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Effect of Wi-Fi Radiation on Heart Rate Variability, Salivary Cortisol Level and Cognition

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

The study aims to analyse the effects of Wi-Fi radiations from mobile phone towers on the level of salivary cortisol , its effects on cardiovascular system , and on the cognitive levels of the subjects. on thirty six subjects exposed to Wi-Fi radiation from mobile phone tower (Group I) and thirty six subjects not exposed to Wi-Fi radiation from mobile phone tower (Group II). The frequency domain parameters of Heart rate variability, salivary cortisol level between both the groups was statistically significant. LF,LF/HF component was increased in Group I, HF component was increased in Group II which signifies parasympathetic withdrawal and sympathetic dominance in Group I. Cognition level was slightly increased in Group II but not statistically significant between both the Groups.

Keywords: WiFi; salivary cortisol; WI-FI radiation effect.

1. INTRODUCTION

Radiation is becoming a life threatening issue in recent times especially the sensitivity too electromagnetic fields [1-2]. The usage of Wi- Fi technology is become unavoidable in day today life. Electromagnetic radiations disarray our body's mechanisms thereby disturbing homeostasis, which ultimately lead to different pathologies, inclusive of our vital organs [3-9].

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They even damage the DNA. The majority of the disorders reported due to this radiations are cardio issues,fatigue.Hence this study aims to correlate the cortisol levels with cardiovascular system and cognition in humans who are under the scorching effect of electromagnetic radiations and also effect of Wi-Fi radiation from mobile phone towers on Heart rate variability, salivary cortisol level and cognition[9].

2. MATERIALS AND METHODS

Study design: This study is a cross-sectional, experimental study.

Sampling: The information of the location of the tower was obtained. The subjects were recruited from the Kancheepuram district. They were randomly selected based on the list given by e local body.

Subject group: 72 healthy volunteers were recruited. They were divided into groups. Both the groups were age and sex matched.

1. **Group I:** Healthy subjects who were exposed to Wi-Fi radiation within I 00 mts of location of mobile phone tower (n-36).
2. **Group II:** Healthy subjects who were not exposed to Wi-Fi radiation (n-36).

2.1 Inclusion Criteria:

1. Age: 20-40 yr.
2. Gender: Both males and females
3. Group-I: Healthy subjects exposed to Wi-Fi radiation from mobile phone towers.
4. Group-II: Healthy subjects not exposed to Wi-Fi radiation from mobile phone towers.

2.2 Exclusion Criteria:

1. Subjects less than 20yrs and more than 40 yrs.
2. Subjects with h/o smoking.
3. Subjects with h/o HT, DM, cardiovascular disorders, respiratory problems, psychological disorders, neurological disorders and cases of cerebrovascular accidents.
4. Subjects working in IT industry.
5. Subjects on regular exercise, yoga, meditation
6. Subjects with oral/dental problems.

The study group 1 with healthy subjects who were exposed to Wi-Fi radiation within 100 mts of location of mobile phone tower (n-36) and group 2 are Healthy subjects who were not exposed to Wi-Fi radiation (n-36).after the biochemical test the heart rate variabilities are assessed. Anthropometric measurements were done. The RA electrode was placed over right wrist, LA electrode is placed over left wrist, LL electrode placed over the right wrist with a spacing of 3cm from the RA electrode. These electrodes were connected to channel I of Bio Amp cable and lead II ECG is recorded for 10 mins.

3. RESULTS AND DISCUSSION

The Frequency domain measures in normalized units LF,HF,LF/HF, Time domain measures - SDNN.RMSSD, mean R-R,mean HR, the level of cortisol in saliva, and the total score of cognition of the 10 subtests in the PGI cognition scale, in Group I and Group II. Mean HR-mean heart ra te , S.Cortisol - salivary cortisol levels and Cognition score in Group I and Group II. The cortisol and heart rates when observed ,the LF component, LF/HF, mean HR and salivary cortisol levels are increased in Group I compared to Group II. The HF component and cognition score is increased in Group II compared to Group I. there is a positive correlation between the duration of stay and level of cortisol in saliva in Group1. the level of salivary cortisol is increasing the high frequency component of HRV is decreased .It shows a negative correl at ion.

In this study where the frequency domain measures of Heart rate variability namely the LF,HF ,LF /HF ratio ,time domain measures were recorded . To study the outcome of the effects in the central nervous system, the level of cognition was assessed in subjects exposed to Wi-Fi radiation within 100 meters of radius of location of mobile phone towers **(**Group I,n =36) and also in those who were living in area where there was no mobile phone tower. (Groupl**,** n =36).

Group I - Healthy subjects who were exposed to Wi-Fi radiation within 100 mts of location of mobile phone tower. Males were 13 in number, Females were 23 in number. Group II- Healthy subjects who were not exposed to Wi-Fi radiation from mobile phone tower. Males were

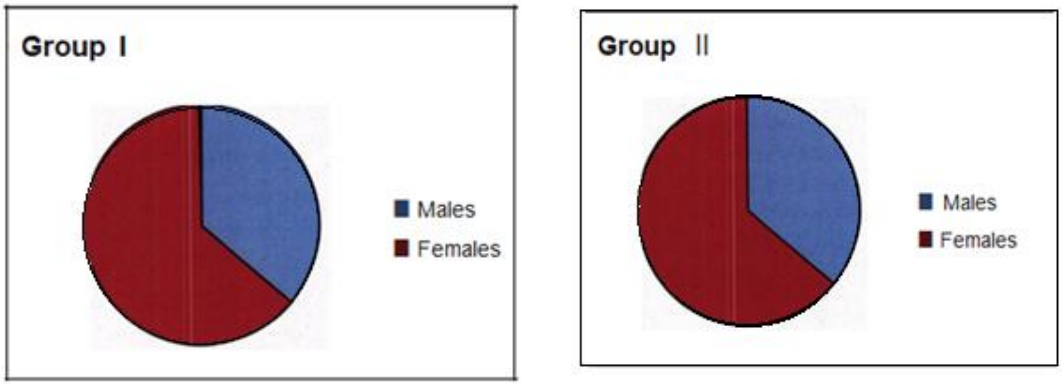

Fig. 1. Depicting the distribution of males and females in Group I and Group II categories of the study

Table 1. Baseline demographic details - the physical and clinical characteristics of Group I and Group II

Parameters	Group 1 Mean±S.D	Group II Mean±SD	t value	p value
Age (yrs)	30.75 ±6.03	30.41 ±6.40	0.290	0.774 ns
Height (cm)	155.4 ±6.3	158.9 ±8.7	-2.129	0.040 *
Weight(kg)	', .- 1 ±5.4	56.7 ±6.8	0.221	0.827 ns
D.O.S (months)	37. 75 ±25.13	72.11 ±29.60	-5.068	0.000**
D.O.M (months)	62.25 ±35.76	34.61 ±28.30	1.994	0.054 ns
D.O .T (mins /da y)	256.94 ±139.89	110.83 ±69.46	5.074	0.000**
SBP(mmHg)	129.02 ±17.76	120.69 ±8.46	2.391	0.022*
DBP(mmHg)	89.44 ±6.18	79.16 ±7.79	1.045	0.303 ns

**is significant (p <.05), **is highly significant (p <.001),is-not significan t*

13 in number, Females were 23 in number.Most of the research on health effects regarding adverse effects of non-ionising radiation were done on extremely low-frequency energy waves emitted by power stations, and cellular phones similar tour studyC Elevated levels of cortisol caused , reduced heart rate variablity , which is a marker for sympathetic activity leading to hypertension, increased heart rate indicating altered autonomic balance regulating the sinus node as observed by Paul et al and other groups [4-10]. Salivary cortisollevel was also statistically significant between both the Groups. It was increases. Salivary cortisol level was also statistically significant between both the Groups was increased.

4. CONCLUSION

From the above findings of our study, we can rightly declare that subjects m Group!, are becoming the ultimate victims to these electromagnetic radiations, due to the increased intensity of exposure to these electromagnetic radiations both from mobile phone towers and mobile phones, unlike Group II who were not a prey to radiations from mobile phone towers. Radiations from these modern day stressors, the mobile phones and mobile phone towers constantly pose a threat to the homeostasis unbalancing the normal biological system thereby affecting the human body to lose its ground to maintain chemical stability, causing

the cortisol present in the saliva to imbibe the damaging effects of these radiations which in turn enroutes to pose distress in the cardiovascular system and not spare the brain in the very long run .

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, participant's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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