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Physiological Study Comprising the Sequelae of Magnetic Radiation on Human

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Abstract

The sequelae of magnetic radiation of the towers of cellular phones were evaluated in this study depending upon a random social volunteer human male samples of ages 25 – 50 years and they were dwelling in houses close to the towers of cellular phones of distances not more than 150 miters far. The samples of these people were labelled as "Subjected". Seventy five samples of blood were gained on a base of ages as twenty five from ages 25 – 30, twenty five from ages 35 – 40, and twenty five from ages 45 – 50 in addition to seventy five samples of people who did not dwell close to the towers and of the same previous pattern of ages and their samples were labelled as "Non subjected". The results have demonstrated a significant elevation in transaminases (AST , ALT), blood calcium (Ca^{++}), blood potassium (K^{+}), total serum cholesterol (TSCH), triacylglycerols (TAGs), very low density lipoprotein (VLDL), and low density lipoprotein (LDL) .

Keywords: *Magnetic waves, Radiation, Lipids.*

Introduction

In our recent life there is an increasing need for the use of cellular phones without the ability to get rid of them taking into our mind that these phones operate on base of radiofrequency emitting and receiving ranging from 400 to 2000 megahertz [(1)]. We know that the radiofrequency usage is not limited to the phones but it is also comprised in the medical appliances and therapy use [(2)]. The stress effects on different body systems is well known and the same like occur when the body is subjected to radiofrequency due to impact energy absorption which could afflict the cellular membranes structures and cause sever damages to various cellular and subcellular structures and body organs like the effects on glands such as pituitary, adrenal, hypothalamus and others and you know this will afflict the functions of the body as a whole [(3)]. Lipid profile, liver antioxidant enzymes, hepatic enzymes, renal functions, neuronal milieu, and others all are subjected to the risk of radiofrequency [(4, 5, 6)].

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Materials and Method

Specimens' collection

The specimens of blood were gained randomly from social volunteer human males of ages 25 – 50 years who were dwelling in Baghdad governorate close to the towers of cellular phones of distances not more than 150 miters far. The samples of these people were labelled as "Subjected". Seventy five samples of blood were gained on a base of ages as twenty five from ages 25 – 30, twenty five from ages 35 – 40, and twenty five from ages 45 – 50 in addition to seventy five samples of people who did not dwell close to the towers and of the same previous pattern of ages and their samples were labelled as "Non subjected". Once blood samples were collected as 5 ml/ people by the use of disposable syringes, they were poured into gel tubes to get blood serum to accomplish the necessary study parameters.

Study parameters

Special kits and a UV spectrophotometer (Apel – PD 303 UV, Japan) were used to perform all the study parameters.

► Total Serum Cholesterol, TCH (mg/dl)

Total serum cholesterol (TSCH) was estimated by using a special kit (Spinreact/CHOD – POD, SPAIN) according to the method of [7].

► Low density lipoprotein, LDL (mg/dl)

Serum LDL was obtained according to the formula: LDL-C = TC – HDL-C – TAG/5 [8].

► High density lipoprotein, HDL (mg/dl)

This was measured by using a chemical kit (HDL-Cholesterol (PTA) / Biolabo SA, France) according to [9].

► Serum very low density lipoprotein-cholesterol, VLDL (mg/dl).

Serum very low density lipoprotein was calculated by method of [8].VLDL = TAG / 5VLDL (mg/dl).

► Triacylglycerols (TAGs)

Triglycerides (TGs) are estimated by using a chemical kit (Triglycerides (GPO) / BIOLABO SA, France), depending upon the method of [10, 11].

► Blood Calcium level (mg/dl)

Blood Calcium level was estimated by the use of a special kit (Biomaghreb) according to method of [12].

► Blood Potassium level (mEq / l)

Blood Potassium level was estimated by the use of a special kit (Cypress Diagnostics) based on the method mentioned by [10, 13].

► Serum transaminases activity determination (Unit/ml)

ALT and AST enzymes were determined by the use of a special kit (Biomerrioux, Lyon-France) according to method of [14].

► Statistical analysis

Anova tests was depended to find the least significant differences (LSD) among groups by the use of SPSS version 21 program. *Numbers in tables represent the mean ± standard deviation.*

Results and Discussion

It is obvious when looking at the results (tables, 1 and 2) that all the human ages groups when continuously subjected to the radiofrequency of cellular phone towers have shown a clear significant elevations in serum AST, ALT, TSCH, LDL, VLDL, K^+, and Ca^{++} besides a significant declination in serum HDL comparing them with the values of people who were not continuously subjected to the radiofrequency of towers at ($P \leq 0.05$).

Dyslipidemia might be caused by obesity or due to consuming medications [15] and it was found that any disturbance in lipid metabolism could result in vascular pathological diseases [16]. Exposure to magnetic waves could result in different stages of peroxidation of lipids and formation of reactive radicals like oxygen reactive radicals and nitrogen ones and both of them besides the peroxidation could affect the different cellular compartments and affect also the lipid metabolism and carrying vehicles [17, 23]. The hepatic enzymes AST and ALT are considered as markers of stress and destruction of different body tissues since they are formed also by another boy regions or tissues like muscles, kidney, and heart [18, 19]. It was found that the exposure to radiofrequencies could result in elevations in cortisol which is a predisposing of stress besides their effects on redox cycles and peroxides production and hence the radiofrequencies cause the elevations of AST and ALT [22]. The elevations of blood calcium and potassium could result also by the frequency exposure as that these ions of great equilibrium in intracellular and extracellular compartments and they are carrying positive charges making the attracted to the negatively charged cellular membranes hence the disturbances caused by radiofrequency to the cell membranes and the destruction of them making the affinity towards these ions to be declined and much more ions could escape to extracellular compartments making them elevated in serum [20, 21].

***T*able (1). Human hepatic enzymes and electrolytes are affected by radiofrequency of mobile towers**

Ages (Years)	Groups	ALT (Unit/ml)	AST (Unit/ml)	Ca++ (mg/dl)	K+ (mEq / l)
20 - 25	Non subjected	b 46.4 ± 10.8	b 39 ± 12.8	b 9.5 ± 2.8	b 4.7 ± 2
	Subjected	a 63.6 ± 15.1	a 75.1 ± 10.7	a 109.4 ± 20.8	a 9.8 ± 2
30 - 35	Non subjected	b 44.5 ± 5.4	b 31.1 ± 6.4	b 10.7 ± 3	b 4.7 ± 2.1
	Subjected	a 63.8 ± 8.5	a 78.5 ± 8.6	a 107.3 ± 20.4	a 8.2 ± 3.6
40 - 45	Non subjected	b 44.5 ± 5.4	b 32.1 ± 7.4	b 11 ± 2.7	b 4.5 ± 3
	Subjected	a 69.5 ± 12.4	a 80.7 ± 12.5	a 109.5 ± 22.7	a 8 ± 3.9
LSD		10.7	35.1	97.3	3.16

Table (2). Human lipid profile is affected by radiofrequency of mobile towers

Ages (Years)	Groups	TCH (mg/dl)	TAGs (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
20 – 25	Non subjected	d 147.5 ± 8.7	d 127.5 ± 8.9	c 97.5 ± 8.9	c 24.1 ± 1.8	d 25.7 ± 1.7
	Subjected	b 340.2 ± 22.5	b 225.2 ± 21.7	b 163.5 ± 18	a 137.5 ± 3.3	b 45.2 ± 4.5
30 – 35	Non subjected	d 168.5 ± 17	d 138.7 ± 16.2	c 100.6 ± 7.7	c 39.7 ± 22.5	d 27.6 ± 3.4
	Subjected	a 380.6 ± 21.3	a 267.2 ± 42	a 179.7 ± 16.2	a 152.6 ± 29.2	a 53.2 ± 11
40 – 45	Non subjected	d 162.8 ± 11.7	d 143.8 ± 17.2	d 59.5 ± 10	b 77.3 ± 10.2	d 28.6 ± 3.3
	Subjected	c 297.1 ± 28.3	c 185.6 ± 6.9	c 99.7 ± 12.3	a 159.2 ± 39.6	c 35.5 ± 2.5
LSD		27.3	38.4	16.1	21.6	6.7

Conclusion

beside a significant decline in high density lipoprotein (HDL) of all Subjected samples as compared with the Non subjected ones at (P≤0.05); effects on redox cycles and peroxides production and hence the radiofrequencies cause the elevations of AST and ALT, also The elevations of blood calcium and potassium could result also by the frequency exposure as that these ions of great equilibrium in intracellular and extracellular compartments.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq

Conflict of Interest: The authors declare that they have no conflict of interest.

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