Study on Drug Selling Pattern In Bangladesh

Dissertation Submitted to the Department of Pharmacy for the Partial Fulfillment of the Bachelor Degree of Pharmacy (B.PHARM)

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February, 2010

EAST WEST UNIVERSITY

This Research paper is dedicated to

my parents.

Study on the Drug Selling Pattern in Bangladesh

CERTIFICATE

This is to certify that, the thesis "Study on the Drug Selling Pattern in Bangladesh" submitted to the Department of Pharmacy, East West University, 43, Mohakhali C/A, Dhaka; in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy (B. Pharm.) was carried out by Md. Shahidul Islam (ID# 2005-2-70-023) under our guidance and supervision and no part of thesis has been submitted for any other degree. We further certify that, all the sources of information and other facilities availed of in this connection is duly acknowledged.

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Acknowledgements

At first I would like to thank the Almighty Allah for being kind to me to carry on and complete my research work. Then I would like to thank my parents for supporting me a lot by each and every means and I am really grateful to them, as well as to my family too.

The studies and findings presented in this report are the result of a great effort by many persons at East West University and the research places during the period of studies were conducted as well as when the papers and the thesis framework were produced. I would, however, like to express my special gratitude to:

Professor A.B.M Faroque, the main supervisor: for giving me the opportunity to involve myself in such a research work under his supervision. He has given me his full support throughout the work. His pragmatic attitudes – always willing to listen and logically compromise, but at the same time guiding us onto the right track during the research project – have been invaluable. Not only he has been constantly available and he has given me encouragements and good scientific advice whenever needed in a soft and friendly manner.

Dr. Chowdhury Faiz Hossain, (Chairperson, Department of Pharmacy), East West University: he has been very kind and active to solve many of the critical problems and thus helped me very much to complete my work. I wish his best healthy life and all Prospects.

A special thanks to all my friends (especially to **Lixon, Shovon, Shohan, Rahat, Abir**) and the dispensers of the drug stores (especially **New Medical Hal, Likhon Medical**) who helped us cordially.

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Abstract

The concept of essential drugs was introduced in Bangladesh in the later part of 1970s, but government published the "Essential Drug List" or "EDL" in 1982 along with the National Drug Policy (NDP). World Health Organization (WHO) globally offers its help and cooperation to the concept of essential drugs to ensure the rational use of life saving drugs. The NDP stated that no medicine of any kind can be manufactured for sale or be imported, distributed or sold unless it is registered with the licensing authority and no person, being a retailer, is allowed to sell any drug without the personal supervision of a pharmacist registered in any Register of the Pharmacy Council of Bangladesh. Despite substantial progress in drug manufacturing, irrational drug use, inappropriate prescribing, inadequate access to essential drugs, uncontrolled price and inappropriate selling of drugs are major problems affecting the total health care system badly of Bangladesh. This project is based on a thorough survey on drug selling pattern in Bangladesh and also based on reviewing related literatures, newspapers articles and online searches using Google. The obtained samples were categorized and reviewed carefully. After reviewing, the result is that, most of the medications are nonprescribed and sold inappropriately and polypharmacy is very common. Injections, Antibiotics, Suppositories and many other sophisticated drugs are often sold irrationally without standard guidelines. Virtually, all the drugs are available without prescriptions and self-medications are highly common. Access to essential medicines is significantly less than that mentioned in the official documents. Price of essential medicines is not consistent and the drugs regulating authority does not have any control over pricing of drugs. Counterfeit medicines have deluged Bangladesh market with an estimated worth of US$100- US$150. Smaller drug manufacturers are engaged in the production substandard or fake drugs. The drug controlling authority should be more vigilant to ensure appropriate use and availability of medicines. Advanced studies are required to assess drug use patterns in the country to find out the picture of Drug Selling Pattern in Bangladesh. This survey programme was conducted in three areas namely Mymensingh, Jamalpur and Sherpur.

Chapter 01

Introduction

1.1 Introduction:

It is difficult to imagine anything other than modern medical treatments but for thousands of years humans have become ill and for the same amount of time people have tried to cure them. Our ideas about medicines in prehistoric times come from archaeologists who have excavated and explored ancient sites. Their findings reveal a very different world to the one we experience today.

Cave paintings and symbolic artifacts found by archaeologists suggest the earliest humans believed in spirits and supernatural forces. Animals, the stars, the land in which they lived and dead ancestors all inhabited a spirit world that was connected to their everyday life. Special individuals, like Shaman, were thought to be able to contact the spirit world and seek their guidance when they entered mysterious trances. These men and women would call upon the spirits to bring good hunting or heal the sick and were possibly the first doctors.

Spirit healers would perform ceremonies and cast spells to treat the sick. We also believe that they dispensed the first medicines. Drinking the blood of a wild animal killed in the hunt would give hunters special powers or eating special plants known only to the shaman could treat sickness. It is possible that these treatments would sometimes have a beneficial effect and it is thought that drugs like digitalis and morphine were first discovered in this way.

All human societies have medical beliefs that provide explanations for birth, death, and disease. Throughout history, illness has been attributed to witchcraft, demons, adverse astral influence, or the will of the gods. These ideas still retain some power, with faith healing and shrines still used in some places, although the rise of scientific medicine over the past millennium has altered or replaced many of the old beliefs.

The continuing improvement of medicinal science, medicines blessed us to live healthy and longer time. The word medicine is derived from the Latin "ars

medicina", meaning the art of healing. Generally a drug or a medicine is "a chemical substance used in the treatment, cure, prevention, or diagnosis of disease or used to otherwise enhance physical or mental well-being." Drugs may be prescribed for a limited duration, or on a regular basis for chronic disorders. Actually there is no single, precise definition of drug and many people & organizations give different definition of drugs.

In 1966. WHO provided a more comprehensive definition of drug- "Drug is any substance or product that is used or is intended to be used to modify or explore physiological system or pathological state for the beneficial of the recipient." [1]

The FD&C Act defines drugs, in part, by their intended use, as "articles intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease" and "articles (other than food) intended to affect the structure or any function of the body of man or other animals." [2]

The branch of medicine comprises all sorts of treatments that can cure human body. It also includes preventive systems that help on preventing many diseases, for example, there are many vaccinations that are used to prevent diseases. The treatment, under the branch of medicine, is done through diet, drugs, exercise and other non-surgical means. Moreover, curing of some disease or healing a wound, medicine, at times, is also used to maintain good health. For example, a diabetic patient has to take medicine regularly to control the blood sugar level in the body. Similarly, some people have to take medicine daily to maintain the blood pressure of their body. So, medicine is also important for maintaining good health.

1.2.1 History of medicine: [3]

All human societies have medical beliefs that provide explanations for birth, death, and disease. Throughout history, illness has been attributed to witchcraft, demons, adverse astral influence, or the will of the gods. These ideas still retain some power, with faith healing and shrines still used in some places, although

The rise of scientific medicine over the past millennium has altered or replaced many of the old beliefs.

1.2.2 General overview of the history of medicine: [3]

Prehistoric medicine:

Prehistoric medicine is a term used to describe the use of medicine before the invention of writing. As the timing of the invention of writing varies per culture and region, the term "prehistoric medicine" encompasses a wide range of time periods and dates.[4]

Although there is no record to establish when plants were first used for medicinal purposes (herbalism), the use of plants as healing agents is an ancient practice. Over time through emulation of the behavior of fauna a medicinal knowledge base developed and was passed between generations. As tribal culture specialized specific castes, Shamans and apothecaries performed the 'niche occupation' of healing.

Egyptian medicine:

During three thousand years of history, Ancient Egypt developed a large, varied and fruitful medical tradition. Herodotus described the Egyptians as "the healthiest of all men, next to the Libyans", [5] due to the dry climate and the notable public health system that they possessed. According to him, "the practice of medicine is so specialized among them that each physician is a healer of one disease and no more." In the Odyssey, Homer describes Egypt as a land where "the earth, the giver of grain, bears greatest store of drugs" and where "every man is a physician"[6] Although Egyptian medicine, to a good extent, dealt with the supernatural [7] it eventually developed a practical use in the fields of anatomy, public health, and clinical diagnostics.

Babylonian medicine:

The oldest Babylonian texts on medicine date back to the Old Babylonian period in the first half of the 2nd millennium BC. The most extensive Babylonian medical text, however, is the Diagnostic Handbook written by the physician Esagil-kin-apli of Borsippa,[8] during the reign of the Babylonian king Adad-apla-iddina (1069-1046 BC).[9]

Along with contemporary ancient Egyptian medicine, the Babylonians introduced the concepts of diagnosis, prognosis, physical examination, and medical prescriptions. In addition, the Diagnostic Handbook introduced the methods of therapy and etiology and the use of empiricism, logic and rationality in diagnosis, prognosis and therapy. The text contains a list of medical symptoms and often detailed empirical observations along with logical rules used in combining observed symptoms on the body of a patient with its diagnosis and prognosis.[10]

The Diagnostic Handbook was based on a logical set of axioms and assumptions, including the modern view that through the examination and inspection of the symptoms of a patient, it is possible to determine the patient's disease, its aetiology and future development, and the chances of the patient's recovery. The symptoms and diseases of a patient were treated through therapeutic means such as bandages, creams and pills.[8]

Greek and Roman medicine:

Hippocratic Corpus, is a collection of around seventy early medical works from ancient Greece strongly associated with the ancient Greek physician Hippocrates and his teachings.

Medicine in Ancient Greece may have been influenced by Babylonian and Egyptian medicinal traditions. As was the case elsewhere, the ancient Greeks developed a humoral medicine system where treatment sought to restore the balance of humours within the body. A towering figure in ancient Greek medicine

was the physician Hippocrates of Kos, considered the "father of modern medicine."[11] [12] The Hippocratic Corpus is a collection of around seventy early medical works from ancient Greece strongly associated with Hippocrates and his students. Most famously, Hippocrates invented the Hippocratic Oath for physicians, which is still relevant and in use today.

Hippocrates, regarded as the father of modern medicine,[11] [12] and his followers were first to describe many diseases and medical conditions. He is given credit for the first description of clubbing of the fingers, an important diagnostic sign in chronic suppurative lung disease, lung cancer and cyanotic heart disease. For this reason, clubbed fingers are sometimes referred to as "Hippocratic fingers".[13] Hippocrates was also the first physician to describe Hippocratic face in Prognosis.

Hippocrates began to categorize illnesses as acute, chronic, endemic and epidemic, and use terms such as, "exacerbation, relapse, resolution, crisis, paroxysm, peak, and convalescence."[14][15] Hippocrates was the first documented chest surgeon and his findings are still valid.

The Greek Galen was one of the greatest surgeons of the ancient world and performed many audacious operations including brain and eye surgeries that were not tried again for almost two millennia. Later, in medieval Europe, Galen's writings on anatomy became the mainstay of the medieval physician's university curriculum along; but they suffered greatly from stasis and intellectual stagnation. In the 1530s, however, Belgian anatomist and physician Andreas Vesalius took on a project to translate many of Galen's Greek texts into Latin. Vesalius's most famous work, De humani corporis fabrica, was greatly influenced by Galenic writing and form [16] The works of Galen and Avicenna, especially The Canon of Medicine which incorporated the teachings of both, were translated into Latin, and the Canon remained the most authoritative text on anatomy in European medical education until the 16th century.

The Romans invented numerous surgical instruments, including the first instruments unique to women,[17] as well as the surgical uses of forceps, scalpels, cautery, cross-bladed scissors, the surgical needle, the sound, and speculas.[18][19] Romans were also pioneers in cataract surgery.[20]

Indian medicine:

Ayurveda (the 'science of life) is a system of traditional medicine native to the Indian Subcontinent and practiced in other parts of the world as a form of alternative medicine.[21] In Sanskrit the word Ayurveda[22] consists of the words āyus, meaning 'life', and veda, meaning 'related to knowledge' or 'science'.[21] Evolving throughout its history, Ayurveda remains an influential system of medicine in South Asia. The earliest literature of Ayurveda appeared during the Vedic period in India. The Sushruta Samhita and the Charaka Samhita were influential works on traditional medicine during this era.[21] Ayurvedic practitioners also identified a number of medicinal preparations and surgical procedures for curing various ailments and diseases.[22]

Ayurveda is considered to be a form of complementary and alternative medicine (CAM) within the western world, where several of its methods, such as the use of herbs, massage, and Yoga as exercise or alternative medicine, are applied on their own as a form of CAM treatment.[23]

Persian medicine: [3]

The practice and study of medicine in Persia has a long and prolific history. Persia's position at the crossroads of the East and the West frequently placed it in the midst of developments in both ancient Greek and Indian medicine. Many contributions were added to this body of knowledge in both pre- and post-Islamic Iran as well.

The first generation of Persian physicians was trained at the Academy of Jundishapur, where the teaching hospital has sometimes been claimed to have

been invented. Muhammad ibn Zakariya al-Razi, for example, became the first physician to systematically use alcohol in his practice as a physician.

The Comprehensive Book of Medicine (Large Comprehensive, Hawi, "al-Hawi" or "The Continence") was written by the Iranian chemist Muhammad ibn Zakariya al-Razi. the "Large Comprehensive" was the most sought after of all his compositions. In it, Muhammad ibn Zakariya al-Razi recorded clinical cases of his own experience and provided very useful recordings of various diseases.

The "Kitab fi al-jadari wa-al-hasbah" by Muhammad ibn Zakariya al-Razi, with its introduction on measles and smallpox was also very influential in Europe.

Chinese medicine: [3]

Traditional Chinese Medicine, also known as TCM includes a range of traditional medical practices originating in China. Although well accepted in the mainstream of medical care throughout East Asia, it is considered an alternative medical system in much of the Western world.

TCM practices include such treatments as herbal medicine, acupuncture, dietary therapy, and both Tui na and Shiatsu massage. Qigong and Taijiquan are also closely associated with TCM.

TCM claims to be rooted in meticulous observation of nature, the cosmos, and the human body, and to be thousands of years old. Major theories include those of Yin-yang, the Five Phases, the human body Channel system, Zang Fu organ theory, six confirmations, four layers, etc. Modern TCM was systematized in the 1950s under the People's Republic of China and Mao Zedong.

Hebrew medicine: [3]

Most of our knowledge of ancient Hebrew medicine during the 1st millennium BCE comes from the Torah, i.e. the Five Books of Moses, which contain various health related laws and rituals, such as isolating infected people, washing after

handling a dead body and burying excrement away from camp . While the observance of these statutes would have and do leads to several health benefits, Jewish belief command that these rituals and prohibitions be kept purely to fulfill the will of God with no ulterior motive. Max Neuberger, writing in his "History of Medicine" says

Islamic medicine: [3]

In the history of medicine, Islamic medicine or Arabic medicine refers to medicine developed in the medieval Islamic civilization and written in Arabic, the lingua franca of the Islamic civilization. Despite these names, a significant number of scientists during this period were not Arab. Some consider the label "Arab-Islamic" as historically inaccurate, arguing that this label does not appreciate the rich diversity of Eastern scholars who have contributed to Islamic science in this era. Latin translations of Arabic medical works had a significant influence on the development of modern medicine, as did Arabic texts chronicling the medical works of earlier cultures.

Islamic medicine was a genre of medical writing that was influenced by several different medical systems, including the traditional Arabian medicine of Muhammad's time, ancient Hellenistic medicine such as Unani, ancient Indian medicine such as Ayurveda, and the ancient Iranian Medicine of the Academy of Gundishapur. The works of ancient Greek and Roman physicians Hippocrates, Dioscorides, Soranus, Celsus and Galen also had a lasting impact on Islamic medicine [24]

Medieval and early modern European medicine:

Medieval medicine in Western Europe was composed of a mixture of existing ideas from antiquity, spiritual influences and what Claude Lévi-Strauss identifies as the "shamanistic complex" and "social consensus "[25] In this era, there was no tradition of scientific medicine, and observations went hand-in-hand with spiritual influences.

In the early Middle Ages, following the fall of the Roman Empire, standard medical knowledge was based chiefly upon surviving Greek and Roman texts, preserved in monasteries and elsewhere. Ideas about the origin and cure of disease were not, however, purely secular, but were also based on a world view in which factors such as destiny, sin, and astral influences played as great a part as any physical cause. The efficacy of cures was similarly bound in the beliefs of patient and doctor rather than empirical evidence, so that remedia physicalia (physical remedies) were often subordinate to spiritual intervention. [3]

Modern medicine: [3]

Medicine was revolutionized in the 19th century and beyond by advances in chemistry and laboratory techniques and equipment, old ideas of infectious disease epidemiology were replaced with bacteriology and virology.

1.3.1 Importance of drugs/ medicines: [26]

Medicine is considered as one of the most important necessity to all of us. It is a branch of the health sciences and is the sector of public life concerned with maintaining or restoring human health through the study, diagnosis, treatment and possible prevention of disease, injury and other damage to a body or mind.

It is both an area of knowledge, a science of body system and their diseases and treatment. This branch of science encompasses treatment by drugs, diet, exercise and other nonsurgical means. It is also used to maintain our health. An agent such as drug is used to treat disease or injury.

There are different types of medicine, we have herbal medicine, which came from different kinds of plants, medicines treat in hospital and etc. Herbal medicine, also called botanical medicine or phytomedicine, refers to use of any plant's seeds, berries, roots, leaves, bark, or flowers for medicinal purposes. Long practiced outside of conventional medicine, herbalism is becoming more

mainstreams as up-to-date analysis and research show their value in the treatment and prevention of disease. Some of us believe in herbal medicines, for it is pure came from plants and no other ingredients. Herbal medicine also uses for cough, fever, toothache and some other diseases that might catch from our environment. Herbalists treat many conditions such as asthma, eczema, premenstrual syndrome, rheumatoid arthritis, migraine, menopausal symptoms, chronic fatigue, and an irritable bowel syndrome among others. Plants had been used for medicinal purposes long before recorded history. For most herbs, the specific ingredient that causes a therapeutic effect is not known. Whole herbs contain many ingredients and it is likely that they work together to produce the desired medicinal effect.

Some medicines may cause problems if you take them with other medicines. This is why it is important to tell your doctor and pharmacist about all the medicines you are taking. And some medicines can cause problems, even if you take them correctly. Call your doctor or pharmacist if you think your medicine is making you feel worse. We take medicine to make us feel better when we are sick.

In general, the instruction should be follow when taking medicines:

- Have a clear understanding of how the medicines should be used (e.g. to be taken orally, placed under the tongue, chewed before swallowing, inhaled, inserted rectally or for external application, etc.).

- Read the drug labels carefully, and pay attention to details including dosage, dosing schedule, efficacy, contraindications and side effects. For example, certain medicines may induce drowsiness and hence possible danger to a person if he/she has to operate machinery and drive a car after medication.

- Unless instructed by the doctor, do not take multiple drugs, including traditional drugs (e.g. Unani, Ayurvedic & Herbal) and oral contraceptives, at the same time to avoid medicinal interference.
- In case of adverse reactions, such as rash, headache and abdominal pain, stop the medication and consult to the doctor immediately.

- Pregnant and breastfeeding women should not use or take medicines unless instructed by a doctor, as some medicines may pass into the placenta or breast milk and pose adverse impacts to the foetus or the infant.

- Check expiry dates of medicines and discard expired or spoiled medicines.

- Medicines in general should be kept in a cool and dry place, but some of them, such as insulin products and oral antibiotics, should be kept in the refrigerator as specified in the label. Do not store medicines in a freezer compartment, as this may affect the efficacy. Medicines should be stored properly to avoid the danger of mistaken consumption by children.

1.3.2 Factors that influence the use of medicines: [27]

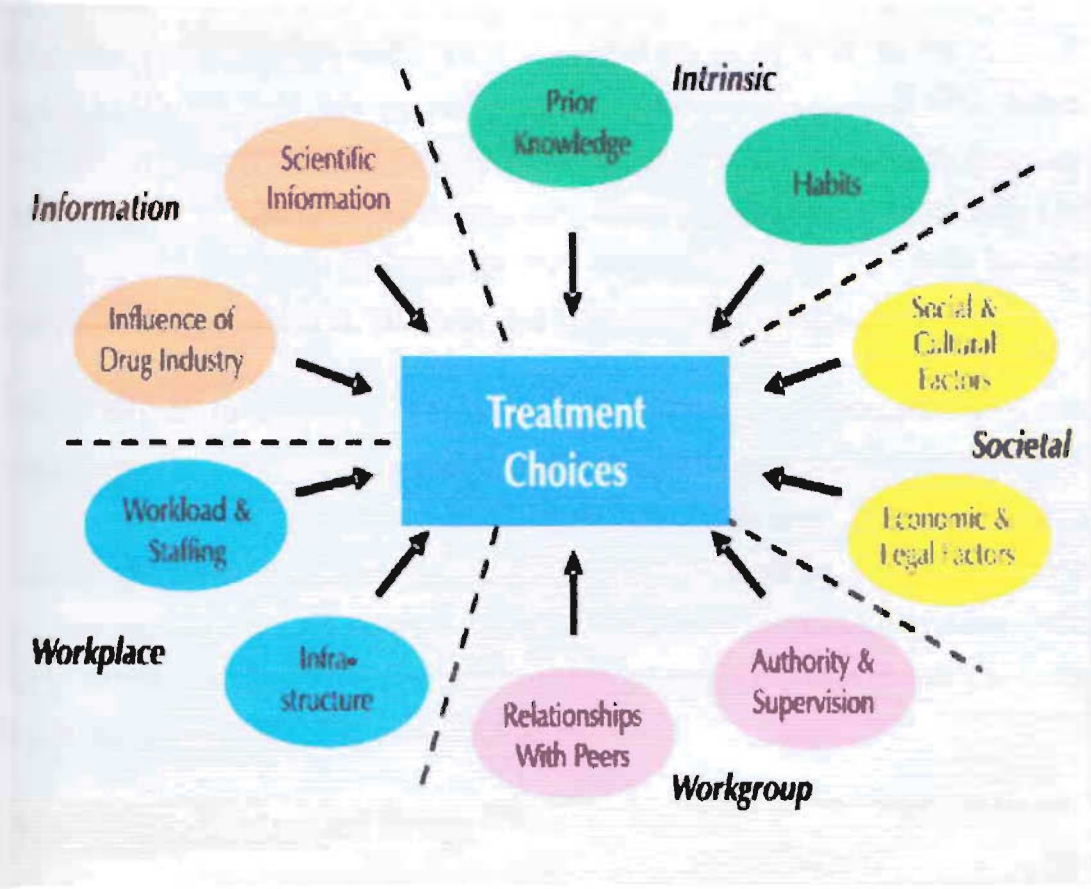

Figure 01: Factors that influence the use of medicines

The Legal considerations divided Drugs mainly into two classes: [28]

a) Over-the-counter (OTC) drugs: medications are sold without restriction as they are considered safe, effective, patient well tolerated enough that most people will not hurt themselves accidentally by taking it as instructed and which may be available without special restrictions and can be bought without any prescription.

b) Prescription only medicine (POM): these are the drugs with narrow safety margin, possess greater chance of toxicity and these must be prescribed by a licensed medical practitioner to use by the patients or consumers.

The International Narcotics Control Board of the United Nations imposes a world law of prohibition of certain medications. They publish a lengthy list of chemicals and plants whose trade and consumption (where applicable) is forbidden. OTC medications are sold without restriction as they are considered safe, effective, patient well tolerated enough that most people will not hurt themselves accidentally by taking it as instructed. Many countries, such as the United Kingdom have a third category of CNS medicines which can only be sold in registered pharmacies, by or under the supervision of a pharmacist.

Drugs as well as medicines help lots of people live more productive lives, freeing them from the symptoms of medical conditions like depression or attention deficit hyperactivity disorder (ADHD) but that is only when they are prescribed for a particular individual to treat a specific condition. Prescription drugs are only safe for the individuals who actually have prescriptions for them and when rational uses of the medicines are ensured both by the physician and the recipient. Other wise drugs may be act as poisons also.

1.4.1 Rational Use of Drug: [29]

The rational use of medicine is determined by the knowledge, attitude and behavior of doctors, pharmacists and patients; and the effectiveness of a drug strongly depends upon dose which can rationally be determined by the physicians as well as by the qualified health professionals only. The rational use of medicines requires that patients receive medications appropriate to their needs in doses that meet their individual requirements, for an adequate period of time, and at the lowest cost to them and their community.

The concept of rational drug use during the past few years has been the theme of various national & international gatherings. Various studies conducted in developed as well as in developing countries during past few years regarding the safe & effective use of drugs show that irrational drug use is a global phenomenon & only few prescriptions justify rational use of drugs.

In simplest words rational use means "prescribing right drug, in adequate dose for the sufficient duration & appropriate to the clinical needs of the patient at lowest cost. The concept of rational drug use is age old, as evident by the statement made by the Alexandrian physician Herophilus 300 B.C that is "Medicines are nothing in themselves but are the very hands of god if employed with reason & prudence."

Rational drug use attained more significance nowadays in terms of medical, socio economical and legal aspect. Factors that have led sudden realization for rational drug use are-

1. Drug explosion: - Increase in the number of drugs available has incredibly complicated the choice of appropriate drug for particular indication.

2. Efforts to prevent the development of resistance: – Irrational use of drugs may lead to the premature demise of highly efficacious & life saving new antimicrobial drug due to development of resistance.

3. Growing awareness: - Today, the information about drug development, its uses & adverse effects travel from one end of the planet to the other end with amazing speed through various media.

4. Increased cost of the treatment: - Increase in cost of the drug increases economic burden on the public as well as on the government. This can be reduced by rational drug use.

5. Consumer protection Act (CPA):- Extension of CPA in medical profession may restrict the irrational use of drugs.

But the matter of fact is that, the irrational use of medicines is a major problem all over the world. According to the estimation of WHO, half of all medicines are prescribed, dispensed or sold inappropriately, and that only about half of all patients take them correctly. The scenario is given in figure 1, which is a result of a survey conducted by WHO. This survey was carried out in developing and

transitional countries in Asia, Africa and Latin America. According to the survey, only about 40% of patients treated at primary health care level (mostly in the public sector) were treated in compliance with standard treatment guidelines.

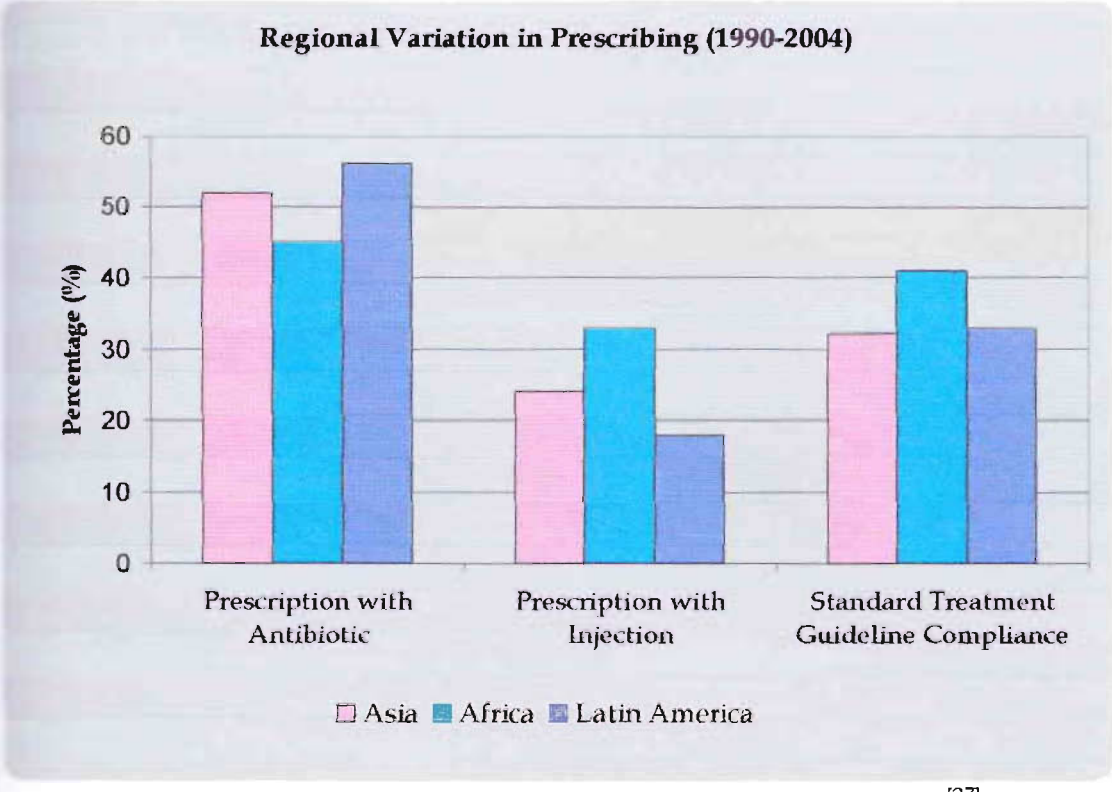

Figure 02: Regional variation in prescribing 1990-2004 [27]

Examples of irrational use of medicines include: use of too many medicines per patient ("poly-pharmacy"); inappropriate use of antimicrobials, often in inadequate dosage, for non-bacterial infections; over-use of injections when oral formulations would be more appropriate; failure to prescribe in accordance with clinical guidelines; inappropriate self-medication, often of prescription-only medicines; non-adherence to dosing regimes. [30]

Incase of poly-pharmacy, medical scientist from throughout the developing countries studied different drug use indicator during the period of 1990-1993. They found that the average number of drugs contained in the prescription of the public sector facilities ranged from 1.3 -2 drugs which is quiet all right as an

indicator. But many of the developing countries did not follow the trend. Position of Bangladesh in the picture was quiet comfortable, around an average of 1.4. [31]

The following figure (**figure 03**) repents the comparative scenario of the tendency to practice of poly-pharmacy of different countries.

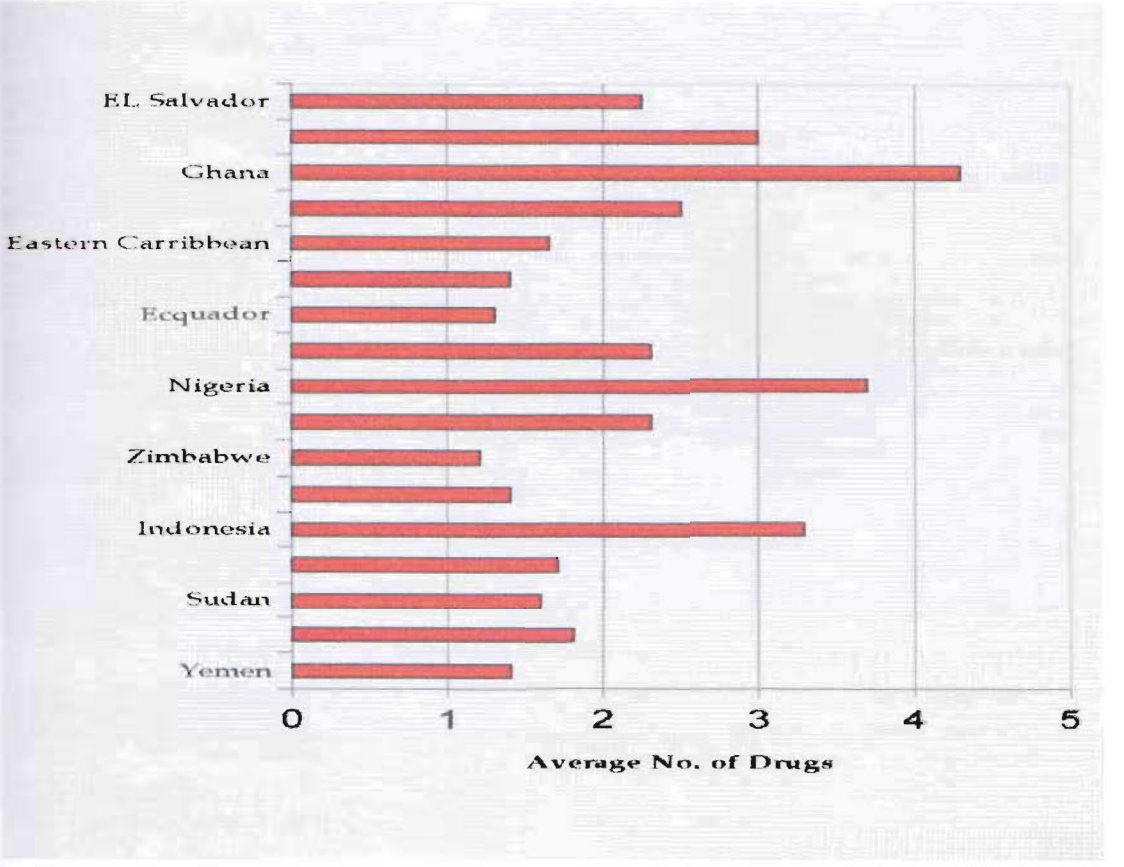

Figure 03: Average Number of Drug per Patient [27]

Injections being the dosage form considered by many patients and prescribers as quiet a "serious" form to treat infections and the developing countries being vulnerable to more infections, the trend of using injections is quiet high in these countries. Risk of contaminations by hepatitis and AIDS, and increased awareness against at caused a notable reduction in the trend. But concern about higher cost for injections seems to be achieved yet, thus many countries are still showing higher use of injections as shown in the study below (**figure 04**):

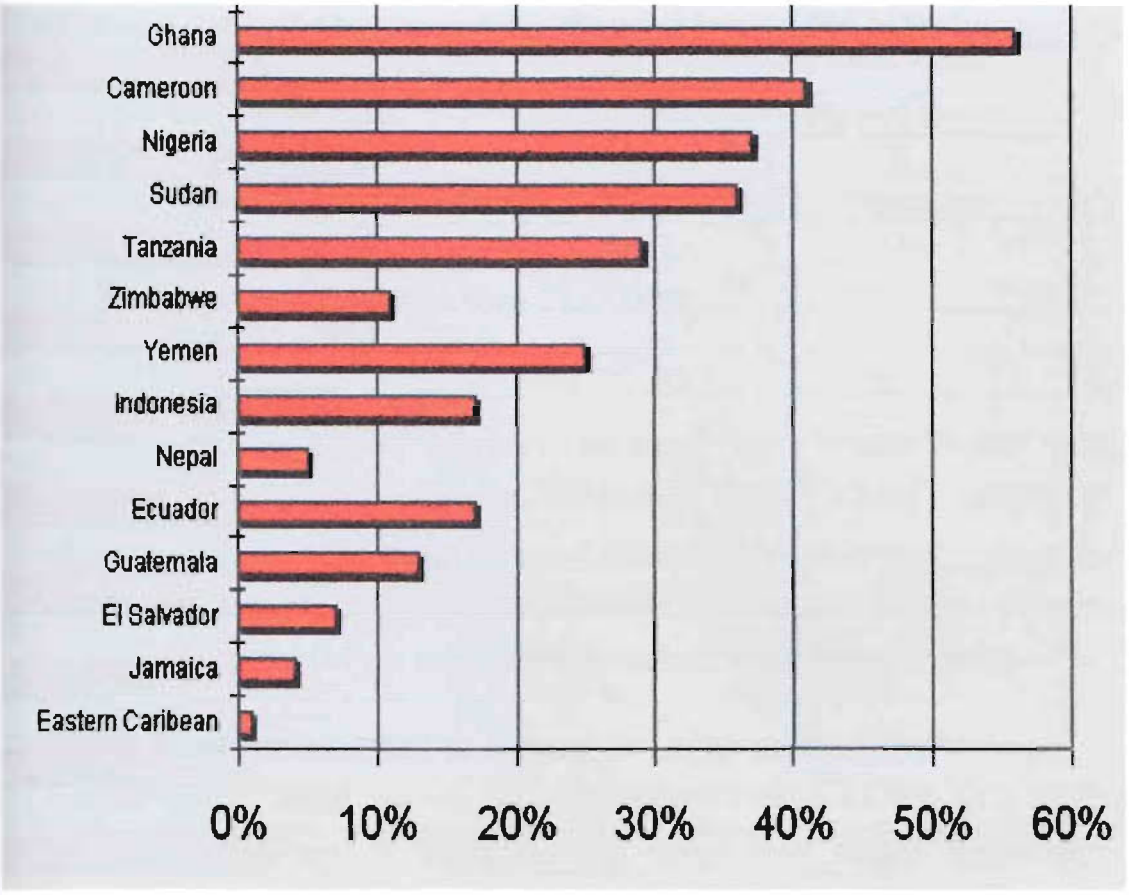

Figure 04: % of primary care patients receiving injections. [27]

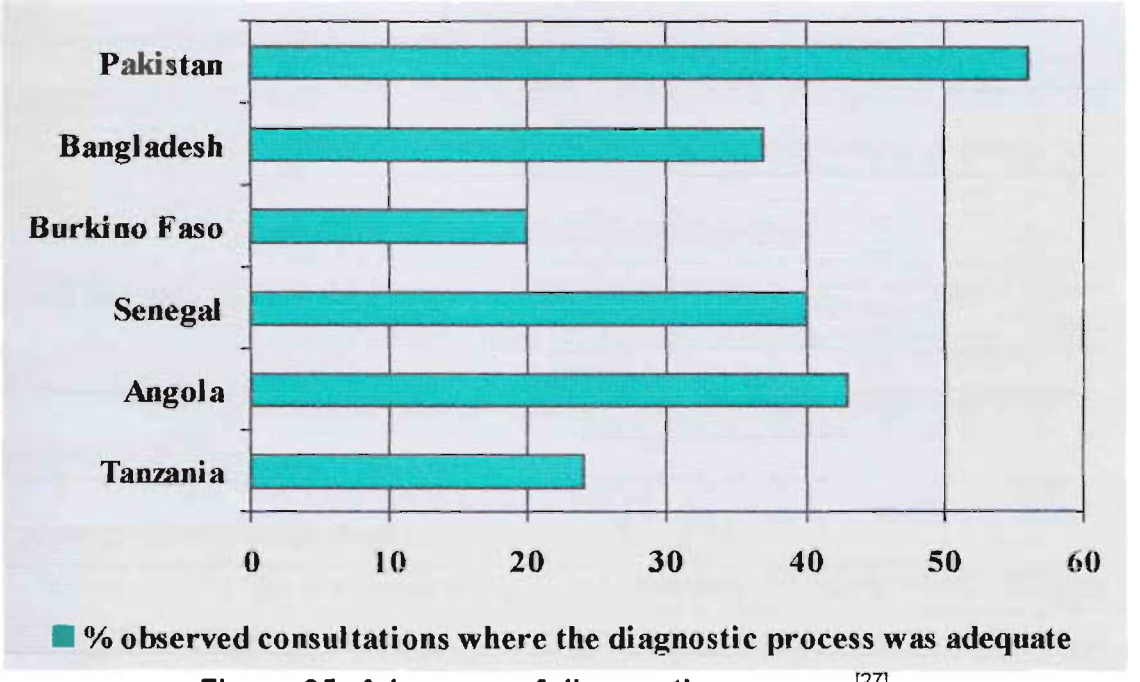

Figure 05: Adequacy of diagnostic process. [27]

Diagnostic is one of the best way to identify the disease. The Discharge Diagnoses provide a possibility to select Patients Individually and then to establish reference values for both "pathological" and control groups.

1.4.2 Reason for Irrational Use of Drugs: [29]

1. **Lack of information**: -
   Unlike many developed countries we don t have regular facility which provides us up to date unbiased information on the currently used drugs. Majority of our practitioners rely on medical representatives. There are differences between pharmaceutical concern & the drug regulatory authorities in the interpretation of the data related to indications & safety of drugs.

2. **Faulty & inadequate training & education of medical graduates**: -
   Lack of proper clinical training regarding writing a prescription during training period, dependency on diagnostic aid, rather then clinical diagnosis, is increasing day by day in doctors.

3. **Poor communication between health professional & patient**: -
   Medical practitioners and other health professional giving less time to the patient and not explaining some basic information about the use of drugs.

4. **Lack of diagnostic facilities/Uncertainty of diagnosis**: -
   Correct diagnosis is an important step toward rational drug therapy. Doctors posted in remote areas have to face a lot of difficulty in reaching to a precise diagnosis due to non availability of diagnostic facilities. This promotes poly-pharmacy.

5. **Demand from the patient**: -
   To satisfy the patient expectations and demand of quick relief, clinician prescribes drug for every single complaint. Also, there is a belief that "every ill has a pill" All these increase the tendency of polypharmacy.

6. **Defective drug supply system & ineffective drug regulation**: -
   Absence of well organized drug regulatory authority & presence of large number of drugs in the market leads to irrational use of drugs.
7. **Promotional activities of pharmaceutical industries**: -
   The money-spinning promotional programs of the various pharmaceutical industries influence the drug prescribing.

1.4.3 Factors Underlying Irrational Use of Drugs: [29]

Patients:

- drug misinformation
- misleading beliefs
- inability to communicate problems

Prescribers:

- lack of education and training
- lack of drug information
- heavy patient load
- pressure to prescribe
- generalization of limited beliefs
- misleading beliefs about efficacy

Industry:

- promotion
- misleading claims

Drug Supply:

- inefficient management
- non-availability of required drugs

Drug Regulation:

- availability of unsafe drugs
- Informal prescribers etc.

1.4.4 Hazards of Irrationals Use of Drugs: [29]

Irrational use of drugs may lead to:-

1. Ineffective and unsafe treatment
2. Exacerbation or prolongation of illness.
3. Distress and harm to patient
4. Increase the cost of treatment

1.4.5 Measures to Promote Rational Drug Use: [29]

Medicines (drugs) cannot be used rationally unless every one involved in the pharmaceutical supply chain has access to objective information about the drug they buy and use. Knowledge and ideas about drugs are constantly changing and a health professional is expected to know about the new development in drug therapy.

The pre-requisites for rational drug use are: -

1. Critical assessment and evaluation of benefits and risk of drug used.
2. Compare the advantages, disadvantages, safety and cost of the drug with existing drug for some indication.

The different kinds of strategies to improve the use of medicines are shown in **Fig. 06** and can influence both providers and consumers. Educational strategies such as training, workshops, posters and printed materials aim to inform and persuade providers and patients. Nevertheless, it is important to understand the other strategies available as educational strategies are unlikely to have sustained long-term impact without implementation of other appropriate strategies.

Managerial strategies aim to guide decision-making. For example, supplying only essential medicines in public sector facilities makes it much more likely that only essential medicines will be used in the public sector. Economic strategies aim to provide financial incentives to institutions, providers and patients.

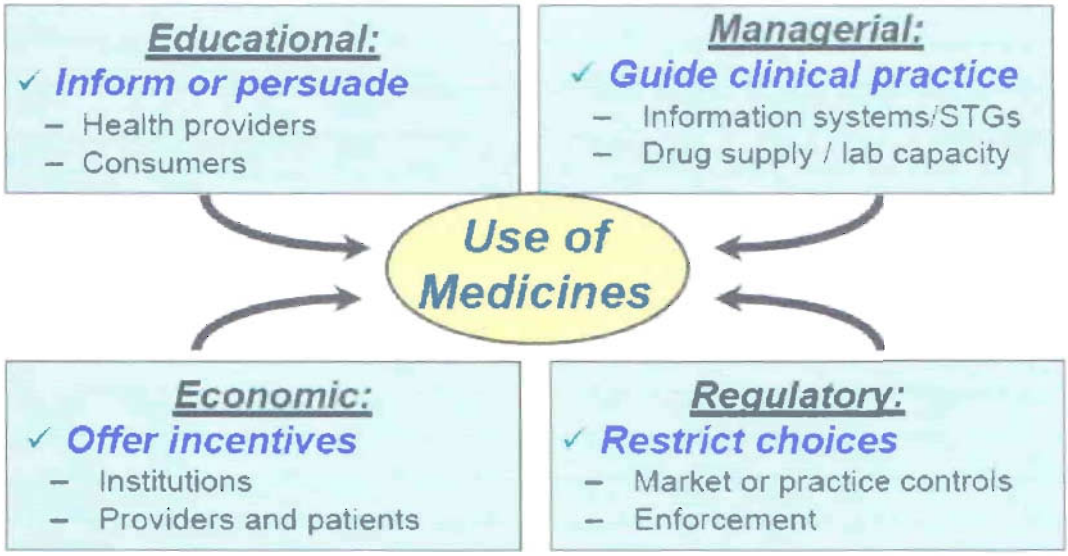

Figure 06: Strategies to improve the use of medicines [32]

Unfortunately, many health systems incorporate perverse economic incentives which actually promote irrational use of medicines. For example, prescribers who must earn their income from the selling of medicines are likely to prescribe more medicines and more costly medicines than those who do not earn their income from selling medicines. Hospitals that make money from selling medicines are more likely to sell more costly medicines. Some of these medicines may not actually be needed by the patients. Regulatory strategies aim to restrict choices by law. The drug regulatory authority is responsible for many of these restrictions which would include registering drugs for marketing, licensing prescribers and drug outlets, and regulating drug promotional activities.

1.4.6 Obstacles Exist in the Rational Drug Use: [29]

Various obstacles in rational drug use are:-

1. Lack of objective information & of continuing education and training in pharmacology.
2. Lack of well organized drug regulatory authority and supply of drugs.
3. Presence of large number of drugs in the market & the lucrative methods of promotion of drugs employed by pharmaceutical industries.
4. The prevalent belief that "every ill has a pill"

1.4.7 Steps to Improve Rational Drug Prescribing: [29]

Step: - I

Identify the patient's problem based on symptoms & recognize the need for action.

Step:-II

Diagnosis of the disease. Identify underlying cause and motivating factors. This may be specific as in infectious disease or non specific.

Step:-III

List possible intervention or treatment. This may be non-drug treatment or drug treatment. Drug must be chosen from different alternatives based on efficacy, convenience and safety of drugs including, drug interactions & high risk group of patients.

Step:-IV

Start the treatment by writing an accurate & complete prescription e.g. name of drugs with dosage forms, dosage schedule & total duration of the treatment.

Step:-V

Given proper information, instruction & warning regarding the treatment given e.g. side effects (ADR), dosage schedule & dangers/risk of stopping the therapy suddenly.

Step:-VI

Monitor the treatment to check, if the particular treatment has solved the patient's problem. It may be:

(a) Passive monitoring done by the patient himself. Explain him what to do if the treatment is not effective or if too many side effects occur.

(b) Active monitoring done by physician and he makes an appointment to check the response of the treatment.

Indiscriminate use of drugs is not only waste scarce resources that could otherwise be spent on other essential services, but also leads to drug induced disease. The drug control authority, the teaching institutes, drug industries, NGOs & the patient himself may be helpful for rational drug use. Drug authority must circulate the list of essential drugs which could be updated from time to time. It must monitor the safe and proper use of these drugs and enforce a uniform regulation for promotional literature. Teaching institute must conduct regular research work & proper training of undergraduates and post graduates. Motivation of NGO to organize various programmes for public awareness lastly, the patient himself should observe strict compliance to the physician's prescription & never indulge in self-medication. To conclude, the demands of rational drug use are:-

1. Availability of essential & life-saving drugs and unbiased drug information with generic name.
2. Adequate quality control & drug control.

3. Withdrawal of hazardous & irrational drugs.
4. Drug legislation reform.

1.5.1 Changing the existing drug use pattern: [31]

The above discussion underscores the need to change the existing drug use pattern to a more rational one, which can only be effectively done through a concerted and well-planed effort. Medical scientists suggested that this would need a cyclical approach, which is similar to clinical consultation.

They also suggested that the team for such changing of drug use patterns should consist of medical scientists and the programme for intervention should contain both qualitative and quantitative measures. The present work adopts the above principles and plans to work to study the existing drug use pattern, designing some interventions and to measure the impact, if any, on the drug use pattern.

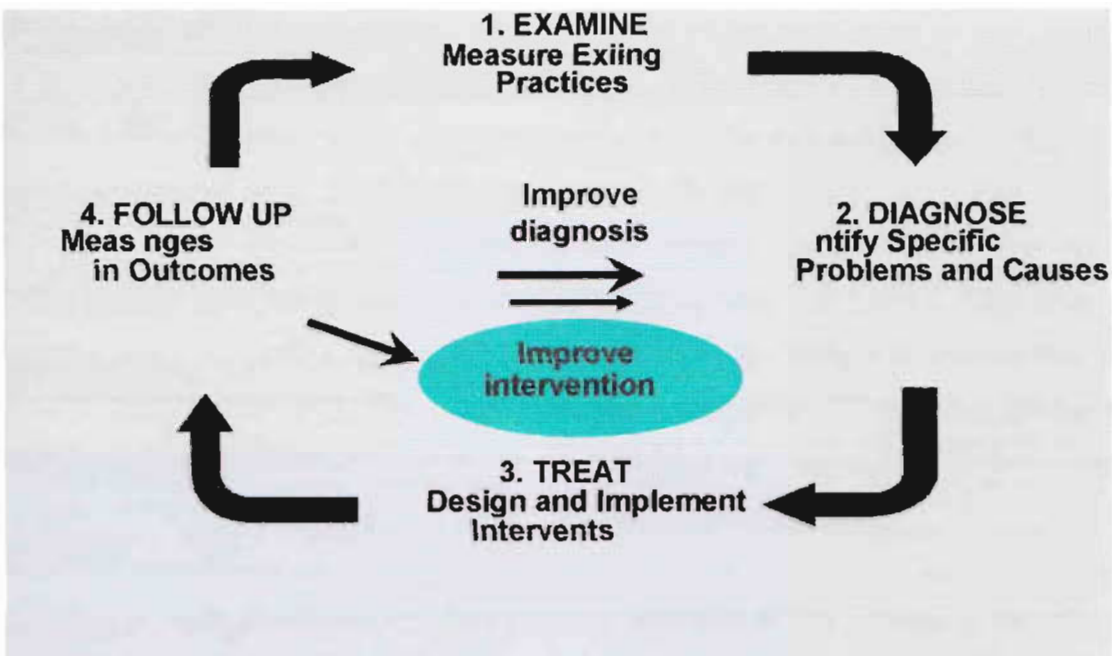

Figure 07: Flow chart of improving drug use pattern. [34]

1.5.2 Recommendations made to improve use of Medicines in Developing Countries: [33]

To improve use of medicines in developing countries, a variety of educational and administrative approaches have been tried targeting both professionals and the public. Laing, Hogerzeil & Ross-Degnan (2001) reviewed the experiences of the last decade, to identify which interventions were effective in developing countries and suggest policy options for health managers and planners (*11*). They observed that many promising interventions are relatively inexpensive and simple methods are available to monitor drug use and to identify inefficiencies.

In his keynote address at the Second International Conference on Improving Use of Medicines, at Chiang Mai, Thailand in 2004, the WHO Regional Director for South-East Asia, Dr Sample Plianbangchang, stated that "A drug should not be seen simply as a chemical but a chemical plus the information for its correct use. Often, prescribers do not always have unbiased information such as formularies or standard treatment guidelines. On this issue, one important factor may be that health care systems do not always provide for effective education, either for health personnel or to the public. The point in this regard is on supplying drugs, with little or no emphasis on ensuring their rational use. Providing the right information should be an essential part of the drug supply system to fully ensure rational use, but unfortunately this is rarely done. The drug information that is readily available is from the pharmaceutical companies. These are primarily aimed at promoting the use of specific products, but not necessarily for the health benefit of the people."

The intervention strategies that have proven effective in some settings are given below:

a) Standard treatment guidelines
b) Essential drugs list
c) Pharmacy and therapeutic committees

d) Problem-based basic professional training
e) Targeted in-service training of health workers

Some of the interventions which need further testing but should be supported:

a) Interaction of health providers and consumers on proper use of medicines
b) Training of pharmacists and drug sellers
c) Educating the public about medicines by consumer organizations
d) Issues that require long term equity approach:
e) Improving prescribing in the private sector
f) Monitoring key pharmaceutical indicators in health and regulatory sector's reform

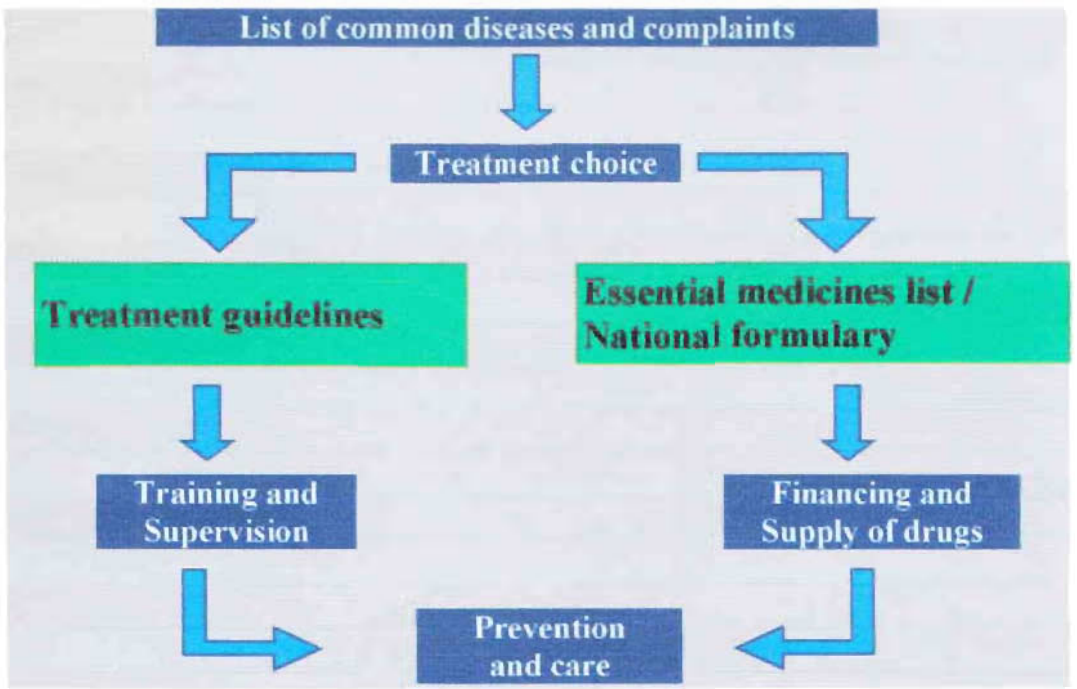

Figure 08: Clinical guidelines and a list of essential medicines lead to better prevention and care. [34]

Chapter 02
Study Background

2.1 Present Situation of Bangladesh:

2.1.1 General Health Features of Bangladesh:

In Bangladesh the tendency of the mass people to buy medicines without proper prescription is increasing day by day. Bangladesh is considered a Least Developing Country (LDC) with a population of 15 Cores (approximately). more than 75% of the total (142 million) population living in rural areas. About 36% of the population continue to live below the national poverty line (<US$1/day). Basic needs of living particularly health and education remain largely unmet and only less than 40% of the population has access to basic healthcare [32] [33] Distribution of health workers (per 1000 population) in Bangladesh is given bellow:

- Physicians 0.26 (per 1000 population)
- Nurses 0.14 (per 1000 population)
- Pharmacist 0.06(per 1000 population)

Per capita total expenditure on health only US$ 2.84 in comparison to US$ 30-40 per capita, the minimum required for essential health interventions in low-income countries [35]. Though majority of the population live in rural areas, the government healthcare system remains a very minor source of health care there [36]. Around 26% of professional posts in rural areas remain vacant and there is high rate of absenteeism (about 40%). Thus treatments in the rural areas are mainly (about 45%) provided by unqualified health personnel including medical assistants, mid-wives, village doctors, community health workers and mostly by the chemists of the pharmacies in comparison to that by qualified medical graduates (only 10-20%). [37] Over-prescribing and inappropriate prescribing are very common in the country due to unethical practices of both health professionals and drug manufacturers [38].

In many developing and developed countries, community and retail pharmacies are the main source of drugs. The importance of this role and its implications has been addressed and stressed worldwide. The Government of Republic Bangladesh also tried to introduce and establish Retail pharmacy in 1976 but failed due to protest from the association of the drug stores owners.

Most of the people in Bangladesh lives in rural area and also are too poor to afford a visit of doctor and have poor accessibility to health care. Thus they often rely on medical advice from unregistered or non professional persons. As a result, powerful prescribe only medicines are routinely, and illegally, sold over the counter.

2.1.2 Drugs Abuse: [31]

The patterns and cost of drug abuse were investigated among 196 drug abusers who were admitted to a drug dependence treatment centre in Dhaka, Bangladesh. Of the respondents, 93.9% were male, 64.8% were unmarried, 56.1% were either students or unemployed, 95.4% were smokers, 85.7% were influenced by friends, 64.3% were addicted to codeine-containing cough syrup, 64.3% were addicted to more than one drug, 65.8% took drugs in groups, and 63.8% had a history of unprotected sex. The mean number of drugs abused was 1.9 and the mean duration of addiction was 42.1 months. The average cost of drugs per person was from $1.9 to $3.1 per day or from $707 to $1135 per year. The economic impact of drug abuse included cost of drug itself, health care expenditure, lost productivity, and other impacts on society such as crimes and accidents.

2.1.3 Regulation of Therapeutic Drugs in Bangladesh:

To ensure the rational use of life saving drugs, the concept of essential drugs in Bangladesh was introduced in 1982 known as "Essential Drug List" or "EDL" with the assistance of World Health Organization (WHO), after the implementation of

the National Drug Policy and Drug Ordinance (Drug Control Ordinance, 1982). Drug policy was a course of action adopted and pursued by the government for rational use of substances used in medicine either externally or internally for curing, alleviating, or preventing a disease or deficiency.

Bangladesh was the first country in the world to introduce the principles of Alma-Ata and the essential drug concept into practice through the adoption of a drug policy in 1982 Known as "National Drug Policy". Some of the major objectives of the National Drug Policy were to prepare a basic list of 150 essential drugs and a supplementary list of 100 specialized drugs; and to restrict of ownership of retail pharmacies to professional pharmacists only.

The basic EDL was subdivided into three levels of use-

a) 12 drugs for village workers
b) 45 drugs for primary health care and
c) All 150 drugs for tertiary care;

Main focus of this policy were to ensure easy accessibility to essential drugs with affordable price, standard quality of drugs and rational use of drugs through appropriate prescribing and dispensing by the health care professionals.[39]

Drug Control Ordinance, 1982 was made and promulgated by the Chief Martial Law Administrator of the People's Republic of Bangladesh on 11th June, 1982 as Ordinance No. VIII of 1982. The provisions of this Ordinance are additional to, and not derogatory of the Drugs Act 1940; which controls the manufacture, import, distribution, and sale of drugs in the country. This Ordinance Stated that no medicine of any kind can be manufactured for sale or be imported, distributed or sold unless it is registered with the licensing authority; and no person, being a retailer, is allowed to sell any drug without the personal supervision of a pharmacist registered in any Register of the Pharmacy Council of Bangladesh [39]

Despite these Essential Drug List, National Drug Policy and Drug Control Ordinance 1982; in real sense, there is still no 'Prescription Only Drug' in

Bangladesh at present. One can get any drugs from anywhere. Only need is money; no prescription indeed. Over the Counter (OTC) drugs have emerged recently as drugs of serious misuse across Bangladesh, and other neighboring countries. One report estimates that there are four million drug misusers in the South Asian region, with Bangladesh accounting for nearly 500,000. Self-medications in a population with low literacy level like Bangladesh are very challenging, which poses risks such as incorrect diagnosis, absence of knowledge of alternative treatments, irrational use of drugs and neglecting side effects and drug interactions. Study showed that around 30-40% of disadvantaged population including the women, elderly, ethnic minorities, poor / ultra-poor undertake self-medications for managing illness.[40]

2.1.4 Overview of The Prevailing Drugs Market:

Bangladesh drug market is flooded with over 8,000 formulations compared to 117 essential drugs and 100 supplementary drugs listed on the essential drug list. Among 231 allopathic drug manufacturers, top 30 companies are considered as large scale units and these are enjoying major share of the total market [41]. Interestingly, Bangladesh owns about 70.9% of generic medicines in terms of total sales among the 48 least developed countries of the world [42]. At present there are about 30,000 illegal [43] and more than 70,000 illegal drugstores according to the Bangladesh chemist and druggist association, Bangladesh. These are alleged to sell substandard or fake, poor quality, smuggled and adulterated medicines. Most of them are selling medicines without registered doctors' prescription [44]. The paper was undertaken with the recognition that bringing a review of available literatures within a short time frame presenting useful information to anyone interested in researching, implementing or comparing data in this area. This review may not provide answers to all questions but may provide detailed and considerable amount of information on drug use patterns, prescribing behaviours of the medical practioners, access to essential medicines, antibiotic prescribing practice, compliance or noncompliance with standard prescribing practice and cost of medications in Bangladesh. It also

includes what has been done till date, what is going on and what needs to be done, in the aforementioned fields.

2.1.5 Prescription Patterns of Drugs:

In reality, there is no mechanism or legislation exists in the country for assessing the competence of prescribing medical practitioners. No legal action is taken against them even if a serious mistake leads to a fatal outcome. The relatives of the victim accept it as fate, and no complaint is lodged. A medical practitioner can prescribe anything from vitamins to vincristine, for anything from the common cold to cancer [40]. Inappropriate prescriptions are readily available due to poor consulting period (a mean of only 54 seconds!) of doctors in Bangladesh [46]. It is estimated that more than half of medicines are inappropriately prescribed, dispensed or sold [47] Moreover, polypharmacy is very common among the rural medical practitioners with antibiotics and vitamins prescribed widely. [48]

The prescription procedure of antibiotics in Bangladesh is less than ideal as prior identification of the pathogens and its sensitivity to the drug is rarely determined before the drug is prescribed [49]. The situation is very alarming in the rural areas. For example, one survey conducted among rural medical practitioners with an average of 11 years' experience showed 60% of antibiotics prescriptions written based on the symptoms alone.[50] All antimicrobial agents were prescribed mainly on the patient's complaints, and all available antibiotics were prescribed in inappropriate doses and duration as has been showed in another similar survey. [51]

Children are mostly affected by inappropriate antibiotics prescribing in Bangladesh. In a study it was showed 26% of purchased drugs were antibiotics for children aged 0-4 year(s) and 48% of antibiotics were purchased in quantities of less than a single day's dose.[52] Pneumonia and diarrhoea are the two most common infectious diseases among children in Bangladesh

with the annual deaths of about 230,000 children due to diarrhoea.[53] But the percentages of appropriate antimicrobial treatment of pneumonia, and diarrhoea were 57.1% and 67.8% respectively as shown in one study.[35] Misuse of drugs in the treatment of acute diarrhoea among under-five children is highly prevalent and WHO-recommended treatments were seen in only 26.7% of cases and metronidazole was prescribed in all 38.6% cases.[36] Multiple and inappropriate antimicrobial drugs is the most common treatment errors in dysentery with failure to recommend use of oral rehydration solution.[54]

Over-statements and misinformation is very common in Bangladesh, which greatly influences doctors' prescribing behaviors. Currently, drug companies are the only organizations in Bangladesh to provide information to health personnel and the information supplied is often not consonant with recommendations from public health bodies. [55] Along with bribe in the form of cash, a large number of doctors accept various gifts including free air ticket for foreign trips, computers, mobile phones, air conditioners, television, table lamps, telephones, towels, calendars, paperweights, pens and what not. Ultimate result is prescriptions of inappropriate or unnecessary and expensive medicines. [56]

2.1.6 Uses of Prescription Drugs:

The drug use studies involving outcomes, adverse reactions and bioavailability in Bengali population has never been seriously looked into in Bangladesh [57]. Like all other developing countries, irrational and inappropriate use of medicines is very common in Bangladesh [55]. Recent study showed that about half of the antibiotics were sold without any prescriptions, and even ordinary people without any knowledge of medicine asked the drug seller for specific antibiotics [49] Almost every drug store salespersons illegally recommends and sells prescription medicines people often do not buy all the drugs as prescribed for them because of financial constraint. Moreover, self-medication is a common practice among laypeople [36]. Unjustified combination

of vitamins and minerals are still extensively available violating the principles of NDP, which restricts the production and marketing of these types of combination products. Recently, many pharmaceutical manufacturers have launched one such combination containing 32 ingredients including selenium, vanadium, molybdenum, tin and other less important or unnecessary minerals. But the socio-demographic conditions of Bangladesh clearly outweighs the justification of this type of combination products as most of the nutritional deficiencies are caused due to Vitamin A or B-complex, iron, calcium, iodine, or zinc deficiency. Deficiencies due to selenium, vanadium or tin are seldom diagnosed in Bangladesh, if ever. British pharmacopoeia clearly indicates that there is no justification for prescribing multiple ingredient vitamin preparation [46]. As single agent Vitamin A and ergometrine are dispensed inappropriately in more than 60% of the cases [58] In addition, drug like syntocinon (a hormonal injection which is given to pregnant women to ease labor) is being sold or used indiscriminately in home deliveries in rural Bangladesh, which is readily available without prescription there [59]. The NDP clearly indicates that no company can market a drug of similar benefits as of the existing one with minor chemical difference. But at present, there are captopril, cilazapril, enalapril, fosinopril, lisinopril, perindopril, and ramipril in use in Bangladesh [60].

2.1.7 Over The Counter (OTC) Drug Uses:

In Bangladesh the tendency of the mass people to buy medicines without proper prescription is increasing day by day. The drugs which can be collected without the prescription are termed as the Over the Counter (OTC) drugs. This study is endeavored to identify the factors that influence the purchase of any OTC drugs. The primary factors identified are the past experience with the drugs, corporate image of the pharmaceutical company, brand identity of the drug, insignificant side effect, and prior assumption about the drug to be used for the ailment. Undoubtedly this is not a healthy practice to adopt. This type of tendency can bring hazardous outcome even in short run and long run for the individual

consumer. Govt. has drawn a demarcation line between the prescribed and unprescribed drugs but the line has almost got blurred. Awareness is required to reduce the tenacity of transacting such type of products.

In real sense, there is no 'prescription only drug' in Bangladesh at present. One can get any drugs from anywhere. Only need is money; no prescription indeed [40]. Over the counter (OTC) drugs have emerged recently as drugs of serious misuse across Bangladesh, and other neighboring countries. One report estimates that there are four million drug misusers in the South Asian region, with Bangladesh accounting for nearly 500,000 [61]. Self medications in a population with low literacy level like Bangladesh are very challenging, which poses risks such as incorrect diagnosis, absence of knowledge of alternative treatments, irrational use of drugs and neglecting side effects and drug interactions. Study showed that around 30-40% of disadvantaged population including the women, elderly, ethnic minorities, poor / ultra-poor undertake self-medications for managing illness [37].

2.1.8 Factors for Choosing the OTC Drugs: [47]

The factor analysis results show that the people of Bangladesh are selecting OTC drugs for 11 factors. The factors are: (i) Past experience with the drugs, (ii) Company and brand image, (iii) Safe to use, (iv) Level of education, (v) Preference of brand name over the generic name, (vi) Distrust over the physicians, (vii) Prior assumption of physician's prescription, (viii) Information on the label and package, (ix) Side effect of the selected drug and (x) Awareness about the medicines (xi) Company's promotional activity, (Table 4).

Factors' name	Eigenvalues	Variance (%)	Cumulative variance (%)
1. Past experience with the drugs	3.297	12.681	12.681
2. Company and brand image	2.691	10.352	23.030
3. Safe to use	2.005	7.868	30.898
4. Level of education	1.834	7.089	37.987
5. Preference of brand name over the generic name	1.674	6.438	44.425
6. Distrust over the physicians	1.369	5.267	49.692
7. Prior assumption of physician's prescription	1.204	4.632	54.324
8. Information on the label and package	1.108	4.260	58.584
9. Side effect of the selected drug	1.086	4.176	62.760
10. Awareness about the medicines	1.052	4.045	66.805
11. Company's promotional activity	1.031	3.964	70.769

Table 01: Factors for choosing the OTC drugs

2.1.9 Availability and Accessibility of Essential Drugs:

A health system only functions well with sustained availability of essential drugs, as patients tend to bypass facilities that can not provide drugs [62] Though the official documents showed that about 80% of the people of Bangladesh had sustainable access to affordable essential drugs in Bangladesh [63], there are numerous evidences of frequent and persistent unavailability of essential drugs in the government health facilities. For instance, one study conducted in four district hospitals and one medical college hospital showed that only 8% of household reported outpatients reported receipt of the prescribed medicines from the facilities. Some 42% of hospital interviewed outpatients got all the prescribed medicines. Most of the inpatients (86%) reported paying for medicines from outside [64]. As with rural areas, unavailability of essential drugs the urban government health facilities are often very common. One report showed that two large hospitals (Sir Salimullah Medical College and Mitford Hospital) in the capital (Dhaka) city had been operating without essential medicines for eight weeks [65]. Theft and illegal sale of essential medicines from the government hospitals are

very common. Officials in-charge of hospital drug stores sell these drugs to local pharmacies instead of supplying to the poor patients.

2.1.10 Price of Available Drugs:

The stated aim of the NDP is to ensure that common people can get the essential and necessary drugs easily and to ensure the quality and safety of these essential drugs. It identified 150 essential drugs for controlled pricing. Since 1993, the number of the price-controlled essential drugs has been reduced to 117 primary health care drugs [62]. Maximum retail price (MRP) of the essential drugs will be fixed by the Directorate, Drug Administration, according to the existing drug policy. In case of others, company price is approved by the same authority. Price of essential drugs in Bangladesh is virtually uncontrolled. The drug regulating authority does not negotiate the price rather only approves the prices sought by the pharmaceuticals companies [66]. Recently, a strong syndicate of top 20 drug manufacturers has pushed up the prices of medicines almost double than the previous ones of some 18 varieties of essential drugs immediately before declaration of revised drug policy to legalize the price hike [67]. Wilderness of price discrimination has become rampant now a days. For example, the price of ciprofloxacin tablets ranges from Tk. 8-Tk. 14 (US$ 0.11-0.2) per tablet. But one mid-level company supplies the same medicine to medical college/university hospitals at Tk 2.5 (US$ 0.04) per tablet. The supplied tablets have been tested subsequently and proved to be of standard quality. Obviously, the actual production cost of this antibiotic is less than Tk. 2.5 per tablet. But amazingly, some companies are making a profit of not less than Tk 12 (US$ 0.17) for per tablet [66][68].

2.1.11 Lack of Control Over Drug Prices: [47]

In Bangladesh the maximum retail price (MRP) of every essential drug is fixed by the Directorate of Drug Administration (DDA); for all other drugs the DDA endorses the companies' quoted prices. Drug prices are quite high in Bangladesh

in comparison to neighbouring countries. The drugs control authority is apparently reluctant to negotiate with the companies to fix prices . The regulatory authorities have virtually no control over drug prices in Bangladesh. Indiscriminate pricing can be observed in all therapeutic classes of drugs. For example, prices of various ciprofloxacin brands range from Taka (Tk) 5 to 14 (US$ 0.07 to 0.20) per unit . The price of dexamethasone eyedrops extends from Tk 24 to 90 (US$ 0.34 to1.29) per 5ml, and diclofenac eye drops are available at a price range from Tk 40 to 200 (US$ 0.57 to 2.86) per unit. These are a few of the existing price discrepancies in the country.

2.1.12 Quality of Marketed Drugs:

One media report showed that 300 pharmaceutical companies in Bangladesh, only the 20 to 25 top companies are producing quality medicines in the country [69]. The situation clearly raises a question about the role of the remainder manufacturers. They are mainly involved in the production of fake/substandard or imitating renowned brands of various drugs. At present, spurious drugs have been flooded all over Bangladesh. Another testing conducted by the drug regulating body found 69% paracetamol tablets and 80% ampicillin capsules as substandard from some small manufacturers [70]. In its annual testing of 5000 drug samples in 2004, the Public Health and Drug Testing Laboratory (PHDTL) detected 300 drugs that are either counterfeit or of very poor quality. Significantly these include many popular antibiotics and lifesaving drugs [72]. Similar report in 1999 from the drug regulating authority mentioned that 102 drugs out of 6517 registered drug samples found below standard. In1998, it was 260 out of 5920 registered drug samples [73]. Because of scarce drug testing facilities, many of the drugs are entering into the market without any valid quality assessment procedures. Besides, there are many brands existing in the market having active ingredients less than the specifications. A recent assay involving 15 brands of ciprofloxacin showed that 47% of the collected samples containing active ingredient less than the required specification [70] Apart from fake or substandard drugs, the use of date-expired or drugs with tampered dates in

Bangladesh can not be ignored. This is of especially alarming in the rural areas due to high rate of illiteracy. But regretfully, increased numbers of renowned private hospitals in the capital city (Dhaka) have been fined by a mobile in charge of possessing least 15 life-saving medicines with expired dates [74]. Appropriate storage conditions of drugs are very important in tropical countries like Bangladesh as heat, light or moisture may degrade the drug molecules easily. But most drug manufacturers in the country lack suitable storage facilities and enclose medicines in such low quality foils that it is impossible for them to retain their potency up to indicated shelf-life [71] Use of counterfeit or substandard drugs is very threatening to human life. Along with substantial damage of health, they can even kill. For example, contaminated paracetamol elixir with di-ethylene glycol killed around 223 children in Bangladesh in 1992 [75]. Adulteration of antibiotics poses risks not only to human body but also for the environment. Along with the risk for therapeutic failure, counterfeit antibiotics can produce chance of potential antibiotic resistance [45]. Some statistics, however, show marked improvement in the health sectors of Bangladesh particularly in family planning and immunizations. As an integral part, drug management is still remaining in primitive level even after the implementation of the NDP more than two decades before. Availability of studies relating drug management is almost rare. Only one large scale baseline study on drug use patterns, prescribing behaviours, access to essential drugs and consulting time has been carried out in 1991. Except some institutional surveys, there are no such studies in the country till now. Thousands of unnecessary drugs are present in the market including many multivitamin and mineral preparations. Illegal drugstores are prevalent elsewhere that accounts more than the legal ones. Due to lack of any controlling mechanism prescribing practices of the medical practioners are very rampant everywhere in the country. About half of the medications are prescribed inappropriately and polypharmacy is very common. Antibiotics, vitamins and minerals are widely prescribed. Irrational prescribing practices are predominant in the rural areas. Standard treatment guidelines are not often practiced specially in acute diarrhoea in under-five children. As with other developing countries,

indiscriminate use of drugs and self-medications are highly prevalent in Bangladesh. Virtually, all the drugs are available without prescriptions at present. Access to essential medicines is significantly less than that mentioned in the official documents. Availability of essential drugs in the government health settings are scarce both in rural and urban areas. Price of essential medicines is not consistent. Wide variations of prices are existent within brands of the same drug molecules. The drug regulating authority does not have any control over pricing of drugs and drug manufacturers are manipulating this opportunities. Counterfeiting of drugs in Bangladesh has flourished because of poor supervisionand control and unethical practices of most of the officials of drug regulating authority [76] Among the total 245 pharmaceutical manufacturers only top 20 leading manufacturers are producing good quality medicines in the country and most others are engaged in the production substandard or fake drugs. Substandard or fake versions of life-saving drugs are alarmingly prevalent in Bangladesh markets. In some cases, it is around 70% to 80%. The value of fake and contraband drugs the market is estimated to be around US $100-US$150 million in Bangladesh [72].

Drug management, as an integral part is still remaining in primitive level even after the implementation of the NDP more than two decades before. Thousands of unnecessary drugs are present in the market including many multivitamin and mineral preparations. Illegal drugstores are prevalent elsewhere that accounts more than the legal ones. Due to lack of any controlling mechanism prescribing practices of the medical practitioners are very rampant everywhere in the country. About half of the medications are prescribed inappropriately and polypharmacy is very common. Antibiotics, vitamins and minerals are widely prescribed. Irrational prescribing practices are predominant in the rural areas.

Chapter 03
Literature Review

3. Literature Review

As human being we have the fundamental right to have access to health services. While viewing the health related issues we hardly can be oblivious about any medicine or drug. Now a days around the world mass people collect medicines with or without the prescription of the physicians. There are some medicines that may be sold without a prescription, in contrast to prescription drugs—these drugs are termed as Over-the-counter (OTC) drugs. Over-the-counter (OTC) drugs are non-prescription drugs sold in convenience stores, grocery stores and health shops. They range from pain relievers, cough and cold remedies to sleeping aids, weight reducing aids, and vitamin supplements. The OTC drugs are characterized as less risk taking, less dynamic, non-maintenance therapeutic pharmaceutical drugs. The efficacy and potency of these drugs have been well established. OTC drugs play an increasingly vital role in health care system. Some medicines considered safe in general terms may be available in general stores, drug stores, supermarkets etc. The rules for collecting those OTC drugs vary considerably from country to country. For example, in the United States, the manufacture and sale of OTC substances is regulated by the FDA. Generally FDA controls the operational and marketing activity of the manufacturers so that the customers ultimately get the safe and secured medicines. As a general rule, over-the-counter drugs have to be primarily used to treat a condition that does not require the direct supervision of a doctor and must be proven to be reasonably safe and well-tolerated. OTC drugs are usually also required to have little or no abuse potential, although in some areas drugs such as codeine are available OTC.

Over time, drugs that prove themselves safe and appropriate for self-medication may be switched from prescription to OTC. An example of this is Diphenhydramine (Benadryl®) which once required a prescription but now is available OTC nearly everywhere in the USA. Diphenhydramine is a deliriant; nevertheless, most recreational drug users find its effects uncomfortable rather than exciting. In our country, according to the physicians and pharmacists only a

few drugs like paracetamol, ranitidine, metronidazole, omeprazole ORS saline, diaclofenac sodium, and aspirin are supposed to be sold as the OTC drugs. But the unscrupulous drug sellers sell almost 90% of the stocked drugs without prescription. Even the sedatives are also being traded like fast food in Bangladesh. According to the 1982 Drug Ordinance, The pharmaceutical industry is monitored and guided by the government under the ministry of health. Under the ministry of health the director of Drugs Administration supervises various key tasks ranging from the manufacture to the marketing of the drugs. The present study is an attempt to explore the issues related to OTC drugs with strong focus on the identification of the factors that affect the choice and selection of OTC Pharmaceutical products.

The term "over-the-counter" is somewhat confusing to some, since these items can be found on the shelves of stores and bought like any other packaged product in some countries or in others may be bought "over the counter" from the pharmacy, while prescription drugs are sold at a pharmacy counter. The term likely dates back to before self service shopping became common, when most goods were obtained by requesting them from a clerk at a sales counter; while prescription drugs required a visit to the doctor first, these drugs could be purchased "over the (sales) counter" just like other goods (wikipedia, 2007). Home care is a common response to illness that allows the caregiver time to monitor a child before making the expensive decision to seek help outside. Home care often starts with medicines already at home that were left over from previous prescriptions or bought from patent medicine vendors (PMVs) or home remedies that include local herbs. Home treatment can also combine over-the-counter (OTC) drugs and herbs. Prompt first-line treatment is facilitated by purchase of OTC drugs from retail outlets (Afolabi, 2007). In every country the pharmaceuticals industry is being controlled by a well established regulatory board. Presently the pharmaceuticals industry in Bangladesh is being controlled by the Drug Ordinance of 1982. At present, there are 231 Allopathic companies operating in Bangladesh (Drug Administration website, 2007). The Directorate of

Drug Administration (DDA) under the Ministry of Health & Family Welfare, Government of the People's Republic of Bangladesh, is the drug regulatory authority of the country. Mission of the DDA is to ensure that the common people have easy access to useful, effective, safe and good quality essential and other drugs at affordable price (Islam, 2006). Before 1982, The Drugs Act 1940 was in place. The drug ordinance '82 was established to promote the local companies into the pharmaceutical industry. Before that policy's enactment there were about 3,500 brands of drugs in the market including necessary, unnecessary and even harmful drugs. No structured national committee or regulatory body was present to regulate the business in this sector and no price control was maintained. Using the brand and corporate image, the multinational companies charged as much as possible and used aggressive selling campaign to grab market share from the counterpart MNC's and local companies. Local companies were a bit down as they were unable to compete under the situation of superfluous production. Moreover the misuse of drugs increased day-by-day. Out of this necessity the Bangladesh Pharmacy Council was established with members from concerned community of doctors and social workers. They brought a major change in the earlier drug act of 1940 and named it as drug ordinance 1982. It took the boldest step to ban production of drugs out of a prescribed list with an immediate order. The new ordinance also imposed some restriction on the formulation of different drugs in the list and their pricing. After 1982, production of drugs was limited to 150 essential drugs provided by WHO. As an after effect of the '82 Ordinance, today nearly 25% of the market share in the pharmaceutical industry is owned by the two local companies- Beximco and Square. These two companies had no significant presence in the pharmaceuticals industry before 1982. Currently Beximco and Square both have started exporting their products in more then 20 countries and thus contributing toward the foreign exchange earning of the nation.

Bangladesh drug market is flooded with over 8,000 formulations compared to 117 essential drugs and 100 supplementary drugs listed on the essential drug list. Among 231 allopathic drug manufacturers, top 30 companies are considered as

large scale units and these are enjoying major share of the total market (http://www.ddabd.org/).

Interestingly, Bangladesh owns about 70.9% of generic medicines in terms of total sales among the 48 least developed countries of the world (WHO report, 2004). At present there are about 30,000 legal and more than 70,000 illegal drugstores according to the Bangladesh chemist and druggist association (The Daily Star, November 14, 2004). These are alleged to sell substandard or fake, poor quality, smuggled and adulterated medicines. Most of them are selling medicines without registered doctors' prescription (The Observer, November, 17, 2003).

The per-capita annual drug expenditure in Bangladesh remains extremely low at $4 compared to $9, $28, $191 and $412 for China, Mexico, United States and Japan respectively (Source: WHO report, 2005). This is expected to increase as healthcare awareness rises and as increasing urbanization leads to sales growth of the more expensive lifestyle segment drugs. The per capita expenditure of Govt. for public health is gradually increasing and stood at USD $ 4 in 2004. In the health sector, Govt. has made an allocation of BDT 3,732 crore combining revenue and development in the budget of 2004-05, which is around 59% higher than the previous year (ADB annual report, 2005).

In real sense, there is no 'prescription only drug' in Bangladesh at present. One can get any drugs from anywhere. Only need is money; no prescription indeed (Islam, Goldman, Kunin, 1996). Over the counter (OTC) drugs have emerged recently as drugs of serious misuse across Bangladesh, and other neighboring countries. Self-care is a predominant therapeutic activity consisting 30-40% of the disadvantaged populations including women, elderly, ethnic minorities and poor in Bangladesh (Ahmed, 2005). Self-medication as a mean of self-care through the purchase of over-the-counter (OTC) medicines is, and always has been common in the society for a wide variety of minor ailments, such as headaches, colds and indigestion. But such products can often be misused or

abused (Wazaify, 2005). One report estimates that there are four million drug misusers in the South Asian region, with Bangladesh accounting for nearly 500,000 (Mudur, 1999). Self-medication in a population with low literacy level like Bangladesh are very challenging, which poses risks such as incorrect diagnosis, absence of knowledge of alternative treatments, irrational use of drugs and neglecting side effects and drug interactions. Study showed that around 30%--40% of disadvantaged population including the women, elderly, ethnic minorities, poor / ultra-poor undertake self-medication for managing illness (Ahmed, 2005). Over-the-counter medicines have emerged as drugs of serious misuse across Bangladesh, and other neighboring countries. Along with the common practices of self medication, almost every drug store salesperson is illegally involved in the recommendation and sells of prescription only medicines in Bangladesh (Roy, 1997). Self-medications in a country with low literacy level like Bangladesh is very important where prescription medicines are freely available. This may pose serious risks related to inappropriate and irrational personal use of medicines. Like all other developing countries, irrational and inappropriate use of medicines is very common in Bangladesh (Ronsmans, Islam, Bennish, 1996) Recent study showed that about half of the antibiotics were sold without any prescriptions, and even ordinary people without any knowledge of medicine asked the drug seller for specific antibiotics (Mamun, Tabassum, 2006). Almost every drug store salespersons illegally recommends and sells prescription medicines people often do not buy all the drugs as prescribed for them because of financial constraint.

Chapter 04
Aim of the Study

4.1 Aim of the Study:

In Bangladesh the tendency of the mass people to buy medicines without proper prescription is increasing day by day. The drugs which can be collected without the prescription are termed as the Over the Counter (OTC) drugs. The primary factors identified are the past experience with the drugs, corporate image of the pharmaceutical company, brand identity of the drug, insignificant side effect, and prior assumption about the drug to be used for the ailment. Undoubtedly this is not a healthy practice to adopt. This type of tendency can bring hazardous outcome even in short run and long run for the individual consumer. Govt. has drawn a demarcation line between the prescribed and unprescribed drugs but the line has almost got blurred. Awareness is required to reduce the tenacity of transacting such type of products.

The patterns and cost of drug abuse were investigated among 196 drug abusers who were admitted to a drug dependence treatment centre in Dhaka, Bangladesh. Of the respondents, 93.9% were male, 64.8% were unmarried, 56.1% were either students or unemployed, 95.4% were smokers, 85.7% were influenced by friends, 64.3% were addicted to codeine-containing cough syrup, 64.3% were addicted to more than one drug, 65.8% took drugs in groups, and 63.8% had a history of unprotected sex. The mean number of drugs abused was 1.9 and the mean duration of addiction was 42.1 months. The average cost of drugs per person was from $1.9 to $3.1 per day or from $707 to $1135 per year. The economic impact of drug abuse included cost of drug itself, health care expenditure, lost productivity, and other impacts on society such as crimes and accidents.

In Mymensingh, 51.91% were male and 48.09% female, 25.42% were educated, where 30.7% male and 20% female, 90.4% were smokers, 85% were influenced by friends, 60% were addicted to codeine-containing cough syrup and 70.8% had a history of unprotected sex.

Bangladesh is considered a Least Developing Country (LDC) with more than 75% of the total (142 million) population living in rural areas. About 36% of the population continue to live below the national poverty line (<US$1/day). Basic needs of living particularly health and education remain largely unmet and only less than 40% of the population has access to basic healthcare. Beside this, around 26% of professional posts in rural areas remain vacant and there is high rate of absenteeism (about 40%). Thus treatments in the rural areas are mainly (about 45%) provided by unqualified health personnel including medical assistants, mid-wives, village doctors, community health workers and mostly by the chemists of the pharmacies in comparison to that by qualified medical graduates (only 10-20%).

Use of several medicines for treating a single disease and inappropriate prescribing are very common practice throughout the country due to unethical practices of both health professionals and drug Dispensers. In real sense, there is still no 'Prescription Only Drug' in Bangladesh at present. Every one can get any drugs from anywhere in terms of money and it does not require any prescription even. Study showed that around 30-40% of population including the women, elderly, ethnic minorities, poor / ultra-poor living in the rural areas take self-medications for managing illness.

"Essential Drug List" or "EDL" was introduced in Bangladesh in 1982 following the guidance as well as recommendation of World Health Organization (WHO); after the introduction and implementation of the National Drug Policy and Drug Ordinance (Drug Control Ordinance, 1982). EDL was introduced in the country with intention to ensure the rational use of life saving drugs, the concept of essential drugs in the country. To support this rational use of drug, Bangladesh Government also carried out the establishment of the National Drug Policy and Drug Ordinance (Drug Control Ordinance, 1982) prior to the introduction of EDL to control the manufacture, import, distribution, and sale of drugs in the country. This Ordinance Stated that no medicine of any kind can be manufactured for sale or be imported, distributed or sold unless it is registered with the licensing

authority; and no person, being a retailer, is allowed to sell any drug without the personal supervision of a pharmacist registered in any Register of the Pharmacy Council of Bangladesh.

In many developing and developed countries, community and retail pharmacies are the main source of drugs. The importance of this role and its implications has been addressed and stressed worldwide. Even though, Bangladesh was the first country among the world to introduce National Drug Policy; but rational use of drug has not been established in the country. At present there are approximately 30,000 legal and more than 75,000 illegal drug stores are operating business within the country by non-qualified personnels. Any one can buy any medicine from these drug stores only in terms of money; no legal prescription is required here.

Most of the people in Bangladesh lives in rural area and also are too poor to afford a visit of doctor and have poor accessibility to health care. Thus they often rely on medical advice from unregistered or non professional persons. As a result, powerful prescribe only medicines are routinely, and illegally, sold over the counter.

4.1.1 General Objectives:

The Study was carried out to find the present scenario of "Drug selling pattern in Bangladesh" and that is an important indicator to measure the rational and irrational use of drug in Bangladesh. Because drug selling pattern is an important parameter to compare the rational and irrational use of drug. It was also considered to find out the comparative scenario of the drug selling pattern in Mymensingh city, Jamalpur city, Sherpur city and outside of the city. Moreover, the study was also carried out to compare the drug selling pattern in the urban and rural area.

4.1.2 Specific Objectives:

Beside the general objectives, the specific findings of the study carried out are as follows:

1. Percent of Prescription and Non-prescription Sell.
2. Drug selling pattern among Mymensingh city and out of the city.
3. Area wise distribution of the drug selling pattern.
4. Patient Compliance Regarding Different Dosage Form, e.g. Tablet, Capsule following the hierarchy of their percent sells.
5. Patient Compliance Regarding Different Types of Dosage Form, e.g. Solid, Liquid following the hierarchy of their percent sells.
6. Use Pattern of Injections.
7. Selling pattern of suppository.
8. Percent of Aerosol & Dusting Sold.
9. Percent of prescription sample containing both Allopathic and Traditional Medicine.
10. Percent sell of the combination (8) of both Allopathic and Traditional Medicine in Urban and Rural.
11. Percent of Unani and Ayurvedic Medicine sold.
12. Percent of Herbal Medicine sold.
13. Percent sell of Sex Stimulants Vs % of Nerve tonic, Digestant and Others
14. Percent sell of Paracetamol Vs % of Diclofenac.

15. Percent of Drug Sold per Encounter (1, 2, 3, 4....).

16. Percent sell of Different Companies (hierarchy of Top 10 companies and their percent sell).

17. Percent sell of Different Companies in Mymensingh city (hierarchy of Top 10 companies and their percent sell).

18. Percent sell of Different Companies in Jamalpur city (hierarchy of Top 10 companies and their percent sell).

19. Percent sell of Different Companies Sherpur city (hierarchy of Top 10 companies and their percent sell).

20. Percent sell of National and Multinational Companies.

21. Percent sell of Imported Drugs.

Chapter 05
Methodology

5. Methodology

5.1 Definitions:

Urban Area:

The District or the Divisional cities were considered as Urban area.

Rural Area:

Areas, relatively uncivilized or having lack of civilization activity than that of their respective district city were considered as the Rural areas.

Prescription Sell:

A prescription drug is a licensed medicine that is regulated by legislation to require a prescription before it can be obtained. Drugs that were sold by the prescription of a registered physician or health care professionals have been considered as the Prescription Sell. According to the study, physicians having at least an M.B.B.S degree have been considered as the registered physician. The study excludes those personals having other qualifications except M.B.B.S or higher, e.g. Paramedic Doctors, Village level Health Workers, Rural Medical Practitioners (RMPs) etc.

Non Prescription Sell:

Any medicine or drug that have been sold following any prescription by the qualified health professionals or self medication or the drugs sold after the recommendation by the chemist or the shop keeper has been considered as the Non Prescription Sell.

Beside this, if any body having prescription but did not brought or showed the copy to the retailer during purchasing of the medicines has been considered as Non Prescription Sell. In this case, any document or prescription without any

signature and registration number has also been considered as the Non Prescription Sell.

5.2 Study Design and Population:

The study was performed randomly and designed with intension to cover the collection of data from three different regions that almost covers the population of every class. Prior to the initiating the field work of the study; the regions were divided randomly to collect sample in Mymensingh City, Jamalpur city, Sherpur city and the regions out of the city; only the district town and its respective rural areas were considered to collect samples.

5.3 Length of the Study Period:

The study as well as collection of sample was carried throughout a period of eleven months, from January'09 to November'09.

5.4 Sampling Area for Data Collection:

After selection of the strategy to collect sample randomly on the basis of the developed method, the following sampling areas were considered from which collection of sample were carried out:

a. Mymensingh City:

i. Urban Area: Hospital Road, Durga Bari Road

ii. Rural Area: Fulpur (Deu), Fulpur Bazar, Fulpur (Sherpur road)

b. Jamalpur City:

i. Urban Area: Hospital Road, Station Road

ii. Rural Area: Nandina East Bazar, Nandina West Bazar

c. Sherpur City:

i. Urban Area: Hospital Road, New Market, Bottola

ii. Rural Area: Sripoddi Bazar, Nokla Bazar

5.5 Sampling Technique:

The study was carried out by collecting sample randomly from the drug stores in the both sampling areas (urban and rural). To carry it on, it was mandatory to be present at the data collection point or at drug stores.

5.6 Data Collection Tool:

A format containing the option of Type of sell, Brand Name, Generic Name, Dosage Form and Types of Dosage Form etc had been prepared prior to the data collection that was used as the measure for collection of data and has been included in the annexure (annexure 01).

5.7 Collection of Data:

The data of our interest was the-

i. Type of Sell (whether Prescription or Non-Prescription)

ii. Brand Name(s) of the drug(s) sold

iii. Generic Name(s) of the drug(s) sold

iv. Dosage form(s) of the drug(s) sold

v. Manufacturer(s) of the drug(s) sold

The data collection tool had the options to collect the above parameters. Using these parameters of the data, the study has been carried out.

5.8 Sample Size:

The study has been carried out with a total sample of 1000. The distribution of the samples is as follows:

a. Mymensingh City: 400

i. Urban Area:

Hospital Road : 100

Durga Bari Road : 100

ii. Rural Area:

Fulpur Road (Deu) : 50

Fulpur Bazar : 50

Fulpur (Sherpur Road) : 100

b. Jamalpur City: 300

i. Urban Area:

Hospital Road : 100

Station Road : 100

ii. Rural Area:

Nandina East Bazar : 50

Nandina West Bazar : 50

c. Sherpur City: 300

i. Urban Area:

Hospital Road : 100

New Market : 50

Bottola : 50

ii. Rural Area:

Sripoddi Bazar : 50

Nokla Bazar : 50

5.9 Data Counting:

Data counting for the study has been performed with a prepared data counting format. The format has been included in the Annexure (annexure 02).

5.10 Data Processing and Analysis:

The upgraded version of Microsoft Office 2003 has been utilized for data processing, analysis as well as for the preparation of the graphs.

Chapter 06
Result and Discussion

6. Result and Discussion:

The major object of the study was to find out the Drug Selling Pattern in Bangladesh and the area wise distribution of the selling pattern. Both the major and minor finding outs of the study are as follows:

6.1 Drug Selling Pattern in Bangladesh:

The study on the Drug Selling Pattern carried out has shown that there is no 'prescription only drug' in Bangladesh at present. Overall result is that, in a total sample of 1000, the amount of prescription selling was 418, while the amount of non-prescription selling was 582. The percentage of prescription selling was (418 samples) 41.8% and the percentage of non-prescription selling (582 samples) 58.2%. This is shown in the following Table 02 and Figure 09.

Table 02: % prescription and Non-Prescription sell of drugs.

Category	Percent Sold
Prescription Sell	41.8%
Non-Prescription Sell	58.2%

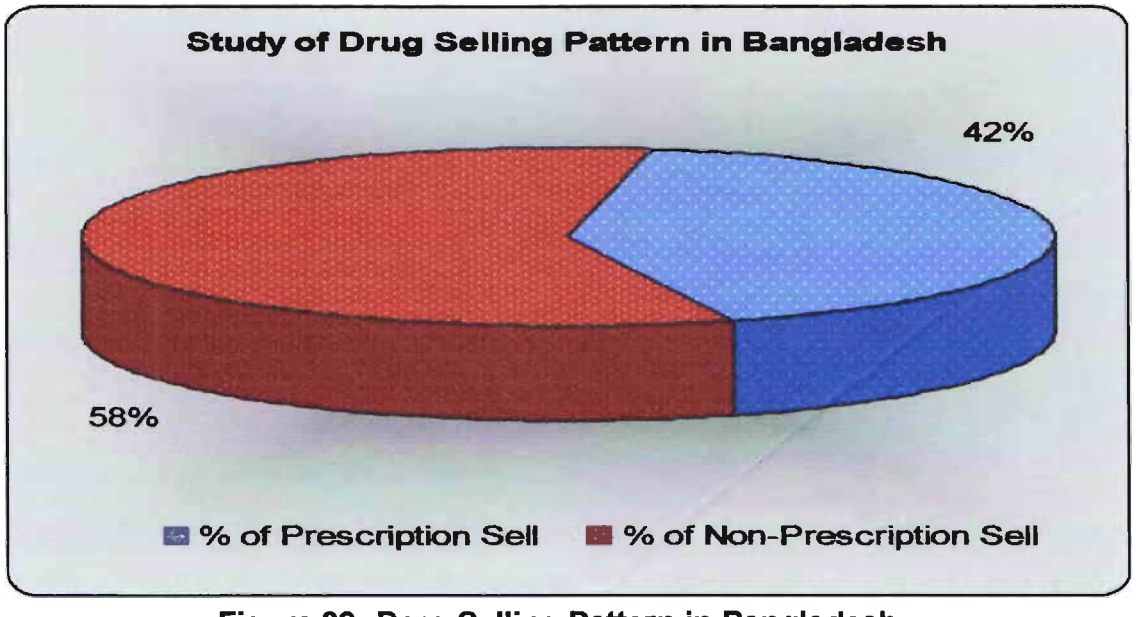

Figure 09: Drug Selling Pattern in Bangladesh

6.1.1 Drug selling Pattern between Mymensingh City and Outside of Mymensingh City:

The health care policy is supposed to be implemented in Mymensingh more strictly. But the selling pattern of drugs does not differ that much than other areas of study. According to the study performed, only 46.25% and 38.83% of the drugs were sold by the prescription in Mymensingh City and out side of Mymensingh respectively.

Table 03: Drug selling Pattern in Mymensingh City and Outside of the Mymensingh City.

Category	Value
% of Prescription Sell in Mymensingh City	46.25%
% of Prescription Sell in Outside of Mymensingh City	38.83%

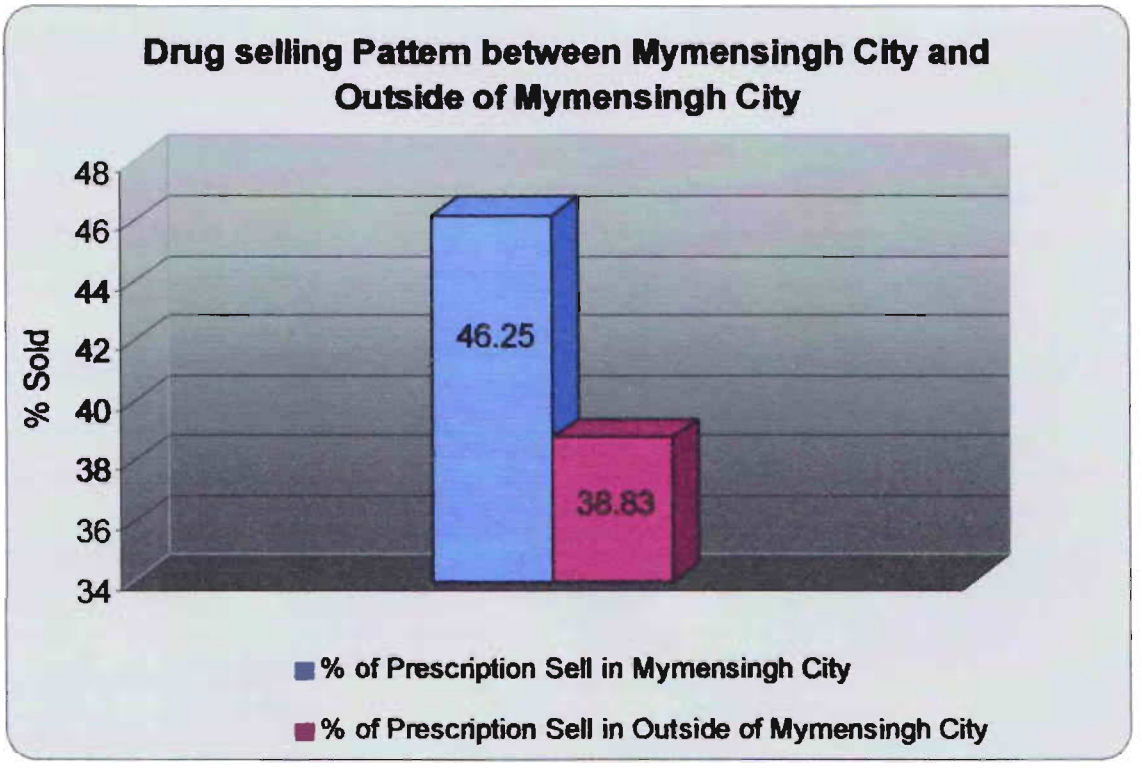

Figure 10: Drug selling Pattern in Mymensingh City and Outside of Mymensingh City.

6.1.2 Drug Selling pattern in Different Areas:

During the study period, it was found that only 46.25%, 45%, and 32.67% of the drugs were sold by the prescription in Mymensingh, Jamalpur and Sherpur respectively and 53.75%, 55% and 67.33% of the drugs were sold without any prescription in those respective areas. The comparative selling pattern of drugs has been shown in the figure below (Figure 11):

Table 04: Data of Drug Selling pattern in Different Areas.

Area	% of Prescription Sell	% of Non-Prescription Sell
Mymensingh	46.25%	53.75%
Jamalpur	45%	55%
Sherpur	32.67%	67.33%

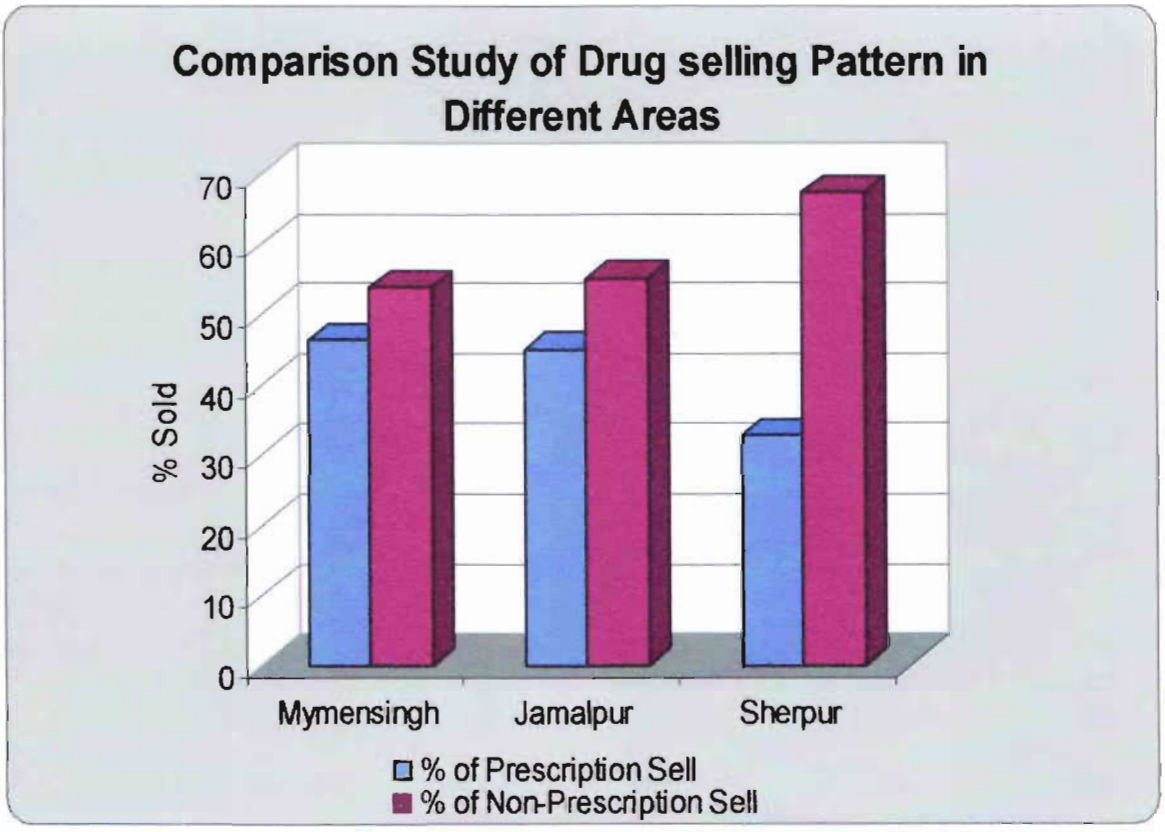

Figure 11: Area wise Distribution of Drug Selling Pattern

6.2 Patient Compliance Regarding Different Dosage Form and Their Types:

Drugs are formulated into different types of dosage forms but not all the types are equally well accepted by both the patient and the physicians. The popularity of each class considering their percent sold during the study period was found has been shown below in the table and their popularity hierarchy has been shown in the figure **(Figure 12)** below:

Table 05: Data of percent of different dosage form sold.

Types of Dosage form	% Sold	Types of Dosage form	% Sold
Solid	73.48%	ParenteralSemi-Solid	3.67%
Liquid	10.96%	Others	3.07%
Parenteral	6.64%	Opthalmic	2.15%

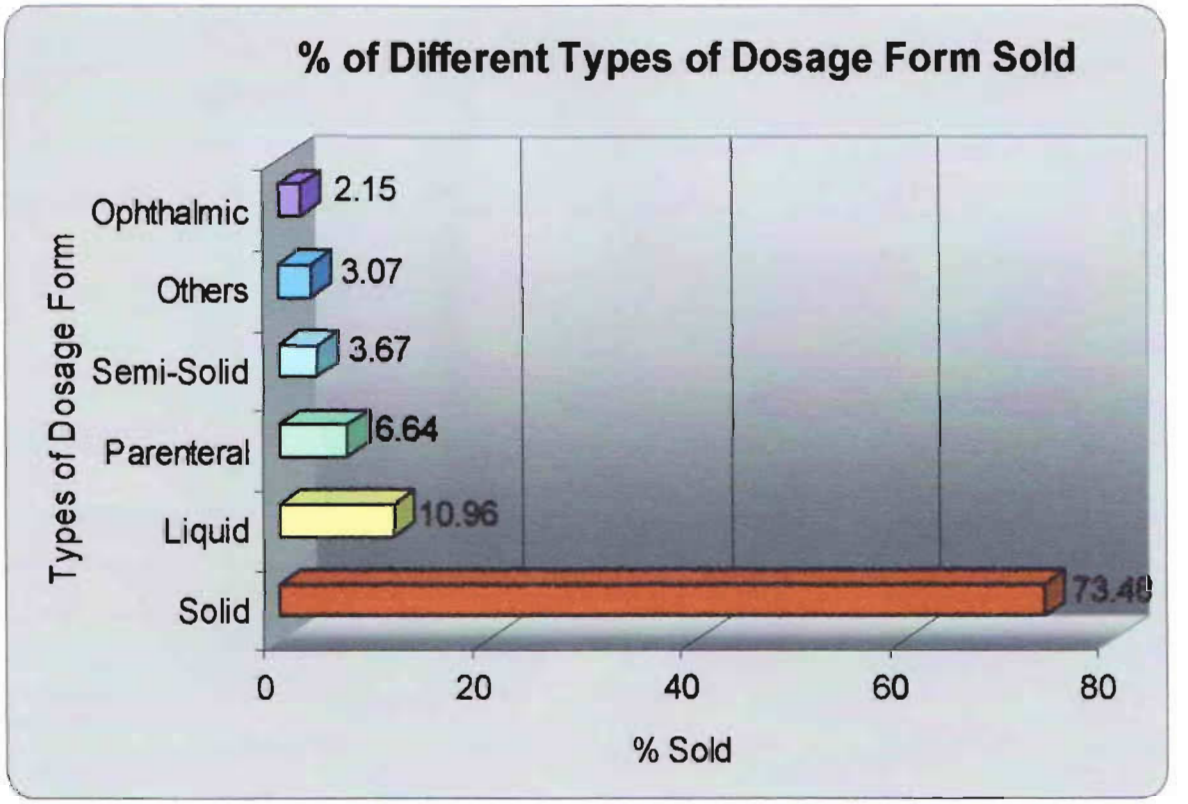

Figure 12: Study of Percent cell of Sold Popular Types of Dosage Form.

6.2.1 Popular Dosage Forms:

Pharmaceutical Science has developed and formulated a number of dosage forms like tablet, capsule, ointment, suppository, syrup, suspension, eye Drop, nasal drop, ampoule, vial, aerosol, dusting powder etc. The hierarchy of popularity of top five dosage form on the basis of their sell during the study period has been shown (on the basic of their percent sold) in the figure below.

Table 06: Percent sell of top five popular dosage forms.

Dosage Form	% Sold
Tablet	57.5%
Capsule	13.8%
Syrup	7.07%
Suspension	3.38%
Vial	2.48%

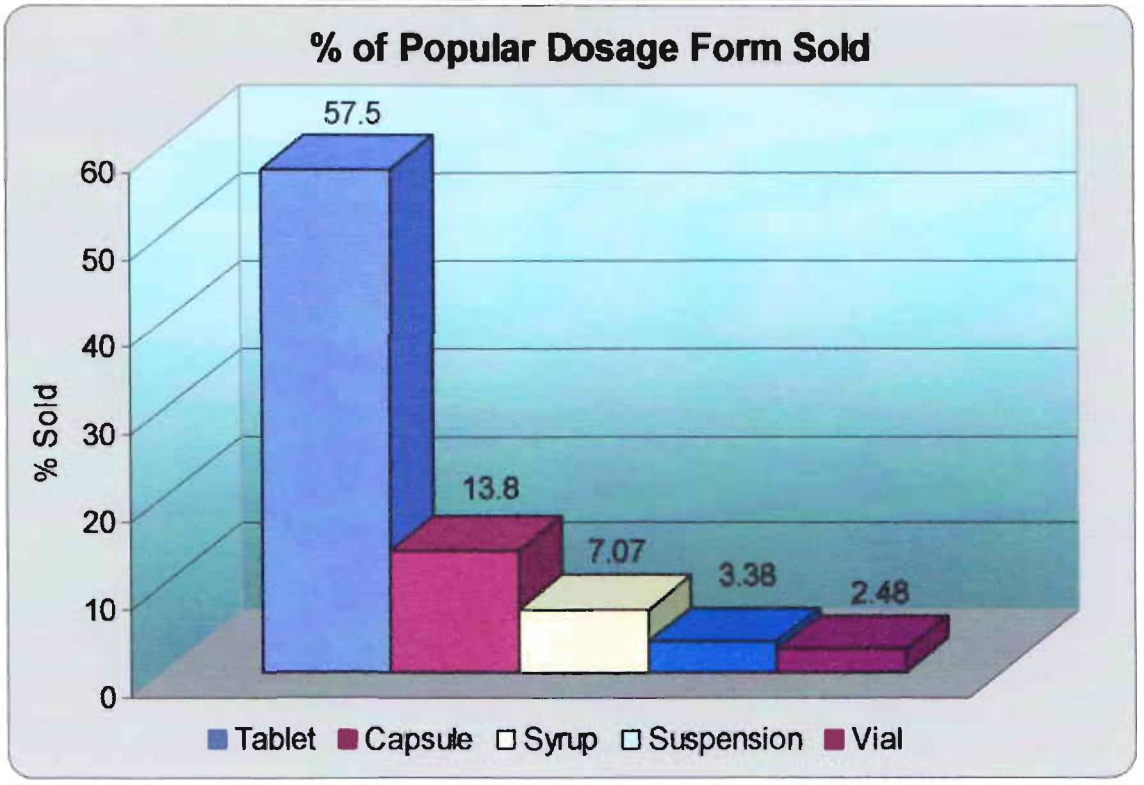

Figure 13: Top five Popular Dosage Forms on the basis of Percent sell.

6.3 Use Pattern of Injections:

Injections are one of the most important dosage forms and use of injections is one of the powerful indicators. Through injections, drugs are directly introduced at the systemic circulation. These are very much useful incase of emergency and life saving case but not well accepted by the patient due to the associated pain. The prescribing behavior of injections by the physician was found in the study is shown in the figure (Figure14) below:

Table 07: Percent of prescription sample containing injections.

Category	% Value
No. of Prescribed Sample without Inj.	77.99%
Prescribed Sample Containing Injection	22.01%

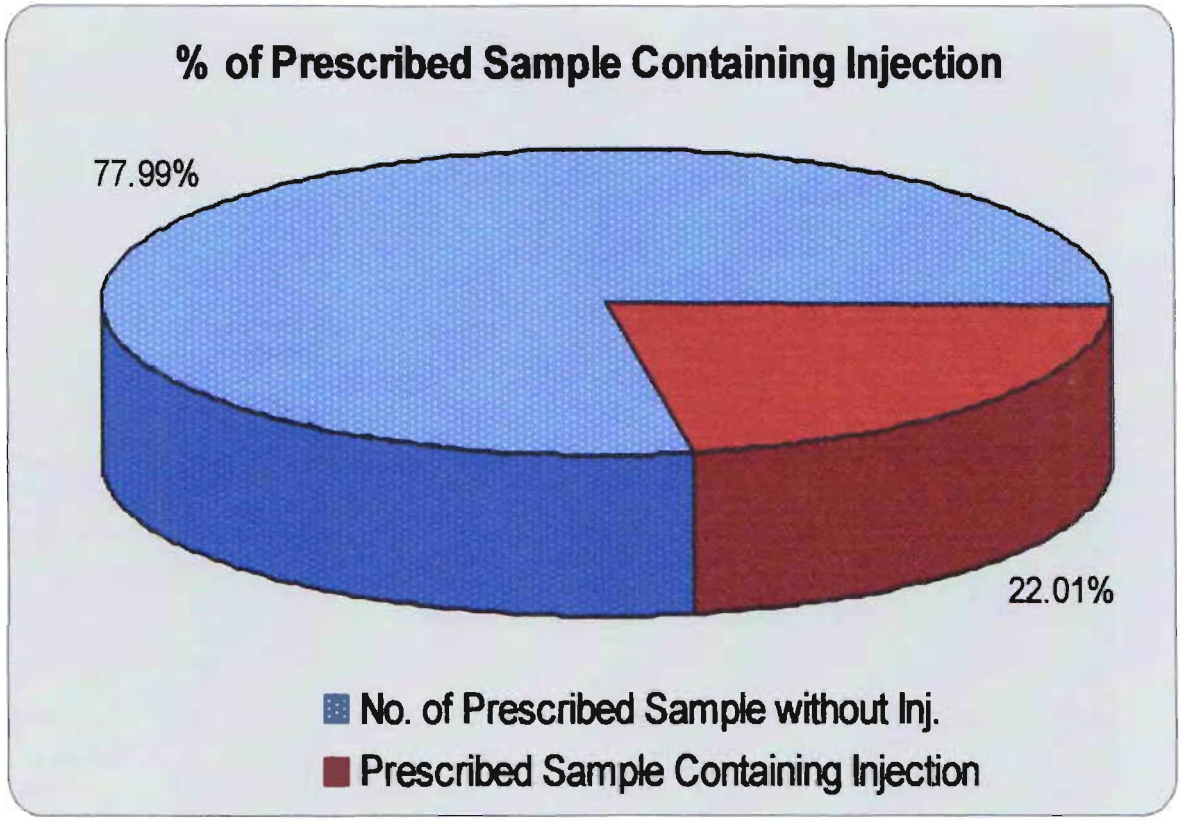

Figure 14: Percent of Prescribed Sample Containing Injections.

6.3.1 Selling Pattern of Injection:

During the study period, it was found that only 6.64% of the injections were sold. This is shown in the following Table 8 and Figure 15.

Table 08: Data of percent of injection sold.

Category	% Value
Other Item Sold	93.36%
No. of injection Sold	6.64%

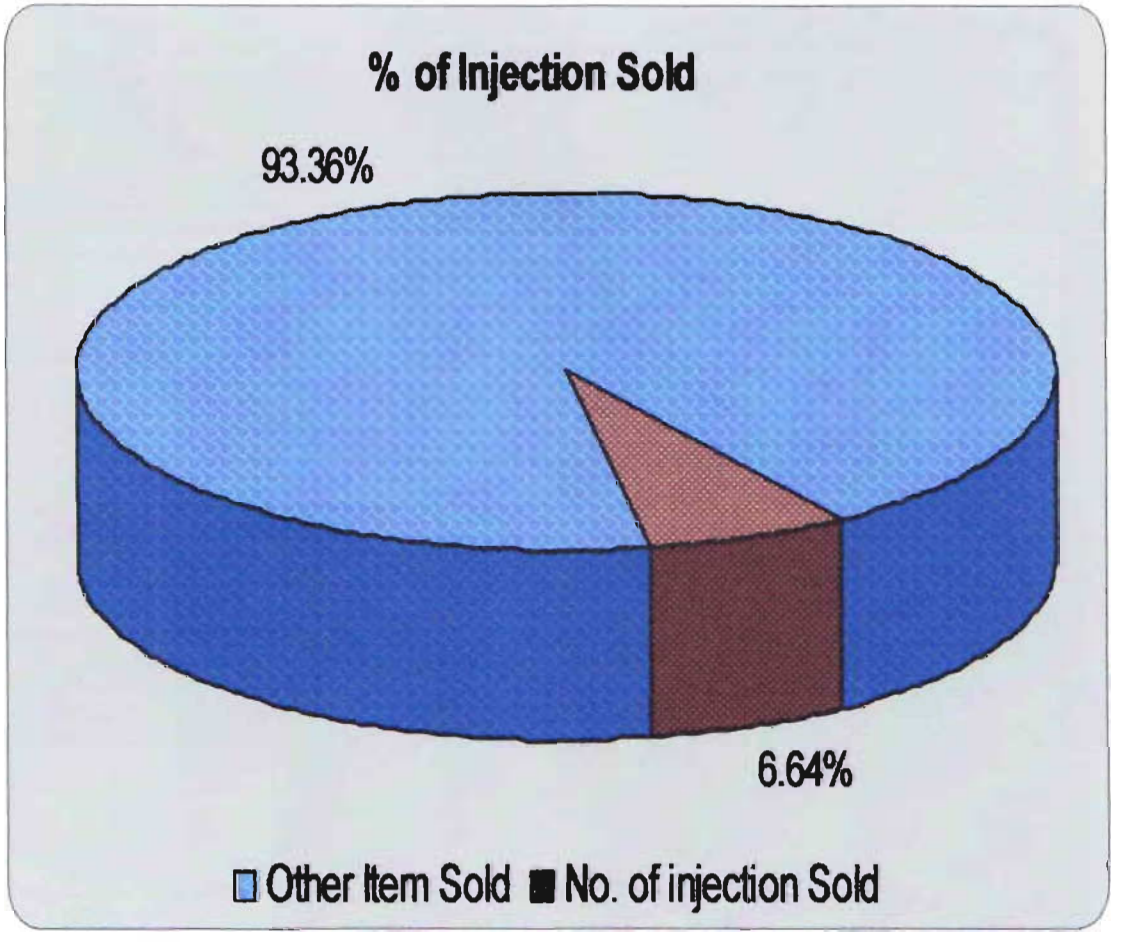

Figure 15: Percent of Injection Sold

6.3.2 Selling Pattern of Prescribed and Non-Prescribed injections:

Around 74.79% were prescribed and the rest 25.21% was sold without prescription. A little percent of injection was sold during the study period; the selling pattern of injections is shown in the following figure (Figure 16):

Table 09: Percent of prescribed and non-prescribed injections items sold.

Category	% Value
Prescribed Injection	74.79%
Non-Prescribed Injection	25.21%

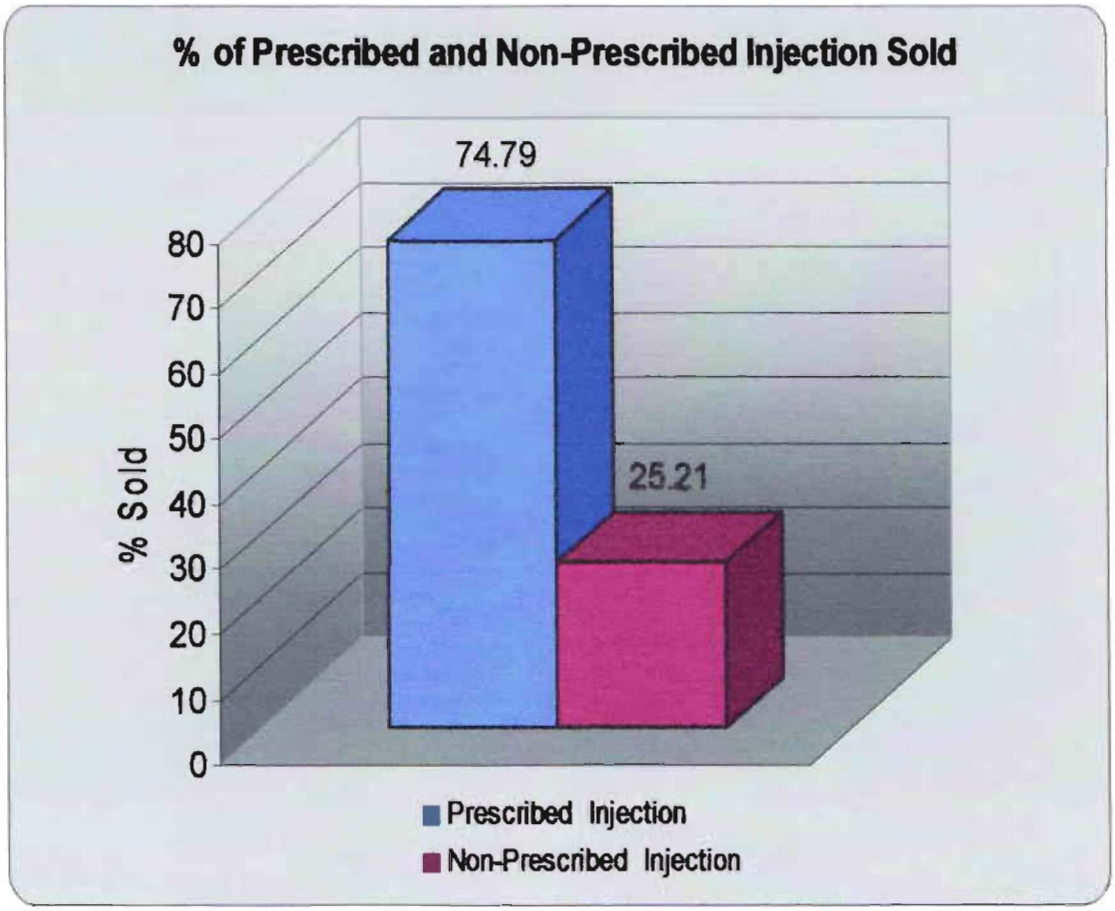

Figure 16: Percent sell of prescribed and non-prescribed injections.

6.4 Selling Pattern of Suppository:

Suppository is another one if the dosage forms that enables prompt onset of action by delivering the drug directly into systemic circulation but is not of patient compliance due to its hazardous administration. During the study period it was found that the sell of suppository was only 1.57% of the total sell.

Table 10: Percent sell of suppository.

Category	% Value
Total No. of Item Sold	98.43%
No. of Suppository Sold	1.57%

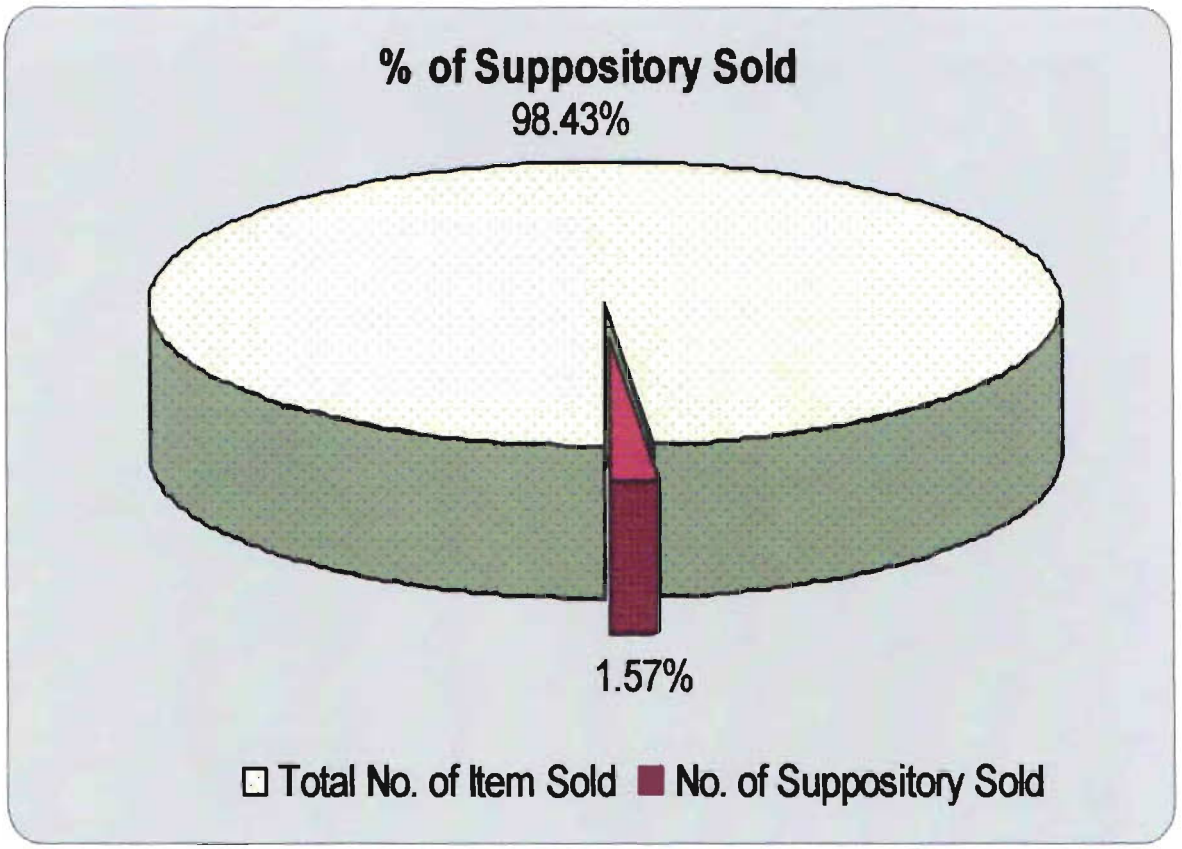

Figure 17: Percent sell of Suppository.

6.4.1 Selling Pattern of Prescribed and Non-Prescribed Suppository:

Though suppository has not achieved that much well acceptability by the patient, it was found during the study period that the sell of suppository was mainly accomplished by the non-prescribe sells and the prescribed sell of suppository was lower than the prescribed sell. As per the study out come, the percent sell of prescribed suppository was 44.83% and the percent of non-prescribe sell was 55.17%.

Table 11: Percent sell of prescribed and non-prescribed suppository.

Category	% Value
Sell of Prescribed Suppository	44.83%
Sell of Non-Prescribed Suppository	55.17%

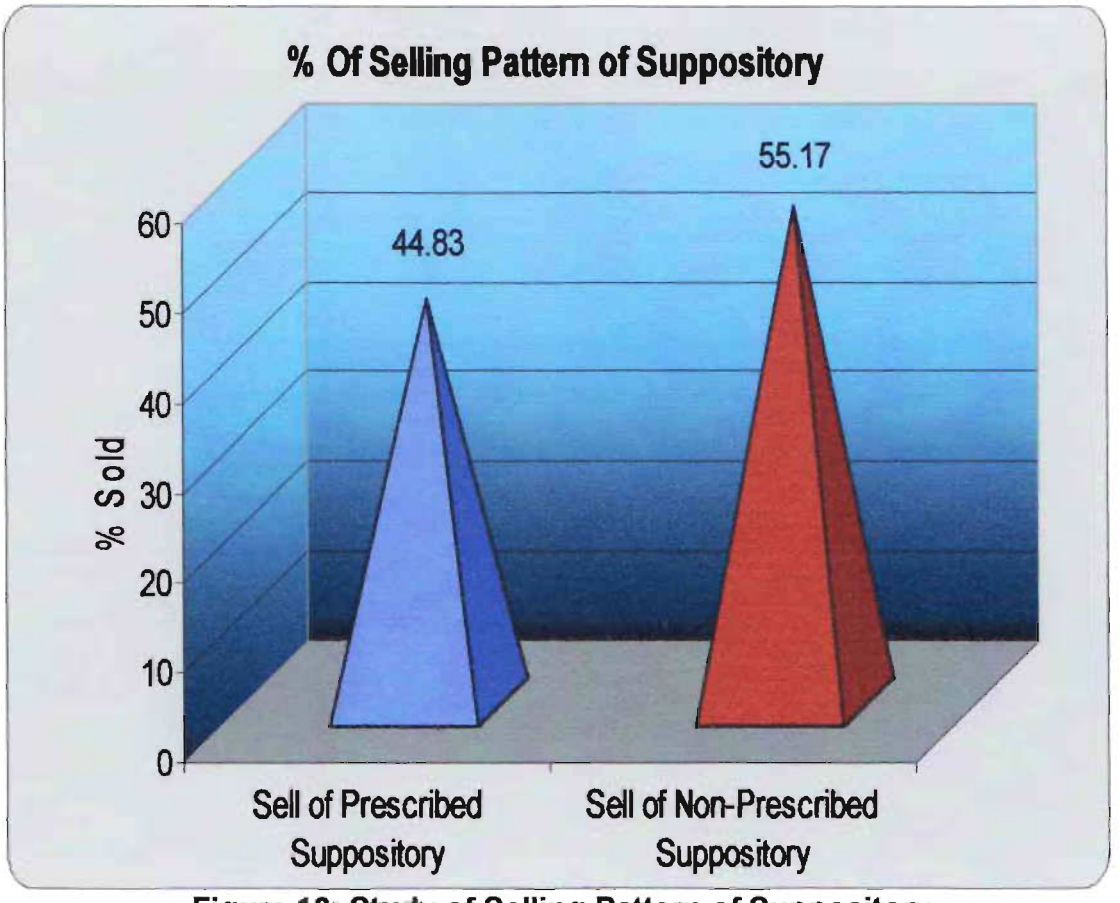

Figure 18: Study of Selling Pattern of Suppository

6.5 Sells of Aerosol and Dusting Powder:

In previous CFCs were used in aerosol as propellant in aerosols and thus the use of aerosol was discouraged by the Montreal Protocol that came into force in 1989. But still the use of aerosol is seen and during the study period sells of Aerosol was of 0.70% of the total item sold.

Dusting powder is one of another dosage form that is cheap as well as patient convenience also but the use of dusting powder is seen rarely. It was found during the study period that only 0.21%Dusting Powder was sold of the total item.

Table 12: Percent sell of both Aerosol and Dusting Powder.

Category	Value
% of Aerosol Sold	0.70%
% of Dusting Powder Sold	0.21%

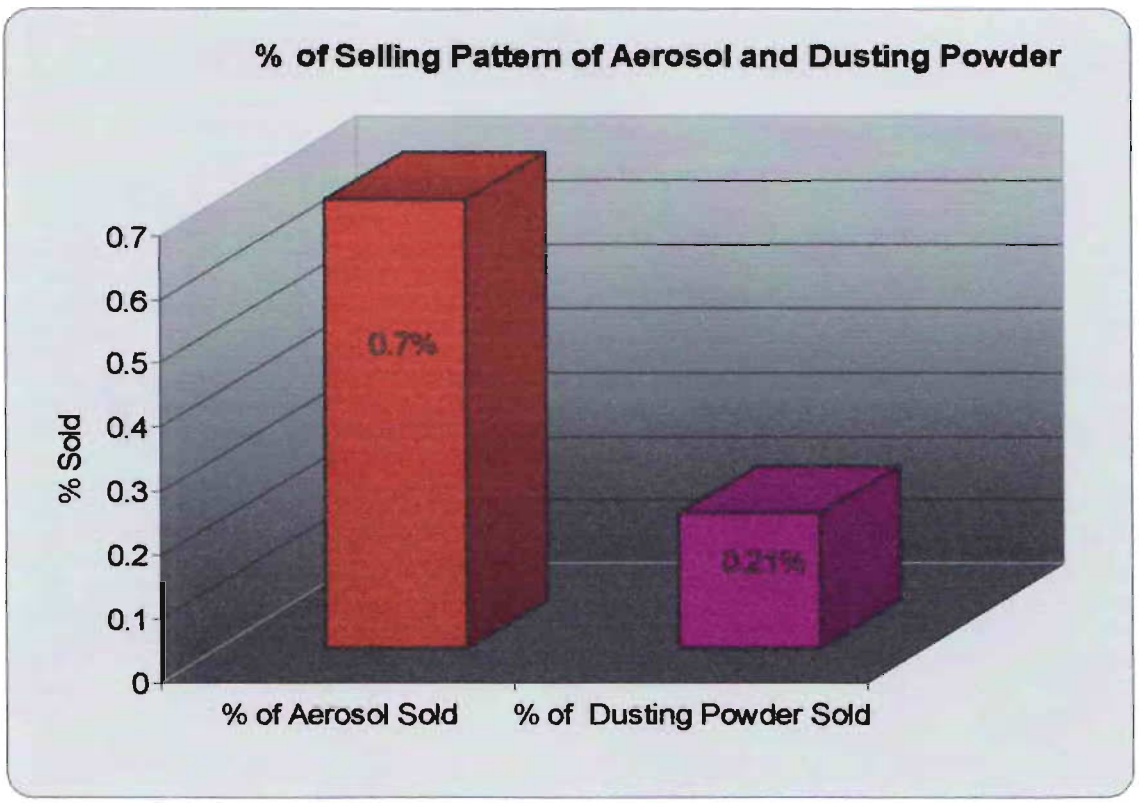

Figure 19: Percent sell of both Aerosol and Dusting Powder.

6.6 Use of both Allopathic and Traditional Medicine Together:

The importance of traditional medicine which is regarded as part of rural culture has began increasing attention through attempts to find alternatives to modem medicine to cure diseases without minimum chance of side effects. During the study period, it was found that 2.3% of the total item sold contained both allopathic and traditional medication system.

Table 13: Data on the sample contained both allopathic and traditional medicines.

Category	Total	Percent Value
Sample Size	1000	100%
No. of Sample Contained	23	2.3%

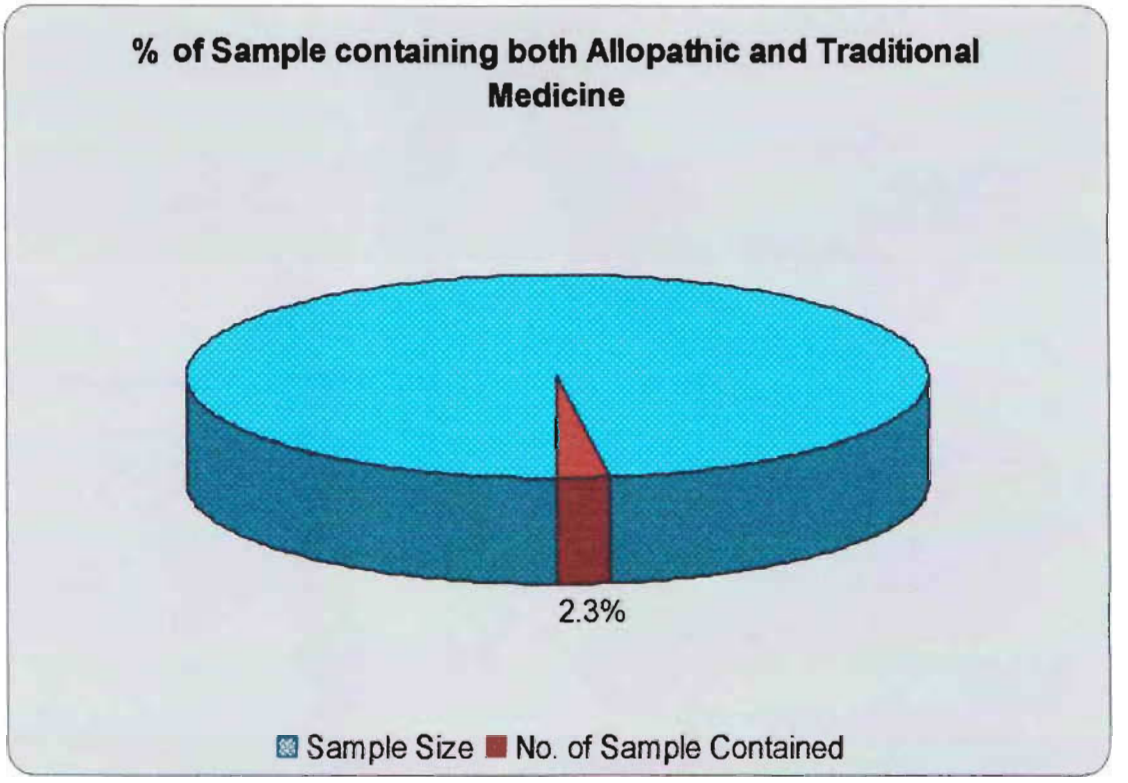

Figure 20: Percent of Prescription Sample containing both allopathic and traditional medicine together.

6.6.1 Prescribed Sample Containing Both the Allopathic and Traditional system of Medicine:

Now a day, very significant number of allopathic health care professionals began the practice to utilize the alternate or traditional medication system beside the allopathic treatments. The study result indicates that 0.2% of the total prescribed sample contained both the allopathic and traditional system of medicine.

Table 14: Percent of prescribed sample containing both the allopathic and traditional system of medicine.

Category	Total	% Value
Prescription sample with Allopathic Medicine alone	414	**98.52%**
Prescription sample with both Allopathic and Traditional Medicine	4	**1.48%**

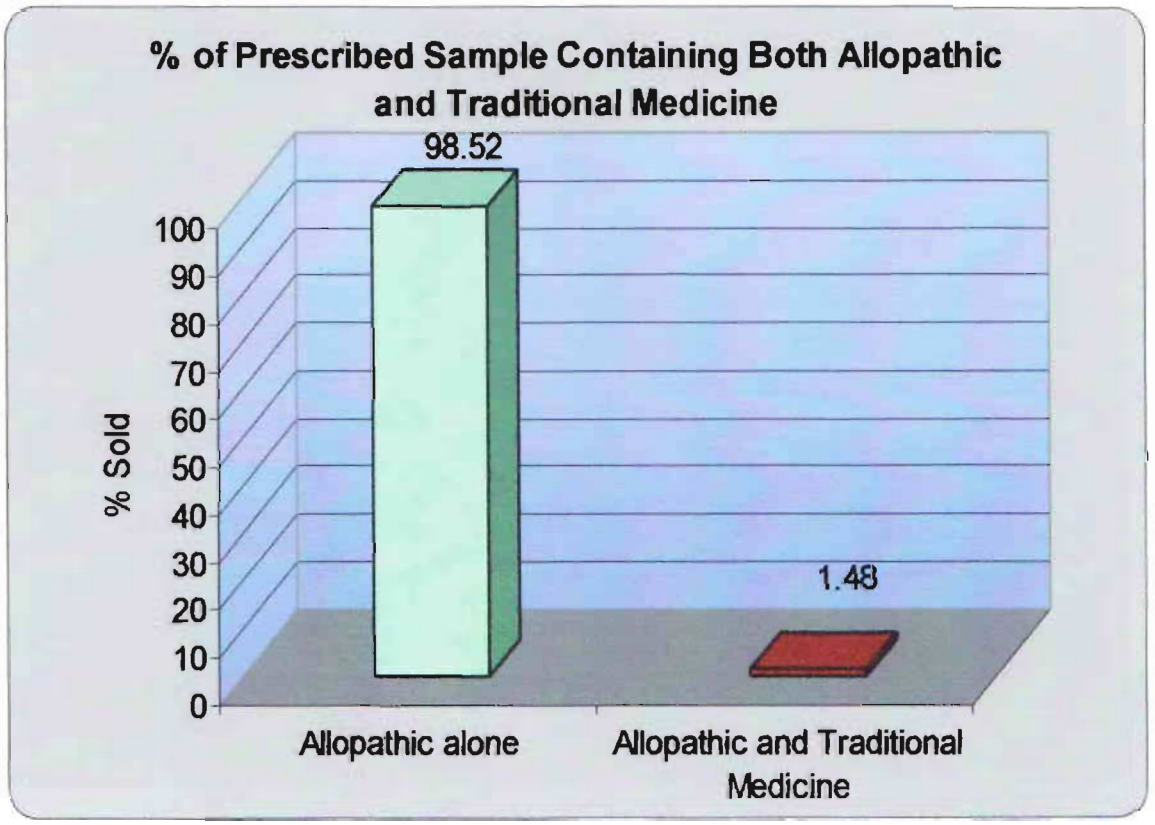

Figure 21: % of Prescribed Sample containing both Allopathic and Traditional Medicine

6.6.1 Percent Sell of the Combination of Allopathic and Traditional Medicine in Urban and Rural:

In the recent days, the popularity of traditional medicine is growing day by day. Though traditional medicines are regarded as part of rural culture, but during the study period it was found that the percent sell of traditional medicine in rural area was 2.25% of the percent sell in urban area 2.3%.

Table 15: Percent sell of the combination of Allopathic and Traditional medicine in Urban and Rural Area.

Category	Total	% Value
Sell in Urban (600)	14	**2.3%**
Sell in Rural (400)	9	**2.25%**

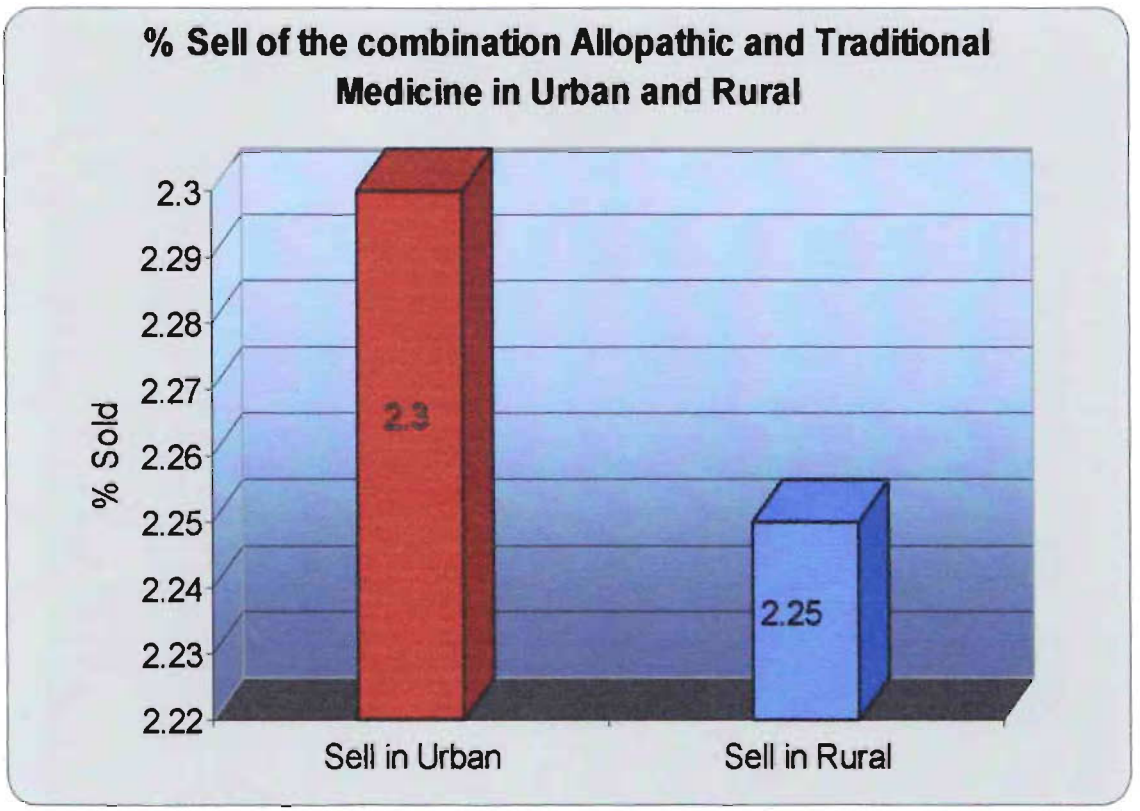

Figure 22: Percent sell of the combination of Allopathic and Traditional medicine in Urban and Rural area.

6.7 Unani and Ayurvedic Medicine:

Unani and Ayurvedic medicines are two most famous and established traditional medicational systems. The comparison of the percent sell of these systems from the study performed showed the percent sell of Unani 1.67% and Ayurvedic 0.27% of the total sell.

Table 16: Percent of Unani and Ayurvedic Medicine Sold.

Category	% Sold
Unani Medicine	1.67%
Ayurvedic Medicine	0.27%

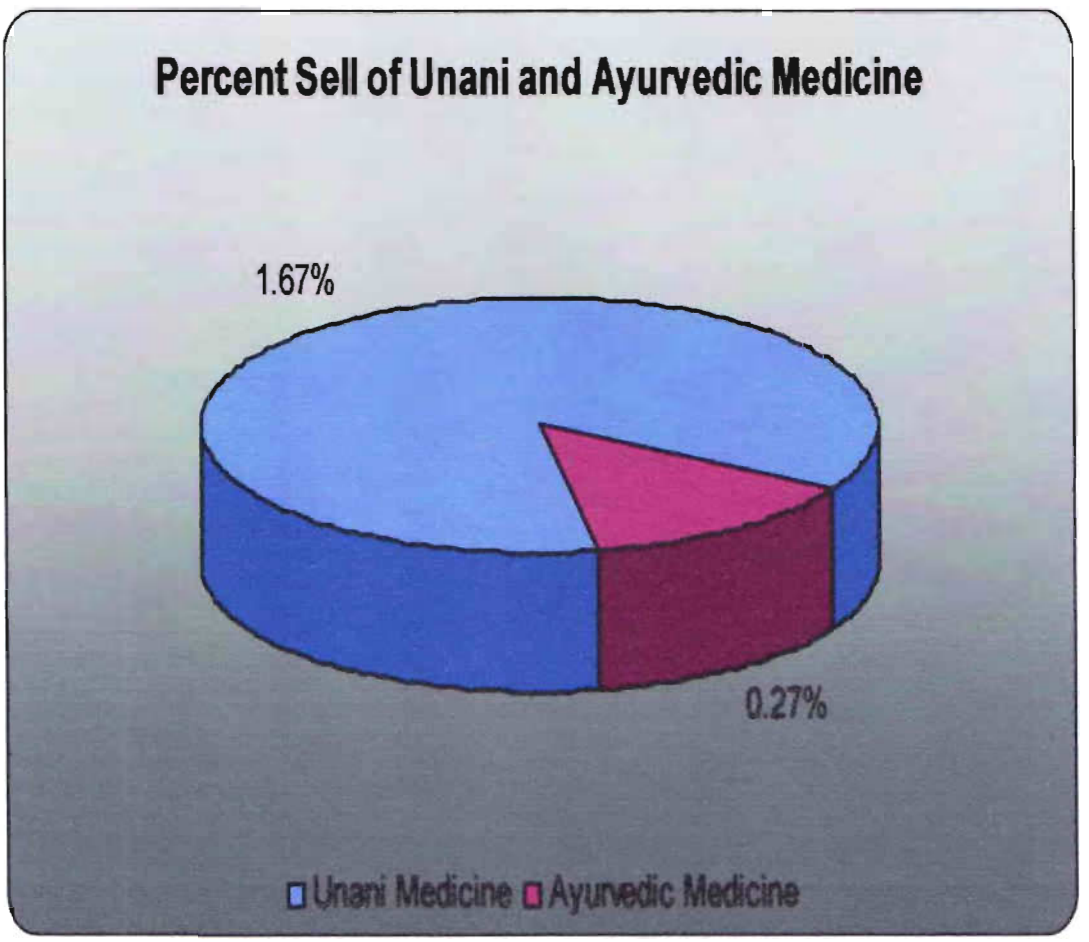

Figure 23: Percent sell of Unani and Ayurvedic Medicine.

6.8 Herbal Medicine:

Herbal preparations are the recent interest of the manufacturer, physicians and the patient to treat disease with allopathic medicine of natural origin. During the study period it was found that the total sell of Herbal product is 1.94%.

Table 17: Percent sell of Herbal Medicine.

Category	% Value
Other Items Sold	**98.06%**
Herbal Medicine Sold	**1.94%**

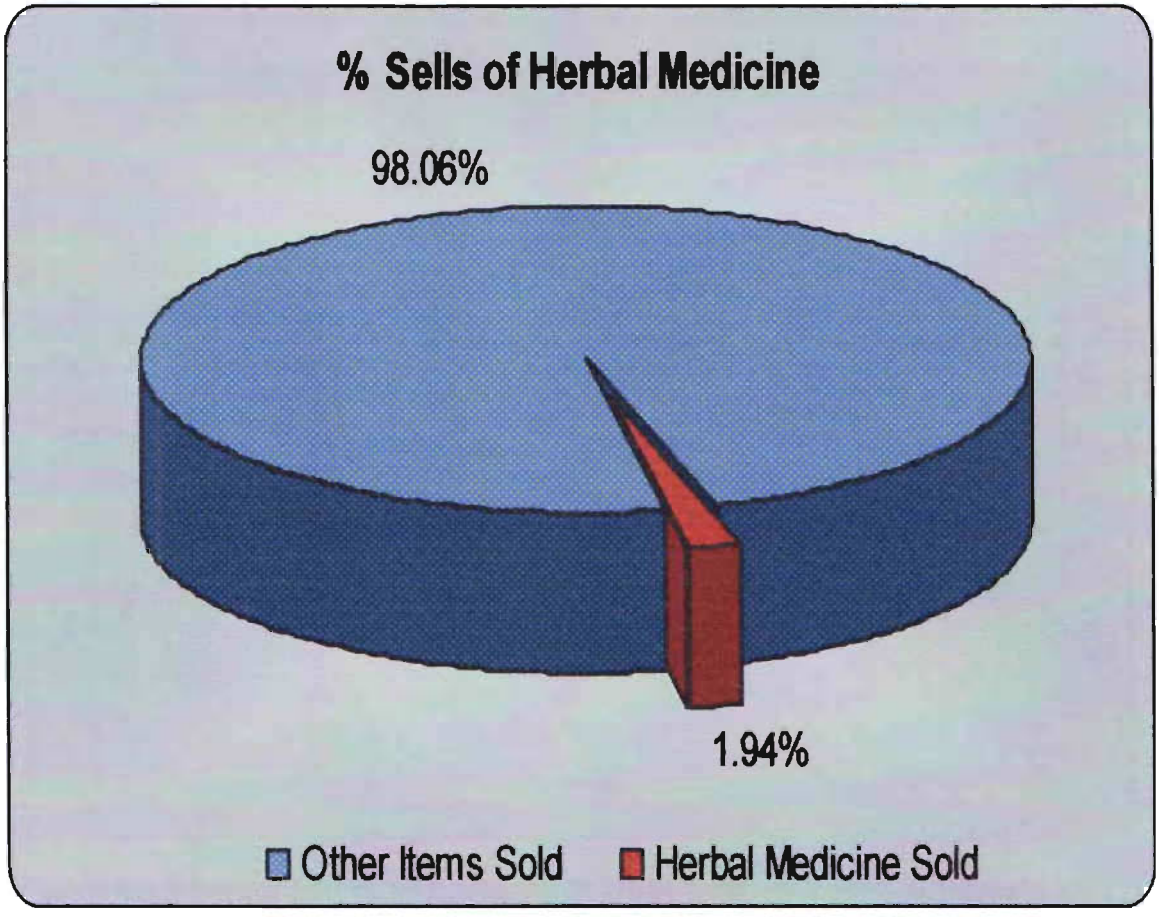

Figure 24: Percent sell of Herbal Medicine.

6.8.1 Percent Sell of Sex Stimulant versus Nerve Tonic, Digestant and Others:

Sex Stimulants from both Unani and Ayurvedic medicine systems are one of the most popular items in Bangladesh. The other popular classes include Nerve tonic, Digestant, Vitamin etc. The comparative study from the survey carried out have shown that the percent sell of Sex Stimulants was 0.54% and the percent sell of Nerve tonic, Digestant and others were 1.13% of the total (1852) sell of medicine.

Table 18: Percent sell of Sex Stimulant versus Nerve Tonic, Digestant and Others.

Category	% Sell
Sex Stimulant	0.54%
Nerve tonic, Digestant and Others	1.13%

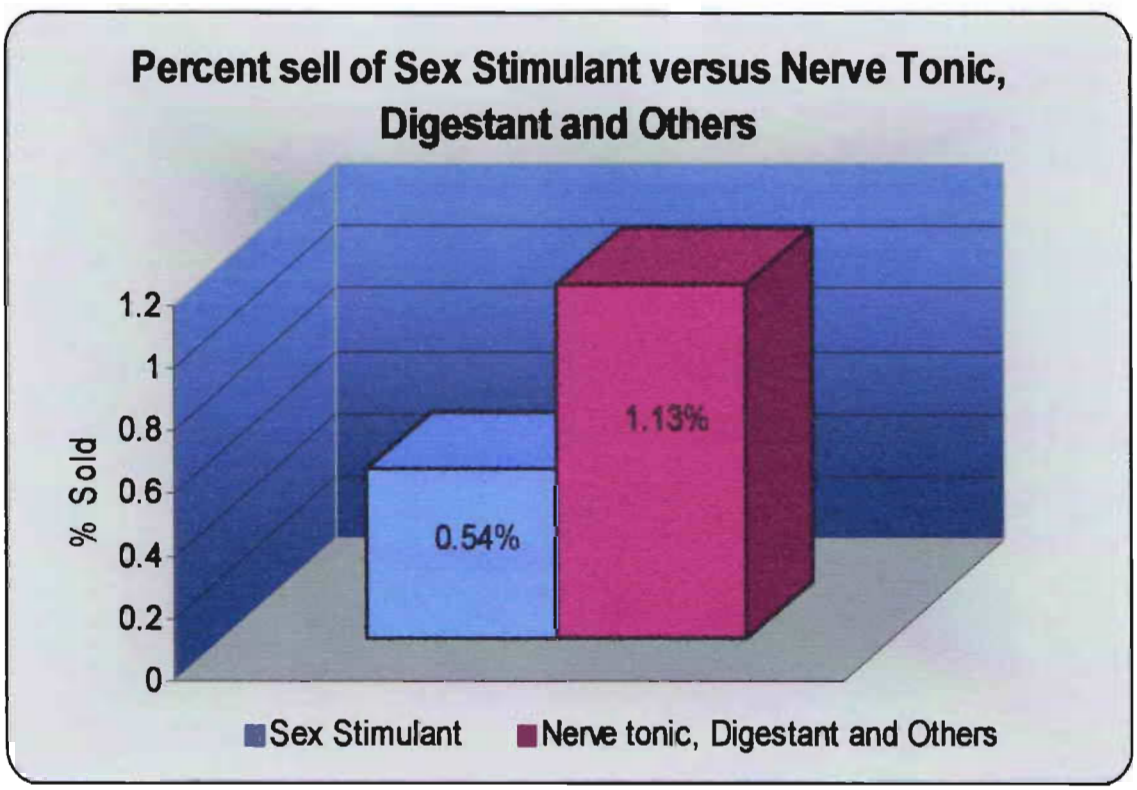

Figure 25: Percent sell of Sex stimulant versus Nerve Tonic, Digestant and Others.

6.9 Paracetamol and Diclofenac:

Both Paracetamol and Diclofenac are two most frequently used NSAIDs that are also included in the Essential Drug List. During the study period, it was found that the percent sell of Paracetamol and Diclofenac was 7.24% and 1.94% respectively of the total sell.

Table 19: Percent sell of Paracetamol and Diclofenac.

Category	% Sell
Paracetamol	7.24%
Diclofenac	1.94%

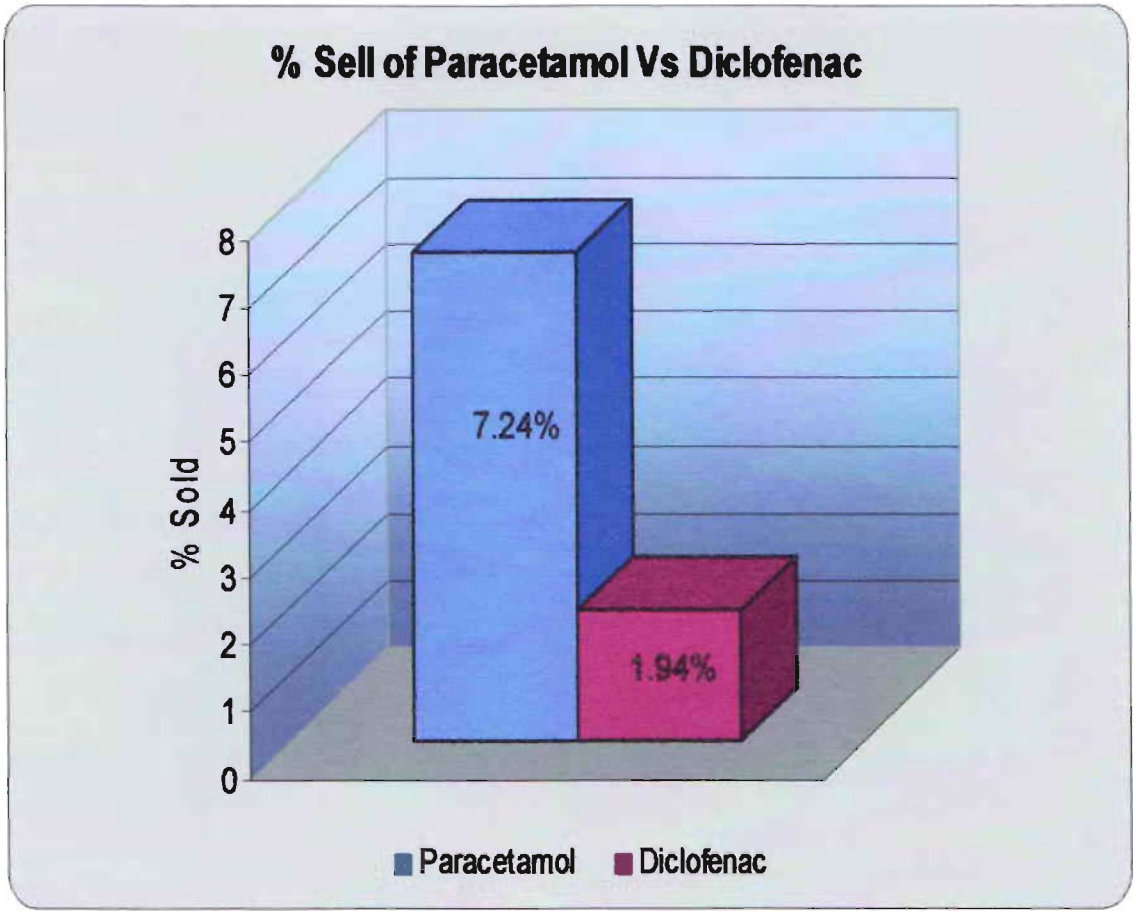

Figure 26: Percent sell of Paracetamol and Diclofenac.

6.10 Number of Drug Sold per Encounter:

The percent of number of drug sold per encounter calculated from the study carried out is as follows **(Table 20):**

Table 20: Percent of Number of Drug Sold per Encounter.

No. of Drugs per Encounter	% Sell	No. of Drugs per Encounter	% Sell
1 Drug	50.4%	6 Drugs	0.8%
2 Drugs	28.2%	7 Drugs	0.2%
3 Drugs	11.5%	8 Drugs	0.1%
4 Drugs	6.5%	9 Drugs	0.1%
5 Drugs	2.3%	10 Drugs or More	0.0%

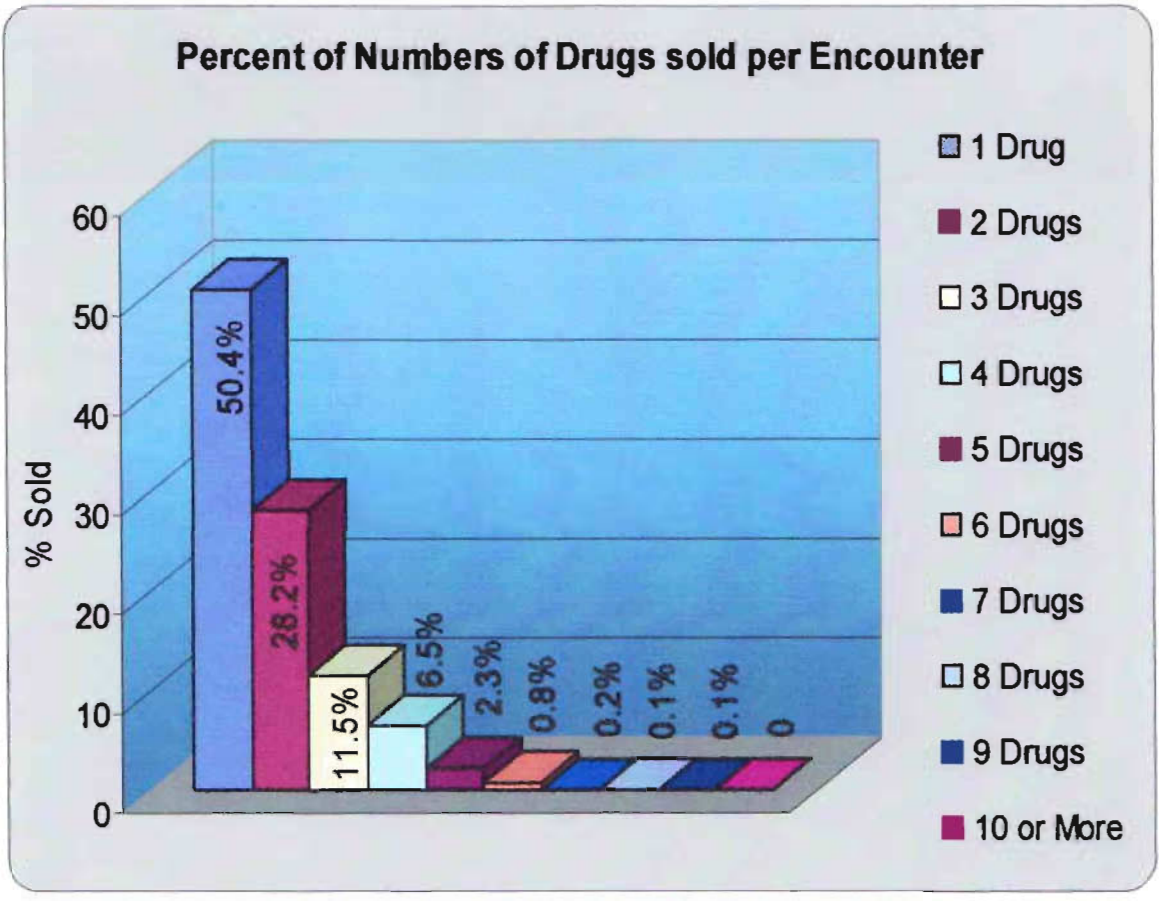

Figure 27: Percent of number of drug sold per encounter

6.11 Top Most Selling Companies and Their Market Share:

The drug market in Bangladesh is mainly dominated by top 30 companies. In terms of the National Percent sell of the companies, the study indicate 67.66% of the total market is captured by the best ten (10) selling companies and their percent sells are given below in **Table 21.**

Table 21: Percent sell of top ten selling companies.

Company	% Sell	Company	% Sell
Square	22.25%	SKF	3.83%
Beximco	8.42%	Aventis	3.75%
Opsonin	6.53%	ACI	3.35%
Incepta	6.48%	Reneta	2.97%
Acme	4.75%	Aristo	2.75%

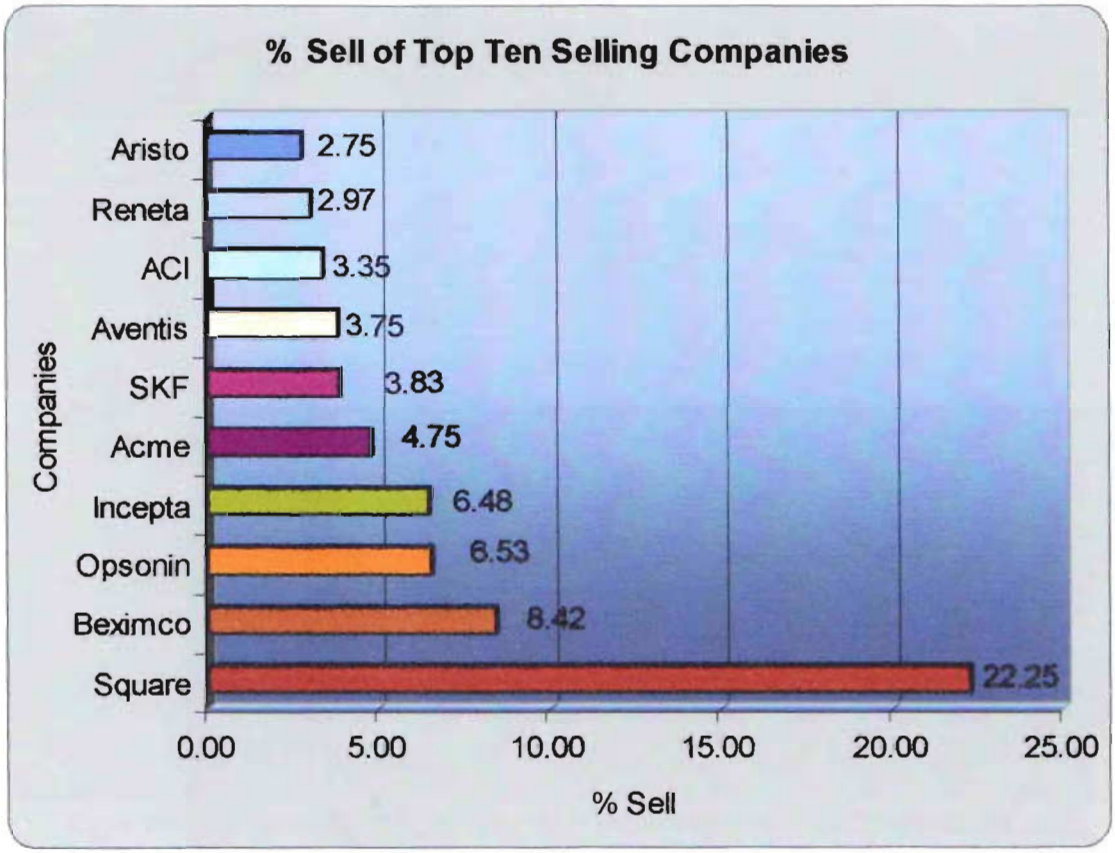

Figure 28: Hierarchy of percent sell of top most 10 selling Companies.

6.11.1 Status of the Companies in Mymensingh:

In Case of the drug market in Mymensingh, the top most ten selling companies are controlling 68.44% of the market in terms of selling their product. The percent sell for each of the top ten selling companies are as follows:

Table 22: Percent sell of Top ten selling companies in Mymensingh.

Company	% Sell	Company	% Sell
Square	23.45%	Aventis	3.80%
Incepta	7.60%	Reneta	3.68%
Opsonin	6.46%	Acme	3.55%
Beximco	6.34%	Drug Int.	3.42%
SKF	4.06%	ACI	2.92%

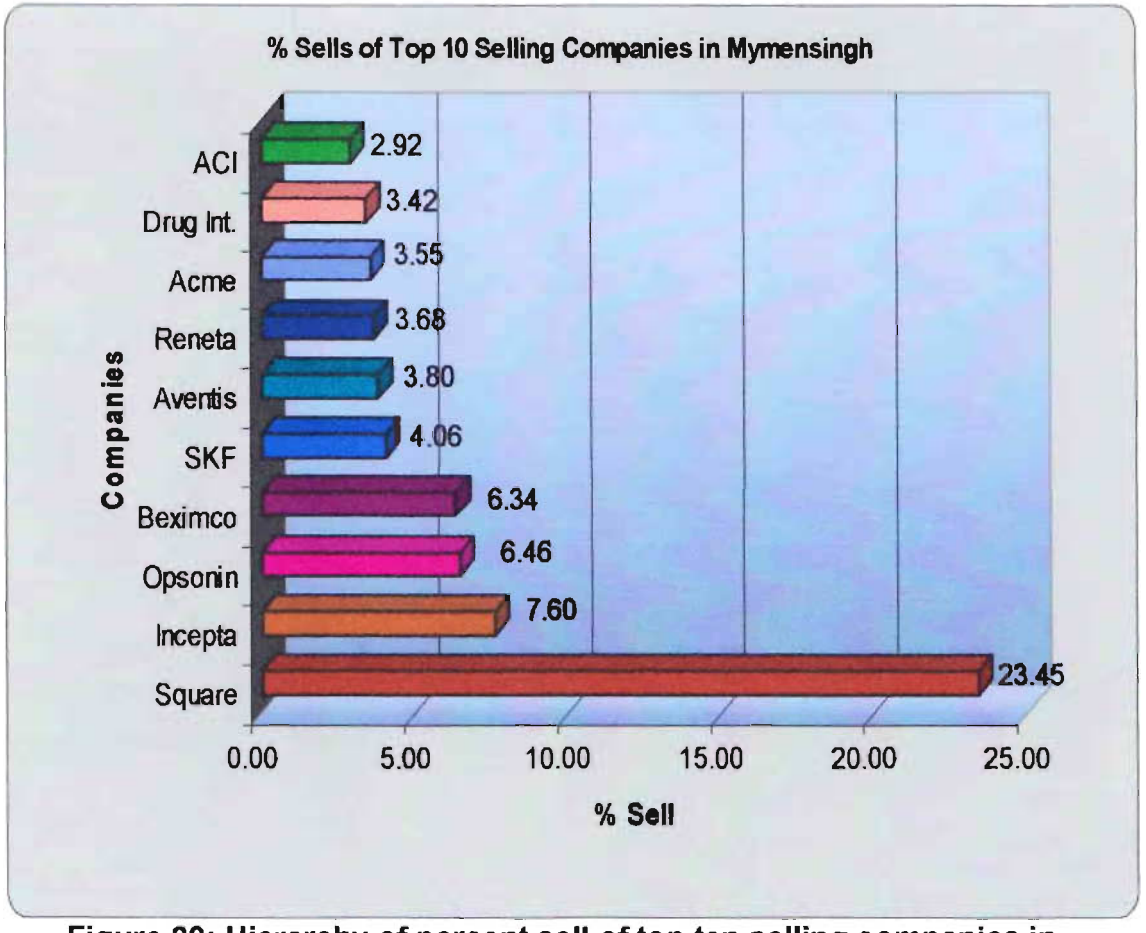

Figure 29: Hierarchy of percent sell of top ten selling companies in Mymensingh

6.11.2 Status of the Companies in Jamalpur:

In Case of the drug market in Jamalpur, the top most ten selling companies are controlling 67.57% of the market in terms of selling their product. The percent sell for each of the top ten selling companies are as follows:

Table 23: Percent sell of top ten selling companies in Jamalpur.

Company	% Sell	Company	% Sell
Square	20.44%	ACI	3.55%
Beximco	8.61%	Aristo	3.04%
Opsonin	8.28%	Aventis	2.87%
Acme	6.08%	Drug Inte.	2.20%
Incepta	4.90%	Reneta	2.20%
SKF	3.89%		

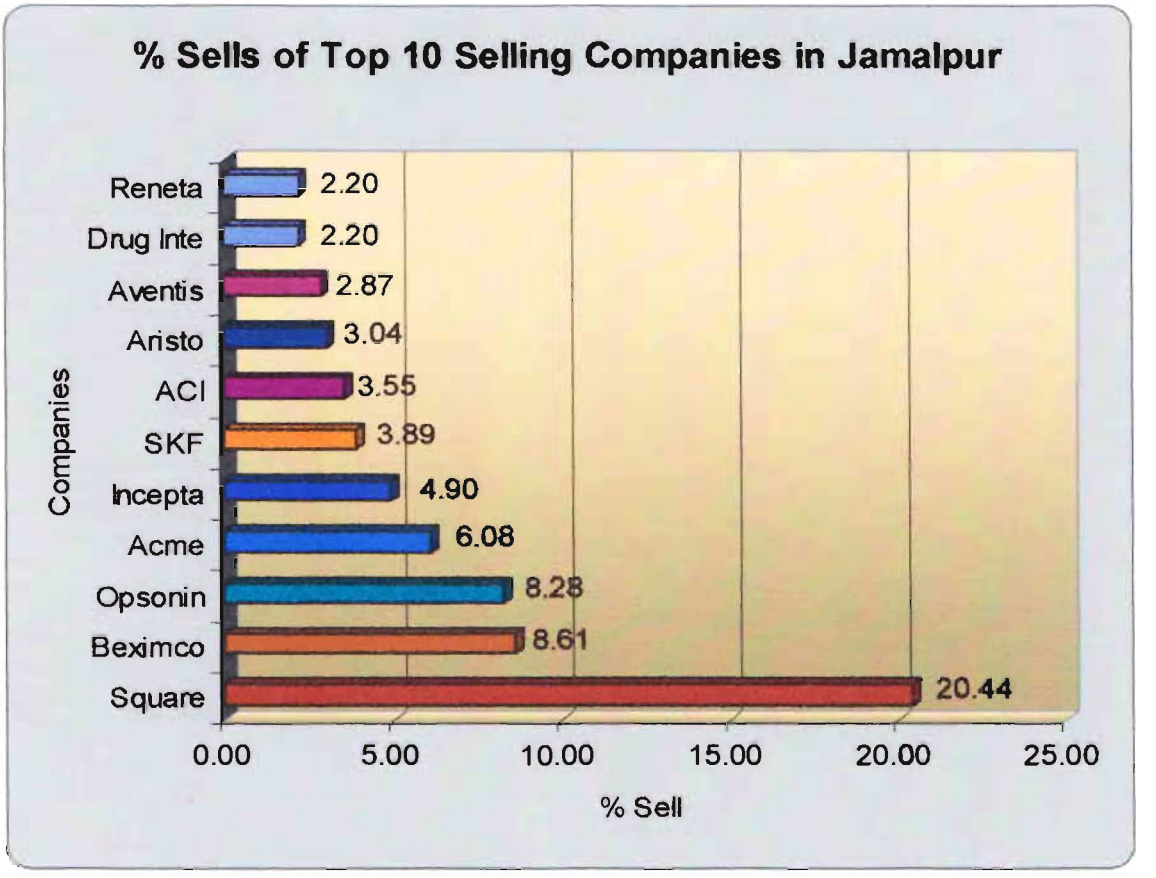

Figure 30: Hierarchy of Percent sell of top ten selling companies in Jamalpur.

6.11.3 Status of the Companies in Sherpur:

The drug market in Sherpur is controlled by 65.82% by the top most ten selling companies are in terms of their percent sell of products. The percent sell for each of the top ten selling companies are as follows:

Table 24: Percent sell of top ten selling companies in Sherpur.

Company	% Sell	Company	% Sell
Square	22.29%	Aristo	4.03%
Beximco	11.68%	ACI	3.82%
Incepta	6.58%	SKF	3.40%
Acme	5.10%	Reneta	2.76%
Opsonin	4.46%	Drug Int.	1.70%

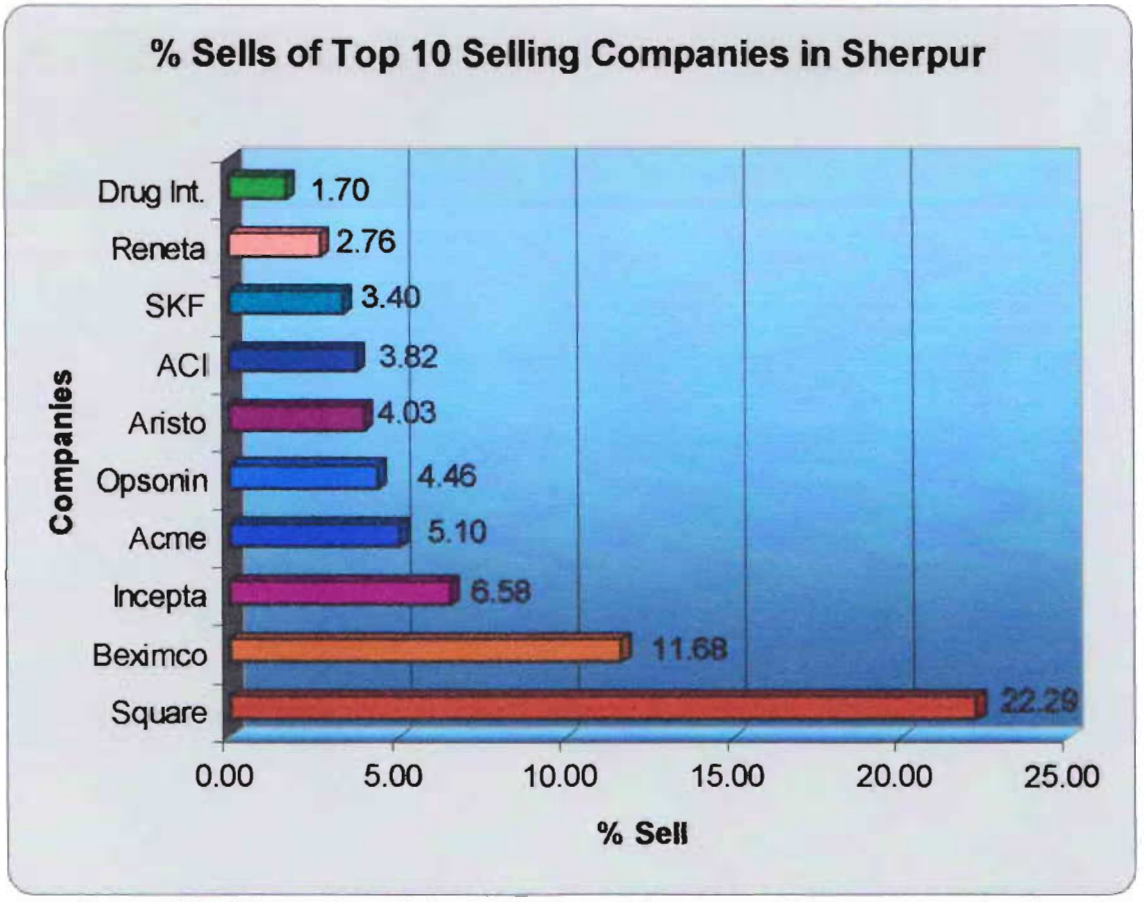

Figure 31: Hierarchy of Percent sell of top ten selling companies in Sherpur.

6.12 Market Share of National and Multinational Companies:

After the liberation of Bangladesh, the drug market of Bangladesh was mostly dominated by the Multinational companies but the implementation of Drug Control Ordinance 1982 totally reversed the situation. It was found during the study period that the market share of the multinational companies is only 8.53% whereas the share of national companies is 91.47%.

Table 25: Market Share of National and Multinational Companies.

Category	% Value
Sell Of National Companies	91.47%
Sell Of Multi-National Companies	8.53%

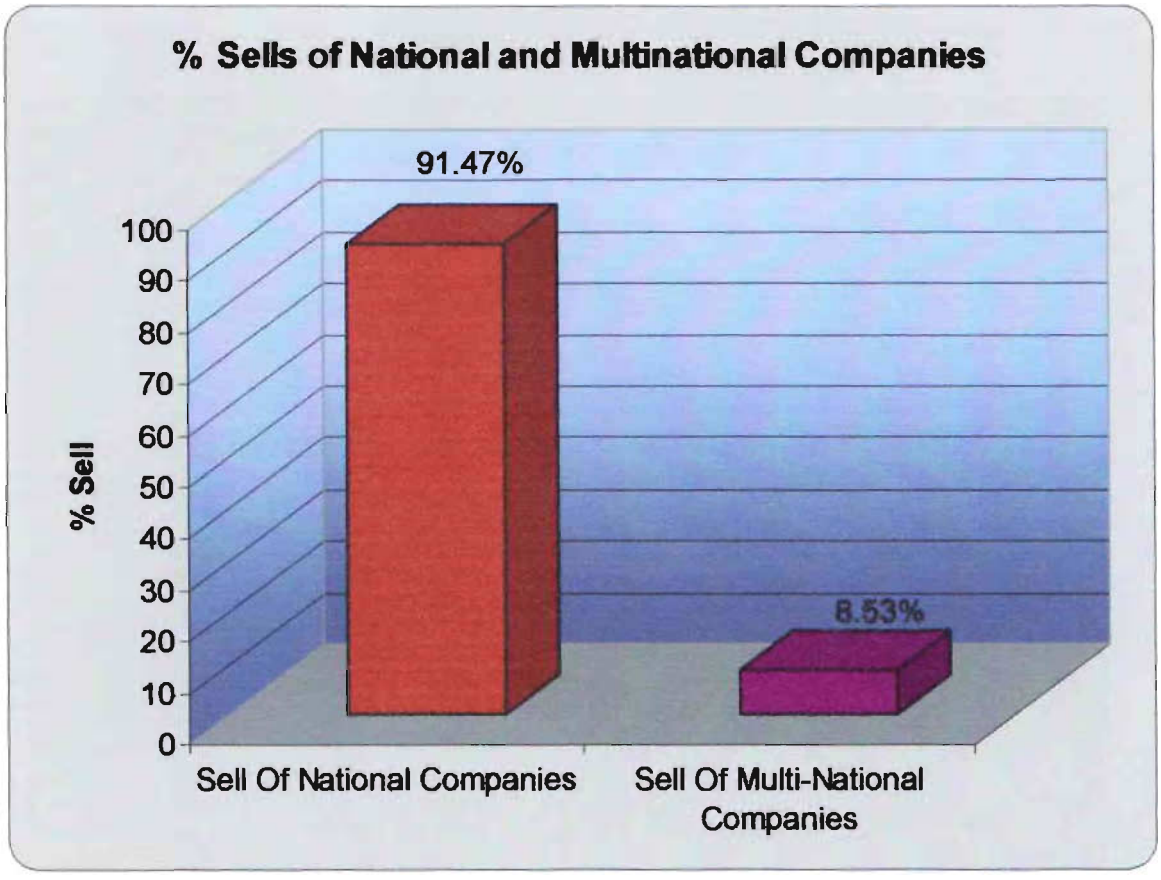

Figure 32: Percent Sell of National and Multinational companies

6.13 Imported Drugs:

The local demand of medicine was meet mainly by importing the medicines from abroad, prior of the introduction of the Drug Control Ordinance 1982. But at present the drug industry of the country have grown enough to meet the demand of medicine by the nation. It has been found from the study that, only 1.51% of the sophisticated and high technology medicines are sold by importing them from abroad and the rests 98.49% of medicines are being manufactured in the country.

Table 26: Percent of Imported and Locally manufactured medicines sold.

Category	Value
% of Manufactured Drug	98.49%
% of Imported Drug	1.51%

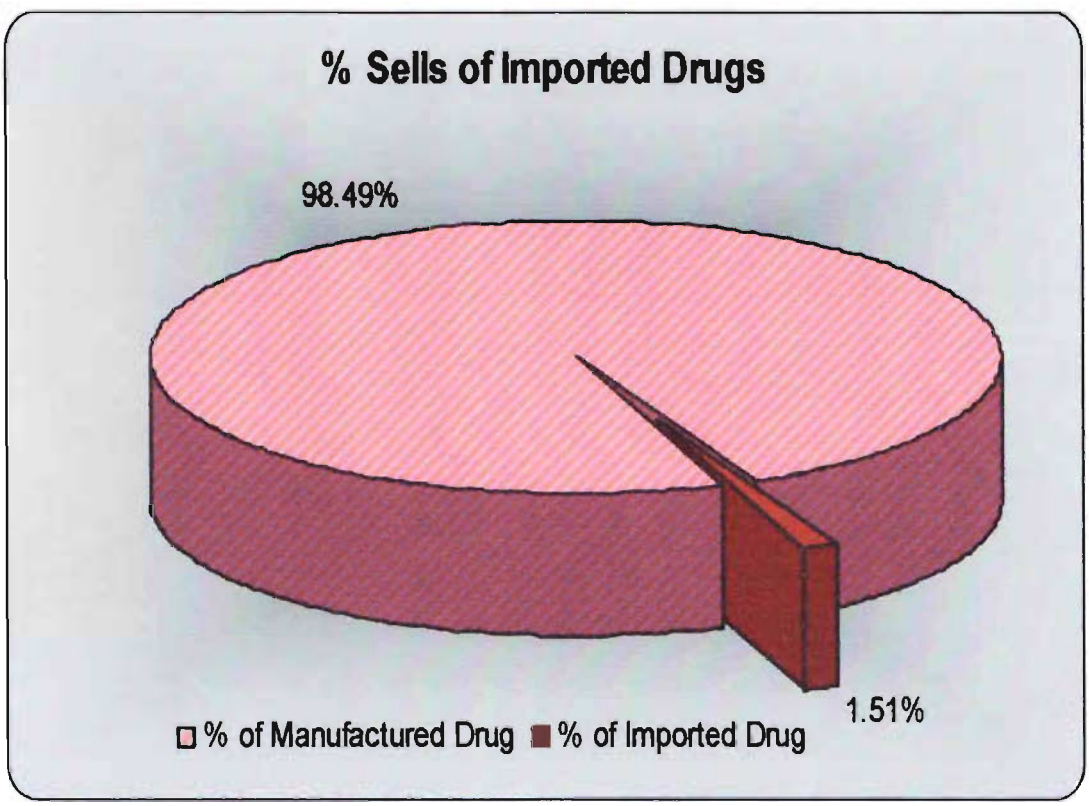

Figure 33: Percent of Imported and Locally manufactured medicines sold

Chapter 07

Report Summary

7. Report Summary:

The study has been carried out to find out the selling pattern of drug in Bangladesh. The studies have been performed with 1000 samples collected from Mymensingh, Jamalpur and Sherpur. During sample collection, it was considered to collect the sample from both urban and from the respective rural area of that urban.

The total percent of prescription sell found was 41.8% and the comparative percent of sell found in Mymensingh city was 46.25% and outside of Mymensingh city was 38.83%. The area wise percent of prescription sell found were Mymensingh 46.25%, Jamalpur 45% and Sherpur 32.67%.

The hierarchy of the popularity of the types of dosage forms found was- Solid (73.48%), Liquid (10.96%), Parenteral (6.64%), Semi-solid (3.67%), others (3.07%), and Ophthalmic (2.15%); and similarly the hierarchy found for the top five popular dosage forms were- Tablet (57.5%), Capsule (13.8%), Syrup (7.07%), Suspension (3.38%) and Vial (2.48%).

The percent of injection sold, found during the study period was 6.64% of the total sell among which the percent sell of prescribed injection was 74.79% and the percent of non-prescribed injection was 25.21%. More over, the percent of prescribed sample containing injection was 22.01%.

Being a non popular dosage form, the percent of suppository sold was only 1.57%, among which only 44.83% percent was sold by prescription and the rest 55.17% were sold without any prescription. The percent sell of aerosol and dusting powder found was 0.70% and 0.21%.

The percent sell of the combination of both Allopathic and traditional medicine found from the study was 2.3% form 1000 sample, among which 2.3% was sold in Urban (Urban Sample 600) and 2.25% in rural (Rural Sample 400) and the percent of prescribed sample containing such combination was only 1.48% of the

total prescribed sample and the rest 98.52% contained the allopathic medicines only.

According to the study performed, the percent sell of Unani medicine, Ayurvedic medicine and Herbal medicine was 1.67%, 0.27% and 1.94% respectively. Among the all traditional medicines sold, 0.64% was sex stimulants in nature and the rest 1.13% were constituted Nerve tonic, Digestant, Vitamins and others.

Beside these, it was found from the study that percent sell of Paracetamol and Diclofenac was 7.24% and 1.94% respectively. The study also indicated that the percent of sample containing one, two, three, four, five six, seven, eight, nine and ten or above drug was 50.4%, 28.2%, 11.5%, 6.5%, 2.3%, 0.8%, 0.2%, 0.1%, 0.1% and 0.0% respectively.

The market share of national companies was 91.47% and multinational companies were 8.53%. It was found from the study that only 1.51% of the total sell was of imported drugs.

With accordance with the study performed, the market share of top ten selling companies is 65.06% and their individual share is- Square 22.25%, Beximco 8.42%, Opsonin 6.53%, Incepta 6.48%, Acme 4.750%, SKF 3.83%, Aventis 3.75%, ACI 3.35%, Reneta 2.97% and Aristo Pharma 2.75%.

In case of Mymensingh, the market share of the top ten selling companies according to the study is 66.67% and their individual share is- Square 23.45%, Incepta 7.60%, Opsonin 6.46%, Beximco 6.34%, SKF 4.06%, Sanofi Aventis 3.80%, Reneta 3.68%, Acme 3.55%, Drug International 3.42%, ACI 2.92% and Imported items 1.39%.

In case of Jamalpur, the market share of the top ten selling companies according to the study is 66.05% and their individual share is- Square 20.44%, Beximco 8.61%, Opsonin 8.28%, Acme 6.08%, Incepta 4.90%, SKF 3.89%, ACI 3.55%, Aristo 3.04%, Sanofi Aventis 2.87%, both Drug International and Reneta 2.20%.

In case of Sherpur, the market share of the top ten selling companies according to the study is 65.82% and their individual share is- Square 22.29%, Beximco 11.68%, Incepta 6.58%, Acme 5.10%, Opsonin 4.46%, Aristo Pharma 4.03%, ACI 3.82%, SKF 3.40%, Reneta 2.76% and Drug International 1.70%.

Chapter 08
Conclusion

8. Conclusion

In Bangladesh almost all types of medicines are really very available. Day by day the demarcation line between prescribed and nonprescribed drugs is getting blurred despite the non promotional activities of the pharmaceutical companies. The tendency to purchase and sell OTC drugs bears the risk of circulation of unauthorized drugs among the mass people. The factor analysis has extracted 11 factors which contribute to the selection of any medicine without the proper medical documents. The above analysis has shed light on factors of multiple dimensions.

Amongst the most important factors for purchasing an OTC drug, past experience, corporate image and brand identity, prior assumption of physician's prescription, awareness about the medicines are mentionable ones. In the rural areas, where the physicians are not very easily accessible, people have to rely on their past experience and own knowledge about the disease. In Bangladesh, promotional activity in mass media of pharmaceutical products is strictly prohibited. That is why; the companies have to rely solely on the sales force and physicians for promoting their products. Brand identity grows among the mass people just through personal experience and Word of Mouth Marketing. There are some brands which are like grocery items to us. Govt. in Bangladesh has restricted the boundary of OTC drugs. But that margin has been crossed grossly long time ago. This type of phenomenon is a desired one for the marketers as they are reaping the benefit without making any significant marketing effort but it may not be a healthy practice for the consumers as they are simply a layman to take decision regarding medication to heal any disease. So to cease this type of tendency in Bangladesh, the concerned authority should focus, on the outset, on the variables that force the customer to buy any drug without proper document and create awareness about the negative side of this practice.

The following recommendations can be suggested based on the present study:

1. Establishment of Hospital Pharmacy and Community Pharmacy in the country.

2. An interdisciplinary approach involving physicians, nurses, pharmacists, economists, sociologists, communication specialists, manufacturers and others should address the problem of inappropriate use of drugs.

3. The policy makers, manufacturers and the medical professionals should be committed to uphold the status of public health systems of the country through the implementation of the noble objectives of the NDP.

4. The drug regulating authority should increase drug testing facilities and manpower in order to control the quality of all the medicines available.

5. The price controlling mechanisms should be stricter to ensure easy affordability of essential medicines in the country.

6. The primary health care systems of the country need to be aware to improve drug utilizations in the rural areas. The government should be more concern to eliminate substandard drugs from rural areas.

7. The government should ensure a steady supply of good quality essential medicines in the government health care facilities.

8. Post-marketing surveillance and adverse drug reactions monitoring should be initiated for all the currently marketed drugs.

9. Mass media like radio, television and newspapers can be used to create awareness and to educate the consumers about dos and don'ts of rational drug uses.

10. Participation of local and international NGOs are necessary to promote high quality and rational use of drugs.

11. Drug sellers should be trained properly to minimize inappropriate drug dispensing and recommendations.

Chapter 09

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Chapter 10
Annexure

Annexure-1

Survey on Drug Selling Pattern

Name of Researcher : **Sample No. :**

Location of Shop : **Thana:** **District:**

Types of Sell: ○ **Prescription** ○ **Non-Prescription**

Serial	Brand Name	Generic Name	Dosage Form																	
			Solid			Semi-Solid			Liquid		Ophthalmic				Injections			Others		
			Tablet	Chew Tablet	Capsule	Ointment	Cream	Suppository	Syrup	Suspension	Eye Ointment	Eye Drop	Ear Drop	Nasal Drop	Infusion	Ampoules	Vials	Aerosol	Dusting Powder	Miscellaneous

Annexure 02

Name of Researcher:

Location of Shop: Thana: District:

No of Sample: #Prescription: #Non-Prescription:

Solid	**Tablet**					
	Chew Tab					
	Capsule					
Semi-Solid	**Ointment**					
	Cream					
	Suppo.					
Liquid	**Syrup**					
	Suspension					
Ophth	**Eye Oint**			**Ear Drop**		
	Eye Drop			**Nasal Drop**		
Injec	**Infusion**					
	Ampoules					
	Vials					
Others	**Aerosol**					
	Dusting					
	Miscell					

Sample Containing No. of Medicine					
01			06		
02			07		
03			08		
04			09		
05			10		

No. Sample Containing Both Allopathic & Traditional Medicine	

No. Sample Containing Different Traditional Medication		
Sex Stimulants		
Nerve Tonic, Digestive & Others		

No. Sample Containing Unani & Ayurvedic Medicine		
Ayurvedic		
Unani		

No. Sample Containing Paracetamol and Diclofenac		
Paracetamol		
Diclofenac		
Aceclofenac		

No. Sample Containing Suppository		**Total:**
Prescribed		
Non-Prescribed		

Annexure 03

Companies

ACI	
Acme	
Alcon	
Amico	
Apex	
Aristo	
Asiatic	
Aventis	
Beacon	
Benham	
Belsen	
Beximco	
Bio-Pharma	
Bristol	
Bufco	
Chemist Lab	
Decent	
Delta	
Dr.'s Chemi	
Drug Int.	
Edruc	
Fisons	
Gaco	
General	
GSK	
Globe	
Hamdard	
Health Care	
Hudson	
Ibn Sina	
Incepta	
Jayson	
Modi-Mundi	
Mystic	
Navana	
Novartis	

Novo H.C	
Novo N.disk	
Nuvista	
Opsonin	
Organon	
Orion	
Oweshadhi	
Pacific	
Paraugs	
Peoples	
Popular	
Proteety	
Radient	
Rangs	
Reneta	
Rephco	
Roche	
Sandoz	
Serveier	
Smsl-Alamin	
Silva	
SKF	
SMC	
Square	
Sun	
Tasty Foods	
Tech.Drugs	
Unimed	
Universal	
White Horse	
Ziska	