

Mobile Phone Usage and its Health Effects Among Adults in a Semi-Urban Area of Southern India

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ABSTRACT

Introduction: Worldwide, mobile phone usage has been increased dramatically which could affect the health of the people. India has the second largest number of mobile phone users. However there are only few studies conducted in India to assess its effects on health.

Aim: To determine the prevalence and pattern of mobile phone usage and to assess the relationship between certain selected health problems and mobile phone usage among adults.

Settings and Design: Community-based cross-sectional study was conducted in Kottakuppam, a town panchayat in Villupuram district of Coastal Tamil Nadu, Southern India. It is a semi-urban area with a population of about 16,000. Majority of the residents are Muslim by religion and belong to different socio economic status.

Materials and Methods: The study was approved by the Institutional Ethics Committee. A total of 2121 study participants were interviewed by the pre-final medical students through house-to-house survey using a pretested structured questionnaire. The questionnaire included the variables such as socio demographic

profile, mobile phone usage and pattern, selected health problems, perceived benefits and threats and blood pressure. Selected health problems included headache, earache, neck pain, tinnitus, painful fingers, restlessness, morning tiredness, tingling fingers, fatigue, eye symptoms, sleep disturbance and hypertension.

Statistical Analysis Used: Only 2054 were included for data analysis using SPSS 17 version. Proportions were calculated. Chi-square test was used to measure the p-value. The p-value < 0.05 was considered as statistically significant.

Results: The prevalence of mobile phone usage was 70%. Calling facility (94.2%) was used more than the SMS (67.6%). Health problems like headache, earache, tinnitus, painful fingers and restlessness etc., were found to be positively associated with mobile phone usage. There was negative association between hypertension and mobile phone usage.

Conclusion: The prevalence of mobile phone usage was high. There was significant association between selected health problems and mobile phone usage. In future, higher studies are required to confirm our findings.

Keywords: Adverse effects, Cellular phone, Health Promotion

INTRODUCTION

Mobile phone, a device that was once considered a luxury of the affluent has now become a necessity. Following its introduction in 1973 [1] for the sole purpose of making and receiving calls, with the advancement in technology its usage has evolved to a maximum including facilities like camera, internet and much more. Subscription to mobile phones has increased drastically during the past decade [2]. In 2013, there are almost as many mobile subscriptions as people in the world, with the Asia-Pacific region as home to more than half of them (3.5 billion of the total 6.8 billion subscriptions). Mobile penetration rates stand at 96% globally, 128% in developed countries and 89% in developing countries [3].

India, a developing nation has the second largest number of mobile phone users in the world, accounting for more than 900 million users with the fastest growing telecom network [4]. Mobile phones account for 88% of all telecommunication users and more than 25% of all wireless phone users belong to the rural sector [5]. With increasing number of mobile phone subscribers in the country, India is expected to become the country with the largest number of mobile phone subscribers in the near future. In response to public and governmental concern, World Health Organization (WHO) established the International Electromagnetic Fields (EMF) Project in 1996 to assess the scientific evidence of possible adverse health effects from electromagnetic fields [6]. According to the WHO, IEI-EMF (Idiopathic Environmental Intolerance attributed to Electromagnetic Fields) is characterized by physical symptoms such as tingling and burning sensations in the face, fatigue, tiredness [7]. Several studies have found that mobile phone usage may be related to the occurrence of these symptoms [8].

In spite of vast number of mobile phone users in India and questionable negative health effects of mobile phone usage, very few studies have been conducted in India in this regard. Not much has been explored on the usage pattern, the effects of this technology on people's health and how this technology can be used to improve their health. Hence, this study was conducted to measure the prevalence, usage pattern of mobile phone, health effects and the feasibility of utilizing mobile phones for health promotion.

MATERIALS AND METHODS

Community-based cross-sectional study was conducted in Kottakuppam, a town panchayat in Villupuram district of Coastal Tamil Nadu, Southern India during January 2014. It is a semi-urban area with a population of about 16,000. Majority of the residents are Muslim by religion and belong to different socio economic status. The study participants were adults (more than 18 years of age) residing in the area for more than 1 year and available during our visit. There are very few studies conducted on mobile phones in India. Prevalence of mobile phone usage has not been studied. As we could not find a community based study on prevalence of mobile phone usage among adults in India, we have not calculated the sample size for our study. However, we tried to achieve maximum sample size as much as possible during the allotted time for data collection (10 days). Regarding the sampling technique, a street was selected randomly and all eligible participants in that street were interviewed. Then the subsequent streets were also covered in the same manner till the data collection period was over. A total of 2121 study participants were interviewed by the pre-final medical students through house-to-house survey using a pretested structured questionnaire under

the supervision of interns, postgraduates and faculty from the Department of Community Medicine. All the medical students were given adequate training prior to data collection to minimize the inter-observer variations. The questionnaire included the variables such as socio-demographic profile, mobile phone usage and pattern, selected health problems, perceived benefits and threats and blood pressure. Selected health problems included headache, earache, neck pain, tinnitus, painful fingers, restlessness, morning tiredness, tingling fingers, fatigue, eye symptoms, sleep disturbance and hypertension. Blood pressure of 140/90mmHg and above was defined as hypertension. Close contact with mobile phone was operationally defined as keeping the mobile phones in shirt/pant pockets, pouches near the hip, hanging around the neck and near the pillows while sleeping. Modified BG Prasad classification (April 2013) based on monthly per capita income was used to ascertain the socio-economic status of the study participants. Ethical clearance for the study was obtained from the Institutional Ethics Committee and participant information sheet was given to the participants and written informed consent was obtained from each participant prior to data collection.

STATISTICAL ANALYSIS

Data were entered in Microsoft Excel 2007. 67 study participants didn't provide the complete information and were not included for analysis. Only 2054 were included for data analysis using SPSS 17 version. Proportions, Odds ratio and 95% confidence interval were calculated. Chi square test was used to measure the p-value. The p-value < 0.05 was considered as statistically significant. Multivariate logistic regression was used to adjust for confounders which included age, sex and socio-economic status.

RESULTS

The mean (SD) age of the study participants was 40 (15) years. Maximum number (33.3%) of participants belonged to the age group of 18–30 years. Majority (63%) of the participants were females and 54.3% of them were home makers. A 22.4% of the participants were illiterates and 28.2 % have studied upto middle school. Majority (31.7%) of the participants belonged to lower middle (class IV) socioeconomic status.

[Table/Fig-1] shows, the prevalence of mobile phone usage among the study participants. The prevalence of mobile phone usage among the study participants was 69.8%. The prevalence was highest in the age group of 18-30 years (79.2%). Mobile phone usage was higher among males (83%) as compared to females (62%). With respect to socioeconomic status, the prevalence of mobile phone usage was high in upper high socio-economic class (86.4%).

[Table/Fig-2] shows, the usage pattern of mobile phones among the mobile phone users. Most of them were using calling facility (94.2%) than SMS facility (67.6%). One fourth of them were listening to music and less than one fifth (16.8%) were playing games in their mobile phones. Among the GPRS/smart phone users, 39.7% used internet facility and 24% used social networking in their mobiles.

[Table/Fig-3] shows, the association between mobile phone usage and selected health problems. The prevalence of health problems was significantly higher in the mobile phone users when compared to non-users. After adjusting the confounding factors using multivariate logistic regression, it was found that all the health problems had positive association with mobile phone usage except hypertension. Tinnitus {OR 5.94 (2.29 – 15.5)}, painful fingers {OR 3.15 (1.48 – 6.69)}, restlessness {OR 3.30 (1.70 – 6.41)}, earache {OR 2.25 (1.29 – 3.92)} had significant association with mobile phone usage.

The proportion of study participants who received promotion calls and SMS were 60.8% and 80.7% respectively. Among those who received the promotion SMS, 56% and 15% read and responded to them respectively. But only 29% and 7% listened and responded to promotion calls.

Variables	Prevalence (%)
Age (years)	
18 – 30	79.2
31 – 40	78.6
41 – 50	68.5
51 – 60	49.0
61 – 70	50.3
> 70	33.3
Gender	
Male	83.0
Female	62.1
Socio Economic Status*	
Upper High	86.4
High	82.1
Upper Middle	75.0
Lower Middle	61.3
Poor	51.7
Total	69.8

[Table/Fig-1]: Prevalence of mobile phone usage among the study participants (n=2054).

*Modified B G Prasad's classification April 2013

Usage Pattern	Percentage (%)
All mobile phone users (n=1433)	
Calling facility	94.2
SMS facility	67.6
Listening to music	25.0
Playing games	16.8
Alarm	37.3
GPRS/Smart phone users (n=532)	
Internet Usage	39.7
Social networking	24.0

[Table/Fig-2]: Usage pattern of mobile phones among the mobile phone users.

Health problems	Prevalence (%)		Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio** (95% CI)
	Mobile users (n = 1433)	Non Users (n = 621)		
Headache	35.2	24.8	1.65 (1.33 – 2.03)	1.81 (1.43 – 2.29)
Earache	6.5	2.7	2.47 (1.46 – 4.17)	2.25 (1.29 – 3.92)
Neck pain	17.3	11.3	1.65 (1.24 – 2.19)	2.05 (1.50 – 2.80)
Tinnitus	3.8	0.8	4.92 (1.96 – 12.3)	5.94 (2.29 – 15.5)
Painful fingers	4.0	1.4	2.82 (1.39 – 5.73)	3.15 (1.48 – 6.69)
Restlessness	3.8	2.1	1.87 (1.01 – 3.44)	3.30 (1.70 – 6.41)
Morning tiredness	9.0	6.3	1.48 (1.02 – 2.14)	1.83 (1.22 – 2.74)
Tingling fingers	2.6	2.1	1.24 (0.65 – 2.35)	1.46 (0.73 – 2.93)
Fatigue	13.3	12.2	1.10 (0.83 – 1.46)	1.54 (1.12 – 2.11)
Eye symptoms	10.7	8.7	1.26 (0.91 – 1.75)	1.55 (1.08 – 2.22)
Sleep disturbance	10.8	10.3	1.06 (0.78 – 1.44)	1.49 (1.06 – 2.10)
Hypertension*	69.1	66.6	1.12 (0.92 – 1.38)	0.75 (0.59 – 0.95)

[Table/Fig-3]: Association between mobile phone usage and selected health problems (n = 2054).

*n = 2027

**Adjusted for age, sex and socio-economic status using multivariate logistic regression

The perceived benefits and threats due to mobile phone usage were assessed among the mobile phone users. About 40% of the study participants perceived that mobile phones can be used to promote health. Out of them, 57.3% said that call would be a better mode of communication for health promotion than SMS. Regarding their perception about health problem due to mobile phone usage, about one third (32.1%) responded that mobile phones can lead to health problems.

DISCUSSION

According to our study, the prevalence of mobile phone usage was found to be 70% whereas, a study done in Iran reported a prevalence

of 31.4% [9]. This difference in prevalence might be because the study in Iran was conducted among high school students and not many of them would own a mobile phone whereas, our study was done among adults and majority of them owned a mobile phone. Another study done in Kenya showed 85% prevalence of mobile phone usage among the study participants [10]. This could be because, most of those participants belonged to high socio economic class and were above 16 years of age. The findings of our study showed that participants used calling facility more than the SMS facility whereas a study done in Japan among 73 high school students showed that the frequency of using SMS facility was more when compared to calling facility [11]. This may be attributed to the different socio-demographic profiles of the study participants.

Our study found that usage of mobile phones are associated with health problems like headache, earache, neck pain, tinnitus, painful fingers, morning tiredness, fatigue, eye symptoms, sleep disturbance and restlessness. Similarly, in a prospective cohort study done in Sweden among young adult men and women, sleep disturbance was found to associate with mobile phone usage [12]. In another study from Sweden among adolescents, they found that the prevalence of tiredness, headache and sleep disturbances was high among frequent mobile users [13]. Similar findings were reported by other studies conducted in Saudi Arabia [14], Egypt [15] and Poland [16]. However, a study conducted by Cinel C et al., in United Kingdom found that there was no association between mobile phone usage and subjective symptoms [17]. Therefore, research on these areas should be continued till we get conclusive evidence on the relationship between mobile phone usage and subjective symptoms.

In our study, we found that mobile phone usage had a protective effect on hypertension which was similar to a study done in USA, which observed an inverse association between mobile phone use and self-reported hypertension [18]. This may be due to increase in parasympathetic activity or reduction in sympathetic activity originating from the brainstem [19]. Our study participants preferred calls (57.3%) over SMS (20%) for receiving health tips. In contrast to our study, a study done in Uganda on 1503 adults found that 51% of them were in favour of receiving health tips through SMS [20]. On the other hand a study done in Kenya on 500 HIV patients found that majority (72%) of them preferred calling facility than SMS facility for receiving health tips which is similar to our findings [21].

The main strength of our study is large sample size and the blood pressure was measured in our study whereas it was self reported in the USA study [18]. Confounding factors such as age, sex and socio-economic status which could affect the health effects of mobile phone usage were adjusted in our study.

CONCLUSION

The prevalence of mobile phone usage was high. Most of the study participants used calling facility more than the SMS facility. Health problems that were found to be positively associated with mobile phone usage were headache, earache, neck pain, tinnitus, painful fingers, morning tiredness, fatigue, eye symptoms, sleep disturbance and restlessness. Hypertension was found to be negatively associated with mobile phone usage. In future, higher

studies are required to confirm the relationship between mobile phone usage and health problems.

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