

Exposure To High Frequency Electromagnetic Fields, Biological Effect And Health Consequences In Taif , Saudi Arabia

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Abstract: Background: Exposure to human-made electromagnetic fields (EMF) has increased over the past century. The widespread use of EMF sources has been accompanied by public debate about possible adverse effects on human health. The World Health Organization (WHO) established the International EMF Project to assess the scientific evidence of possible health effects of EMF in the frequency range from 0 to 300 GHz. Aims: To assess biological effect and health consequences of high frequency electromagnetic fields in Taif , Saudi Arabia. Setting and Design: This cross section study was conducted at population living in Taif city, Saudi Arabia. Methods and Material: A structured questionnaire was designed for data collection to this study by researchers based upon review of literature. It includes three parts ; Socio-demographic data, Location and exposure of the devices and consequences of high frequency electromagnetic fields. Questionnaire was randomly distributed through phone and emails to a sample of people living in Taif, their ages ranged from 10 years old and above, responded people were 373. Results: Out of 373 respondents there were 106 (28.4%) male and 267 (71.6%) female with common age group (21 - 30) years with percentage of (49.1%), most of participants used mobile phone 360(95.7%), with highest time duration between 5 -7 hours daily (26.3%), the common symptoms between participants was idle and lazy 185(49.2%), the most mobile phone users was students at university level with significant relation between them $P \leq 0.05$ and most children with hyperactivity use video games with no significant relation between them $P \leq 0.429$ Conclusion: In our search we found that; the mobile phone was most commonly used among students at university level with significant relation between them $P \leq 0.05$ and the highest duration time between 5 – 7 hours daily, the common symptoms between the participant was idle and lazy, and most children with hyperactivity use video games with no significant relation between them $P \leq 0.429$

Key words: Electromagnetic fields, biological effect, high frequency , mobile phone , university level , Taif city, Saudi Arabia.

1 INTRODUCTION

High recurrence electromagnetic fields are portions of the electromagnetic range between the low recurrence and the optical piece of the range. As this piece of the range is utilized for broadcasting and media transmission, it is named radio recurrence (RF) The RF range is characterized in the recurrence run between 9 kHz and 300 GHz.[1]Electromagnetic fields can be depicted as a progression of waves that waver at a specific recurrence and have a specific separation between one wave and the following – the wavelength. EMFs have an extremely wide scope of frequencies, stretching out from low recurrence power supply lines with wavelengths of somewhere in the range of several meters, through the radio and noticeable light frequencies, to exceptionally high-recurrence medicinal X-beams with wavelengths estimated in trillions of a meter. This range is appeared in the electromagnetic range. [2] The electromagnetic condition comprises of common radiation and man-made electromagnetic fields that are created either deliberately or as results of the utilization of electrical gadgets and frameworks. The regular electromagnetic condition starts from earthbound and extraterrestrial sources, for example, electrical releases in the world's climate and radiation from sun and space. Normal for regular fields is an exceptionally broadband range where arbitrary high pinnacle homeless people or blasts emerge over the clamor like continuum foundation. This regular foundation is requests of size underneath

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nearby field levels delivered by man-made RF-sources considered here. The regular utilization of gadgets and frameworks transmitting radio recurrence (RF) electromagnetic fields is ceaselessly expanding. Sources producing abnormal amounts of electromagnetic fields are normally found in restorative applications and at specific working environments. Restorative gadgets utilized for attractive reverberation imaging, diathermy, hyperthermia, different sorts of RF removal, medical procedure, and judgments may cause large amounts of electromagnetic fields at the patients position or locally inside the patient's body [3]

Unlike ultraviolet light, gamma rays and X-rays which are in the ionizing part of the electromagnetic spectrum .For decades we have been lead to believe by our governments and many institutions that are supposed to protect us that there is some kind of magical cut-off point between ionizing and non-ionizing radiation, that ionizing radiation is dangerous but that non-ionizing radiation is perfectly harmless. Non-ionizing radiation is potentially very harmful. Some scientists even believe it to be more harmful than ionizing radiation due to the insidious way it impacts our life.[1] Nearly everybody encounters some introduction to electromagnetic fields of different frequencies brought about by the utilization of electrical gadgets and remote correspondence systems. The basic part of that introduction originates from electromagnetic radiofrequency radiation (EMRR) of different frequencies from the recurrence band ranging from 88 to 5700 MHz, discharged by different frameworks of present day remote innovations, for example, radio and television broadcasting, open cell versatile correspondence frameworks or remote access to the Internet. The utilization of such frameworks makes regular introduction EMRR present in both workplace and open spaces. [4] Genuine intense wellbeing impacts of abnormal state presentation normally present

just in the work environment or medical use, are outstanding and perceived as identified with the warm impacts of electromagnetic vitality ingestion in the human body like incessant illness, migraine, aggravations in the rest, free in hunger . Aggravation of the center ear. [5] The international commission on non-ionizing radiation protection have research about this in 2009 [Exposure to high frequency electromagnetic fields, biological effects and health consequences (100 kHz-300 GHz)].in Saudi Arabia there is no research about this problem , For this reason we will work in this research (Exposure to high frequency electromagnetic fields, biological effect and health consequences in Saudi Arabia).

2 MATERIAL AND METHOD

2.1 Research design

Cross section study conducted in the period from September 2016 to July 2017 , in Taif city , Saudi Arabia.

2.2 Subjects of the study :

A sample of 373 were selected randomly by distribution of questionnaire through phone and email. i) Inclusion criteria: people above 10 years old, live in Taif, Saudi Arabia. ii)

Exclusion criteria: people who are not willing to participate in the study.

Tool of data collection: A structured questionnaire was designed for data collection by researchers based upon review of literature. It includes three parts.

First part: Socio-demographic data; (Age, Gender, Occupation, Nationality and Level of education).

Second part: Location and exposure of the devices.

Third part: suffering from disease.

2.3 Statistical analysis

Data coded and entered into computer for analysis using SPSS version 0.20. Descriptive statistical analysis was used to determine frequency distribution and demographic variables. Cross tabulation test used to assess level of education and the devices used and between infected child and the devices used.

The level of significance for this study was set at ($p = 0.05$) to detect any indication of differences found in the data available.

Ethical considerations: Informed consent was taken individually from each client before sending the questionnaire.

3 RESULTS

TABLE 1

Socio-demographic characteristics of study sample (N=373)

	Frequency	Percent
Gender:		
Female	267	71.6
Male	106	28.4
Total	373	100.0
Age:		
10-20	127	34.0
21-30	183	49.1
31-40	47	12.6
41-50	7	1.9
51-60	7	1.9
61-70	2	.5
Total	373	100.0
Education:		
Primary	5	1.3
Intermediate	8	2.1
Secondary	94	25.2
University	231	61.9
Postgraduate	34	9.1
Total	373	100.0
Job field:		
Education	188	50.4
Medical	54	14.5
Engineering	5	1.3
Management	15	4.0
Other	111	29.8
Total	373	100.0

*Table (1): This table represented that most of participant were female , age group ranged from (21-30yrs) , university and the job field were educational ,(71.6%), (49.1%), (61.9%)and (50.4%),respectively.

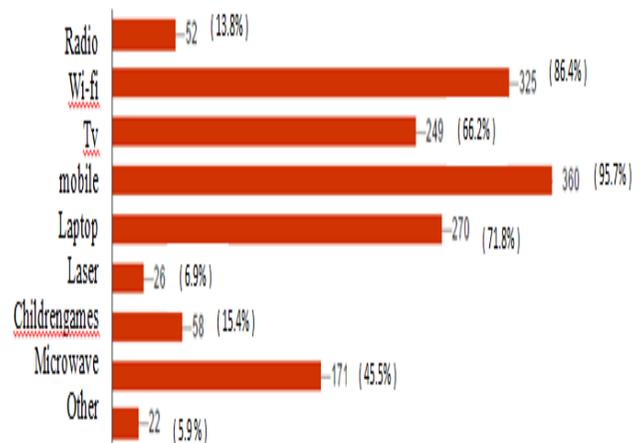


Fig (1): This graph Showed that (95.7%) of participants had used mobile.

TABLE (2)
Association between education level and the devices used, (N= 373)

Education level	Devices used				Total	P value
	Mobile phone	Wi-Fi	TV	Lap top		
Uneducated	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.3%)	0.05ns
Primary	5 (1.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (1.3%)	
Intermediate	7 (1.9%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	8 (2.1%)	
Secondary	89 (23.9%)	0 (0.0%)	5 (1.3%)	0 (0.0%)	94 (25.2%)	
University	210 (56.3%)	4 (1.1%)	16 (4.3%)	1 (0.3%)	231 (61.9%)	
Postgraduate	31 (8.3%)	1 (0.3%)	2 (0.5%)	0 (0.0%)	34 (9.1%)	
Total	343 (92.0%)	5 (1.3%)	24 (6.4%)	1 (0.3%)	373	

* Table (2): this table showed the most mobile phone user was students at university level of education 210(56.3%) with significant relation between them P:≤0.05

TABLE (3)
Association between Infected child and the devices used, (N= 373)

Infected child	Devices used				Total	P value
	Video games	Wi-Fi	TV	Lap top		
Hyperactivity	11 (2.9%)	1 (0.3%)	2 (0.5%)	0 (0.0%)	14 (3.8%)	0.429ns
Autism	0 (0.0%)	0 (0.0%)	2 (0.5%)	0 (0.0%)	2 (0.5%)	
Hyperactivity + Autism	5 (1.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (1.3%)	
No disease	326 (87.4%)	4 (1.1%)	21 (5.6%)	1 (0.3%)	352 (94.4%)	
Total	343 (92.0%)	5 (1.3%)	24 (6.4%)	1 (0.3%)	373 (100.0%)	

* Table (3): this table showed most children with hyperactivity use video games with no significant relation between them P:≤0.429

4 DISCUSSION:

The study included 373 Public who were randomly answer electronic survey closeted end quainter in Taif City, Saudi Arabia. As regard Gender, more than half (71%) of public were Female. age,nearly half (41.1%) of study publication were in the age of 21-30 years. Educations level, the majority is University(61.9%), and the minority is primary (1.3%), the

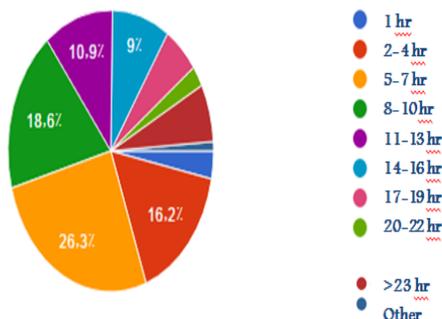


Fig (2) : This graph Showed that ; the time duration(5-7hrs) represented higher percentage (26.3%)

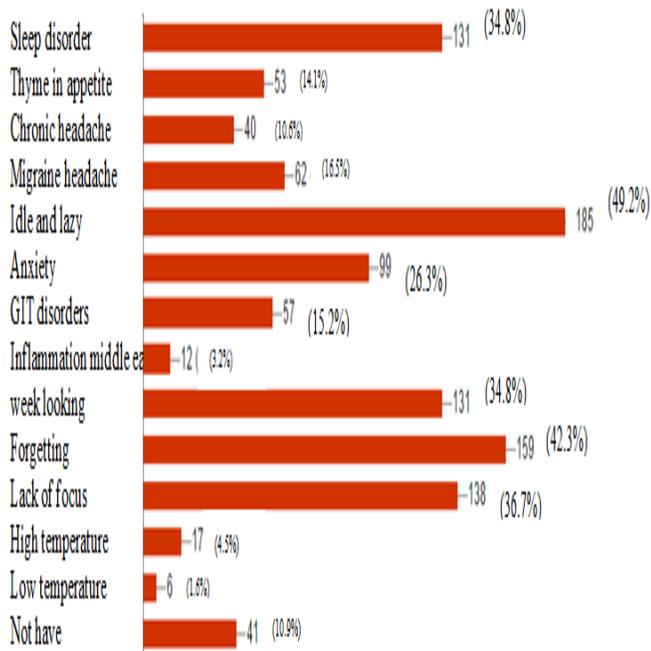


Fig (3) : This graph Showed that ; the idle and lazy is common symptoms by percentage(49.2%)

majority of participants job were in education field, and the minority were in engineering field as in table(1). Regards the equipment used in our whole life, the mobile phone is the most used by percentage (95.7%) as in graph (1). This result was coincided with Yakymenko, et al, 2010,[6]they reported: Intensive implementation of mobile telephony technology in everyday human life during last two decades has given a possibility for epidemiological estimation of long-term effects of chronic exposure of human organism to low-intensive microwave (MW) radiation. Latest epidemiological data reveal a significant increase in risk of development of some types of tumors in chronic (over 10 years) users of mobile phone. The majority of the participants use the equipment between 5-7 hours daily by percentage (26.3%) and the minority were between 20-22 hours daily, as in graph(2), this result was disagree with Ionut Andone,et al, 2016, they reported: Females use smartphones for longer periods than males, with a daily mean of 166.78 minutes vs. 154.26 minutes.[7] Symptoms that affect in our life , (34.8%) was have sleep disorder , (14.1%)was have thyme in appetite, (10.6%) was have chronic headache,(16.5%)was have migraine headache,(49.2%)was have idle and lazy as a high percentage,(26.3%)was have anxiety ,(15.2%) was have gastrointestinal disorders,(3.2%)was have inflammation of the middle ear , (34.8%) was have week looking,(42.3%) was have forgetting,(36.7%) lack of focus was have ,(4.5%)was have high temperature ,(1.6%)was have low temperature,(10.9%) was have no symptom, as in graph (3), this results was not coincided with Richard Mankiewicz, 2010, [8] he reported that: The most common reaction for a person sensitive to electromagnetic frequencies is a warm burning sensation in the area most affected. This could be the face or one side of the head, or even a general burning sensation throughout the body. According to association between used devices and education level of participant , there was significant correlation between them. The researcher found that: University level of the participants most mobile phone users, due to the use of electronic devices in the study and scientific research as in table (2), this result was coincided with Andrew Lepp, et al, 2015, [9] they reported: Presently, cell phone use is a dominant and defining characteristic of this generation of college students and often occurs during class time, while completing homework, and while studying. Regarding to association between infected child of the participants and the used devices,there was no significant correlation between them. Most children with hyperactivity use video games, as in table(3), this result was not coincided with : Doug Hyun, et al, 2009, [10] they reported, We suggest that Internet video game playing might be a means of self-medication for children with ADHD

5 CONCLUSION

In our search we found that; the mobile phone was most commonly used among students at university level with significant relation between them $P \leq 0.05$ and the highest duration time between 5 – 7 hours daily, the common symptoms between the participant was idle and lazy, and most children with hyperactivity use video games with no significant relation between them $P \leq 0.429$

6 RECOMMENDATIONS

More education programs about electromagnetic fields and its biological effect must be implemented in Taif community.

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