Available on line www.jocpr.com

Journal of Chemical and Pharmaceutical Research

J. Chem. Pharm. Res., 2010, 2(1): 106-112

ISSN No: 0975-7384

Drugs Hazards and Rational Use of Drugs: A Review

S. C. Shivhare[1], H. K. Kunjwani[2], A. M. Manikrao[2,] A. V. Bondre[3]

[1]Vels college of Pharmacy Pallavaram, Chennai (Tamil Nadu)
[2]Parul institute of Pharmacy, Limda, Vadodara (Gujarat)
[3]Bajiraoji Karanjekar College of Pharmacy, Sakoli, Dist. Bhandara(M.S)

Abstract

Ever since the accessibility of modern medicine increased all over the world, the rampant and misuse also increase considerably. A continuous research resulting in introduction of the newer compounds is going on. Many of these are being introduced and used without complete of drugs. The pharmacist because of different reasons is unable to practice the rational drug therapy that is supply right drug, at right time in right dose to the patient. The present article takes the help of some published reports to explain irrational or misuse of drug leading to fatal effect. The article also highlights the major reasons involved in the irrational use of drugs. Not only the irrational use but the drugs having the adverse reaction and hazardous effects are also used in large amount in developing nations due regulatory reasons. The use of these drugs without the complete knowledge has also a major problem. In this article the author has given emphasis on the drug hazards and rational use of drug by giving some reports like US FDA, different hazardous effect of drug. Author has also explained the rational use of drug in terms of medical, socio economic and some legal aspects along with reasons for irrational use of drug and obstacles exist in rational drugs, also includes some steps to improve rational drug prescribing method, and conclude that drug may act as a God or may act as a Devil if not used properly.

Key words: Misuse of drugs, different hazards of drugs, US FDA reports, WHO reports, irrational use of drugs, reasons for irrational use of drugs.

Introduction

Ever since the accessibility of modern medicine increased all over the world, the rampant and misuse also increase considerably. People take medicines on their own, often without consulting their family doctors. Thus there is an increasing tendency for self medication. Drugs are like a knife, means it shows both activities, harmful as well as useful. In similar manner drugs act as a fire which is very much beneficial for human being, if used by accurate hands and if not it may swallow the whole world .Any patient suffering from deathful diseases for example in case of Cancer,T.B etc. the patient have to fully relay over the drugs. If he do not go with the drugs then he may get life threatening effects, so it is widely proved that importance of drugs cannot be neglected. In other words if drugs used in proper manner like its dose ,route of administration, choice of drug ,etc. it may give the magical effect but if we alter any standards related the procedure of drug administration or whole drug and the same can create lots of problem, except from those which are initially with patients. The drug encounter in day to day use may have broad spectrum of physical, chemical, toxicological and physiological effect which may give, acute effect or Chronic effects so that we are trying to highlight the effects of drug causes death or related problems with help of US FDA report showing in table 1.

Table 1.

US FDA reports that 12000 deaths and 15000 cases of hospitalization in US are due adverse drug reaction.
Nearly 98000 Americans die each year due to medical mistakes, out of which 7000 cases are due prescription errors.
In US hospitals, nearly 25% -50% of all ANDRADE'S are due to medication errors.
Drug related mobility reduces quality of life and results in loss of work and loss of money
Drug related morbidity cost as much as 7 billion US dollars.

Adverse reaction /effects:

Adverse effects has defined by WHO as any response by a drug which is noxious, unintended and occurs at doses in man for prophylaxis, diagnosis or therapy in turns it may give such hazards effect for a fatal life.(in table 2.)

Table 2. Drugs with significant adverse effect on fetus

DRUGS	EFFECTS
ACE Inhibitors	Renal damage
AMPHETAMINE	Abnormal developmental patterns, decreased school performances
ANDROGENS	Masculinization of female fetus
ANTIDEPRESSANTS	Neonatal withdrawal symptoms have been reported with clomipramine
COCAINE	Increased risk of spontaneous abortion, premature labour,neonatal cerebral infraction, decreased school performances
LITHIUM	Ebstein is anomaly.
ORGANIC SOLVENTS	Multiple malformations.
SMOKING(Constitutes of Tobacco Smoke)	Intrauterine growth retardation,prematurity,sudden infant death,syndrome,perinatal complications
STREPTOMYCIN	Eight nerve toxicity.

Side effects

Many unwanted effects of drugs are medically trivial and in order to avoid inflating the figures of drugs induced disease, it is convenient to retain the term side effects.(as in table 3.)

Table 3. Drugs contradicted during lactation

DRUGS	ADVERSE EFFECTS
ANTINEOPLASTIC AGENT	Carcinogenesis, immunosuppressant.
ANTIMICROBIAL AGENT E.G::CIPROFLOXACIN	Bone marrow depression, atropathy.
PSYCHOACTIVE AGENTS E.G.:-MARIJUANA	Insomnia, hypotonia, bradycardia, CNS stimulation.
ANT THYROID DRUGS E.G:CARBIMAZOLE	Hypothyroidism.

Toxicity

Toxicity implies a direct action of the drug, often at high dose ,damaging cell for e.g.:-liver damage from Paracetamol overdose.(table 4.)

TABLE 4. Drugs suspected or proven to cause malformation

DRUGS	MALFORMATION
CARDIOVASCULAR DRUGS E.G:ACE INHIBITORS	Renal anamolies,pulmonary hyperplasia and neonatal renal failure.
ANTINEOPLASTIC AGENTS	Abortion and malformation.
ANTIEPILEPTIC E.G:VALPORIC ACIDS	Neural tube defects,phenytoin-cranifocial,limb deformities.
ANTIMICROBIAL AGENTS E.G:TETRACYCLINE	Interference with foetal skeleton.
CORTICOSTEROIDS	Cataracts, interventricular septal defects, growth retardation, cleft lip and cleft palate.
SEX HORMONES E.G:ANDROGEN,OESTROGEN	Androgen causes verilization of female foetus,oestrogen causes feminization of male fetus
CHELATING AGENTS E.G:PENCILLAMINE	Cutis laxa,marked flexion deformity of limbs.

All drugs for practical purposes are toxic in overdose, can be absolute or relative in later case and ordinary may be administered but may be toxic due to an underlying abnormality in the patient. E.g: diseases of the kidney.

Rational use of drug

The concept of rational drug use during the past few years has been theme of various national and international gatherings, various studies conducted in developing and developed countries. Past few year regarding safe and effective use of drugs shows that irrational drug is a global phenomenon and only few prescriptions justify rational use of drugs.

Definition of rational drug

In simple words rational use means prescribing right drug, in adequate dose for the sufficient duration and appropriate to the clinical needs of the patients at lowest cost. The concept of

rational drug use in age old, as evident by 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 and prudence."Rational drug use attained more significance now a days in terms of medical,socio-economical and legal aspects. Factors that have led sudden realization for rational drug use are:

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

2) *Effects To Prevent The Development Of Resistance*: Irrational use of drug may lead to the premature demise of highly efficacious and life saving new antimicrobial drug due to development of resistance.

3) *Growing Awareness*: Today the information about drug development, its use and adverse effect travel from one end of the planet to the other end with amazing speed.

4*) Increased Cost Of Treatment*: Increase in cost of drug increase economic burden on the public as well as on the government. This can be reduced by rational use of drug

5) *Consumer Protection Act*(CPA):Extension of CPA in medical profession may restrict the irrational use of drug

Reasons for irrational use of drugs

1) *Lack Of Information*:-Unlike many developed countries we don't have regular facilities which provide us up to date unbiased information on the currently used drugs

2)*Faulty And Inadequate Training And Education Of Medical Graduates*: Lack of proper clinical training regarding writing a prescription during training period, depending on diagnostic aid, rather than clinical diagnosis, is increasing day by day in doctors.

3)*Poor Communication Between Health Professionals And Patients*: Medical practitioners and other health professionals giving less time to 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 towards rational drug therapy.

5) *Demand from Patient*: To satisfy the patient expectations and demand of quick relief, clinician prescribed drug for every single complaint.

6) *Defective Drug Supply System and Ineffective Drug Regulation*:-Absence of well organized drug regulatory authority and presence of large number of drugs in the market leads to irrational use of drugs.

7) *Promotional Activities of Pharmaceutical Industries*: The lucrative promotional programmes of various pharmaceuticals industries influence the drug prescribing.

Hazards of irrational use of drugs

Irrational use of drug may lead to: Ineffective and unsafe treatment
Exacerbation or prolongation of illness
Distress and harm to patient
Increase the cost of treatment.

Measures to promote rational drug use

Medicines (drugs) cannot be used rationally unless everyone involved in the pharmaceutical supply chain has access TO objective information about the drug they buy and use. Knowledge & ideas about drugs are constantly changing & a clinician is expected to know about the new development in drug therapy. The pre-requisites of rational drug use are:

-Critical assessment & evaluation of benefits & risk of drug used.

-Compare the advantages, disadvantages, safety & cost of the drug with existing drug for some indication

Obstacles existing in rational drugs

-Lack of objective information and of continuing education and training in pharmacology.

-Lack of well organized drug regulatory authority and supply of drugs.

-Presence of large number of drug in the market and lucrative methods of promotions of drugs employed by pharmaceuticals industries.

-The prevalent belief that "Every ill has a pill."

Table 5. Irrational combinations of drugs

Sr. No.	Combinations	Irrationality
1	Norfloxacin+ Metronidazole; Norfloxacin+Tindazole; Norfloxacin+tindazole+Loperamide; Norfloxacin+Tinidazole+Dicycloamine; Norfloxacin+Ornidazole; Ciprofloxacin+Tinidazole; ofloxacin+Tinidazole; Ofloxacin+Metronidazole; Ofloxacin+Ornidazole; Gatifolxacin+Ornidazole.	Though claimed to be broad spectrum, combining (antiameobic) with fluroquinolone (antibacterial) is irrational because patient suffers only from one type of diarrhea. Using this combination adds to cost, adverse effects ad may encourage resistance.
2	Nimesulide+Diclofenac; Nimesulide+Dicycloamine+Simethicone; Nimesulide + Paracetamol; Nimesulide+ Cetrizine + Pseudophedrine; Nimesulide + Paracetamol+ Tizanidine.	Nimesulide is a controversial drug, has been banned in many countries. It is a sorry state of affairs that its combinations are readily available over the counter. Combining two NSAIDs may increase the side effects of both the NSAIDs. There is little documentary, evidence that a preparation containing more than one analgesic is more effective than a single ingredient preparation.
3	Amoxicillin+ Cloxacillin.	Amoxicillin is inactive against staphylococcus as most strains produce β lactamase and cloxacillin is not so active against streptococci. For any given, infection, one of the components is useless but adds to cost and adverse effect. Since amount of each drug is halved, efficacy is reduced and chances of selecting strains are increased.
4	Domperidine+ Rabeprazole; Domperidone + Esomeprazole.	Increased incidence of rhabdomyolysis
5	Simvastatin + Nicotinic acid; Atrovastatin + Nicotinic acid	Probability of myopathy is increased
6	Enalpril+ Losartan.	Combining two drugs affecting the same pathway is

		irrational ; it doesn't add to efficacy
7	Diazepam+Dried aluminum hydroxide gel +aluminum glycinate + oxyphenonium; Diazepam+ Magaldrate + Oxyphenonium; Diazepam+ Dried alumininum hydroxide gel + magnesium trisilicate+ Dimethylpolysiloxane.	Antacids raise the gastric pH and reduce the absorption of benzodiazepines
8	Cetrizine + Phenylpropanolamine + Dextromethorpan; Cetrizine + Phenylpropanolamine +Paracetamol; Levocetrizine+ Paracetamol+ Phenylpropanolamine.	Phenylpropanolamine is banned drug; yet it's a part of many cold remedies. Besides its potential to cause stroke (more so in hypertensive) , it can aggravate diabetes , glaucoma and prostate enlargement .
9	Cisapride+ Omeprazole; Mosapride+ Pantoprazole	In patients with gastro esophageal reflux disease, the use of this combination has shown no benefit due to addition of prokinetic agents.

Steps to improve rational drug prescribing

STEP 1: Identify patient's problem based on symptoms and recognize the need for action.
STEP 2: Diagnosis of the disease. Identify underlying cause and motivating factor. T his may be specific as in infectious disease or non specific.
STEP 3: 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 and high risk group of patients.
STEP 4: Start the treatment by writing an accurate and complete prescription e.g:-name of drugs with dosage forms, doses schedule and total duration of treatment.
STEP 5: Given proper information, instructions and warning regarding the treatment given for e.g:-side effects (ADR), dosage schedules and dangers/risk of stopping the therapy suddenly.
STEP 6: 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 make an appointment to check the response of the treatment.

Discussion and Conclusion

Above discussion shows that the drug may acts as a God or may act as a devil, if not used properly. Indiscriminate use of drugs not only waste scarce resources that could otherwise be spend on other essential services, but also leads to drug induced disease. The drug control authority, the teaching institute, drug industries, NGO and the patient himself may be helpful for rational drug use.

Drug authority must circulate the list of essential drug 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 and proper training of undergraduates and postgraduates. Motivation of NGO to organize various programmes for public awareness lastly, the patient himself should observe strict compliance to the physician prescription and never indulge in self medication.

Acknowledgements

Authors are thankful to the authorities of the Vels college of Pharmacy and Parul institute of Pharmacy for providing necessary facilities and library.

References

[1] Gautam.CS., Aditya S, *Ind.J. Pharmacol*; **2006**, 12(3), 69-170.
[2] Uma Tekur and Isha Gupta, *Rajasthan*.**1998**; 2: 273-276.
[3] Adesh Mathur, Rational Drug use organization behaviours and community health promoting rational drugs use amongst health professional Published by State institute of Health and family welfare, Jaipur, **2001**; 3: 95-103.
[4] Gubani N.K,Sharma Rameshwar and Dandiya P, Rational use of drugs, *Pharma Times*, May **2000**; 8-33.
[5] Roger Walker,Cate Whittlesea.Clinical Pharmacy and Therapeutics, 4th ed., **2007,** p .40-64.
[6] David E. Golan,Arment H.Tashjian Jr.,Ehrin J.Arnstona,Aprilw Arstong. Principle of Pharmacology.The Pathophysiologic basic of drugs therapy, 2nd ed., **2008,** p.08-59.
[7] P.N.Bennett,M.J.Brown.Clinical Pharmacology., 9th ed, **2003** p.135-150.
[8] S.D. Seth Essential drugs and Rational Therapeutics Text book of Pharmacology 1st ed.**1997**, 783-791.
[9] The rational use of drugs, Report on conference of experts Nairobi, 25-29 Nov.**1985**.
[10] F.S.K.Barar, Essential of Phramcotherapeitics, 4th ed **2007**, p. 43-48.
[11] K.D.Tripathi, Essential of Medical Pharmacology, 5th, **2003,** p.60-67.