e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(5); 411-414

Original Research Article

Impact of Radiofrequency Radiation from Mobile Phone Towers on Heart Rate

Mahila S.[1], Ilham Jaleel[2], Devaki P.R.[3]

[1]Professor, Department of Physiology, Panimalar Medical College Hospital & Research Institute, Chennai, Tamil Nadu, India.

[2]Associate Professor, Department of Physiology, Panimalar Medical College Hospital & Research Institute, Chennai, Tamil Nadu, India.

[3]Professor & Head, Department of Physiology, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India.

Received: 01-02-2026 / Revised: 15-03-2026 / Accepted: 21-04-2026

Corresponding author: Dr. Ilham Jaleel

Conflict of interest: Nil

Abstract

Introduction: In the recent years, with the growth of telecommunication infrastructure, there is potential impact of radiofrequency electromagnetic radiation from mobile phone towers on public health. There is limited and inconclusive evidence about its impact on the cardiovascular system.

Objective: To explore the effect of radiofrequency radiation from mobile phone towers on heart rate, systolic blood pressure, and diastolic blood pressure among people residing close to, and away from mobile phone towers.

Materials and Methods: This cross-sectional study included 72 participants. They were divided into two groups. Group I (exposed) had 36 participants residing within 100 meters of a mobile phone tower and Group II had 36 participants residing in areas without nearby mobile phone towers. Data was collected using a structured proforma regarding general health, medical history, duration of mobile phones, duration of residence. Heart rate, systolic blood pressure, and diastolic blood pressure were measured using standard procedures. Statistical analysis was done using SPSS software.

Results: The heart rate and systolic blood pressure were increased in Group I compared to Group II and was statistically significant. The diastolic blood pressure was also increased in Group I but was not statistically significant.

Conclusion: The results show that there may be association between the radiofrequency radiation from the mobile phone towers and the alterations in the cardiovascular parameters. Hence further large scale longitudinal students are required to clarify the long-term health implications.

Keywords: Radiofrequency Radiation, Mobile Phone Towers, Heart Rate, Blood Pressure, Cardiovascular Effects.

DOI: 10.25258/ijcpr.18.5.66

Introduction

With the extensive use of mobile communication worldwide, the possibility of RF-EMF exposure from mobile phone towers has become widely prevalent. These towers transmit RF radiation in the MHz to low GHz range at a constant rate to support wireless connectivity. This raises the public health concern of potential exposure of non-thermal biological effects beyond safety threshold. Although international regulations like those by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) are designed to prevent thermal tissue damage, there is scientific controversy as to the extent of impacts of chronic low-level RF exposure on physiological systems such as cardiovascular regulation. [1]

Heart rate (HR) and heart rate variability (HRV) are important markers of autonomic nervous system activity and cardiovascular health. HRV reflects the dynamic interplay between sympathetic and parasympathetic control of cardiac function, and changes in HRV have been linked to stress, disease risk, and environmental exposures. Most of the epidemiological and experimental studies performed concentrate on RF exposure from mobile handsets rather than exposure from base stations. Hence, it is increasingly being

investigated if continuous exposure to RF-EMF can influence cardiac endpoints in a subtle manner [2,3]. Studies have shown that exposure of EMF was associated with sympathetic predominance suggesting long-term cardiovascular risk. [4]

Human experimental studies have recently studied the effects of RF signals on cardiac autonomic parameters. Studies show that adults exposed to EMF showed variations in HRV indicating the involvement of the autonomic nervous system [5]. In addition, systematic reviews of human volunteers show that while RF-EMF exposure does not seem to have a statistically significant effect on resting heart rate per se in most instances, the effects on HRV may be heterogeneous and likely depend on the exposure context, physiological state, and methodological rigor [6]. Although those findings are quite mixed, they do indicate the need for studies of the base station RF exposure, which is distinct from handset exposures in terms of characteristics of the signal, duration, and patterns in population exposure. Knowledge of such effects is becoming increasingly valuable due to the greater density of wireless infrastructure, given that long-term health consequences of low-level RF radiation are still a major issue.

Aim & Objective

1. To assess the effect of Wi-Fi radiation from mobile phone towers on cardiovascular parameter namely heart rate among exposed individuals compared to non-exposed individuals over the study period.
2. To assess the association between distance from mobile phone towers and heart rate variation.

Materials and Methods

This study was a cross-sectional study. Ethical approval was obtained from the Institutional Ethical Committee. Informed consent of all participants was obtained.

The participants were selected randomly from the Kancheepuram district considering their proximity to mobile telephone towers. The proforma included information regarding their general background, medical history, years of staying in the town, and duration of mobile phone usage.

The study population was divided into 2 groups:

- **Group I:** Comprised healthy participants living within 100 meters of a mobile phone tower and exposed to Wi-Fi radiation, including 13 males and 23 females.
- **Group II:** Comprised healthy participants with no exposure to Wi-Fi radiation from mobile phone towers, including 13 males and 23 females.

Inclusion Criteria:

- Ages between 20 and 40 years
- Both males and females

Exclusion Criteria:

- History of smoking, hypertension, diabetes mellitus, cardiovascular disorders, respiratory disorders, psychological disorders, or cerebrovascular accidents.
- Employees of IT industry.
- Those with regular exercise regimens, yoga practices, meditation.

Participants were instructed to report to the Research Laboratory, for evaluation. Heart rate and Blood pressure were recorded.

Results

Table 1 shows the baseline characteristics and exposure related variables of the two groups.

Table 1: Parameters and groups

Parameters	Group I	Group II	t value	P value
Age	30.75±6.03	30.41±6.40	0.290	0.774
Height	155.4±6.3	158.9±8.7	- 2.129	0.040
Weight	57.1±5.4	56.7±6.8	0.221	0.827
D.O.S(mths)	37.75±25.13	72.11±29.60	-5.068	0.000
D.O.M(mths)	62.25±35.76	34.61±28.30	1.994	0.054
D.O.T (mins/day)	256.94±139.8	110.83±69.4	5.074	0.000
Mean HR (Beats/min)	88.13±3.6	78.83±4.1	4.06	0.000

All the values are expressed as mean ± standard deviation. The Student's t-test was used to compare parameters between Group I and Group II. A p value < 0.05 was considered statistically significant at the 95% confidence level, and a p value < 0.001 was considered highly significant at the 99% confidence level. All analyses were performed using SPSS software (version 15.0).

Discussion

The present study assessed the impact of exposure to electromagnetic radiation coming from mobile phone towers on cardiovascular parameters in healthy individuals, mainly the heart rate. The results illustrate how subjects residing within 100 meters of mobile phone towers had a significantly

higher resting heart rate than subjects on the receiving end of no or low levels of mobile phone radiation.

Baseline age and weight characteristics were similar in the two groups, presenting little confounding from these variables. Height was a statistically significant factor, but its effect on cardiovascular autonomic regulation is limited in clinical practice.

An interesting finding in this study was the significantly increased talk per day (D.O.T) rates among the exposed group. Thus, in addition to being exposed to environment by mobile towers, we should also consider that personal mobile phone use may also be able to provide electromagnetic field (EMF) exposure. Previous studies show that time spent using mobile phones also affects autonomics and heart responses with prolonged use [7,8].

The most noteworthy result of this study is the notable increase in mean heart rate in the exposed population. An elevated heart rate is a result of increase in the sympathetic activity or decreasing parasympathetic tone. This is consistent with the idea that EMF can increase the sympathetic activity. Other studies have found similar effects on heart rate variability (HRV), showing that the presence of electromagnetic radiation resulted in a reduction of vagal and autonomic activity [9,10].

The World Health Organization (WHO) has recognized that exposure to electromagnetic fields (EMF) can provoke detectable biological changes although the ultimate effects of these technologies can be lengthy and still be determined [11].

Studies have shown that EMF may influence cellular processing, ion channel activity, and neuroendocrine pathways, as well as regulation of autonomic nervous system [12].

The processes contributing to such modifications might be of EMF thermal or non-thermal nature. Nonthermal properties can modulate neuronal excitability, autonomic response and might result in upregulation of catecholamines and increased HR [12,13].

Conclusion

The study shows that being close to mobile phone towers is linked with elevated resting heart rate reflecting autonomic imbalance, but however other confounding factors should also be considered.

Limitation of the study: A cross-sectional design of the study limits causal interpretation. Also, the longer duration of usage of mobile phones in the exposed group may be a potential confounding factor. Other factors like stress, physical activity, environmental factors etc were not controlled. They might also influence the autonomic function.

Ethics committee approval: Ethical clearance was obtained from Institutional Human Ethical Committee of Sree Balaji Medical College & Hospital, Chennai, Tamil Nadu, and India.

Dated: 15.10.2012. Ref No. 935/SBMC/IHEC/2012-105.

Author's contribution:

- Dr. Mahila. S. – Conceptualization, methodology and data collection
- Dr. Ilham Jaleel – Writing- original draft, review and editing.
- Dr. P.R. Devaki – Supervision and Validation.

References:

1. Michelant S, Selmaoui B. Impact of radiofrequency electromagnetic fields on cardiac activity at rest: a systematic review of healthy human studies. Bioelectromagnetics. 2025.
2. Alharbi N, Alassiri M. The effect of exposure to mobile phones on electrical cardiac measurements: a multivariate analysis and a variable selection algorithm to detect the relationship with mean changes. Int J Cell Biol. 2024; 2024:7093771. doi:10.1155/2024/7093771.
3. Wallace J, Andrianome S, Ghosn R, Blanchard ES, Telliez F, Selmaoui B. Heart rate variability in healthy young adults exposed to global system for mobile communication (GSM) 900-MHz radiofrequency signal from mobile phones. Environ Res. 2020;191:110097. doi:10.1016/j.envres.2020.110097.
4. Parizek D, Visnovcova N, Hamza Sladicekova K, et al. Electromagnetic fields: do they pose a cardiovascular risk? Physiol Res. 2023;72(2): 199–208. doi:10.33549/physiolres.934938.
5. Dale S, Reiz R, Popa S, Ardelean-Dale A, Keller J, Geier JU. Evaluating the effect on heart rate variability of adults exposed to radio-frequency electromagnetic fields in modern office environment. Int J Adv Comput Sci Appl. 2024;15(6). doi:10.14569/IJACSA.2024.0150609.
6. Mansourian M, Marateb HR, Nouri R, Mansourian M. Effects of man-made electromagnetic fields on heart rate variability parameters of the general public: a systematic review and meta-analysis of experimental studies. Rev Environ Health. 2023;39(3):603–616. doi:10.1515/reveh-2022-0191.
7. Bortkiewicz A, Gadzicka E, Szymczak W. Mobile phone use and risk for intracranial tumors and cardiovascular effects. Med Pr. 2012;63(5):613–21.

8. Bortkiewicz A, Zmyślony M, Szyjkowska A, Gadzicka E. Subjective symptoms reported by people living near mobile phone base stations. Med Pr. 2004;55(4):345–51.
9. Havas M. Radiation from wireless technology affects the blood, the heart, and the autonomic nervous system. Rev Environ Health. 2013;28(2–3):75–84.
10. Braune S, Riedel A, Schulte-Mönting J, Raczek J. Influence of a radiofrequency electromagnetic field on cardiovascular and hormonal parameters of the autonomic nervous system in healthy individuals. Radiat Res. 2002;158(3):352–6.
11. World Health Organization. Electromagnetic fields and public health. Geneva: WHO; 2014.
12. Hyland GJ. Physics and biology of mobile telephony. Lancet. 2000;356(9244):1833–6.
13. Szmigielski S. Cancer morbidity in subjects occupationally exposed to high-frequency electromagnetic radiation. Sci Total Environ. 1996;180(1):9–17.