HEALTH HAZARDS TO WORKERS IN GASOLINE STATIONS

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THESIS

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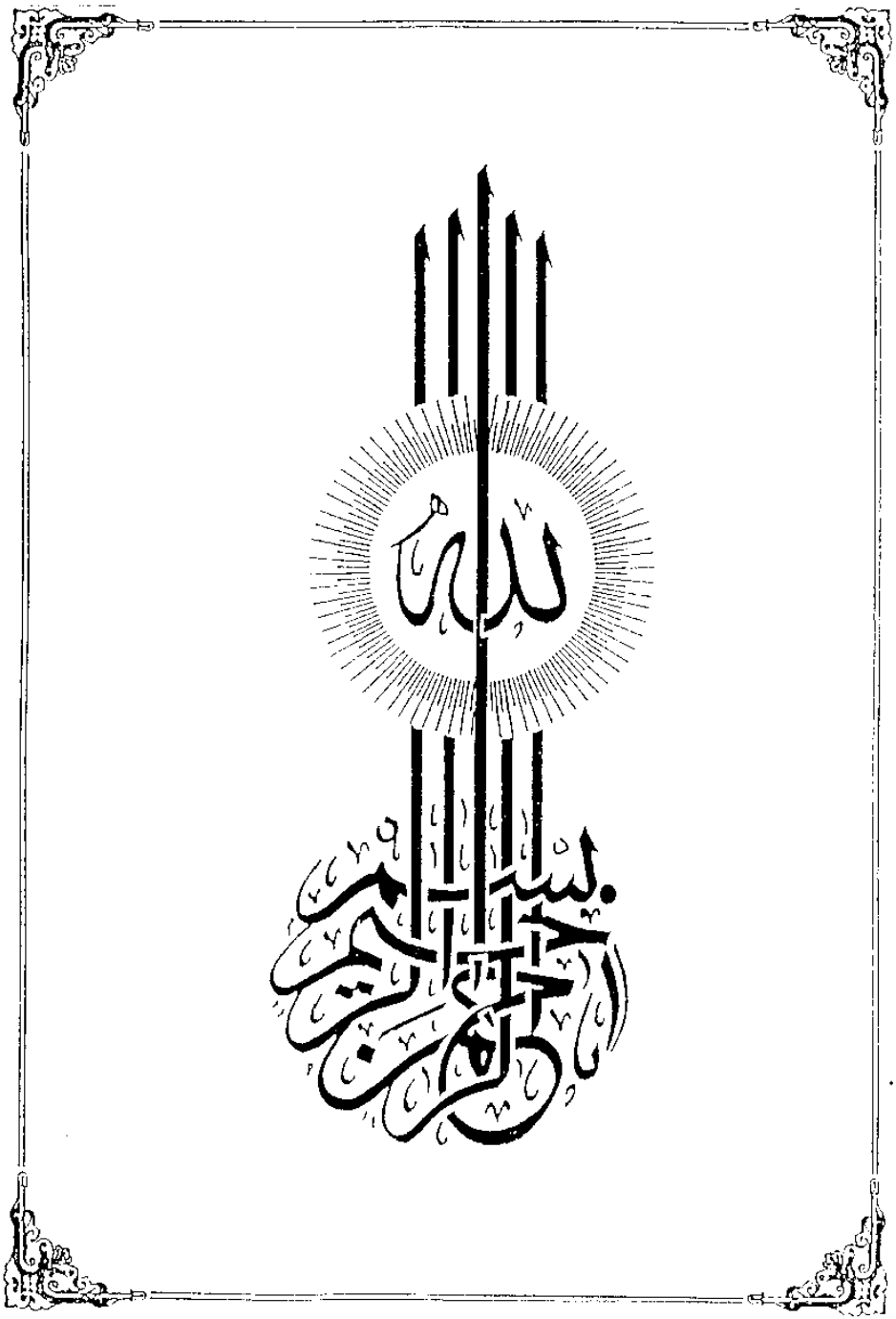

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INTRODUCTION

Introduction

The increasing number of cars in Cairo (more than one million cars) and the incresing need for more gasoline stations has drawn the attention to the possible dangers of gasoline and traffic noise .

Although some dangers of gasoline were recognised and studied as early as 1920 's when the addition of anti - knock substances was begun in the U. S. A. , additives were considered safe in spite of contrary opinions which existed even then . (Hamilton A. , 1972)

Today there is no dout that the use of gasoline has substantially increased environment pollution (a report prepared by the Committee on biological effects of atmospheric pollutants of the Division of medical sciences , National Aoademy of sciences , 1971)
However ,although there is as yet no conclusive proof showing harmfull effects of present levels of exposure.

Gasoline stations workers are in a sense occupationally exposed to a great extent of gasoline and to traffic noise .

So it was decided to evaluate such hazards of gasoline and traffic noise in Egyptian workers in some gasoline stations in Cairo .

GENERAL HAZARDS TO WORKERS IN GASOLINE STATIONS

Generral hazards to workers in gasoline stations

Some of the hazards that may occure in gasoline stations include injuries due to fire and explosion , falling of cars from the hydrolic plat-form , hand tool injuries , and falls because of unclean greasy floor .
Also compressed air plant has the risk of bursiting the air reciever , and in tyre maintenance ; bursiting tyres may project violentally and cause injuries .

Epoxy resins used with reactive curing agents in glues, are irritating to the eye and skin , some are suspected of producing cancer (Cited from Encyclopedia of Occupational Safety and Health , 1983) .

Many workers use gasoline for cleaning hands and clothes , this may imply skin hazards . Also lubricating oils and grease may be hazardous .
The increase interest in environmental pollution during the recent years has drowen the attention to possible dangers caused by the addition of anti-knock additives (tetra-ethyl and tetra-methyl lead) , and the presence of cyclic hydrocarbons like benzene (benzol) . Wildman (1976) reported that benzene and lead which are present in commercial gasoline, pose an environmental risk . His study demonstrated that benzene and lead

individually inhibited both intact reticulocyte heme and protein synthesis in the presence or absence of iorn transferrin . When these two compounds were present in the same incubation , their effects were additives . These in vitro results suggested that further evaluation of the combined risks of benzene and lead was indicated .

Falahi (I984) studied the contamination with heavy metals emmited from auto-motives . High levels of heavy metals in soil, plants and the atmosphere related to industeries , high ways , chemical dumping , impure chemical fertilizers , and pesticides containing metals . An important source of heavy metals especially lead was from the combustion of leaded gasoline used for transportation . Other heavy metals associated transportation included nickle , which is also added to gasoline and is contained in engine parts , Zinc and cadmium were present in tyres , lubricating oils and galvanised parts such as fuel tanks .

Traffic noise is also one of the potential hazards that may affect the hearing of the workers .

The main topics of our study will be explained in details in the following chapters , they include gasoline , and noise .

Gasoline

Gasoline is one of the major products of crude petroleum . Crude petroleum is a liquid consisting primerly from hydrocarbons , but containing in addition sulpher , oxygen , nitrogen compounds , and other elements and metals . It is believed to have been formed by the decay of small marine organisms and vegetations subjected to temprature , pressure , and other influences over many hundreds of thousands of years . (Encyclopedia of Occupational Safety and Health , 1983)

The following table shows the principal petroleum products and their uses .

Major fuel products	Uses
motor gasoline	cars , truks , marine , farm & consumption equipment
diesel gasoline	trucks , buses , railway , marine , farm & consumption equipment
heating oil	oil-burning home furnace.
kerosine	kitchen stoves , home space heaters & kerosine lamp
jet fuel	aviation jet engines
bunker fuel oil	ships , power plants , industerial plant.
Minor fuel products	**Uses**
tractor fuel	farm & construction equipments
asphalt & solvents	

Health hazards of petroleum products

Petroleum fuel has variant health hazards that include :

* Dermatitis : it occures more with low boiling products as gasoline . It is usually the result of defating effect on the skin . More viscous products may plug the skin follicles and lead to dermatitis .

* Polyneuropathy : Gallasi et al (1980) reported a case of polyneuropathy in a 14 years old boy , a chronic gasoline sniffer . Clinical and electromyographic examinations showed a symmetrical motor involvement mainly distally and in lower limbs . A sural nerve biopasy showed only slight changes , both axonal and demyelinating type .

* Anaethetics and asphixiating properties : the gaseous petroleum fractions and the more highly volatile products such as gasoline , have a mild anaesthetic action . This property generally is in inverse ratio to molecular weight and for medical proffesion may be best illusted by cyclopropan which is used as an anaethetics .

* Aspiration hazards :

the lower boiling point liquid of fuel products , such

as gasoline or kerosine , produce severe pneumonitis if inhaled into the lungs .

Simpson (I98I) reported that chemical burns and pulmonary complications were the most comman problems encountered in a patient immersed in gasoline . The patient demonstrated partial thickness and chemical burns in 46 % of the total body surface area. Although he did not develop bronchitis , he displayed persistant atelectasis , laryngeal oedema , and subsequent upper air way obstruction . This had not previously been reported in gasoline inhalation injury . Hydrocarbon hepatitis secondary to the vascular endothelial damage was apparently reversible lesion with no reported long term sequelae . He reported that gasoline immersion injury may be a serious multi-system injury .

* General and psychological effects

Rimengton (I984) described the physical and psychological picture of gasoline sniffing . It included visual hallucination , changes in consciousness , euphoria , nystagmus , dizziness , weakness and tremors . There was a possibility of rappid recovery . Sudden death or brain damage could occure with chronic abusers . When leaded gasoline was abused then, blood and urine lead levels and erythrodytic delta amino levulonic acid dehydrase (ALAD) levels might be increased . Although the treatment of acute and chronic gas sniffing was supportive and not specific , when lead levels were high

Chelated therapy was indicated including British anti-lewesite , calcium disodium versenate , or D-penicillamine .

He also reported his findings on an isolated Indian population, where intentional gas sniffing has reached an epidemic proportions . 10 % of the total population , and 25 % of the children between 5 and 15 years of age had been identified as gasoline inhalation abusers . In this study the most important etiological factors included enviromental , and cultural components .

* Exposure to lead present in motor fuel

motor fuel generally contain an alkyl lead as anti-knock agent , and this may be a source of pollution .

Melke in 1984 used the soil lead as an index for describing the urban lead levels in the metropolitan area. He assesed the soil lead levels next to homes of neiborhoods of the metropolitan area . Lead levels of rural soils were around 5 ug / g . Near the city limits they were around 25 - 50 ug / g , and in the central bussiness district they were 500 - 1000 ug / g , or over 100 times greater than the rural area .

Coulehan et al in 1983 studied the gasoline sniffing and lead toxicity in Navajo adolescents in U.S.A. . During a 6 years period , 23 Navajo adolescents were hospitalised 47 times for persumed lead intoxication secondary to gasoline sniffing . Most of the patients were males (87 %) and sniffed gasoline as social activity , more frequently in spring and summer . 56 % of the patients first presented with encephalopathy of total episodes , 31 % involved asymptomatic lead encephalopathy , 31 % involved tremors,ataxia , and other neurologic signs , and 38 % involved encephalopathy with disorientation and hallucination . Free erythrocyte proto-porphyrin level was not consistantly high , although blood lead levels were elevated .

One death occured . Aproximately 11 % of 537 Navajo adolescents said they inhaled gasoline for enjoyment at least occasionally . Among 147 junior high school students, blood lead levels averaged 18 $\pm$ 6 μg / dl , with no values greater than 40 μg / dl .

Three of these students had also elevated zinc proto-porphyrin levels and all three were anaemic .

No correlation was found between levels of zinc proto-porphyrin and wheather or not the youth reported gasoline sniffing .

However , gasoline sniffing was associated with poor school performance and delinquent behavior . From the adolescents only