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Impact of Envirocare and Envirochip on Heart Rate Variability (HRV) and Resting Heart Rate (RHR): A Controlled Interventional Study

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Abstract

The increasing use of wireless devices emitting non-ionizing electromagnetic fields (EMF) has raised concerns about their potential health impacts and heightened stress levels in various settings, including the workplace and at home. These concerns are especially pertinent in relation to cardiovascular parameters. This controlled interventional study explored the impact of Envirocare and Envirochip in protecting/ improving HRV and RHR. Seventy seven healthy participants aged 18-60 years were enrolled. HRV and RHR were recorded under four conditions: baseline, with Participants using Envirocare , during mobile phone use by the participants, and during mobile phone use with Envirochip by the participants. Significant differences were observed in RHR and HRV between baseline and Envirocare, as well as between mobile phone and Envirochip groups. These findings highlight the potential influence of EMF exposure on cardiovascular parameters and suggest a role for Envirochip in mitigating these effects and benefit of using the Envirocare to enhance health parameters.

Keywords: heart rate variability; envirocare; envirochip; resting heart rate

Introduction

The electromagnetic emmisions from the devices such as computers, mobile phones, routers, and other wireless devices has become an integral part of our daily lives. With over 5 billion individuals globally using wireless devices, it is difficult to imagine our lives without these technologies. However, the rapid development of wireless communication has led to concerns about the potential health effects of non-ionizing electromagnetic fields, particularly from mobile phones. Excessive use of wireless devices, especially among young children and adolescents, has raised concerns among health and educational authorities [1] due to the negative impact on human tissues and organs, specifically the cardiovascular system (CVS). Research has demonstrated that the usage of mobile phones exerts a substantial impact on heart rate variability (HRV) and resting heart rate (RHR) in human subjects. This influence is attributed to the electromagnetic fields emitted by mobile phones, which have been correlated with alterations in autonomic nervous system function, primarily due to interference in internal communication system of the body, thereby affecting HRV and RHR. Extended exposure to mobile phone emmssions can disrupt the balance within the autonomic nervous system, culminating in reduced HRV and elevated RHR. These effects become notably pronounced during phone calls or when individuals keep their phones in close proximity to their bodies for extended durations. While a comprehensive understanding of the precise mechanisms underlying this phenomenon necessitates further investigation, it is evident that excessive and prolonged mobile phone use presents a potential health hazard for individuals who heavily rely on these devices. Consequently, it is advisable for individuals to mitigate their exposure to mobile phones by utilizing hands-free devices or by curtailing their phone usage whenever feasible.

Furthermore, it is imperative to recognize that electromagnetic emissions possess the capability to induce alterations in HRV. Research findings have indicated that a decline in HRV is associated with an escalated risk of sudden cardiac death, particularly among individuals already afflicted with heart diseases. This reduction in HRV amplifies the susceptibility to life-threatening arrhythmias and heightens the overall risk of mortality [2-4]. Studies by Thomas et al. (2018) [5] and Lin et al. (2019) [6] have demonstrated alterations in HRV associated with

mobile phone use, suggesting potential autonomic nervous system disruption. Understanding the relationship between EMF and these cardiovascular parameters is essential for assessing health risks. Concurrently, several investigations conducted by researchers have unveiled a spectrum of pathological effects associated with mobile phone usage. These effects encompass skin burns, miscarriages, headache [7], extreme irritation [8], decrease in reflexes, blurring of vision, increase in heart rate, inflammation in the eyes, change of sleep patterns [9], regional cerebral blood flow, and stress due to negative thermic effects on living organisms. However, it is noteworthy that only a limited number of studies have reported no discernible harmful effects on the human body. This wide array of findings underscores the multifaceted nature of the impact of mobile phones on human health, calling for continued research and comprehensive understanding of these effects to inform public health policies and guidelines.

Despite the mounting evidence, only a handful of studies have ventured into investigating the influence of mobile phone usage on HRV and RHR parameters. This research aims to bridge this gap by comprehensively examining how the mobile phone usage affects HRV and RHR among participants, shedding light on the potential health implications of prolonged exposure. It has also been observed that the optimum Vibratory Frequency of the body is disturbed by stress and can lower immunity levels [10-11]. To address these concerns and explore potential solutions, this study delves into the impact of EMF exposure on HRV and RHR and evaluates the efficacy of two innovative technologies—Envirocare and Envirochip—developed by Syenergy Environics Ltd., India. Envirochip is engineered to neutralize the effects of man-made EMF emissions from wireless devices by altering the nature of emitted radiofrequency radiation (RFR), rendering it non-bio-effective and neutralizing the harmful impact on the human body [12-13]. Envirocare serves as an immunity enhancer device, designed to maintain the natural bio-frequency of the body [14] This enhancement is believed to expand the size and radius of the Ionic Body (Aura), thereby fortifying the body's immune system, improving HRV, RHR, sleep efficiency, and bolstering overall resistance to diseases.

Materials and Methods

Subjects

A total of 77 healthy participants aged 18-60 were enrolled in this controlled interventional study, however data of only 70 subjects were analysed as 7 subjects dropped out due to absenteeism or incomplete data. The study was conducted at the Apollo Hospital, New Delhi, India, after approval by its institutional ethics committee- Biomedical Research, vide letter no IAH- BMR-001/01-22, RP-32/2021). The study has been registered with the clinical trial registry of India CTRI/2022/05/042367 [Registered on: 04/05/2022]. A full, free, and voluntary informed consent was obtained from all the subjects and/or their legal guardian(s). The study enrolled a cohort of individuals who were in good health, free from any ongoing medical conditions, and provided informed consent to participate in the research. In preparation for data collection, participants were instructed to abstain from consuming food, beverages, and snacks for a period of thirty minutes before the data gathering process. Data collection commenced only after participants confirmed their compliance with these guidelines. Additionally, participants were encouraged to relax, and individuals exhibiting higher-than-usual stress levels at the time of data collection were excluded from the study to ensure the reliability of the results. Furthermore, stringent exclusion criteria were applied to the participant selection process. Individuals with pre-existing cardiovascular, metabolic, or neurological disorders, as well as those taking medications known to influence cardiorespiratory responses, were deliberately excluded from the study. This approach was adopted to maintain the homogeneity of the study group and minimize potential confounding factors. Additionally, participants were provided with assurances regarding the confidentiality of their personal information. The study's rationale and the terminology used in the questionnaire were thoroughly explained to each participant to ensure their understanding and informed participation in the research.

Inclusion Criteria

- Healthy participants between 18-60 years who were willing to participate in the study.
- The participants who were not suffering from any Heart related chronic disease.

Exclusion Criteria

- People suffering with any Heart related disorder or any chronic physical illness.

- People with any chronic respiratory problem (including nasal congestion, chest infections, asthma, adenoids, allergic rhinitis etc), having any device like pacemaker/ implants with electrical interface/batteries, cochlear implants, and a pregnant woman.
- People on regular medication.

Data collection

Following the completion of the data collection forms and obtaining informed consent from each participant, heart rate variability (HRV) and resting heart rate (RHR) data were systematically recorded. The HRV and RHR data for each included subject were recorded in four distinct states:

1. **Normal Data at Rest:** Baseline HRV and RHR measurements were obtained while participants were in a resting state, providing a reference point for their physiological parameters.
2. **Data During Envirocare Usage:** The second set of data was recorded while participants were wearing the Envirocare device, enabling the assessment of any potential effects of Envirocare on HRV and RHR.
3. **Data During Mobile Phone Usage:** The third set of data was collected while participants engaged in active mobile phone usage, such as making calls. This stage aimed to capture the impact of mobile phone radiation on HRV and RHR.
4. **Data During Mobile Phone Usage with Envirochip:** The final set of data was acquired while participants were actively using their mobile phones with the Envirochip affixed to the back of the device at a predefined location. This configuration allowed for an evaluation of the combined influence of mobile phone usage and the Envirochip on HRV and RHR.

It is important to note that, in addition to assessing the effects of mobile phones and Envirocare/Envirochip individually, corrective measures were taken to account for radiofrequency radiation (RFR) emanating from nearby Wi-Fi devices, computers, and laptops. This was achieved by applying the Envirochip before recording HRV and RHR measurements. To ensure the reliability and validity of the collected data, three readings were obtained for each condition, thereby enhancing the reproducibility of the results. For baseline HRV, the average of three readings taken in the resting state was calculated for all subjects. Subsequent sets of data were obtained by averaging three readings for each respective condition: Envirocare usage, mobile phone usage, and mobile phone usage with Envirochip. This meticulous approach to data collection aimed to provide a comprehensive understanding of how these factors influence HRV and RHR, allowing for robust and reliable analyses. To collect heart rate variability (HRV) and resting heart rate (RHR) data, the study employed the Elite CorSense HRV Monitor, a device developed by EliteHRV in the United States. This sophisticated device is compatible with mobile phones and utilizes the Elite HRV app for data management. It is specifically designed to measure HRV and RHR by detecting cardiac pulses through a high-quality 500-hertz multi-wave sensor array, which is renowned for its accuracy in assessing parasympathetic modulation.

The Elite CorSense HRV Monitor connects to HRV apps via Bluetooth technology to transmit the gathered data for analysis. While some minor variations may exist in comparison to data obtained from other HRV measurement tools like Kubios HRV 2.2, researchers widely acknowledge the reliability of the Elite smartphone HRV application. It is considered comparable to hospital-grade 5-lead EKG/ECG equipment for the assessment of HRV and RHR.

The device itself is equipped with several advanced features, including three multi-wavelength LED emitters, five large visible spectrum photodetectors, and one infrared detector. These components work in concert to ensure precise and consistent data collection. Additionally, the Elite CorSense HRV Monitor incorporates a rechargeable Lithium-Ion battery with a capacity of 150mAH, ensuring sustained operation during data collection sessions. Furthermore, the device has been meticulously calibrated to measure relevant biomarkers accurately and is capable of compensating for potential variations in skin tone and circulation factors. This comprehensive and technologically advanced device was employed to ensure the accuracy and reliability of the HRV and RHR measurements in the study.

Mobile Phone, Envirocare, and Envirochip application

The study utilized a Redmi Note 4 android mobile phone equipped with a robust 4100 mAh battery. To investigate the effects of Envirochip, this innovative technology was affixed to the back of the mobile phone as well as the laptops used by the participants. Ensuring uniformity and consistency across the study, the same mobile phone was employed for all

participants, minimizing any potential variations attributable to different devices.

Figure 1: Envirochip fixed on both panels of a laptop.

Figure 2: Envirochip fixed at back side of the mobile phone.

As per a study study published in Current Advances in Neurology and Neurological Disorders revealed that prolonged exposure to the Radiofrequency emissions from the Mobile Phones can affect brain activity and Envirochip has the potential to reduce the over excitability in alpha and theta bands [15].

Figure 3: Envirocare Card.

Figure 4: Envirocare Pendant.

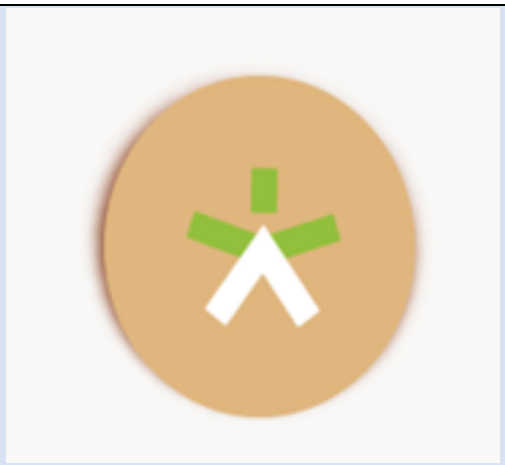

Figure 5: Envirocare Patch.

Envirocare was worn by the participants in various forms - a patch, Pendant or card, as per their choice. Envirocare enhances an individual's immunity, which in turn can lead to improvements in other aspects of health, including sleep efficiency, stress management, and heart health, etc.

Statistical Analysis

T-test and ANOVA were used to see the mean difference between two or more than two groups respectively. Descriptive statistics were used in this study to summarize data from the sample utilizing indexes, including means, and SD. Paired t-test were used to see the difference between the two groups with different variables i.e. HRV, RHR, RMSSD, SDNN, HF Power, RHR, and PNN50.

All statistical analysis was done using STATA 15.1 software and all tests were two-sided and the p-value was considered <0.05 as significant.

Results

Out of 77 subjects enrolled in the study, 70 subjects were taken for the final analysis. Seven subjects dropped out of the study due to absenteeism or incomplete data.

Envirocare

There was a statistically significant difference between baseline and Envirocare in terms of RHR (78.3±5.2) vs (75.1±2.1), p<0.001 and overall HRV (61.0± 7.6) vs (64.1± 4.7) . We did not find any statistically significant difference between other variables (table1).

Table 1

	Baseline	Envirocare	
Factor	Mean±SD (N=20)	Mean±SD (N=20)	p-value
RMSSD, mean ±SD	71.3 ±26.0	72.3 ±23.7	0.81
SDNN, mean ±SD	84.9 ±28.5	84.8±28.1	0.99
HF Power, mean ±SD	2009.1 ±1897.2	2355.7±1951.1	0.29
RHR, mean ±SD	78.3±5.2	75.1±2.1	<0.001
PNN50, mean ±SD	35.0±15.5	35.0±12.6	0.99
HRV, mean ±SD	61.0± 7.6	64.1± 4.7	0.004

Envirochip

We found statistically significant difference between the mobile phone and Envirochip group in terms of RMSSD (64.4±20.5) vs (74.8 ±26.1), p<0.01; ISDNN (76.8 ±27.6) vs (90.0±36.6), p<0.012.; HRV (64.0 ± 5.5) vs (57.8±6.0), p<0.001, RHR (83.2±4.7) vs (76.4±2.6), p<0.001; and PNN50 (31.8±11.8) vs (36.2±11.8), p<0.031. there is no significant difference in terms of HF Power. (Table2).

Table 2

Factor	Mobile Phone	Enviorchip	p-value
RMSSD, mean ±SD	64.4 ±20.5	74.8 ±26.1	0.01
SDNN, mean ±SD	76.8 ±27.6	90.9 ±36.6	0.012
HF Power, mean ±SD	2439.4 ±2880.2	2746.2 ±2347.5	0.49
RHR, mean ±SD	83.2 ±4.7	76.4 ±2.6	<0.001
PNN50, mean ±SD	31.8 ±11.8	36.2 ±11.8	0.031
HRV, mean ±SD	64.0 ± 5.5	57.8±6.0	<0.001

The data indicates that there were significant improvements observed in Resting Heart Rate (RHR) and Heart Rate Variability (HRV) as a result of the interventions involving Envirochip and Envirocare. RHR decreased among the participants who used both Envirocare and Envirochip. Multiple studies have revealed that an elevated RHR is associated with adverse effects on heart health, overall well-being, and increased mortality rates [16-19]. Conversely, Heart Rate Variability (HRV) exhibited significant improvements and increases as a result of these interventions. Extensive literature supports the notion that decreased HRV is linked to higher morbidity, elevated stress levels, increased blood pressure, and higher heart rates [20-24].

Discussion

The concerns about the health effects of non-ionizing electromagnetic fields, such as those emitted by mobile phones, have been the subject of numerous studies. Research by Meral et al. (2017) [25] and Kheifets et al. (2010) [26] has shown associations between mobile phone use and various health issues, including changes in heart rate, headaches, and sleep disturbances. These findings underscore the need for further investigation into the impact of EMF on human health. Excessive use of mobile phones raises concerns about its exposure, particularly among young individuals, and its potential health consequences. These concerns have significant implications for public health policies and guidelines. Research by Redmayne and Johansson (2015) [27] emphasizes the importance of precautionary measures and the need for public awareness regarding EMF exposure.

The impact of electromagnetic fields (EMF) on heart rate variability (HRV) and resting heart rate (RHR) is a critical topic of concern, as it has far-reaching implications for public health. Emerging research has suggested that prolonged exposure to EMF, primarily from ubiquitous wireless devices like mobile phones, can disrupt autonomic nervous system function, resulting in altered HRV patterns and elevated RHR. These physiological changes are indicative of potential cardiovascular stress and may have broader implications for overall health. Therefore, understanding the relationship between EMF and these cardiovascular parameters is pivotal for informed decision-making, public awareness, and the development of guidelines to mitigate potential risks associated with the pervasive use of wireless

technology. This topic warrants comprehensive investigation and dissemination of findings to ensure that the public is well-informed about the potential consequences of EMF exposure on cardiovascular health.

Recent findings from the Deccan College of Medical Sciences (DCMS) study have bolstered this evidence by revealing a statistically significant change in average heart rate and time between beats when a mobile phone is in direct contact with the ear compared to when it is connected using earphones. The findings suggest that prolonged exposure to EMF may lead to cardiovascular stress. The study also introduces Envirocare and Envirochip as potential interventions to mitigate these effects and improve other health conditions.

Limitations of the study

This study's main drawbacks are its limited number of participants and the fact that they all came from the same racial background. Additionally, the participants were all healthy individuals, which doesn't accurately mirror real-life situations. Furthermore, none of the subjects had any other medical conditions or reported experiencing stress or disorders, making them different from the broader population.

Conclusion

Use of Envirocare and Envirochip in controlled conditions has demonstrated promising effects on HRV and RHR. Recognizing the profound influence of HRV and RHR on an individual's emotional and physical well-being, and considering the favourable outcomes observed in this preliminary study, it is imperative to initiate broader population-based investigations encompassing various aspects of human health within real-world contexts. This approach will provide a more comprehensive understanding of the potential benefits of these technologies.

Declarations

Availability of data and materials

All data are included in the manuscript.

Competing interests

The authors declare no competing interests.

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