

ORIGINAL RESEARCH

Assessment of effect of smart phone usage on cardiovascular and hematological parameters**¹Dr. Priyanka Srivastava, ²Dr. Pankaj Mishra, ³Dr. Priyanka Jain**¹Associate Professor, Department of Physiology, MSDASMC and ATH Baharich, Uttar Pradesh, India²Professor, Department of Community Medicine, Mayo Institute of Medical Sciences, Barabanki, Uttar Pradesh, India³Assistant Professor, Statistics, Maharaja Saiyaji Rao University, Barodara, Gujarat, India**Correspondence:**

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Abstract**Background:** Mobile phones have become a ubiquitous part of our daily lives. The present study was conducted to assess effect of smart phone usage on cardiovascular and hematological parameters.**Materials & Methods:** 205 subjects using smart phone since 5 years of both genders were selected. Blood pressure of the subjects were recorded in the sitting posture by mercury sphygmomanometer. Total WBC count was done by Haemocytometer method using Turk's fluid as diluents. The duration of mobile phone usage per day were recorded. Daily duration of mobile phone use was calculated automatically by dividing the total duration of calls.**Results:** Out of 205 subjects, males were 105 and females were 100. There were 40 subjects with <1 hour mobile usage having 70-90 mm Hg of DBP, 50 (1-2 hours) with 70-80 mm Hg of DBP, 81-90 mm Hg was seen in 25 and 55 with <1 hours and 1-2 hours usage, 15 and 20 had 91-100 mm Hg DBP with <1 hour and 1-2 hours usage. The difference was non-significant ($P > 0.05$). 80 subjects had <1 hour usage and 4000- 11000 TLC, 60 had 1-2 hours usage with 4000-11000 TLC, 45 and 20 had >11000 having <1 hour and 1-2 hours usage. The difference was non-significant ($P > 0.05$).**Conclusion:** A long-term duration of Mobile phone use may influence and change the autonomic balance in favor of an increased sympathetic tone. An increase in the sympathetic tone and a concomitant decrease in the parasympathetic tone are reported to be measured among the subjects who have used the mobile phones for prolonged period of time.**Key words:** Mobile phones, TLC, DBP**Introduction**Mobile phones have become a ubiquitous part of our daily lives.¹ Initially, mobile phones were used only as a communication tool; but, these days, mobile phones function as mobile computers that serve us with music player, games, internet, video camera, calculator, alarm clock, and many more other perceived benefits as increased accessibility and social connectivity, reduced loneliness, and security in emergency situations.²

The smartphone era began in 1993 with the introduction of Simon smartphone from IBM. Smartphone revolution era began with introduction of blackberry smartphone in mass communication market equipped with many features such as web browsing, camera, email and internet.³ Apple entered the market in 2007 and became a major breakthrough in the market as the company introduced its first smartphone. By the end of 2007, android operating system by Google was revealed to public in aim to approach smartphone consumer with advanced technology.⁴

The regular and long-term use of mobile phones can have negative impact upon biological system especially on autonomic nervous system. Mobile phones do not use any cable, hence are functioning on the basis of wireless radio-frequency wave. Electromagnetic radiation emitted from mobile phones may have influences on autonomic, cardiovascular, endocrine, blood, and reproductive system.⁵ The present study was conducted to assess effect of smart phone usage on cardiovascular and haematological parameters.

Materials & Methods

The present study comprised of 205 subjects using smart phone since 5 years of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Blood pressure of the subjects were recorded in the sitting posture by mercury Sphygmomanometer. Total WBC count was done by Haemocytometer method using Turk's fluid as diluents. Cells were counted manually using compound microscope. The duration of mobile phone usage per day were recorded. Daily duration of mobile phone use was calculated automatically by dividing the total duration of calls. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of subjects

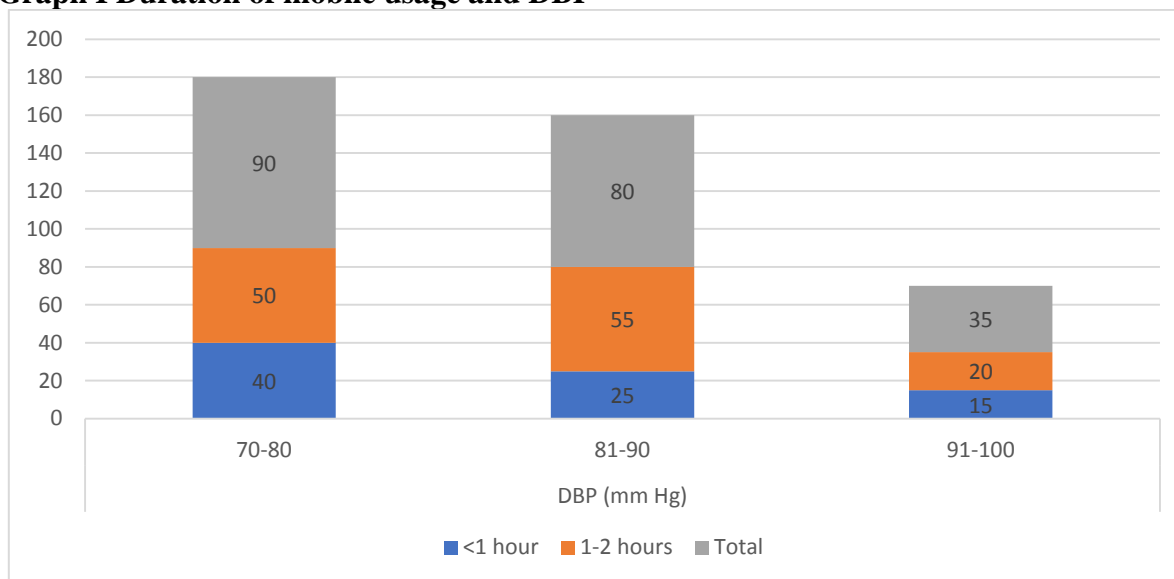
Total- 205		
Gender	Males	Females
Number	105	100

Table I shows that out of 205 subjects, males were 105 and females were 100.

Table II Duration of mobile usage and DBP

Duration of mobile usage (hours)	DBP (mm Hg)			P value
	70-80	81-90	91-100	
<1 hour	40	25	15	0.321
1-2 hours	50	55	20	
Total	90	80	35	

Table II, graph I shows that there were 40 subjects with <1 hour mobile usage having 70-90 mm Hg of DBP, 50 (1-2 hours) with 70-80 mm Hg of DBP, 81-90 mm Hg was seen in 25 and 55 with <1 hours and 1-2 hours usage, 15 and 20 had 91-100 mm Hg DBP with <1 hour and 1-2 hours usage. The difference was non-significant (P > 0.05).

Graph I Duration of mobile usage and DBP**Table III Duration of mobile usage and TLC**

Duration of mobile usage (hours)	TLC (cumm of blood)		
	4000-11000	>11000	P value
<1 hour	80	45	0.271
1-2 hours	60	20	
Total	140	65	

Table III shows that 80 subjects had <1 hour usage and 4000- 11000 TLC, 60 had 1-2 hours usage with 4000-11000 TLC, 45 and 20 had >11000 having <1 hour and 1-2 hours usage. The difference was non- significant ($P > 0.05$).

Discussion

The fast growth of technology has developed electronic device such as smartphone that the function do not limited only for messaging but this device allow long distance communication. Smartphone can be called as minicomputer as the features and functions provided are like computer in its mini form and its handy.⁶ Worldwide, mobile phones subscriptions have reached six billion.⁷ In India, people living in both rural and urban areas, literate or illiterate, and belonging to almost all age groups are now dependent on a mobile phone.^{8,9} The present study was conducted to assess effect of smart phone usage on cardiovascular and hematological parameters.

We found that out of 205 subjects, males were 105 and females were 100. There were 40 subjects with <1 hour mobile usage having 70-90 mm Hg of DBP, 50 (1-2 hours) with 70-80 mm Hg of DBP, 81-90 mm Hg was seen in 25 and 55 with <1 hours and 1-2 hours usage, 15 and 20 had 91-100 mm Hg DBP with <1 hour and 1-2 hours usage. Khan et al¹⁰ found that subjects (n=21) whose systolic blood pressure were recorded to be >140 mmHg accounting for 10.65% of total subjects. Subjects (n=2) whose diastolic blood pressure were recorded >90 mmHg whose percentage is 1.01 of the total subjects studied. After adjustment for age and sex, the positive correlation was found between the duration of mobile phone usage and SBP, DBP with a p value of 0.169 and 0.386 respectively. Total WBC count was found to be higher than normal range in two number of subjects with a p value of 0.715

We found that 80 subjects had <1 hour usage and 4000- 11000 TLC, 60 had 1-2 hours usage with 4000-11000 TLC, 45 and 20 had >11000 having <1 hour and 1-2 hours usage. According to a study conducted in Baghdad, Iraq, on smoker and non-smoker subjects, study groups

were exposed to gamma radiation. It was found that, after increasing the doses of γ -rays, that resulted in decline in the values of WBCs, lymphocytes, and neutrophils as reported among smokers as compared to that of non-smokers and this confirms that these cells are more fragile, weak, and less tolerant to external stimuli such as gamma rays that cause damage at cellular level and are penetrating, causing diffuse damage throughout the body. Low levels of γ -rays cause a stochastic health risk, which for radiation dose assessment is defined as the probability of cancer induction and genetic damage. High doses of it produces deterministic effects, which is the severity of acute tissue damage that is certain to happen.¹¹

Latest smartphones are viewed as handheld computers rather than a normal phone because of its powerful computing ability and large memory.⁶ The capability of running feature-rich application (apps) on smartphones made smartphone a more powerful device replacing many devices such as alarms clocks, calculators, laptops, GPS navigators and digital cameras.¹²

The limitation the study is small sample size.

Conclusion

Authors found that A long-term duration of Mobile phone use may influence and change the autonomic balance in favor of an increased sympathetic tone. An increase in the sympathetic tone and a concomitant decrease in the parasympathetic tone are reported to be measured among the subjects who have used the mobile phones for prolonged period of time.

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