

Assessment of the degree of awareness among post-graduate medical physicians and Pharmacists about look-alike, sound-alike drug and potential medication errors

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ABSTRACT

Background: With thousands of drugs currently in the market, the potential for medication errors due to confusing drug names amongst practising physicians, pharmacists and patients is significant. The existence of confusing drug names is one of the most common causes of medication error. There are many look-alikes, sound-alike (LASA) combinations that could potentially result in medication errors. There is insufficient data about medication errors due to LASA. Hence, we conducted the present study to determine the degree of awareness regarding LASA drugs among post graduate medical physicians and Pharmacists.

Methods: This study was a cross-sectional, questionnaire-based survey, conducted among 137 year post graduate medical residents of a tertiary care teaching hospital and 121 local pharmacists in an urban metropolitan Indian city.

Results: There were 34% resident doctors and 17% pharmacists were aware of concept of LASA drugs. Only 46% resident doctors and 22% pharmacists had knowledge about the full form of LASA. Among resident doctors, 39% came across prescription errors due to LASA drugs. Only 69% of the pharmacists agreed that they consulted their doctors when they faced problems due to prescription errors due to similar looking and similar sounding drugs.

Conclusions: Look-Alike, Sound-Alike (LASA) drugs are common source of medication errors. Our study suggests that there is lack of awareness about LASA drugs amongst resident doctors and pharmacists, which may contribute to occurrence of medication errors. Therefore, combined efforts by prescribers, pharmacists, organizations, manufacturers and patients is required to overcome medication errors due to LASA drugs.

Keywords: Look-alike Sound-alike, Medication errors, Safe medication practice

INTRODUCTION

The Indian Pharmaceutical Industry today is in the front rank of India's science-based industries with wide ranging capabilities in the complex field of drug manufacture and technology. It is now the third largest in the world in terms of volume and 14th in terms of value.¹

The processes of discovering, designing, developing, evaluation, marketing authorisation, dispensing and administrating medicines are complex.² Today with thousands of drugs available in the market, the potential for

medication errors due to confusing drug names amongst practising physicians, pharmacists and patients is significant. The existence of confusing drug names is one of the most common causes of medication error and is of concern worldwide.³

The World Health Organization's International Non-proprietary Names Expert Group works to develop international non-proprietary names for pharmaceutical medicinal substances for acceptance worldwide. However, brand names are developed by the product's sponsor and often differ significantly between countries. Some medicines,

although marketed under the same or similar-sounding brand names may contain different active ingredients. Furthermore, the same drug marketed by more than one company may have more than one brand name.⁴

Many drug names look or sound like other drug names. Contributing to this confusion are illegible handwriting, incomplete knowledge of drug names, newly available products, similar packaging or labelling, similar clinical use, similar strengths, dosage forms, frequency of administration, and the failure of manufacturers and regulatory authorities to recognize the potential for error and to conduct rigorous risk assessments, both for non-proprietary and brand names, prior to approving new product names.^{5,6} The Institute for Safe Medication Practices (ISMP) has posted an eight-page listing of medication name pairs actually involved in medication errors.⁷ There are many other look-alikes, sound-alike (LASA) combinations that could potentially result in medication errors. The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) has defined medication errors (MEs) as, "Any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the health care professional, patient, or consumer".⁸ Today the problem due to medication errors is underestimated due to lack of proper procedures and sufficient awareness of this issue among health care workers. There is insufficient data about medication errors due to LASA.⁹ Although some studies have investigated this phenomenon, they did not offer a global framework on this issue.¹⁰ According to A. Berman, LASA drug errors are most common in the USA, causing millions of deaths. He showed that errors could be attributed to the confusion generated by similar names or similar labels and packages.¹¹ According to Naunton *et al.*, pharmacists in particular should play an important role in the community in implementing and undertaking strategies to avoid LASA medication errors.¹² In India, studies done in Uttarakhand and Karnataka have documented the medication error rate to be as high as 25.7% and 15.34%, respectively, in hospitalized patients.^{13,14}

Tertiary care teaching hospitals play a dual role in terms of providing health care facilities to patients and also educating medical students. Medical residents completing their post-graduation at these hospitals are primarily involved in patient management and hence their awareness about LASA drugs is of prime importance in preventing medication errors due to similar sounding and looking drug names. However, there are very few published studies on the awareness about LASA medication errors from India. Hence, we conducted the present study to determine the degree of awareness regarding LASA drugs among post graduate medical residents and pharmacists.

METHODS

Study design

This study was a cross-sectional, questionnaire-based survey, conducted among first, second and third year postgraduate

medical physicians from the various clinical departments of a tertiary care teaching hospital and from the local pharmacists in an urban metropolitan Indian city. The study was conducted between June 2018 and October 2018.

Sample size

Assuming the awareness rate about LASA drugs to be 50% among the given population with an error rate of 10%, a minimal sample size of 100 post graduate medical residents and pharmacists respectively was calculated.

Study procedure

Prior to this survey, Institutional Ethics Committee approval was taken (ECARP/2018/60 approved on 19th April 2018). Study objectives and procedure were explained to the participants and they were enrolled in the study after obtaining informed consent. Those who were not willing to participate or did not return the questionnaires within the stipulated time were excluded from analysis.

Each participant was given adequate time (45-60 minutes) to answer the questionnaire. A pre-validated questionnaire with questions (12 for resident doctors and 10 for pharmacists) regarding knowledge and awareness about LASA drugs and medication error was used as the tool which was administered to the medical residents and pharmacists. The questionnaire for the medical resident physicians also had a quiz wherein they had to match the brand names with the generic names for certain drugs and to match the drug with its therapeutic class so as to confirm their practical knowledge regarding LASA medications.

Statistical analysis

The returned questionnaires were checked for completeness of the data. The data thus obtained was analysed in Microsoft Excel. Descriptive statistics was used to summarize the data. Chi-square test was used for analysis of nominal data. Internal consistency of questionnaire was tested by assessing the Cronbach's alpha value (value of 0.7 obtained).

RESULTS

A total of 137 post graduate medical residents and 121 pharmacists participated in the survey to assess the knowledge and degree of awareness of Look-Alike, Sound-Alike (LASA) drugs and potential medication errors.

As shown in Table 1, more women responded among the medical residents (52%) as compared to 48% men while it was the opposite in case of the Pharmacists (86% were men and 14 % women).

Majority of resident doctors (77%) had work experience between 2-5 years while 23% had experience less than 2 years. Among the pharmacists, majority of pharmacists (75%) had work experience between 2-5 years.

Table 1: Demographic details of the study participants.

		Doctors (n=137)	Pharmacists (n=121)
Gender	Male	66 (48%)	104 (86%)
	Female	71 (52%)	17 (14%)
Experience	<2 years	32(23%)	4 (3%)
	2-5 years	105(77%)	91 (75%)
	>5 years	0	26(21%)

Regarding the degree of awareness about LASA drugs among resident doctors and pharmacists, it was observed

that 34% resident doctors and 17% pharmacists were aware of the concept of LASA drugs (p value 0.0033) while 46% resident doctors and 22% pharmacists had knowledge about the full form of LASA (p value 0.0001). Most of the resident doctors (88%) and 52% pharmacists knew that prescription errors could occur due to LASA drugs (p value 0.0001).

The difference between knowledge and awareness regarding LASA drugs between resident doctors and pharmacists was statistically significant (p value <0.05). The results are summarised in Table 2.

Table 2: Awareness regarding LASA drugs among resident doctors and Pharmacists.

Awareness of LASA drugs				P value*
Doctors		Pharmacists		
Aware	47 (34%)	Aware	21 (17%)	0.0033
Not Aware	90 (66%)	Not Aware	100(83%)	
Full form of LASA drugs				
Doctors		Pharmacists		
Correct	63 (46%)	Correct	27(22%)	0.0001
Incorrect	74 (54%)	Incorrect	94(78%)	
Knowledge about “prescription errors can occur due to LASA drugs”				
Doctors		Pharmacists		
Yes	121 (88%)	Yes	63(52%)	0.0001
No	16 (12%)	No	58(48%)	

*using Chi Square test

Table 3: LASA drugs pairs encountered among resident doctors and pharmacists.

LASA Drug Pair (Doctors)		LASA drug pair (Pharmacists)	
Terfenadine	Terbinafine	Opam	Opaz
Cotrimoxazole	Clotrimazole	Celin	Celib
Doxycycline	Doxylamine	Periset	Procef
Fluoxetine	Fluvoxamine	Trima	Trimol
Chlorpheniramine	Chlorpromazine	Sesil	Setil
Cilnidipine	Clonidine	Mocox	Moclox
Metoprolol	Metolazone	Acem	Acein
Aripiprazole	Rabeprazole	Edegra	Allegra
Clozapine	Clonazepam	Ciplar	Ciplox
Telmisartan	Tamsulosin	Dan	Dax

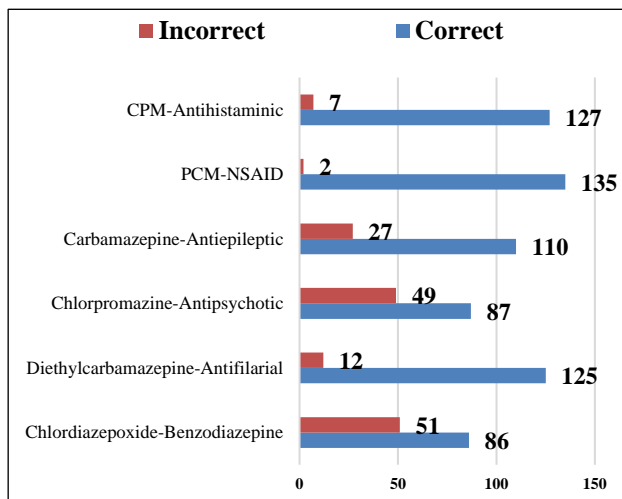
Among the resident doctors, 53 (39%) mentioned that they had come across prescription errors due to LASA drugs. Table 3 depicts commonly observed LASA drug pairs among resident doctors and pharmacists. Some common examples of prescription errors reported by patients were, Levocetirizine-Levetiracetam, Clozapine-Clonazepam, Futop-Fintop and Doxycycline- Doxylamine. 60 (44%) of the resident doctors said that their patients reported medication errors due to LASA drugs. About 84% doctors said that although they asked their patients to show the medicines that were prescribed after they purchase the

medicines, only 77% patients came back and showed the purchased medicines. 75% of the pharmacists said that they faced difficulty in understanding the legibility of the doctor’s handwriting. 10% of the pharmacists said that the issue of not understanding doctor’s handwriting was encountered in 50%-80% of prescriptions seen per week. 69% of the pharmacists agreed that they consulted their doctors when they faced problems due to prescription errors due to similar looking and similar sounding drugs. 60% of pharmacists said that patients came back to complain about prescription errors due to LASA drugs.

The result of the quiz used to assess the practical knowledge of the doctors showed that 44% of the responses for Lamisil-Terbinafine match and 38% responses for Lamictal-Lamotrigine match were incorrect with respect to the brand versus generic names. Similarly, it was observed that 37% responses for Chlordiazepoxide-Benzodiazepine pair and 36% responses for Chlorpromazine- antipsychotic pair were incorrect. The results are summarised in Table 4 and Figure 1.

Table 4: Analysis of the Quiz matching brand names with generic names of drugs among resident doctors.

Match the Columns		Response	
Brand name	Generic Name	Correct	Incorrect
Pitocin	Oxytocin	126 (92%)	11(8%)
Lamictal	Lamotrigine	84 (61%)	52(38%)
Valcivir	Valcyclovir	103 (75%)	33(24%)
Pitressin	Vasopressin	124 (91%)	13(9%)
Valgan	Valgancyclovir	101(74%)	36(26%)
Lamisil	Terbinafine	77 (56%)	60(44%)



PCM- Paracetamol; NSAID- Nonsteroidal Anti-inflammatory Drugs

Figure 1: Analysis of the Quiz matching drug name with drug class among resident doctors.

DISCUSSION

The knowledge possessed by a community is indicative of their understanding of the given subject.¹⁵ The present study evaluates the knowledge and awareness regarding LASA drugs and potential medication errors among postgraduate resident doctors in tertiary care teaching hospital and pharmacists.

Our findings showed that only 34% resident doctors and 17% pharmacists were aware of the term ‘LASA drugs’ while 88% resident doctors and 52% pharmacists were aware that prescription errors could occur due to LASA drugs. This lack of awareness about LASA drugs can lead to administration of wrong drugs to patients which can cause therapeutic failure,

aggravation of the disease, serious toxicity, antibiotic resistance and increased cost of medications. Further it also affects patient’s confidence in medical care. Medication errors due to LASA drugs can be minimized by creating awareness and educating healthcare professionals about LASA drugs. Furthermore, mentioning generic name of drugs along with brand names, confirming the correct drug with its dose before administration will minimize LASA drug errors. Reporting of such events is also very important, as more data can be generated so as to create awareness about the same.

In this study, it was noted that drug pairs, which were most commonly confused are Lamictal- Lamotrigine and Lamisil-Terbinafine. It was seen that the drugs forming the LASA drug pair had different indications, different doses and schedule. In case the drug dose is not specified, it can create confusion.

Our study results also showed that the awareness of LASA drugs among pharmacists was significantly lower when compared with that of resident doctors. Similarly, in the study conducted by NM Rickles *et al*, it was observed that there was a need to develop educational interventions and training of pharmacists to improve their knowledge and practise in terms of Medication errors.¹⁶ To minimize medication errors due to LASA drugs among pharmacists, they can revert back to doctors if there is confusion about drug name. Furthermore, a computerized reminder can be installed for the most confusing drug name pair so that the alert is generated when entering prescriptions for either drug.¹⁷

Brand names are approved by a regulatory authority such as the Food and Drug Administration. FDA looks for ways to prevent medication errors. Before drugs are approved for marketing, FDA reviews the drug name, labelling, packaging, and product design to identify and revise information that may contribute to medication errors. For example, FDA reviews- proposed proprietary (brand) names to minimize confusion among drug names. With the help of simulated prescriptions and computerized models, FDA determines the acceptability of proposed proprietary names to minimize medication errors associated with product name confusion. After drugs are approved for marketing in, FDA monitors and evaluates medication error reports. FDA may require a manufacturer to revise the labels, labelling, packaging, product design or proprietary name to prevent medication errors.¹⁸

However, more research is needed to develop the best methods for assuring that new brand names and non-proprietary names cannot be confused. In addition, world regulatory authorities and the global pharmaceutical industry must place more emphasis on the safety issues associated with drug names.

Furthermore, strategies such as TALL man letters in the look-alike drug names should be implemented for identifying medications, not only on pharmaceutical industry labels, but also in other places where drug names

appear, including computerized prescription software, pharmacy system screens, labels for pharmacy preparation. Adoption of simple methods of writing prescriptions, such as use of block letters while writing drug name can also eliminate medication errors due to improper handwriting. It is very important to circulate the list of confusing drug names among the practicing doctors and pharmacists.

Look-Alike, Sound-Alike (LASA) drugs are common source of medication errors. It may lead to therapeutic failure, aggravation of disease, adverse drug reaction and increased cost of therapy. Solutions such as improving prescribing and dispensing system, proper patient education, and regulatory authority intervention can help reduce medication errors associated with LASA drugs. In the present study, we have tried to assess the awareness of this problem in terms of knowledge, attitude and practices. Our study suggests that there is lack of awareness about LASA drugs amongst resident doctors and pharmacists, which may contribute to occurrence of medication errors. Furthermore, the extent of problem due to medication errors associated with LASA drug in India is known to a lesser extent; therefore, we need well-structured medication error reporting programme and surveillance for drug naming. To overcome this issue, combined efforts of prescribers, pharmacists, organizations, manufacturers and patient is required.

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