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Prevalence and impact on health of mobile phone usage in rural Bareilly district: A cross-sectional study

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Abstract

Background: Mobile phones have become indispensable tools for communication, particularly in rural areas where access to other communication means may be limited. However, excessive use has been linked to several health concerns, both physical and mental.

Objectives: To determine the prevalence, patterns, and health impacts of mobile phone usage among the rural population of Bareilly district.

Methods: A community-based cross-sectional study was conducted among 389 participants aged 18-60 years using a pretested questionnaire. Data were collected through face-to-face interviews and analyzed using descriptive statistics.

Results: The study found that 72% of participants had been using mobile phones for more than five years, with 55% using phones before sleep. Health issues reported included headaches (26.5%), eye strain (22%), neck pain (19%), and sleep disturbances (20.6%). Despite moderate awareness of electromagnetic radiation risks (51%), only 41% used protective features like eye safety mode.

Conclusion: High mobile phone usage in rural Bareilly is associated with notable health problems. Awareness campaigns and behavioral interventions are necessary to promote safe usage and reduce associated health risks.

Keywords: Mobile phone, rural population, health impact, addiction, Bareilly, sleep disturbance, eye strain

1. Introduction

The twenty-first century is widely regarded as the Information Era, characterized by rapid advancements in internet and wireless communication technologies that have revolutionized the way people connect and interact. Mobile phones, first demonstrated by Motorola in 1973 and commercially launched in 1984, have evolved into powerful devices integral to daily life. Today, whether accessed via a computer, tablet, or smartphone, digital screens are a defining feature of the modern world.

In the digital age, smartphones act as both a tool for unlimited access to information and a source of potential overdependence. While they facilitate communication, learning, and entertainment, excessive and unregulated use can negatively impact mental health, physical well-being, and social relationships. Prolonged screen exposure and sedentary lifestyles have been linked to obesity, cardiometabolic disorders, and poor mental and social health outcomes ^[1].

Recognizing the gradual but persistent encroachment of mobile phone overuse is critical. The aim is not merely to reduce screen time, but to reclaim undistracted moments, nurture deeper connections, and maintain a balance between technological convenience and human interaction.

Excessive reliance on mobile devices also influences family and community dynamics, with particular concern for children and adolescents—groups highly susceptible to mental health challenges. In addition, overuse among youth raises questions about its potential impact on their productivity and readiness for the future workforce ^[2].

This study seeks to provide insights into the prevalence and health implications of mobile phone usage in rural Bareilly, along with strategies for mitigating associated risks. While mobile phones communicate via base stations using radiofrequency waves—non-ionizing radiation unlike X-rays or gamma rays—the behavioral and ergonomic consequences of prolonged usage remain a growing public health concern.

Aim

To determine the prevalence and health impact of mobile phone usage in rural Bareilly district.

Objectives

1. Identify patterns of mobile phone usage among individuals.
2. Determine the prevalence of mobile phone usage.
3. Examine mobile phone addiction behavior and associated risk factors.

Materials and Methods

- **Study Area:** Rural areas of Bareilly district.
- **Study Design:** Community-based cross-sectional study.
- **Sampling Technique:** Simple random sampling.
- **Study Duration:** 1 year.

Sample Size Calculation

Using the formula: $4p(1-p) / d^2$

Where:

p = 58.2% prevalence of mobile addiction ^[3]

d = relative precision of 5% with a 95% confidence limit

The minimum sample size was calculated as 389 participants.

Inclusion Criteria

1. Individuals with access to a mobile phone.
2. Consent to participate in the study.
3. Age between 18-60 years.

Exclusion Criteria

1. Households locked during survey visits.
2. Individuals with diagnosed mental illness.

Data Collection: Data were gathered via face-to-face interviews using a predesigned, pretested questionnaire in Hindi or English.

Ethical Considerations: Ethical clearance was obtained from the RMCH Bareilly IEC Committee (Letter No. IEC/RMCH/04/2024/JUL).

Results

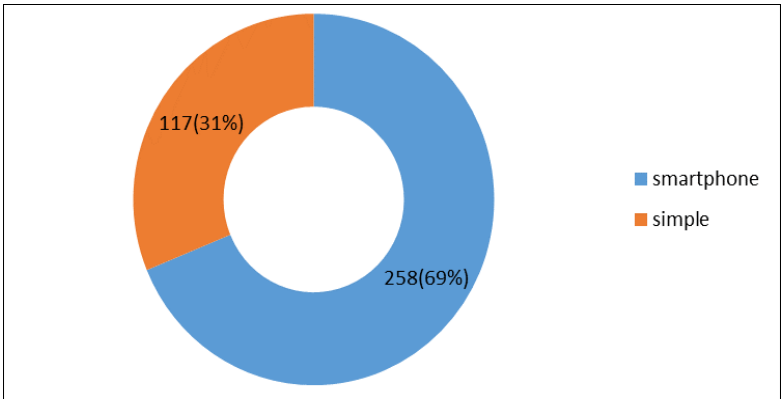


Fig 1: Prevalence of mobile phone among study population (N=389)

This donut chart visually represents the distribution of mobile phone types used by the study population in rural Bareilly. Out of 389 participants, 69% (n=258) reported using smartphones, while 31% (n=117) used basic or feature phones (referred to as "simple" phones in the chart). The

predominance of smartphones indicates growing digital adoption in rural areas, which has implications for both digital connectivity and potential health outcomes associated with prolonged and multifunctional device use.

Table 1: Sociodemographic factors of study population (N=389)

Particulars		Frequency (389)	Percent (100%)
Sex	Male	273	70%
	Female	116	30%
Age	18-24	100	26%
	25-32	138	35%
	33-39	55	14%
	40-47	42	11%
	48-55	22	6%
	>55	32	8%
Religion	Hindu	340	87%
	Muslim	49	13%
Caste	general	197	51%
	OBC	123	31%
	SC\ST	69	18%
Occupation	Farmer	135	35%
	Student	51	13%
	Housewife	84	22%
	Business	21	5%
	shopkeeper	38	10%
	Laborers	60	15%

The sociodemographic analysis of the study population (N = 389) revealed a male predominance, with 70% (n = 273) of the participants being male and 30% (n = 116) female. The age distribution showed that the majority of participants were between 25-32 years (35%), followed by the 18-24 age group (26%). Other age groups included 33-39 years (14%), 40-47 years (11%), 48-55 years (6%), and those above 55 years (8%). In terms of religion, 87% identified as Hindu and 13% as Muslim. Regarding caste distribution, 51% belonged to the general category, 31% to Other Backward

Classes (OBC), and 18% to Scheduled Castes or Scheduled Tribes (SC/ST). Occupationally, the most common group was farmers (35%), followed by housewives (22%) and laborers (15%). Students made up 13% of the sample, while shopkeepers (10%) and businesspersons (5%) comprised smaller portions. This demographic profile reflects a predominantly rural and agrarian population with a relatively young age structure and modest representation of women.

Table 2: Habituation analysis of mobile phone usage

Habituation	Number of participants (%)
Duration of mobile usage[years]	N =280(72%)
< 5	120(43%)
6-10	80(29%)
11-15	50(18%)
16-20	30(10%)
Duration of mobile usage in a day[hrs]	N=389(100%)
<1	211(54%)
2-3	108(28%)
3-4	26(6.7%)
4-5	30(7.7%)
>5	14(3.6%)
Frequency of mobile phone checking[times]	N=220(57%)
0-10	128(58%)
11-20	50(23%)
21-30	30(13.6%)
>30	12(5.4%)
Use of mobile phone before sleep	N=373(96%)
Yes	205(55%)
No	168(45%)
Duration of mobile use before sleep [min]	N=238(61%)
<30	72(30%)
30-60	140(59%)
>60	26(11%)

The data indicate significant habituation patterns to mobile phone use among study participants. Out of 280 respondents (72%), the majority (43%) had used mobile phones for less than 5 years, followed by 29% with 6-10 years of usage, while 18% and 10% had used them for 11-15 years and 16-20 years, respectively. Regarding daily usage duration (N = 389), more than half (54%) reported using their phones for less than one hour per day, whereas 28% used them for 2-3 hours, and smaller proportions reported higher daily usage: 3-4 hours (6.7%), 4-5 hours (7.7%), and more than 5 hours (3.6%). Among 220 participants, the frequency of checking

mobile phones was highest (58%) in the 0-10 times per day range, while 23% and 13.6% checked their devices 11-20 and 21-30 times per day, respectively; only 5.4% exceeded 30 checks daily. Notably, a large number of participants (55% of 373) used mobile phones before sleep. Of those who reported this habit (N = 238), the majority (59%) used their phones for 30-60 minutes, 30% for less than 30 minutes, and 11% for over an hour before sleeping. These findings reveal habitual usage behaviors that may contribute to health issues, particularly due to nighttime use and high-frequency phone checking.

Table 3: Analysis of awareness of mobile phone hazards

Particulars	Numbers of participants [%]
Place of hand phone keeping	N=389
In the bag	40(10%)
Around pelvic area	125(32%)
Around your neck	224(58%)
Kept mobile under pillow while sleeping	N=370(95%)
Yes	217(59%)
No	153(41%)
Awareness on danger EMR	N=359(92%)
Yes	182(51%)
No	177(49%)
Knowledge of eye safety button	N=345(89%)
Yes	155(45%)
No	190(55%)
Use of eye safety button	N=296(76%)
Yes	121(41%)
No	175(59%)
Most frequently used application by study participants (≥multiple selections)	N=389
Communications	250(64%)

Photo	200(51%)
Entertainments	140(36%)
Media	40(11%)
Education	25(6.4%)
Game	14(4%)
Sports	10(3%)
Reading news and books	20(5%)
Reminder and calendar	30(7.7%)

EMR: Electromagnetic radiation

This table shows significant patterns in mobile phone usage and awareness regarding potential health hazards among 389 study participants. A considerable proportion of individuals (90%) reported keeping their mobile phones close to the body, predominantly around the neck (58%) and pelvic area (32%), which may increase exposure to electromagnetic radiation (EMR). Furthermore, 59% of respondents acknowledged placing their mobile phones under their pillows while sleeping, a practice that raises concerns about prolonged nighttime exposure. Awareness regarding the harmful effects of EMR was limited, with

only 51% of participants reporting knowledge of such risks. Similarly, while 45% of respondents were aware of the eye safety feature available on mobile devices, actual utilization of the feature was lower (41%), indicating a gap between knowledge and practice. The most commonly used mobile applications included communication (64%) and photography (51%), underscoring a high dependency on mobile devices for social interaction and media consumption. These findings underscore the need for targeted health education initiatives to enhance awareness and encourage safer mobile phone usage behaviors, particularly among frequent users.

Table 4: Type of Health problem due to use of mobile phone

Particulars	Number of participants (%)
Tingling sensation in hands or fingers	N=213(55%)
Yes	23(11%)
No	190(89%)
any pain on wrist and hand because of smartphone use	N=200(51%)
Yes	30(15%)
No	170(85%)
Feeling pain at the neck while utilizing a smartphone	N=260(67%)
Yes	50(19%)
No	210(81%)
Headache	N=370(95%)
Yes	98(26.5%)
No	272(73.5%)
Eye problem	N=367(94%)
Yes	80(22%)
No	287(78%)
Difficulty in sleep	N=364(94%)
Yes	75(20.6%)
No	289(79%)
Backache	N=361(93%)
Yes	80(22.2%)
No	281(77.8%)
Lazyness	N=197
Yes	33(16.8%)
No	164(83.2%)

This table shows notable prevalence of physical and psychological health issues associated with prolonged smartphone use among the study participants. Of the 213 individuals assessed for tingling sensations in hands or fingers, 11% reported experiencing such symptoms, which may indicate early signs of nerve strain or overuse. Wrist and hand pain, attributed to extended smartphone handling, was reported by 15% of 200 participants. Similarly, 19% of the 260 respondents experienced neck pain during smartphone use, suggesting poor posture or extended device usage. Among 370 participants, 26.5% reported headaches, a common complaint linked to screen time and eye strain. Eye-related problems were reported by 22% of the 367 individuals surveyed, while 20.6% of 364 participants experienced difficulty in sleep, likely due to blue light exposure and device use before bedtime. Backache was observed in 80 out of 361 participants (22.2%), indicating musculoskeletal strain. Additionally, 33 out of 197 respondents (16.8%) reported experiencing persistent laziness or fatigue, potentially linked to sedentary behavior

associated with excessive phone usage. These findings underscore the emerging burden of technology-related health issues and emphasize the need for awareness programs on ergonomic practices and responsible screen use.

Discussion

This study assessed the prevalence, usage patterns, and health impacts of mobile phone usage in the rural population of Bareilly district. Our findings highlight a significant degree of habituation, with 72% of participants reporting over five years of mobile phone usage and 55% using phones before sleep. These usage behaviors mirror national trends, where rural smartphone penetration has increased rapidly, reaching over 50% according to TRAI (2023) [3]. The National Statistical Office reported that mobile phones have become a primary means of communication in rural areas, with implications for health literacy and information dissemination, NSSO Data (2021) [4].

The sociodemographic distribution showed male

predominance (70%) and a large number of users in the 25-32 years age group, aligning with the demographic most vulnerable to digital overuse. The high frequency of mobile phone checking (more than 20 times per day for 18.6% of users) and the fact that 59% use mobile devices for more than 30 minutes before bed suggest patterns associated with behavioral addiction and this result is similar to study by Sharma *et al.* (2022) that highlights approximately 65% of rural households in the Bareilly district own at least one mobile phone, with younger demographics showing the highest usage rates [5].

In terms of physical health, 26.5% of respondents reported headaches, 22% had eye problems, and 20.6% reported sleep difficulties. These findings are consistent with prior studies that link prolonged screen exposure to visual fatigue, musculoskeletal strain, and poor sleep quality. For instance, Demirci *et al.* (2015) [6], established a direct link between smartphone overuse and poor sleep, anxiety, and depression, and Ozcan & Acimis (2021) [7], found over half of participants in their study had poor sleep quality related to smartphone use.

Musculoskeletal complaints such as wrist pain (15%) and neck pain (19%) further indicate ergonomic issues arising from prolonged and poor postural habits, corroborating findings by Parasuraman *et al.* (2017) [8], where similar symptoms were noted among rural users. A study by Soni *et al.* (2024), points to an increase in reported cases of musculoskeletal disorders and eye strain associated with prolonged screen time, particularly among agricultural workers in rural areas [9].

Mental health concerns, while not directly quantified in this study, are implied by the reported physical symptoms and usage patterns. Literature suggests that excessive mobile phone use is associated with increased rates of depression, anxiety, and social isolation, particularly among younger users. Khan *et al.* (2023) [10], reported similar associations, and Khalaf *et al.* (2023) [11], stressed the impact of digital overuse on adolescents' mental well-being.

Notably, awareness of health risks such as electromagnetic radiation (EMR) and protective features like eye safety mode was suboptimal. While 51% were aware of EMR risks, only 41% used the eye safety feature regularly. This disconnect between knowledge and practice underlines the urgent need for targeted health education interventions.

Lastly, the usage of communication apps (64%) and entertainment content (36%) suggests a primarily recreational and social use of smartphones, potentially displacing productive or educational activities. This is concerning given that overuse may impact academic and occupational performance, as discussed in Joshi *et al.* (2022) [12].

This study highlights a high prevalence of mobile phone use in rural Bareilly, with the majority of users owning smartphones and demonstrating notable habituation patterns. Over half of participants reported using phones before sleep, and frequent phone checking was common, reflecting behaviors associated with digital dependency.

The physical health complaints—headaches (26.5%), eye strain (22%), sleep disturbances (20.6%), and musculoskeletal pain—mirror findings from global literature. Awareness gaps were notable: while 51% recognized electromagnetic radiation risks, fewer than half regularly used eye safety features. The predominance of communication and entertainment app usage suggests a recreational focus, potentially at the expense of educational or occupational productivity.

These findings reinforce the need for targeted interventions

promoting digital hygiene, ergonomic awareness, and safe usage habits, especially among younger adults—the demographic most at risk for problematic use.

Conclusion

Mobile phones have become integral to rural life in Bareilly, enhancing connectivity but also posing health risks when used excessively. The observed patterns—nighttime usage, prolonged daily screen time, and frequent checking—are linked to both physical and potential mental health issues.

Bridging the gap between awareness and practice is essential. Structured health education, integration of digital literacy into school programs, and promotion of ergonomic practices can help mitigate these risks. Proactive policies and community engagement are crucial to ensure the benefits of mobile technology are realized without compromising health.

Limitations

1. Reliance on self-reported data introduces the possibility of recall bias.
2. Cross-sectional design limits causal inference.
3. Findings may not be generalizable beyond the study area.
4. Health complaints were not clinically confirmed.

Recommendations

1. Launch village-level awareness campaigns on safe mobile use.
2. Integrate digital health literacy into rural school curricula.
3. Screen regularly for mobile addiction at rural health centers.
4. Promote ergonomic practices and screen breaks.
5. Train communities on using protective features like blue light filters.
6. Conduct longitudinal studies to assess long-term impacts.

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