Journal of Food and Dietetics Research (2024) 4(1):10–19
DOI: 10.48165/jfdr.2024.4.1.2

JFDR

Research Article

ISSN 2770-0259 (Online)

Assessment of Knowledge, Practices, and Dietary Patterns on Menstrual Health among Rural Women in Salem District

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ABSTRACT

Poor menstrual hygiene knowledge, practices, dietary patterns during menstruation increase the risk of reproductive health issues and mental stigma. Despite being a global problem, there is a significant lack of knowledge and many misconceptions about menstrual hygiene among women of all ages, particularly in rural areas. This study aims to assess the knowledge, practices, and dietary patterns related to menstrual hygiene among rural women in Salem, Tamil Nadu. The findings will help policymakers, NGOs, and planners to take effective initiatives. This cross-sectional survey, conducted from December 2023 to January 2024, assessed menstrual hygiene knowledge, practices, and dietary patterns among rural women in Salem, Tamil Nadu. Using convenient sampling, 71 participants were initially recruited, and after excluding incomplete responses, 70 completed surveys were analyzed. Female research staff conducted door-to-door interviews using structured questionnaires in English and Tamil. A pilot test with 10 participants refined the questionnaire. Participants were women aged 18-55. Data were analyzed using SPSS for statistical validation. Majority were aged 31-40, with schooling up to the school level, employed, earning Rs. 5,001-10,000 monthly, living in nuclear families with 3-4 members. While age and education influenced menstrual knowledge, factors like occupation and income did not. Menstrual practices were notably engaged, but not significantly predicted by demographic factors. Dietary patterns varied across occupations. Overall, targeted interventions are needed to improve menstrual health knowledge and practices among rural women, considering demographic and dietary influences. The study reveals the nuanced influence of demographic, socioeconomic, and dietary factors on menstrual health knowledge and practices. While age and education notably affect menstrual knowledge, other factors do not significantly explain menstrual practices. However, dietary patterns stand out as influential, suggesting the need for deeper exploration into how diets impact menstrual hygiene.

Keywords: Menstrual Hygiene, Rural Women, Dietary Patterns, Knowledge and Practices, Socioeconomic Factors

Introduction

Menstrual health is a fundamental aspect of women's overall well-being, yet it often receives inadequate attention, particularly in rural areas where access to healthcare and educational resources may be limited (Head et al.[1]). Understanding menstrual health involves exploring various factors such as knowledge, practices, and dietary choices among rural women. In Salem District, situated in India, gaining insights into menstrual health is crucial for developing targeted interventions that address the unique needs of this population.

Several studies provide valuable insights into menstrual health practices in India, each contributing to our understanding of the challenges and opportunities in promoting menstrual hygiene among rural women. Singh et al.[2] conducted a comprehensive study focusing on menstrual hygiene practices among rural Indian adolescent women, revealing significant disparities in hygienic method usage influenced by factors such as education and socioeconomic status. Similarly, Angeline et al.[3] underscored the necessity for education and improved access to sanitary products based on their investigation in Kancheepuram district, India.

Chakravarty.[4] emphasized the prevalence of unhygienic menstrual practices among rural Indian women and proposed various communication strategies to raise

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Received 02-09-2024; Accepted 10-10-2024

awareness about menstrual hygiene. Furthermore, Bera and Adhikari.[5] underscored the need for educational interventions to enhance menstrual hygiene awareness among rural women in West Bengal, India. Aggarwal et al.[6] surveyed adolescent girls in rural Maharashtra, India, revealing inadequate menstrual hygiene knowledge and the urgent need for increased awareness and access to sanitary products. Additionally, Balamurugan et al.[7] examined menstrual hygiene practices among rural women in Tamil Nadu, India, identifying socioeconomic factors significantly influencing hygiene practices and emphasizing the necessity for targeted policy interventions and health education.

Moreover, Das et al.[8] found satisfactory overall hygiene practices among rural women in Tripura, India, but highlighted the need for larger studies to understand factors influencing menstrual hygiene. Similarly, Sheoran et al.[9] conducted a descriptive study in Haryana, India, revealing prevalent inadequate menstrual hygiene practices and emphasizing the necessity for education to improve hygiene among rural women. Furthermore, the studies by Borker et al.[10], Kavitha Kiran and Yashoda[11], Sinha et al.[12], and Siddique et al.[13] provide additional insights into menstrual hygiene practices and challenges among rural women in different regions of India.

In light of these studies, this article aims to comprehensively assess the understanding, practices, and nutritional choices related to menstrual health among rural women in Salem District. By delineating the current landscape of menstrual health in this context, the study seeks to inform targeted interventions aimed to enhance hygiene practices and overall well-being among rural women.

Materials and Methods

Study area

The study was carried out in the villages of Kullagoundanur, Sangeethapatti, Mattukaranur, Aataikanur, Karuppur, Vellalapatti, Thekanpatti, of Salem district in Tamil Nadu through a well-structured questionnaire-based survey. The survey was conducted for the period of 3 months from December 12, 2023, to January 12, 2024. These villages were selected to provide a diverse representation of the rural population in Salem district.

Sample Size

The sample size for this study was 70 participants. Due to limited time and the challenges in obtaining responses from village women, we were able to recruit and analyze data from 70 respondents. While the sample size is modest, it provides a crucial snapshot of menstrual hygiene knowledge, practices, and dietary patterns among rural women in the selected areas of Salem.

Study design, participants, and procedure

The present study employed a cross-sectional survey design, utilizing self-reported questionnaires administered between December 2023 and January 2024. Participants were recruited through a non-probability sampling method, specifically convenient sampling. Each participant required approximately 10-15 minutes to complete the interview. Initially, 71 individuals participated in the surveys, but after eliminating incomplete responses, the final analysis encompassed 70 completed surveys. Data collection occurred via paper-based structured questionnaires, available in both English and local vernacular language, and was conducted door-to-door. Given the sensitive nature of menstrual hygiene, only female research staff members collected the data, ensuring strict confidentiality throughout the process.

A pilot test involving 10 participants from the same population (target group) was conducted to assess the acceptability and transparency of the questionnaire. Based on the pilot testing, several minor adjustments were made to the questionnaire. The inclusion criteria of the participants included: i. Women at reproductive age (18 to 55), The participants below 18 years and over 55 years were excluded from the study. Informed consent was received from the study participant.

In Reliability test, Cronbach's alpha was carried out the value of 0.742 suggests good internal consistency among the items. The obtained value indicates that the items in the scale are positively correlated with each other, supporting the reliability of the scale.

Measures

Socio-demographic measures and determinants of menstrual hygiene

Socio-demographics information was gathered by questions including participants' names, ages, educational qualifications ranging from illiteracy to graduate level, primary occupations such as coolie work, business ownership, or employment status, monthly income brackets (<RS.5,000, RS.5,001 – 10,000, >RS.10,001), family types (nuclear or joint), and family sizes categorized as 1-2, 3-4, 5-6, or more than 6 members.

Knowledge, practices and dietary patterns

measures

Menstrual knowledge: the questionnaire covered various aspects related to menstrual hygiene, starting with participants' self-rated knowledge levels (ranging from very low to very high) and their attendance at educational programs on menstrual hygiene (from never to regular attendance). Additionally, participants were asked about their usual menstrual product usage, satisfaction levels with available products (ranging from not satisfied at all to extremely satisfied), ease of access to menstrual products in their area (ranging from very difficult to very easy), and affordability of menstrual products (from not affordable at all to extremely affordable). Furthermore, their access to private and hygienic facilities for managing menstrual hygiene (rated from no access to excellent access) and the cleanliness of public toilets or facilities in their area (rated from very unclean to very clean) were assessed. This comprehensive approach provides valuable insights into participants' menstrual hygiene practices, product preferences, access to resources, and the overall hygiene infrastructure in their environment.

Menstrual practices: the questionnaire investigated various factors influencing menstrual hygiene practices through a nuanced five-point assessment. Participants were prompted to evaluate the impact of cultural norms on their menstrual hygiene practices, ranging from "Not at all" to "Very strongly." Additionally, they were asked to gauge if cultural practices hindered their hygiene management, with choices spanning from "No hindrance" to "Very strong hindrance." Concerns about the health implications of poor menstrual hygiene were measured on a scale from "Not concerned at all" to "Extremely concerned," while experiences with related health issues were categorized from "Never" to "Always." Social support and comfort levels discussing menstrual hygiene were assessed from "Not comfortable at all" to "Extremely comfortable," and the frequency of support received from the community ranged from "Never" to "Always." Environmental concerns regarding menstrual waste were rated on a spectrum from "Not concerned at all" to "Extremely concerned," and access to eco-friendly menstrual products was categorized from "Not at all" to "Excellent access." Lastly, participants' likelihood of passing on menstrual hygiene knowledge to younger generations was evaluated from "Not likely at all" to "Extremely likely," and their involvement in community initiatives for menstrual hygiene education was measured from "Never" to "Always." This comprehensive approach enabled a thorough examination of the multifaceted factors shaping menstrual hygiene practices and attitudes among respondents.

Dietary patterns: work and life: the questionnaire delved into the multifaceted aspects of menstrual hygiene and its impact on various domains of daily life, employing a comprehensive five-point scaling system. Participants provided insights into the management of menstrual hygiene at work, ranging from "Difficult to manage" to "Very easy to manage," and evaluated the adequacy of workplace facilities, from "Not at all" to "Extremely." Moreover, they assessed the impact of menstrual hygiene practices on daily activities, from "No impact" to "Very high impact," and reported on challenges faced in accessing menstrual hygiene products during travel, categorized from "Never" to "Always." Additionally, respondents rated their consumption of nutrition-rich foods before menstruation and their intake of iron-rich foods and hydration during and after menstruation, assessing from "Poor" to "Excellent." Furthermore, participants described their emotional well-being in the days leading up to menstruation, from "Poor" to "Excellent," and disclosed coping strategies employed to manage emotional challenges during menstruation, categorized from "None" to "Very effective." They also indicated the influence of stress on the severity of menstrual symptoms, from "Not at all" to "Extremely." This comprehensive analysis provides valuable insights into the diverse experiences and coping mechanisms related to menstrual hygiene and emotional well-being among respondents.

Statistics analysis

The data underwent analysis utilizing Statistical Package for Microsoft Excel and IBM SPSS Statistics 29.0.2.0. Descriptive statistics, multiple linear regression analysis, Kruskal-Wallis test and General Linear Model were performed using SPSS including the total score of knowledge, practice and dietary pattern, work and life.

Result

General characteristics of the participants

Demographic information of the respondents were categorized by age, educational qualification, occupation, income per month, family type, and family size. Regarding age, 22.9% are between 21-30 years, 47.1% between 31-40 years, 24.3% between 41-50 years, and 5.7% between 51-60 years. Regarding educational qualifications, 8.6% are illiterate, 51.4% have schooling up to school level, 38.6% are graduates or higher and 1.4% falls into another unspecified category. In terms of occupation, 31.4% have no occupation, 15.7% are coolies, 5.7% are in business, and 47.1%

Chart.1 Demographic information of the respondents

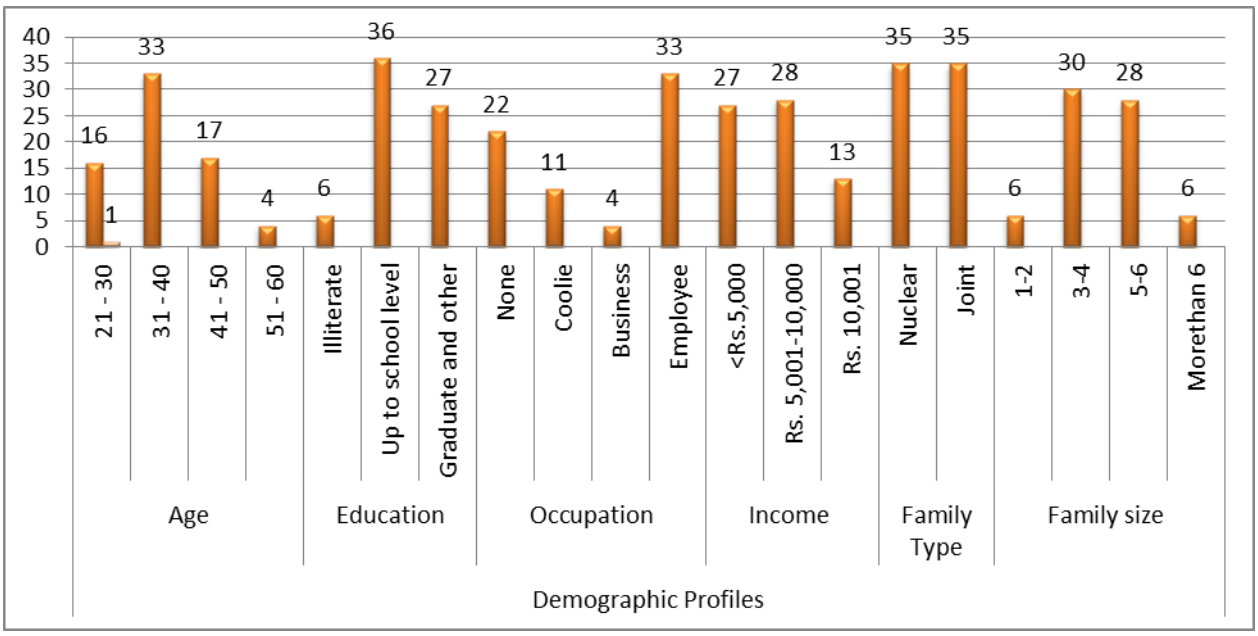

Table.1 Multiple regression analysis predicting knowledge

Model	R	R Square	Adjusted R Square[c]	Std. Error of the Estimate
1	0.499[a]	0.249	0.177	0.48777

a. Predictors: (Constant), Family Size (in Numbers), Age, Occupation, Educational Qualification, Family Type, Income/Month

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.958	6	0.826	3.473	0.005[b]
	Residual	14.989	63	0.238		
	Total	19.947	69			

a. Dependent Variable: Menstrual Knowledge

b. Predictors: (Constant), Family Size (in Numbers), Age, Occupation, Educational Qualification, Family Type, Income/Month

are employees. Monthly income distribution shows that 38.6% earn less than Rs. 5,000, 40.0% earn between Rs. 5,001-10,000, 18.6% earn more than Rs. 10,000, and 2.9% fall into another category. The family type is evenly split with 50.0% living in nuclear families and 50.0% in joint families. Family size indicates that 8.6% have 1-2 members, 42.9% have 3-4 members, 40.0% have 5-6 members, and 8.6% have more than 6 members (Chart 1).

Knowledge regarding menstrual hygiene

The statistical summary offers a detailed portrayal of the dataset concerning menstrual knowledge, encompassing 70 valid cases without any missing data. The analysis reveals that, on average, respondents scored approximately 1.98 in menstrual knowledge, with a 95% confidence interval suggesting a range between 1.85 and 2.11 for the true population mean. The trimmed mean, reflecting the average after removing extreme values, closely aligns with the overall mean, indicating minimal influence from outliers. The median score of 2 highlights the middle point of the dataset, with half of the respondents scoring 2 or below and the other half scoring 2 or above. Variance, measuring the spread of data around the mean, is approximately 0.289, while the standard deviation, indicating the average deviation from the mean, stands at around 0.538. The range, depicting the difference between the maximum and minimum scores, is 3, illustrating the extent of variation in knowledge levels. The skewness, slightly negative, hints at a minor left skew, while the positive kurtosis suggests a slightly peaked distribution compared to a normal curve. In the Kolmogorov-Smirnov and Shapiro-Wilk tests, both yield p-values above 0.05, failing to provide significant evidence against the assumption of normality, affirming the dataset's adherence to a normal distribution.

The multiple regression analysis examined the impact of various factors (age, educational qualification, occupation, income per month, family type, and family size) on menstrual knowledge. The model explains 24.9% of the variance in menstrual knowledge ($R^2 = 0.249$, Adjusted $R^2 = 0.177$) and is statistically significant ($F(6, 63) = 3.473$, $p = 0.005$), meaning that the predictors collectively have a significant impact on menstrual knowledge. Among the predictors, age has a significant negative effect ($\beta = 0\text{-}.275$, $p = 0.024$), indicating that older individuals tend to have lower menstrual knowledge. Educational qualification shows a marginally significant positive effect ($\beta = 0.241$, $p = 0.059$), suggesting that higher educational levels might be associated with better menstrual knowledge. The other factors (occupation, income per month, family type, and family size) do not significantly affect menstrual knowledge. There is no severe multicollinearity among the predictors, as indicated by the VIF and tolerance values.(Table.1)

Menstrual Practices

The statistical examination of menstrual practices, encompassing data from 70 complete cases, showcases a mean score of 2.07, indicating a notable level of engagement among respondents. The confidence interval, calculated at a 95% level, reveals a range between 1.97 and 2.17, offering a precise estimate of the population mean. While the dataset displays a slight right skewness and a moderately peaked distribution, overall stability is evident, supported by a variance of 0.182 and a standard deviation of 0.426, signaling limited variability. The range of scores, spanning from 0.80 to 3.50, underscores the diversity in respondents' practices, while the interquartile range of 0.50 underscores the spread of central data. Despite minor deviations from the normal distribution, as indicated by tests of normality, the analysis remains robust. In sum, the findings underscore a satisfactory level of engagement in menstrual practices among respondents, offering valuable insights into this critical aspect of reproductive health.

The regression analysis with predictors such as family size, age, occupation, educational qualification, family type, and income per month to predict menstrual practices yields an R value of 0.278, indicating a weak correlation. The R Square value of 0.077 suggests that only 7.7% of the variability in menstrual practices is explained by these predictors, with an adjusted R Square of -0.011, indicating that the model does not improve over simply using the mean. The standard error of the estimate is 0.42837. The ANOVA results show that the regression model is not statistically significant ($F(6,63) = 0.878$, $p = 0.517$), indicating that the predictors do not collectively predict menstrual practices well. The coefficients table shows that none of the predictors are statistically significant ($p > 0.05$), with occupation being the closest to significance ($p = 0.076$). The collinearity statistics indicate no severe multicollinearity issues, with VIF values below 10 and tolerance values above 0.1. The highest condition index is 10.553, which suggests some multicollinearity, but it is not critical. Overall, the model does not provide a meaningful explanation of the variance in menstrual practices based on the selected predictors (Table.2). So, in the future study should consider the other factors for menstrual practices.

Dietary pattern, work and life

The average score for dietary patterns stands at 1.97, suggesting a moderate adherence level among respondents. With a 95% confidence level, the true mean falls between 1.85 and 2.09, providing a reliable estimate. Even after trimming 5% of extreme values, the mean remains consistent, indicating dataset stability. The median score of 2.00 indicates that half of the respondents exhibit dietary patterns at

Table.2 Multiple regression analysis predicting menstrual practices

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.278a	0.077	0-.011	0.42837

a. Predictors: (Constant), Family Size (in Numbers), Age, Occupation, Educational Qualification, Family Type, Income/Month

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.966	6	0.161	0.878	0.517[b]
	Residual	11.561	63	0.184		
	Total	12.527	69			

a. Dependent Variable: Menstrual Practice

b. Predictors: (Constant), Family Size (in Numbers), Age, Occupation, Educational Qualification, Family Type, Income/Month

or above this level. Variability in responses is evident, with a range spanning from 0.89 to 3.11 and an interquartile range of 0.69. Despite a slight left skew and kurtosis indicating a slightly flatter distribution than normal, the dataset maintains robustness. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests suggest deviations from a normal distribution, with p-values of 0.034 and 0.039, respectively. These low p-values indicate that the null hypothesis of normality is rejected.

The Kruskal-Wallis test was conducted to determine if there are statistically significant differences in age, educational qualification, occupation, income per month, family type, and family size across different dietary patterns. The test results indicate that only occupation shows a significant difference across dietary patterns (Kruskal-Wallis H = 7.458, p = .0024), suggesting that occupation varies significantly between the dietary groups. The differences in age (p = 0.165), educational qualification (p = 0.214), income per month (p = 0.712), family type (p = 0.754), and family size (p = 0.699) were not statistically significant, indicating that these variables do not differ notably across the dietary patterns.

Effects of dietary patterns on menstrual knowledge and practices

A General Linear Model (GLM) analysis was conducted to examine the effects of dietary patterns on menstrual knowledge and practices. The within-subjects factor was menstrual hygiene, comprising menstrual knowledge and menstrual practice, while the between-subjects factor was dietary patterns with three groups. The multivariate tests for menstrual hygiene showed no significant effects (p = 0.822), indicating no overall differences between menstrual knowledge

and practices. Interaction effects between menstrual hygiene and dietary patterns were also non-significant (p = .156), suggesting that the dietary patterns did not differentially impact menstrual knowledge and practices. Mauchly's test confirmed sphericity (W = 1.000, p = not applicable), so no corrections were needed. The tests of within-subjects effects showed non-significant results for both menstrual hygiene (p = 0.822) and its interaction with dietary patterns (p = 0.156).

However, the tests of between-subjects effects revealed a significant difference among dietary patterns (F = 4.666, p = 0.013), indicating that dietary patterns influence menstrual hygiene overall.

Discussion

Women are an integral part of our society. Their health is of great importance (Begum et al. 2023[14]). Therefore, there is a dire need to develop health guidelines and educational matterials for this segment of population (Gul et al., 2023[15]). The present study was undertaken to investigate the understanding, practices, and nutritional choices related to menstrual health among rural women in order to understand and deliberate on the current landscape of menstrual health in this context, the

Table.3 Kruskal-Wallis test indicating Dietary pattern, work and life

Kruskal-Wallis Test

Ranks

Dietary Patterns		N	Mean Rank	Kruskal-Wallis H	df	Asymp. Sig.
Age	1.00	14	28.57	3.603	2	0.165
	2.00	43	38.80			
	3.00	13	32.04			
	Total	70				
Educational Qualification	1.00	14	40.50	3.080	2	0.214
	2.00	43	32.48			
	3.00	13	40.12			
	Total	70				
Occupation	1.00	14	23.50	7.458	2	0.024
	2.00	43	39.36			
	3.00	13	35.65			
	Total	70				
Income/Month	1.00	14	32.36	0.679	2	0.712
	2.00	43	36.91			
	3.00	13	34.23			
	Total	70				
Family Type	1.00	14	38.00	0.564	2	0.754
	2.00	43	34.28			
	3.00	13	36.85			
	Total	70				
Family Size (in Numbers)	1.00	14	35.86	0.717	2	0.699
	2.00	43	34.24			
	3.00	13	39.27			
	Total	70				

Table 4 General Linear Model indicating dietary patterns influence menstrual hygiene

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	428.886	1	428.886	1991.578	<.001
Dietary Patterns	2.010	2	1.005	4.666	.013
Error	14.428	67	.215		

study seeks to inform targeted interventions aimed to enhance hygiene practices and overall well-being among rural women.

Menstrual Knowledge

The multiple regression analysis explored the impact of several demographic and socioeconomic factors on menstrual knowledge, including age, educational qualification, occupation, income per month, family type, and family size. The model accounts for 24.9% of the variance in menstrual knowledge ($R^2 = 0.249$), with an adjusted R^2 of 0.177. The overall model is statistically significant ($F(6, 63) = 3.473$, $p = 0.005$), indicating that these predictors collectively have a significant impact on menstrual knowledge.

Among the individual predictors, age demonstrated a significant negative effect ($\beta = -0.275$, $p = 0.024$), implying that older individuals tend to have lower levels of menstrual knowledge. This may reflect generational differences in education and awareness about menstrual health.

Educational qualification showed a marginally significant positive effect ($\beta = 0.241$, $p = 0.059$), suggesting that higher educational attainment is associated with better menstrual knowledge. This aligns with the understanding that education plays a crucial role in enhancing health literacy.

Other predictors, such as occupation, income per month, family type, and family size, did not show significant effects on menstrual knowledge. The absence of severe multicollinearity among the predictors, as indicated by VIF and tolerance values, strengthens the reliability of these findings.

To improve menstrual knowledge, targeted educational interventions should focus particularly on older individuals and those with lower educational attainment.

Menstrual Practices

The regression analysis examining the same set of predictors for menstrual practices yielded an R value of 0.278, indicating a weak correlation. With an R Square of 0.077 and an adjusted R Square of -0.011, the model explains only 7.7% of the variability in menstrual practices, and it does not perform better than the mean prediction. The standard error of the estimate is 0.42837.

The ANOVA results ($F(6, 63) = 0.878$, $p = 0.517$) indicate that the predictors do not collectively explain menstrual practices effectively. None of the individual predictors reached statistical significance, with occupation being the closest ($p = 0.076$). Collinearity statistics confirmed no severe multicollinearity issues. However, the highest condition index of 10.553 suggests some multicollinearity, though it is not critical. Overall, the model does not provide a meaningful explanation of the variance in menstrual practices based on the selected predictors. Future analysis should explore additional or alternative predictors beyond the current demographic and socioeconomic factors to better understand and explain the variance in menstrual practices.

Dietary patterns, work and life

The Kruskal-Wallis test was employed to investigate differences in demographic and socioeconomic factors across various dietary patterns. The results showed that occupation significantly differs across dietary patterns (Kruskal-Wallis $H = 7.458$, $p = 0.024$). This suggests that dietary habits may be influenced by occupational roles or that certain occupations may predispose individuals to specific dietary patterns. However, other variables such as age ($p = 0.165$), educational qualification ($p = 0.214$), income per month ($p = 0.712$), family type ($p = 0.754$), and family size ($p = 0.699$) did not show significant differences across dietary patterns. This indicates that these factors are relatively consistent regardless of dietary habits. To improve dietary patterns, it is crucial to tailor awareness programs considering the significant influence of occupational roles while acknowledging that age, education, income, and family structure do not majorly impact dietary habits.

Effects of dietary patterns on menstrual knowledge and practices

A General Linear Model (GLM) was used to assess the effects of dietary patterns on menstrual knowledge and practices. Menstrual hygiene, comprising menstrual knowledge and practices, was the within-subjects factor, while dietary patterns formed the between-subjects factor with three groups.

The multivariate tests indicated no significant overall effects of dietary patterns on menstrual hygiene ($p = 0.822$), nor were there significant interaction effects between menstrual hygiene and dietary patterns ($p = 0.156$). Mauchly's test confirmed sphericity, so no adjustments were necessary.

Despite the non-significant results for menstrual hygiene, the tests of between-subjects effects revealed a significant difference among dietary patterns ($F = 4.666$, $p = 0.013$). This finding suggests that while dietary patterns do not differentially impact menstrual knowledge and practices, they do influence menstrual hygiene overall. This could imply that certain dietary patterns are associated with better overall menstrual health management.

Conclusion

The findings highlight the complex interplay between demographic, socioeconomic, and dietary factors in influ-

encing menstrual health knowledge and practices. While age and education significantly impact menstrual knowledge, these factors, along with others, do not significantly explain menstrual practices. Dietary patterns emerge as a significant factor influencing overall menstrual hygiene, warranting further investigation into how specific diets may contribute to better menstrual health outcomes.

Acknowledgements

Authors are grateful to participants who took part in the study.

Funding

We gratefully acknowledge the financial support from the University Grant Commission (UGC) under the scheme of Women's Studies Centre.

Conflict of interest

We have no conflicts of interest to disclose.

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