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

Thesis

Submitted for partial fulfilment of master degree
in Occupational medicine

By

Mostafa Mohamed Mostafa Yosef

M.B., B. Ch.

Ain Shams University

Supervised by

Professor/ Ahmed Esmat Shoman

Professor of Occupational medicine
Faculty of medicine- Ain Shams University

Professor/ Nahla El Sayed Nagy

Professor of Psychiatry
Faculty of medicine- Ain Shams University

Ass. Prof./ Mona Abdel-Aal Abdel-Hamid

Assistant Professor of Occupational Medicine
Faculty of medicine- Ain Shams University

Faculty of medicine - Ain Shams University
2015

ACKNOWLEDGEMENT

First of all thanks to Allah, who gave me the power and strength to complete this work. I would like to express my special appreciation and thanks to my supervisors Professor Dr. Ahmed Shoman, Professor Dr. Nahla El- Sayed Nagy and Ass. Professor Dr. Mona Abdel Aal, they have been tremendous mentors for me. I would like to thank them for encouraging my research and for allowing me to grow as a research scientist. Their advice on both research as well as on my career have been priceless.

I would especially like to thank the managers of the factory, where this study was held for their support, without their help this work would not have been possible. I also like to show my deepest gratitude to the workers who agreed to participate in this study.

A special thanks to my family. Words cannot express how grateful I am to them for all of the sacrifices that they have made on my behalf. Your prayers for me were what sustained me. At the end I would like express appreciation to my beloved wife Sara who was always my support in the moments when there was no one to answer my queries.

CONTENTS

LIST OF ABBREVIATIONS

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

LIST OF TABLES

LIST OF FIGURES

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 regrading 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 μPa 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, LAeq,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