ASSESSMENT OF RESPIRATORY HAZARDS AMONG WORKERS IN IRON AND STEEL INDUSTRY

By

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Thesis

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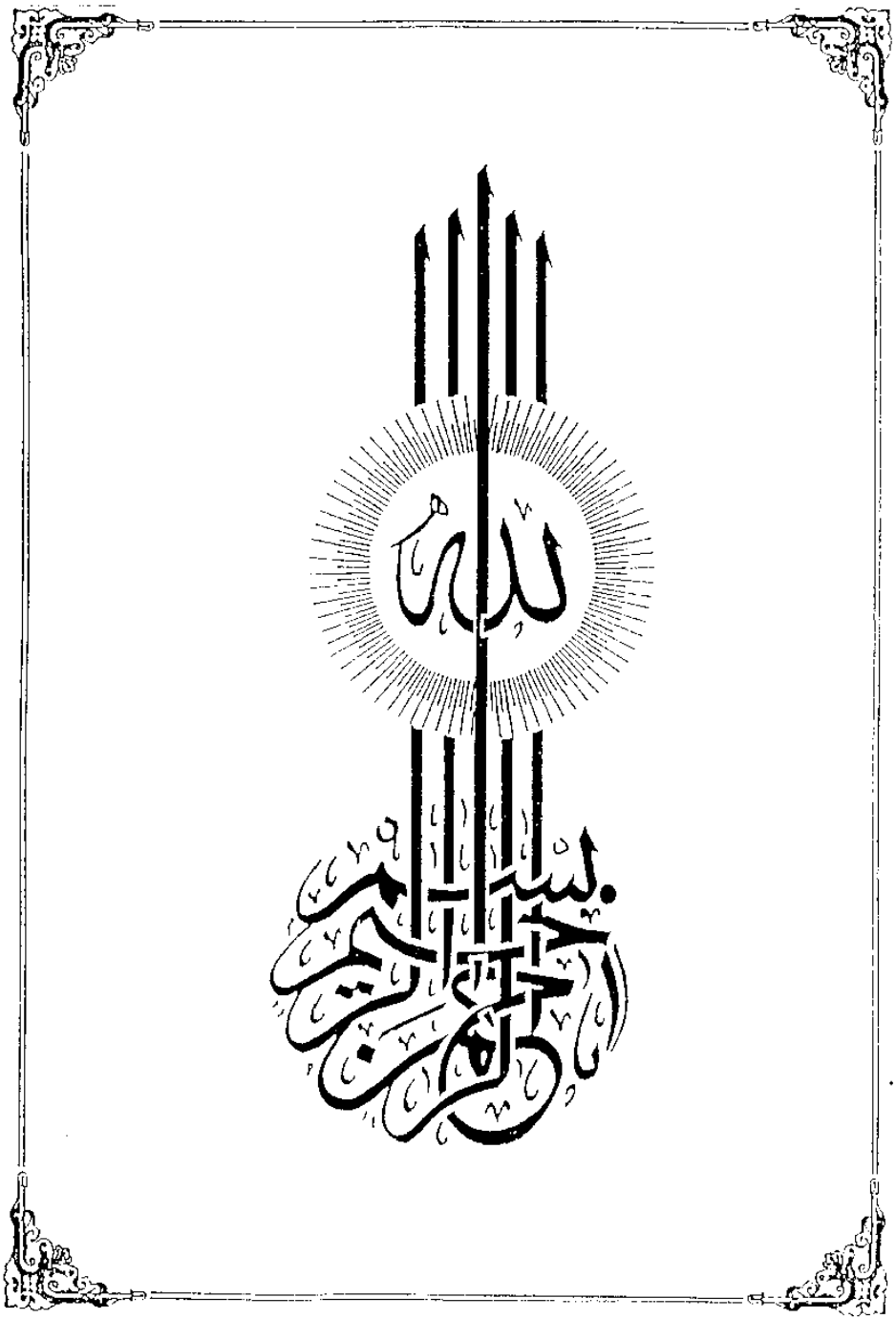

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List of abbreviation

- **A.R.E** : Arab Republic of Egypt .
- **AlO_3** : Aluminium oxide .
- **C** : Carbon .
- **$^{\circ}C$** : degree centigrate .
- **$CaCO_3$** : Calcium carbonat .
- **CaO** : Calcium oxide .
- **$CaSiO_3$** : Calcium silicate .
- **CO** : Carbon monoxide .
- **CO_2** : Carbon dioxide .
- **FEF 25-75%** : Forced expiratory flow at middle half of the FVC .
- **FEV1** : Forced expiratory volume in one second .
- **Fe_2O_3** : Ferrous oxide .
- **Fe_3O_4** : Ferric oxide .
- **FRC** : Functional residual capacity .
- **FVC** : Forced vital capacity .
- **FVC/PVC%** : Forced vital capacity percentage to predicted vital capacity .
- **I.D.** : Identification .
- **μ** : micron .
- **M.A.C.** : Maximum allowable concentration .
- **mg/m^3** : milligram per cubic meter .
- **MgO** : Magnisium oxide .
- **mm** : Millimeter .
- **mppcf** : milion particle per cubic foot .

- **MRC** : British Medical Research Council .
- **0.01 N** : 0.01 normal .
- **$Na_2S_2O_3$** : Sodium thiosulphate .
- **No** : number .
- **NO_2** : nitrogen dioxide .
- **O** : oxygen .
- **P/c.c.** : Particle per cubic centimeter .
- **PEFR** : Peak expiratory flow rate .
- **PPM** : Particle per million .
- **R.V.** : Residual volume .
- **S.D.** : Standard deviation .
- **SiO** : Silicon dioxide .
- **SO_2** : Sulfur dioxide .
- **TLC** : Total lung capacity .
- **TLV** : Threshold limit value .
- **V.C.** : Vital capacity .
- **X^2** : Chi square .

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INTRODUCTION

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Pulmonary affection including those characterized by airflow limitation are increasing in the industrialized countries of the world , and they are also responsible for high rates of morbidity and extended periods of disablement (Rockville, 1984).

The classic diseases of dusty occupations may be on the decline , but this is not the case for chronic non malignant lung disease characterized by air flow limitation.

Like other chronic life style diseases, they are almost multifactorial in etiology involving host factors as well as environmental factors, (Speizer and Tager, 1979).

The effects of occupational dust exposure on pulmonary function are controversial especially in their interaction with cigarette smoking (Parkes, 1982 and Morgan, 1986).

Nemery et al (1985) , suggested that , the main exogenous determinant in the causation of chronic obstructive lung diseases is cigarette smoking ,but occupational exposure to industrial pollution in the iron and steel industries also causes progressive decrease in pulmonary functions.

Epidemiologic studies have identified a number of risk factors which influence the distribution of these clinical syndromes in population host factors implicated particularly in relation to respiratory illnesses , and genetic characteristics (Speizer and Tager 1979 and Burrows ,1981).

When considering specific types of industries ,one finds that , there are often many different production processes, resulting in many different types of pollutants.

Few people outside the iron and steel industry are aware of the enormous volumes of air required to produce iron and steel from raw materials to finished shapes.

About 3.5 tons of air must be supplied to the blast furnace to reduce the ore to metal and this amount of air produces about 5 tons of blast furnaces gas (Sell, 1987).

So it is apparent that the tonage of air and gas far exceed the solid charge to the furnaces and the product tapped from the furnaces.

AIM OF THE STUDY

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The aims of this study are :

1 - To evaluate the respiratory system affections of exposed workers at different departments of iron and steel industry.

2 - To find out the relation between environmental measurments and ventilatory functions .

3 - To study the risk factors e.g. smoking habits , duration of exposure and air mask using which may affect the ventilatory functions.

REVIEW OF LITERATURE

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The Egyptian Iron & Steel Company :

The Egyptian Iron & Steel Company ,founded on 14 june 1954 is the first integrated steel plant in A.R.E. The plant was erected on the vast desert area on the eastern side of the Nile 30 km South of Cairo near Helwan.

The plant was commissioned in 1952 of two blast furnaces (1 + 2), 4 Thomas converters, 2 electric steel making furnaces, a blooming mill , a heavy section mill , a plant mill with an original steel capacity , of 265,000 tons per year using low grade high phosphorus Asswan Iron ore but now converted to Bahariya ore.

In 1963/1964, a light section mill and a sintering plant NoI containing one sinter machine have been added. In 1974 another identical sinter machine has been erected in sinter plant NoI.

The full expansion which has been commissioned in two stages contains the following main units :
Sintering shop containing four sintering machines,blast furnaces 3 & 4, Oxygen converter shop of 3 converters, continuous casting shop consisting of 3 two - strand slapping machines and 3 six - strand billeting machines , a continuous hot rolling strip mill consisting of one roughing stand and 6 continuous stands, a

cold rolling mill , of two reversible mills , a pickling line, annealing furnaces and temper mill.

Additional utility units include a central workshop . (mechanical and electric) for maintenance and repair , A central laboratory for chemical and mechanical testing , a slag crushing plant ,line calcining plant , a dolomite shaft kiln - a dolomite tar bonding shop including mixers , presses and bottom firing furnaces.

A salg granulation plant for producing granulated blast furnaces slag for cement manufacture , steam and electricity step-down stations for various energy feed requirements.

Mining is in EL-Gadida mines at Bahariya Oasis , 320 Km south west of the works. Ore is transported by railway to the storage yard at Helwan .

Limestone is obtained from Rifai and Beni Khaled and

Dolomite : from Adabeya deposits.

The man power is 26,000 by now .