Drug Therapy Problem
Analysis of Losartan Potassium

Highlights
Emergence of Allium Cepa
Ambulatory Hypertensive Patients

Discovering Thoughts, Inventing Future

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Emergence of *Allium Cepa* as Antitubercular Agent

By Shashidhar Mehta, Sandhya S Mehta, Pankaj Patyal & Suhasini Bhatnagar

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**Abstract** - Tuberculosis (TB) is the main cause of morbidity in modern era and a latent infection affecting nearly one third of world’s population including forty percent from India. There is an urgent need to explore the effective and promising new anti-tubercular drugs to combat against Tuberculosis. Nature provides diverse secondary metabolites with anti-tubercular activity in medicinal plants. Among them *Allium cepa* (onion), contains various constituents like quercetin, fructose, quercetin-3-glucoside, isorhamnetin-4-glucoside, xylose, galactose, glucose, mannose, organosulfur compounds, allylsulfides, flavonoids, flavenols, S-alk(en)yl cysteine sulfoxides, cycloalliin, selenium, thiosulfinates, and sulfur and seleno compounds that have proved to have protective role in tuberculosis. *Allium cepa* (onion) possesses antibiotic activity against both Gram-positive and Gram-negative bacteria and can be used to prevent tuberculosis most effectively.

**GJMR-B Classification : NLMC Code: QV 4**

Strictly as per the compliance and regulations of:
Emergence of **Allium Cepa** as Antitubercular Agent

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**Abstract**—Tuberculosis (TB) is the main cause of morbidity in modern era and a latent infection affecting nearly one third of world’s population including forty percent from India. There is an urgent need to explore the effective and promising new anti-tubercular drugs to combat against Tuberculosis. Nature provides diverse secondary metabolites with anti-tubercular activity in medicinal plants. Among them Allium cepsa (onion)., contains various constituents like quercetin, fructose, quercetin-3-glucoside, isorhamnetin-4-glucoside, xylose, galactose, glucose, mannose, organosulfur compounds, allylsulfides, flavonoids, flavonols, S-alk(en)yl cysteine sulfoxides, cycloalliin, selenium, thiosulfimates, and sulfur and seleno compounds that have proved to have protective role in tuberculosis. Allium cepa (onion) possesses antibiotic activity against both Gram-positive and Gram-negative bacteria and can be used to prevent tuberculosis most effectively.

**I. Introduction**

Tuberculosis (TB) has emerged as one of the most serious and devastating that contributes the great loss of life and has been growing on pandemic rate. Medicinal plants have been used from long back the centuries and thus have shown very promising results. They have been used as pure as a raw material and thus have been elucidated. Out of the numerous plants, a small fraction has been screened out for their therapeutic efficacy. India has a rich culture with widespread use of herbal drugs for their elucidation of the mechanistic role that proves to be effective. The increase in the resistance of MDR and XDR further warrants the urge for the discovery of new drug that can be effectively screened out for the benefit of mankind.

The issue of multidrug resistance has been increasing at an alarming rate. Mutation either at the genetic level or the transcriptional level leads to various deregulations that have been associated with the concept of multi drug resistance. The inculpation of the chemotherapy in the management of MDR-TB ensures the high risk of toxicity that is posing more dangerous to the mankind.

The second line drugs used to treat TB has been associated with great probability of drug resistance. This led to various devastations that further poses damage to the health of an individual. The WHO recommends the use of herbs in order to combat the various types of resistance so that therapeutic effect can be attained without compromising the quality of the life care of the patient. The worldwide research conducted on a number of plants gave very promising results and thus can be explored to attain the therapeutic benefits.

Allium cepsa (onion) has been used in India from long centuries before and is almost exclusively used throughout the world. Research conducted on various studies suggest the role of Allium cepsa as antimicrobial, anti-cancer, antioxidant, anti-diabetic, anti-hypercholesterolemic, anti-hyperglycemic, anti-mutagenic, cicatrizant effects, hemostatic, osteoelastic and anti-cardiovascular effects and thus gave very effective results. The effect of Allium cepsa against gram positive and gram negative microorganisms like Escherichia, Salmonella, Staphylococcus, Streptococcus, Klebsiella, Proteus, Bacillus, clostridium, Helicobacter pylori and even acid-fast bacilli (AFB) have shown their utmost important role.

The use of onion as promising medicinal plants has been further demonstrated in various Ayurveda and Greek system of medicine. The presence of various constituents in the onion makes it an effective therapeutic target for a wide array of diseases. However, the much research has been further needed to exploit the further hidden mechanism and modulatory role of pathways by which Allium cepsa shows the promising role.

The use of herbal drugs in India has been traced back long before the centuries and thus they have been used on a large demand. The use of MDR resistance has been growing and thus there is an urge for all the researchers to combat the disease by discovering new therapeutic targets. The various research has been carried through out the world to study the effect of Allium cepsa to assess itsbeneficial role. The promising result given by Allium sativum necessitates the further exploitation of the effect of Allium cepsa that can be extrapolated if possible for the benefit of mankind.

**II. Pathophysiology of Tuberculosis**

M. tuberculosis requires the presence of oxygen to grow. It does not require the presence of any bacteriological stain due to high lipid content in its wall,
Emergence of Allium Cepa as Antitubercular Agent

III. Promising Role of Herbal Drugs

Rifambicin, ethambutol, isoniazid and pyracinamide has been used as the current therapy for TB but the emergence of problem of multiple drug resistant (MDR) and (XDR) strains of mycobacterium is very usual to with these drugs and poses a serious problem. The presence of “cross resistance” cause no single drug or combination therapy was able to control TB to a maximal account and such drug resistance is developed only against purified chemical compounds and has given successful results. The purified compounds cause the existence of resistance in pathogens and thus have proved to be effective against such diseases. Mycobacteria are having self regulation to digest the drug by altering their receptor structure in response to the chemical structure of the drug. Thus the Mycobacteria adapt at a very less rate and develop resistance against the new and modern drugs. The occurrence of drug resistance and thus can be eventually used in the therapy as an antitubercular drug. Hence an effective and appropriate drug therapy as an anti tuberculosis drug need to be evaluated and thus can be used to overcome the problem of cross resistance and can be used for the benefit.

IV. Discussion

The appearance of tuberculosis not only in India but in whole world is increasing at an alarming rate. The appearance of various resistant strains like MDR and XDR further mandates the exploration of new and promising therapy for the beneficial effect and in reducing the various mortalities and morbidities. Thus, urgent need of various studies are the need of the day to assess isolates/strains of M. tuberculosis as well as fractions of crude extract/ purified/semi-purified principle in order to evaluate their therapeutic role and thus serve the effect for the health status of the mankind.

V. Conclusion

The side effects associated with the allopathic drugs have remarkably necessities the need of herbal drugs. The various side effects and serious morbidities associated with allopathic drugs further necessitates the need of the day to explore various effective and safe therapies that can be used as a promising agent . In the present review, authors have tried to make a complete description of allium cepa as antitubercular drugs around the globe. The various constituents present in plants makes them as an effective antitubercular drug. The discovery of new drugs has finally begin to emerge, the standard of care for tuberculosis might become possible soon Although the prevalence of TB in the society exists from long back centuries, still new and promising research needs to be evaluated out for the benefit of the society and improving the status of the healthcare.

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Characterization of Extract of P. Notatum isolated from Virgin Forest

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Abstract- Penicillium notatum has been found years ago to be one of the leading novel candidates of fungi for the discovery of novel antibiotics. The fungus was isolated from eighty years old virgin forest Ikota, Ondo state. The fraction was obtained through column chromatography using mixture of solvents, after culturing and purification process of the extract. The fraction was characterized using gas chromatography mass spectrophotometer, the Gc-Ms results revealed Benzene, 1,2,4,5-trimethyl- having retention time 5.117,% of total 6.505%, p-cymene having retention time 5.170 minutes, % of total 16.439%, Trans-Decalin, 2 methyl with retention time 5.235 minutes and % of total 9.468 %, also n-Nonadecanol-1 having retention time 5.301 minutes and 13.302 %, Naphthalene with retention time 6.161 minutes, % of total 11.369 %, 5, 8,11,14-Eicosatetraenoic acid, methyl ester, having retention time of 6.381 minutes and % of total 2.544 %. Literature reports had indicated the physiological activities of these compounds and of interest p-cymene and Naphthalene derivative to possess strong pharmaceutical uses.

Keywords: penicillium notatum, gas chromatography mass spectrophotometer, retention time, % of total.

GJMR-B Classification : NLMC Code: QV 252
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I. Introduction

fungi are rich sources of bioactive compounds. The medicinal chemists have always tried to design drug substance possessing maximum therapeutic application and minimum toxicity. Soil is traditionally the main source of fungal genetic resources for bio-prospection programs. To expand the search for pharmacologically active agent, soil sample from virgin forest of 80 years old in Ikota, Nigeria was examined.

II. Methodology

**Figure 1:** Showing the map of study area

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a) **Soil sample collection**

Soil sample collection was done in July 2013 in Ikota, Ondo State, Nigeria. Random sampling method was used in collecting soil sample directly and the collection was done using soil auger at a depth of 10cm. The collected soil was put into polythene bag and stored inside refrigerator.

b) **Isolation of the fungi**

One gram of soil sample was transferred to a sterile Erlenmeyer (EM) flask containing 50ml sterile water. The flask was shaken on rotary shaker for 30 minutes for the detachment of the spore chains. The flask was kept aside for 30 minutes to settle down the particulate matter. The clear supernatant was diluted with sterile water (dilutions $10^{-1} - 10^{-3}$) was used on inoculator. One ml of each of these dilutions was pipette out into the medium, plated into Petri dishes 6mm diameter and incubated at 28°C for 2-4 weeks and potato dextrose agar was used.

c) **Identification**

*Cultural observation*: using the natural eyes and microscope at low power magnification (x40), parameters such as, colony color, color change in the medium, characteristic of the submerged hyphae whether rhizoid, spiral or regular and characteristic shape of mature fruiting bodies are strictly observed.

d) **Microscopic observation**

A small piece of mycelium free of medium was transferred using inoculating needle on to a glass slide containing a drop of cotton blue in loctophenol and the mycelium was spread properly with another needle. The preparation was covered with a cover slip and observed under medium power (x100) and later at high power (x400) magnifications. Details of spore colouration, shape, septation and surface marking were studied and *P. Notatum* was identified and confirmed by professor of microbiology in Microbiology laboratory.

e) **Culturing the fungi**

The fungi with strong antagonistic efficacy were culture in the laboratory for maximum yield of bioactive compounds using the fabricated fermenter, five ml of already cultured fungi was put into sterilized potato broth of 500ml and poured into the fermenter and allowed to excrete maximum yield for two weeks, the air pump supplied continuously sterilized air and the culture being mixed together using powered mixer.

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**Figure 2**: Showing the flowsheet for the process
f) **Extraction and Purification**

The fungi cultures were centrifuged and extraction of compounds from multiplied fungi was carried out in a separating funnel using ethyl acetate. The extract was concentrated using rotary evaporator. The fraction was eluted using mixture of 50% ethyl acetate and 50% hexane through column chromatography and the fractions was concentrated using rotary evaporator.

g) **Gas Chromatography- Mass Spectrophotometer (GC-MS)**

Analysis was conducted using an HP (Hewlett Packard, 5890 series II GC hyphenated with 5890 Mass Spectrometer). MS conditions were as follows: Detector mass spectrometer voltage 70eV and its source temperature was 300°C. The injector temperature was 240°C and the split less mode 0.5μL injection. The HP 55% dimethyl-95% diphenylpolysiloxane non-polar column was performed with length 30 cm x 0.25 mm, coating thickness film 0.25 μm. The oven was adjusted at 100°C for 1 min and initial time 1.5 min with 40°C which ended by a final temperature of 300°C and 4 min hold time where the total run time was 45 min. The components were identified by comparing their retention times with those of authentic samples, as well as by comparing their mass spectra with those of (NIST).

### III. Results

**Figure 3**: Showing the chromatogram of the extract
Figure 4: Showing spectral of compound identified
Figure 5: Showing spectral of compound identified
Figure 6: Showing spectral of compound identified
Figure 7: Showing spectral of compound identified
Figure 8: Showing spectral of compound identified
Figure 9: Showing spectral of compound identified
Figure 10: Showing spectral of compound identified
Figure 11: Showing spectral of compound identified
Figure 12: Showing spectral of compound identified
Figure 13: Showing spectral of compound identified
Figure 14: Showing spectral of compound identified
Figure 15: Showing spectral of compound identified

IV. DISCUSSION

Naphthalene having retention time 6.161 minutes, percentage total 11.369 %, was revealed. Naphthalene has been identified as new range of potent antimicrobials effective against wide range of human pathogens (Rokade and Sayyed 2009). They occupy a central place among medicinally important compounds due to their diverse and interesting antibiotic properties (Rokade and Sayyed 2009). Several naphthalene containing drugs are available, such as nafacillin, natifine, tolnaftate. Also identified in the fraction was P-cymene having retention time of 5.170 minutes, percentage of total 16.439 % was revealed, this compound has just been patented and useful as nutraceutical composition for cognition -cognitive functions and psycho-social status, such as learning, memory and alertness, psychotic stability and maintenance (Ann, 2010). Benzene 1, 2, 4, 5-tetramethyl having retention time 5.117 minutes and percentage of total 6.505 % was identified. Many compounds that have benzene ring have been synthesized and possess strong pharmaceutical activities such as Aspirin, sulfanilamide, amphetamine, acetaminophen. 2-isopropylidene-5-methylhex-4-enal having retention time 5.508 minutes and percentage of total 5.446 %. From the figure 3 showing the chromatogram of the fraction, it is found that p-cymene having % of total 16.439% was the highest followed by Naphthalene of % total 11.369 %, n- Nonadecanol-1 of.
% total 10.302 %. Understanding the biochemistry of alcohol metabolism has helped to develop treatments for alcohol abuse. For example, the drug Antabuse inhibits aldehyde dehydrogenase allowing a toxic accumulation of acetaldehyde to occur when alcohol is consumed (Brick, 2003; Brick and Erickson, 1999; Crews, 2003; Pohorecky, L. and Brick). Trans-Decalin, 2-methyl of % total 9.468 %. These compounds have been found to have various pharmaceutical applications, this include as anagelsic, antimicrobial activities and as composition in the formulation of drugs and other industrial compounds.

V. Conclusion

From the above analysis, the fungus, P. Notatum has been found to be a reservoir of many bioactive compounds. If these compounds could be isolated and characterized using various spectroscopic techniques, novel and lead candidates compounds may be discovered.

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Drug Therapy Problem and Contributing Factors among Ambulatory Hypertensive Patients in Ambo General Hospital, West Shoa, Ethiopia

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Abstract- Background: Hypertension is the most serious health problems in the world. Though modern medicine can improve the well-being, its benefit can be compromised by drug-related problems (DTPs).

Objective: The objective of the study is to determine both type and number of drug related problems and factors affecting it in Ambo General Hospital.

Methods: A hospital based cross-sectional study was conducted. All patients who had contact time during the data collection were included. Trained data collectors collected the data.

Result and conclusion: A total of 151 ambulatory hypertensive patients were found during data collection period in Ambo general Hospital. A maximum of 200 drug therapy problems were found. The mean DTP was 1.32 + 0.47. The most common DTP was indication type problems. The maximum number of DTPs was three. None of the independent variable is associated with both presence and number of Drug Therapy Problem.

Keywords: drug therapy problem, hypertension, indication.

GJMR-B Classification : NLMC Code: WB 330
Drug Therapy Problem and Contributing Factors among Ambulatory Hypertensive Patients in Ambo General Hospital, West Shoa, Ethiopia

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Keywords: drug therapy problem, hypertension, indication.

1. Introduction

Cardiovascular diseases (CVDs) remain the biggest cause of death world wide. WHO report (2011) estimated that 17.1 million people die of CVDs each year representing 30% of all deaths. By 2030, an estimated 23.6 million people will die from CVDs mainly from heart disease and stroke. These are projected to remain the single leading causes of death (1). According to the WHO, cardiovascular diseases will be the major cause for death and disability in India by 2020(2, 3, 4).

Hypertension (HTN) or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. Blood pressure is summarized by two measurements, systolic and diastolic, which depend on whether the heart muscle is contracting (systole) or relaxed between beats (diastole). This equals the blood pressure at rest is within the range of 100-140mmHg systolic (top reading) and 60-90mmHg diastolic (bottom reading). High blood pressure is said to be present if it is often at or above 140/90 mmHg.

The Prevalence of hypertension was 19.04%. Given that the burden of CVD morbidity and mortality is projected to increase in developing countries, therefore it is essential to provide current reliable data on the epidemiology of hypertension.

The first lines of treatment for hypertension are preventive lifestyle changes include: dietary changes, physical exercise, and weight loss. These have all been shown to significantly reduce blood pressure in people with hypertension. If hypertension is high enough to justify immediate use of medications, lifestyle changes are still recommended in conjunction with medication. Therefore, more than one anti-hypertensives might be used. The most common class of anti-hypertensives are calcium channel blockers, angiotensin convertase enzyme blockers, diuretics and beta blockers.

Although pharmacotherapy in cardiovascular diseases can improve the well-being, its benefit can be compromised by drug-related problems (DTPs). A drug-related problem is any event or circumstance involving drug treatment that interferes with the outcome of medical care (5). They pose significant risk, leading to significant morbidity and mortality. Here in this study, type and number of drug therapy problems (DTP) and predictors for it will be assessed.

a) Statements of the problem

High blood pressure is widely prevalent in Addis Ababa and may represent a silent epidemic in this population. Overweight, obesity and physical inactivity are important determinants of high blood pressure. There is an urgent need for strategies and programs to prevent and control high blood pressure, and promote healthy lifestyle behaviors primarily among the urban populations of Ethiopia.

The burden of this disease is high encompassing economic, psychosocial, and, personal loss to self, family, or immediate community. The cost of illness may be reflected in absenteeism, low productivity, high cost for medical care, and low quality

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life. These resulted in negative outcome on the socioeconomic status of the country in general.

Hypertension is a risk factor for all clinical manifestations of atherosclerosis. It is also an independent predisposing factor for heart failure, coronary artery disease, stroke, renal disease, and peripheral arterial disease. It is the most important risk factor for cardiovascular morbidity and mortality, in the world.

Many studies have proven the significance of pharmacists in identifying and resolving potential DTPs through timely interventions. Studies assessing the magnitude of DTPs in hospitalized patients and contributing factors are scarce in Ethiopia.

II. Significance of the Study

It would be much better to prevent drug related problems than to correct them, but this is not always possible because of the complexity of pharmacotherapy. A more comprehensive study of DRPs in hospitalized patients should be done to provide valuable insights for the healthcare professionals to reduce the incidence of DRPs and the result can also be used as a base line information to establish, since it is an emerging concept on safe use of medication in the health care management.

III. Objectives

a) General Objectives

To determine presence of drug related problems among ambulatory hypertensive patient in Ambo General Hospital from April to May 2014.

b) Specific Objective

• To determine prevalence of DTPs among ambulatory hypertensive patient in Ambo general Hospital.
• To know type of DTPs
• To know number of DTPs per patient
• To determine factors affecting DTPs

c) Study Population

All patients receiving anti-hypertensive drugs were included in the study.

i. Inclusion criteria

All People who receive anti-hypertensive drugs during the data collection period at the ambulatory ward

ii. Exclusion criteria

Patients those who are not willing to participate

d) Sample size and sampling technique

All patients who had visit during the data collection period were included. The sampling technique used was every other patient.

i. Study Variable

a. Dependent

Drug therapy problems

b. Independent

✓ Age
✓ Sex
✓ Number of drugs
✓ Co morbidity

e) Data collection procedures

The structured questionnaires were used. It contains socio-demographic characteristics, medical and drug condition. The trained data collectors were used to collect the data from patient card and patient him/herself during data collection period.

i. Data Analysis

All data were cleaned, coded and entered in SPSS version 20. Descriptive, logistic and leaner regressions were used. P< 0.05 is considered to be significant.

f) Ethical consideration

Formal letter was obtained from Research Ethics Committee of Ambo University and submitted to Ambo General Hospital, so the letter was given to the hospitals and they allowed us to do the research. Written consent was taken so that the patient was willing to give his/her medical information.

g) Operational definition


V. Results

a) Socio demographic characteristics

A total of 151 patients were encountered during data collection period. 63 (41.7%) of them were males. 82(54.3%) and 41(27.15%) were treated by double and triple therapy respectively.
Table 1: Socio demographic characteristics of ambulatory hypertensive patient in Ambo General Hospital from April to May 2014. (Logistic)

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Frequency (%)</th>
<th>P</th>
<th>AOR</th>
<th>CI (95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>63 (41.7)</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>88 (58.3)</td>
<td>.395</td>
<td>1.380</td>
<td>.657</td>
</tr>
<tr>
<td></td>
<td>&lt;17</td>
<td>0(0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;17-59</td>
<td>108(71.5)</td>
<td>.231</td>
<td>.612</td>
<td>.274</td>
</tr>
<tr>
<td></td>
<td>&gt; 60</td>
<td>43(28.5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Number of medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;=3</td>
<td>99 (65.6%)</td>
<td>.462</td>
<td>.511</td>
<td>.085</td>
</tr>
<tr>
<td></td>
<td>&gt;3</td>
<td>52 (34.44)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) **Blood pressure measurement**

The mean systolic and diastolic blood pressure was 134.67 ± 18.24 and 85.56 ± 10.75 mm Hg respectively.

Figure 1: Blood Pressure of each hypertensive patient in ambulatory ward of Ambo General Hospital from April to May 2014

**Key**

Series 1 = systolic blood pressure  
Series 2 = Diastolic blood pressure

c) **Types of medication**

From the recommended drugs Hydrochlorothiazide (108(71.5%)), Nifidipine (87(57%)), and Enalapril (66(43.7%)) were the commonly used drugs.

d) **Drug therapy problems**

The mean of drug therapy problems is 1.32 ± 0.47 and the total numbers of drug therapy problems were 200. Most patients had one drug therapy problem. The most common DTP was indication related problem.
Table 2: Type of Drug therapy problems among ambulatory hypertensive patients in Ambo General Hospital from April to May 2014

<table>
<thead>
<tr>
<th>Drug therapy problems involved</th>
<th>Reasons</th>
<th>Number of patient (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indication</td>
<td>Unnecessary drug therapy</td>
<td>37(24.5)</td>
</tr>
<tr>
<td></td>
<td>No medical condition</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Duplicate therapy</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Non-drug therapy indicated</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Treating avoidable ADR</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Addictive or Recreational drugs</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Untreated indication</td>
<td>24(15.89)</td>
</tr>
<tr>
<td></td>
<td>Preventive or prophylactic</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Synergistic or potentiating</td>
<td>-</td>
</tr>
<tr>
<td>Needs additional drug therapy</td>
<td>More effective drug available</td>
<td>7(4.64)</td>
</tr>
<tr>
<td></td>
<td>Condition refractory to drugs</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Dosage form inappropriate</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Not effective for condition</td>
<td>11(7.23)</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>Dosage too low</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Wrong dose</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Frequency inappropriate</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Drug interaction</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Duration inappropriate</td>
<td>24(15.89)</td>
</tr>
<tr>
<td>Safety</td>
<td>Adverse drug reaction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Undesirable effect</td>
<td>15(9.93)</td>
</tr>
<tr>
<td></td>
<td>Unsafe drug for patient</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Drug interaction</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Dosage administered or changed too rapidly</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Allergic reactions</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Contraindication present</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Wrong dose</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Frequency inappropriate</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Duration inappropriate</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Dose too high</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Drug interaction</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Incorrect administration</td>
<td>-</td>
</tr>
</tbody>
</table>

VI. Discussion

Most hypertensive patients had DTP, which is consistent with the study done on Felege Hiwot referral Hospital. There were 200 numbers of DTPs, on the other hand, relatively lesser number of DTPs (105) was found in the study done in Felege Hiwot referral Hospital. [6, 9]

The number of DTP per patient was 1.32 ± 0.47, while study in Jimma showed it was 1.8 ± 0.8, relatively higher. This might be due to the fact that the study in JUSH includes all medical patients [9]

The most common DTP was indication problem, which is similar to study done in Felege Hiwot referral Hospital while different from study done in India [7, 9, 10, 11]. Of the total type of Drug therapy problems, most frequently found was unnecessary drug therapy (24.5%) and need for additional (31, 20.53%). On the other hand, the study done in India showed, dose-related problems (35.1%) followed by need for additional drugs (19.7%), and unnecessary drugs (16.7%) were the common DTP.[7, 9]

In this study, age (p = 0.231), sex (p = 0.395), and number of medication (p=0.085) were not associated with presence of Drug Therapy Problem. Sex (p=0.232), age (p=0.45), and number of medication (p = 0.724) were not associated with number of DTPs.

e) Factors Affecting Drug Therapy Problems

Age (p = 0.231), sex (p = 0.395), and number of medication (p=0.085) were not associated with presence of Drug Therapy Problem.

Sex (p=0.232), age (p=0.45), and number of medication (p = 0.724) were not associated with number of DTPs.

VII. Conclusion

High proportion of patients in Ambo General Hospital had DTPs. The most common DTP was indication type problems. The maximum number of DTPs was three. Age, sex, and number of medication were not associated with presence of Drug Therapy.
Problem, as well as sex, age, and number of medication were not associated with number of DTPs.

VIII. Recommendation

The following recommendations are forwarded:
- Ambo general hospital: to develop team work among health care professionals.
- Ambo general hospital pharmacists: to strengthen pharmaceutical care
- Ambo general hospital physician: to stick themselves to the current guideline

IX. Acknowledgement

We are very grateful to our college staff members for their constructive suggestions starting from the stage of proposal development. Finally our deepest gratitude goes to Ambo General Hospital staff workers who helped and allowed us in collecting and gathering data from the hospital. Finally we thank all hypertensive patients in Ambo General Hospital.

Conflicts of interest

The author(s) declare(s) that there is no conflict of interests regarding the publication of this manuscript.

References Références Referencias

Prescription Pattern of Injection at Out Patient Pharmacy Department of Adama Hospital Medical College, Adama, Ethiopia

By Belayneh Kefal Gelaw, Adunya Feyissa, Gobezie Temasgen Tegegne, Amsalu Degu Defersha, & Getasew Amogne Ayinalem

Ambo University, Ethiopia

Abstract: Introduction: Injection is an infusion method of putting drugs or fluids into the body with a hollow needle and a syringe. The use of injection for treatment accompanied with variety of disadvantages including sepsis at administration, risk of tissue toxicity, costly difficulties in correcting the error. Injections are very expensive compared to other dosage forms and require trained personnel for administration. Moreover, unhygienic use of injections can increase the risk of transmission of potentially serious pathogens, such as hepatitis, HIV/AIDS, and blood-borne diseases. It is estimated by the WHO that about 16 billion injections are undertaken in developing countries annually and are often irrationally used.

Objective: The present study was aimed to assess the prescription pattern of injections in Adama Hospital Medical College.

Method: Hospital based Prospective cross sectional study was done to assess prescription pattern of injections in outpatient pharmacy of AHMC. All Prescription cards from March 24, 2015 to May 24, 2015 were taken and reviewed using pretested data collection format. Finally data was edited, coded, tallied and cleaned. Descriptive statistics was computed.

Key Terms: injection medicine, prescribing pattern, prescribers, prescription, adama.

GJMR-B Classification : NLMC Code: QV 701
Prescription Pattern of Injection at Out Patient Pharmacy Department of Adama Hospital Medical College, Adama, Ethiopia

Belayneh Kefal Gelaw,a Adunya Feyissa,a Gobezie Tamasgen Tegegne,a Amsalu Degu Defersha,b and Getasew Amogne Ayinalem,c

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Result: On review of 500 prescription papers, 600 injections were prescribed. The percentage of prescriptions containing name of the patient, sex, age, address, date and card number were 490 (98%), 395 (79%), 405 (81%), 250 (50%), 300 (60%) and 480 (96%) respectively. The most commonly prescribed therapeutic class was injectable antibiotics 154 (25%), anti-pains 120 (20%) and diuretics 66 (11%). Injections prescribed with over, under and optimum dose were 15 (2.5%), 9 (1.5%), 576 (96%), respectively. About 18 (3%), 6 (1%) and 2 (0.3%) of antibiotics were prescribed by incorrect frequency, short and extended duration of therapy, respectively. Only on 190 (38%), 65 (13%) and 480 (96%) of prescription papers were names, qualification and signature of the prescribers specified respectively.

Conclusion: There was rational use of injections in the hospital though there are some problems that have to be considered.

Key Terms: injection medicine, prescribing pattern, prescribers, prescription, adama.

I. Introduction

a) Background

Injection is an infusion method of administering drugs or fluids into the body with a hollow needle and a syringe. The uses of injectable drugs have many disadvantages including sepsis at administration, risk of tissue toxicity, costly difficulties in correcting the error. Injections are very expensive compared to other dosage forms and require skilled personnel for administration. Apart from this, unhygienic use of injections can enhance the hazard of transmission of potentially serious pathogens, such as hepatitis, HIV/AIDS, and blood-borne diseases [1]. According to WHO report about 16 billion injections are undertaken in developing countries annually [2].

Injectable drugs are often irrationally used. Use of Drugs involves the prescribing, dispensing and the interaction between the prescriber and the patient. These behaviors include the process of making a diagnosis, prescribing, dispensing, and use of drugs by the patient [3].

According to World Health Organization (WHO) definition the rational use of injectable drugs requires that patient receive the right medications at the right dose, right frequency and duration of therapy and in the lowest cost that could be afford by them and their community. Rational use of drugs is also one indispensible element in achieving quality of health and medical care for patients and the community as a whole [5].

According to a study done in the northern, central, eastern, western and southern areas of Tehran in 1999, the average prescription injectable drugs for each encounter was equivalent to 3.6 which 39% of it consisted of injection medicines [6]. Another study conducted in Tehran revealed that the average prescribed items were equivalent to 2.85 and at least one injection item was among 28.96% of them [7].

Rational prescription could be achieved if the prescribers have access to an essential drugs list and the essential drugs are available on a regular basis. In the absence of such facility-related factors, the risk of irrational prescribing could raise several folds. Irrational
use of drugs is presently a major health problem in medical practice whose consequences include ineffective treatment, unnecessary prescription of drugs particularly antimicrobials and injections, development of resistance to antibiotics, adverse effects and economic burden on both patients and society. It has been estimated that 50% or more expenditure on medicines is being wasted through irrational prescribing, dispensing and usage [8].

b) Statement of the Problem

Globally, it is anticipated that more than 30% of injections prescribed, dispensed or sold improperly. Irrational use of injection has been found to be a frequent problem in various parts of the world, especially in developing countries. Irrational prescription of injection medicines is also one of the common problems of medical treatments in developing countries [2]. Nonetheless, overuse of injection medicines is an additional current health problem in developing countries. On top of this, the practice of irrational prescribing is a global major problem of health care delivery. However, this problem is most commonly pronounced in developing countries where health budgets are small and 30 – 40 % of the total health budget is spent on drugs [8].

Prescription of injectable drugs carries all necessary information, such as name, age, and address of the patient together with a brief diagnosis of the condition targeted by the drug treatment. However, most prescription did not contain this information [9].

c) Significance of the study

- Most prescription of injectable drugs do not full fill the requirement information on the prescription paper such as patient related information, drug related information and prescriber related information. The finding of this study would enable to improve such problems and to fill the gap that observed on the prescription pattern of injectable drugs.
- The data regarding pattern of injection use in the AHMC is still lacking or scarce. This study is thus initiated to fill such information gaps by determining the pattern of injection use in the hospital.
- This study will also provide a base line data for policy makers and also initiate other researchers on this topic.

II. Objective

a) General objective

- To assess prescription pattern of injectable drugs in AHMC.

b) Specific objective

- To assess the percentage of injectable drugs per prescription
- To determine the percentage of injections prescribed by generic name per encounter.
- To determine the type of drugs commonly prescribed.

III. Methods and Materials

a) Study area

Adama Hospital Medical College is located in the Middle East Ethiopia, Oromia Regional state, in Adama town 99km from Addis Ababa to the South East. It was established in 1946 by Italian missionaries. The hospital was named as Hailemariam Mamo memorial hospital little bit after establishment, but its name was changed to Adama Referral Hospital in mean time and now it renamed as Adama Hospital Medical College by Oromia regional state health bureau after it start to teach accelerated medicine, Emergency surgery and some Specialty in 2011. AHMC is one of the hospital that serve large size of population from middle east and southern Oromia, Afar, Somali, Southern Nation, Nationalities and peoples(SNNP) and even some parts of Amhara region. Currently the college hospital has catchment population of about 5 million serving as referral hospital for all nearby hospitals and the adjacent regions. It has capacity of 200 beds for inpatient with five disciplines (Surgery, Internal medicine, pediatrics, Gynecology/Obstetrics and ophthalmology) with four pharmacies (OPD, ward, emergency and ART pharmacy) and serves about 850 patients per day at OPD during working hours and on average 52 patients per day after working time in private wing clinic. The hospital has about 465 workers of which 257 were health professionals and the remaining are administrative workers and teachers. The hospital is now working in collaboration with Adama General Hospital and Medical College (AGHMC)

b) Study period

- Study was conducted from March 24, 2015 to May 24, 2015.

c) Study design

- A prospective cross sectional study was done to assess prescription pattern.

d) Source population and Study population

i. Source population

- All available prescription in the outpatient Pharmacy department during the study period.

ii. Study population

- All prescription containing injectable drugs during the study period.

e) Inclusion and exclusion criteria

i. Inclusion criteria

- All prescription containing injectable drugs.
ii. **Exclusion criteria**
- Those prescriptions containing drugs which were not clear to read.
- Prescriptions from other health settings dispensed in the hospital.
- Prescriptions containing only medical supplies such as syringe, needle and catheter.

f) **Sampling size**
- A total of 500 encounters containing injectable drugs were successfully evaluated during the study period.

g) **Measurements**
1. **Dependent variables**
   - Number of injectable drugs per prescription
   - Number of injectable drugs prescribed by generic name
   - Prescription pattern of injectable drugs
2. **Independent variables**

h) **Data collection process**
The data was collected by four trained data collectors (pharmacy Graduating class students) using pretested data collection formats. Data was collected from the prescription paper. The collected data was checked for completeness and consistency before processing.

i) **Data quality control**
The quality and completeness of the data was checked by the principal investigator. Pretest was performed as a part of training and the data collectors were guided by the investigators.

j) **Data processing and data analyzing**
Data were compiled, analyzed and summarized then interpreted by using tables or graphs.

k) **Ethical approval**
Ethical clearance was obtained from Ethical Review Board of College of Medicine and Health Sciences of Ambo University to conduct this study.

l) **Operational Definitions**
- Prescriber: Any medical practitioner who is authorized/licensed to write prescription.
- Injectable drugs: Are drugs which were administered parenteral route.
- Prescription: Is a written form of communication between any authorized body and pharmacists to dispense drugs.
- Poly pharmacy: Is when the prescription contains three or more drugs at once.
- Injection: Is an infusion method of putting drugs or fluids in to the body with a hollow needle and a syringe.

IV. **Results**
a) **Patient related information**
During the study period five hundred (500) encounters were successfully evaluated. The percentage of prescriptions containing name of the patient, sex, age, address, date and card number were 490 (98%), 395 (79%), 405 (81%), 250 (50%), 300 (60%) and 480 (96%) respectively (Figure 1).

![Figure 1: Patient related information on the prescription in AHMC from March 20 - May 20, 2015](image_url)
b) Prescriber related information

Only on 190 (38%), 65 (13%) and 480 (96%) of prescription papers were names, qualification and signature of the prescribers specified respectively (Table 1).

<table>
<thead>
<tr>
<th>Prescriber related information</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the prescriber</td>
<td>190</td>
<td>38%</td>
</tr>
<tr>
<td>Qualification</td>
<td>65</td>
<td>13%</td>
</tr>
<tr>
<td>Signature</td>
<td>480</td>
<td>96%</td>
</tr>
</tbody>
</table>

Table 1: Prescriber related information on the prescription in AHMC from March 20 to May 20, 2015

Table 2: Drug related information on the prescription in AHMC from March 20- May20, 2015.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Class of injectable drugs</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anti biotic</td>
<td>154</td>
<td>25%</td>
</tr>
<tr>
<td>2</td>
<td>Anti pain</td>
<td>120</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>Diuretics</td>
<td>66</td>
<td>11%</td>
</tr>
<tr>
<td>4</td>
<td>Corticosteroid</td>
<td>54</td>
<td>9%</td>
</tr>
<tr>
<td>5</td>
<td>Respiratory drugs</td>
<td>54</td>
<td>9%</td>
</tr>
<tr>
<td>6</td>
<td>Vitamins</td>
<td>42</td>
<td>7%</td>
</tr>
<tr>
<td>7</td>
<td>GIT</td>
<td>36</td>
<td>6%</td>
</tr>
<tr>
<td>8</td>
<td>Cardiovascular</td>
<td>36</td>
<td>6%</td>
</tr>
<tr>
<td>9</td>
<td>CNS</td>
<td>24</td>
<td>4%</td>
</tr>
<tr>
<td>10</td>
<td>Others</td>
<td>14</td>
<td>2.3%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>600</td>
<td>100%</td>
</tr>
</tbody>
</table>

c) Drug related information

Six hundred (600) injectable drugs were prescribed during the study period and the most commonly prescribed therapeutic class was injectable antibiotics 154 (25%), anti pains 120 (20%) and diuretics 66 (11%) respectively (Table 2)

Among the individual prescribed injections ceftriaxone (10.4%) and diclofenac (8.8%) were highly prescribed (Table 3).

Table 3: The top ten prescribed injections at the outpatient pharmacy of AHMC from March 20- May20, 2007.

<table>
<thead>
<tr>
<th>Prescribed injection</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftriaxone</td>
<td>52</td>
<td>10.4%</td>
</tr>
<tr>
<td>Diclofenac</td>
<td>44</td>
<td>8.8%</td>
</tr>
<tr>
<td>Insulin</td>
<td>40</td>
<td>8%</td>
</tr>
<tr>
<td>Metronidazole</td>
<td>41</td>
<td>8.2%</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>38</td>
<td>7.6%</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>34</td>
<td>6.8%</td>
</tr>
<tr>
<td>Cloxacillin</td>
<td>28</td>
<td>5.6%</td>
</tr>
<tr>
<td>Furosemide</td>
<td>26</td>
<td>5.2%</td>
</tr>
<tr>
<td>Penicillin G Benzanthin</td>
<td>20</td>
<td>4%</td>
</tr>
<tr>
<td>Vitamin B complex</td>
<td>18</td>
<td>3.6%</td>
</tr>
<tr>
<td>Total</td>
<td>341</td>
<td>68.2%</td>
</tr>
</tbody>
</table>

Regarding the number of drugs per encounter 25%, 50%, 15% and 10% of the prescription were prescribed with one, two, three and four drugs respectively (Fig.2).

Figure 2: The number of drugs prescribed per encounter.
Table 4: Class of injectable drugs prescribed in AHMC from March 20 to My 20, 2015

<table>
<thead>
<tr>
<th>Class of drug</th>
<th>Dose</th>
<th>Strength</th>
<th>Frequency</th>
<th>Duration of treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Over</td>
<td>Under</td>
<td>Optimum</td>
<td>Correct</td>
</tr>
<tr>
<td>Anti pain</td>
<td>-</td>
<td>-</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Corticosteroid</td>
<td>1</td>
<td>3</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>Vitamins</td>
<td>-</td>
<td>-</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>GIT</td>
<td>-</td>
<td>-</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>10</td>
<td>4</td>
<td>14o</td>
<td>154</td>
</tr>
<tr>
<td>Diuretics</td>
<td>-</td>
<td>-</td>
<td>66</td>
<td>66</td>
</tr>
<tr>
<td>Respir. Drugs</td>
<td>3</td>
<td>1</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>CVS</td>
<td>-</td>
<td>1</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>CNS</td>
<td>-</td>
<td>1</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>Others</td>
<td>-</td>
<td>-</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>15(2.5)</td>
<td>9(1.5)</td>
<td>576(96)</td>
<td>600(100)</td>
</tr>
</tbody>
</table>

V. Discussions

In appropriate prescription of injectable drugs might reduce the quality of medical care, patient safety, and leads to wastage of resources. An encounter provides an insight into a prescriber’s attitude to the diseases being treated and the nature of health care delivery system in the community.

According to this study, 490 (98%) prescription papers contain name of patients. This was comparable when compared with a study conducted in Nigeria for which 99.86% of the prescriptions contained patients name (9). Even if the figure is low 10 (2%), it might have created problem during dispensing of the right drug to the right patient, and wrong drug might have been given to wrong patient.

In this study, about 105 (21%), 95 (19%), 250 (50%), 200 (40%) and 20 (4%) prescriptions did not contain patients sex, age, address, date and card number respectively. When compared with study done in Health facilities in North Ethiopia, prescriptions which did not contain any information on patient address (6.02%), age (2%), and sex (4.03%) were higher in this study. But figures for sex, age and address were lower in this study when compared with another study in hospital pharmacy in Saudi Arabia and France which showed prescriptions that did not contained age, and sex were 22.7 and 49.7%, and no prescription contained patient address (4, 9).

Regarding to prescriber related information, only 38%, 13% and 96% of the prescription papers were names, qualification and signature of the prescribers specified respectively.

About 310 (62%) prescriptions did not contain name and 435 (87%) did not specify the qualification of prescribers, but all most all prescriptions (96%) were signed. This was different from a study done in hospital pharmacy in Saudi Arabia where 83.3%, 9.6% and 81.9% of the prescriptions contained name, qualification and signature for the prescribers, respectively and in France where full name and signature was written only for 7.8% of prescriptions (4, 9).

Of a total of 600 prescribed drug products, the most commonly prescribed drugs were antibiotics (25.7%), ant pains (20%) and diuretics (11%) (Table2). The percentage of drugs prescribed by generic names at AHMC was 96% which approaches the Standard value set by WHO (100%) and higher than the national value reported by Federal Democratic Republic of Ethiopia Ministry of Health (FDREMOH) in 2003(87%). However, lesser value was reported in India (48.5%) [10]. This might be because of prescribers well trained, experienced, and qualified.

In this study, from a total of 600 injectable drugs prescribed, the average number of drugs per encounter was 1.2; this is lower when compared with the standard (1.6-1.8). The value from this study is also much lower...
as compared with the study conducted in Hawassa University Hospital, which was 1.9 [1]. This might be so due to prescribers qualification and experience. Essential drugs offer a cost-effective solution to many health problems in developing countries. The national EDL were selected regarding to disease frequency, affordability, with assured quality and availability in appropriate dosage forms. Regarding the percentage of drugs prescribed in AHMC from the essential drug list was 94.7%, which is less than the ideal value of 100% set by WHO, and other studies results reported by Desalegn in 2013 from Hawassa university hospital (96.6%) [1] and Federal Democratic Republic of Ethiopia Ministry of Health (FMOH) national report in 2003 (99%). This may be due to lack of awareness of Essential Drug List and deficiency of availability of Essential Drug List.

In this study about 582(97%) of drugs were prescribed with its frequency and about 18(3%) were not prescribed with its frequency. This is comparable with the study conducted in Iran for which 96.5% and 17.3% of the drugs were prescribed with correct and incorrect frequency, respectively. The present study raveled that analgesics were the second most commonly prescribed drugs group in this health facility. This may be so due to patients demand and the primary instinct of pain alleviation by prescribers. However, higher values of 64.3 and 41% have been reported from other studies in Nigeria [11,12]. Vitamins were prescribed in 7 % of encounters in this study. This figures is much lower than those found in the India where 62.9 % of prescriptions had vitamins prescribed [11]. This may be so due to patients’ low demand of vitamins.

In this study all drugs (100%) were prescribed in correct strength. This was different from the study conducted in Nigeria where 84% of drugs were prescribed by correct strength. This difference is might be due to prescribers experience toward writing the correct strength of drugs [12].

From a total of prescribed drugs about 15(2.5%) and 9(1.5%) were prescribed as over and under dose. This is was different from study done Iran hospital for which over and under dose was 5.01% and 8.5%, respectively. This may be because of variation in prescribers’ knowledge and experience on drug dose [12].

VI. Conclusion

Most of the injectable drugs were prescribed in their generic name even if a few of them were prescribed in brand form. The percentage of injectable antibiotics prescribed was high which could contribute for drug resistance and all of the prescriptions found with no diagnosis. Some prescriptions missed relevant information especially with regard to patient and prescriber related information. Based on the findings of this study, the prescribing practice for injection exhibited deviation from the standard recommended by WHO and prescribing in generic name were found to be a problem in this study.

VII. Recommendation

Based on the result the following recommendations were forwarded.

- **Prescribers:** All of the drugs should be prescribed in their generic name and it is better if the diagnosis is written on the prescription because it helps for the pharmacists to ensure that the drugs prescribed are appropriate for the patient condition.
- **Ministry of Health:** There is a clear need for medical education programs which could rationalize the prescribing of injection and the prescribers should clearly complete information on the prescriptions.
- **Pharmacy staff:** The pharmacy staff should provide the relevant information to the prescribers about effective utilization of drugs by establishing Drug Information Center (DIC). Identifying and correcting health care is the common duty of all health professionals and inter disciplinary communication should be improved among them.
- **To concerned body:** Further research could be conducted on the topic with wide sample size and analytical statistics.

**Acronyms**

- **AHMC:** Adama Hospital Medical College
- **ARVT:** Anti Retro viral Therapy Pharmacy
- **EDL:** Essential Drug List
- **EP:** Emergency Pharmacy
- **ID:** Injectable Drugs
- **IP:** Inpatient Pharmacy
- **OP:** Outpatient Pharmacy
- **OPD:** Out Patient Department
- **WHO:** World Health Organization

**Authors’ contribution**

BKG; carried out the research drafting, design, statistical analysis and interpretation as well as coordinating all activities in the research, AF; participate in the sequence alignment and drafted a manuscript, GTT; participates in the design of the study and performs statistical analysis, ADD; participate in the design, analysis and interpretation of the research, JLL; participated in literature review, identified the research design issues, participated in coordination, and reviewed the manuscript.

**Competing interest**

None declared
VIII. Acknowledgement

Authors would like to acknowledge the financial support of Ambo University.

References Références Referencias


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Assay for Quantitative Analysis of Losartan Potassium by using UV Spectroscopy

By Zehra Ashraf, Nimra Waheed, Erum Naz, Fatima Ahmed, Taiba Asim, Fatima Muzammil, Syeda Saghira & Maria Ayub

Jinnah University for Women, Pakistan

Abstract- Drug is a substance that brings about a change in the biological functions through its chemical actions. Drug losartan are the first marketed beta blockers of the angiotensin II-type (AT1) receptor. It is the prototypic ARB. Their pharmacologic effect are very similar to the ACE inhibitors, because they also produce the arteriolar and venous dilation and block aldosterone secretion, thus lowers the blood pressure, decreases the salt and water retention. Its chemical name is losartan potassium. It is indicated in mild to severe hypertension and contraindicated in pregnancy because it increases teratogenic risk and may leads to mal formation or death of fetus. It is light yellow solid and stable under recommended storage conditions, freely soluble in water and soluble in alcohol. Losartan inhibit the binding of angiotensin II to type 1 in tissue (kidney and adrenal gland) losartan and its active metabolite is more potent then losartan inhabitation causes vasodilation and decreases sodium and water retention. The aim of study is to determine the %age assay of losartan potassium of different brands.

Keywords: losartan potassium, anti-hypertensive, beta blockers.

GJMR-B Classification : NLMC Code: QV 704

Strictly as per the compliance and regulations of:
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Zehra Ashraf, Nimra Waheed, Erum Naz, Fatima Ahmed, Taiba Asim, Fatima Muzammil, Syeda Saghira & Maria Ayub

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Keywords: losartan potassium, anti-hypertensive, beta blockers.

I. Introduction

Drug is a substance that brings about a change in the biological functions through its chemical actions. Losartan are the first marketed blockers of the angiotensin II-type receptor (non peptide, orally active, and competitive antagonist of AT1 receptor) [1]. Its wavelength is 234nm which lies in the UV range i.e. 200-380nm. It is the prototypic ARB. Their pharmacologic effects are very similar to the ACE inhibitors, because they also produce the arteriolar and venous dilatation and block aldosteron secretion, thus lower the blood pressure, decreases the salt and water retention. They have no effect on bradykinin levels and metabolism [2]. They decrease the nephrotoxicity of diabetes and making attractive therapy in hypertensive diabetics. They also provide benefit in patient with heart failure and chronic kidney disease. The adverse effects are also similar to ACE’s inhibitors, but the risk of cough and angioedema is decreased because it has no effect on bradykinin levels ARB’s are fetotoxic and should not be used by women who are pregnant, it is contraindicated during pregnancy [3].

The formula of losartan is C22H23CIKN6O. Losartan is given orally and it is well absorbed but undergo first pass metabolism. Systemic bioavailability is 33 after metabolism it is highly protein bound and while taking the food with medicine decreases its absorption. In healthy individual it distributes about 34l and its metabolite about 12l. It is metabolized in liver by an enzyme CYP450, 2C9 and 3A4 and converts into an active metabolite 5 carboxylic acid derivatives (E-3174). It is administered orally so 35% excreted in urine and about 60% excretion in feces. When administer by IV route then 45% of drug is excreted in urine and 50% drug in feces [6]. Protein binding of losartan is 99.7% (primarily albumin) and bioavailability is 25-35%. [7].

The appearance of losartan potassium is white to off white crystalline powder its melting point is
between 263-265°C and it is freely soluble in water. Molecular mass of losartan potassium is 462.01 [8].

Its indications are: mild to severe hypertension, diabetic nephropathy reducing risk of stroke in people with heart disease [9]. Its adverse effect include: losartan worsens the condition the patients who had a history of PD, in the form of several falls and episodes of freezing and severe bradykinesia. So, its combination with levodopa or carbidopa should be avoided [10]. Hypergranulosis and hyperkeratosis be developed during its treatment with losartan for arterial hypertension. Long term of losartan potassium develops angioedema. It triggers psoriasis and generalized bullous lesions and patients can develop Steven-Johnson syndrome and renal impairment during the treatment of hypertension with losartan [11].

Losartan potassium is contraindicated in pregnancy because it is fetotoxic and can cause mal formation of the fetus and even leads to death and it is also contraindicated for renal impaired function and bilateral renal artery stenosis[12].

Drug-Drug interactions of losartan potassium with fluconazol rises the plasma level of losartan, indomethacin blunt its antihypertensive effect, concomitant use of potassium supplement may lead to increase in serum potassium, rifamycin may reduce the antihypertensive effect, and increase in lithium may increase its adverse effects [13]. Drug food interactions of losartan potassium with grapefruit which decreases its active metabolites so reducing the efficacy, drinking alcohol can further lower B.P and may increase certain side effects [14].

II. Methodology

a) Material
Distilled water, losartan potassium tablets standard and sample, glass rod, mortar and pestle, measuring cylinder, tissue paper, weigh balance and UV visible spectrophotometer.

b) Method
- Wash the apparatus (beakers, glass rod, conical flask, mortar and pestle, measuring cylinder) and rinsed with freshly prepared distilled water. Dry all the apparatus. Now weight the tablets accurately. Crush the tablets in mortar and pestle. Transfer the 0.2mg of calculated amount of drug into 100ml of beaker and make up the volume with freshly prepare distilled water. Note down the absorbance of standard solution and sample solution separately at 234nm wavelength by using UV visible spectrophotometer.
- Calculate the % assay with the help of formula [15].

III. Observations and Calculations

<table>
<thead>
<tr>
<th>Standard</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of tablet 1 = 0.158gm</td>
<td>Weight of tablet 1 = 0.248gm</td>
</tr>
<tr>
<td>Weight of tablet 2 = 0.156gm</td>
<td>Weight of tablet 2 = 0.247gm</td>
</tr>
<tr>
<td>Average: 0.158+0.156/2 = 0.157</td>
<td>Average: 0.248+0.247/2 = 0.2475gm</td>
</tr>
<tr>
<td>Each tablet of 100mg or 0.1gm</td>
<td>Each tablet of 100mg or 0.1gm</td>
</tr>
<tr>
<td>0.1gm -------------- 0.175gm</td>
<td>0.1gm -------------- 0.2475gm</td>
</tr>
<tr>
<td>0.2gm -------------- 0.314gm</td>
<td>0.2gm -------------- 0.2475×0.2/0.1=0.495gm</td>
</tr>
</tbody>
</table>

Losartan Potassium

<table>
<thead>
<tr>
<th>Absorbance of Standard</th>
<th>Absorbance of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.864</td>
<td>2.796</td>
</tr>
</tbody>
</table>

% ASSAY:
% assay = absorbance of sample/absorbance of standard × 100
% assay = 2.796/2.864 × 100
% assay = 97.62 or 98%

Figure 1: Linearity of Losartan potassium
IV. Result

We have performed the assay of losartan potassium by using UV-visible spectrophotometer, and the calculated % assay of losartan potassium is 98% [16].

V. Discussion

The aim of the study was to carry out the pharmaceutical assay on different brands of losartan potassium by using spectrophotometer. This results shows that absorbance is directly proportion to concentration so, it is obeys to Beers lambert law and assay of all brands are within range of USP and British pharmacopeia linearity given in figure1. We have done these types of assay for different brand which helpful for selecting drugs[17].

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Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:
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Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

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Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author’s name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

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6. AFTER ACCEPTANCE

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TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

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20. **Use good quality grammar**: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straightforward. put together a neat summary.

21. **Arrangement of information**: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. **Never start in last minute**: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

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26. **Go for seminars**: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
27. **Refresh your mind after intervals**: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. **Make colleagues**: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. **Think technically**: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. **Think and then print**: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

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33. **Report concluded results**: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. **After conclusion**: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

**INFORMAL GUIDELINES OF RESEARCH PAPER WRITING**

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- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

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The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.
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· Present your points in sound order

· Use present tense to report well accepted

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An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

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- Significant conclusions or questions that track from the research(es)

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- Center on shortening results - bound background information to a verdict or two, if completely necessary
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- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.
Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.

Shape the theory/purpose specifically - do not take a broad view.

As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

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- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

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- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
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- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

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- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

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- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

**Results:**

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.
Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report.
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts.
- Despite of position, each figure must be numbered one after the other and complete with subtitle.
- In spite of position, each table must be titled, numbered one after the other and complete with heading.
- All figure and table must be adequately complete that it could situate on its own, divide from text.

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information.
- Submit to work done by specific persons (including you) in past tense.
  - Submit to generally acknowledged facts and main beliefs in present tense.
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