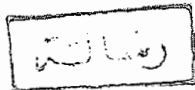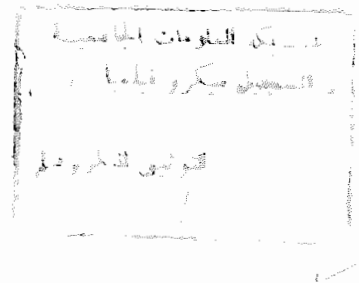# PEDIATRIC INTOXICATIONS

Essay
Submitted In Partial Fulfillment
Of M.Sc. Degree In
Pediatrics

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*To My Mother And
My Father's Spirit*

بسم الله الرحمن الرحيم

ACKNOWLEDGEMENT

List Of Abbreviations

- UK : United Kingdom .
- USA : United States of America .
- CDC : Center for Disease Control .
- SGOT : Serum glutathione oxaloacetic .
- SGPT : Serum glutathione pyruvic transaminase .
- NAC : N-acetyl cystein .
- TIBC : Total iron binding capacity .
- TCA : Tricyclic antidepressants .
- ECG : Electro-cardiogram .
- ICU : Intensive care unit .
- PCC : Poison control center .
- FEP : Free erythrocyte protoporphyrin .
- BAL : Dimer caprol .
- 2,3 DMSA : 2,3 Dimercapto succinic acid .
- EMIT : Enzyme multiplied immuno-assay .
- TLC : Thin layer chromatography .

CONTENTS

INTRODUCTION

INTRODUCTION

Poisoning in children is today and has always been considered as a serious international problem . It is one of the most common acute emergencies that confront pediatricians . The problem increases and takes variable etiologies with the advancement of chemical industries for cleaning products , insecticides and medicaments .

Pharmaceutical firm often prepare tablets and capsules in a variety of attractive colors and shapes , therefore make them very attractive to children .

Poisoning in children in early age group occurs mainly in the home . It is mostly accidental and manifests itself clinically in an acute pictures . Young children are peculiarly liable to accidental poisoning because of their activity in exploring their surrounding environment especially at home unawareness of the hidden dangers *(Pascoe et al , 1974)* .

In a study done in Great Britain , the number of children admitted to hospital because of ingestion of a poison has risen markedly over the last few years of 20.000 children admitted annually to hospitals in the UK , 80 % are under 5 years and most lie in the age range 18 to 36 months .

In the United States 59 % of 144.262 poison control cases reported to the food and drug administration in 1979 involved children aged less than 5 years . This is the period when children are particularly active and exploratory and have a strong impulses to put things into their mouths , both for identification and self gratification . These characteristics predispose to accidental poisoning which may occur when parents are in attentive or neglectful as at times of family crises *(Meredith , 1985)* .

In the UK , the majority of children ingest therapeutic agents : Analgesics account for 25 % of cases . A further 35 % ingest other pharmaceutical preparations - iron - tricyclic antidepressants , benzodiazepines , paracetamole (acetaminophen) and the contraceptive pills are the agents most commonly involved , the remainder are poisoned by a variety of house hold products (Turpentine substitute , Kerosene) .

A similar pattern of poisoning is seen in the United States . Following the introduction of child resistant closures , death due to aspirin ingestion declined in both the UK and USA . While carbon monoxide remains a common cause of childhood death due to poisoning . Tricyclic antidepressant ingestion carries a relatively high mortality when one considers the infrequency with which children ingest these drugs in overdose *(Vale , 1985)* .

Study done in Poison Control Center in USA , (1983) showed that acetaminophen is the most commonly involves in poisoning followed by cough and cold preparations , salicylates , vitamins , benzodiazepines and antibiotics .

In 1984 , the proportionate number of calls due to cough and cold preparation and vitamin exposure increased slightly (*Matthew , 1988*) .

In Egypt , we can not estimate properly the volume of this problem . There is always insufficient statistical studies and under estimation of cases intoxicated . In our country , we have to put into consideration that there are many factors which might contribute for the prevalence of poisoning of several types of detergents the use of potash is still wide as being the cheapest and most easy obtained .

Kerosene is still widely present in Egyptian houses inspite the use of Butane , it is used mainly for cooking , heating and cleaning . Drugs and insecticides can not be related to a special social class because the obtaining of drugs is easy , they can be brought from any pharmacy without prescription . The governmental hospital yield unlabelled drugs without charge , therefore a wide variety of medicaments may be present in every house . For insecticides , they are used in most of the houses to combat different forms of harmful insects . They are abused for dustiny food stuffs which may lead to pollution and intoxication .

Classification Of Common Poisons

The pediatric toxicological emergencies can be classified into drugs and non drugs intoxications .

I-(A)Drugs Intoxication

In order of frequencies as reported according to the reports of Toxicology Department in Ain-Shams University .

1-Acetaminophen (Paracetamol) .

2-Salicylates .

3-Iron .

4-Barbiturates .

5-Benzodiazepine .

6-Antidepressants .

7-Digitalis .

I-(B) Non Drugs Intoxication

In order of frequencies as reported according to the reports of Toxicology Department in Ain-Shams University .

1-Corrosives .

2-Lead .

DRUGS INTOXICATIONS

I-(A) Drugs Intoxications

1-Acetaminophen "Paracetamol"

Acetaminophen is widely used as analgesia and antipyresis drugs in most of patients seen in pediatric practice (*Barry et al , 1986*).

The analgesic and antipyretic properties are similar to those of salicylates , but unlike salicylates , it has no significant anti-inflammatory , uricosuric , or anti rheumatoid effect *(Cooper , 1981)* .Acetaminophen has advantages over salicylates , that it is lack of sensitization (especially for asthmatics) , absence of gastrointestinal irritation (especially for ulcer patients) . no effect on coagulation (for patients with natural or iatrogenic coagulation disorders) , and no association with Reye's syndrome in children .

The United States centers for disease control (CDC) recommended the use of acetaminophen in childhood fevers because of the suspected link between salicylate use in Varicella or Influenza and the development of Reye's syndrome *(Matthew , 1988)* .

In Great Britain , prior to antidotal therapy , there were 7.000 hospitalizations each year with 1.400 cases of severe hepatic necrosis and at least 60 deaths secondary to hepatic failure , current estimates indicate that acetaminophen is the main cause of acute hepatic

necrosis in the United Kingdom with the introduction of effective antidotal therapy for acetaminophen intoxication in 1973 , mortality in acetaminophen over doses decreased from approximately 1 % to less than 0.4 % *(Henry et al , 1984)* .

Toxic Doses Of Acetaminophen Intoxication :

Acetaminophen , accumulated in febrile children after therapeutic doses (13.3 mg / Kg / 4 hours) for several days , acetaminophen level did not exceed 40 ug / ml and no hepatotoxicity developed *(Nahata , 1984)* .

Children under 9 - 12 years of age demonstrate less hepatotoxicity than adults despite equivalent toxic plasma acetaminophen levels , because different metabolic pathway are utilized *(Miller , 1976)* .

Pharmacology And Metabolism Of Acetaminophen :

Acetaminophen is absorbed rapidly after an oral therapeutic dose and produce a peak plasma level between 1/2to 1 hour after ingestion in most patients this absorption may be delayed in over dose so that peak plasma level may not occur until as long as 4 hours post ingestion *(Peterson , 1978)* .

The drug then is metabolized in the liver where liver biotransforms 90 % of acetaminophen by conversion to sulfate or

glucuronide . The sulfate pathway is predominant in children under 12 years of age but adults use the glucuronide pathway . Unchanged renal excretion accounts for less than 5 % of the elimination (*Miller* , *1976*) .

Small portion of the therapeutic dose is metabolized by the P_{450} mixed function oxidase pathway to a reactive intermediate *(Black , 1980)* . In the presence of adequate glutathione stores this intermediate is detoxified to mercapturic acid conjugates and cysteine (*Slattery et al , 1981*) . When a patient takes a significant overdose of acetaminophen , the first molecules passing through P_{450} are conjugated with hepatic stores of glutathione and excreted as non toxic mercapturic acid . When glutathione stores are depleted usually to about 70 % of normal , then highly reactive intermediate metabolite bind to hepatic macromolecules and hepatic damage then may occur *(Peterson et al , 1977)* .

Once the reactive intermediate metabolites bind to hepatic cells in the untreated, overdosed patient injury occurs . This is reflected by a gradual rise of serum glutathione oxaloacetic transaminase (S.GOT) and abnormal bilirubin and prothrombin time *(Rumack et al , 1981)*.

There is significant individual susceptibility to the toxic effects of acetaminophen . Age , diet , nutritional status , metabolic state , and drug ingestion affect individual changes in mixed function