

Effects of Mobile Use on Selected Hematological Parameters in Female Medical Students

Dr. Mrs. Anuya Joshi¹, Dr. Mrs. Kanchan Wingkar², Dr. Anand Joshi³

¹PhD Student

²Professor & HOD, Physiology

³Professor of Physiology

Abstract: *The mobile phone industry has been one of the fastest growing industries in modern history. Today, India has million mobile phone users, and mobile phones account for 88% of all telecommunication users. Mobile phones are low-powered radiofrequency transmitters, operating at frequencies between 450 and 2700 MHz with peak powers in the range of 0.1 to 2 watts. Concerns about the possible adverse health effects of mobile phones (MP) have increased along with the expansion of their use. In present study female medical students were divided in to lowest exposure group Group A: (300000 minutes and below.) and highest exposure Group B: (1500000 and above minutes) and following hematological parameters values were measured and compared. Total Hemoglobin gm./100ml of blood., Total red blood cell count/cubic mm. Total white cell count/cubic mm. Total platelet count/cubic mm. Difference between group A and Group B was significant for total WBC. (P value <0.05). No significant differences were observed for other parameters studied between both the groups (P value > 0.05) **Conclusion:** Further research on large sample size and controlled exact exposure to EMF and more number of years exposure to mobile EMF. is required to come to conclusion.*

Keywords: Electromagnetic Field (EMF), hematological parameters, Mobile phone

1. Introduction

Today mobile phones have become an indispensable tool because of the many uses. Mobile is used for communication, net banking, calculator, radio etc. The mobile phone industry has been one of the fastest growing industries in modern history. Today, India has million mobile phone users, and mobile phones account for 88% of all telecommunication users. The number of mobile phone users in the world is expected to pass the five billion mark by 2019. In 2016, an estimated 62.9 percent of the population worldwide already owned a mobile phone. The mobile phone penetration is forecasted to continue to grow, rounding up to 67 percent by 2019. [1,2] The number of mobile phone users in the world is expected to pass the five billion mark by 2019. Mobile phones are low-powered radiofrequency transmitters, operating at frequencies between 450 and 2700 MHz with peak powers in the range of 0.1 to 2 watts. [3] However, this extensive use has led to exposure to a dangerous level of electromagnetic waves. Adolescents are at an age where good quality sleep, mental and physical wellbeing is of utmost importance [4]

2. Literature Survey

The Indian Council of Medical Research (ICMR) has informed that in a number of studies it has been reported that exposure to radiation from mobile phones causes adverse health effects but there is no conclusive data available so far on this issue, however the growing body of scientific evidences indicates some bio-effects and possible adverse health effects of Radio Frequency Radiation (RFR) which merit further investigations. Even the World Health Organization (WHO) (2011) after reviewing the studies published from year 2000 to 31st May 2011 classified the radio frequency electromagnetic radiations field emitted from wireless phone under group 2 B-carcinogen category.

Concerns about the possible adverse health effects of mobile phones (MP) have increased along with the expansion of their use. A number of research papers have tried to address this issue. In present research work hematological parameters like hemoglobin percentage, total white cell count, total red blood cell count and total platelet count is studied. Results of present research work can be used to plan the large scale study. Present study will be also useful to decide safety limits and advises for advocating safety measures.

3. Materials and Methods

3.1 Objectives of the Study

- 1) To divide Female medical students in to lowest and highest Electromagnetic field (EMF) exposure groups, and to measure following hematological parameters values.
- 2) Total Hemoglobin gm./100ml of blood., Total red blood cell count/cubic mm. Total white cell count/cubic mm. Total platelet count /cubic mm.
- 3) To compare values of above mentioned parameters for statistical significance.

Inclusion criteria

Apparently healthy female medical students, between the age group of 18 to 23 years and willing to participate into the study.

Exclusion criteria

Any major illness. History of recent infection, fever, trauma or blood loss.

For present study 240 female medical students (age group 18 to 23 years) from KIMS. Karad were studied. The study was carried out in the Department of Physiology, KIMS. Karad.

Volume 8 Issue 7, July 2019

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

Maharashtra. Written consent was obtained. ethical approval was taken. Study was done in morning hours from 10A.M. to 12 A.M. an hour after light breakfast.

The detail history, general and systemic examination of each subject was carried out carried to check for inclusion criteria. Blood sample from Antecubital vein was collected and sent for pathology departments for investigation,. Nihon Kohden, Automated 3part cell counter (Model MEK-6420P) was used for the study. Following investigations were carried out. Hemoglobin,(Hb gm.%), Total red blood cell count.(RBC count /cubic.mm.), Total white cell count. (WBC count/cubic.mm. , Total platelet count.(Cubic./mm) Detailed history of mobile use was obtained. How many years using the mobile, how much is daily average use of mobile. From which total exposure was calculated in minutes. As no students were available who are not using mobiles, control group was not possible. Students were divided into two groups .Group A: lowest exposure groups (300000 minutes and below.) And Group B: highest mobile exposure group. (1500000 and above minutes)

Table 1: Showing Comparison between lowest and highest mobile exposure groups on various hematological parameters (Hb.gm. %, WBC /cubic.mm, RBC/cubic.mm., total platelet count /cubic.mm)

Group A) 01 to 300000 minutes of Exposure

Group B) 1500000 and above minutes of Exposure

Sr. No.	WBC, count Cells/cubic mm.	Group A	Group B	P value	Remarks
1	Mean	8424.85	7044.54	0.033	Significant.
	SD.	2080	730	(t value	
	Sample size	67	11	2.169)	

Sr. No.	RBC, count Cells/cubic mm.	Group A	Group B	P value	Remarks
2	Mean	4305000	4027200	0.28	Not. Significant.
	SD.	620	910		
	Sample size	67	11		

Sr. No.	Platelets. /cubic mm.	Group A	Group B	P value	Remarks
3	Mean	285100	259000	0.19	Not. Significant
	SD.	61	62		
	Sample size	67	11		

Sr. No.	Hb. Gm per 100 ml. of blood	Group A	Group B	P value	Remarks
4	Mean	11.92	12.31	0.32	Not. Significant
	SD.	14	11		
	Sample size	67	11		

Difference between group A and Group B was significant for total WBC. (P value < 0.05).No significant differences were observed for other parameters studied between all the groups (P value> 0.05.)

4. Discussion

Comparison between lowest and highest mobile exposure on various hematological parameters showed that difference between group A and Group B was significant for total WBC. Count (p value < 0.05) .No significant differences were observed for other parameters studied. (P

value> 0.05.) .Total WBC was decreased in more exposure group. There are reports that EMF increases RBC count, WBC count in rats. [5,6] The sensitivity of the various organs of the human body correlate with the relative sensitivity of the cells from which they are composed. For example, since the blood forming cells were one of the most sensitive cells due to their rapid regeneration rate, the blood forming organs are one of the most sensitive organs to radiation. Muscle and nerve cells were relatively insensitive to radiation. [7, 8, 9, 10, 11]

There are reports that electromagnetic field caused a decrease of immunological parameters (total lymphocytes and CD4 counts) in both humans and mice [12]. So many mechanisms were postulated for effects of EMF on human body. Oxidative Stress (OS) resulting from imbalance of reactive oxygen species (ROS) and antioxidants, leading to disruption of cell functions, has been proposed as one of the probable modes of EMF action. EMFs have also been implicated to lengthen life of free radicals particularly by Fenton reaction, affect enzyme activity, and change protein levels indicative of induction of cellular stress response pathways. Other mechanisms like Melatonin Diminution, Calcium Flux are also put forward. Based on in depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research. [13, 14]. Our study showed only change in total WBC count.

5. Conclusion

Decreased total white blood cell count indicates that long term exposure to EMF , has some bio-effects and possible adverse health effects.

6. Limitations

Sample size is small; exact duration of exposure is as per students history, More duration of exposure is not studied.

7. Future Scope

However for conclusive results, large sample size and controlled exact exposure to EMF and more number of years exposure to mobile EMF are required.. Knowledge of large scale study will be useful for advising safety measures.

References

- [1] <https://vaciniti.com/mobile-phone-users-worldwide>.
- [2] <https://www.statista.com/statistics/274774/forecast-of-mobile-phone-users-worldwide..>
- [3] Kapdi M¹, Hoskote SS, Joshi SR. Health hazards of mobile phones: an Indian perspective. J Assoc Physicians India. 2008; 56:893-7.
- [4] Kwon MK¹, Choi JY, Kim SK, Yoo TK, Kim DW. Effects of radiation emitted by WCDMA mobile phones on electromagnetic hypersensitive subjects. Environ Health. 2012 Sep 21;11:69

- [5] Side-Effects of Harmful Radiation from Mobile Phones and Towers.
- [6] Press Information Bureau Government of India Ministry of Health and Family Welfare 03-March-2015 14:22 IST
- [7] Children's Health and the Environment WHO Training Package for the Health Sector
- [8] World Health Organization www.who.int/ce Biological Effects of Radiation Reactor
- [9] Abdolmaleki A, Sanginabadi F, Rajabi A, Saberi R (2013) The effect of electromagnetic radiation on blood parameters. *IJHOSCR* 6: 13-16
- [10] Agarwal A, Singh A, Hamada A, Kesari K (2011) Cell phones and male infertility. a review of recent innovations in technology and consequences. *Int Braz J Urol* 37: 432-454.
- [11] Alghamdi MS, El-Ghazaly NA (2012) Effects of exposure to electromagnetic field on some hematological parameters in mice. *Open Journal of Medicinal Chemistry* 2: 30-42.
- [12] Diechmann WB, Male J, Landeen K (1964) Effects of microwave radiation on the hemopoietic system of the rat. *Toxicol Appl Pharmacol* 6: 71-77.
- [13] Parkar MA, Ahmed R, Abdullah BB, Patil BS, Das KK (2010). Effect of cell phone exposure on physiologic and hematologic parameters of male medical students of Bijapur (Karnataka) With reference to serum lipid profile. *J Basic Clin Physiol Pharmacol.*; 21(2): 201-10.
- [14] <https://www.who.int/peh-emf/about/WhatisEMF/en/index1.html> Electromagnetic.
- [15] Rajdeep Mitra, Milan Mazumder, Koushik Pal, Subasish Jana. Study on effect of mobile phone radiation on human health Exploratory Animal and Medical Research. 2014; 4(2):246-252
- [16] Bhargavi K, KE Balachandrudu, , Nageswar P. Mobile Phone Radiation Effects on Human Health, *International Journal of Computational Engineering Research*; 03:10-13.