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Short Communication

THE EFFECT OF NOISE POLLUTION ON SCHOOL CHILDREN AT DUHOK CITY, IRAQ

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ABSTRACT

The movement against noise pollution is weak in Duhok city, Kurdistan region in north of Iraq. Most of the people do not consider it as pollution and accept it as a part of their routine life. This paper reports a qualitative study that was carried out to investigate the noise pollution, and finds the relation between the occupational noise level and arterial blood pressure (Systolic Blood Pressure and Diastolic Blood Pressure). The Study Sample consisted of 180 pupils aged 16 years old and18 years old distributed equally in six schools (3 males and 3 females), studied school were selected in three different regions very noise, noise and quite. The noise levels measured during day school in the chosen schools and the arterial blood pressure were measured before and after exposure to noise for five hours. This study shows that after five hours of exposure to noise for pupils through the day school, there was a significant relation between the arterial blood pressure and sound pressure levels also shows that female's pupils were more affected by noise pollution than male's pupils at the same level of noise. While, the effected of noise pollution according to the pupils age shows there was no significant relation.

Keywords: Blood pressure, noise pollution, school environment.

INTRODUCTION

Noise pollution has an annoyance effect on human beings. It is usually created sound that disturbs that activity and balance of the man in life. It is a growing environmental problem that is increasingly becoming an omnipresent one. However, it is an unnoticed from pollution not only in the developed countries but also in the developing ones. The word noise is derived from the Latin word “Nausea” which mean “unwanted sound” or the sound which either loud or unpleasant or unexpected. It can be defined as a wrong sound in the wrong place at the wrong time (Public Law, 1988). Thirty years ago, the noise has been increasing quickly namely in urban areas because the modern technological developments especially in industry and transportation. This fact leads researchers to focus on such important field to organize and to issue rules and legislations controlling noise pollution and protect people from its dangerous effect (Hanini, 2002).

In the united, the Federal Government officially recognized noise polluting factory and begin to support noise research and its regulation. Consequently, the national environmental policy act (NEPA) and the noise pollution and abatement act (more) commonly known as a noise control act (NCA) came into existence in 1969 and 1972 respectively (Public Law, 1988). In fact, the effects of noise on person differ from one person to another according to several factors like sound level, frequency and time duration to noise pollution. Exposure to noise pollution has bad effects on health like hypertension, hearing loss, sleep disturbance, change in skin temperature and blood circulation (Loeb, 1989). Moreover, the average sound level should not exceed 40 dB (A) according to the USA environmental Protection Agency Standards (Rosenhall, 1990). In other words, the average sound level during day time should not exceed 65 dB (A) according to the Occupational Safety and Health Administration (OSHA). Whereas exposure to noise pollution at 85 db(A) should not 40 hours per week. For every additional 3 dB(A) the maximum exposure time is reduced by a factor 2. For example, exposure to noise pollution at 88 dB(A) should not exceed 20 hours (Leighton, 2009).

Now noise is the most common global environmental problem in urban areas. Unlike other forms of pollution such as air, water and solid waste, noise does not remain long in the environment, however, it effects are immediate interns of annoyance as sleep disturbance and interference with communication etc (Jones *et al*., 1981; Kiernan, 1997; Leighton, 2009; Loeb, 1989). These effects can be cumulative temporarily or permanently and may lead to hearing loss (Miedema and Vos, 1998, 1999; Ohrstrom, 1991). Noise can interfere with the complex task performance and can modify social behavior and cause many psychological problems. The effects of noise are dangerous and worrisome. It is observed that shrieks and roars of urban life are causing serious long-term

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health effects on children. As a result, children in their mother's wombs may suffer from a high noise level and may develop high blood pressure and stiffening of nerves (Ohrstrom *et al*., 1988; Public Law, 1988) besides, it can impair children's speech, perception, reading and spelling ability, behavior, attention and academic performance (Rosenhall *et al*., 1990; Stansfeld *et al*., 2005). Children who attend noisy school do not learn to read as well as those who attend quiet ones. There is evidence that noise may reduce helping behavior, increase aggression and reduce the processing of social cues, which can be seen as an irrelevant task performance (Jones, 1981). Similarity, Kiernan finds that even a low level of noise can affect human health and may cause hypertension, disturbance of sleep and or hindering of cognitive development in children.

MATERIALS AND METHODS

The Study Sample consisted of 180 students aged 16 years oldand18 years old (each school 30 students), distributed equally in six schools (3 males and 3 females), of three different sound pressure levels located in the following three locations: related to distance from the main street (near, medium and far distance). Data collections for the systolic blood pressure and diastolic blood pressure for each pupil were collected twice for each student took place since coming to school and before leaving the school all pupils had no history of blood pressure, while the measurement of sound pressure level was taken every second during a school day. The noise level was measured by using PeakTeak 8005 which has characterized as shown in the table below:

Measurement frequency	31,5 Hz …….. 8KHz
Accuracy	± 1,4 dB
Automatic range	30 …… . 130 dB
Time weighting	Fast (125 ms) or Slow (1s)
Inter memory	Max. 32000 values, 1 time per second (about 8.88 hours)

In addition, we use Sphygmomanometer Mercurial Model to take blood pressure for each pupil. Pressure rang 0-300 mmHg and basic error ±2 mmHg. The measurements were analyzed using the SAS program and comparing the means by using Dnkon Test at significant level 5% (SAS, 2000) and Microsoft Excel spreadsheet were used for data entry and analysis. We divided the date to three factors: First: Affected the distance, second: Affected the gender, and third: Affected the age.

RESULTS AND DISCUSSION

Sound pressure levels (SPL) for the six schools were measured. The results of those measurements in addition to a full description of the schools distant from the main road (far, medium and near), age and gender are shown in table 1. In order to give more insight to the school's environment's, for example, the school lies next to the main road, other building (governmental building) or schools located at the middle of camp, which is crowded with traffics and peoples.

Table 1. Diastolic Blood Pressure.

Gender	Distant	AGE		GEN	AGE
		18	16		
M	far	0.661	0.567	0.843	0.955
	media	0.954	0.850		
	near	1.105	0.920		
F	far	1.073	0.78	1.074	0.962
	media	1.014	1.04		
	near	1.308	1.213		
Distance		0.839	0.899	1.136	

Table 2. Systolic Blood Pressure

Gender	Distance	AGE		GEN	AGE
		18	16		
M	far	0.283	0.519	0.565	0.806
	media	0.400	0.561		
	near	0.920	0.708		
F	far	0.78	0.853	1.084	0.843
	media	0.921	0.986		
	near	1.536	1.430		
Distance		0.644	0.793	1.037	

Figure 1, illustrates that there is a direct systematic correlation between SPL values and the distance from the level of noise pollution, that's due to the environment around the school. The average highest noise SPL value of the sample school of this study were in the AL-Takhee boy's school and Mardeena girls' school at [74.6 and 73.96 dB (A)] respectively. The middle's average noise levels were in kardokh boy's and Awais girl's at [70.3 and 70.96 dB(A)] respectively. Whereas, the Kaw boy's school and Nasebeen girl's had the lowest value of noise level at [66 and 67.1 dB(A)] respectively. And since the average sound level during day time should not exceed 65 dB(A) according to the Occupational Safety and Health Administration the schools under study can easily be considered as a noisy environments.

There is a significant relation between pupil's hypertension blood pressure and distance from the noise source (regardless age and gender). DBP and SBP for pupils in very noisy school (near to main road) are bigger than pupil's hypertension in quite school (far too main road), gave 1.136 for very near school, while 0.839, 0.899

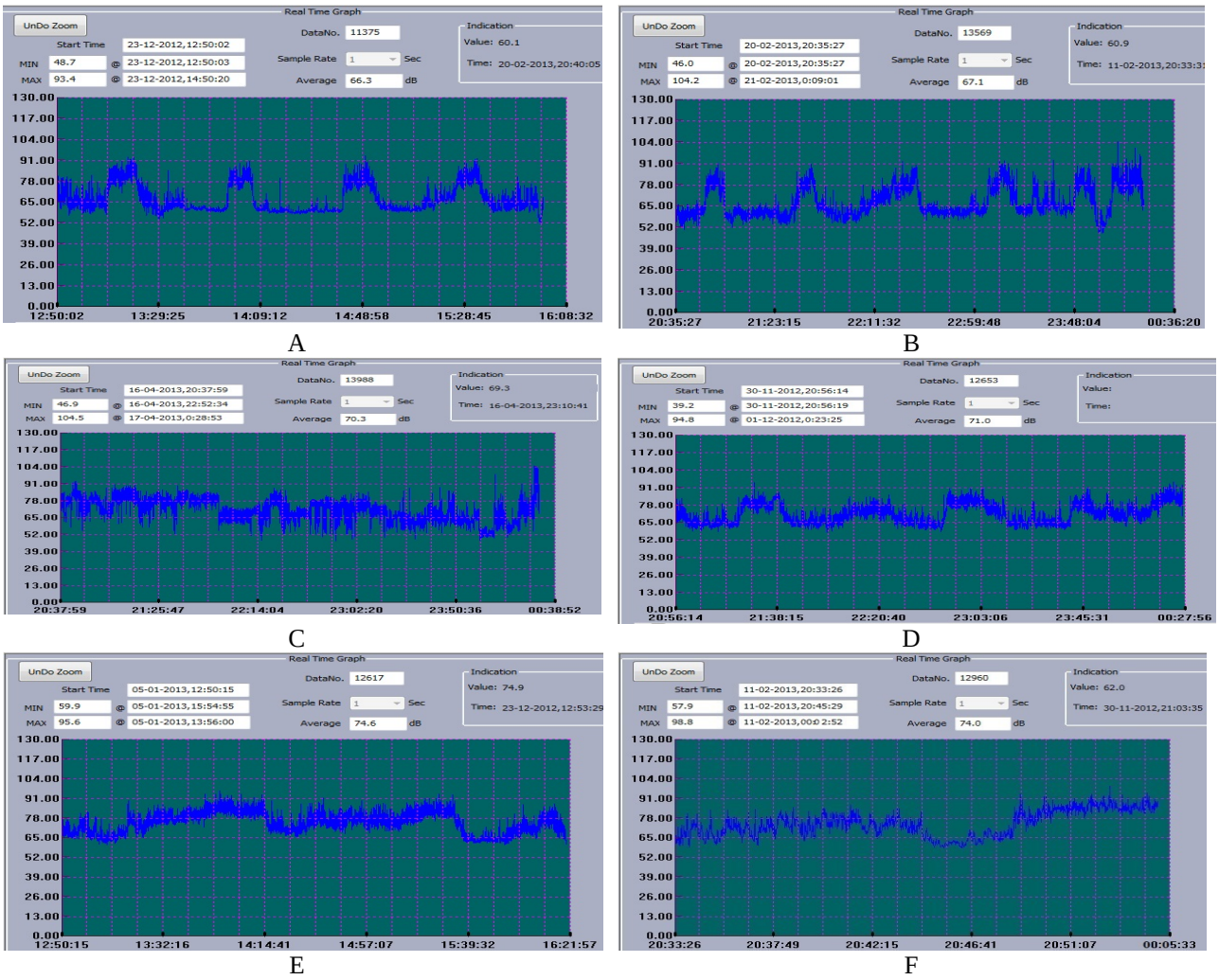


Fig. 1. The schools A- Kaw boys B- Kardokh boys C- Al-Takhee boys D- Nasbeen girls E- Awais F- Mardeena girls.

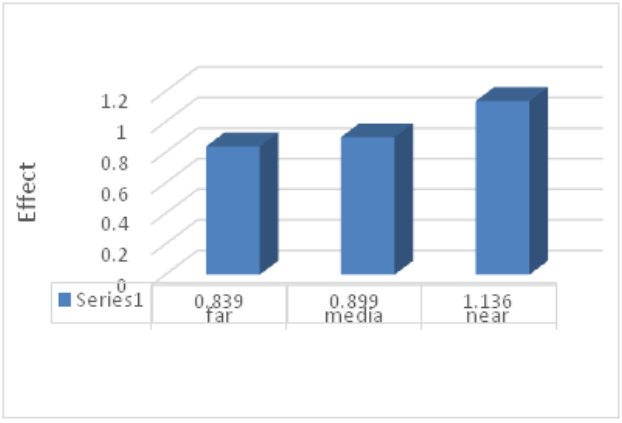
for far and medium schools, respectively. Which isn't differing significant among them? Increasing ratio was o.353 and 0.203 for very near schools from far and medium schools respectively, figure 2, illustrates that.

The effect of noise pollution on gender (regardless distance from noise pollution and age) can be shown by comparing male's school with female's school. The study shows that DBP and SBP are more affected in girl's school. This means that females are more affected by noise pollution than males as shown in figure 3.

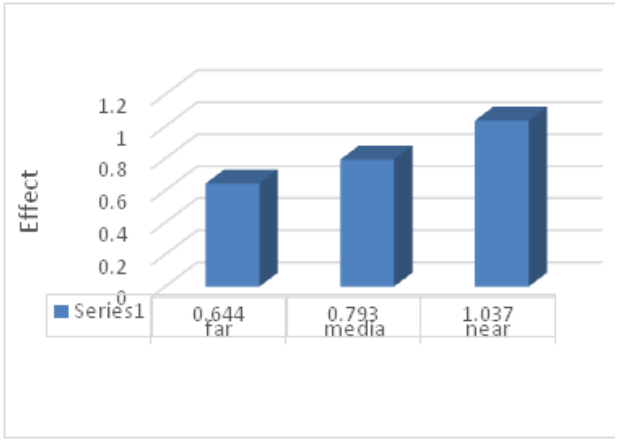
By comparing two groups of pupils 16 years old and 18 years old (regardless the gender and distance) they affected by noise pollution on DBP and SBP are approximately same when we regardless the gender, this means there is not significant effect (Fig. 4).

Figure 5-a and b, shown the relationship between males and females with distance from the noise source. It can be seen that the maximum affected significantly for DBP was 1.308 to female pupils in very noisy school (18 y), the minimum affected for DBP was 0.567 for male pupils in quite school (16 y), while in SBP the highest value was 1.536 for female's school (18 y) and the lowest affected was 0.283 for male's pupils (18 y) in quite school. In other hand, by comparing figure 5, for DBP and SBP, we can see that DBP is more affected with noise than SBP.

The DBP increasing for pupil girls comparing with boy's pupils can be returned for many reasons Genetic and psychological and physical related to ability the male endurable the noise (harder) more than females or the females more sensitive for outside effective like the noise. It can explain the increasing in DBP and SBP for schools near to the source (Main Street) as you can see in graph 1, Which show the rate noise in all schools and the effect, that to form the worry and fatigue mental consequence increase DPB and SBP.

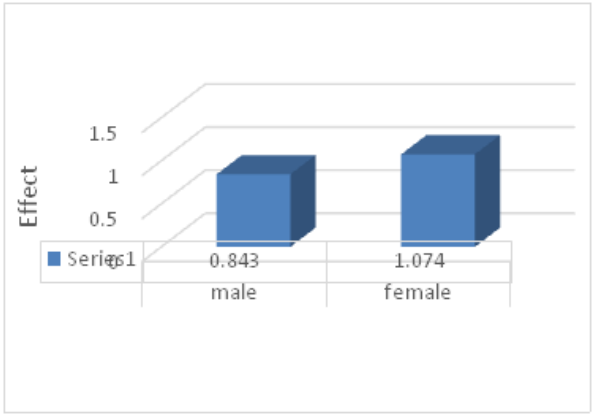


A - DBP

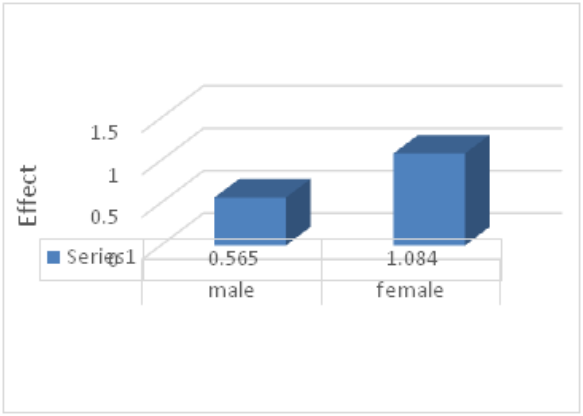


B - SBP

Fig. 2.The effect of noise pollution on distance.

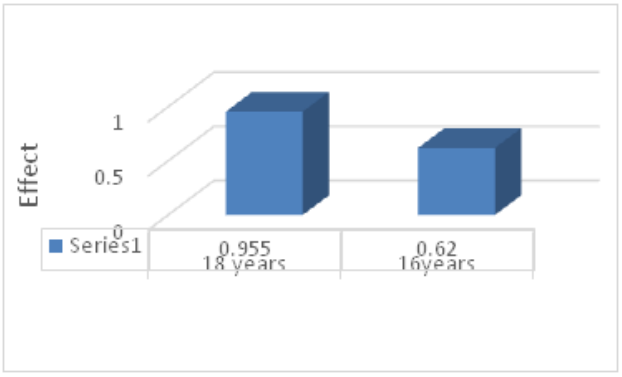


A - DBP

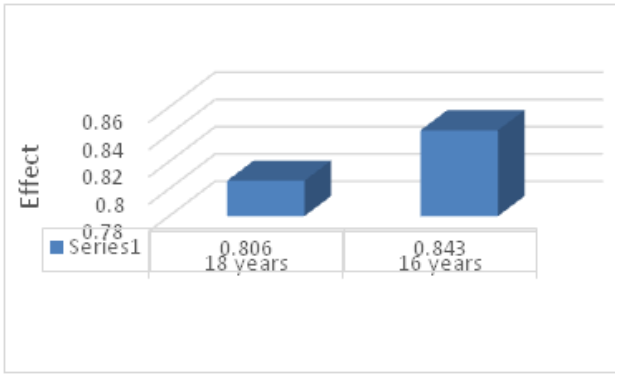


B - SBP

Fig. 3. The effect of noise pollution on gender.



A - DBP

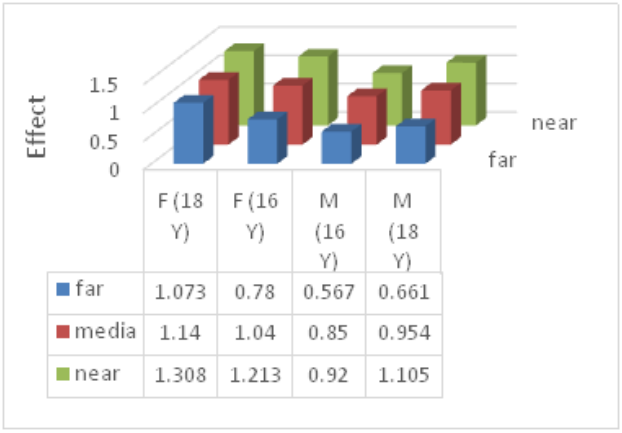


B - SBP

Fig. 4. The effect of noise pollution on age.

CONCLUSION

The important source of pollution in the study area was the road traffic, followed by lack of awareness. Exposure to high noise levels may risk disease the positive cause and effect relationship was observed between noise level and occurrences of DBP and SBP. This study shows that there was a statistical significant relation between noise level and blood pressure (systolic, diastolic) for all selected pupils in Duhok city. Therefore, it is important to take action to reduce the noise levels by improving school environments in society, to protect pupils from the adverse impact that could be caused. For example: Building schools in quiet areas away from main noise



A - DBP

B - SBP

Fig. 5. The interference between gender, age and distance affected by noise.

sources such as roads, using sound proof materials and absorbents while constructing all parts of school buildings. In future, it is recommended to have a larger number of schools and samples in order to show more evidence and to investigate widely the relation between noise level and blood pressure.

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