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POTENTIAL HAZARDS OF ILLEGIBLE PRESCRIPTION: LOOK ALIKE SOUND ALIKE TRADE AND GENERIC NAMES

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ABSTRACT

Objective: In India, where market has thousands of trade name medicines and prescriptions of doctors are usually in illegible handwriting there is high probability of dispensing and medication errors due to look-alike sound-alike (LASA) trade names. This study is an attempt to correlate doctor's handwriting and confusion of trade name to develop a help list of confusing product names. **Methodology:** A total of 5472 prescriptions presented for dispensing during a period of six months were studied and analyzed to determine and identify the confusing trade names, so as to design a ready made list of such products which will serve as a cautionary reference for avoiding dispensing errors. **Findings:** Potentially confusing trade name pairs of medicines available in local market of Andhra Pradesh, India were paired out and categorized. A list of 55 pairs of almost identical trade names was compiled, which shall serve as a ready reference for pharmacists while dealing such prescriptions. The list has been arranged alphabetically for ease of reference. **Practical implications:** It recommends three step audit of prescription before final dispensing to avoid any potential error. **Originality/value:** This research shall have direct implication on reducing chances of wrong dispensing due to poor/illegible handwriting of doctors. **Conclusion:** Several trade names are almost identical orthographically or phonologically with very minor difference in spelling but having entirely different pharmacological, therapeutic and toxic effects. Preventing such possible confusion during dispensing of prescription shall have great medical and social value. The help list developed shall serve as a ready reckoner for safe dispensing of prescriptions.

Key words: *Illegible prescription; LASA trade names; Medication error; Dispensing error; Prescribing error.*

INTRODUCTION

Trade name of medicines is arbitrarily decided by manufacturers without any relevance to the drug molecule or therapeutic class or disease for which it is intended to be used. This leads to ever increasing number of look-alike sound-alike (LASA) trade names and dispensing error. The problem is further compounded by illegible prescription writing and selling of medicines by salesmen who do not have any knowledge of medicine or disease and are not registered pharmacist. As a result of these, medication error becomes eminent which can cause anything from discomfort to serious health problems and even death or disability to the patient. Pharmacists are professionally and ethically bound to ensuring therapeutic efficacy and patient safety and therefore it becomes her/his key duty to prevent medication error. Although issues relating confusing brand names and their consequences[1-8], trade name confusion related medication error[9-10], LASA names and their problems[11-14], trade name and generic name identity[15], prescription and medication error[16-18], changing role of pharmacists[19] have been regularly studied and reported.

Literature review also revealed that in the United States of America Food and Drug Administration uses POCA (phonetic and orthographic computer analysis) software to evaluated names of drug products submitted for approval.[20]

However, the consequences of illegible prescription writing and its impact on LASA trade names remain largely untouched.

In light of the above background a systematic study was planned to analyze hand written prescriptions for legibility, chance of confusion, wrong dispensing, design list of LASA trade names so as to evaluate its implication on health of the patient.

METHODS

A systematic study of 5472 handwritten prescriptions and medicines available on shelves of shop were conducted during a period of six months from December 2013 to May 2014. Comparison of hand written prescriptions with trade name of products was done to estimate chance of confusion due to spelling similarity.

RESULTS

During a period of six months 5742 prescriptions of patients were studied and analyzed for this research work. Out of the 5742 patients 3589 (62.51%) were male and 2153 (37.49%) were female (Figure 1). The prescriptions were further categorized into children and geriatric patient. Out of the 5742 prescriptions 3609(62.85%) were children below the age of 12 years and 1658(28.87%) were geriatric patient above the age of 65 years (Figure 2). The geriatric patients were further categorized into young old (ages 65–75 years) 957(16.67%), the old (ages 75–85 years) 510 (08.89%) and the old old (age > 85 years) 191 (03.33%).

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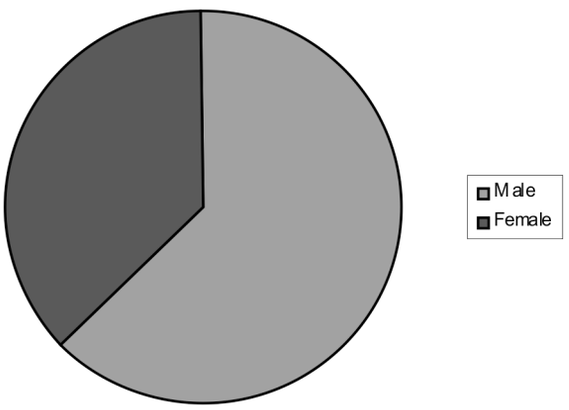

Fig.1: *Male, female distribution of patients.*

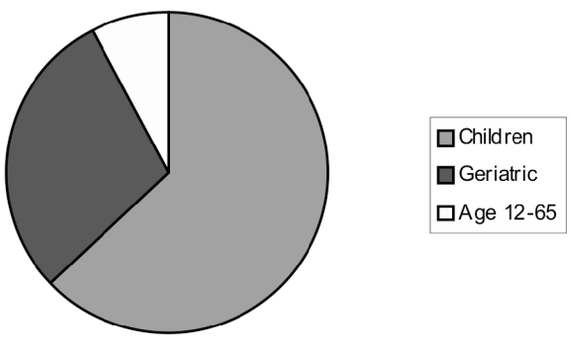

Fig.2: *Distribution of patient as Children, Geriatric and others.*

All the prescriptions were further analyzed for legibility of handwriting for the name of medicines prescribed. Out of the 5742 prescriptions only 319(05.56%) prescriptions had name of medicines written in capital letters, which did not cause any problem in identifying the prescribed medicine and even the literate patient or her/his attendant could compare the prescribed and supplied medicine to be sure.

Further 5423 prescriptions (94.44%) contained name of the medicines in running handwriting beginning with capital letter in which difference between small letter a,o/c,e/e,i/i,l/m,n/r,v/u,v is hard to find and thus probability of guessing become usual resort for the salesmen.

All the 5742 prescriptions were also analyzed to assess clarity of instructions for the use of the medicines. Surprisingly only 579 (10.08%) contained visual instruction, whereas 5163(89.92%) contained instructions like o.d.; b.i.d.; t.i.d and no prescription contained instruction in mother tongue of the patient.

All the prescriptions were also analyzed for precautions regarding food and beverages which may be required to be avoided during medication. Surprisingly none of the 5742 prescriptions under study contained any such instruction.

The study of the 5742 handwritten prescriptions revealed that as many as 55 pairs of LASA trade names were there which could be confused for the prescribed medicine if the prescription is not audited before dispensing to identify the diagnosis and correlate the prescribed medicines with that as well as complaints of the patient. In order to reach at a conclusion it was also necessary in such cases to interact with the patient or patient's attendant as also examine the reports. Table 1 presents help list of pair of medicines which had maximum chance of substitution for each other due to illegible or cursive hand writing and very minor difference in spelling.

Table 1: *LASA trade name pairs*

No.	Trade name	Active ingredient	Indication
1	**ABAN**	Albendazole	Anthelmintic
	ABANA	Ayurvedic Medicine	Anti-hypertensive
2	**AB-CAN**	Fluconazole	Antifungal
	AB-CIN	Levofloxacin	broad-spectrum antibiotic
3	**AC2**	Aceclofenac+Paracetamol	Analgesic,Antipyretic,Anti-inflammatory
	AC-2	Amoxicillin+clavulanate potassium	Antibiotic
4	**ACER**	Diacerein	Anti-Inflammatory
	ACERA	Rabeprazole	Peptic ulcer and gastro-oesophageal reflux disease (GERD)
5	**ACETEN**	Coptopril	Cardio-vascular disease
	ACETEC	Acitretin	Psoriasis
6	**ACILEX**	Aceclofenac	Anti-inflammatory
	ACIFIX	Magnesium hydroxide, Dried aluminium hydroxide, Simethicone	Antacid
7	**ALDEC**	Nandrolone decanoate	anabolic steroid
	ALDIC	Diclofenac Potassium, Paracetamol, Serrateionpeptidase	anti-inflammatory and antirheumatic
8	**ALEVA**	Levocetirizine	Antihistaminic & Antiallergic
	ALEVO	Levofloxacin	broad-spectrum antibiotic
9	**ALEXA**	Dexamethasone sodium phosphate	Cotricosteroid
	ALEXI	Amoxicillin+ Clavulanic acid	broad-spectrum antibiotic
10	**BACIMOX**	Amoxicillin+ Cloxacillin	broad-spectrum antibiotic
	BACMAX	Baclofen	Muscle Relaxant
11	**BUSCOPAN**	Hyoscine butyl-bromide	Antispasmodic
	BUSUPHAN	Busulfan	Treatment of cancer
12	**CALURAN**	Bicalutamide	anti-androgen
	CALRON	Calcium lacto-bionate, calcium Gluc-onate, ferric ammonium citrate, vitamin A	Vitamins & Minerals
13	**CARMAX**	Omega-3 fatty acid, alpha lipoic acid, Cyanocobalamin, chromium, picolinate, selenium	Vitamins, minerals, micronutrient
	CARMOX	Amoxicillin, Carbocisteine	broad-spectrum antibiotic
14	**CYPAN**	Pantoprazole	proton pump inhibitor
	CYPON	Cyproheptadine hydrochloride, dried yeast	Appetite Enhancer
15	**DAMOL**	Tramadol	Analgesic
	DIMOL	Activated dimethicone	Antiflatulent
16	**DAONIL**	Glibenclamide	Anti diabetic
	DIOVOL	Dried Aluminium hydroxide, Magnesium hydroxide, Magnesium carbonate light, Activated dimethicone	Antacid
17	**DAXID**	Sertraline hydrochloride	Antidepressant
	ROXID	Roxithromycin	antibiotic
18	**DIAMIG**	Miglitol	Anti diabetic
	DIAMIN	Imipramine	Antidepressant
19	**DIAMOX**	AcetazolamideTreatment of glaucoma and miosis	
	DICIMAX	Diacereinanti-inflammatory and antirheumatic	
20	**DIGENE**	Aluminium hydroxide, magnesium aluminium silicate, magnesium hydroxide, Simethicone	Antacid
	DIFENIC	Diclofenac sodium	Anti –inflammatory
21	**DROXYL**	Cefadroxil	Cephalosporin antibiotic
	DOXY-1	Doxycycline	Tetracycline antibiotic
22	**E-PRIN**	Aspirin	Antiplatelets& Fibrinolytic
	EPRIL	Enalapril Maleate	cardiovascular disease
23	**FEGAN**	Diclofenac	Anti-inflammatory
	FEGEM	Iron (III) hydroxide Polymaltose complex 100 mg, folic acid	Antianemic
24	**GAMET 800**	Gabapentin 300 mg, Mecobalamin	Anticonvulsant
	GAMETOP	Gemifloxacin	broad-spectrum antibacterial

No.	Trade name	Active ingredient	Indication
25	**HIFEN**	Cefixime	Cephalosporin antibiotic
	HIPEN	Amoxicillin	broad spectrum Penicillin
26	**IDEBEN**	Idebenone	CNS Stimulant
	IDIBEND	Mebendazole	Anthelmintic
27	**IKA**	Cetirizine, Pseudoephedrine hydrochloride	Cough & Cold
	IKKA	Amikacin	antibiotic
28	**JUCAN**	Fluconazole	antifungal
	JUGAM	Sparfloxacin	Broad spectrum antibacterial
29	**KARDIA**	Dobutamine	heart failure
	KARDIN	Trimetazidine	Anti-Anginal
30	**L-CIT**	Levocetirizine	Antihistamines & Antiallergic
	L-COT	Omeprazole, Clarithromycin, Tinidazole	Gastritis
31	**METACIN**	Paracetamol	Analgesic & Antipyretic
	METHACIN	Neomycin sulphate	Anti-Infective & Antiseptic
32	**Microgest 200mg**	Progesterone	for maintaining pregnancy
	Misoprost 200mg	Mifepristone	Abortifacient
33	**NEPOMOX**	Amoxicillin	Broad spectrum penicillin
	NEPOTOX	Cefotaxime	Broad spectrum antibiotic
34	**NIFDEC**	Diclofenac	Anti-inflammatory
	NIFEDINE	Nifedipine	Anti-Anginal
35	**NIPCARE**	Lanolin	Emollient
	LPCARE	Losartan potassium	cardiovascular disease
36	**OCUVIT**	Vitamin A, D, E	Vitamin
	OCUWET	Povidone	Lubricant
37	**PACID**	Pantoprazole	peptic ulcer and gastro-oesophageal reflux disease (GERD)
	PACIP	Ciprofloxacinantibaterial	
38	**QUINIDINE**	Quinidine	arrhythmia
	QUININE	Quinine	Malaria
39	**ROBI-D**	Methocarbamol, Diclofenac	Muscle Relaxant & Pain Reliever
	RAB-D	Rabeprazole, Domperidone	peptic ulcer and gastro-oesophageal reflux disease
40	**SIBOLONE**	Tibolone	Menopausal Vasomotor symptoms, Prophylaxis of postmenopausal osteoporosis
	SORBILINE	Tricholine citrate	Early Phase of liver disease due to alcohol, Viral hepatitis, and toxic hepatitis associated with fatty infiltration of liver.
41	**TRENTAL**	Pentoxifylline	Peripheral vasodilator
	TEGRITAL	Carbamazepine	Epilepsy
42	**TROPAN**	Oxybutynin chloride	Bladder & Prostate Disorders
	TROPARIN	Certoparin Sodium	Anticoagulant, Antiplatelet & Fibrinolytic
43	**ULCORT**	Deflazacort	Corticosteroid
	ULCURE	Omeprazole	Peptic ulcer and gastro-oesophageal reflux disease (GERD)
44	**ULOTRIC**	Duloxetine hydrochloride	Depression
	ULORICA	Ilopurinol	Gout, Hyperuricaemia
45	**ULPAN**	Pantoprazole	Peptic ulcer and gastro-oesophageal reflux disease (GERD)
	ULPANE	Oxphenonium bromide, diazepam, Magaldrate	Anxiety and depression
46	**ULTRCIT**	Potassium citrate, citric acid	helps the kidneys get rid of uric acid, Calculi Dissolution Agent
	ULTRICH	Whey protein, carbohydrate, sugar, fat, calcium carbonate, vitamin C, carbonyl iron, folic acid, vitamin B_{12}, vitamin D_3	Protein supplement & energy drink
47	**UVEX**	Levofloxacin	Quinolone antibacterial
	UZEX	Magaldrate, Simethicone, Oxetacaine	Antiulcer
48	**VAL-BCD**	Valdecoxib	Osteoarthritis, Rheumatoid Arthritis
	VAL-FCD	Sodiumvalproate, Valproic Acid	Primary Generalised Seizures, Partial Seizures
49	**VALUE**	Rabeprazole	Peptic ulcer and gastro-oesophageal reflux disease (GERD)
	VALIUM	DiazepamAnxiolytic	
50	**WINCIP**	Ciprofloxacin, Tinidazole	Amoebiasis and other protozoal diseases
	WINCID	Omeprazole	Peptic ulcer and gastro-oesophageal reflux disease (GERD)
51	**XET**	Paroxetine hydrochloride	Anti-depressant
	XMET	Metformin hydrochloride	Antidiabetic
52	**XONE**	Ceftriaxone sodium	Typhoid Fever, gonorrhoea Fever, Meningococcal meningitis
	XOXE	Cefuroxime	Urinary tract infections, Respiratory tract infections, gonorrhoea, Prophylaxis of surgical infections
53	**YESMOX**	Amoxicillin	extended spectrum Penicillin
	YESROX	Roxithromycin	Macrolide antibiotic
54	**ZIMIG**	Terbinafine hydrochloride	Antifungal
	ZIMINIC	Cefixime trihydrate	Hypersensitivity to Cephalosporins
55	**ZOPIC**	Alprazolam	Anxiety, agitation or tension
	ZOPID	Zolpidem	Hypnotic and sedative

DISCUSSION

Analysis of legibility of the prescriptions clearly indicated that very low percentage (5.56%) of the prescriptions had name of medicines in capital letters where there was no chance of ambiguity or dispensing error. In such cases even the patient or her/his attendant can compare the prescribed medicine with product supplied to them. Such prescriptions are ideal prescriptions and every doctor should aim to write name of medicines in capital letters and leave no scope for guessing about the product. This will drastically reduce medication error and improve therapeutic success of the prescription.

Analysis of Table 1 reveals that every pair of trade names has high potential for confusion and replacement for each other. It also reveals that the two trade names of same pair are from entirely different therapeutic class. Thus the probability of wrong dispensing becomes therapeutic hazard to the patient as the substituted product will not only be therapeutic failure but also lead to unnecessary drugging and iatrogenic diseases leading to further consultation, treatment and/or hospitalization.

CONCLUSION

Several trade names are almost identical ortho-graphically or phonologically with very minor difference in spelling but having entirely different pharmacological, therapeutic and toxic effects. Such trade names or generic names sound or appear to be similar to each other when handwritten or spoken. Poor handwriting and fast writing makes the prescription reading difficult and increases the chance of guessing. Preventing such possible confusion during dispensing of prescriptions shall have great medical and social value. The help list (table 1) is a step forward to minimize dispensing error and ensure safe therapy.

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