ORIGINAL RESEARCH

Effect of smart phone usage on cardiovascular and hematological parameters

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ABSTRACT
Background: Smartphone can be called as minicomputer as the features and functions provided are like computer in its mini form and its handy. The present study was conducted to evaluate effect of smart phone usage on cardiovascular and hematological parameters. **Materials & Methods:** 180 subjects using smart phone since 5 years of both genders. Assessment of blood pressure, total WBC count and duration of mobile phone usage per day were recorded. **Results:** Out of 180 subjects, males were 80 and females were 100. 60 subjects had <1 hour usage and 4000- 11000 TLC, 35 had 1-2 hours usage with 4000-11000 TLC. 45 and 40 had >11000 having <1 hour and 1-2 hours usage respectively. The difference was non-significant (P> 0.05).There were 45 subjects with <1hour mobile usage having 70-80 mm Hg of DBP, 15 (1-2 hours) with 70-80 mm Hg of DBP, 81-90 mm Hg was seen in 30 and 25 with <1 hours and 1-2 hours usage, 25 and 40 had 91-100 mm Hg DBP with <1 hour and 1-2 hours usage respectively. The difference was significant (P< 0.05). **Conclusion:** Along-term duration of mobile phone use may affect and change the autonomic balance in favour 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, sympathetic tone, white blood cell

INTRODUCTION

The fast growth of technology hasdevelopedelectronic 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.[1]Mobile phones ubscriptions have reached six billion. In India, people living inboth rural and urban areas, literate or illiterate, and belonging to almost all age groups are now dependent on a mobile phone.[2] Smartphone revolution era began with introduction of blackberry smart phone in mass communication market equipped with many features such as web browsing, camera, email and internet.[3]The regular and long- term use of mobile phones can have negative impact upon biological system especially on autonomic nervous system.[4]Prolonged and high rate of exposure to electromagnetic fields can affect human body tissues adversely since the neural network employs electric charges for transmitting signals between brain and tissues. Usually, mobile phones are held very close to the human head and are linked with a large number of base station antennas.[5]

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.[6]The present study was conducted to evaluate effect of smart phone usage on cardiovascular and hematological parameters.

MATERIALS & METHODS

The present study consisted of 180 subjects using smart phone since 5 years of both genders.

All were agreed to participate in the study and gave their written consent.

Data such as name, age, gender etc. was recorded. A thorough general physical examination was carried out. Assessment of blood pressure with mercury sphygmomanometer based on auscultatory method was performed. Estimation of total WBC count was done usinghaemocytometer 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- 180		
Gender	Males	Females
Number	80	100

Table I shows that out of 180 subjects, males were 80 and females were 100.

Table II: Assessment of duration of mobile usage and total leukocyte count

TLC (cu mm Hg)	Duration of mobile usage (hours)		P value
	<1 hour	1-2 hours	
4000-11000	60	35	0.04
>11000	45	40	0.95

Table II, graph I shows that 60 subjects had <1 hour usage and 4000- 11000 TLC, 35 had 1-2 hours usage with 4000-11000 TLC. 45 and 40 had >11000 having <1 hour and 1-2 hours usage respectively. The difference was non- significant (P> 0.05).
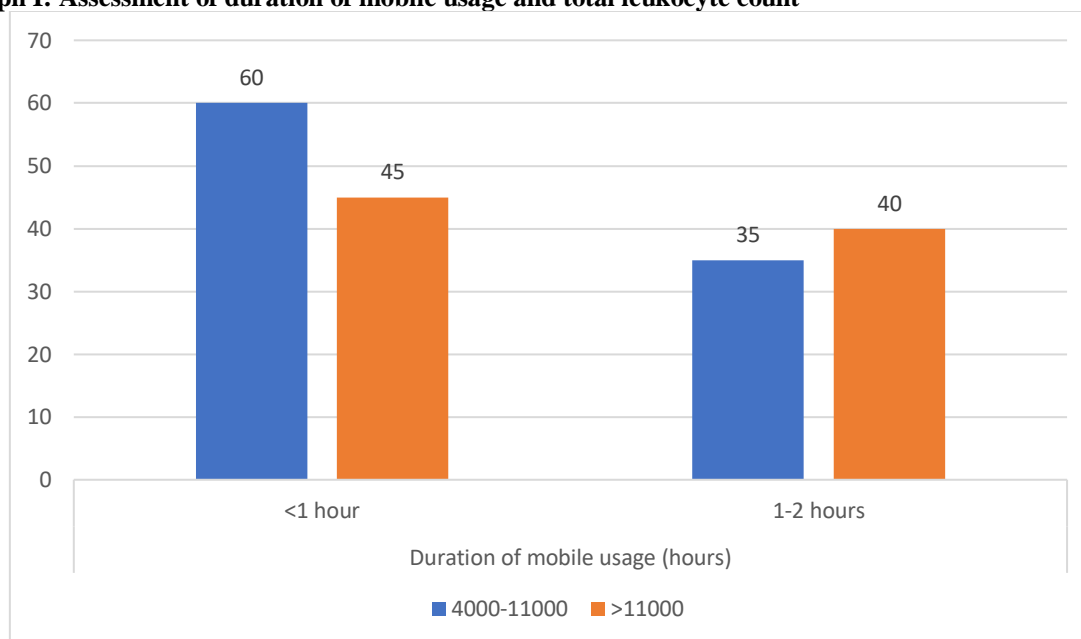
Graph I: Assessment of duration of mobile usage and total leukocyte count

Table III: Assessment of duration of mobile usageDBP

DBP (mm Hg)	Duration of mobile usage (hours)		P value
	<1 hour	1-2 hours	
70-80	45	15	0.02
81-90	30	25	0.91
91-100	25	40	0.05

Table III shows that there were 45 subjects with <1hour mobile usage having 70-80 mm Hg of DBP, 15 (1-2 hours) with 70-80 mm Hg of DBP, 81-90 mm Hg was seen in 30 and 25 with <1 hours and 1-2 hours usage, 25 and 40 had 91-100 mm Hg DBP with <1 hour and 1-2 hours usage respectively. The difference was significant (P< 0.05).

DISCUSSION

Mobile phones have become a ubiquitous part of our daily lives.[7,8]Initially, mobile phones were used only as a communication tool;but, these days, mobile phones function as mobile computers thatserve us with music player, games, internet, video

camera,calculator, alarm clock, and many more other perceived benefitsas increased accessibility and social connectivity, reduced loneliness,and security in emergency situations.[9,10]The present study was conducted to evaluateeffect of smart phone usage on cardiovascular and hematological parameters.

We found that out of 180 subjects, males were 80 and females were 100. Christopher et al[11] studied the effect of smart phones on hemoglobin level, white blood cell (WBC) count, platelet count and erythrocytes sedimentation rate (ESR). Matched case control methodology was adopted. For comparison of the levels of hematological parameters, blood exposed to 1 h of phone radiation and control were analysed. Experimental results show that there is a significant change on the hematological components. The exposed blood samples were found to display decrease in platelet count only. Hemoglobin level, ESR rate and the WBC counts were found to be increased. While these observations are performed under controlled laboratory conditions, given the tremendous growth in number of mobile phone users, the effects could be a real concern especially in work places and cities even through passive exposure.

We observed that 60 subjects had <1 hour usage and 4000- 11000 TLC, 35 had 1-2 hours usage with 4000-11000 TLC. 45 and 40 had >11000 having <1 hour and 1-2 hours usage respectively. Khan et al[12] 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.

We found that there were 45 subjects with <1hour mobile usage having 70-80 mm Hg of DBP, 15 (1-2 hours) with 70-80 mm Hg of DBP, 81-90 mm Hg was seen in 30 and 25 with <1 hours and 1-2 hours usage, 25 and 40 had 91-100 mm Hg DBP with <1 hour and 1-2 hours usage respectively. Sihet al[13] in their study 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

The limitation the study is small sample size.

CONCLUSION
Authors found that long-term duration of mobile phone use may affect and change the autonomic balance in favour 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.

REFERENCES
1. Dixit S, Shukla H, Bhagwat AK, Bindal A, Goyal A, Zaidi AK, et al. A study to evaluate mobile phone dependence among students of a medical college and associated hospital of central India. Indian J Community Med. 2010;35(2):339–41.
2. Bulck JVD. Adolescent use of mobile phones for calling and for sending text messages after lights out: results from a prospective cohort study with a one-year follow-up. Sleep. 2007;30(9):1220–3.
3. Setubal JC, Meidanis J (1997) Introduction to computational molecular biology. PWS Publishing Company, Boston, USA.
4. Sani A, Labaran MM, Dayyabu BEffects of Electromagnetic Radiation of Mobile Phones on Hematological and Biochemical Parameters in Male Albino Rats. Eur Exp Biol.2018;11.
5. Sharma N, Sharma P, Sharma N, Wavare RR. Rising concern of normophobia amongst Indian medical students. Int J Res Med Sci. 2015;3(3):705–7.
6. Zulkefly SN, Baharudin R. Mobile phone use amongst students in a university in Malaysia: its correlates and relationship to psychological health. Eur J Sci Res. 2009;37(2):206–18.
7. Mazaheri MA, Mohamed F, Karbasi M. Mobile phone usage patterns among students in Iran. RRAMT. 2014;40(1):313–9.
8. Jambulingam M, Sorooshian S. Usage of mobile features among undergraduates and mobile learning. Curr Res J Soc Sci. 2013;5 (4):130–3.
9. Sivaranjani Suresh Sita Kalidindi, Anoop Shankar. Cell-Phone Use and Self-Reported Hypertension: National Health Interview Survey 2008. International Journal of Hypertension 2011;1-7.
10. Rubin GJ, Hahn G, Everitt BS, Cleare AJ, Wessely S. Are some people sensitive to mobile phone signals? Within participants double blind randomized provocation study. BMJ2006:332:886-9.
11. Christopher B, Mary YS, Khandaker MU, Bradley DA, Chew MT, Jojo PJ. Effects of mobile phone radiation on certain hematological parameters. Radiation Physics and Chemistry. 2020 Jan 1;166:108443.
12. Khan et al. A study on effect of smart phone usage on cardiovascular and hematological Parameters in Adult Population. International Journal of Health and Clinical Research, 2021;4(20):225-229.
13. Sih BT, Alqasim AM, Ajil AH. The effect of gamma ray on total leukocytes, lymphocytes and neutrophils on blood samples of smokers compared to non- smoker donors. Iraqi J Hematol 2017; 6:1-5.