

# **Noise associated psychological disturbances among Workers in an Egyptian Electric Devices Factory**

Thesis

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# CONTENTS

<b>LIST OF ABBREVIATIONS .....</b>	<b>ii</b>
<b>LIST OF TABLES.....</b>	<b>iii</b>
<b>LIST OF FIGURES.....</b>	<b>vii</b>
<b>ABSTRACT .....</b>	<b>viii</b>
<b>PROTOCOL .....</b>	<b></b>
<b>INTRODUCTION.....</b>	<b>1</b>
<b>OBJECTIVES.....</b>	<b>3</b>
<b>REVIEW OF LITERATURE.....</b>	<b>4</b>
Chapter 1 Occupational noise exposure.....	4
Chapter 2 Extra-auditory effects of noise .....	11
Chapter 3 Psychological and behavioral effects of noise .....	17
Chapter 4 Noise prevention and control .....	33
<b>PARTICIPANTS AND METHODS.....</b>	<b>42</b>
<b>RESULTS.....</b>	<b>53</b>
<b>DISCUSSION .....</b>	<b>77</b>
<b>CONCLUSION .....</b>	<b>85</b>
<b>LIMITATIONS.....</b>	<b>86</b>
<b>RECOMMENDATIONS.....</b>	<b>87</b>
<b>SUMMARY.....</b>	<b>88</b>
<b>REFERENCES .....</b>	<b>92</b>
<b>Appendix.....</b>	<b></b>
الملخص العربي .....	

## **LIST OF ABBREVIATIONS**

<b>APA</b>	American Psychological Association
<b>CI</b>	Confidence Interval
<b>DALY</b>	Disability adjusted life years
<b>DASS</b>	Depression, Anxiety and Stress Scale
<b>dB</b>	Decibel
<b>DSM IV TR</b>	Diagnostic and Statistical Manual of Mental Disorders (text Revised)
<b>EEG</b>	Electroencephalogram
<b>EMG</b>	Electromyogram
<b>EOG</b>	Electrooculogram
<b>GAD</b>	Generalized Anxiety Disorder
<b>HARS</b>	Hamilton Anxiety Rating Scale
<b>HDRS</b>	Hamilton Depression Rating Scale
<b>NIHL</b>	Noise induced hearing loss
<b>NIOSH</b>	National institute of occupational safety and health
<b>OR</b>	Odds Ratio
<b>OSHA</b>	Occupational Safety and Health Administration
<b>PPE</b>	Personal Protective Equipments
<b>PSG</b>	Polysomnography
<b>PSQI</b>	Pittsburgh Sleep Quality Index
<b>REM sleep</b>	Rapid eye movement sleep
<b>SCID-I</b>	Structured Clinical Interview for DSM IV TR axis I disorders
<b>STS</b>	Standard Threshold Shift
<b>TWA</b>	Time weighted average
<b>WHO</b>	World Health Organization

## **LIST OF TABLES**

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Tables of Review</b>		
<b>Table (A)</b>	Categories of blood pressure according AHA	47
<b>Tables of Results</b>		
<b>Table (1)</b>	Socio-demographic characteristics of the studied groups	54
<b>Table (2)</b>	Occupational History of the Studied Groups	55
<b>Table (3)</b>	Comparison between both groups regarding sleep quality	56
<b>Table (4)</b>	Comparison between both groups regarding anxiety, depression and dysthymia according to SCID-I	57
<b>Table (5)</b>	Description of HARS and HDRS in both groups	58
<b>Table (6)</b>	Comparison between both groups regarding tinnitus	59

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Table (7)</b>	Relationship between sleep quality and Anxiety, Depression and Dysthymia among the participating groups	60
<b>Table (8)</b>	Distribution of the participants in both groups according to difference grades of blood pressure	62
<b>Table (9)</b>	The Influence of Socio-demographic Characteristics of Participating Workers on their Sleep Quality	63
<b>Table (10)</b>	The Influence of Occupational Characteristics of Participating Workers on their Sleep Quality	64
<b>Table (11)</b>	Logistic Regression model for the Factors affecting Sleep Quality of Participating Workers	65
<b>Table (12)</b>	The Influence of Socio-demographic Characteristics of Participating Workers on Anxiety	66
<b>Table (13)</b>	The Influence of Occupational Characteristics of Participating Workers on Anxiety	67

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Table (14)</b>	Logistic Regression model for the Factors affecting Anxiety among Participating Workers	68
<b>Table (15)</b>	The Influence of Socio-demographic Characteristics of Participating Workers on Depression	69
<b>Table (16)</b>	The Influence of Occupational Characteristics of Participating Workers on Depression	70
<b>Table (17)</b>	Logistic Regression model for the Factors affecting Depression among Participating Workers	71
<b>Table (18)</b>	The Influence of Socio-demographic Characteristics of Participating Workers on Dysthymia	72
<b>Table (19)</b>	The Influence of Occupational Characteristics of Participating Workers on Dysthymia	73
<b>Table (20)</b>	Logistic Regression model for the Factors affecting Dysthymia among Participating Workers	74

<b>Table No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Table (21)</b>	Comparison between high and low noise regarding mental health problems (anxiety, depression and dysthymia according to SCID-I)	75
<b>Table (22)</b>	Logistic Regression model for the Factors affecting mental health problem among Participating Workers	76

## **LIST OF FIGURES**

<b>Figure No.</b>	<b>Title</b>	<b>Page No.</b>
<b>Figure (1)</b>	DALYs lost annually because of environmental noise exposure in European A-member states alone	10
<b>Figure (2)</b>	Factor affecting PPE usage among workers	37
<b>Figure (3)</b>	Typical audiogram for early noise-induced hearing loss NIHL.	39

## **ABSTRACT**

Noise is a known environmental stressor; poor sleep quality, depression and anxiety is reported among residents near airports; however there is a lack of evidence that occupational noise exposure can cause similar health problems. This study aimed to determine the association between noise exposure and some psychological disorders as anxiety, depression, and sleep quality among workers exposed to noise at an Egyptian electric device factory. Two hundred forty four workers were recruited from the factory divided into 2 groups matched for age and sex, 124 exposed to high noise (96-106 dB) and 120 exposed to low noise below 85dB. All workers included in the study were subjected to an interview questionnaire including personal and occupational history. Structured Clinical Interview for DSM IV TR Axis-I disorders (SCID-I) to diagnose both depression and anxiety where the severity of those diseases was assessed using Hamilton anxiety rating scale (HARS) and Hamilton Depression rating scale (HDRS). The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality. In addition the workers blood pressure was measured using an electronic sphygmomanometer. Results of this study showed that the high noise group had significantly poorer sleep quality and significantly higher anxiety, depression and dysthymia rates than the low noise group. By applying regression analysis sleep quality appeared to be influenced by shift work more than any other factor. Also anxiety was influenced by shift work and tinnitus. Depression and dysthymia were influenced by the noise exposure, while depression was also influenced by tinnitus. On the other hand no significant difference regarding blood pressure was noted. Prospective studies are also recommended to determine the causal relation between occupational noise exposure and psychological and sleep problems

## **INTRODUCTION**

Noise, or unwanted sound, is one of the most prevalent occupational health problems. It is a hazard of many industrial processes. Exposure to high levels of noise causes hearing loss and may cause other harmful health effects as well. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure (*OSHA, 2002*).

Review of the literature indicates that noise has a series of health effects, in addition to hearing impairment. These health effects can be physiological (*Neghab et al., 2009*) or psychological (*Lee et al., 2011*).

Poor sleep quality and irritability in the morning have been reported in residents exposed to environmental traffic and aircraft noise (*Jakovljevic et al., 2006*). Depression, anxiety, and stress were higher among those exposed to aircraft noise (*Lee et al., 2011*). Accidents , injuries and cognitive failures (17.3%) were also related to high noise exposure (*Smith, 2011*).

Psychological disorders can cause negative effects on role functioning that are greater than physical illness. This is reflected in occupational settings in the form of lost productivity which includes short term disability, compensations, absenteeism, and on the- job impairment (*Stewart et al., 2003*).

Most of the studies preformed to associate noise exposure to psychological problem investigated the effect of environmental noise exposure ( *Hardoy et al., 2005; Lee et al., 2011*). And some work was done to investigate the same association in occupational settings (*Smith, 2011; Yoon et al., 2014*).

## **OBJECTIVES**

To determine the association between noise exposure and some psychological disorders as anxiety, depression, and sleep disorders among workers exposed to noise at the factory.

# **REVIEW OF LITERATURE**

## **Chapter 1** **Occupational Noise Exposure**

Sound consists of pressure changes in a medium (usually air), caused by vibration or turbulence, while noise or unwanted sound is a by-product of many industrial processes and is considered the most disturbing environmental hazards in the world; it originates from a variety of sources as road, rail or air traffic, and industrial plants (*OSHA, 2002*).

Several ways of measuring noise were introduced, of these; Sound pressure level (L) is a measure of the air vibrations that make up sound. A wide range of sound pressure levels is detected by the human ear (from 20  $\mu$ Pa to 200 Pa); they are measured on a logarithmic scale to indicate the loudness of a sound with units of decibels (dB). The human ear does not have equal sensitivity to sounds at different frequencies, to account for the perceived loudness of a sound, a spectral sensitivity factor is used to weight the sound pressure level at different frequencies (A-filter). These A-weighted sound pressure levels are expressed in units of dB(A).

In occupational settings sound levels fluctuate in time, so the equivalent sound level is determined over a time period. The A-weighted sound level is averaged over a period of time (T) and is represented by  $L_{Aeq,T}$ . A common exposure period occupational studies is 8 hours, and the parameter is represented by the symbol,  $L_{Aeq,8h}$  (*WHO, 2004*).

Different types of noise exist in occupational settings, Continuous noise (periodic): is constant, with no breaks or changes in intensity. Intermittent noise (aperiodic): changes in intensity over time, having gaps of relatively quiet intervals between repeated louder phases (*Speaks, 1992*).

## **Noise measurement instruments:**

### *Sound level meters:*

It is considered the basic instrument, an electronic instrument consisting of a microphone, an amplifier, various filters, a squaring device, an exponential averager and a read-out calibrated in decibels (dB). It also has a built-in frequency weighting devices, which are filters that allow most frequencies to pass while discriminating against others. The most commonly used filter is the A-weighting network, which was developed to