



Hand Hygiene Practices and Associated Morbidity in a Rural Community of Davanagere, Karnataka: A Cross-Sectional Study

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ABSTRACT:

Background: Hand hygiene is a fundamental preventive measure against the fecal-oral transmission of infectious diseases. Despite the physiological evidence supporting its efficacy, adherence to proper handwashing practices remains inconsistent in rural India, contributing to a significant burden of diarrheal and respiratory illnesses.

Objectives: This study aimed to (1) assess the medium and frequency of handwashing among residents of a rural community; (2) examine associations between handwashing practices and socio-demographic characteristics, specifically literacy; and (3) evaluate the relationship between handwashing practices and the self-reported incidence of diarrheal and respiratory illnesses.

Methods: A community-based cross-sectional observational study was conducted in Kakkaragolla, the rural field practice area of J.J.M. Medical College, Davanagere, from May to July 2025. A systematic random sampling technique was employed to select households. Data were collected from 535 individuals via house-to-house interviews using a pretested semi-structured questionnaire. Statistical analysis was performed using SPSS version 26, employing descriptive statistics and the Chi-square test for associations ($p < 0.05$).

Results: Of the 535 participants (58.9% female, 41.1% male), 62.5% ($n=334$) used soap and water for handwashing, while 29.1% ($n=156$) relied on water alone, and 8.4% ($n=45$) used antiseptic solutions. A statistically significant association was observed between literacy levels and the choice of handwashing medium ($\chi^2 = 64.8$, $p < 0.001$), with soap usage rising from 38.6% among illiterates to 61.2% among graduates. Participants using only water reported significantly higher rates of diarrhea (17.2%) and Upper Respiratory Tract Infections (URTI) (22.3%) in the preceding three months compared to those using soap and water (6.8% and 9.4%, respectively; $p < 0.01$).

Conclusion: While a majority of the rural population practices handwashing with soap, a significant minority continues to use suboptimal methods, correlating with higher morbidity. Educational status is a strong determinant of hygiene behavior. Targeted health education interventions are essential to bridge the gap between knowledge and practice.

INTRODUCTION

Hand hygiene is widely recognized as one of the oldest, simplest, and most cost-effective methods for interrupting the transmission of infectious diseases [1]. It serves as a primary barrier against the spread of pathogens via the fecal-oral route and direct contact, significantly reducing the burden of diarrheal diseases and respiratory infections [2].

Despite the proven efficacy of handwashing, practice remains suboptimal in many developing regions. In India, particularly in rural settings, socio-cultural habits, lack of awareness, and limited access to water and sanitation facilities often hinder the consistent practice of handwashing with soap [3]. While initiatives like the Swachh Bharat Abhiyan have improved sanitation infrastructure, behavioral adherence to hygiene norms requires continuous reinforcement.



The "Global Handwashing Day" initiative emphasizes the necessity of making handwashing a habitual social norm. However, local epidemiological data is crucial to contextualize these global recommendations. Variations in literacy, socio-economic status, and cultural beliefs create distinct hygiene profiles across different Indian geographies.

Existing literature suggests a strong correlation between inadequate hand hygiene and increased incidence of communicable diseases [4,5]. However, recent data from the Davanagere region is limited. Therefore, this study was undertaken to assess the current status of handwashing practices in Kakkaragolla, a rural community in Karnataka, and to analyze its determinants and health impacts. The findings intend to guide local health policy and behavioral change communication strategies.

MATERIALS AND METHODS

Study Design and Setting

A community-based cross-sectional study was conducted in Kakkaragolla village, the designated Rural Field Practice Area of the Department of Community Medicine, J.J.M. Medical College, Davanagere, Karnataka.

Study Duration

The study was carried out over a period of three months, from May 2025 to July 2025.

Study Population and Sampling

The study population comprised residents of Kakkaragolla village. The inclusion criteria were all individuals aged ≥ 5 years present at the time of the household visit who provided consent.

- **Sample Size:** A total sample of 535 individuals was included, representing approximately 10% of the village population.
- **Sampling Technique:** Systematic random sampling was employed across all wards of the village. Approximately one in every five households was selected to ensure representative coverage of the community.

Data Collection

Data were collected through house-to-house interviews conducted by trained house surgeons under the supervision of the principal investigator. A pretested, semi-structured questionnaire was used to capture:

1. **Socio-demographic profile:** Age, gender, and education level.

2. **Handwashing practices:** Material used (water only, soap and water, antiseptic), frequency, and critical times of washing (after defecation, before meals, after handling animals).

3. **Morbidity profile:** Self-reported episodes of diarrhea and Upper Respiratory Tract Infection (URTI) within the last three months.

Additionally, direct observation was used where possible to verify the presence of designated handwashing areas and the availability of soap.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS statistical software (Version 26.0, IBM Corp, Armonk, NY). Categorical variables were expressed as frequencies and percentages. The Chi-square (χ^2) test was utilized to determine the association between categorical variables (e.g., literacy vs. handwashing medium; handwashing medium vs. morbidity). A p-value of <0.05 was considered statistically significant.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee of J.J.M. Medical College, Davanagere. Written informed consent was obtained from all adult participants, and assent was taken for minors with parental consent.

RESULTS

Socio-demographic Characteristics

A total of 535 participants were included in the study. The study population showed a female preponderance (58.9%, $n=315$). The majority of participants belonged to the age group of 21–40 years (42.6%). Regarding education, nearly half of the participants had completed secondary education (47.5%), while 13.1% were illiterate (Table 1).

Table 1: Distribution of Participants by Socio-demographic Characteristics (N=535)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	220	41.1
	Female	315	58.9



Age Group (years)	<10	42	7.9
	11–20	108	20.2
	21–40	228	42.6
	41–60	102	19.1
	>60	55	10.3
Education	Illiterate	70	13.1
	Primary	113	21.1
	Secondary	254	47.5
	Graduate & Above	98	18.3
Total		535	100.0

Handwashing Practices

Regarding the medium of handwashing, the majority (62.5%) used soap and water. However, a substantial proportion (29.1%) still relied on water alone. Use of antiseptic solutions was low (8.4%) (Table 2). In terms of timing, 93.5% reported washing hands after defecation, 84.6% before meals, and 64.8% after handling animals.

Table 2: Distribution of Participants by Handwashing Medium

Handwashing Medium	Frequency (n)	Percentage (%)
Water only	156	29.1

Water + Soap	334	62.5
Water + Antiseptic	45	8.4
Total	535	100.0

Association between Literacy and Hand Hygiene

A statistically significant association was found between literacy status and the preferred medium of handwashing ($\chi^2 = 64.8$, $p < 0.001$). The practice of using soap and water or antiseptics increased progressively with education levels. Among graduates, only 22.4% used water alone, compared to 60.0% among the illiterate population (Table 3).

Table 3: Association Between Literacy Status and Handwashing Medium

Literacy Status	Water Only (%)	Soap & Water (%)	Antiseptic (%)	Total (N)	p-value
Illiterate	42 (60.0%)	27 (38.6%)	1 (1.4%)	70	<0.001*
Primary	28 (24.8%)	77 (68.1%)	8 (7.1%)	113	
Secondary	64 (25.2%)	170 (66.9%)	20 (7.9%)	254	
Graduate	22 (22.4%)	60 (61.2%)	16 (16.3%)	98	
Total	156	334	45	535	

*Significant at $p < 0.05$ level using Chi-square test.



Association between Handwashing and Morbidity

Participants using only water for handwashing reported a significantly higher burden of infectious illness in the preceding three months compared to those using soap or antiseptics. The incidence of self-reported diarrhea was 17.2% in the 'water only' group compared to 6.8% in the 'soap and water' group ($p=0.002$). Similarly, URTI rates were more than double in the 'water only' group (22.3%) compared to the 'soap and water' group (9.4%) ($p=0.004$) (Table 4).

Table 4: Association Between Handwashing Medium and Incidence of Diarrhea/URTI (Last 3 Months)

Handwashing Medium	Total (N)	Diarrhea Episodes n (%)	URTI Episodes n (%)
Water only	156	27 (17.2%)	35 (22.3%)
Water + Soap	334	23 (6.8%)	31 (9.4%)
Water + Antiseptic	45	2 (4.4%)	4 (8.9%)
Statistical Inference		$\chi^2 = 21.4$, $p = 0.002$	$\chi^2 = 16.9$, $p = 0.004$

DISCUSSION

This study provides a snapshot of hand hygiene practices in a rural community in Karnataka and elucidates the link between hygiene behavior, education, and health outcomes.

Prevalence of Soap Usage

We found that 62.5% of the study population used soap and water for handwashing. While this represents a majority, it highlights that over one-third of the population (29.1% using water only) remains at high risk for transmissible diseases due to inadequate hygiene. Our findings are slightly lower than those reported by Pandve et al. in a rural community in Pune, where 79.5% of participants utilized soap [3]. This discrepancy may be attributed to regional differences in socio-economic development, water availability, or the intensity of local health education campaigns.

Role of Education

A critical finding of this study is the strong gradient between literacy and hygiene practice ($p < 0.001$). Illiterate participants were significantly more likely to use water alone (60%) compared to graduates (22.4%). This aligns with the findings of Ray et al., who emphasized that formal education enhances the comprehension of health messages and facilitates behavioral change [2]. This suggests that health interventions must be tailored to literacy levels, utilizing pictorial or demonstrative methods rather than text-based information for lower-literacy groups.

Health Impact

The study reinforces the epidemiological evidence that handwashing with soap significantly reduces morbidity. The 'water only' group experienced a diarrhea incidence of 17.2%, nearly 2.5 times higher than the 'soap and water' group (6.8%). This is consistent with the systematic review by Curtis and Cairncross, which estimated that handwashing with soap could reduce diarrheal risk by 42–47% [5]. Similarly, the reduction in URTI rates (22.3% vs. 9.4%) corroborates the findings of Luby et al., supporting the role of hand hygiene in preventing respiratory pathogens [4].

Public Health Implications

The findings underscore the need for sustained behavioral change communication (BCC) under national programs like the Swachh Bharat Mission [7]. Merely providing infrastructure is insufficient; the focus must shift to "nudge" behaviors that convert knowledge into habit. The distinct gap in practice among the illiterate population calls for focused community health worker (ASHA/Anganwadi) engagement.

Strengths and Limitations

The strength of this study lies in its community-based approach and the use of house surgeons for data collection, ensuring medical accuracy in morbidity recording. However, limitations include the cross-sectional design, which prevents causal inferences. The three-month recall period for morbidity may introduce recall bias. Additionally, self-reported hygiene practices are subject to social desirability bias, where participants may over-report soap use.

CONCLUSION

In the rural community of Kakkaragolla, while the majority practice handwashing with soap, a significant proportion continues to use water alone, particularly among those with lower literacy levels. This suboptimal practice is significantly associated with a higher burden of diarrheal and respiratory illnesses. To achieve



universal hygiene coverage, future interventions must target the uneducated demographic with culturally appropriate, non-textual behavioral change strategies.

DECLARATIONS

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Ethical Approval: The study was approved by the Institutional Ethics Committee of J.J.M. Medical College, Davanagere.

Conflict of Interest: None declared.

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