

# Effect of Mobile Phones on Blood Biochemistry and General Health: A review

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## Abstract

The mobile has become one among the foremost prospering inventions of the Twentieth Century. The consequences of 900-megahertz Radiofrequency radiation (RF) from digital mobile could impose damaging health effects on human. As time passes the number of mobile users is increasing and therefore to satisfy the necessity of higher information rates than the previous generation the technology keeps on evolving. This in turns leaves a large harmful biological impact on the diversity. The microwave mobile communication systems embody the TV, FM and AM broadcasting station that use an outsized quantity of power to transmit the signals at a larger amount of distance. several have tried to see the result of the emitted electromagnetic wave of mobile phones on some haematological (RBC, MCV, WBC, HGB, MCH, MCHC, LYM, LYM %) and organic chemistry parameters (AST, ALT and ALP) in experimental rats. The results indicated that no important variations between high and low EMR exposed rats in terms of haematological parameters (RBC, MCV, WBC, HGB, MCH, MCHC, LYM, LYM %) and organic chemistry parameters (ALT, AST and ALP) ( $P>0.05$ ).

**Keywords:** Mobile phones; Electromagnetic radiation; Biochemistry enzymes.

## Introduction

The mobile has greatly modified people's lifestyle and is an integral part of the lifestyle. With the exaggerated use of mobile phones, their potential effects on human health became additional necessary. The implications of this technology for human health are typically unmarked. Innovations in cell phones are also related to harmful effects on the human brain, circulatory system, and additional specifically male copy. Non-ionizing radiation (NIR) is widespread within the human surroundings. The foremost frequent sources of NIR are mobile phones and cell towers that emit microwave radiation (MWR). They emit radiofrequency electromagnetic waves (RF-EMW), the results of that are unknown, nevertheless. Mobile phones and connected telephone technologies transmit info that's encoded into magnetic attraction waves within the microwave vary around 900 megahertz and 1800 MHz. so as to measure the impact of frequency magnetic attraction waves on the body an identical unit known as the SAR value (Specific Absorption Rate) was established. The SAR measures the speed of radiofrequency energy absorption within the body, expressed as watt/Kg. Device specific SAR tests are conducted at the best power level of the device, altogether four frequency bands. The radiation absorbs through our bodies which act as antennas that and convert it into alternating cross current. The wave from the speaker goes through a transmitter that converts the sound into a wave once speaking into a cellular phone, this radiation might alter traditional bodily functions. several studies have checked out numerous body tissues reactions to radiation exposure.

In 2016, Armand et al. show that mobile radiation is harmful

effects on catalyst activity and tissue. The negative impact on human health is because of physiological state and radical that increase oxidative stress and cause injury to internal body organs<sup>[1]</sup>

While Kaur et al. Reviewed the long-term and short-term effects of mobile phones. The disease caused by an uncontrolled division of abnormal cells in a part of the body such as cancers, high blood pressure, stillbirth, DNA damage, hormonal imbalance etc. due to the Long-term usage of mobile phones cause such health hazards while other conditions like insomnia, depression, headaches, sleep disorders, etc. due to the short-term uses can cause such conditions.<sup>[2]</sup>

## Effect of mobile phone electromagnetic waves on the hematological and biochemical parameters

In this study, to assess the effects of mobile phone electromagnetic waves in mice. Some haematological and biochemical parameters were tested to determine the effects of mobile phone electromagnetic waves in mice. A sixteen (16) male mice each were used, a control group and an exposure group. The mice of the exposure group were exposed to 1200 MHz electromagnetic waves for 45 days as 6 hours daily. The results of the haematological test exhibit a significant increase in red blood cells count, total leukocytes count, lymphocytes, monocytes and acidophilus of the exposure group as a parallel with those of the control group. However, there was a significant decrease in haemoglobin, packed cells volume, and neutrophils in exposed group compared with those of the

control group. A significant increase in biochemical results

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exhibits in blood calcium and a significant decrease in total cholesterol, blood glucose, aspartate aminotransferase, and

alanine aminotransferase enzymes versus those of the control group as shown in table 1 [3]

**Table 1.** Illustrated the changes in blood parameters in an exposed group

Blood parameter	Results of the exposure group compared to control group
Blood cells count	Increased
Total leukocytes count	Increased
Lymphocytes	Increased
Monocytes and acidophilus	Increased
Serum calcium	Increased
Packed cells volume	Decreased
Neutrophils	Decreased
Haemoglobin	Decreased
Cholesterol, blood glucose, aspartate aminotransferase, and alanine aminotransferase enzymes	Decreased

In recent decades several studies to analyze the connection between magnetic force fields with completely different intensities on the incidence of vertebrate biological process disorders, sterility, sleep disorders, gastrointestinal, vessel, numerous neoplasms as well as hematologic disorders or haematogenic growth process has taken place. The results of those studies are inconsistent and extremely typically, that the analysis of this field remains wide. The result of mobile radiation on the liver has been studied. Methods: forty immature male Wistar rats weighing  $10 \pm 60$  g were ready and divided into four teams of 10 classes, together with management, experiment one, experiment two, severally. Management group received no radiation, Controls on the topic of mobile phones; however no phone calls like that employed in the experimental group (with the identical conditions) were used. Experimental groups one to 5 times per day for one month, and each 10 minutes on the phone calls were exposed and experimental groups 2 to 5 times per day for one month, and twenty minutes were exposed to mobile calls. Then at the tip of a month, changes in liver enzymes ALT, AST, ALK and liver weights were measured to check the consequences of various doses of the poison, the statistical analysis of ANOVA followed by Turkey's post hoc check was used. Results: Liver weight was considerably exaggerated within the experimental group than the management group is 2. Enzymes AST and ALK experimental group 2 (20 min) showed a major increase compared to the management group ( $P < 0.05$ ). ALT enzyme levels within the experimental group one (10 min) and experimental group two had a major increase compared to the management group ( $P < 0.05$ ). Discussion: According to the results obtained with the sounds of the liver alters liver enzymes are secreted and time-dependent radiation injury affects fewer leaves. Therefore, it's not suggested to use mobile phones at associate early age [4].

In 2018 Sani A, et al. apparent that partial or whole-body exposure to EMR might cause a range of changes in their hematological system. With blood counts or alternative response, these changes are usually transient, returning to traditional either directly or presently once the exposure. Interpretation of the EMR result on blood and blood-forming systems depends to a wonderful degree on the absorption of biological material and thermoregulatory system of the irradiated individual. as an example, blood, blood fluid skin, muscle, brain and internal organs that contain an outsized amount of water content as bone, fat and connective tissue. The t-test indicated that there is no significant differences between low & high EMR exposed rats in terms of RBC, MCV, WBC, HGB, MCH, MCHC, LYM and LYM% ( $P > 0.05$ ).

ALT and AST as reported are specific liver enzymes that increase in hepatic diseases and toxic damage of liver cells increased AST levels can occur in connection with damages of heart or skeletal muscle as well as liver parenchyma. The

mean values of ALP and ALT are fluctuating across the exposure periods in low EMR exposed rats. However, the values of AST are increasing from 1hr to 3hrs exposed rats but then it remains the same with 5hrs exposed rats.

In study by Ismail Abdel Aziz et al. Serum transaminases (AST & ALT), ALP and bilirubin exhibited a general increase in cases exposed to E.M.F compared to the controls. The observed elevation of serum AST, ALT and ALP activates in response to E.M.F exposure is in agreement with the study of Fatma et al., who observed the increases of liver enzyme activates ALT, AST and ALP in serum and liver tissue significantly and increased oxidative stress marks (MDA & H<sub>2</sub>O<sub>2</sub>) after exposure to mobile phone radiation in the liver of male rats. Bilirubin is a naturally occurring antioxidant of physiological importance and as such, could have a role in protecting lipid and lipoproteins against oxidation. The mean values of ALP in 30% of high EMR exposed rats have not exceeded the control group. However, the mean values of AST and ALT in 30% of high EMR exposed rats has exceeded the control groups. Sharma et. al. found out that the values of ALT and AST levels in rats exposed to EMR were significantly higher than the control ( $p \leq 0.05$ ). There is no significant difference between high and low EMR exposed rats in terms of ALT, AST and ALP ( $P > 0.05$ ) [5].

### **Effects on general health**

There are two distinct prospects that health might be affected as a result of frequency field exposure. These are thermal effects of microwave radiation is an electrical phenomenon, within which any dielectric material (such as living tissue) is heated by rotations of polar molecules elicited by the magnetic attraction field. within the case of an individual employing a mobile phone, most of the heating result can occur at the surface of the top, inflicting its temperature to extend by a fraction of a degree. during this case, the extent of temperature increase is an order of magnitude but that obtained throughout the exposure of the top to direct daylight. The brain's blood circulation is capable of getting rid of excess heat by increasing local blood flow. However, the cornea of the eye doesn't have this temperature regulation mechanism and exposure of 2– 3 hours period has been reportable to supply cataracts in rabbits' eyes at SAR values from 100–140 W/kg, that made lenticular temperatures of 41 °C [6]. Secondly, there may be probably non-thermal effects could be reinterpreted as a standard cellular response to a rise in temperature. The German physicist Roland Glaser, as an example, has argued that there are many thermos-receptor molecules in cells which they activate a cascade of second and third traveller systems, gene expression mechanisms and production of warmth shock proteins so as to defend the cell against metabolic cell stress caused by heat. The will increase in temperature that causes these changes are too little to be detected by studies like REFLEX, that base their

whole argument on the apparent stability of thermal equilibrium in their cell cultures [7, 8].

## CONCLUSION

This paper has additionally reviewed the long and short effects of mobile phones. long usage of mobile phones cause health hazards like cancer, high blood pressure, miscarriages, DNA damage, hormonal imbalance etc. whereas their short-term uses will cause conditions like sleep disorder, depression, headaches, sleep disorders, etc.

It may be concluded that there's no modification in terms of behavior once exposure, however, there is a rise within the weight of animals that are seen to be suffering from an increase in the exposure period. Among the haematological parameters, the values of erythrocyte, HGB and MCH were determined to be higher in animals exposed to EMR. The values of organic chemistry parameters showed less increase in animals exposed to EMR than the management group. Therefore, indicating that long-time exposure would possibly cause damaging effects to blood elements, liver and their function.

## References

1. M. Aberumand, E. Mansouri, F. pourmotahari et al., Biochemical and Histological Effects of Mobile Phone Radiation on Enzymes and Tissues of Mice, September–October 2016, RJPBCS 7(5), Page No. 1962.
2. Sukhdeep Kaur et al, International Journal of Computer Science and Mobile Computing, Vol.5 Issue.2, February-2016, pg. 298-304.
3. Wissam S H. Effect of mobile phone electromagnetic waves on the hematological and biochemical parameters in laboratory mice. Bas. J. Vet. Res. 2015; 14(2): 250-264.
4. S. Ghaedi, A. sara, mohammed and et al., Effects of mobile phone radiation on liver enzymes in immature male rats, Advances in Environmental Biology 7(6), January 2013, 1133-1137. Cited by Viera Almäšiová, Viera Cigánková, K Holovská and Marcela Martoncíková. Structural and Ultrastructural Study of Rat Liver Influenced by Electromagnetic Radiation. Journal of Toxicology and Environmental Health Part A 78(6):353-356 · March 2015.
5. Sani A, Labaran MM, Dayyabu B (2018), Effect of Electromagnetic Radiation of Mobile Phones on Hematological and Biochemical Parameters in Male Albino Rats. Eur Exp Biol Vol. 8 No. 2:11.
6. International commission on non-ionizing radiation protection. Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). Health Physics. 1998; 74(4): 494–505. Cited by Carlberg M, Hedendahl L, Koppel T, Hardell L. High ambient radiofrequency radiation in Stockholm city, Sweden. Oncol Lett. 2019 Feb; 17(2):1777-1783. Epub 2018 Dec 3.
7. Glaser, Roland. Are thermoreceptors responsible for "non-thermal" effects of RF fields? Edition Wissenschaft. Forschungsgemeinschaft Funk. 2005; 14515(21): 1–14. Cited by Uwe Schneidewind, Mandy Singer-Brodowski and Karoline Augenstein. Transformative Science for Sustainability Transitions. Handbook on Sustainability Transition and Sustainable Peace pp. 123-136. First Online: 11 August 2016.
8. Blank M, Goodman R. Electromagnetic fields stress living cells. Pathophysiology. 2009; 16(2-3):71-8. Cited by Sun-Young Lee, Gyula Peter Szigeti and Attila Marcell Szasz. Oncological hyperthermia: The correct dosing in clinical applications. International Journal of Oncology. Pages: 627-643, November 23, 2018.