Available online at www.abhipublications.org
Research Article
International Journal of Pharmacy and Engineering (IJPE)
ISSN 2320-849X

A Pilot Study to Assess for Mislabelling of Drug Samples with Regards to Amount of Active Ingredient

RITIKA KONDEL[1], ANJUMAN ARORA[1], AVANEESH K. PANDEY[1], I. P. KAUR[2], N. SHAFIQ *, S. MALHOTRA[1],

[1]Department of Pharmacology, Post graduate institute of medical education and research, Chandigarh, 160012, India
[2] University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh, 160014, India
Corresponding author: Dr. Nusrat Shafiq, Email - nusrat_shafiq@hotmail.com

Abstract:
Substandard drugs are the drug products whose composition and ingredients do not meet the correct scientific specifications and could be dangerous to the patient. The aim of the present pilot study was to explore whether the active ingredient is within predefined limit in different brands of drug samples in North Indian city. We have collected in total 30 samples of three drugs Atorvastatin, Ethionamide and Phenytion of different brands from different sectors and have done analysis by HPLC. The result of the study was that out of 30 samples analyzed, two were found to contain amount not equivalent to the claims according to the packing. The reported incidence of spurious drugs may indeed be overinflated and also generic drugs are not substandard. However, larger studies, from more representative samples of the country need to be undertaken to recognize the true extent of this problem.

Key Words: Substandard drugs, HPLC, counterfeit drugs.

1.Introduction:

World Health Organization (WHO) defines substandard drugs as the drug products whose composition and ingredients do not meet the correct scientific specifications and which are consequently ineffective and often dangerous to the patient. [1]These may occur as a result of negligence, human error and financial resources or counterfeiting. Within the broader group of substandard drugs are the spurious or counterfeit or adulterated drugs and the clumped term for these drugs is SFFC (Spurious/falsely-labeled/falsified/counterfeit) products.

On a global scale, WHO has estimated that approximately 10 per cent of the global pharmaceuticals market consists of counterfeit drugs, but this estimate increases to 25% for developing countries, and may exceed 50% in certain countries. [2]

While taking into account of Indian scenario, a Countrywide survey was conducted by CDSCO in 2009 and concluded that the extent of spurious drug in retail pharmacy is much below the projections made by various media, WHO, SEARO, and other studies i.e. only 0.046 % (11 samples out of 24,136 samples) [3].Rec ently, there have been several reports of spurious or counterfeit drugs in the lay press as well as by official documents of health organisations. Further, personal communications with many medical practitioners have led us to believe that many generic drugs that are being sold are often substandard and fail to bring about the same therapeutic response as the innovator drug or even a branded generic

drug. In the present study we aimed to explore if samples of different brands of drugs contained (a) active ingredient as was claimed in the labeling, and (b) if the active ingredient was within a predefined limit.

2. Materials and Methods:

Procurement of drugs:

The selected drugs were: Atorvastatin; ethionamide as an anti-tubercular drug and phenytoin. All three drugs were purchased from different chemist's shops from two sectors in Chandigarh.

Drug extraction procedure [4,5,6]

All the drugs were extracted from similar method as follows:

10 tablets of each drug sample were weighed and triturated. Powder equivalent 'x' mg of drug was weighed. This was dissolved in a suitable solvent for the drug, and the solution was transferred in conical flask. The flask was placed on the magnetic stirrer for 15 min. The solution was filtered using syringe filter and then the solution was used for HPLC.

Drug estimation:

The drugs were analyzed using HPLC(Shimadzu Pump LC-20AD, Prominence liquid chromatograph) with SPD-20A prominence UV-Vis detector. C-18 column (Hibar 250 × 4.6 Purospher STAR, RP-18e (5µm).

The method for analysis of the drugs was standardized in our laboratory according to previously described methods. [4,7,8]

3.Results and Discussion:

The chosen drugs were standardized for the estimation by the HPLC. The correlation coefficient of the equation for atorvastatin, ethionamide and phenytoin were 0.999, 0.994 and 0.998 respectively.

Atorvastatin tablets:

A total of 14 drug samples of 7 different brands were collected and analysed from two sectors which included 14 shops. Only 2 samples out of 14 samples comprising of 20 tablets showed amount of atorvastatin more than that mentioned in the label (Table 1).However, since Atorvastatin has a relatively wide therapeutic index drug, the adverse drug reactions are unlikely to be of any clinical significance.

Phenytoin tablets:

A total of 12 samples of phenytoin of 4 different brands from two sectors including 12 shops were analyzed. All the samples showed the same amount as that mentioned in the label (Table 1). This is a very positive finding as phenytoin is a drug with a narrow therapeutic index and a minor alteration in the content can lead to therapeutic failure and or adverse drug reactions.

Ethionamide tablets:

A total of 4 samples of 2 different brands from two shops were analyzed. All the samples showed the same amount as that mentioned in the label (Table 1). Encouraging was the finding as any alteration in the amount of can lead to drug resistance, which is a huge problem in tuberculosis therapy.

TABLE 1: SELECTED DRUG DOSE EQUIVALENCY ANALYZED BY HPLC

S.NO	NAME OF MEDICINE	NO.OF SOURCES	BATCHES SCRUTINISED	NO. OF SAMPLES SCRUTINISED	ATORVASTATIN HPLC RESULT (%, 10 mg dose equivalency)	MEDIAN	RANGE (80-120%)	NO.OF SUBSTANDARD SAMPLES FOUND
ATORVASTATIN								
1	Atorlip (cipla)	4 SHOPS	4	4 (20 tablets each)	S1= 106.2%, 10.62 S2= 96.5%, 9.65 S3= 121.2%, 12.12 S4= 109.2%, 10.92	10.77	96.5%-121.12%	1/4 (higher amount)
2	Lipicure (intas)	2 SHOPS	2	2 (20 tablets each)	S1= 105.25, 10.55 S2= 110.7%, 11.07	10.81	80%-110.7%	0/2
3	Lipvas (Cipla)	2 SHOPS	2	2 (20 tablets each)	S1= 97.7%, 9.77 S2= 121%, 12.1	10.935	97.7%-121%	1/2 (higher amount)
4	Atorva (ZydusMedica)	2 SHOPS	2	2 (20 tablets)	S1= 97%, 9.7 S2= 108%, 10.8	10.25	97.7%-108%	0/2
5	Modlip (Torrent)	1 SHOP	1	1 (20 tablets each)	S1= 111.5%,11.15	11.15	80%-111.5%	0/1
6	Avas (Microlabs)	2 SHOPS	2	2 (20 tablets each)	S1= 117.2%, 11.72 S2= 112%,11.2%	11.46	80%-117.02%	0/2
7	Atorbig (Unichem lab)	1 SHOP	1	1 (20 tablets)	S1= 106.2%, 10.62	10.62	80-106.2%	0/1
PHENYTOIN								
1	Eptoin(Abott)	5 SHOPS	5	5(20 tablets each)	S1= 116.8%, 292 S2= 112.8%, 282 S3= 106%, 265 S4= 111.2%, 278 S5= 81.2% 203	278	81.2%-116.8%	0/5
2	Epsolin(Zydus)	3 SHOPS	3	3(20 tablets each)	S1=118.4%, 296 S2= 89.2%, 223 S3= 108.4%, 271	271	89.2%-118.4%	0/3
3	Celetoin (Intas)	1 SHOP	1	1(20 tablets)	S1= 81.56%, 203.9	203.9	81.56%-120%	0/1
4	Dilantin(Pfizer)	3 SHOPS	3	3(20 tablets each)	S1= 110.4%, 276 S2= 101.2%, 253 S3= 91.6%, 229	253	91.6%-110.4%	0/3
ETHIONAMIDE								
1	Ethide(Lupin)	2 SHOPS	2	2 (20 tablets each)	S1=112.96%,141.2 S2= 91.52%, 114.4	127.8	91.5%-112.9%	0/2
2	Ethomid (Macleods)	2 SHOPS	2	2 (20 tablets each)	S1= 110.4%, 135 S2= 94.4%, 118	126.5	94.4%-110.4%	0/2

4.Conclusion:

Albeit in a small sample of assessment, our study shows two things. Firstly, the drugs were largely to be found within the limits specified in the drug label and secondly, generic drugs are not substandard. As this study has a limitation of a small sample size, this study can serve as an important pilot study based on which larger studies with greater number of drugs can be planned. Vigilant monitoring of the drug distribution networks can prevent the introduction of substandard drugs. Upgradation of existing laboratories should be done to check the quality of pharmaceutical products.

5. References:

[1]. Substandard and counterfeit medicines, Fact sheet N^{o} 275 November 2003, WHO, Cited atfile:///D:/ritika/my%20project/rough%20draft/WHO%20%20%20Substandard%20and%20counterfeit %20medicines.htm, Dated on 16 December 2012.

[2]. Nsimba SE. Problems associated with substandard and counterfeit drugs in developing countries: a review article on global implications of counterfeit drugs in the era of antiretroviral (ARVs) drugs in a free market economy. East Afr J Public Health, 2008, 5,205-10.

[3]. Report on countrywide survey for spurious drugs, CDSCO, Directorate general of health services, Ministry of health and family welfare, Govt. of India 2009

[4]. Stanisz B, Kania L. Validation of HPLC method for determination of atorvastatin in tablets and for monitoring stability in solid phase. Acta Pol Pharm, 2006, 63, 471-6.

[5]. Varaprasad A. *et al*. International Journal of Biological & Pharmaceutical Research,2012, 3, 126-129.

[6]. Bahrami G, Mohammadi B, Mirzaeei S, Kiani A. Determination of Atorvastatin in human serum by reversed-phase high-performance liquid chromatography with UV detection. J Chromatogr B AnalytTechnol Biomed Life Sci, 2005, 826, 41-5.

[7]. Joshi M, Pohujani S, Kshirsagar N, Shah P, Acharya V. Simultaneous HPLC measurements of Phenobarbitone, Phenytoin and carbamazepine from plasma samples. Indian J Pharmac, 1990, 22, 177-179.

[8]. Kumar G, Sharma S, Shafiq N, Pandhi P, Khuller GK, MalhotraS.Pharmacokinetics and tissue distribution studies of orally administered nanoparticles encapsulated ethionamide used as potential drug delivery system in management of multi-drug resistant tuberculosis. Drug Deliv, 2011, 18, 65-73.