

The Impact Of Electric Power On Health From The Employees' Perspective In Jordanian Electric Power Company

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ABSTRACT

The study aimed at investigating the impact of electric power on health from the employees' perspective in Jordanian Electric Power Company, and also to investigate the effect of job title, experience, and qualification on employees' perspectives. A questionnaire was distributed on a sample consisted of (230) employees in Jordanian Electric Power Company. The study concluded that there is a relationship between electric power and health, and it also found there is no statistically significant difference between the employees perspectives' due to their job title, no statistically significant difference between their perspectives' due to their experience, and there is statistically significant differences between their perspectives due to their qualification. The study recommends that all employees must comply with appropriate health conditions.

Keyword: electric power

Introduction

In contrast to the obvious benefits of the provision of electricity, there are also a number of disadvantages due to the detrimental effects of electricity generation on the environment. Some of these impacts (such as smog) are highly visible, while others are not, but many of them are damaging to humans, materials, flora and fauna.

Dirty Electricity and other electrical pollution come from a number of sources. Clean electric power was originally intended to power our homes and buildings at a safe frequency of 60 Hertz (Hz). Today, for a number of reasons, it's becoming increasingly contaminated with invisible micro-surges of dangerous radio frequency radiation and other electromagnetic contaminates now referred to as "Dirty Electricity".

Dirty Electricity has become a growing problem in recent years due to our increased use of modern energy-efficient lighting and electronic devices such as dimmer switches, computer and electronic entertainment centers. These modern electronic conveniences, although energy-efficient, tend to induce high levels of transients (high frequency spikes) and harmonics (multiples of the fundamental 60Hz frequency) back into a building's electrical system. These electromagnetic contaminates ride along on a building's electrical system and can contaminate an entire building and even buildings and homes nearby. (Graham, M. 2008)

Some impacts start even before the construction of a power plant and some continue long after the plant is decommissioned. These harmful effects all have a cost associated with them, a cost which is often not included in the cost of electricity generated but which is nevertheless a cost to individuals as well as to society. It is increasingly being realized that the choice of the type of power plant to build and operate must involve an assessment of its impact on the environment. The effect of a power plant on the environment varies from one type of plant to another and from region to region. Any comparison between plants must take these variations into account. (International Atomic Energy Agency Vienna, 1999)

Many doctors and other health professionals all over the world are not yet aware of the recent scientific evidence surrounding electromagnetic energy (EMF) and its effects on human health. The body of empirical

evidence confirming that the EMF exposure causes health problems and damages human cells is very strong. Children are more at risk than adults and many children are now showing signs of EHS. People can react adversely to many types of electromagnetic energy, many improve when they are in an electro-magnetically clean environment. Long-term exposure to electrical contaminants are known to have many adverse health effects – some permanent.

In humans, EMF of various frequencies have been found to adversely affect calcium binding at the cell surface, DNA synthesis, and cell division; to alter circadian rhythms, affect or alter some important enzyme activities, and affect specific glands like the pineal and the hypothalamus area of the brain as well as the production of certain neurotransmitters, like serotonin and dopamine production; to increase the permeability of the blood-brain barrier; to create artificial stress responses; to over stimulate the immune system initially, then suppress it and decrease T-lymphocyte production; and to promote malignant tumor growth with particular concentrations in the central nervous system, in the blood and skeletal systems, and in glandular tissue.

EMF has been linked to diseases such as diabetes, cancer and childhood leukemia, ALS (Lou Gehrig's disease) miscarriages, MS, depression and chronic fatigue syndrome, as well as to many of the sleep disorders plaguing our modern society. The effect depends on the person's sensitivity, as well as the magnitude, duration of exposure, and path the waves take through one's body. (Jan. 2006 German Gov't health warning concerning DECT cordless phones)

Significance of the Study

Emerging Scientific Research suggests that the Poor Quality of the Electric Power in our Homes, Schools and Workplaces may be Making Many of us Sick.

Most of us assume that the danger from electricity is safely confined to the wires in our homes, schools and workplaces. But, what most of us don't know is these same wires have become conduits for dangerous levels of radio frequency (RF) radiation and other harmful electromagnetic energy.

Electricity is dangerous, insidious form of electrical contamination that's now invading our homes, schools and workplaces. Until recently, this phenomenon had largely escaped the attention of the general public and medical community.

Now, emerging scientific research shows that the Dirty Electricity present in today's homes, schools and workplaces can have dramatic and serious health consequences for many of us.

Statement of the Problem

We live in a high tech world, and especially in more developed countries, we are surrounded by power lines, cell phones and radio waves. There is a lot of concern for our environment in terms of clean air and water, growing organic foods and keeping pesticides, heavy metals and industrial organic chemicals out of our systems. But now there is a new pollutant to worry about – invisible and ubiquitous. It is found in our homes, schools, even our hospitals. Employees in the Electric Power Companies face this danger more than others, so the researcher tried to investigate their perspectives about the impact of electricity on health.

Purpose of the Study

The purpose of this study is to investigate the impact of electric power on health from the employees' perspective in Jordanian Electric Power Company, and also to investigate the effect of job title, experience, and qualification on employees' perspectives

Questions of the study

- 1- What are the perspectives of the employees in Jordanian Electric Power Company about the impact of electric power on health?
- 2- Are there any statistically significant differences in the employees' perspectives about the impact of electric power on health due to their job title (Officer, Engineer)?
- 3- Are there any statistically significant differences in the employees' perspectives about the impact of electric power on health due to their experience (less than 5 years, 5 years or above)?
- 4- Are there any statistically significant differences in the employees' perspectives about the impact of electric power on health due to their qualification (less than Bachelor degree, Bachelor degree or above)?

Limitations of the study

This study is limited to the employees working at Jordanian Electric Power Company.

Literature Review

There isn't enough literature about the effect of electricity on human health although some researchers tried to shed light on some effects of electricity on human life using different samples, the researcher will introduce some studies; in a study conducted by Hefeneider et al. (2001) he gave details of a more recent study in which no significant differences in interleukin-1 or -2 activity were recorded, notes that due to a technical problem, electric and magnetic field strengths were reduced for part of the more recent experiments. In these, a group of animals were shielded from the power line electric field by grounded metal screens. A statistically significant correlation was noted (p. 175) between wind direction and the difference in IL-1 activity between these shielded animals and the unshielded controls. One interpretation of the data is that electrically charged airborne agents may have depressed control sheep IL-1 levels in certain wind directions, but were prevented from influencing the shielded animals by the grounded metal screens.

Air ion levels however were not measured in any of these studies.

In 2002, in its International Agency for Research on Cancer *Monographs on the Evaluation of Carcinogenic Risks to Humans* series, International Agency for Research on Cancer, 2002 published the results of an EMF health risk evaluation conducted by an expert scientific working group that met in 2001. IARC stated at the conclusion of the working group's review: IARC has now concluded that ELF magnetic fields are possibly carcinogenic to humans, based on consistent statistical associations of high level residential magnetic fields with a doubling of risk of childhood leukaemia. Children who are exposed to residential ELF magnetic fields less than 0.4 microTesla [4 milligauss] have no increased risk for leukaemia. . . . no consistent evidence was found that childhood exposures to ELF electric or magnetic fields are associated with 2 brain tumours or any other kinds of solid tumours. No consistent evidence was found that residential or occupational exposures of adults to ELF magnetic fields increase risk for any kind of cancer.

Goheen et al. (2004) noted that, in strong electric fields, animal hairs and whiskers could act as corona discharge sources and generate ozone. However, Pethig (1983) pointed out that high levels of ionization energy are required for ozone production. Corona air ionization may occur at field strengths below the threshold for significant production of ozone and nitrogen oxides. In the absence of data on laboratory air ion levels, possible airborne electro activity in the US Department of Energy experiments cannot be excluded.

A report by World Health Organization, (2007) indicated that there is scientific evidence suggesting that every day, chronic, low-intensity ELF magnetic field exposure poses a possible health risk is based on epidemiological studies demonstrating a consistent pattern of an increased risk of childhood leukemia.

Uncertainties in the hazard assessment include the role of control selection bias and exposure misclassification. In addition, virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between low-level ELF magnetic field exposure and changes in biological function or disease status.

Thus, on balance, the evidence is not strong enough to be considered causal and therefore ELF magnetic fields remain classified as possibly carcinogenic.

A number of other diseases have been investigated for possible association with ELF magnetic field exposure. These include other types of cancers in children and adults, depression, suicide, reproductive dysfunction, developmental disorders, immunological modifications, neurological disease and cardiovascular disease. The scientific evidence supporting a linkage between exposure to ELF magnetic fields and any of these diseases is weaker than for childhood leukemia and in some cases (for example, for cardiovascular disease or breast cancer) the evidence is sufficient to give confidence that magnetic fields do not cause the disease.

Design and Methodology

Population of the study

The population of the study consisted of all employees working at Jordanian Electric Power Company who form about 4000 employees.

Sample of the study

The sample of the study consisted of (230) employees who are working at the Jordanian Electric Power Company in the year 2013; a questionnaire was distributed among them.

Instrument of the study

A questionnaire was distributed among the employees working at the Jordanian Electric Power Company and this questionnaire was designed by the researcher himself, it consisted of 20 items. Many variables were included such as the job title, experience, and qualification of the employees.

Reliability of the instrument

To ensure the questionnaire reliability, the researcher applied it to a pilot sample of (30) employees excluded of the study sample in the same company from which the sample was chosen with a two-week period between the first and second time it was distributed. The researcher found that the reliability of the questionnaire was suitable after he calculated it using correlation coefficient and it was 0,87

Procedures of the study

A questionnaire about the impact of electric power on health was given to 230 employees in Jordanian Electric Power Company. After that the researcher collected the questionnaires and collected data, and then this data was analyzed statistically.

Statistical analysis

The results were analyzed for each question using suitable statistical methods such as mean and standard deviation. The researcher also used figures to clarify the results more.

Findings of the study

The purpose of this study is to investigate the impact of electric power on health from the employees' perspective in Jordanian Electric Power Company, and also to investigate the effect of job title, experience, and qualification on employees' perspectives.

To answer the first question about employees' perspectives about the impact of electric power on health: What are the perspectives of the employees in Jordanian Electric Power Company about the impact of electric power

on health? A questionnaire was distributed among them and means and standard deviation were calculated. Results were shown in table 1

Table 1: Employees' Perspectives About The Impact Of Electric Power On Health

No	Mean	Std. Deviation
Q1	4.14	.840
Q2	4.17	.853
Q3	3.19	1.054
Q4	3.22	.981
Q5	4.14	.896
Q6	3.15	1.189
Q7	3.27	1.202
Q8	4.20	.998
Q9	3.21	1.316
Q10	4.05	.974
Q11	4.53	.768
Q12	2.90	1.199
Q13	3.64	1.317
Q14	2.92	.937
Q15	4.02	1.076
Q16	4.38	.864
Q17	3.45	1.214
Q18	3.03	1.029
Q19	4.18	.869
Q20	4.36	.810
attitudes	3.71	.186
Valid N (listwise)		

Table 1 shows there are statistically significant differences in employees' perspectives about the impact of electric power on health. It shows the results of the questionnaire which was distributed among (230) employees about their perspectives about the impact of electric power on health. Means and standard deviations were calculated and results show that question 11 got the highest mean which was (4.53); question 16 comes next with a mean of (4.38).

Standard deviation for question 11 was (0.768) which is higher than ($\alpha \leq 0, 05$) so it means that it is statistically significant. Standard deviation for question 16 was nearly the same; it was (0.864) which is also statistically significant.

To answer the second question about employees' perspectives about the impact of electric power on health and their job title: Are there any statistically significant differences in the employees' perspectives about the impact of electric power on health due to their job title (Officer, Engineer)? Means and standard deviations were computed and table 2 shows the results.

Table 2: Means, standard deviations and t-test according to job title variable

	Job title	N	Mean	Std Deviation	t	df	Sig. (2-tailed)
attitudes	Officer	101	3.62	.149	-5.373	164	.000
	Engineer	129	3.77	.186			

Table 2 shows there are statistically significant differences due to job title variable. It shows the results of the questionnaire which was distributed among (230) employees about their perspectives about the impact of electric power on health. Means and standard deviations were calculated and results show that Officers got a lower mean than Engineers which was (3.62, and 3.77) respectively; this indicates that the job title variable has an effect on employees perspectives.

Standard deviation for Officers was (0.149) which is higher than ($\alpha \leq 0, 05$) so it means that it is statistically significant. Standard deviation for Engineers was higher; it was (0.186) which is also statistically significant. So, table 2 shows there are statistically significant differences due to job title variable in favor of Engineers.

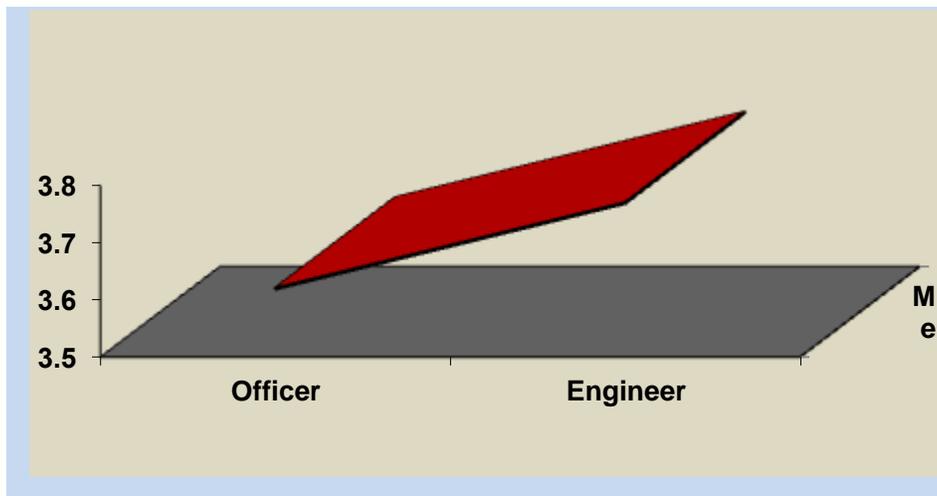


Diagram 2: Means, standard deviations and t-test according to job title variable

Diagram 2 shows that Officers got lower negative perspectives about the impact of electric power on health than Engineers.

To answer the third question about employees' perspectives and experience: Are there any statistically significant differences in the employees' perspectives about the impact of electric power on health due to their experience (less than 5 years, 5 years or above)? Means and standard deviations were computed and table 3 shows the results.

Table 3: Means, standard deviations and t-test according to experience variable

	experience	N	Mean	Std Deviation	t	df	Sig. (2-tailed)
Attitudes	Less than 5 years	138	3.75	.195	3.294	164	.001
	5 years or above	92	3.66	.162			

Table 3 shows there are statistically significant differences due to experience variable. It shows the results of the questionnaire which was distributed among (230) employees about their perspectives about the impact of electric power on health. Means and standard deviations were calculated and results show that employees whose experience is less than 5 years got a higher mean than employees whose experience is 5 years or above which was (3.75, and 3.66) respectively; this indicates that experience variable has an effect on employees' perspectives.

Standard deviation for employees whose experience is less than 5 years was (0.195) which is higher than ($\alpha \leq 0, 05$) so it means that it is statistically significant. Standard deviation for employees whose experience is 5 years or above was lower; it was (0.162) which is also statistically significant. So, table 3 shows there are statistically significant differences due to experience variable in favor of less than 5 years experience employees.

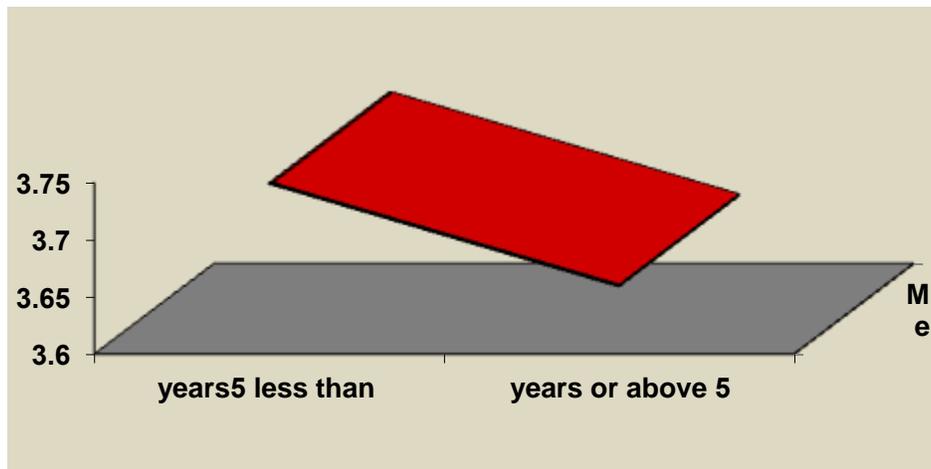


Diagram 3: Means, standard deviations and t-test according to experience variable

Diagram 3 shows that employees whose experience is less than 5 years got more negative perspectives the impact of electric power on health than the employees whose experience is 5 years or above.

To answer the fourth question about employees' perspectives and qualification: Are there any statistically significant differences in the employees' perspectives about the impact of electric power on health due to their qualification (less than Bachelor degree, Bachelor degree or above)? Means and standard deviations were computed and table 4 shows the results.

Table 4: Means, standard deviations and t-test according to qualification variable

	Qualification	N	Mean	Std Deviation	t	df	Sig. (2-tailed)
Attitudes	less than Bachelor degree	155	3.75	.194	4.852	164	.000
	Bachelor degree or above	75	3.61	.120			

Table 4 shows there are statistically significant differences due to qualification variable. It shows the results of the questionnaire which was distributed among (230) employees about their perspectives about the impact of electric power on health. Means and standard deviations were calculated and results show that employees whose qualification is less than bachelor degree got a higher mean than employees whose qualification is bachelor degree or above which was (3.75, and 3.61) respectively; this indicates that qualification have an effect on employees perspectives.

Standard deviation for employees whose qualification is less than bachelor degree was (0.194) which is higher than ($\alpha \leq 0, 05$) so it means that it is statistically significant. Standard deviation for employees whose qualification is bachelor degree or above was lower; it was (0.120) which is also not statistically significant. So, table 4 shows there are statistically significant differences due to qualification variable in favor of employees whose qualification is less than bachelor degree.

So, table above shows there are statistically significant differences in employees' perspectives due to

qualification variable in favor of employees whose qualification is less than bachelor degree.

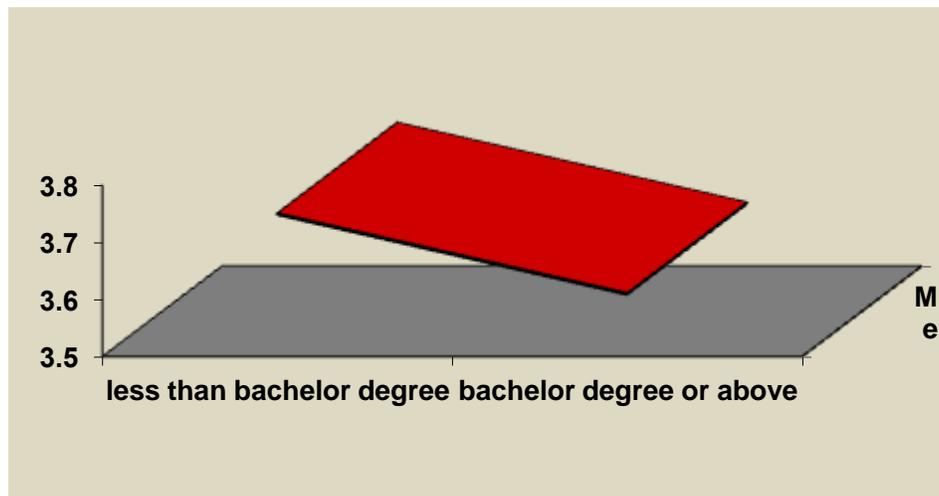


Diagram 4: Means, standard deviations and t-test according to qualification variable

Diagram 4 shows that employees whose qualification is less than bachelor degree got more negative perspectives towards the impact of electric power on health than employees whose qualification is bachelor degree or above.

Conclusion

The scientific evidence does not firmly establish that exposure to electricity and magnetic fields found around the home, the office or near power lines are a hazard to human health. In view of the epidemiological studies, however, the possibility remains that intense and prolonged exposures to magnetic fields may increase the risk of diseases among people. If exposure to higher-than-normal magnetic fields does actually affect health at the level indicated in some scientific reports, then, on average, there would be some cases of leukaemia and other diseases in Jordan every year due to this cause. The evidence does not allow health authorities to decide whether there is a specific magnetic field level above which prolonged exposure is a hazard to human health. The researcher shed light on some of these issues and investigates the employees' perspectives about the impact of electricity on human health and he clarifies results using suitable statistical analysis.

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