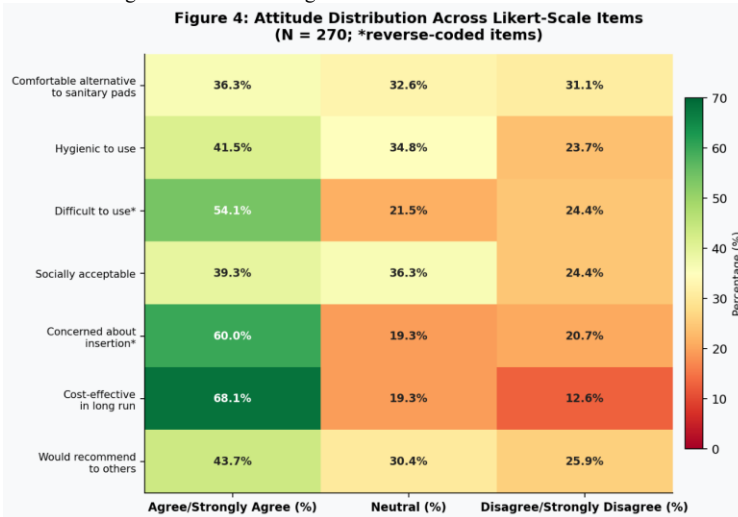
Table 4 presents the attitude distribution based on responses to the seven Likert-scale items. The mean attitude score was 22.4 (SD = 5.1) out of a maximum of 35. The median score was 23. Using the median as the cut-off, favourable attitudes were observed in 136 participants (50.4%), while 134 participants (49.6%) had unfavourable attitudes.

Positive attitudes were most evident for the statements regarding cost-effectiveness, with 184 participants (68.1%) agreeing or strongly agreeing that menstrual cups are cost-effective in the long run. However, concerns about insertion were prominent, with 162 participants (60.0%) expressing agreement or strong agreement that they were concerned about insertion. Similarly, 146 participants (54.1%) agreed or strongly agreed that menstrual cups are difficult to use. Social acceptability was perceived favourably by only 106 participants (39.3%), while 98 participants (36.3%) were neutral on this aspect.

Table 4: Attitude towards Menstrual Cups (N=270)

Attitude Statement	Strongly Agree/Agree n (%)	Neutral n (%)	Disagree/Strongly Disagree n (%)
Comfortable alternative to sanitary pads	98 (36.3)	88 (32.6)	84 (31.1)
Hygienic to use	112 (41.5)	94 (34.8)	64 (23.7)
Difficult to use*	146 (54.1)	58 (21.5)	66 (24.4)
Socially acceptable	106 (39.3)	98 (36.3)	66 (24.4)
Concerned about insertion*	162 (60.0)	52 (19.3)	56 (20.7)
Cost-effective in long run	184 (68.1)	52 (19.3)	34 (12.6)
Would recommend to others	118 (43.7)	82 (30.4)	70 (25.9)

*Reverse-coded items; percentages shown are for agreement with the negative statement



Ever-use of menstrual cups was reported by 26 participants (9.6%). Current use (use during the most recent menstrual cycle) was reported by 16 participants (5.9%). Among ever-users, the duration of use was less than 6 months for 12 participants (46.2%), 6-12 months for 8 (30.8%), and more than 1 year for 6 (23.1%). Frequency of use was reported as every menstrual cycle by 14 ever-users (53.8%) and occasionally by 12 (46.2%).

Problems faced by menstrual cup users are shown in Table 5. The most commonly reported problem was difficulty in insertion or removal, reported by 12 users (46.2%). Leakage was reported by 8 users (30.8%), and pain or discomfort by 6 users (23.1%). Notably, 8 users (30.8%) reported no problems with menstrual cup use.

Table 5: Problems Faced by Menstrual Cup Users (n=26 ever-users)

Problem	Frequency (n)	Percentage (%)
Difficulty in insertion/removal	12	46.2
Leakage	8	30.8
Pain or discomfort	6	23.1
No problems	8	30.8

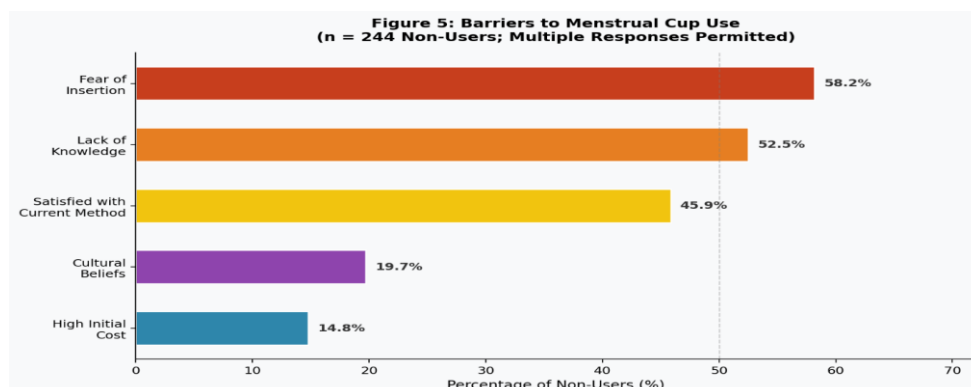
*Multiple responses permitted

Among the 244 participants who had never used a menstrual cup, the reasons for non-use are presented in Table 6. The predominant barrier was fear of insertion, reported by 142 participants (58.2%). Lack of knowledge about menstrual cups was reported by 128 participants (52.5%). Satisfaction with current menstrual products was reported by 112 participants (45.9%). Cultural beliefs were cited as a barrier by 48 participants (19.7%), and high initial cost was reported by 36 participants (14.8%).

Table 6: Barriers to Menstrual Cup Use (n=244 non-users)

Barrier	Frequency (n)	Percentage (%)
Fear of insertion	142	58.2
Lack of knowledge	128	52.5
Satisfaction with current method	112	45.9
Cultural beliefs	48	19.7
High initial cost	36	14.8

*Multiple responses permitted



Among all participants, willingness to try a menstrual cup in the future was expressed by 138 participants (51.1%), while 82 (30.4%) were unsure, and 50 (18.5%) were not willing. Factors that would encourage menstrual cup use are presented in Table 7. Awareness programs were identified as a motivating factor by 168 participants (62.2%), followed by demonstration or training (142, 52.6%), recommendation by a doctor (126, 46.7%), and peer use (88, 32.6%).

Table 7: Factors Encouraging Menstrual Cup Use (N=270)

Factor	Frequency (n)	Percentage (%)
Awareness programs	168	62.2
Demonstration/training	142	52.6
Recommendation by doctor	126	46.7
Peer use	88	32.6

*Multiple responses permitted

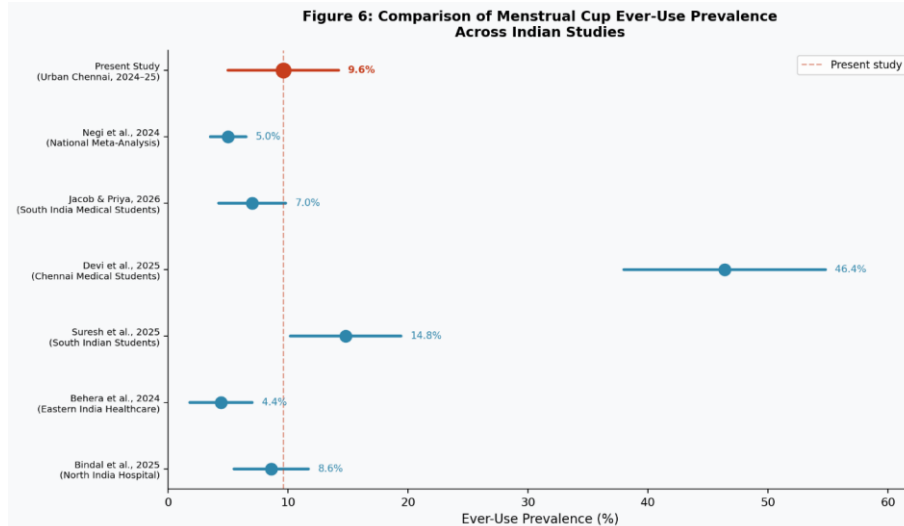


Table 8 presents the association between sociodemographic factors and adequate knowledge, favourable attitude, and ever-use of menstrual cups. Educational status was significantly associated with adequate knowledge ($\chi^2 = 18.42, p = 0.001$), with postgraduate participants demonstrating the highest proportion of adequate knowledge (55.1%). Monthly family income was also significantly associated with adequate knowledge ($\chi^2 = 12.86, p = 0.005$), with the highest income group showing 57.1% adequate knowledge. Age group showed a significant association with favourable attitude ($\chi^2 = 9.84, p = 0.007$), with younger participants (18-25 years) demonstrating more favourable attitudes (59.3%) compared to older participants. Marital status was significantly associated with ever-use ($\chi^2 = 6.24, p = 0.012$), with unmarried women showing higher ever-use (13.9%) compared to married women (6.1%).

Table 8: Association of Sociodemographic Factors with KAP Outcomes

Variable	Category	Adequate Knowledge n (%)	p-value	Favourable Attitude n (%)	p-value	Ever-use n (%)	p-value
Age group	18-25 years	52 (48.1)	0.342	64 (59.3)	0.007*	14 (13.0)	0.068
	26-35 years	48 (41.4)		54 (46.6)		10 (8.6)	
	36-45 years	22 (47.8)		18 (39.1)		2 (4.3)	
Education	Up to secondary	12 (30.0)	0.001*	16 (40.0)	0.082	2 (5.0)	0.154
	Higher secondary	14 (35.0)		18 (45.0)		2 (5.0)	
	Graduate	50 (44.6)		58 (51.8)		10 (8.9)	
	Postgraduate	46 (55.1)		44 (56.4)		12 (15.4)	
Monthly income	<₹20,000	14 (30.4)	0.005*	18 (39.1)	0.124	2 (4.3)	0.096
	₹20,000-40,000	30 (41.7)		34 (47.2)		4 (5.6)	
	₹40,001-60,000	30 (44.1)		36 (52.9)		6 (8.8)	
	>₹60,000	48 (57.1)		48 (57.1)		14 (16.7)	
Marital status	Married	64 (43.2)	0.456	68 (45.9)	0.098	9 (6.1)	0.012*
	Unmarried	58 (47.5)		68 (55.7)		17 (13.9)	

*Statistically significant at $p < 0.05$

Discussion

The present study assessed the knowledge, attitude, and practice regarding menstrual cups among 270 urban women in Chennai, South India. The findings reveal a substantial gap between awareness and actual adoption, with adequate knowledge present in less than half of the participants and current use at only 5.9%. These findings contribute to the growing body of literature on menstrual hygiene management in urban India and highlight specific targets for public health intervention. The proportion of participants who had heard about menstrual cups in this study (68.9%) is considerably higher than the pooled national estimate of 35% reported in a recent systematic review and meta-analysis [4]. This discrepancy likely reflects the urban, relatively educated nature of the present study sample, as well as the increasing visibility of menstrual cups in digital and social media spaces in metropolitan cities. However, the high awareness rate masks substantial knowledge deficits. Only 52.7% of aware participants correctly identified the material composition of menstrual cups, and only 49.5% knew that menstrual cups are safe for unmarried women.

The finding that nearly one-third of aware participants believed menstrual cups are unsafe for unmarried women is particularly concerning and reflects persistent cultural taboos surrounding vaginal insertion and virginity [5,9]. Similar misconceptions have been documented in studies from Karnataka and Nepal, where concerns about virginity loss were cited as a barrier to menstrual cup adoption [5,9]. This finding underscores the need for culturally sensitive educational interventions that explicitly address the anatomical compatibility of menstrual cups with the hymen and clarify that cup use does not compromise virginity.

The mean knowledge score of 6.1 (out of 8) among aware participants is comparable to findings from a study among medical students in Chennai, where the mean knowledge score among those aware was 6.4 [2]. However, the proportion of participants with adequate knowledge in the present study (45.2% using the median split) is lower than the 56.4% with poor knowledge reported by Devi et al. [2] – noting that their categorisation was reversed. The present findings suggest that knowledge remains inadequate among the general urban population, even when awareness is relatively high.

The attitudinal findings reveal a complex picture. While participants recognised the cost-effectiveness of menstrual cups (68.1% agreement), substantial concerns about insertion difficulty (54.1%) and personal concerns about insertion (60.0%) were evident. This pattern – acknowledging benefits while fearing practical implementation – is consistent with the diffusion of innovations theory, which posits that perceived complexity is a major barrier to adoption of novel products [10].

The proportion of participants with favourable attitudes (50.4%) is slightly higher than the 42.4% reported among medical students in Chennai by Devi et al. [2], but lower than the 63% agreement with accessibility statements reported among South Indian students by Suresh et al. [6]. These differences may reflect variations in study populations, with medical students potentially having greater exposure to clinical knowledge but also greater awareness of potential complications.

Notably, only 43.7% of participants expressed willingness to recommend menstrual cups to others. This finding is concerning, as peer recommendation is a critical driver of adoption for novel health products [6,8]. The low willingness to recommend may reflect the participants' own uncertainty about the product, as well as the social stigma still associated with menstruation and vaginal products in Indian society.

The prevalence of ever-use (9.6%) and current use (5.9%) in the present study is higher than the national pooled estimate of 5% for ever-use reported by Negi et al. [4], but lower than the 46.4% usage reported among medical students in Chennai by Devi et al. [2] and the 14.8% reported among medical students in Puducherry [11]. The lower usage in the general population compared to medical students is expected, given the latter group's greater health literacy and access to information. However, the 5.9% current use is notably lower than the 7.0% reported among medical undergraduates in Karnataka [8] and the 9.6% ever-use reported in the same study.

The finding that 46.2% of ever-users discontinued or reduced use due to difficulty with insertion or removal is consistent with the literature. Suresh et al. reported that 73% of participants cited insertion difficulty as a reason for discontinuation [6]. Similarly, Jacob and Priya found that 55.3% of non-users identified insertion or removal difficulty as a barrier [8]. This recurring finding across multiple Indian studies suggests that practical training and demonstration may be as important as informational campaigns in promoting sustained use.

Encouragingly, among ever-users who persisted, 53.8% used the cup every cycle, and 30.8% reported no problems. This finding aligns with the systematic review by van Eijk et al., which reported that 73% of menstrual cup users wished to continue use after study completion [3]. The progressive improvement in ease of use over successive cycles, documented by Twisha and Chidurala in a Chennai-based prospective study, suggests that initial difficulties diminish with experience [12]. The identification of fear of insertion (58.2%) and lack of knowledge (52.5%) as the primary barriers to adoption mirrors findings from multiple Indian studies. Jacob and Priya reported that 55.3% of non-users cited difficulty with insertion or removal, and 50.9% preferred other "hassle-free" products [8]. Bindal et al., in a hospital-based study from North India, found that insufficient knowledge was the primary barrier to use [7]. Behera et al., in a study from Eastern India, reported an unmet need of 95.6%, with comfortable use of sanitary napkins and lack of adequate knowledge as the predominant reasons [13].

The finding that 45.9% of non-users were satisfied with their current method highlights an important challenge: menstrual cups must compete not only with the status quo but also with the convenience of disposable products that require no learning curve. This finding suggests that interventions must emphasise not merely the environmental and cost benefits of cups, but also the experiential benefits once the learning phase is overcome.

The facilitators identified – awareness programs (62.2%), demonstration or training (52.6%), and doctor recommendation (46.7%) – provide clear guidance for intervention design. The strong preference for demonstration suggests that passive information dissemination through pamphlets or social media may be insufficient. Hands-on training, potentially using anatomical models or peer-led demonstrations, may be necessary to overcome the barrier of insertion fear.

The significant association of higher education and higher income with adequate knowledge is consistent with the findings of Bindal et al. [7] and Devi et al. [2]. This association likely reflects differential access to information sources, as well as greater health literacy and engagement with novel health products among more educated and affluent populations.

The association of younger age with favourable attitudes is notable and may reflect generational differences in openness to novel products, as well as greater exposure to social media campaigns promoting menstrual cups. Similar age-related patterns have been reported by Bindal et al. [7] and by Suresh et al. [6].

The finding that unmarried women had significantly higher ever-use compared to married women (13.9% vs. 6.1%) is interesting and somewhat counterintuitive, given the misconception that cups are unsafe for unmarried women. This finding may reflect differences in age (unmarried women being younger on average) or differences in autonomy regarding health decisions. Married women may face additional constraints from family members, particularly mothers-in-law or husbands, regarding menstrual product choices. This hypothesis requires further investigation.

The present study's findings can be directly compared with several recent studies conducted in Chennai. Devi et al., studying medical students at a private medical college in Chennai, reported that 56.4% had poor knowledge, 57.6% had unfavourable attitudes, but 46.4% were current users [2]. The much higher usage among medical students is expected given their clinical training and access to medical resources. However, the similar knowledge and attitude patterns suggest that even among future doctors, misconceptions and concerns about menstrual cups persist.

Twisha and Chidurala conducted a prospective study at a tertiary care centre in Chennai, enrolling 200 first-time menstrual cup users and following them for three cycles [12]. They reported that ease of insertion improved from 72% to 85% over three cycles, leakage decreased from 17% to 5%, and 96.5% intended to continue use. These findings are encouraging and suggest that with proper initial education and a brief familiarisation period, most women can successfully adopt menstrual cups. The high discontinuation rate in the present study (46.2% of ever-users reporting insertion difficulty) may reflect the absence of such structured education and support in community settings.

Shanmugham et al., studying doctors of reproductive age in Kancheepuram (near Chennai), reported that 96.4% were aware of menstrual cups but only 4.4% used them [14]. The facilitators they identified – comfort, no skin irritation, no foul odour – align with the facilitators reported in the present study by users.

The findings of the present study align with the broader national pattern identified by Negi et al. in their systematic review and meta-analysis: awareness of menstrual cups in India is increasing, but actual adoption remains very low, with a pooled prevalence of only 5% [4]. The reasons for non-use identified in the meta-analysis – price as both a barrier and facilitator, leakage concerns, and lack of knowledge – are consistent with the present findings.

International comparisons are instructive. Van Eijk et al., in a global systematic review and meta-analysis, reported that 73% of menstrual cup users wished to continue use, and leakage was similar or lower for cups compared to pads or tampons [3]. The present finding that 30.8% of ever-users reported leakage is higher than the 24% pooled prevalence reported by Negi et al. [4] but comparable to the 17% leakage reported in the first cycle by Twisha and Chidurala [12]. The higher leakage in community settings compared to controlled studies may reflect differences in user training and experience.

Studies from other low- and middle-income countries have reported similar barriers. A qualitative study from rural Nepal found that schoolgirls expressed concerns about pain during insertion, stickiness, and potential effects on fertility [9]. A study from Kenya reported that while menstrual cups were acceptable to schoolgirls, leakage and the need for water for cleaning were concerns [15]. These cross-cultural similarities suggest that the barriers to menstrual cup adoption are not uniquely Indian but reflect universal challenges associated with introducing an insertable, reusable menstrual product.

The findings of this study have several implications for public health policy and practice in Chennai and similar urban settings in India.

First, the substantial knowledge gaps despite relatively high awareness suggest that current information dissemination strategies are insufficient. Social media, identified as the primary source of information, may not be providing comprehensive or accurate information. Public health authorities should consider developing standardised educational materials that address the specific knowledge deficits identified: material composition, safety for unmarried women, infection risk, and proper insertion and removal techniques.

Second, the high proportion of participants expressing willingness to try menstrual cups (51.1%) suggests a receptive population. The unmet need for menstrual cups, defined as willingness to use but not currently using, appears substantial. Behera et al. estimated the unmet need at 95.6% among medical and paramedical students in Eastern India [13]. While the present study did not directly calculate unmet need, the gap between willingness (51.1%) and current use (5.9%) suggests a similar pattern.

Third, the strong preference for demonstration and training over passive information indicates that interventions should be experiential rather than didactic. Peer-led demonstrations, video tutorials, and hands-on workshops using anatomical models may be more effective than pamphlets or lectures. The success of the "Maithri Menstrual Cup" scheme in Karnataka, which provided free cups to adolescent girls alongside education, suggests that government programs can effectively promote adoption [8].

Fourth, the finding that married women had lower ever-use than unmarried women suggests that family-level interventions may be necessary. Engaging husbands and mothers-in-law in menstrual health education, while culturally challenging, may be important for enabling married women to adopt novel menstrual products. This study has several strengths. It is one of the few studies to assess menstrual cup KAP among the general urban population in Chennai, rather than focusing exclusively on students or healthcare providers. The sample size was adequate to provide precise estimates of knowledge and attitude prevalence. The use of a pre-tested, validated questionnaire and the inclusion of both household and institutional participants enhanced the representativeness of the sample.

Several limitations must be acknowledged. The cross-sectional design precludes causal inference; associations identified should be interpreted as correlational rather than causal. The reliance on self-reported data introduces the possibility of recall and social desirability bias, particularly regarding attitudes toward menstrual products. The sample, while diverse, may not be fully representative of all urban women in Chennai, as homeless women, women in slum settlements, and women with very low literacy may have been underrepresented. The small number of menstrual cup users (n=26) limited the statistical power for analyses of factors associated with use and for multivariate regression. Finally, the study did not collect qualitative data, which would have provided richer insights into the lived experiences of users and non-users.

Conclusion

This study examined the knowledge, attitude, and practice regarding menstrual cups among 270 urban women in Chennai, South India. The findings reveal that while awareness of menstrual cups has increased substantially, knowledge remains inadequate, with fewer than half of participants demonstrating adequate knowledge. Attitudes are mixed: participants recognise the cost-effectiveness of menstrual cups but express significant concerns about insertion difficulty and social acceptability. Actual practice is very low, with only 5.9% of participants currently using menstrual cups, despite over half expressing willingness to try. Fear of insertion and lack of knowledge emerged as the primary barriers to adoption, while awareness programs and demonstration or training were identified as the most important facilitators. Higher education and income were associated with better knowledge, younger age with more favourable attitudes, and unmarried status with higher ever-use. The substantial gap between willingness and current use represents a significant public health opportunity. With half of the study population expressing willingness to try menstrual cups, targeted interventions that address knowledge deficits, provide hands-on training, and normalise the use of insertable products could substantially increase adoption. Such interventions should be culturally sensitive, addressing misconceptions about virginity and safety, and should include practical demonstrations to overcome insertion fears. Future research should employ mixed methods to explore the lived experiences of menstrual cup users and non-users, should include longitudinal designs to assess the durability of adoption, and should evaluate the effectiveness of different intervention strategies. Studies should also include more diverse populations, including women from lower socioeconomic strata and those with less education, to ensure that interventions are equitable. In conclusion, menstrual cups represent a promising sustainable alternative to disposable menstrual products, but their potential will not be realised without concerted public health efforts to educate, train, and support potential users. The present study provides a baseline assessment that can inform such efforts in Chennai and similar urban settings across India.

Figure Suggestions

Figure 1: Conceptual framework of the KAP model applied to menstrual cup adoption (showing hypothesised relationships between sociodemographic factors, knowledge, attitude, and practice)

Figure 2: Bar chart showing sources of information about menstrual cups among aware participants (social media, friends/family, health professionals, school/college)

Figure 3: Stacked bar chart showing proportion of correct, incorrect, and don't know responses for each knowledge item

Figure 4: Heat map showing attitude distribution across the seven Likert-scale items

Figure 5: Bar chart comparing barriers to menstrual cup use among non-users (fear of insertion, lack of knowledge, satisfaction with current method, cultural beliefs, high initial cost)

Figure 6: Forest plot showing comparison of menstrual cup ever-use prevalence between the present study and other Indian studies (from published literature)

Figure 7: Flow diagram of participant recruitment and data collection

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