INTRODUCTION

Toxic exposures have become one of the most common causes of acute medical illness in many developed as well as developing countries. In this regard, the elderly are no exceptions and poisoning can be considered as a significant health problem especially in this specific age group ***(Moghadamnia & Abdollahi, 2002).***

The study of geriatric intoxication has become more important nowadays, especially if we know that more than one-quarter of the world's population are now over the age of 60, and by the year 2050, one in five will be 60 years or older (according to *WHO* expectation), which explains the possibility of increasing incidence of toxicity in this age group ***(Shi et al., 2008 & WHO, 2009).***

There are many factors responsible for poisoning in the elderly as failing health, loss of independence, death of a spouse, and retirement which can be all considered as contributing or precipitating factors to poisoning in this age group who once exposed to poisoning, they have the highest mortality. This high mortality rate observed warrants the attention to the risk factors and the prognostic criteria of poisoning in the elderly. In addition, the presentation of poisoning may be delayed and the presenting symptoms and signs may be atypical ***(Willis & Gupta, 2007).***

Despite their over-representation in every aspect of health care, they are under-represented in every aspect of the research that creates the knowledge base for causation, diagnosis and treatment ***(Studenski et al., 2009).***

Up till now, articles that describe toxic exposures in the elderly are still insufficient and may focus on one aspect rather than others.

For all the above mentioned factors, there is an increasing need for studying the pattern of poisoning in the elderly.

AIM OF THE WORK

This study aims to:

1- Portray the pattern of poisoning in the elderly population via a cross-sectional hospital-based observational study on geriatric patients presented to the Poison Control Center *(PCC)* of Ain Shams University hospitals during the period from December 2009 to December 2010.

2- Identify specific differences in the elderly regarding mode of poisoning, common intoxicants, differences in clinical courses and if management protocols require some modifications from that of the young adults.

3- Review and analyze data about poisoning in the elderly collected from literature.

REVIEW OF LITERATURE

DEFINITION OF ELDERLY AND AGEING:

A starting point in most discussions on ageing or elderly populations is the definition of the terms ageing and elderly. Based on chronological age, the term elderly (also known as ‘old age’ or ‘older people’) is used to describe people aged 60 years and above, where those from 60 to 74 years old are referred to as "young or early elderly", those from 75 to 85 years old as "old or late elderly" while those above 85 years as "very old or oldest elderly" ***(Hajime et al., 2006 & Zimniak, 2008).***

Ageing can be defined as a homeostatic alteration in body’s normal metabolic processes, resulting usually in an increased risk of death with time (***Jeste, 2005).***

This continuous process is of course a biological reality having its own dynamic, largely beyond human control. No two individuals age in exactly the same manner; consequently there is considerable heterogeneity in the elderly population, with wide variations in physical health and cognitive functions. In addition, there is a big difference between disease and ageing effects. For example, renal impairment may be a part of ageing, but renal failure is not ***(South, 2009).***

Diverse levels of physical health and overall well-being make it difficult to categorize what constitutes "normal ageing" ***(Jink, 2010).***

Within each of the subgroups of people over 60 years of age, individual biological responses to ageing are affected by a range of physiological, genetic, socioeconomic and environmental factors including nutrition, access to medical care, smoking, and weight ***(Molton & Jensen, 2010).***

Further, the over-60 subgroups vary widely in physical, emotional and mental health, social function, activity levels, and overall vitality ***(Saltman et al., 2006).***

THE ELDERLY SITUATION IN HEALTH CARE SYSTEMS:

Over the past few years, the world's population has experienced a tremendous growth in the number and proportion of the elderly. In 2004, there were approximately 600 million people in the world who were aged 60 years and over. It is estimated that the number will double by 2025 and will reach 2 billion by 2050 ***(WHO, 2009).***

Unfortunately, the elderly are still neglected and poorly treated even in many developed counties, to the extent that many of them who are urgently in need of public services are currently treated as second-class citizens. In addition, the majority of them live in developing countries where the health care systems are less organized and therefore less able to adapt to the consequences of population ageing ***(Gavrilov & Heuveline, 2003).***

Acute poisoning primarily involves younger populations, with about 2.3% - 5.3% of the cases occurring in people aged 60 years or older in most studies all over the world. Although they comprise the minority in poisoning events, the dangerous consequences of acute poisoning in this specific age group should not be neglected ***(Cassidy et al., 2008).***

Compared to younger patients, this population has specific characteristics; the most important of them are unclear

complaints and difficult triage, more frequent hospital admissions, increased resources utilization, and finally higher rate of adverse health outcomes ***(Aminzadeh & Dalziel, 2002 and Adams & Gerson, 2003).***

In the United States, those 60 years and older comprise about 12% - 14% of the total population, where they account for 43% of emergency department visits and 48% of all critical care admissions from emergency departments. However; poisoning is considered the commonest form of fatal self-harm in Asia, accounting for over 60% of all deaths in old age. Moreover; in India, suicidal and accidental poisoning have become an increasingly important problem for emergency medical centers ***(Langley & Sumner, 2002 and Mohanty & Patnaik, 2007).***

In Egypt, there are still limited and insufficient data concerning acute poisoning in the elderly. However; acute intoxication in the geriatric age group above the age of 60 years presented to the Poison Control Center *(PCC)* of Ain Shams University Hospitals during the year 2009 was 155 out of 16774 cases representing about 0.92% of the total number of cases presented to the *PCC*. Out of them, 25 cases required intensive care unit admission, while 47 cases required inpatient admission and death occurred in 4 cases ***(PCC annual report, 2009).***

Till the recent past, poisoning fatalities were the domain of young and middle aged population, but nowadays, the geriatric population represents a quite disturbing trend in poisoning fatalities. Among exposures reported to poison control centers in 2003, the fatality ratio (number of cases divided by number of deaths) increased with age and was highest among people 80 years and older. Moreover; in a study of selected drug overdoses reported to the *American Association* of *Poison Control Centers Toxic Exposure Surveillance System (TESS)* between 1995 and 2002, it was found that the relative risk of death for the elderly was 2.7 times that of young adults ***(McLoone & Crombie, 2006 & Rogers & Heard, 2007).***

Furthermore, awareness of the general pattern of geriatric poisoning, careful monitoring, early recognition of complications and appropriate management may dramatically and unexpectedly decrease the morbidity and mortality rates among these patients ***(Studenski et al., 2009).***

MODES OF POISONING IN THE ELDERLY:

I- INTENTIONAL:

Despite the fact that suicide and its prevention continue to be a priority area for health care all over the world, suicide in the elderly remains a neglected subject receiving little interest and research attention ***(Hawton & Van Heeringen, 2009).***

Suicide rates in most countries increase steadily with age where the elderly account for almost 16.6% of all suicides and the rate of suicide is currently about 14.7 per 100,000. In addition, Suicidal behaviour in the elderly is undertaken with greater intent and with greater lethality than in younger age groups ***(Conwell, 2001).***

The risk of suicide by all methods increases with age, particularly among white men. Males aged 75 and over have the highest rates of suicide in most countries. The male-to-female ratio of suicidal attempts narrows with increasing age, so that in the oldest age groups, males attempt suicide slightly more often than females, when all methods of attempted suicide are considered ***(Wiktorsson et al., 2010).***

In the United States, drug overdose accounts for 3% of completed suicides in older males; among females, drug overdose is nearly as frequent a cause of death as firearms, each

accounting for approximately 25% of successful suicides. When death by inhalation is included, poison exposure surpasses gunshot wounds as a cause of death among elderly females ***(Ahronheim, 2007).***

RISK FACTORS FOR INTENTIONAL POISONING IN THE ELDERLY:

Compared to any other age group, the elderly experience many psychological problems as death of a spouse or depression due to loss of independence. Additionally, in younger adults, alterations in cellular and physiologic abnormalities that lead to disease are assumed to be dominated by a single underlying process, but in elderly, dysregulation of multiple homeostatic processes is mostly involved ***(Karbakhsh & Zandi, 2008 & Studenski et al., 2009).***

It is stated that elderly who attempted suicide were more likely to have suffered bone pain, major depression/bipolar disorder, or acute emotional stress than patients with unintentional exposure ***(Hawton & Harris, 2006).***

The proportion of patients receiving psychosocial assessment at the time of *ED* presentation or during psychiatric after-care was also not reported ***(Liu, 2009).***

Prompt psychosocial assessment might be critical in the control of repeated deliberate selfharm *(DSH)* or attempted suicide because prior *DSH* has been shown to be an independent risk factor for suicide ***(Hu et al., 2010 & Ivanova et al., 2011).***

II- UNINTENTIONAL:

Unintentional poisoning constitutes a major problem in the elderly and may lead to serious complications even in relatively small doses. Accidental poisoning is considered to be the third leading cause of unintentional injury death among the elderly accounting for <5% of all types of injuries ***(Skarupski et al., 2004).***

According to the 2004 World Health Report, it is estimated that 350,000 people died from unintentional poisoning worldwide in 2002; half of them in Southeast Asia and the Western Pacific region ***(WHO, 2004).***

RISK FACTORS FOR UNINTENTIONAL POISONING IN THE ELDERLY:

There are many risk factors predisposing to this type of poisoning in this age group including age-related alteration in pharmacokinetics and pharmacodynamics, increased incidence of polypharmacy for chronic illness with increased potential for

drug interactions, cognitive dysfunction, improper administration or storage of medications, and mistaken identification of medications due to poor eyesight ***(Cannon et al., 2006).***

Research done on home/community health care found that "nearly 1 of 3 medical regimens contains a potential medication error" and about 25% of the elderly are prescribed at least one drug that is contraindicated in this specific age group. Unfortunately, the magnitude of the problem is continuously getting worse with the advent and availability of newer drugs and chemicals ***(Cassidy et al., 2008 & Harugeri et al., 2010).***

Because unintentional poisonings in the elderly are often preventable, viable strategies for poisoning prevention and/or health promotion should be designed as reducing the probability for drug-drug interactions. Further, major and fatal outcomes are more common among patients with intentional poisoning compared to those with unintentional exposure ***(Crouch et al., 2004 & Karbakhsh & Zandi, 2008).***

In addition, available researches on the effects of medications on elderly age groups are sparse, making it difficult to predict their response to medications and therapies ***(Shoepp, 2001, Zahn et al., 2001& Holland et al., 2008).***

COMMON TOXIC AGENTS IN THE ELDERLY:

There are many agents responsible for acute intoxication in the elderly, whether intentionally or not, including mainly anticholinergics, anticoagulants, antidepressants, antipsychotics and cardiovascular drugs ***(Ahronheim, 2007).***

Different cross-sectional observational studies, carried out in some countries all over the world, drew the attention to the variations in the drugs and agents responsible for intoxication in this age group. For example, in India, a study done in the period from 1993 to 2004 showed that organophosphorus compounds were consumed in maximum number of cases, since the majority of patients were from rural habitat ***(Arun et al., 2005).***

In Iran, a study done in 2003 showed that benzodiazepines, opioids, antidepressants, analgesics and pesticides are the commonest agents involved in suicide attempts among the elderly ***(Karbakhsh & Zandi, 2008).***

In England, a study done from 2004 to 2007 showed that tricyclic antidepressants, lithium and cardiovascular drugs were found to be the commonest drugs ingested by the elderly ***(Doak et al., 2009).***

A study done in Taiwan during the period from 2006 to 2008 showed that benzodiazepines were the commonest drugs followed by warfarin there ***(Hu et al., 2010).***

Another common cause of acute poisoning in the elderly is food poisoning which cannot be neglected, especially in most of the developing countries, including Egypt ***(Sodha et al., 2009).***

RISK FACTORS FOR FOOD POISONING IN THE ELDERLY:

The elderly are considered to be one of several 'high risk' groups for food poisoning. Along with babies and young children, they have a higher than normal chance of this illness. This can be attributed to many factors as poorly functioning immune system, an acute condition or a long term chronic disorder and taking some medications as antibiotics or steroids. They are less likely to throw food away than a younger person which is often due to old habits of making food last as long as possible rather than allowing it to go to waste ***(Abubakar et al., 2007).***

Another factor is fixed incomes in the face of rising prices and an overall increase in the cost of living. One example of this was an increase in the number of cases of listeria in the over 60's which was attributed to their consumption of food which had passed its 'use by' date ***(Chan & Wiedmann, 2009).***

REDUCING THE RISK OF FOOD POISONING IN THE ELDERLY:

Many measures can be taken to reduce the risk of food poisoning in the elderly including storing food at the correct temperature in the fridge or freezer, following cooking instructions carefully and finally, eating food before its 'use by' date ***(Pigott, 2008).***

COMPLICATIONS OF FOOD POISONING IN THE ELDERLY:

If an elderly person contracts food poisoning then the symptoms of this are likely to be much worse than for a younger person. They will experience a severe form of this illness which may lead to complications such as dehydration which is particularly dangerous for the elderly and can result in hypotension that impairs renal blood flow. This results in kidney failure which can be fatal ***(Craig & Zich, 2009).***

III- ABUSE:

It is noticed that substance abuse declines with age, but is important to be considered in relevant clinical circumstances. Although 60% of substance abuse is recognized in patients under the age of 60, only 37% is recognized in patients over this age ***(Wu & Blazer, 2010).***