Assessment of Prevalence, Management and Outcome of Acute Poisoning at St. Paul‘s Hospital Millennium Medical College and Addis Ababa Burn, Emergency and Trauma Hospital

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This is to certify that the thesis prepared by Elias Melese, entitled '*Assessment of Prevalence, Management and Outcome of Acute Poisoning in Saint Paul's Hospital Millennium Medical College and Addis Ababa Burn, Emergency and Trauma Hospital*' and submitted in partial fulfilment of the requirements for Degree of Master of Pharmacy in Pharmacy Practice (M.Pharm) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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Abstract

Assessment of Prevalence, Management and Outcome of Acute Poisoning at Saint Paul's Hospital Millennium Medical College and Addis Ababa Burn, Emergency and Trauma Hospital, Addis Ababa, Ethopia

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Acute poisoning is an injury in which the toxic effects occur immediately, usually within hours from time of exposure. It is a common reason for emergency department visit and hospitalization. There is sparse data on acute poisonings in Ethiopia, although case fatality rate is reported to range from 2.4% to 8.6%. The aim of this study was therefore to determine the prevalence, management and outcome of acute poisoning among acutely poisoned patients admitted to the emergency rooms of SPHMMC and AaBET hospital. The study was cross sectional study conducted between August 2015 to August 2016, involving extraction of data from patient charts and registries.

The one year prevalence of acute poisoning in the two hospitals was 2.5% per total emergency visits and 6.2% per emergency admissions. The highest prevalence of poisoning cases was in the age group of 15-29 years (51.9%) and majority (54.5%) of them were females. Most (88.5 %) of the cases were intentional self-harm. Quarrel with family was the highest reason (25.8%) for intentional poisoning. About 64% of the cases were from rural areas and March- May (Tseday) was the most common months for acute poisioning (36.2%). Organophosphates (38.8%) were the leading causes of poisoning followed by bleaching agents (12.7%) and rodenticides (11.1%). Atropine was used as antidote for (25.8%) poisioined patient. Even though, most (68.9%) of the acutely poisoned patients survived without disability, the case fatality rate was found to be (8.4%). Out of the total deaths reported, organophosphate poisoning was the most common followed by herbicides and rodenticides.

The prevalence and case fatality rate of acute poisoning in the two hospitals were found to be high Hence, controlling open market sales of agrochemicals, creating awareness on proper handling of chemicals and prescribed drugs, assesing the referal linkage of hospitals, improving availability of antidotes, proper record keeping and documentation practices, are recommended.

Keywords: Poisoning, Prevalence and Outcome of Acute Poisoning.

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Abbreviations/Acronyms

2, 4-D	2, 4-Dichloro Phenoxy Acetic Acid
AaBET	Addis Ababa Burn, Emergency and Trauma
ACEP	American College of Emergency Physicians
BZD	Benzodiazepines
DALY	Disability Adjusted Life-Years
DTC	Drug and Therapeutic Committee
EFMHACA	Ethiopian Food, Medicine and Health Care Administration and Control Authority
EFMOA	Ethiopian Federal Ministry of Agriculture
EFMOH	Ethiopian Federal Ministry of Health
HMIS	Health Management Information System
ICU	Intensive Care Unit
IPCS	International Program on Chemical Safety
JUSH	Jimma University Specialized Hospital
NAC	N-Acetyl cysteine
PFSA	Pharmaceutical Fund and Supply Agency
SPHMMC	Saint Paul's Hospital Millennium Medical College
TASH	Tikur Anebesa Specialized Hospital
TAT	Tetanus Anti-toxin
WBI	Whole Bowel Irrigation
WHO	World Health Organization

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1.Introduction

1.1 Background

Poisoning is a qualitative term used to define the potential of a chemical substance acting adversely or deleteriously on the body by interfering with normal body functions after it is swallowed, inhaled, injected, or absorbed. The resulting effects of the exposure may be localized or generalized ; it may also be topical or systemic (Islambulchilar et al., 2009). In most cases, the detailed mechanism of poisoning is unknown, but the time between the exposure and the elucidation of the resulting toxic effects determines whether an exposure is acute or chronic. The effects occur almost immediately after an exposure whether the effects follow a single dose or a series of doses or exposures, when the effects appear within 24hours; this is termed “acute poisoning” (Klaassen, 2008).

Acute poisoning is an injury in which the toxic effects occur almost immediately, usually within hours from the time of exposure and can result from exposure to excessive doses of any chemical, with medicines being responsible for most childhood and adult poisonings (Malangu and Ogunbanjo, 2009). Acute poisoning is a medical emergency and it is a common reason worldwide for visits to emergency departments and hospitalization. Morbidity and mortality associated with it is becoming a major public health issue in many countries.

It is estimated that some types of poisons are directly or indirectly responsible for more than 1 million illnesses worldwide annually. However, since most poisoning cases in the world go unreported, the exact number of incidences can be even higher (Zae and Baa, 2014). World Health Organization (WHO) estimates that the total number of acute accidental poisonings throughout the world ranges from 2-3 million cases annually; of which 1 million are severe poisonings resulting in 20, 000 deaths annually; while the estimated annual intentional poisoning number is about 2 million resulting in 200,000 suicides (Moazzam et al.,2009, Banerjee et al., 2012).

The nature of poisons varies in different parts of the world and may vary even in different parts of the same country depending on the socioeconomic factors and cultural diversity. Management of these critically ill patients will greatly improve if the common causes of poisoning are properly defined (Malangu, 2008a). Exposure to agrochemicals, medicines and environmental

agents are the major causes of poisoning. Distress due to loss in the business, failure in romance or differences with the intimate partner or examination, emotional disturbances and chronic diseases are the common reasons for intentional poisoning (Chowdhary et al., 2007).

Though a lot is known and documented on poisoning on a global perspective, very little is known on its prevalence, management practice and outcome in most developing countries. Furthermore, although there are good databases in developed countries concerning poisoning surveillance system, there are no formal and well established poison control centers to collect such data in most of the low income countries. Hence, information on this public health issue remains insufficient (Bundotich et al., 2015). Studies with regard to pattern of poisoning in a particular region would help to identify the risk factors and allow early diagnosis and management of such cases, which in turn should reduce morbidity and mortality in the public (Ahmadi et al., 2010).

1.2. Statement of the problem

Several studies have reported the prevalence of poisoning based on the number of people attending the emergency departments, and /or people admitted in the hospital wards with a diagnosis of acute poisoning (Malangu and Ogunbanjo, 2009).

The reported distribution of global poisoning mortality by region as 8% for Africa, 7% for America, 5% for Europe, 19% for Eastern Mediterranean region, 7% for south east Asian region and 7% for west pacific region (WHO,2004).

Acute poisoning has been identified as a significant cause of both morbidity and mortality, and many studies also revealed that in developed countries, the rate of mortality from poisoning is 1% to 2%, but in developing countries the mortality is very high. In India, the mortality due to poisoning varies between 15 to 30% and poisoning is the fourth most common cause of mortality in rural India (Unnikrishnan et al., 2005).

In Sri Lanka, the reported mortality is 10% and acute poisoning is among the leading ten causes of hospital death in the country (Shoaib et al., 2009). In Botswana, acute poisoning contributes to 7% of morbidity and ranks third among injuries leading to hospitalization (Malangu and Ogunbanjo, 2009; Malangu, 2008a).

There are few studies on prevalence of acute poisonings in Ethiopia. This because most of the screening & confirmatory tests are not done routinely in available set-ups with in the country.

The existing little hospital based studies revealed that the case fatality rate was reported to range from 2.4% to 8.6%. Despite the rapidly growing role of chemicals in the country, lack of poison centers and toxicological expertise among health professionals may increase the likelihood of adverse health impacts of acute poisoning to the public (Abula and Wondmikun, 2006; Desalew et al., 2011; WHO, 2014).

The country doesn't have enough poison control center, which could have supported the management of patients with acute poisoning, undertakes toxicovigillance activities and provide poison information to the general public as well as health care professionals working in emergency departments and intensive care units (ICUs). Furthermore, no satisfactory data on demographical and etiological characteristics of acute poisoning were provided by the annual performance reports and other published documents of the Federal Ministry of Health (FMOH). Continuous surveillance of cases of acute poisoning is important for planning and evaluating public health interventions (Oxman et al., 2009).

Therefore, the current study aimed at generating data on the prevalence, pattern, management practice and outcome of acute poisoning in Saint Paul's Hospital Millennium Medical College and Addis Ababa Burn, Emergency and Trauma Hospital in Addis Ababa, Ethiopia. The findings of the study would help in identifying gaps and potential intervention areas with respect to acute poisoning for the hospital managers as well as concerned stakeholders. Besides, it would serve as a baseline for further study in the area.

1.3 Literature review

1.3.1 Prevalence of Acute Poisoning

The prevalence and types of acute poisoning vary considerably across the world and depend on socioeconomic status and cultural practices, as well as on local industrial and agricultural activities (Hassan and Siam 2014).

It is estimated that some forms of poisons are directly or indirectly responsible for more than 1 million illnesses worldwide annually. The exact number is likely higher as most cases actually go unreported (Abd-Elhaleem et al.,2014). This is because poisonings require rapid, early treatment and supportive care due to their severity, leaving little time for extensive investigations or diagnoses (Dines et al., 2007). The medical costs of poisoning treatment can be substantial, exerting a considerable burden on the national health care service in developed and developing countries (Hanssens et al., 2001).

Regarding the prevalence of acute poisoning in the world various retrospective hospital based studies showed that there was a variation. For instance, a retrospective analysis of acute poisoning conducted in Iran-Tehran reported a prevalence of 5.4 % (Islambulchilar et al., 2009), While in Kenya it was 0.07 % (Bundotich et al., 2015).

Only few epidemiological studies exist in Ethiopia concerning acute poisoning. However, these few previously published available lines of evidences suggest that acute poisoning is an important public health problem in Ethiopia (Biruh and Mistire 2007). Concerning the prevalence of acute poisoning in Ethiopia, a retrospective analysis of acute poisoning conducted in Gondar hospital reported a prevalence of 0.67% among patients admitted at the emergency ward of the hospital with a diagnosis of acute poisoning (Mequaninit and Belay, 2016).

1.3.2 Patterns of Acute Poisoning

Several factors can contribute to the wide difference in poisoning pattern such as climate (for carbon monoxide poisoning), socioeconomic factors, cultural (traditional remedies versus medical advice and products), ethnic variations and religious beliefs prevalent in the community.

In addition, a different prescribing practice among physicians, the type of medications involved and their availability can vary from one country to another (Hanssens et al., 2001).

The pattern of acute poisoning changes with time, and differ from country to country, and even between geographical areas within the same country (Lawson et al., 2011). Substantial differences in socioeconomic and cultural situations in different countries also cause various patterns of poisoning with different poisonous agents (Eddleston, 2000).

1.3.2.1 Distribution by Age

Various studies have shown the distribution of acute poisoning by age.Over 60% of the poisoning occurs among adolescents and adults aged between 15–59 years and majority of the cases were in the age range of 21–30 years (WHO, 2001). Country specific studies also showed that the larger proportion of the cases to fall between this range. For example, 42.63% were in the age range of 20-30 years in the Indian study (Raizada et al., 2012), 38% of cases were in the age range of 21–30 years in the Iran study (Shadnia et al., 2007). 44.8% were in the age range of 13- 20 in the Ethopian study (Desalew et al., 2011).

Studies from different parts of the world reported that pediatric age groups are at risk for accidental poisoning (Jepsen and Ryan, 2005). A study carried out in Saudi Arabia with regard to acute poisoning incidents reported that pediatric group less than 12 years old mostly poisoned accidentally, while accidental poisoning is decreased with adolescents and adults (Abd-Elhaleem and Almuqhem,2014). While in the Ethopian study, children showed higher incidence for accidental poisioinig (79.1%) (Bacha and Tilahun, 2015).

1.3.2.2 Distribution by Sex

Concerning sex distribution of poisoning cases, males in low and middle income countries of Europe account for the highest number of poisoning worldwide (WHO, 2001). Different retrospective hospital based studies conducted in southern part of India (81.2%) (Gargi et al.,2008), Iran –Teheran (51%) (Shadnia et al., 2007) and Zambia (52%) (Jessyet al., 2016) have also indicated higher incidence of acute poisonings in males.

However, other retrospective studies conducted in Iran –Teheran (55.7%) (Islambulchilar et al., 2009), Turkey (60%) (Kavalci et al., 2008) and Gondar Ethiopia (63.5 %) (Mequanit and Belay, 2016) showed higher incidence of acute poisonings in females.

1.3.2.3 Distribution by Place of Residence

Differences have also seen in studies from different parts of the world regarding place of residence. A retrospective study conducted in India showed that acute poisoning is more common in rural area (55.8 %) as compared to urban area (44.2%) (Yadav et al., 2009). Another retrospective study done in the same country also reported a similar pattern with prevalence being 52.6% in rural areas and 42.8 % in urban areas (Gargi et al., 2008). In contrast to the above, a retrospective study done in Gondar University hospital, Ethiopia showed that urban areas had higher incidence of acute poisoning (75.9%) than rural (24.0%) (Mequaninit and Belay, 2016).

1.3.2.4 Distribution by Season

Seasonal variation of acute poisoning was also seen in studies from different part of the world. In a study conducted in Iran-Tehran, the seasonal distribution of poisoning to be spring (28%), summer (27.5%), winter (23.6%) and autumn (20.8%) (Islambulchilar et al., 2009). Similarly in India, poisoning cases were seen more during the summer season (28.1%) followed by the winter season (26%) (Jessinet al., 2010). It was also reported that intentional poisoning occurred mostly during spring (28.2%), whereas unintentional poisoning was more frequent during autumn (33.3%) of unintentional cases (Islambulchilar et al., 2009). A different pattern also emerged in other studies. For example, in Qatar, seasonal differences were observed with most victims being seen in summer and autumn (Khudairl et al., 2013).

Some studies also reported time difference in acute poisoning by month rather than by season. In China January showed the highest incidence (11.33%) and March had the lowest (6.35%) (Chan et al., 2010). In the Ethopian study, the greatest numbers of patients was admitted in July (14.6%) and the lowest in March (2.6%) (Mequaninit and Belay, 2016).

1.3.2.5 Distribution by Type of Poisoning

Poisoning may occur either intentionally (deliberately) or unintentionally (accidentally). Intentional poisoning is the result of a person taking or giving a substance with the intention of causing harm while unintentional poisoning occurs if a person taking or giving a substance did not mean to cause harm (Kaal et al., 2013). Unintentional poisoning may result from error in judgment, carelessness, negligence, or an unexpected situation in the home, or at workplace as in

the case of intoxication due to treatment, referred to as ‘iatrogenic intoxication” (Hermanns-Clausen et al., 2009) .

In intentional poisoning, the victim is intoxicated on purpose; either by their own doing called “deliberate self-poisoning” which may be Para suicide or suicide; or at own request, as in euthanasia; or by being the unwitting victim of intoxication arranged with criminal intent (Trestrail, 2007). When the distinction between intentional and unintentional is unclear, poisonings are usually regarded “undetermined” in intent (Kaal et al., 2013). Deliberate self-harm is a major public health problem in many developing countries. For example, a study done in India showed that 500,000 deaths occur in rural Asia due to suicide and 200,000 of these deaths were due to self-organophosphate (OP) poisoning (WHO, 2008).

Variation is also observed on the patterns of the circumstances of poisoning which were intentional, accidental and unknown. Literatures showed that intentional poisoning is the major cause of death in many developing and developed countries (McCaig and Burt, 1999). It has been shown that consequences of intentional self-poisoning outweigh those of accidental poisoning by far (Abdollahet al., 1997). Accidental poisoning commonly occur among children (Jepsen and Ryan,2005).

Different studies also reported that intentional poisoning is the major mode of poisoning in many countries. In Iran-Teheran (90.2%) (Islambulchilar et al., 2009), India (66.1%) (Unnikrishnan et al., 2005), Addis Ababa-Ethopia (96.5%) (Desalew et al., 2011) and Jimma-Ethiopia (50.5%) (Eyosias et al., 2016).

1.3.2.6 Distribution by Reason/Risk Factor

Review of the literature from the developing countries revealed that the cause for increase in the number of self-poisonings may be related to factors such as unemployment, urbanization, and break up in family support system, failure of love affair and economic instability (Abdollah et al., 1997; Islambulchilar et al., 2009). In industrialized countries, it predominantly occurs in young people impulsively responding to stressful events with little desire to die (Eddleston, 2000). Youths with psychiatric or psychological disorder, those with history of child abuse, and

those who are addicted to any substance, constitute a high-risk group for acute poisoning (Fliegeet al., 2009).

There are many precipitating factors for the occurrence of acute poisoning; anxiety, depression, isolation, unemployment, failure in examination and marital disharmonies are the common ones (Shadnia et al., 2007). It is possible to retain some key risk factors that can lead to defining a "high-risk" group. For acute poisoning, the youth, from teenagers to young adults, particularly those with any psychiatric or psychological disorder, those with history of child abuse, and those who are addicted to any substance constitute a high-risk group for Para- suicide and suicide (Fliege et al., 2009). A systematic review reported that intentional self-poisoning may occur at all ages, yet adolescents and young adults are at a higher risk. From the same authors, they reported that there is an association between current self-harm behavior and a history of childhood sexual abuse as well as negative emotions such as anxiety, depression, and aggressiveness (Fliege et al., 2009).

A retrospective hospital study conducted in India, academic failure and discord within the family or with loved ones were the most commonly cited reasons for suicidal poisoning in the younger age group whereas economic hardships and marital discord were important precipitating causes in the middle aged and endogenous depression or the loss of a spouse in majority of the elderly (Raizada et al., 2012). In Ethiopia, a study at TASH showed that among 65 patients who reported their reason of poisoning, temporary quarrel (57%) and emotional disturbance (26%) were frequently reported (Desalewet al., 2011).

1.3.2.7 Distribution by Poisonous Substances

Poisoning can result from exposure to a variety of substances. The substances used in poisonings vary depending on the area and culture. Typical agents used in poisonings include, pesticides, rodenticides, herbicides, pharmaceutical products, household chemicals, animal bite, carbon monoxide, alcohols, plants, traditional medicines and illegal street drugs. Toxins such as poisonous plants and animals also occur frequently (Eddleston, 2000).

Pesticide accounts for about one-third of the world's suicides and intentional self-poisoning. Pesticides particularly OP compounds are widely used for agriculture, vector control and domestic

purposes. Because of their easy availability OP poisoning has assumed major global health challenge (Aaron et al., 2004). Moreover, pesticides are the most common cause of self-poisoning worldwide, with the proportion ranging from 4% in the European region to over 50% in the Western Pacific region (Bertolote et al., 2006). A retrospective study conducted in Zambia revealed that pesticides and pharmaceuticals were the most common toxic agents responsible for hospital admissions (Jessy et al., 2016). In Kampala-Uganda, most of the poisoning cases were due to agrochemicals and household chemicals (Malangu, 2008 b).

Beside pesticides, pharmaceuticals are involved in acute poisoning. Both prescription and non-prescription medicines have been used throughout the world for self-poisoning mainly in urban areas.The most commonly used medicines are central nervous system-acting drugs such as antipsychotics, antidepressants, barbiturates, and benzodiazepines; followed by analgesics mainly paracetamol; anti-epileptic drugs such as carbamazepine; antiseptics and disinfectants; antimalarial drugs such as chloroquine and others (Aaron et al., 2004). In Francistown and Gaborone, Botswana, household chemicals and pharmaceuticals were the predominant cause of acute poisoning (Malangu, 2008a). In another study conducted in Turkey, the most common poisoning agents were pharmaceuticals and carbon monoxide (Kavalci et al., 2008).

Snake bite causes considerable death and injury and pose an important yet neglected threat to public health (Malangu and Ogunbanjo, 2009;Malangu, 2008a). In addition to that, it is a common acute medical emergency faced by rural populations in tropical and subtropical countries with heavy rainfall and humid climate (Banjere, 2003). In Khuzestan region, South Western Iran, envenomation by scorpions, spiders and snakes was the major cause of poisoning (Jalali et al., 2012).

Toxic alcohol poisonings are also serious intractable toxicological problems. They cause significant morbidities and mortalities in different part of the world (Ghannoum et al. 2014). In Russia, it is reported that drinking toxic alcohols and harmful ethanol ingestions have been responsible for up to 50% of poisonings and they have been known for causing up to 62% of poisoning related mortalities in the country (Zaridze et al., 2009).

Food is another common cause of acute poisoning, but due to the lack of effective surveillance systems, its incidence is not well established. Moreover, food poisoning is often confused with food allergy and food adverse effects, which are an immune-mediated reaction, and a clinically abnormal response, respectively, attributed to an exposure to a food or food additive (Malangu and Ogunbanjo, 2009 ; Malangu, 2008a).

Poisoning from plants is due to their toxic constituents, mainly alkaloids, but also taxanes, glucosides, saponins, flavonoids, and other compounds. Historically, plants containing alkaloids such as aconitine, strychnine, and others have been used in criminal poisoning (Trestrail, 2007). Moreover, many traditional medicines especially in the tropical regions of Africa contain plants or plant materials that can produce acute poisoning (Malangu and Ogunbanjo, 2009; Malangu, 2008a).

Finally,when it comes to Ethiopia, A case study done in TASH showed that, household cleansing agents were the leading causes of poisoning (43.1%) followed by OP (21.6%) and phenobarbitone (10.3%) (Desalew et al., 2011). While the weighted pool percentages of seven studies in Ethiopia showed that OPs (47.2%) were the leading cause of acute poisoning reported. The other reported causes of poisoning were sodium hypochlorite (bleaching agents) (12.9%), drugs (10%), herbicides (6.2%), hydrocarbons (2.9%), alcohol (2.9%), carbon monoxide (1.4%), and in 14.8% the cause was not identified (Oghabian et al., 2014).

1.3.3 Management of Acute Poisoning

1.3.3.1 General

Gathering history of exposure, evaluating clinical presentation and lab data's, and removing the toxic source are the primary parameters for the assessment and treatment of the potentially poisoned patient (ACEP, 1995). Evaluation involves recognition that poisoning has occurred, identification of agents involved, assessment of severity, and prediction of toxicity. Choosing of the appropriate parameters and length of time to monitor a patient who has been exposed to a toxic agent requires knowledge of toxic effects and the time course of the intoxication (Holstege et al., 2008). Patients at risk of severe toxicity must be admitted at the intensive care unit (ICU)

with careful assessment of cardiac, pulmonary and central nervous ststem (Kulling and Persson, 1986).

A poisoned or overdosed patient is primarily managed based on symptomatic and supportive care (Holstege et al., 2008). Specific antidotes exist only for a small percentage of the thousands of potential drugs and chemicals that could cause poisoning. The "ABCs'' are the first aspect of patient management with poisoning and it encompasses basic support of airway, breathing, and circulation (ACEP, 1995). Optimal management of the poisoned patient depends upon the specific poison(s) involved, the presenting and predicted severity of illness, and elapsed time between exposure and presentation. In general, treatment variably includes supportive care, decontamination, antidote therapy, and enhanced elimination techniques (Liden and Burns, 2001).

1.3.3.2 Supportive Care

Supportive care is the most important aspect of treatment and, when coupled with decontamination, frequently is sufficient to affect complete patient recovery. Supportive care for the poisoned patient is generally similar to that utilized for other critically ill patients, but certain issues are managed slightly differently (Bond, 2002). The aim of the supportive treatment is to preserve the vital organ functions until the poison is eliminated from the body and the patient resumes normal physiological functions. Therefore, functions of the central nervous system, cardiopulmonary system and renal system should be supported with proper care for coma, seizures, hypotension, arrhythmias, hypoxia, and acute renal failure. Fluid, electrolyte and acid base status should be closely monitored in all patients (Vernon and Gleich, 1997).

1.3.3.3 Decontamination

Decontamination following initial patient stabilization may be performed if indicated. The sooner decontamination is performed; the more effective it is in preventing poison absorption. Copious water or saline irrigation for topical exposures and administration of activated charcoal for ingestions are the preferred methods of decontamination (Bond,2002). Cathartics are not effective as GI decontaminants, and their use is no longer advised (ACEP, 1995). Currently, most emergency departments use aqueous activated charcoal mixtures, rather than charcoal-sorbitol combinations (Chin et al.,1981).

Activated charcoal has become the preferred method of GI decontamination for the treatment of toxic ingestions (Bond, 2002). If administered within 1 hour of ingestion, the adsorption of toxins to charcoal prevents absorption, which is assumed to prevent toxicity and improves patient outcome, especially if the risk to the patient is low (ACEP, 1995). Vomiting with aspiration of activated charcoal occurs in about 5% of patients who receive activated charcoal (Bond, 2002). The resulting pulmonary problems can be due to aspiration of acidic stomach contents and/or the charcoal. Decreased oxygenation can occur immediately, or pulmonary effects can occur later (Elioit et al., 1989). Adult respiratory distress syndrome has resulted after the unintentional instillation of charcoal into the lung. Aspiration of charcoal can result in chronic lung disease or fatalities, whereas the toxic exposure, for which the charcoal was administered, is often not lethal or even serious (Tomaszewski, 1999).

Airway protection by endotracheal intubation should be performed early in the poisoned patient with depressed mental status because of the high risk for aspiration and its associated complications particularly when gastric decontamination procedures need to be undertaken (ACEP ,1995). Endotracheal intubation with mechanical ventilation is also indicated in the presence of severe acid-base disturbances or acute respiratory failure. Occasionally, the management of high-grade physiologic stimulation may require sedation and/or paralysis with mechanical ventilation to limit the extent of complications such as hyperthermia, acidosis, and rhabdomyolysis (Isbisteret al., 2004).

Whole Bowel Irrigation (WBI) with a polyethylene glycol–balanced electrolyte solution can successfully remove substances from the entire GI tract over several hours. WBI is effective with ingestions of sustained release dosage forms, as well as substances that form bezoars (concretions of tablets or capsules), such as ferrous sulfate or Phenytoin (Kulig, 1992).WBI is also indicated when the toxic agent is not adsorbed by activated charcoal (e.g., body-packer packets, lithium, iron, potassium (ACEP, 1995). This method of GI decontamination takes much longer to complete and is associated with poor patient adherence because large volumes of fluid (2L/hour for adults until the effluent is clear) need to be ingested for this to be effective. Nasogastric (NG) tube, however, can be inserted, and the WBI fluid mixture can be administered via this NG tube (Tenebein, 2004).

1.3.3.4 Antidotes

Antidote administration is appropriate when there is a poisoning for which an antidote exists, the actual or predicted severity of poisoning warrants its use, expected benefits of therapy outweigh its associated risk, and there are no contraindications. Antidotes dramatically reduce morbidity and mortality in certain intoxications, but they are unavailable for most toxic agents and therefore are used in only about 1% of cases. Antidotes reduce or reverse poison effects by a variety of means. They may prevent absorption, bind and neutralize poisons directly, antagonize end-organ effects, or inhibit conversion to more toxic metabolites (Litovitzet al., 2001). Some antidotes can displace a drug from receptor sites (e.g., naloxone for opioids, flumazenil for benzodiazepines) and some can inhibit the formation of toxic metabolites (e.g., *N*-acetyl cysteine [NAC] for acetaminophen, fomepizole for methanol) (Hoffman and Gold frank, 1995).

Although a response to empirically administered antidotes can be used to confirm a suspected diagnosis, their indiscriminate use can potentially increase patient morbidity. As an example, routine administration of flumenzail to comatose patients suspected of benzodiazepine overdose may precipitate seizures and worsen the clinical course if tricyclic antidepressants have been ingested (Watson etal, 1998).

1.3.3.5 Enhanced Elimination

Hemodialysis and manipulation of urine pH can enhance the clearance of substances. Hemodialysis can successfully treat some specific intoxication (e.g., methanol, ethylene glycol, aspirin, lithium). Hemodialysis can also be used in patients with severe acid–base or renal dysfunction. One of the commonlyused methods to increase the elimination of a toxin is forced diuresis with alteration in urine pH. Renal excretion of a substance is dependent upon glomerular filtration rate, active renal tubular secretion and passive tubular reabsorption. The glomerular filtration is determined by the molecular weight, the degree of protein-binding and the volume of distribution in the body. A large volume of distribution means that only a small amount of a chemical is available for filtration and therefore, forced diuresis is of little help (Prescottet al., 1982). Alkaline diuresis can enhance the elimination of drugs such as aspirin and phenobarbital (Garrettson and Geller, 1988).

1.3.3.6 Prevention

Regarding prevention and control strategies the health sector recognizes that injuries have multiple causes which, with efforts to strengthening the emergency medical services, necessitate multi-sectorial approach towards effective prevention and rapid responses when it occurs (FMOH, 2010). Recording of patient-related information and record-keeping processes should be improved and further large scale studies were required to investigate national trends of poisoning and factors associated with poisoning (Abula and Wondmikun, 2006).

The study done by Desalew etal.(,2011) in TASH, also pointed out that awareness on proper handling of chemicals and prescribed agents should be forwarded to users of these agents. Furthermore, it was also recommended that as majority of patients poisoned for intentional self-harm purposes,particularly those with suicidal attempt, should undergo psychiatric consultation to reduce the risk of future attempts (Desalew et al., 2011).

1.3.4 Outcomes of Acute poisoning

Acute poisoning is a common situation in the emergency departments (EDs) all over the world and involves high medical attention and significant costs (Bariet al. 2014). Unless a short period of medical observation is performed, the management of acute poisoning often requires hospitalization, whose outcomes are the length of stay and the associated costs. If the treatment is successful, the patient would have survived and discharged from the hospital. When the treatment is not successful, acute poisoning may lead to death. This outcome is measured as the case fatality rate (Malangu and Ogunbanjo, 2009).

Studies have shown that acute poisoning has been identified as a significant global public health problem. According to the WHO, over 350,000 people died worldwide from unintentional Poisoning in 2004, resulting in the loss of over 7.4 million years of healthy life (disability adjusted life years (DALYs). Although data on the prevalence of poisoning on a global scale may seem to be well established, updated data from developing countries is largely unexplored (WHO, 2008).

A recent study in US reported an unprecedented increase in number of intentional and unintentional drug induced deaths (Paulozzi and Annest, 2007). In Sri-Lanka, studies have shown that there are more than 160 hospital admissions for severe pesticide poisoning per 100.000 inhabitants per year (Van der Hoek and Konradsen, 2005). In a study done in Gondar hospital Ethopia,the case fatality rate was reported to be 2.4% (Abula and Wondmikun,2006).

2.Objectives

2.1 General Objective

- To assess the prevalence, management and outcome of acute poisoning at the Emergency Wing of SPHMMC and AaBET Hospital.

2.2 Specific Objectives

- To estimate the prevalence of acute poisoning
- To describe the pattern of acute poisoning
- To identify factors associated with acute poisoning
- To describe the management practice of acute poisoning
- To assess outcome of acute poisoning

3. Methodology

3.1 Study Design and period

This was a cross sectional study conducted from June to November 2016 at the Emergency Wing of Saint Paul's Hospital Millennium Medical College and Addis Ababa Burn, Emergency and Trauma Hospital. A one year quantitative data, from August 2015 to August 2016, was collected retrospectively from patient medical charts, registries and Health Management Information System (HMIS) data base of the hospitals using a semi-structured data collection tool.

3.2 Study areas

The study was conducted at the Emergency wing of SPHMMC and AaBET Hospital. SPHMMC is one of the major federal hospitals under the EFMOH found in Addis Ababa, the capital of Ethiopia. It has 426 beds and serves 200, 000 patients annually and has a catchment of 5,000,000 populations (SPHMMC, 2016).

The Emergency Department has an Adult and pediatric wings. The adult wing of SPHMMC has a total of 40 beds and provides services to patients with emergency conditions including acute poisoning (SPHMMC, 2016). It has a total of 37 health professionals with 24 Nurses, 2 Emergency Specialists doctors, 2 Medical interns, 6 surgical interns and 3 Laboratory technologists. There are also pharmacy proffesionlas who are working there by rotation (SPHMMC, 2016).

The pediatric wing of SPHMMC has a total of 14 beds and it has a total of 27 health professionals with18 Nurses, 2 Public health professionals, 3Pedatricians and 4 Peadtric Residents (SPHMMC, 2016) .

On the other side, AaBET is an affiliate Hospital of SPHMMC and it was opened by the FMOH on August 2015 with the mission of managing burn, emergency cases and trauma. Annually, the hospital serves 5,000 to 7,000 patients with a total of 250 beds. It has a total of 209 health professional, with 161 Nurses, 28 Medical Doctors and 20 Specialists with different areas of specialty. In addition, 15 pharmacy professionals serve the hospital (SPMMCH, 2016).

3.3 Source and Study Population

3.3.1 Source Population

The source population includes all patients visiting the emergency wing of SPHMMC and AaBET Hospital during the study period.

3.3.2 Study Population

The study population includes all patients who fullfil the inclusion criteria at the emergency wing of SPHMMC and AaBET Hospital during the study period.

3.4 Inclusion and Exclusion Criteria

3.4.1 Inclusion Criteria

All pediatrics and adult Patients who were acutely poisoned and presented to emergency wing SPHMMC and AaBET Hospital during the study period were included in the study.

3.4.2 Exclusion Criteria

Both pediatrics and adult patients whose medical records were found to be incomplete, completely lost or misplaced were not included in the study.

3.5 Sampling and Sample Size Determination

All eligible patients who presented in the two study settings with an assessment of acute poisoning from August 2015 to August 2016 were considered as a sample. A one year data was taken to avoid any seasonal variation in the pattern of acute poisoning and in fact AaBET Hospital was established in August 2015. List of patients with a diagnosis of acute poisoning was obtained from Patient registration book and on the hospital's HMIS database.

3.6 Data Collection and management

3.6.1 Instrument

A semi structured quantitative data collection tool (Annex1) was prepared using prior literatures based on the study objectives. Data was extracted from all eligible patient medical charts and registries. The data collection tool contains patient socio-demography,poisoning substances identified, type of poisoning occurred, season and reason of poisoning, type of treatment given and outcome of the incidence. All the data collection process was conducted by recuritted nurses and monitored by the PI at the two hospitals.

3.6.2 Data Quality Assurance

Pretest was done and the necessary modifications were made on the data collection tool based on the findings. Data were checked for accuracy and consistency by the PI on a daily basis during data collection.

3.7 Data Entry and Analysis

Data extracted from patient's medical charts and the registry was entered into SPSS software, cleaned and analyzed. Simple descriptive statistics such as frequencies, percentages, mean, and standard deviation were used to characterize the variables.Chi square test was used to explore associations between dependent and independent variables . A p-value of < 0.05 was considered to be statistically significant.

3.8 Dependent and Independent Variables

3.8.1 Independent Variables

- Age
- Sex
- Place of residence
- Season of acute poisoning
- Type of poisoning substance
- Type of poisoning
- Reason of acute poisoning

3.8.2 Dependent Variables

- Prevalence of Acute Poisoning
- Outcome of Acute Poisoning

3.9 Ethical Considerations

Ethical approval was obtained from the Ethics Review Committee (ERC) of SoP, AAU. Additonal,ethical approval and permission was also obtained from SPHMMC and AaBET hospital. Confidentiality of patients was maintained at all levels of the study as the data abstraction format lacked patient identifiers.

3.10 Operational Definitions

Clinical complications of acute poisoning: includes respiratory and multi-organ failure, cardiogenic shock and arrhythmia.

Disability: in this study disability was to mean either physical disability or physiological disability leading to dialysis or respiratory failure following acute poisoning.

Outcome of acute poisoning: in this study outcome of acute poisoning could be death, survival with disability or without disability.

Prevalence of acute poisoning: prevalence in this study was defined as the proportion of a population who were poisoned from the total number of people attending the emergency departments or from the total people admitted at the emergency wards of the two hospitals.

Rural: Cases that are admitted from areas surrounding Addis Ababa, mainly from Oromia Liyu Zone.

Urban: Cases admitted from the city of Addis Ababa.

4. Results

4.1 Socio-Demographic Characteristics

A total of 328 acute poisoning cases were found in the patient registry book and HMIS of the two hospitals, with 225 (68.59%) from AaBET hospital and 103 (31.41%) at the emergency wing of SPHMMC. However, due to information incompleteness, only 306 (93.2%) patient medical charts were found to be usable and hence included in the final analysis. A slightly higher proportion (54.5%) of the acutely poisoned patients were females. In general, the age of patients with acute poisoning was between 2 and 90 years with a mean age of 27.2 years (SD ±11.08). Of the total cases, young adults and adults (15-59 years of age) made up the highest proportion (96.0%) (Table 1).

Table1:Socio-demographic characteristics of patients with acute poisoning at the emergency wing of SPHMMC and AaBET Hospital, 2015-2016, (n =306).

Socio-demographic characteristics	Frequency	Percent
Sex		
Male	139	45.42
Female	167	54.57
Age		
< 5	1	0.32
6-14	2	0.65
15-29	159	51.9
30-59	135	44.1
>=60	9	2.9
Place of Residence		
Rural	196	64.05
Urban	110	35.94
Total	**306**	**100**

4.2 Prevalence of Acute Poisoning

In this study, the prevalence of acute poisoning per number of people presenting to the emergency departments in the two hospitals per year was found to be 2.5% (306/12,154). Further, the prevalence of acute poisoning per emergency admissions per year was found to be 6.2 % (306 /4921).

4.3 Patterns of Acute Poisoning

4.3.1 Intentional versus unintentional Poisoning

In this study, 271 (88.56 %) of patients were acutely poisoned intentionally (deliberately), while 35 (11.43%) of the cases accounted for unintentional (accidental) type of acute poisoning.

4.3.2 Reasons for Acute Poisoning

The most common reason documented for acute poisoning was ‘Quarrel with Family,which accounted for 25.8% and‘Marital and Love Disharmonies’ accountings for 19% of the total cases. However, reason of poisoning was not specified in nearly 18 % of the cases (Figure1).

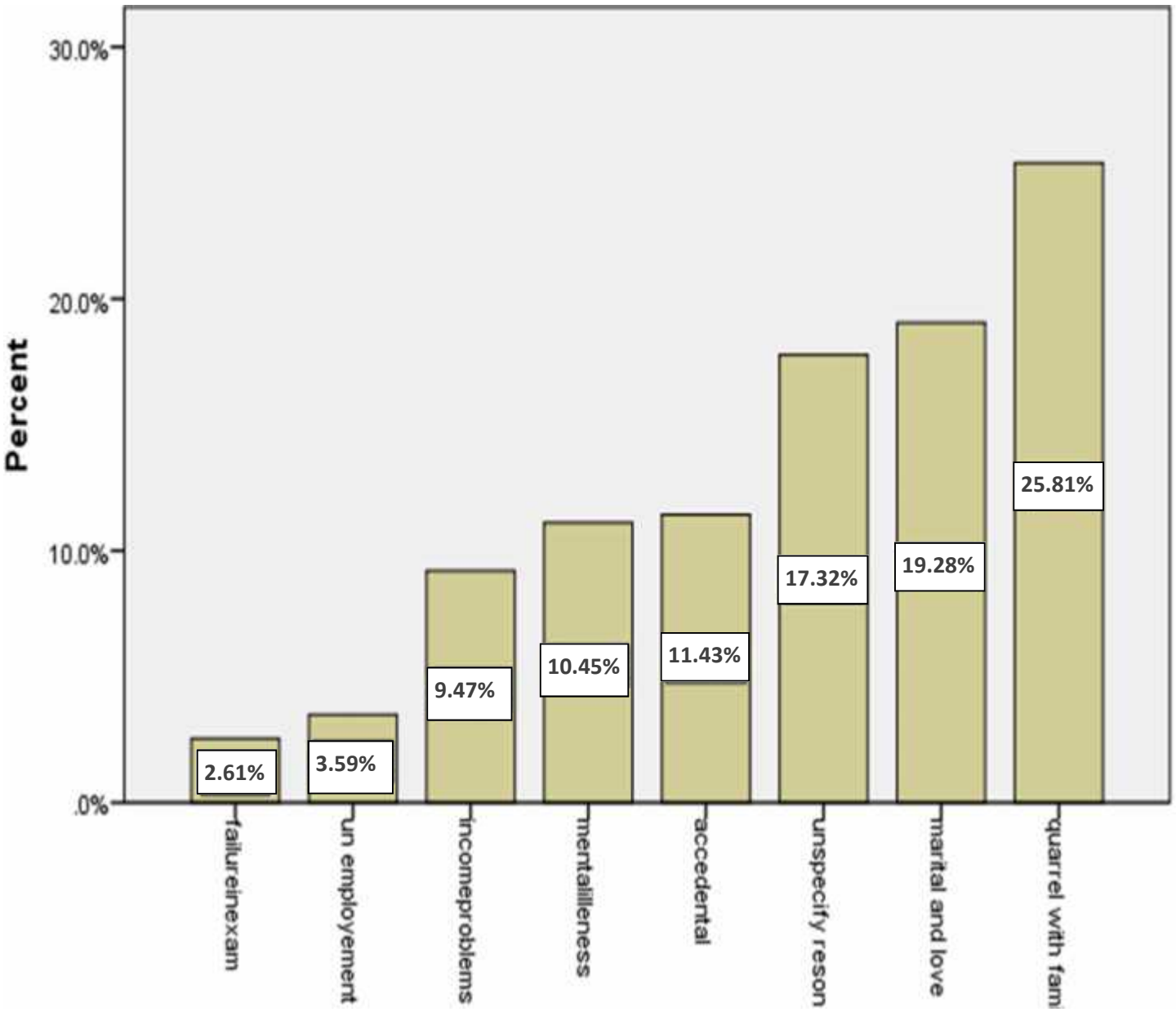

Figure 1 Reasons of acute poisioning at the Emergency wing of SPHMMMC and AaBET Hospital ,2015-2016 , (n =306).

4.3.3 Seasons of Occurrence

Regarding the distribution of acute poisoning by seasons of occurrence, the highest proportion 111 (36.2%) of acute poisoning cases occurred from March-May (Tseday), followed by from June-Aug (Kiremt) 105 (34.3%) and from Dec-Feb (Bega) 90 (29.4%). Seven poisoned cases

were found from the registry in Sept-Nov (Belg) but since patient charts were lost or incomplete, they were not included in the analysis.

4.3.4 Common Poisoning Agents

Of the total acute poisoning cas es, the most common category of poisoning agents implicated in the two hospitals were Ops and Bleaching Agents which together constituted half of the cases followed by rodenticides and Pharmaceuticals that accounted for a fifth of the cases (Table2).

Table2: Category of common poisoning agents identified at the emergency wing of SPHMMC and AaBET Hospital, 2015-2016,(n =306).

Common PoisoningAgents	Frequency	Percentage
Organophosphate Pesticides	119	38.8
Bleaching Agent (Sodium hypochlorite)	39	12.7
Rodenticides	34	11.1
Pharmaceuticals	33	10.7
Herbicides (2.4,Dichloro Phenoxy acetic acid)	28	9.1
Carbon Monoxide	23	7.5
Alcohol Intoxication	21	6.8
Snake Bite	9	2.9
Total	**306**	**100%**

Among the organophosphate pesticides, Malathion accounted for 88 (73. 9%) of the cases. Aluminum phosphide tab accounted for 31(26.1%) of the cases**.**

During the study period, it was observed that most of these chemicals (particularly pesticides, herbicides and rodenticides) were sold to the public in an open market without taking any precaution around the study settings (Annex 8).

Among the total pharmaceuticals responsible for acute poisoning, Phenobarbitone accounts for 7(21.2%) Ampicillin 6 (18.1%) and Amitrptyline 5 (15.1%) were the major ones and together accounted for 50 % of the cases. This was followed by paracetmol tab. Multiple drug poisoning was also observed with Ciprofloxacin and Doxycycline and Augmentin and Multivitamin tab of the cases (Table 3).

Table 3: Types of medications identified as common poisoning agents at the emergency wing of SPHMMC and AaBET Hospital, 2015-2016, (n =306).

Medications	Frequency	Percentage
CNS acting *	13	39.3
Antibiotics	6	18.1
Analgesics	6	18.1
Formalin	3	9.0
Omeprazole 20mg cap (GIT- drugs)	2	6.06
Multiple drug poisoning *	2	6.06
Anti-asthmatic	1	3.03
Total	**33**	**(100%)**

CNS acting *Central Nervous System acting drugs as barbiturates, anti- psychotics and Benzodizepams

Multiple drug poisoning * includes Ciprofloxacin and Doxycycline and Augmentin and Multivitamin tab

4.4 Management Practice of Acute Poisoning

It was noted that large proportion (251, 82%) of the acutely poisoned patients received fluid resuscitation with or without other methods of management (Table 4). Out of these, 66 (26.2 %) were managed by both fluid resuscitation and supportive medications; 27 (10.7%) of patients managed by only fluid resuscitation; and 18 (7.1%) patients managed by fluid resuscitation, atropine, gastric lavage, supportive medications and intra nasal oxygen. Atropine was used as antidote for 79 (25.8 %) poisoned patients. Among these,18 (22.7%) patients were managed by fluid resuscitation, atropine, gastric lavage;18 (22.7%) patients managed by fluid resuscitation, atropine, gastric lavage, supportive medications and intra nasal oxygen; and 17 (21.5%) patients were managed by fluid resuscitation, atropine, gastric lavage and supportive medications. Whole bowel irrigation, emesis and chelation methods of poisoning management were not used in the study period in both hospitals.

A total of 64 (20.9%) psychiatric consultations were made for these poisoned patients. Among these, 75% referred to SPHMMC psychiatric unit for further evaluation. Those patients with carbon monoxide intoxication were managed by 100% oxygen. Patients poisoned by medications

and snake bite were managed by supportive medications and fluid resuscitation.Among those who survived but with some disability, six cases underwent hemodialysis at the SPHMMC.

During the study period, only 4 out of the 15 antidotes and 4 out of the 12 antidotes according to the EFMHACA's Emergency Medicine List and EFMHACA's Essential Medicine List respectively (EFMHACA, 2014 , EFMHACA, 2014) were available. Atropine injection, Naloxone injection, CalciumGluconate injection and Vitamin K1 were the antidotes available in the two hospitals during the study period .

Table 4: Management practice of acute poisoning at the emergency wing of SPHMMC and AaBET Hospital, 2015-2016, (n =306).

Management Practice/Approaches	Frequency	Percent
Fluid Resuscitation	251	(82)
Atropine (Antidote)	79	(25.8)
Gastric Lavage	63	(20.5)
Hemodialysis	6	(1.9)
Supportive Medications *	205	(66.9)
Intra-Nasal Oxygen	29	(9.4)

*Supportive Medications includesMagnesium Sulfate inj, Calcium Gluconate inj, Dopamine inj, Potassium Chloride inj ,Hydrocortisone inj, Adrenaline inj, Normal saline inj,Dextroseinj,Cimetidine inj, Antiacid syrup ,Omeprazole Cap,Ranitidineinj,Metronidazoleinj,Cephalexintab,Ceftriaxoneinj,Augmentintab,TATinj,Dexamethasoneinj,Tramadolinj,Paracetamoltab,Diclofenacinj,Amitriptylineinj,Haloperidolinj,Diazepaminj,Phenobarbitonetab,Metoclopramide inj,Salbutamol aerosol, prednisolone tab, Unfractionated Heparin and Vitamin B complex preparation.

4.5 Outcomes of Acute Poisoning

Regarding the outcome of poisoning, while majority (211, 68.9%) of the patients Survived without disability, close to a quarter 69 (22 .5%) of them survived but ended up with disability. The case fatality or death rate of acute poisoning in the two hospitals was 8.4%. Out of the 26 deaths reported, OPs represent the highest percentage 19 (73%) followed by herbicides 4 (15.3%) and rodenticides 3 (11.5%).

4.6 Determinants of Acute poisoning

When a chi square analysis was performed to see if there was an association between independent variables and outcome of acute poisoning,no variable was found to be significantly associated with outcomes (Table 5).

Table 5: Association of independent with outcome variables of acute poisoning at the emergency wing of SPHMMC and AaBET Hospital, 2015-2016, (n =306).

Variables		Survived without disability	Survived with disability	Died	Total	X^2	P value
Age	<18 years	10	4	1	15	**0.908**	
	>=18 years	201	65	25	291	**0.908**	**>0.05**
	Total	**211**	**69**	**26**	**306**		
Sex	Male	100	28	11	139	**0.581**	
	Female	111	41	15	167	**0.581**	**>0.05**
	Total	**211**	**69**	**26**	**306**		
Placeof residence	Rural	130	43	23	196	**0.0251**	**>0.05**
	Urban	81	26	3	110	**0.0251**	
	Total	**211**	**69**	**26**	**306**		
Poisoning substances	Pharmaceuticals	28	5	0	33	**0.0673**	
	Non-pharmaceuticals	183	64	26	273	**0.0673**	**>0.05**
	Total	**211**	**69**	**26**	**306**		
Type of poisoning	Intentional	186	59	26	271	**0.133**	
	Unintentional	25	10	0	35	**0.133**	**>0.05**
	Total	**211**	**69**	**26**	**306**		

5. Discussion

The current study was conducted to assess the prevalence, management practice and outcome of acute poisoning in emergency wing of SPHMMC and its affiliate AaBET hospital. The ultimate goal of this research is to show the magnitude of the problem for the health care professionals, government bodies and for the community, so that the necessary interventions could be designed and put in place.

In this study, a prevalence of 2.5% per total emergency cases per year were found in the two hospitals during the study period. However, this result is higher as compared to the study done in Gondar, Ethiopia (0.67%) (Mequanit and Belay, 2016). This might be because this study was conducted at two hospitals unlike the latter which was done only in one hospital. In addition, one of the hospital, AaBET is the center dedicated to manage emergency cases, and could account for increased number of cases reported per year. On the other hand, this result was found to be lower as compared to a study done in Iran-Tehran (5.4 %) (Islambulchilar et al., 2009). This might be because of the difference in the sample size (the latter study includes 1342 acute poisioning cases while the present one was 306).

In this study, the highest proportion of acute poisoning occurred in young adults with the age of 15-29 years (51.9%). This result is comparable with a study done in Kenya (Bundotich et al., 2015). However, this result was different as compared to a study conducted in Taiwan,which reported age 65 years or older to have the highest rate (29.4%) for acute poisoning (Chien et al., 2011). This may be related to the fact that this population has a lower literacy rate, resulting in a lack of knowledge and skills related to handling items safely. In addition, the existence of multiple illnesses, multiple drug medication and poor physical conditions may also increase the risk of poisoning.

The rise in the number of self-poisonings at the age category of 15-29 years might be because of failure in high school leaving exams or college failure. Alternatively, it might be associated with repeated quarrels with family. This is also evidenced by the fact that the most common reason of poisoning at this age category in the present study was quarrel with family (17.4%) at the two hospitals. This result was comparable with other studies conducted in Jimma-Ethiopia (Eyosias et al., 2016) and Turkey (Baydin et al., 2005).

The sex distribution of acute poisoning in this study revealed that the preponderance to be relatively higher (54.5%) in females. This finding appears to be concordant with other studies

conducted in Iran-Teheran (55.7%) (Islambulchilar et al., 2009), Turkey (60%) (Kavalci et al., 2008) and Gondar-Ethiopia (63.5 %) (Mequanit and Belay, 2016). However, there are other studies that have indicated higher incidence of acute poisonings in males including those conducted in southern part of India (81.2%) (Gargiet al., 2008), Iran-Teheran (51%), (Shadnia et al., 2007), Zambia (52%) (Jessyet al., 2016) and Nakuru, Kenya (58.33%) (Bundotich et al., 2015). This may be related to more exposure of males to occupational hazards and stress.

The higher proportion of females being acutely poisoned in this study might be because some situations such as unwanted pregnancy could be frustrating for them and they might commit suicide. In addition when there are economic challenges in a family, they might feel guilty and might attempt for self-poisoning. This may explain on this study findings that quarrel with the family (15.2 %) and marital and love disharmonies (8.8%) were the most common reason of poisoning among the female poisoned patients at the two hospitals.

Regarding the residential place of poisoning, the results of the present study indicated that majority of the cases (64%) were from the rural areas. This result seems comparable with a retrospective study conducted in India that showed acute poisoning in rural areas of 55.8 % (Yadav et al., 2009). Another retrospective study done in India also pointed out that rural areas accounted for higher proportion of acute poisioning (Gargi et al., 2008). However, this result is found to be different from a result in a study conducted in Gondar-Ethiopia that most of the poisoned cases were from urban areas (75.9%) (Mequanit and Belay, 2016). This might be because of the difference in the proportion of rural and urban catchment areas of the studied hospitals in the two studies.

Regarding the type of poisoning, this study revealed that 88.5% patients were poisoned intentionally. Different studies also reported that intentional poisoning is the major mode of poisoning in many countries (Unnikrishnan et al.,2005; Shadnia et al., 2007; Islambulchilar et al., 2009 ;Banerjee et al., 2012).

When the data was analyzed by seasons most of the patients had intoxication and admitted at the two hospitals in Tseday (36.2%) and Kiremt (34.3%). This is probably because these seasons are periods of preparation for agricultural farming and the availability of common poisoning agents such as pesticides in the rural areas will be higher due to obvious reasons.

Among the poisoning agents identified in this study, OPs represent the highest percentage (38.8 %) followed by house hold cleansing or bleaching agents (12.7%), rodenticides (11.1%) and

pharmaceuticals (10.7%). Similar reports are available in multiple places. For instance, a retrospective study conducted in Zambia revealed that pesticides and pharmaceuticals were the most common toxic agents responsible for hospital admissions (Jessy et al., 2016). In Kampala-Uganda, most of the poisoning cases were due to agrochemicals and household chemicals respectively (Malangu, 2008a).

Many of the studies in Ethiopia also support this result in one way or another.A retrospective case study at Gondar hospital showed that, Ops, rat poison and alcohol were mostly encountered as poisoning agents (in about 70% of cases) in adults possibly with suicidal or Para-suicidal intention (Abula and Wondmikun, 2006). A case study done in TASH also showed that household cleansing agents were the leading causes of poisoning (43.1%) followed by organophosphate (21.6%) and phenobarbitone (10.3%) (Desalew et al., 2011).

The highest percentages of these chemicals might be because of the availability and open sales of pesticides and rat poison in the street of urban and rural areas as observed during this study. Aaron et al. (2004) also reported that pesticides particularly Ops are widely used for agriculture, vector control and domestic purposes. Because of their easy availability, OPs poisoning has assumed major global health challenge.

However, this result is different from a study done in Iran that the most common involved toxic agents were drugs (60.8%) (Islambulchilar et al., 2009). This difference might be because both prescription and non-prescription medicines have been used throughout the world for self-poisoning mainly in urban areas. However, in this study the major proportion of poisoning cases identified were from rural areas (64%). It is known that poisonous agents show geographical variations depending on economic status. In developed and middle income countries, poisonings are mostly due to drugs, cosmetics and beauty products, household cleansing products and alcohol, while in developing countries, where the economy is based on agriculture, common causes of poisoning are hydrocarbons, pesticides, traditional medicines and mushrooms (Abd-Elhaleem et al.,2014).

Nonetheless, there is similarity among the type of pharmaceuticals identified as a poisoning agent both in this study and in other studies. For instance, according to a study done by Aaron et al (2004), the most commonly implicated medicines were neuroactive drugs, which is concordant with the present findings. Regarding the management practice in the studied hospitals, there was no standard guideline or protocol prepared and utilized for the management of acute poisoning

during the study period. Most patients were treated with supportive measures mainly using fluid resuscitation (82%). This is because a poisoned or an overdosed patient is primarily managed based on symptomatic and supportive care (Holstege et al., 2008). Supportive care to maintain fluid, electrolyte and acid base status was widely utilized. Almost, 25.8% patients were given atropine as a management for pesticides poisoning cases, due to its action as a competitive antagonist at both central and peripheral muscarinic receptors and antagonize the cholinergic effects of excess acetyl choline at these sites (Eddleston et al., 2004).

The current study also revealed that no charcoal use "universal antidote "as chelation agent due to unavailability of activated charcoal during the study period in the two hospitals. However, different studies showed that the use of activated charcoal as chelation or gastric decontamination agent prevents absorption of substances in the gastrointestinal tract, thereby decreasing systemic absorption of potentially toxic agents when given to a poisoned patient within an hour of ingestion (Albertson et al., 2011). Besides, all snake bite cases were not managed by the standard method of treatment. The cases were managed by TAT injection and Anti pain medications. This might be because of the unavailability of antivenom at the two hospitals during the study period. Patients with drug overdoses were treated using fluid resuscitation, supportive medications, gastric lavage and intranasal oxygen. Even though it is not possible to say that these approaches are not recommended for the management of drug overdoses, antidotes could have played an important role in treatment of such poisonings. Unavailability of antidotes in the hospitals forced the use of only general management. For instance, during the study period, 4 out of 15 antidotes in the national emergency medicines list and 4 out of 12 antidotes in the national essential medicines list, were available in the two hospitals. For instance, noacetylcysteine, flumazenil and sodium bicarbonate were available for paracetamol, benzodiazepine and antideperessant intoxications respectively, for a total of 10 cases among with drug over doses.

While good supportive care and elimination techniques may, in many cases, restore a poisoned patient to good health and stabilize his or her body functions, the appropriate use of antidotes and other agents may greatly enhance elimination and counteract the toxic actions of the poison. In certain circumstances, they may significantly reduce the medical resources otherwise needed to treat a patient, shorten the period of therapy, and, in some cases, save a patient's life. Thus, antidotes may sometimes reduce the overall burden on the health service of managing cases of

poisoning (WHO, 2010). It is also important to remember that antidote administration is appropriate when there is a poisoning for which an antidote exists, the actual or predicted severity of poisoning warrants its use, expected benefits of therapy outweigh its associated risk, and there are no contraindications (Litovitz et al., 2001). One should also note that their indiscriminate use can potentially increase patient morbidity (Watson et al, 1998).

On the other side, it was a good practice that a total of 64 (20.9%) psychiatry consultations was made for those poisoned patients in the present study. Among these, 48 (75%) of them were referred from AaBET hospital to SPHMMC because of the unavailability of the service in the former hospital. However, there was little follow up and poor documentation for the consulted poisoned patients at the two hospitals. Moreover, even though this practice could be taken as a good start, it is not adequate. Because, it is recommended that, in all cases, patients who have deliberately self-poisoned require appropriate mental health assessment before disposition and discharge. All acts of deliberate self-harm must be taken extremely serious. This assessment and disposition planning should begin before the clinical resolution of acute poisoning.

With respect to outcome of acute poisoning in this study, majority (68.9%) of the cases survived without disability and almost a quarter (22.5%) of the poisoned cases survived but end up with disability. Moreover, the case fatality rate (death) in the two hospitals was 8.4%. However, this result was different as compared to a study conducted in India, which reported that the case fatility rate to be 13.2% (Raizada et al.,2012). This variation in mortality may be explained due to lack of early diagnosis and treatment of the cases by the latter study. But the case fatality rate of this study similar with other studies conducted in TASH-Ethiopia (Desalew et al., 2011) and Botswana (Malangu and Ogunbanjo, 2009; Malangu, 2008a).

Moreover, this study revealed that,among 119 patients poisoned with OPs, 19 of them died, making its mortality rate 15%. This might be because of the inherent toxic nature of the poisoning agent, the place of residency for this individuals, type of poisoning (intentional versus accidental) or unavailability of antidotes. For instance, most of the dead cases (23 out of 26) were from rural areas which might contribute to high mortality rate because of a delay in their presentation to hospitals for timely treatment. According to this study no detrminants could be identified with the association analysis (Table 5) , indicating poisoning is not affected by socio demographic factors.

6. Limitation of the study

The fact that data was collected retrospectively, it was not possible to find a complete information in all patient medical charts. Inaddition, socioeconomic factors like religion and level of income were not considered among the factors in measuring prevalence and outcome of acute poisoning.

7. Conclusion

Even though this study was a hospital based study, the result suggests that acute poisoning is a public health problem in the community. The present study found that, the prevalence of acute poisoning in the two hospitals was 2.5% per total emergency visits and 6.2% per total emergency admissions per year. This study also revealed that youth in the community (15-29 years) remain very vulnerable for poisoning with higher prevalence in females. Deliberate self-poisoning is a problem mainly of the young adults aged below 30 years and once again females are more prone. Moreover, the present study indicated that majorities of the cases were from rural areas and temporary quarrel was the main reason for individuals to poison themselves. Furthermore, the case fatality rate was found to be 8.4%. OPs pesticides are the leading cause of poisoning with most prevalence of death. Mortality was higher in rural areas.

8. Recommendations

The growing number of poisoning cases among the public compels us to pay more attention to setting up of interdisciplinary-based prevention and strategies. Therefore, based on the results of the present study as well as observation during the study period, the following points are recommended:

- Creating awareness about proper handling of chemicals and prescribed drugs in the society should be design and implemented by FMOH, through different mechanisms especially for the youth.
- Since most of the patients who died from acute poisoning were from rural areas, it might be important to assess the referral linkage and if there is a delay in arrival to emergency departments.
- EFMHACA and Ministry of Agriculture must control agrochemical substances to minimize their open market sales and promote their rational use, which in turn might contribute in reducing the prevalence of acute poisoning.
- Ensuring availability and easy accessibility of antidotes and antivenoms by suppliers especially, PFSA and placing regular monitoring and evaluation system through the hospital's DTC is also recommended.
- Appropriate documentation and improving the record-keeping practice is also suggested for a better information access and utilization.
- Future studies should be prospective in design to accurately capture information and there by able to evaluate treatment appropriateness and its association with outcome of acute poisoning.

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Annexes

Annex 1: Data abstraction format from patient medical charts

1. Age: ---------
2. Sex: Male ---- Female -----
3. Marital Status: Single ----- Married -----Divorced------Widowed------
4. Educational level: Illiterate ----- 1^{o}School ------ 2^{o} School ----- 3^{o}School ------
5. Place of Residence: Rural ----- Urban -----
6. Occupation: Unemployed ----- Farmer ----- Employed ----- Merchant ------ Student ------ Daily laborer ----- House Wife ----- Other (Specify) ----------
7. Reason of Poisoning: Unemployment -------Mental Illness------- Income Problems ------- Failure in Exam ------- Quarrel with Family -------Unspecified Reason ------Marital and Love Disharmonies------- Others (Specify) ----------
8. Mode of Poisoning: Intentional ------- Accidental -------Unspecified ------
9. Season of Poisoning: Dec-Feb (Winter) ----- March-May (Spring) ----- June-Aug (Summer) ----- Sep-Nov (Autumn)-----
10. Poisoning Substances Identified:
    a. Organophosphate Materials, -----
    b. Bleaching Agents, ----------
    c. Pharmaceuticals:
        - Benzodiazepines
        - Antipsychotics
        - Barbiturates
        - Analgesics
        - Others (Specify) ----------
    d. Herbicides, ----------

e. Rat Poisoning Chemicals, --------
f. Alcohol Intoxication, ----------
g. Carbon Monoxide, ----------
h. Snake Bite, ----------
i. Traditional Medicines, ----------
j. Others(Specify) ----------

11. Type of Treatment Given/Management Practices:
    a. Fluid Resuscitation
    b. Chelation with Activated Charcoal
    c. Antidote Management
    d. Whole Bowel irrigation
    e. Gastric Lavage
    f. Hemodialysis
    g. Emesis
    h. Medications other than Antidote
    i. Others(Specify) ----------
12. Outcome of Poisoning: Survived without Disability ------ Survived with Disability -----Death

Annex 2: Ethical Clearance letter from Saint Paul's Hos.pitalMillennium Medical College

Date: 26/7/2016

Ref. No. P.M93/300

Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College (SPHHMC)

Ethical Clearance

Research Title: - Prevalence and Management of Acute Poisoning at the Saint Paul's Hospital Millennium Medical College

Principal Investigator: - Elias Melese

The IRB of SPHMMC has reviewed the above mentioned research proposal and made the following decision:

1. Approved:- ✓
2. Approved with recommendation:- _____
3. Approved on condition :- _____
4. Disapproved:- _____

The decision is valid for 12 months and the research should be conducted in compliance with the protocol/proposal approved by the IRB of SPHMMC. Any subsequent revision/amendment of the protocol/proposal needs approval before conduct of the research. The researcher should also submit summaries of the research status to the IRB every 03 months. Upon the conclusion of the study, manuscripts and thesis work to the final/completed research project needs to be submitted to the IRB.

IRB Chair: Dr Birke Anbesse

Signature: _____

Date: July /25/2016

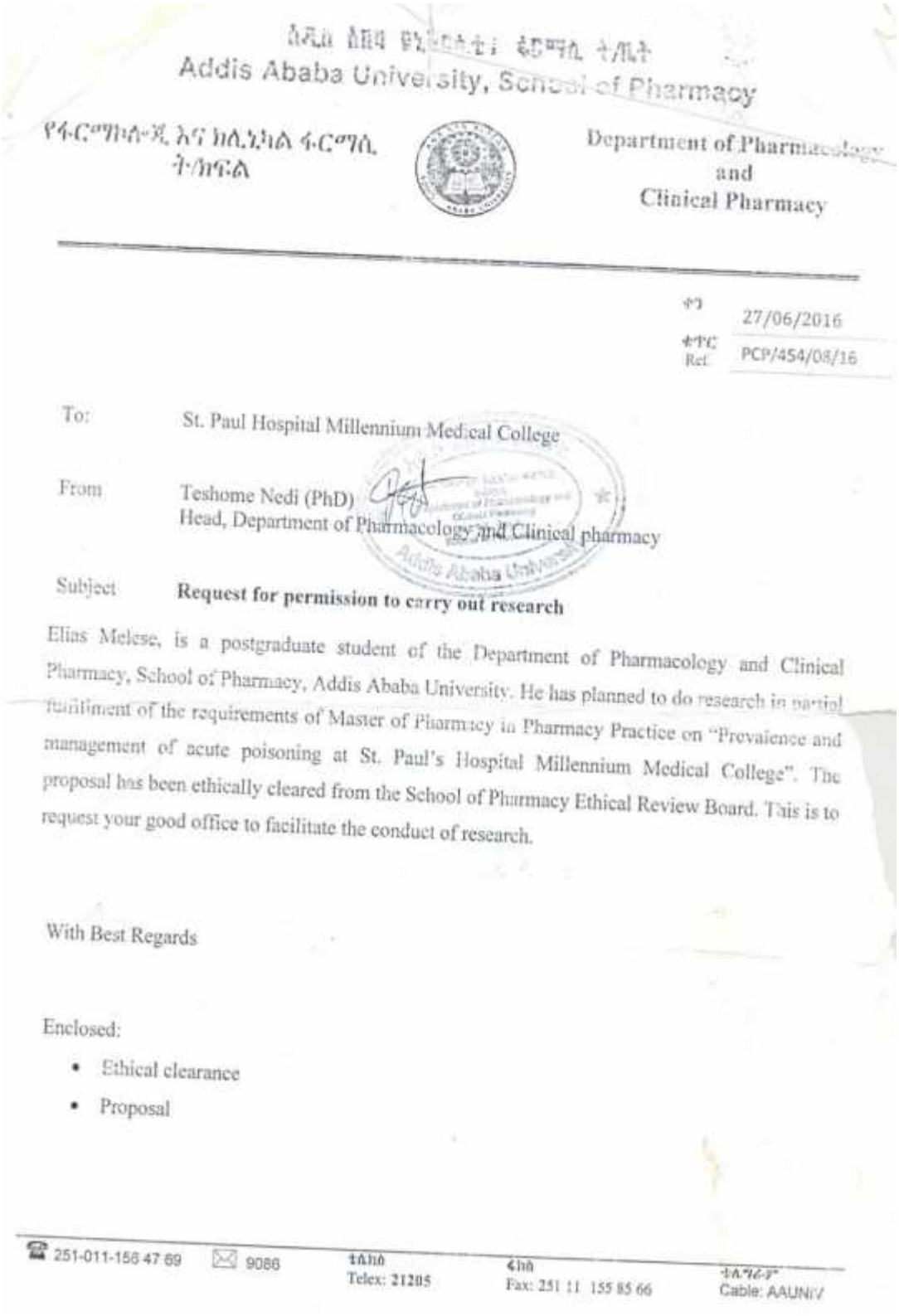
Cc:

- Vice Provost for Academic and Research
- IRB

SPHMMC

Elias Melese

Annex 3: Support Letter from Department of Pharmacology and Clinical Pharmacy SOP, AAU.



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Addis Ababa University, School of Pharmacy

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Department of Pharmacology and Clinical Pharmacy

ቀን 27/06/2016
ቁጥር Ref. PCP/454/08/16

To: St. Paul Hospital Millennium Medical College

From: Teshome Nedi (PhD)
Head, Department of Pharmacology and Clinical pharmacy

Subject: **Request for permission to carry out research**

Elias Melese, is a postgraduate student of the Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, Addis Ababa University. He has planned to do research in partial fulfillment of the requirements of Master of Pharmacy in Pharmacy Practice on "Prevalence and management of acute poisoning at St. Paul's Hospital Millennium Medical College". The proposal has been ethically cleared from the School of Pharmacy Ethical Review Board. This is to request your good office to facilitate the conduct of research.

With Best Regards

Enclosed:

- Ethical clearance
- Proposal

☎ 251-011-156 47 69 ✉ 9086 ስልክ Telex: 21205 ፋክስ Fax: 251 11 155 85 66 ቴሌግራም Cable: AAUNIV

Annex 4: Support Letter from Department of Pharmacology and Clinical Pharmacy, SOP, AAU.

Elias Melese

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Addis Ababa University, School of Pharmacy

የፋርማኮሎጂ እና ክሊኒካል ፋርማሲ ት/ክፍል

Department of Pharmacology and Clinical Pharmacy

ቀን 27/06/2016
ቁጥር Ref. PCP/454/08/16

To: St. Paul Hospital Millennium Medical College

From Teshome Nedi (PhD)
Head, Department of Pharmacology and Clinical pharmacy

Addis Ababa University

Subject **Request for permission to carry out research**

Elias Melese, is a postgraduate student of the Department of Pharmacology and Clinical Pharmacy, School of Pharmacy, Addis Ababa University. He has planned to do research in partial fulfillment of the requirements of Master of Pharmacy in Pharmacy Practice on "Prevalence and management of acute poisoning at St. Paul's Hospital Millennium Medical College". The proposal has been ethically clear[illegible]. This is to request your good office to facili[illegible]

21 July, 2016
Dr. Hanbau Sultan
an emergency physician at AaBET is assigned as advisor
Dr. Alefe G.

With Best Regards

Enclosed:

- Ethical clearance
- Proposal

☎ 251-011-156 47 69 ✉ 9086

Annex 5:Ethical Clearance obtained from Ethical Review Committee (ERC) of SOP, AAU.

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Addis Ababa University

School of Pharmacy
Ethical Review Board

ቀን Date: June 27, 2016

ቁጥር Ref. No.: ERB/SOP/83/06/2016

To: Elias Melese
School of Pharmacy

Subject: Ethical Clearance

It is to be recalled that you submitted a study proposal entitled, "Prevalence and management of acute poisoning at the Saint Paulo Millennium Medical College Hospital", for ethical approval by the School's Ethical Review Board (ERB). The Board thoroughly reviewed the proposal based on its operational guidelines and found it to fulfill all ethical requirements stipulated in the guidelines. This is, therefore, to inform you that the proposal is ethically approved for implementation.

With best regards,

Esubalew Adugna (BPharm, MSc)
Secretary, ERB

☎ 00251156 02 12 ✉ 1176 ቴሌክስ Telex: 21205 ፋክስ Fax: 00251(11)1558566 ቴሌግራም Cable: AAUNIV

Annex 6: List of medicines for poisoning and overdose from Ethiopian Emergency Medicine List .

S. No.	Antidote	Indications	Description
1.	Activated Charcoal	Treatment of acute poisoning	Tablet, 125mg, 250mg Powder for reconstitution,15gm/120ml, 25gm Gel, 300ml
2.	Acetylcystenine inj.	Acetaminophen overdose	Injection, 200mg/ml in 10ml ampoule
3.	Adrenaline		Injection, 0.1mg/ml
4.	Atropine Sulphate inj.	Insecticide and pesticides poisoning	Injection, 1mg/ml in 1 ml ampoule
5.	Calcium Chloride	fluoride toxicity	Calciumin 10ml, 5mmol of calcium & Ions in 5ml
6.	Digoxin Immune Fab (Ovine) Digoxin specific, antibody fragments	digoxin intoxication	Powder for injection, 40mg
7.	Ipecac	Some type of drug over dose	Syrup, 7% powder
8.	Naloxone	For opioids poisoning	Injection, 0.02mg/ml in 2ml ampoule,0.4mg/ml in 1ml and 10ml ampoule, 1mg/ml
9.	Physostigmine Salicylate	Poisoning by anticholinergic drugs	Injection, 1mg/ml in 1ml and 2ml ampoule
10.	PralidoximeChloride	Adjunct to atropine in organophosphorus pesticides poisoning	Powder for injection, 1g/vial, Tablet, 500mg
11.	Protamine Sulfate	Heparin toxicity	Injection, 10mg/ml,
12.	Rabies Antiserum, Equine	Anti-rabies	Injection, 200units in 5ml
13.	Snake Venoum Antiserum polyvalent	For snake bite	Injection, 10ml
14.	Vitamin K	Warfarin toxicity	Injection, 10mg/ml in 1ml ampoule
15.	Universal Antidote (Charcoal +Tannic acid +Magnesium oxide)	Many types of acute poisoning	Powder, 2parts+1part+1part

Annex 7: List of antidotes and other substances used in poisoning from Ethiopian Essential Medicines List .

S. No.	Antidote	Indications	Description
1.	Acetylcystenine inj.	Acetaminophen overdose	Injection, 200mg/ml in 10ml ampoule
2.	Activated Charcoal	Treatment of acute poisoning	Tablet, 125mg, 250mg Powder for reconstitution,15gm/120ml, 25gm Gel, 300ml
3.	Atropine Sulphate inj.	Insecticide and pesticides poisoning	Injection, 1mg/ml in 1 ml ampoule
4.	Calcium Gluconate	fluoride toxicity	Injection, 10%
5.	DesferroxamineMesylate	acute iron poisoning,	Powder for injection 0.5g in vial
6.	Digoxin Immune Fab	digoxin intoxication	Powder for injection, 40mg
7.	Sodium Nitrite	Cyanide poisoning in conjunction with sodium thiosulphate	Injection, 3% (30mg/ml)
8.	Naloxone HCl	For Opioids poisoning	Injection, 0.02mg/ml in 2ml ampoule,0.4mg/ml in 1ml and 10ml ampoule, 1mg/ml
9.	Phytomenadione (Vitamin K1)	Warfarin toxicity	Injection, 10mg/ml in 1ml ampoule
10.	Pralidoxime chloride	Adjunct to atropine in Organophosphurus pesticides poisoning	Powder for injection, 1g/vial Tablet, 500mg
11.	Protamine	Heparin overdose	Injection (sulphate), 10mg/ml in 5ml ampoule; 250mg (10mg/ml), 25ml
12.	Thiosulphate	poisoning with cyanides (used in conjunction with sodium nitrite)	Injection (Sodium), 10% in 50ml ampoule

Annex 8: Samples pictures of poisoning substances observed during the study period while they were sold in open market at Gojam Berenda, near to the studied Hospitals