

Fundamental Awareness of Menstrual Blood-Derived Stem Cells; Knowledge Attitude and Practice Among Female Healthcare Professionals in Kanchipuram, Tamil Nadu

Sowmiya Lakshmi P¹, Dr. Sravani Chithra CH², Dr. Sridevi V³,
Dr. Sampath Kumari⁴, Sree Varsha M⁵, Divya V S⁶,
Ibrahim Mohammed Essa Mazik⁷

¹Third year MBBS Student, Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

²Associate Professor, Department of Obstetrics and Gynecology,

Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

³Professor, Department of Pathology, Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

⁴Professor and Head of Department, Department of Obstetrics and Gynecology,

Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

⁵Third year MBBS Student, Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

⁶Third year MBBS Student, Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

⁷Third year MBBS Student, Sri Muthukumaran Medical College Hospital and Research Institute, Chennai.

Corresponding Author: P Sowmiya Lakshmi

DOI: <https://doi.org/10.52403/ijshr.20260320>

Received: 10/05/2026; Revised: 15/07/2026; Accepted: 05/08/2026

ABSTRACT

Background: Menstrual blood-derived stem cells (MenSCs) have emerged as a promising source of mesenchymal stem cells owing to their non-invasive collection, high proliferative capacity, and potential applications in regenerative medicine. Despite growing scientific interest, awareness and acceptance of MenSCs among healthcare professionals remain inadequately explored.

Aim: To assess the knowledge, attitude, and practice (KAP) regarding menstrual blood-derived stem cells among female healthcare professionals in Kanchipuram, Tamil Nadu.

Methods: A cross-sectional descriptive study was conducted among 400 female healthcare professionals using a structured, validated, self-administered questionnaire available in English and Tamil. The questionnaire assessed knowledge (0–11

points), attitude (0–12 points), and practice (0–13 points) regarding MenSCs. Descriptive statistics were used to summarize participant characteristics and KAP outcomes. Associations between sociodemographic variables and KAP domains were evaluated using the chi-square test, with statistical significance set at $p < 0.05$.

Results: Of the 400 participants, 58.3% demonstrated inadequate knowledge regarding MenSCs, while only 55.3% had previously heard of menstrual blood-derived stem cells and 46.8% recognized their therapeutic applications. In contrast, 76.3% exhibited a positive attitude toward MenSC-based therapies, with most respondents supporting incorporation of MenSC-related education into healthcare curricula. Practice levels were notably poor, with 95.8% classified as having poor practices and only 1.5% reporting previous menstrual blood

donation. Significant associations were observed between knowledge levels and age, educational qualification, professional department, family income, and area of residence (all $p < 0.001$). Attitude and practice were also significantly associated with selected sociodemographic variables.

Conclusion: Female healthcare professionals demonstrated favorable attitudes despite limited knowledge and poor practices regarding MenSCs. Targeted educational interventions, curriculum enhancement, and improved awareness initiatives are warranted to bridge the knowledge–practice gap and promote informed acceptance of menstrual blood-derived stem cell applications in regenerative medicine.

Keywords: Menstruation; Stem Cells; Mesenchymal Stem Cells; Health Knowledge, Attitudes, Practice; Health Personnel; Regenerative Medicine; Reproductive Health.

INTRODUCTION

Stem cell research has emerged as one of the most promising frontiers in regenerative medicine, offering unprecedented potential for treating a wide range of degenerative diseases, tissue injuries, and genetic disorders. Among the various sources of stem cells, menstrual blood-derived stem cells (MenSCs) have garnered significant attention in recent years due to their unique advantages, including non-invasive collection, ethical acceptability, and remarkable regenerative properties [1,2]. Unlike embryonic stem cells, or bone marrow-derived stem cells, MenSCs can be obtained painlessly and repeatedly from menstrual blood, a biological material traditionally considered medical waste [3].

Menstrual blood contains a rich population of mesenchymal stem cells that possess multilineage differentiation potential, capable of differentiating into various cell types including adipocytes, osteocytes, chondrocytes, cardiomyocytes, and neural cells [4]. These cells exhibit high

proliferative capacity, low immunogenicity, and possess immunomodulatory properties that make them particularly attractive for therapeutic applications [5]. Research has demonstrated that MenSCs express characteristic mesenchymal stem cell markers such as CD73, CD90, and CD105, while lacking hematopoietic markers, confirming their stem cell identity [6]. The discovery of these cells has opened new avenues for regenerative medicine, with potential applications ranging from cardiovascular disease and neurodegenerative disorders to wound healing and tissue engineering [7].

Healthcare professionals, especially female healthcare workers, are pivotal in disseminating health information to the community and influencing healthcare decisions [8]. Despite the growing body of scientific evidence supporting the therapeutic potential of MenSCs, awareness and understanding of these cells remain limited, particularly among healthcare professionals who play a crucial role in translating scientific discoveries into clinical practice. However, studies have indicated gaps in knowledge about stem cell biology and regenerative medicine among healthcare workers, which may hinder the translation of research findings into clinical applications [9].

Hence this study aims to assess the fundamental awareness, concerning menstrual blood-derived stem cells among female healthcare professionals in Kanchipuram, Tamil Nadu.

METHODOLOGY

Study Design

This study was conducted over a period of three months employed a cross-sectional descriptive design.

Study Population and Sampling

The study population comprised female healthcare professionals working in various healthcare institutions across Kanchipuram district. A simple random sampling technique was employed to ensure equal

probability of selection for all eligible participants. The sample size was calculated using Cochran's formula: $n = z^2pq/e^2$, where p denoted the sample proportion (49%), based on previous research [10] indicating that approximately 49% of the population showed positive responses to questionnaires about menstrual blood-derived mesenchymal stem cells, the calculated sample size was 384 approximated to 400 participants.

Selection Criteria

Participants were included in the study if they were female healthcare professionals aged between 18 and 45 years, encompassing doctors, nurses, and medical students. The inclusion of medical students was justified by their status as future healthcare professionals. Exclusion criteria eliminated individuals who were not directly employed in the healthcare sector and those who were undergoing treatment or receiving medications that would render survey participation difficult or impractical.

Data Collection Instrument and Procedure

A structured, self-administered offline questionnaire was given to participants, which included informed consent form, sociodemographic questionnaire, and the knowledge-attitude-practice questionnaire. It was developed in two languages (English and Tamil) to accommodate the linguistic preferences of participants. The questionnaire development was based on extensive literature review and existing validated tools in the field of MenSCs research. The instrument consisted of three main sections: a sociodemographic questionnaire capturing variables including age, education level, department, occupation, family monthly income, marital status, religion, nationality, and area of residence (urban or rural); a knowledge assessment section containing questions evaluating participants' awareness, understanding, and factual knowledge about menstrual blood-derived stem cells; an

attitude assessment section exploring participants' perceptions, beliefs, opinions, and feelings toward the use of MenSCs in therapeutic applications; and a practice assessment section examining current behaviours related to menstrual health, donation practices, and willingness to recommend or utilize MenSCs in clinical settings.

Ethical Considerations

The study protocol received approval from the Institutional Ethics prior to commencement of data collection. Written informed consent was obtained from all participants before their inclusion in the study. Confidentiality and anonymity of participants were maintained throughout the study.

Data Management and Analysis

The data collected was imported into SPSS software for comprehensive statistical analysis. Descriptive statistics were employed to summarize the data. The distribution of responses to each question was analysed. Inferential statistical tests were applied to assess relationships between variables, with chi-square tests utilized to examine associations between categorical variables such as professional role (doctors versus nurses versus students) and knowledge levels, attitudes, or practices. Statistical significance was set at $p < 0.05$ for all analyses, and results were presented in the form of tables to facilitate interpretation and comparison of findings across different subgroups within the study population.

RESULTS

The study enrolled 400 female healthcare professionals. As shown in table one - The sample was predominantly young, with 56% aged 18-25 years, reflecting the large proportion of students included. Medical department professionals constituted 78.8% of participants, significantly outnumbering nursing staff (21.3%). Educational distribution showed 56.8% undergraduates and 43.3% postgraduates, while 54.3% were

unemployed (primarily students still pursuing education).

Economic diversity was evident, with the majority (71.8%) earning between 50,000 rupees and above 1 lakh rupees annually, indicating middle to upper-middle-class representation. Most participants were

unmarried (55.3%), Hindu (86.8%), and urban residents (83.8%). The high proportion of urban participants reflects the concentration of healthcare institutions in city centres, while the religious distribution mirrors Tamil Nadu's demographic composition.

Table 1: Sociodemographic Characteristics of Respondents (N=400)

Characteristic	Category	Frequency	Percentage
Age (years)	18-25	224	56.0%
	26-30	4	1.0%
	31-35	34	8.5%
	36-40	86	21.5%
	41-45	52	13.0%
Department	Medical	315	78.8%
	Nursing	85	21.3%
Educational Qualification	Undergraduate	227	56.8%
	Postgraduate	173	43.3%
Occupation	Employed	183	45.8%
	Unemployed	217	54.3%
Family Income (₹)	<10,000	45	11.3%
	10,000-29,000	34	8.5%
	30,000-49,000	34	8.5%
	50,000-1 lakh	141	35.3%
	>1 lakh	146	36.5%
Marital Status	Unmarried	221	55.3%
	Married	175	43.8%
	Separated	4	1.0%
Religion	Hindu	347	86.8%
	Christian	42	10.5%
	Muslim	6	1.5%
	Others	5	1.3%
Area	Urban	335	83.8%
	Rural	65	16.3%

Table two - The KAP assessment revealed striking disparities across domains. Knowledge was inadequate in 58.3% of respondents, with only 41.8% demonstrating adequate awareness. Specifically, while 55.3% had heard about MenSCs, and merely 25% knew menstrual blood could be donated. This indicates superficial rather than comprehensive knowledge among healthcare professionals.

Conversely, attitudes were predominantly positive (76.3%), with 80% supporting healthcare providers discussing MenSCs as a treatment option and 81.5% advocating for curriculum integration. This positive attitude

despite limited knowledge suggests professional openness to innovation. However, only 48% viewed menstrual blood as therapeutically useful, and just 40.8% felt comfortable personally donating.

Practice scores were alarmingly poor (95.8%), with only 4.3% demonstrating good practices. A mere 1.5% had ever donated menstrual blood, and only 20% expressed willingness to donate. Primary barriers included lack of awareness (40%) and perceived discomfort (24.3%). The overwhelming preference for sanitary pads (87.8%) over menstrual cups (2.3%) further limits donation potential.

Table 2: Knowledge, Attitude, and Practice Scores Regarding Menstrual Blood-Derived Stem Cells (N=400)

Domain	Category	Score Range	Frequency	Percentage
Knowledge	Adequate	6-11 points	167	41.8%
	Inadequate	0-5 points	233	58.3%
Attitude	Positive	4-12 points	305	76.3%
	Negative	0-3 points	95	23.8%
Practice	Good	7-13 points	17	4.3%
	Poor	0-6 points	383	95.8%

Table three suggests Multiple sociodemographic factors significantly influenced knowledge levels. Age showed strong association ($p<0.001$), with the 36–40-year age group demonstrating optimal knowledge (50.9% adequate knowledge, only 0.4% inadequate). This mid-career advantage likely reflects completed education combined with ongoing professional development.

Educational qualification was a powerful predictor ($p<0.001$), with postgraduates showing 2.5-fold higher adequate knowledge (71.3%) compared to undergraduates (28.7%). Similarly, medical professionals demonstrated superior knowledge (87.4% adequate) compared to

nursing staff (12.6%), likely reflecting curricular differences and research access.

Socioeconomic status significantly impacted knowledge ($p<0.001$), with higher-income groups showing better awareness, reflecting differential access to educational resources, journals, and continuing education. Geographic location showed the most striking disparity ($p<0.001$), with urban residents comprising 96.4% of those with adequate knowledge versus only 3.6% rural residents. This urban-rural divide reflects unequal access to medical libraries, internet resources, and academic institutions. Notably, religion showed no association ($p=0.22$), indicating that knowledge acquisition transcended religious boundaries.

Table 3: Association Between Sociodemographic Factors and Knowledge About MenSCs

Variable	Category	Adequate Knowledge	Inadequate Knowledge	p-value	Significance
Age	18-25 years	47 (28.1%)	177 (76.0%)	<0.001	Significant
	36-40 years	85 (50.9%)	1 (0.4%)		
	41-45 years	23 (13.8%)	29 (12.4%)		
Education	Undergraduate	48 (28.7%)	179 (76.8%)	<0.001	Significant
	Postgraduate	119 (71.3%)	54 (23.2%)		
Department	Medical	146 (87.4%)	169 (72.5%)	<0.001	Significant
	Nursing	21 (12.6%)	64 (27.5%)		
Family Income	<10,000	11 (6.6%)	34 (14.6%)	<0.001	Significant
	>1 lakh	65 (38.9%)	81 (34.8%)		
Area	Rural	6 (3.6%)	59 (25.3%)	<0.001	Significant
	Urban	161 (96.4%)	174 (74.7%)		
Religion	Hindu	146 (87.4%)	201 (86.3%)	0.22	Not significant
	Others	21 (12.6%)	32 (13.7%)		

Table four - Age significantly influenced both attitude ($p<0.001$) and practice ($p=0.006$). The 36–40-year group showed exclusively positive attitudes, aligning with their superior knowledge.

Educational level significantly affected both domains, with postgraduates showing more positive attitudes (47.5%) consistent with their knowledge advantage. However, undergraduates unexpectedly demonstrated

better practices (88.2%), possibly reflecting generational openness to new health behaviours. Professional department strongly influenced attitude ($p<0.001$), with medical professionals showing more positive views (84.9%), but showed no association with practice ($p=0.71$), indicating that practice barriers transcend professional distinctions.

Family income significantly predicted attitude ($p<0.001$), with higher earners showing more positive views (44.9%), but showed no practice association ($p=0.94$), suggesting practice barriers are informational and infrastructural rather than economic. Geographic location surprisingly showed no attitude ($p=0.43$) or practice ($p=0.68$) associations despite strong knowledge effects, indicating that once

exposed to information, healthcare professionals' attitudes remain equally positive regardless of residence.

Religion showed marginal attitude significance ($p=0.05$) and strong practice association ($p<0.001$), with Hindus demonstrating the highest good practices (88.2%), potentially reflecting cultural attitudes toward menstruation and donation. Overall, these findings reveal that while knowledge is strongly determined by education, profession, income, and location, attitudes are shaped by education and socioeconomic factors, whereas practice remains uniformly poor across demographics, requiring multifaceted interventions to bridge the knowledge-attitude-practice gap.

Table 4: Association Between Sociodemographic Factors and Attitude & Practice Regarding MenSCs

Variable	Category	Positive Attitude	Negative Attitude	p-value	Good Practice	Poor Practice	p-value
Age	18-25 years	158 (51.8%)	66 (69.5%)	<0.001*	16 (94.1%)	208 (54.3%)	0.006*
	36-40 years	86 (28.2%)	0 (0%)		0 (0%)	86 (22.5%)	
	41-45 years	25 (8.2%)	27 (28.4%)		0 (0%)	52 (13.6%)	
Education	Undergraduate	160 (52.5%)	67 (70.5%)	0.002*	15 (88.2%)	212 (55.4%)	0.007*
	Postgraduate	145 (47.5%)	28 (29.5%)		2 (11.8%)	171 (44.6%)	
Department	Medical	259 (84.9%)	56 (53.9%)	<0.001*	14 (82.4%)	301 (78.6%)	0.71
	Nursing	46 (15.1%)	39 (41.1%)		3 (17.6%)	82 (21.4%)	
Family Income	<10,000	24 (7.9%)	21 (22.1%)	<0.001*	2 (11.8%)	43 (11.2%)	0.94
	>1 lakh	137 (44.9%)	9 (9.5%)		5 (29.4%)	141 (36.8%)	
Area	Rural	52 (17.0%)	13 (13.7%)	0.43	2 (11.8%)	63 (16.4%)	0.68
	Urban	253 (83.0%)	82 (86.3%)		15 (88.2%)	320 (83.6%)	
Religion	Hindu	272 (89.2%)	75 (78.9%)	0.05*	15 (88.2%)	332 (86.7%)	<0.001*
	Others	33 (10.8%)	20 (21.1%)		2 (11.8%)	51 (13.3%)	

*Statistically significant ($p<0.05$)

DISCUSSION

The findings revealed significant disparities across the three domains, with inadequate knowledge (58.3%), predominantly positive

attitudes (76.3%), and alarmingly poor practices (95.8%), highlighting a critical gap between theoretical acceptance and practical

implementation of this emerging regenerative medicine technology.

Knowledge Assessment

The findings of the present study that only 41.8% of respondents demonstrated adequate knowledge about MenSCs, with 55.3% having heard about menstrual-derived mesenchymal stem cells and 46.8% recognizing their potential therapeutic applications align with previous research by Kaur et al., who reported that only 49% of female healthcare providers in India demonstrated adequate knowledge of MenSCs [10]. Similarly, Hans and Kaur found that nursing students had an average knowledge regarding menstrual stem cell banking, corroborating our observation of knowledge deficits [11]. The superficial understanding observed in our study, where only 25% knew menstrual blood could be donated and merely 21.3% understood the donation procedure, parallels findings from Podder's assessment of nursing students, which revealed significant knowledge gaps despite professional healthcare training [12].

Our study identified several sociodemographic predictors of knowledge. The 36–40-year age group demonstrated optimal knowledge (50.9% adequate), this finding extends previous observations that professional experience combined with continuous learning enhances knowledge about emerging therapies [13].

The pronounced urban-rural knowledge disparity observed in our study (96.4% of adequate knowledge among urban residents versus 3.6% rural) represents a critical finding that has not been extensively documented in previous MenSCs research. Medical professionals demonstrated superior knowledge (87.4%) compared to nursing staff (12.6%), consistent with Leng et al.'s Malaysian study showing differential knowledge levels across healthcare professional categories [14].

Attitude Assessment

Despite limited knowledge, 76.3% of respondents demonstrated positive attitudes

toward MenSCs. Leng et al. similarly reported that 61% of nurses showed positive attitudes toward stem cell therapeutic potential, though our study revealed higher positivity rates, possibly reflecting increasing awareness over time or regional differences [14].

The finding that 48% viewed menstrual blood as therapeutically useful rather than waste represents a significant shift from traditional perceptions, though it indicates that over half of respondents still harbour reservations. Manley et al. found that 78% of menstruating women were willing to donate menstrual blood and 91% would accept MenSCs therapy, suggesting greater acceptance among potential donors than among healthcare professionals in our study, where only 40.8% felt comfortable personally donating [15]. This discrepancy highlights the need for targeted interventions addressing healthcare professionals' personal concerns about menstrual blood donation.

The marginal religious influence on attitudes ($p=0.05$) suggests that while cultural factors play some role, professional training and scientific understanding predominantly shape healthcare professionals' perspectives on MenSCs.

Practice Assessment

The most concerning finding was that 95.8% of respondents exhibited poor practices, with only 1.5% having ever donated menstrual blood and 20% expressing willingness to donate. This dramatic knowledge-attitude-practice gap represents the most significant barrier to MenSCs utilization and exceeds the practice deficits reported in previous studies. The primary barriers identified—lack of awareness (40%) and perceived discomfort (24.3%)—align with findings from multiple studies indicating that insufficient knowledge and psychological barriers impede menstrual blood donation [11,12,16].

The overwhelming preference for sanitary pads (87.8%) over menstrual cups (2.3%) presents a practical obstacle to menstrual blood collection, as cups are necessary for

donation. This finding reflects broader patterns of menstrual product usage in India, where traditional pads dominate despite growing awareness of alternative options [17]. Interestingly, 40.5% indicated they would prefer using menstrual cups after knowing their advantages, suggesting that targeted education about both MenSCs and collection methods could enhance adoption rates.

Contrary to knowledge and attitude patterns, undergraduates demonstrated better practices (88.2%) than postgraduates (11.8%), an unexpected finding possibly reflecting generational openness to new health behaviours or the impact of contemporary health education that increasingly incorporates menstrual health innovations [18].

The absence of socioeconomic influence on practices ($p=0.94$) suggests that barriers are primarily informational and infrastructural rather than economic, contradicting assumptions that donation practices would vary by income level. This finding indicates that interventions should focus on education and infrastructure development rather than financial incentives, though 21% indicated willingness to donate with incentives, suggesting a subset responsive to such approaches.

Study Limitations

Some limitations warrant consideration. The cross-sectional design precludes causal inferences about relationships between sociodemographic factors and KAP variables. Self-reported data introduce potential response bias, with participants possibly overestimating knowledge or providing socially desirable answers. The study's focus on female healthcare professionals, while appropriate given the topic, limits generalizability to male colleagues who also play roles in women's health counselling.

Implications for Healthcare Education and Policy

The striking KAP gap identified in this study has profound implications for healthcare education and policy development. The pronounced urban-rural knowledge disparity necessitates targeted outreach programs to rural healthcare facilities, possibly utilizing telemedicine to bridge geographic barriers. The differential knowledge across professional categories suggests that nursing education requires particular enhancement, potentially through continuing education programs and integration of stem cell biology into core curricula [19].

Bridging the attitude-practice gap requires multifaceted approaches addressing not only knowledge but also infrastructure development for menstrual blood collection and banking, destigmatization of menstruation discussions, and practical training in patient counselling about donation options [6].

Future Research Directions

Future studies should employ longitudinal and qualitative to explore in-depth reasons for the attitude-practice gap, cultural beliefs about menstruation and donation, and specific barriers to menstrual cup adoption. Comparative studies across different Indian states and international contexts would illuminate how regional, cultural, and healthcare system factors influence MenSCs awareness and acceptance. Research examining male healthcare professionals' knowledge and attitudes would provide a complete picture of the healthcare workforce's preparedness to support MenSCs utilization.

CONCLUSION

This study reveals a critical knowledge-attitude-practice gap regarding menstrual blood-derived stem cells among female healthcare professionals in Kanchipuram, Tamil Nadu, with inadequate knowledge in 58.3% despite predominantly positive attitudes in 76.3% of participants. The alarmingly poor practices (95.8%) highlight urgent need for comprehensive educational

interventions addressing knowledge deficits, particularly among undergraduates, nursing professionals, rural practitioners, and younger healthcare workers. While sociodemographic factors including age, education, professional background, income, and geographic location significantly influence knowledge and attitudes, practice barriers transcend these categories, indicating the need for multifaceted approaches encompassing curriculum integration, infrastructure development for menstrual blood banking, destigmatization initiatives, and practical training programs. The positive attitudes observed provide an encouraging foundation for successful implementation of targeted interventions that could bridge the knowledge-practice gap and facilitate the integration of this promising regenerative medicine technology into mainstream healthcare practice, ultimately improving women's health outcomes and advancing stem cell therapeutics in India.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

Creative Commons Attribution License 4.0

This is an open-access article published under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0).

<https://creativecommons.org/licenses/by/4.0>

REFERENCES

1. Andrzejewska A, Lukomska B, Janowski M. Concise Review: Mesenchymal Stem Cells: From Roots to Boost. *Stem Cells*. 2019 Jul;37(7):855-864. doi: 10.1002/stem.3016.
2. Lv H, Hu Y, Cui Z, Jia H. Human menstrual blood: a renewable and sustainable source of stem cells for regenerative medicine. *Stem Cell Res Ther*. 2018 Nov 21;9(1):325. doi: 10.1186/s13287-018-1067-y.
3. Galea C, Riva N, Calleja-Agius J. Non-gynaecological Applications of Menstrual-derived Stem Cells: A Systematic Review. *Avicenna J Med Biotechnol*. 2022 Jan-Mar;14(1):10-29. doi: 10.18502/ajmb.v14i1.8166.
4. Shokri, MR., Bozorgmehr, M., Ghanavatinejad, A. et al. Human menstrual blood-derived stromal/stem cells modulate functional features of natural killer cells. *Sci Rep* 9, 10007 (2019). <https://doi.org/10.1038/s41598-019-46316-3>
5. Du X, Yuan Q, Qu Y, Zhou Y, Bei J. Endometrial Mesenchymal Stem Cells Isolated from Menstrual Blood by Adherence. *Stem Cells Int*. 2016;2016:3573846. doi: 10.1155/2016/3573846.
6. Zheng SX, Wang J, Wang XL, Ali A, Wu LM, Liu YS. Feasibility analysis of treating severe intrauterine adhesions by transplanting menstrual blood-derived stem cells. *Int J Mol Med*. 2018 Apr;41(4):2201-2212. doi: 10.3892/ijmm.2018.3415.
7. Lai D, Wang F, Yao X, Zhang Q, Wu X, Xiang C. Human endometrial mesenchymal stem cells restore ovarian function through improving the renewal of germline stem cells in a mouse model of premature ovarian failure. *J Transl Med*. 2015 May 12;13:155. doi: 10.1186/s12967-015-0516-y.
8. Obeagu EI. The Role of Women in Promoting Health Education and Reducing Health Disparities in Low-Income Countries. *MSIJMMR*. 2025; 2(3). 35-42.
9. Chen L, Qu J, Cheng T, Chen X, Xiang C. Menstrual blood-derived stem cells: toward therapeutic mechanisms, novel strategies, and future perspectives in the treatment of diseases. *Stem Cell Res Ther*. 2019 Dec 21;10(1):406. doi: 10.1186/s13287-019-1503-7.
10. Kaur KN, Nandi D, Ramachandran K, Mohanan L, Subhashini S, Segan M, Tripathy S, Janardhanan R. Knowledge, attitude, and practice of menstrual blood-derived mesenchymal stem cells among female healthcare workers in India. *Front Public Health*. 2023 May 4; 11:1102016. doi: 10.3389/fpubh.2023.1102016.
11. Hans N, Kaur S. Effectiveness of structured teaching programme on knowledge regarding menstrual blood stem cells banking among nursing students. *Int J Reprod Contracept Obstet Gynecol*. 2017; 5(9):3137-40.
12. Podder L. Assessment of knowledge regarding menstrual blood stem cell banking among nursing students. *Nurs J India*. 2019;110(6):243-7.

13. Bozorgmehr M, Gurung S, Darzi S, Nikoo S, Kazemnejad S, Zarnani AH, et al. Endometrial and menstrual blood mesenchymal stem/stromal cells: biological properties and clinical application. *Front Cell Dev Biol.* 2020 Jul 9;8:497. doi: 10.3389/fcell.2020.00497.
14. Leng LJ, Keng SL, Amir W, Cheng TS. Association between nurses' knowledge and attitudes toward stem cell application in medicine. *Malaysian J Nurs.* 2016;7(3):3-9.
15. Manley H, Sprinks J, Breedon P. Menstrual Blood-Derived Mesenchymal Stem Cells: Women's Attitudes, Willingness, and Barriers to Donation of Menstrual Blood. *J Womens Health (Larchmt).* 2019 Dec;28(12):1688-1697. doi: 10.1089/jwh.2019.7745.
16. Geeta D. A descriptive study to assess the knowledge regarding menstrual blood banking among nursing students at Jodhpur. *EPRA Int J Res Dev.* 2021;6(10):328-32. DOI: <https://doi.org/10.36713/epra8574>
17. Sreeja S, Garikapati K, Sharmila V, Yamini M. Perception on Menstrual Cup Usage Among Teens and Reproductive Age Group Women: A Cross-Sectional Study. *J Obstet Gynaecol India.* 2023 Oct;73(Suppl 1):150-155. doi: 10.1007/s13224-023-01825-0.
18. Sanchez-Mata A, González-Muñoz E. Understanding menstrual blood-derived stromal/stem cells: definition and properties. Are we rushing into their therapeutic applications? *iScience.* 2021 Nov 22;24(12):103501. doi: 10.1016/j.isci.2021.103501.
19. Sasikala P. Descriptive study to assess the knowledge on menstrual stem cell among staff nurses. *Int J Appl Res* 2021;7(6):08-10

How to cite this article: Sowmiya Lakshmi P, Sravani Chithra CH, Sridevi V, Kumari S, Sree Varsha M, Divya V S et al. Fundamental awareness of menstrual blood-derived stem cells; knowledge attitude and practice among female healthcare professionals in Kanchipuram, Tamil Nadu. *Int. J. Sci. Healthc. Res.* 2026; 11(3): 171-180. DOI: [10.52403/ijshr.20260320](https://doi.org/10.52403/ijshr.20260320)
