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# Some Hematological Study on Children After Exposed by Cell Phone Radiation and Treatment by Olive Oil

Khitam Elwasife<sup>1</sup>, Mohammed Abu Jami<sup>1</sup>, Ismail Abdel Aziz<sup>2</sup>, Mohammed Shabat<sup>1</sup>

<sup>1</sup>Department of Physics, Faculty of Science, Islamic University of Gaza, Gaza Strip, Palestine

<sup>2</sup>Department of Biology, Faculty of Science, Islamic University of Gaza, Gaza Strip, Palestine

## Email address:

kelwasife@iugaza.edu.ps (K. Elwasife)

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**Abstract:** According to the spread and raised of using mobile phones in recent year and has become necessary in our modern life, Many research studied the effect of electromagnetic mobile radiation on life tissue. this study aims to investigate the effects of mobile base station radiation with global system mobile frequency 900 MHz on children blood and protective role of olive oil supplementation. The study included three groups. The first group (20 children) as normal control. The second group (30 children) exposed to electromagnetic field, the third group (30 children) exposed to mobile radiation, this group was given 2.5 ml/day olive oil supplementation for 5 weeks. All of them participate filled questionnaire including detailed about health, Behavior, and Physical conditions. Blood samples were measured to investigate CBC. In the results, Concerning hematological parameters, the more obvious changes were observed in the increment of WBC, lymphocyte, Mean corpuscular volum (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and decrease in hematocrit, Hemoglobin concentration (Hb), red blood cell (RBC), and platelet count (PLT) in response to the exposure to mobile radiation alone. Signs of improvements in the previous hematological parameters were noticed during treatments with electromagnetic field in addition to olive oil supplementation.

**Keywords:** Non-ionizing Radiation, Olive Oil, Electromagnetic Field, Hematological Parameter

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## 1. Introduction

Millions of people around the world used mobile phones. The antennas had the task of receiving and sending waves. This lead that installing and using this antenna have become popular in different places including residential areas [1]. Humans are exposed to radiofrequency produced from mobile phones and this has created a need to study its possible ill on health [2]. The exposure from many radiation could lead to reversible or irreversible structural and functional changes at the base station level. This damage depends on the frequency of the electromagnetic waves, electrical field applied, and intensity of the power and the duration of exposure [3]. Previous studies of the effect of electromagnetic fields on living organisms showed that the initial effect of an electromagnetic field is the triggering of key biochemical processes in various metabolic pathways. The physiochemical action, ion, dipolar, macrostructure, electrolytic polarization, and other factor may also play a role

such as molecular excitation, biochemical activation, generation of radicals, chemical bond weakening, hydration change, altered relaxation time of atom vibration, and altered spin of dipoles [4]. The effect of strong static magnetic field on lymphocytes has been investigated [5]. It investigated whether static electromagnetic fields (EMFs) at a flux density of 4.75 T, generated by an NMR apparatus (NMRF), could promote movements of  $\text{Ca}^{2+}$ , cell proliferation, and the eventual production of proinflammatory cytokines in human peripheral blood mononuclear cells (PBMC) as well as in Jurkat cells, after exposure to the field for 1 h. The same study was also performed after activation of cells with 5 mg/ml phytohaemagglutinin (PHA) [5]. The therapeutic role of olive oil has been packed with antioxidants protects human from developing cancer and helps to prevent premature aging. In many studies show that mice received topical olive oil treatment after being exposed to UV rays developed fewer skin cancer related tumors [6]. Basic intensity threshold signal that is emitted from mobile phone

base station may be appropriate to its physiological temperature and biological reactions within the life tissue. During lingering exposure, the effects can change from stimulant to inhibition, depending on the pulse shape, frequency and wavelength [7]. Ismail IA et al, studied an analysis of the biochemical parameters of liver, kidney functions and thyroid stimulated hormone in children after exposure to mobile phone base station radiation and therapeutic action of olive oil [8]. reduced efficiency of lymphocyte and increase of chromosome aberrations and micronuclei in human blood lymphocytes [9]. The study of Schörnborn et al. showed that the adult human head absorbs 80% of the radiation [10] emitted by a cellular telephone. It has been evaluated that exposure to various forms of electromagnetic radiation could lead to reversible or irreversible structural and functional changes at the cellular base station frequency and power density. This damage depends on the frequency of the electromagnetic fields, electrical field applied, and intensity of the power and the duration of exposure [11-12]. the thermal effect of electromagnetic waves produced from mobile phone base station retina eye has been studied my khitam elwasife [13]. In many research, it obvious that the increase in lymphocytes may be due to the harmful action of electromagnetic field exposure that stimulates the haemopoietic system to release more lymphocytes causing an increase in their number in the blood stream. Repacholi et al hav been shown [16] that long-term intermittent exposure to electromagnetic radiation can enhance the probability that animals carrying a lympho magenic oncogene will develop lymphomas [14].

The present work is aimed to study hematological studies in children after exposure to mobile phone base station radiation and the therapeutic action of olive oil.

## 2. Methodology

Eighty male children (aging 6-12 years) were used for the experimental work. There were divided into three groups, as follows:

1. The first group served as control.
2. The second group was exposed to electromagnetic radiation emitted from the base station radiation.
3. The third group was exposed to electromagnetic radiation and given 2.5 ml / day orally olive oil (Ismail, 2000) all over the experimental periods (5 weeks).

The second and the third groups lived nearby mobile phone base station (100-150) m more than 5 years, and exposed to electromagnetic field with constant power in the range from (1.4-4.7) mw/cm, which it is used in their country and measured during the experiment using power meter. The electric field with the range (60-130) V/m. The antenna received the signal from mobile base station at the area. The mobile system used in Gaza is GSM (Global system for mobile) which frequency equals 900 MHz. All of them participate filled questionnaire including detailed about health, behavior, and physical conditions. Blood samples were c to investigate CBC and parameters in all participate. A sample of about (5 ml) of venous blood was obtained for each subject and dividing into EDTA tube (1.0 ml) and

vacutainer plain tube (4.0 ml) vacutainer plain tubes were left about 15 min to allow blood coagulation. Then, clear samples were separated by centrifugation at 3000 r.p.m for 20 min and kept in the refrigerator for difference biochemical assays. Serum total protein determined according to the biuret reaction as designated by Armstrong [15].

## 3. Data Analysis

Data were analyzed using statistical package for the social sciences.

## 4. Results and Discussion

Primary and secondary blood indices of the cases exposed to electromagnetic waves with and without the treatment of olive-oil and the control are summarized in table 1. For many primary blood indices, the mean red blood cell counts (RBC) were significantly decreased in cases exposed to radiation alone compared to controls ( $4.45 \pm 0.05$  VS  $5.50 \pm 0.12 \times 10^6$  cell/ml, %difference= -19.1,  $p < 0.01$ ). However, in cases exposed to mobile base radiation and treated with olive oil ( $4.56 \pm 0.19$  VS  $5.50 \pm 0.12 \times 10^6$  cell/ml, %difference= -17,  $p < 0.01$ ). In parallel hemoglobin and hematocrit level were significantly decreased in cases exposed to E.M.F alone compared to controls ( $11.75 \pm 0.12$  VS  $13.67 \pm 0.16$  g/dl, %difference= -14.1,  $p < 0.01$ ), and ( $35.5 \pm 0.32$  VS  $42.67 \pm 1.8$  g/dl, %difference= -15.83,  $p < 0.01$ ) respectively. However, electromagnetic mobile radiation exposure +olive oil reduced the decrement rate of hemoglobin and hematocrit to -7.1% and -8.7% respectively compared to controls.

### 4.1. Hematological Parameter Results

Secondary blood indices inducing MCV, MCH, MCHC were generally increased in cases compared to controls registering %difference of 4.5, 6.24, 2.27 ( $79.45 \pm 0.57$ pg,  $26.40 \pm 0.25$ pg and  $33.24 \pm 0.25$ g/dl respectively,  $p > 0.05$ ). However, the treatments of cases with olive oil increased the elevation rate 10.01%, 12% and 1.91% respectively compared to controls. Table 2 demonstrates table white blood cell count (WBCs), lymphocyte and blood platelets (PLT) in cases and controls. White blood cell count was non-significant, increased in cases exposed to E.M. F alone compared to controls ( $7.11 \pm 0.26$  VS  $6.7 \pm 1.6 \times 10^3$ cell/mm<sup>3</sup>, %difference= 6.12,  $p > 0.05$ ). For differential white blood cell, lymphocyte was also significantly elevated in cases compared to controls ( $48.79 \pm 1.73$  VS  $40 \pm 0.52$ , %difference= 22,  $p < 0.01$ ). Blood platelets were significantly decreased in cases compared to controls ( $233.7 \pm 8.85$  VS  $270 \pm 8.6$ , %difference= -13.5,  $p < 0.05$ ). However, in cases in cases exposed to E.M.F and treated with olive oil, reduced the decrement rate to -9.25% compared to controls ( $267.5 \pm 17.17$  VS  $270 \pm 8.86$ , %difference= 22,  $p > 0.05$ ).

**Table 1.** Primary and secondary blood indices in children after exposure of electromagnetic field and the therapeutic action of olive oil.

parameters	Control N=20	Electromagnetic field N=30	Electromagnetic field+olive oil N=30
RBC ( $\times 10^6$ cell/mm <sup>3</sup> )	5.50 $\pm$ 0.12	4.45 $\pm$ 0.05	4.56 $\pm$ 0.19
%Change		-19.1	-17
P value		< 0.01	< 0.01
Hb (g/dl)	13.67 $\pm$ 0.16	11.75 $\pm$ 0.12	12.7 $\pm$ 0.36
%Change		-14	-7
P value		<0.05	> 0.05
Hematocrit (%)	42 $\pm$ 1.8	35.35 $\pm$ .32	38.34 $\pm$ 1.51
%Change		-15.83	-8.7
P value		<0.01	> 0.05
MCV (pi)	76 $\pm$ 3.8	79.45 $\pm$ .57	84.07 $\pm$ 1.4
%Change		4.5	10.05
P value		< 0.05	> 0.05
MCH (pg)	24.85 $\pm$ 0.8	26.4 $\pm$ 0.25	27.69 $\pm$ 0.64
%Change		6.24	11.87
P value		> 0.05	<0.05
MCHC (g/dl)	32.5 $\pm$ 0.6	32.24 $\pm$ 0.25	33.12 $\pm$ 0.52
%Change		2.27	1.9
P value		> 0.05	> 0.05

**Table 2.** White blood cells and platelets blood indices in children after exposure of electromagnetic field and the therapeutic action of olive oil.

Parameters	Controls N=30	Electromagnetic field N=50	Electromagnetic field+Olive Oil N=40
WBC ( $\times 10^3$ cell/mm <sup>3</sup> )		7.11 $\pm$ 0.26	7.25 $\pm$ 0.40
%Change	6.7 $\pm$ 1.6	6.12	8.2
P value		> 0.05	> 0.05
Lymphocytes (%)		48.79 $\pm$ 1.73	59.66 $\pm$ 2.36
%Change	40 $\pm$ 0.52	22	49
P value		< 0.01	< 0.01
Platelets ( $\times 10^3$ /mm <sup>3</sup> )		233.7 $\pm$ 8.85	267.5 $\pm$ 17.17
%Change	270 $\pm$ 8.6	-13.45	-925
P value		< 0.01	> 0.05

#### 4.2. Primary and Secondary Blood Indices

The present data showed that primary blood indices including red blood cell count, hemoglobin and hematocrit were significantly decreased in the cases exposed to electromagnetic waves compared to the controls. It is accepted that the number of red blood cells is proportional to the degree of decrease in hemoglobin concentration by Mousavy [16]. These results are not really surprising, as previous studies using different models showed comparable data. Mousavy et al isolated human adult hemoglobin (HbA) from RBC of healthy donors, which was then exposed to RF waves in the range between 910 and 940 MHz between 910 and 940 MHz. Regarding secondary blood indices MCV, MCH and MCHC were also found to be higher in the cases exposed to mobile radiation alone compared to controls. Such results were in partially agreement with Danese [17].

#### 4.3. Total and Differential White Blood Cells

Total white blood cell count was elevated in the cases compared to controls. Lymphocytes was also higher in the cases. Blood platelets were decreased in cases than controls. Abdel Aziz et al studied The induction of white blood cell count. It observed in the present study indicates the activation of a defense mechanism and the immune system, which

could be a positive response for survival [18].

## 5. Conclusion

By studying the effect of electromagnetic radiation on children blood on hematological parameters obvious in this work. It changes were observed in the increment of WBC, lymphocyte, MCV, MCH, MCHC, and decrease in hematocrit, Hb, RBC, and PLT count in response to the exposure to electromagnetic frequency mobile radiation alone. Signs of improvements in the previous hematological parameters were noticed during treatments with electromagnetic field in addition to olive oil supplementation.

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