



AN ANALYSIS OF LOOK-ALIKE SOUND-ALIKE GENERICS AND BRANDS IN INDIAN MARKET

Devendra V. Sinai Paraz^{1*} and Padmanabh V. Rataboli²

¹2nd year PG Student, Department of Pharmacology Goa Medical College, Bambolim, Goa 403202.

²Professor and Head, Department of Pharmacology Goa Medical College, Bambolim, Goa 403202.

*Corresponding Author: Dr. Devendra V. Sinai Paraz

2nd year PG Student, Department of Pharmacology Goa Medical College, Bambolim, Goa 403202.

Article Received on 16/08/2021

Article Revised on 06/09/2021

Article Accepted on 26/09/2021

ABSTRACT

Background: Confusing drug names that look or sound alike commonly lead to medication errors. Hence, it is of utmost importance that healthcare professionals prescribe and instruct patients clearly and legibly. The list of confusing brand names to select from is humungous and the confusion parallels it. The confusion is rising with AYUSH medications also paving a path for themselves, and some generic names also sounding similar to some brands. **Objective:** The aim of this study was to identify and analyze the confusing brand names and depict the current scenario/cross section of Indian drug product market. **Methodology:** We conducted a survey of the commonly available brand names of drug products (from allopathy as well as AYUSH) referring to Pharmacy data, Indian Drug Review, FDA and ISMP list of confused drug names. The study included analysis and categorization of Look-alike Sound-alike (LASA) drugs into subgroups based on the generic name, manufacturer, and dosage forms. New categories were added to the previously existing groups of confusing LASA drugs. **Observations/Results:** Newer and currently available confusing drugs have been identified in the existing 12 categories. 7 new and unique categories have been added to the existing list. **Conclusion:** With thousands of drug products in the market, the potential of medication error due to confusing drug names is considerable. Algorithm by Rataboli et al can be used before allowing drug products to enter the market. Also, using strategies provided by WHO, guidelines for handling LASA drugs, Tall Man Lettering and modern technologies, we can minimize medication errors related to drugs with confusing brand names.

KEYWORDS: Identical; Sound-alike; Look-alike; Confusing; Generic names; Brand names.

INTRODUCTION

Confusing drug names that look or sound alike commonly lead to medication errors. Thus, it is of utmost importance that healthcare professionals necessarily write prescriptions legibly, completely and speak clearly and slowly while giving verbal orders. Patients taking the medications must be instructed correctly and adequately. The list of confusing brand names to opt from is humungous and the confusion parallels it. Tall Man Lettering is one of the methods used to reduce these errors to print parts of the drug names to highlight differences between similar drugs.

The aim of this study was to identify and analyze the confusing generics and brands to depict the current scenario/cross section of Indian drug product market adding more value to the previously conducted studies as we have found the confusion to be rising with AYUSH medications also paving a path for themselves.

Look alike Sound alike drugs **commonly abbreviated as LASA / SALA drugs** are drugs which are strikingly similar in physical appearance/packaging & those that have similar sound and/or similar spellings.

These drugs carry the risk of potential harm and even mortality.

They can be broadly classified as **Identical, Orthographic** pairs (having similar spellings) and/or **Phonological** pairs (similar sounding).

A group of drugs belonging to a particular class or those with a similar action often tend to have similar names. E.g. Beta blockers, Statins, ACE inhibitors

Brand names—also referred to as “trademark names” or “invented names” are approved by a regulatory authority such as the:-

- ❑ Food and Drug Administration in the United States
- ❑ DCGI and CDSCO in India

❑ Invented Names Review Group/CPMP in the European Union

Institute of Safe Medication Practices (ISMP), England provides a list of confusing drug names through ISMP

MERP (medication error reporting program) and **ISMP Vaccine ERP**

Fig. 1: (Gaunt M, 2010).

Confused drug names reported to ISMP MERP from July through September 2010	
Doribax (Doripenem)	Zovirax (Acyclovir)
Dtap (Diphtheria, tetanus toxoids & acellular pertussis)	Tdap (tetanus toxoid, reduced diphtheria toxoid & acellular pertussis)
Durasal (Difluprednate ophthalmic emulsion)	Durezol (Salicylic acid)
LaMICtal (Lamotrigine)	LamISIL (Terbinafine)
Oxycodone	OxyCONTIN (Oxycodone HCL extended release)
Pitavastatin	Pravastatin
Pitocin (Oxytocin)	Pitressin (Vasopressin)
RisperIDONE	RopinIROLE
Zolmitriptan	Zolpidem
Plaquenil (Hydroxychloroquine sulfate)	Provigil (Modafinil)

Fig 2: ISMP list of confused drug names 2016 (Look-Alike Drug Names with Recommended Tall Man Letters [Internet], 2016).

Table 1. FDA-Approved List of Generic Drug Names with Tall Man Letters	
Drug Name With Tall Man Letters	Confused With
acetaZOLAMIDE	acetoHEXAMIDE
acetoHEXAMIDE	acetaZOLAMIDE
buPROPion	busPIRone
busPIRone	buPROPion
chlorproMAZINE	chlorproPAMIDE
chlorproPAMIDE	chlorproMAZINE
clomiPHENE	clomiPRAMINE
clomiPRAMINE	clomiPHENE
cycloSERINE	cycloSPORINE
cycloSPORINE	cycloSERINE
DAUNOrubicin	DOXOrubicin
dimenhyDRINATE	diphenhydrAMINE
diphenhydrAMINE	dimenhyDRINATE
DOBUTamine	DOPamine
DOPamine	DOBUTamine
DOXOrubicin	DAUNOrubicin

Fig. 3: ISMP list of confused drug names February 28, 2019 (List of Confused Drug Names [Internet], 2019)

Updated through February 2019

Drug Name	Confused Drug Name	Drug Name	Confused Drug Name
Abelcet	amphotericin B	ALPRAZolam	LORazepam
Accupril	Aciphex	Altacor	Advicor
acetaminophen	acetaZOLAMIDE	amantadine	amiodarone
acetaZOLAMIDE	acetaminophen	Amaryl	Reminyl
acetaZOLAMIDE	acetoHEXAMIDE	Ambisome	amphotericin B
acetic acid for irrigation	glacial acetic acid	Amicar	Omacor
acetoHEXAMIDE	acetaZOLAMIDE	Amikin	Kineret
Aciphex	Accupril	aMILoride	amLODIPine
Aciphex	Aricept	amiodarone	amantadine
Activase	Cathflo Activase	amLODIPine	aMILoride
Activase	TNKase	amphotericin B	Abelcet
Actonel	Actos	amphotericin B	Ambisome
Actos	Actonel	amphotericin B	amphotericin B liposomal
Adacel (Tdap)	Daptacel (DTaP)	amphotericin B liposomal	amphotericin B
Adderall	Inderal	Anacin	Anacin-3
Adderall	Adderall XR	Anacin-3	Anacin
Adderall XR	Adderall	antacid	Atacand
ado-trastuzumab emtansine	trastuzumab	anticoagulant citrate dextrose solution formula A	anticoagulant sodium citrate solution
Advair	Advicor	anticoagulant sodium citrate solution	anticoagulant citrate dextrose solution formula A
Advicor	Advair	Antivert	Axert
Advicor	Altacor		
Afrin (oxymetazoline)	Afrin (saline)		

So, do we really have many confusing drugs in the market??

We can see from the table below (Fig 4)

Fig. 4: Examples of confusing drug names commonly available in the market.

Protonix (pantoprazole)	Protamine	Restoril	Vistaril, Zestril
Humulin (human insulin)	Humulin L (Insulin lente)	Humalog (Insulin lispro)	Novolog (Insulin aspart)
Betaloc	Betanol	Sedno	Sedron
Imigra	Edegra	Wellbutrin XL	Wellbutrin SR
Cardepa	Carbidopa, Codopa	Zyrtec	Zyprexa
Celebrex	Cerebryx, Celexa,	Effexor	Effexor XR
Brilinta	Brintellix	Bioneem syrup	Biovit capsule

Aim

To identify and analyze the confusing generics and brands of drug products in the Indian market.

Rationale

This study was undertaken to depict the current scenario/cross section of Indian drug product market adding more value to the previously conducted studies as we have found the confusion to be rising with non-allopathic and AYUSH medications also paving a path for them.

MATERIALS AND METHODS

- We conducted a survey of the commonly available brand names of drug products (allopathic as well as non-allopathic) referring to Pharmacy data, Indian Drug Review, FDA and ISMP list of confused drug names.

- Analysis and categorization of LASA drugs into subgroups was then carried out based on generic names, manufacturers, dosage forms, release characteristics, drug combinations (Rataboli P et al, 2005).

RESULTS AND DISCUSSION

Almost 250 confusing drug pairs which can possibly lead to medication errors while prescribing, dispensing and administering were sorted out and re-arranged in 12 existing and 7 new categories.

The following 19 categories of confusing drug pairs highlight the growing confusion in the Indian Market and the potential threat it could cause to the health of the patients consuming it. However, this only presents a superficial outlook whereas the real problem and distress could be far more alarming and larger in magnitude.

Fig. 5: Category 1: Look-alike brand names, different generic names, different manufacturer.

No.	Brand name	Generic name	Manufacturer
1	Amluck (cream)	Amorolfine	Abbott
	Amroid (ointment)	(Aragwadha Priyangu Palasha Karanja Nimba aritaki Lodhra Nagakesara Haridra Daruharidra Durva Vibhitaki Nishotha Ashwagandha Shilajit)	Aimil pharmaceuticals pvt ltd
2	Pioz	Pioglitazone	USV Ltd
	Paz	Alprazolam + propranolol	Race Pharmaceuticals pvt ltd
3	Diamox	Acetazolamide	Pfizer Ltd
	Damoxy	Doxylamine (10mg) + Vitamin B6 (Pyridoxine) (10mg)	Alembic Pharmaceuticals Ltd
4	Melalong (Cream)	Fluocinolone + Hydroquinone+ Tretinoin	Ajanta Pharma Ltd
	Melalite (cream)	Hydroquinone + Octinoxate + Benzophenone	Abbott
5	Folsafe L	Folic acid + Mecobalamin + Pyridoxal Phosphate	Zydus Cadila
	Amlsafe LS	Amlodipine + Lisinopril	Aristo Pharmaceutical Ltd
6	Folinext	Folate + Mecobalamin	Aristo Pharmaceutical Ltd
	Folitrax	Methotrexate	Ipca laboratories Ltd
7	Powergesic	Diclofenac + Linseed oil + Methyl Salicylate	Jenburkt Pharmaceuticals Ltd
	Powervit	Vitamin E + Methylcobalamine + Levocarnitine	Aglowmed Drugs Pvt. Ltd.
8	Disopan	Clonazepam	Incepta Pharmaceuticals Ltd
	Buscopan	Hyoscine butylbromide	Sanofi India

9	Lanol ER	Paracetamol (650mg)	Hetero Drugs Ltd
	Lanzol JR	Lansoprazole (15mg)	Cipla Ltd
	Lonol	Atenolol (50mg)	Khandelwal Laboratories Pvt Ltd
10	Alaspan	Loratadine (10mg)	Fulford India Ltd
	Belaspan	Hyoscine Butylbromide	Everest Healthcare
11	Tazar	Piperacillin Tazobactam	Lupin
	Tozaar	Losartan	Torrent Pharmaceuticals Ltd
12	Cetil	Cefuroxime	Lupin
	Cetin	Cetirizine	Ind Swift laboratories
13	Calin	Vitamin D + Calcium + MgOH	Aingo Pharma
	Celin	Vitamin C	Koye Pharmaceuticals Ltd
14	Ciss Q	Cissus Quadrangularis (Ayurvedic medication)	Aksigen healthcare
	Tuss Q	Bromhexine (8mg) + Chlorpheniramine Maleate (2mg) + Guaifenesin (100mg) + Phenylephrine (5mg) + Paracetamol (325mg)	Blue Cross Laboratories Ltd

Fig. 6: Category 2: Look-alike brand names, Different generic names, Same manufacturer.

No.	Brand name	Generic Name	Manufacturer
1	Dilnip	Cilnidipine (5mg)	Lupin Ltd
	Vilnip	Vildagliptin (50mg)	Lupin Ltd
2	Telpres CT	Telmisartan (40mg) + Chlorthalidone (12.5mg)	ABBOTT
	Telpres MT	Telmisartan (40mg) + Metoprolol Succinate (25mg)	ABBOTT
3	Supermet AM	Amlodipine (5mg) + Metoprolol Succinate (50mg)	ABBOTT
	Supermet XL	Metoprolol Succinate (47.5mg)	ABBOTT
4	Solfe (tablet)	Sodium Feredetate (231mg) + Folic Acid (1.5mg) + Vitamin B12 (15mcg)	ABBOTT
	Solspre (nasal spray)	Isotonic NaCl	ABBOTT
5	Rejoint New (tablet)	Glucosamine (750mg) + Chondroitin (600mg)	ABBOTT
	Rejoint T (capsule)	Mucopolysaccharides + Vitamin C + Collagen Type 1	ABBOTT
	Rejoint UC (capsule)	Collagen Type 2	ABBOTT
6	Phensedyl CR (syrup)	Ambroxol (15mg/5ml) + Guaifenesin (50mg/5ml) + Levocetirizine (2.5mg/5ml) + Menthol (1mg/5ml)	ABBOTT
	Phensedyl LR (syrup)	Levocloperastine (20mg/5ml)	ABBOTT
7	Gluformin G1	Glimepiride 1mg + Metformin 500mg	ABBOTT
	Gluformin G2	Glimepiride 2mg + Metformin 500mg	ABBOTT
8	Durajoint (tablet)	Diacerein (50mg)	ABBOTT
	Durapain (tablet)	Diclofenac (75mg) + Tramadol (50mg)	ABBOTT
9	WIN BP CT	Olmesartan Medoxomil (20mg) + Chlorthalidone (6.25mg)	ABBOTT
	WIN BP MT	Olmesartan Medoxomil (20mg) + Metoprolol Succinate (50mg)	ABBOTT

10	AXL 250	Amoxicillin	Indoco Remedies Ltd
	ATM 250	Azithromycin	Indoco Remedies Ltd
11	Tenormin	Atenolol	ABBOTT
	Zeformin XR	Gliclazide + metformin	ABBOTT
12	Becomax Forte	Vitamin B complex	ABBOTT
	Becozym C forte	Vitamin B complex + vitamin C	ABBOTT
13	Tenormin	Atenolol	ABBOTT
	Tenoclor	Atenolol + Chlorthalidone	ABBOTT
14	GB 29 (capsule)	pregabalin + methylcobalamin	CORONA Remedies Ltd
	HB 29 (tablet)	Vitamin B9 / Folic Acid / Ferrous Ascorbate	CORONA Remedies Ltd
15	Aquamide	Furosemide + Spironolactone	Sun Pharmaceutical Industries Ltd
	Aquazide	Hydrochlorothiazide	Sun Pharmaceutical Industries Ltd

Fig. 7: Category 3: Look-alike brand names, Same generic name, Different manufacturers.

No.	Brand name	Generic name	Manufacturer
1	Ambisome	Liposomal Amphotericin B	Gilead Sciences, Inc.
	Amphonex	Liposomal Amphotericin B	Bharat Serums & Vaccines Ltd
2	Acemax MR (tablet)	Aceclofenac + Paracetamol	MAX NOVA
	Acemax P (tablet)	Aceclofenac + Paracetamol	Anglo-French Drugs & Industries Ltd
3	Dobest	Calcium dobesilate	Wallace Pharmaceuticals Pvt Ltd
	Dobesil	Calcium dobesilate	Sun Pharmaceuticals
4	Zifi OZ	Cefixime + ornidazole	FDC Ltd
	Taxim OZ	Cefixime + ornidazole	Alkem laboratories
5	Euthyroid	Thyroxine 25mcg	Acumentis Healthcare
	Euthyrox	Thyroxine 50mcg	Merck Ltd
6	Bactoclav	Amoxycillin Clavulanate	Micro Laboratories
	Lactoclav	Amoxycillin Clavulanate	Alkem Laboratories

Fig. 8: Category 4: Sound-alike brand names, Different generic names, Different manufacturers.

No.	Brand name	Generic name	Manufacturer
1	Anxenil	(Ayurvedic) Jatamansi Ghana, Brahmi Ghana, Ashwagandha Ghana, Yastimadhu Ghana, Parasikha yavani, Durva, Manjishta	Chaitanya Pharmaceuticals Ltd.
	Anxinil	Alprazolam (0.5mg)	Sun Pharmaceutical Industries Ltd
2	Checal	Calcium orotate	Lupin Ltd
	Shelcal	Calcium, Vit D3	Torrent Pharmaceuticals
3	Glimy	Glimepiride	Dr Reddys Laboratories Ltd
	Glipy	Vildagliptin	Alembic Pharmaceuticals Ltd
4	Zinx (tablet)	Zinc acetate	-
	Lynx (tablet)	Lincomycin (500mg)	Wallace Pharmaceuticals Pvt Ltd
5	Altacef	Cefuroxime	Glenmark

	Ultracet	Paracetamol + Tramadol	Janssen
6	Chexid D (tablet)	Esomeprazole + Domperidone	Aristo Pharmaceuticals Pvt Ltd
	Zaxid (capsule)	Rabeprazole	Akumentis Healthcare Ltd
7	AL (Tablet)	Levocetirizine (5mg)	Avancer Labs Pvt Ltd
	1 AL total (syrup)	Chlorpheniramine Maleate (0.5mg) + Phenylephrine (5mg) + Paracetamol (125mg) + Sodium Citrate (60mg)	FDC Ltd
8	Zorbax	Griseofulvin	Ajanta Pharma Ltd
	Surbex	Vitamin B complex	Abbott
9	Combiflam	Ibuprofen + Paracetamol	Sanofi India Ltd
	Chymoflam	Diclofenac + Trypsin Chymotrypsin	Aglowmed Drugs Pvt. Ltd.

Fig. 9: Category 5: Look-alike or Sound-alike brand names, Different generic names, Different manufacturers, Different dosage forms.

No.	Brand name	Generic name	Manufacturer
1	Aceret (capsule)	Acitretin	Glenmark Pharmaceuticals Ltd
	Acerun (tablet)	Aceclofenac 100 MG	Norris medicines ltd
2	Algina (capsule)	Paracetamol 500mg	Geno Pharmaceuticals Ltd.
	Aginal (tablet)	Amlodipine (5mg)	Alembic Pharmaceuticals Ltd
3	Powergesic (gel)	Diclofenac	Jenburkt Pharmaceuticals Ltd
	Powervit (capsule)	Vitamin E + Levocarnitine + Methylcobalamine	Aglowmed Drugs Pvt. Ltd.
4	Teel tel (bottle oil)	Sesame oil (HERBAL MEDICINE)	-
	Tel tel (tablet)	Telmisartan	Mitoch Pharma
5	Ezact (tablet)	Etoricoxib	Sun Pharma
	Ezlax (sachet/powder)	Macrogol	Nouveau Medicament
6	Diligan (tablet)	Meclizine	UCB India
	Dili Gel (gel)	Diclofenac + methyl salicylate + linseed oil	Olcare Laboratories
7	I-win (Capsule)	Itraconazole	Acme generics
	Zzowin (tablet)	(Withania somnifera) and Jatamansi(Nardostachys jatamansi), Herbs like Tagar (Valeriana wallichii) and Ashwagandha Yastimadhu(Glycyrrhiza glabra) and Mandukparni(Centella asiatica)	Charak Pharma
8	Livogen (Capsule)	Iron + folate	Merck Ltd
	Levozin (tablet)	Levocetirizine	Moraceae Pharmaceuticals
9	Fluner (tablet)	Flunarizine	Geno Pharmaceuticals
	Flunaz (capsule)	Fluconazole	United Biotech
10	B 22 (sinus drops)	Arsenicum album ,Calcarea carbonicum hahnemanni, Hydrastis can. ,Kalium bichromicum, Pulsatilla nig	Baksons Pharmaceuticals

	B28 (Bottle)	Calcarea carb. Hahn ,Croton tig. ,Fucus v. ,Graphites, Natrum sulph. ,Spongia tosta	Baksons Pharmaceuticals
	B29 (Syrup)	Mecobalamine + Folate + alpha lipoic acid + Vitamin D3 + Pyridoxine	Corona Remedies
11	Limcee (tablet)	Vitamin C	Abbott
	Amcee (injection)	Amikacin	Zee Labs

Fig. 10: CATEGORY 6: Identical brand names, One with an additional letter, Different generic names, same manufacturer, And different dosage forms.

No.	Brand name	Generic name	Manufacturer
1	Powergesic plus (gel)	Diclofenac + methyl salicylate + linseed oil	Jenburkt pharmaceuticals ltd
	Powergesic mr (tablet)	Chlorzoxazone (500mg) + diclofenac (50mg) + paracetamol	Jenburkt pharmaceuticals ltd
2	Tyza (cream)	Terbinafine	Abbott
	Tyza m gel	Terbinafine + mometasone	Abbott

Fig. 11: Category 7: Identical brand names, one with an additional letter, Different generic names, Same manufacturer, and same dosage form.

No.	Brand name	Generic name	Manufacturer
1	Aciloc (tablet)	Ranitidine	Cadila Pharmaceuticals Ltd
	Aciloc RD (tablet)	Omeprazole + Domperidone	Cadila Pharmaceuticals Ltd
2	SBL Abroma Radix Mother Tincture Q	Abroma Radix	SBL PVT LTD
	SBL Abroma Augusta Mother Tincture Q	Abroma Augusta	SBL PVT LTD
3	Zifi LBX NEO (tablet)	Cefixime (200mg) + Cloxacillin (500mg) + Lactobacillus	FDC Ltd
	Zifi OZ NEO (tablet)	Ofloxacin (200mg) + Ornidazole	FDC Ltd
4	Zifi (tablet)	Cefixime 100,200mg	FDC Ltd
	Zifi turbo (tablet)	Linezolid 600mg	FDC Ltd
5	C ART eyedrops	Carboxymethylcellulose (0.5% w/v)	Appasamy Ocular Device Pvt Ltd
	ART eyedrops	Hydroxypropylmethylcellulose (0.3% w/v)	Appasamy Ocular Device Pvt Ltd
6	NE	Vitamin e acetate 400mg	Cachet pharmaceuticals pvt ltd
	NE – C	Levo-carnitine (500mg) + Methylcobalamin + Folic Acid (1.5mg)	Cachet pharmaceuticals pvt ltd
7	Dolentia MR	Thiocolchicoside (8mg) + Diclofenac (50mg)	Akumentis Healthcare
	Dolentia Total	Diclofenac 50 MG+Omeprazole 10 MG+Paracetamol 500 MG	Akumentis Healthcare
8	Taxim AZ	Cefixime (200mg) + Azithromycin (250mg)	Alkem laboratories
	Taxim OZ	Cefixime + ornidazole	Alkem laboratories

Fig. 12: Category 8: Identical brand names, One with an additional letter, Different generic names, different manufacturers.

No.	Brand name	Generic name	Manufacturer
1	Epitab	Phenytoin	East West Pharma
	Epitan	Phenobarbitone	Reliance Formulation
2	Wormonil (tablet)	Mebendazole	Wings Pharma
	Wormnil (syrup)	Albendazole	PDC healthcare
3	Anxit	Alprazolam	Micro labs
	Angit	Diltiazem	Anikem labs

4	Alaspan	Loratadine	Fulford India Ltd
	Alspan	Hyoscine	ALIVE pharma
5	Ceftas	Cefixime	Intas Pharma
	Ceftab	Cefuroxime	Sienna Formulations pvt ltd

Fig. 13: Category 9: Identical brand names, one with an additional letter, Same generic name in different combination, Same manufacturer.

No.	Brand name	Generic name	Manufacturer
1	ABEL (tablet)	Azilsartan medoxomil (40mg)	Lupin Ltd
	Abel-CT (tablet)	Azilsartan medoxomil (40mg) + Chlorthalidone (12.5mg)	Lupin Ltd
2	AB-Flo (capsule)	Acebrophylline (100mg)	Lupin Ltd
	AB-Flo-N (tablet)	Acebrophylline (100mg) + Acetylcysteine (600mg)	Lupin Ltd
3	ACECLOREN (tablet)	Aceclofenac 100mg + Paracetamol 500mg + Serratiopeptidase 15mg	Indoco Remedies Ltd.
	ACECLOREN P (tablet)	Aceclofenac 100mg + Paracetamol 500mg	Indoco Remedies Ltd.
4	PPG	Voglibose (0.3mg)	Abbott
	PPG MET	Metformin (500mg) + Voglibose (0.3mg)	Abbott
5	Zifi OZ	Cefixime (200mg) + Ornidazole (500mg)	FDC Ltd
	Zifi CV	Cefixime + Clavulanate	FDC Ltd
6	ACENAC P	Aceclofenac + Paracetamol	Medley Pharmaceuticals
	ACENAC MR	Aceclofenac + Paracetamol + Thiocolchicoside	Medley Pharmaceuticals
	ACENAC SP	Aceclofenac + Paracetamol + Serratiopeptidase +	Medley Pharmaceuticals
7	Telpres AM	Telmisartan + Amlodipine	Abbott
	Telpres AMH	Telmisartan + Amlodipine + Hydrochlorthiazide	Abbott
8	Amlong A	Amlodipine + atenolol	Micro Labs Ltd
	Amlong H	Amlodipine + hydrochlorthiazide	Micro Labs Ltd
9	Tribet	Pioglitazone + Glimepiride + metformin	Abbott
	Tribetrol	Voglibose + Glimepiride + metformin	Abbott
10	Dolentia Gel	Capsaicin + Diclofenac Potassium +Menthol +Methyl Salicylate	Akumentis Healthcare
	Dolentia Relax Gel	Diclofenac Diethylamine + Thiocolchicoside + Methyl salicylate	Akumentis Healthcare
11	Dolentia (gel)	Capsaicin + Diclofenac Potassium +Menthol +Methyl Salicylate	Akumentis Healthcare
	Dolentia P (tablet)	Diclofenac + paracetamol	Akumentis Healthcare
12	Aceclo	Aceclofenac	Aristo Pharmaceuticals Pvt Ltd
	Aceclo Plus	Aceclofenac + Paracetamol	Aristo Pharmaceuticals Pvt Ltd
13	AMLOSAFE AT	Amlodipine + atenolol	Aristo Pharma
	AMLOSAFE LS	Amlodipine + lisinopril	Aristo Pharma
14	WIN BP AM	Olmesartan Medoxomil (20mg) + Amlodipine (5mg)	ABBOTT
	WIN BP	Olmesartan Medoxomil (20mg)	ABBOTT

Fig. 14: Category 10: Identical brand names, different generic names, Different manufacturers, different dosage forms.

No.	Brand name	Generic name	Manufacturer
1	Vizol (capsule)	Multivitamin	Maan Pharm Ltd
	Vizol (eyedrops)	Methyl Cellulose	D'zwon remedies

Fig. 15: Category 11: Identical brand names, Same generic name, Different manufacturers, Different dosage forms.

No.	Brand name	Generic name	Manufacturer
1	Penclav (Syrup)	Amoxycillin Clavulanate	Biochem pharmaceutical
	Funclav (tablet)	Amoxycillin Clavulanate	Bioethix international

Fig. 16: Category 12: Identical brand names, Different generic names, Same manufacturer, Different dosage forms.

No.	Brand name	Generic name	Manufacturer
1	Tyza (tablet)	Terbinafine	Abbott
	I-Tyza (cream)	Itraconazole	Abbott

Fig. 17: Category 13: Identical brand name, Same generic name, Same manufacturer, Different dosage form.

No.	Brand name	Generic name	Manufacturer
1	AB Phylline capsule	Acebrophylline (100mg)	Sun Pharmaceutical Industries Ltd
	AB Phylline SR tablet	Acebrophylline (100mg)	Sun Pharmaceutical Industries Ltd
	AB Phylline Syrup	Acebrophylline (10mg/ml)	Sun Pharmaceutical Industries Ltd
2	Zifi DT tablet	Cefixime	FDC Ltd
	Zifi DT syrup	Cefixime	FDC Ltd
3	Chymotra AT spray	Minoxidil	Adroit Life Sciences
	Chymotra Lotion	Minoxidil	Adroit Life Sciences
4	Tyza (cream)	Terbinafine	Abbott
	Tyza tablet	Terbinafine	Abbott
5	Dologel (gel)	Choline + lidocaine	Dr Reddy's
	Dologel (liquid solution)	Choline + lidocaine	Dr Reddy's
6	Taxim O (tablet)	Cefixime	Alkem Labs
	Taxim O forte (syrup)	Cefixime	Alkem Labs

Fig. 18: Category 14: Identical brand name, One with an additional letter, Same generic name in different combination, Different manufacturers.

No.	Brand name	Generic name	Manufacturer
1	ACEMAX MR (tablet)	Aceclofenac + Paracetamol	Max nova
	ACENAC MR (tablet)	Thiocolchicoside + Aceclofenac + Paracetamol	Medley Pharmaceuticals

Fig. 19: Category 15: Identical brand name, Same generic name, Different release characteristics.

No.	Brand name	Generic name	Manufacturer
1	ADALAT RETARD	Nifedipine	-
	ADALAT LA	Nifedipine	-
2	AB-Flo SR	Acebrophylline (200mg)	Lupin Ltd
	AB-Flo	Acebrophylline (100mg)	Lupin Ltd
3	ACECLO	Aceclofenac 100mg	Aristo Pharmaceuticals Pvt. Ltd.
	ACECLO SR	Aceclofenac 200mg	Aristo Pharmaceuticals Pvt. Ltd.
4	Duvadilan	Isoxsuprine 10mg	Abbott
	Duvadilan Retard (SR)	Isoxsuprine 40mg	Abbott

5	Diamicron	Gliclazide 80mg	Serdia Pharma
	Diamicron XR	Gliclazide 60mg	Serdia Pharma

Fig. 20: Category 16: Confusing generic drug pairs.

No.	Generic drug pairs	
1	Vincristine	Vinblastine
2	Ephedrine	Epinephrine
3	Lorazepam	Clonazepam
4	SulfaSALAZINE	SulfaDIAZINE
5	Tramadol	Trazodone
6	MethylDOPA	LevoDOPA
7	Penicillin	Penicillamine
8	Valacyclovir	Valganciclovir
9	Alteplase	Retepase
10	Dactinomycin	Daptomycin
11	Dopamine	Dobutamine
12	Hydralazine	Hydroxyzine
13	Nifedipine	Nicardipine
14	Prednisolone	Prednisone
15	Nifedipine	Nimodipine
16	Carbimazole	Clotrimazole, Cotrimoxazole
17	Buspirone	Bupropion
18	Lamivudine	Lamotrigine
19	Glypizide	Glyburide
20	Metoprolol succinate	Metoprolol tartarate

Fig. 21: Category 17: Brand or generic names starting with same letter with similar looking doses.

Similar drug Names and Similar looking doses	
ACECLOFENAC 100mg BD	AMANTADINE 100mg BD
TRICOR (Micronised Fenofibrate 145mg)	TRACLEER (Bosentan monohydrate 125 mg)
AMTAT (amlodipine 10mg)	ASTAT (atorvastatin 10mg)
Pan 40 (pantoprazole 40mg)	Pan L (pantoprazole 40mg + levosulpiride 75mg)
Pan 20 (pantoprazole 20mg)	Pan Junior (pantoprazole 20mg)
AXL 250 (amoxycillin 250 mg)	ATM 250 (azithromycin 250mg)
Gabapentin 600mg	Gemfibrozil 600mg
Milrinone 10mg/10ml vial	Neostigmine 1mg/1ml vial

Fig. 22: Category 18: Allopathic medication similar to other AYUSH/Non-Allopathic medication.

No.	Brand name	Generic name	Manufacturer
1	B 22 (sinus drops)	Arsenicum album, Calcarea carbonicum hahnemanni, Hydrastis can., Kalium bichromicum, Pulsatilla nig (Homeopathic medicine)	Baksons Pharmaceuticals
	B28 (Bottle)	(Homeopathic medicine) Calcarea carb. Hahn, Croton tig., Fucus v., Graphites, Natrum sulph., Spongia tosta	Baksons Pharmaceuticals
	B29 (Syrup)	Mecobalamine + Folate + alpha lipoic acid + Vitamin D3 + Pyridoxine	Corona Remedies
2	ZZOWIN (tablet)	Ayurvedic (Withania somnifera) and Jatamansi (Nardostachys jatamansi), Herbs like Tagar (Valeriana wallichii) and Ashwagandha Yastimadhu (Glycyrrhiza glabra) and Mandukparni (Centella asiatica)	Charak Pharma
	I-WIN (Capsule)	Itraconazole	Acme generics
3	Teel tel (bottle oil)	Sesame oil (herbal medicine)	-
	Tel tel (tablet)	Telmisartan	Mitoch Pharma
4	Anxenil	(Ayurvedic) Jatamansi Ghana, Brahmi Ghana, Ashwagandha Ghana, Yastimadhu Ghana, Parasikha yavani, Durva, Manjishta	Chaitanya Pharmaceuticals Ltd.

	Anxinil	Alprazolam (0.5mg)	Sun Pharmaceutical Industries Ltd
5	Aloesoc (syrup)	Homeopathic medicine	SBL Pvt Ltd
	Alocet (syrup)	Cetirizine	Viilbery Healthcare Pvt Ltd
6	Ciss Q	Cissus Quadrangularis (Ayurvedic medication)	Aksigen healthcare
	Tuss Q	Bromhexine (8mg) + Chlorpheniramine Maleate (2mg) + Guaifenesin (100mg) + Phenylephrine (5mg) + Paracetamol (325mg)	Blue Cross Laboratories Ltd
7	Bioneem Syrup	Ayurvedic medicine	Biotique
	Biovit Capsules	Carbonyl iron, vitamins, zinc	Biovitamins

Fig. 23: Category 19: Similar brand/generic names, Different doses.

No.	Brand name	Generic name	Manufacturer
1	Gluformin G1	Glimepiride 1mg + Metformin 500mg	ABBOTT
	Gluformin G2	Glimepiride 2mg + Metformin 500mg	ABBOTT
2	K glim 1	Glimepiride 1 mg	Blue cross labs
	K glim 2	Glimepiride 2 mg	Blue cross labs
3	K glim M1	Glimepiride 1 mg + metformin 500mg	Blue cross labs
	K glim M2	Glimepiride 2 mg + metformin 500mg	Blue cross labs

Newer and currently available confusing drugs have been identified in the existing 12 categories.

7 new and unique categories have been added to the existing list.

Categories 1, 2,4,5,7,8,12 are the existing categories of drugs which can lead to more number of errors and could be dangerous.

In the newer categories, category 17, 18, 19 are likely to cause more harm than others.

Drugs belonging to these categories 3, 6, 9, 10, 11, 12, 13, 14, 15 are less likely to be confused.

Prescribing one drug instead of the other can not only lead to failure of therapy but also worsen the condition of the patient and cause serious adverse events. Harmful drug interactions can occur between the prescribed drugs itself or with medication taken concurrently for another disease.

Risk factors for medication errors and adverse events related to LASA drugs include

- Illegible handwriting, multiple prescriptions, poly-pharmacy
- Lack of knowledge (Doctor, pharmacist, person administering the drug)
- Doctor prescribing drugs over the phone
- Negligence and hasty dispensing of drugs at pharmacy level in rush hours
- Improper drug storage
- Drug shortage
- Drug related factors: Similar doses and indications, common ingredients, multiple formulations

- Similar looking vials and packaging and similar strengths can worsen the confusion further
- Incorrect reading and ordering of drug products by patients on phone or online prescriptions
- Patient characteristics (Guide on handling look alike, sound alike medications, 2012)

Risk assessment

Major contributors to LASA medication errors are drug names, labels and packaging of drug products. Multiple drug product characteristics should be used for risk assessment. Medication errors due to LASA drugs are predictable and preventable. Hence, we can design drug products to decrease the risk of error and augment the safety of its use. All drug product characteristics must be a part of risk assessment. Errors involving products with suffixes may lead to an incorrect dosing interval or the wrong drug being prescribed, dispensed or administered. All the processes involved in handling of the drug right from prescription stage to the stage of administration and effect of the drug must be considered for risk assessment and prevention.

One such algorithm for risk assessment that can be used is **Risk and Confusability Algorithms by Rataboli et al** (Rataboli PV et al, 2015).

Strategies to prevent and reduce LASA related errors (Rataboli et al, 2005), (Managing High-Alert/Hazardous and Look-Alike-Sound-Alike Medications in Ambulatory Care Settings [Internet]. 2020), (Guide on handling look alike, sound alike medications, 2012), (Guide on handling look alike, sound alike medications, 2007)

1. Creating awareness among the prescribers about LASA medication.
2. Prescribing practitioners should write prescriptions clearly and instruct the patient thoroughly; especially on telephonic orders.
3. Pharmacist should correctly identify the drug prescribed and dispense correctly with the use of his/her knowledge. In case of any confusion or doubt, the pharmacist should contact the prescribing doctor.
4. Patients who can read and write can correlate if they have received the correct medication before administration. Illiterate and dependent patients can consult other sources or use help to confirm before consuming the drug products
5. Use **TALL MAN LETTERING** and try to incorporate generic name as well as the brand name in the prescription.

Tall Man Lettering is a strategy which blends both upper and lower case letters to draw attention to LASA medication, making it visually straightforward to tell apart. The US FDA encourages the use of Tall Man Lettering on drug labels.

E.g BetaNOL – BetaLOC, FluOXETine – FluVOXAMine

6. Using printed/electronic prescription methods can also reduce the chance of error.
7. Nursing staff and attendants who are bound to medicate the patients can be sufficiently educated.
8. Hospital/ institution can develop policies in such a way that the more important drug in the confusing drug pair is retained and better and suitable alternatives can be included.
9. Annual or 6 monthly review of list of LASA drugs used in the hospital can be conducted.
10. Regulatory bodies approving the drug products should consider more stringent measures regarding LASA drugs to have a safer and smoother consumption of drug products.
11. Manufacturers should keep in mind this confusion and its consequences and name the brands and package the products suitably. Drug manufacturers should incorporate computerized screening methods and practitioner testing in their name development process.
12. Anonymous reporting systems can be put in place to minimize errors and malpractice.
13. A list of commonly used LASA drugs can be circulated among practitioners and staff dealing with such drugs.

CONCLUSION

With thousands of drug products in the market, the potential of medication error due to confusing drug names is considerable. Algorithm by Rataboli et al can be used by authorities before allowing drug products to enter the market. Also, using strategies provided by WHO, guidelines for handling LASA drugs, Tall Man Lettering and technologies such as computerized

physician order entry (CPOE), bar coding, or automated dispensing devices, we can minimize medication errors at various levels of prescription of drugs with confusing brand names.

ACKNOWLEDGEMENT

Throughout the writing of this article, I have received enormous support and assistance.

I express my sincere gratitude on having successfully completed my article titled, “An analysis of look-alike sound-alike generics and brands in indian market”, to all those who have directly or indirectly helped me complete it by giving their valuable suggestions and inputs.

My heartfelt gratitude to my guide, Dr. Padmanabh V. Rataboli, Professor and Head of Department of Pharmacology, under whose valuable guidance this article was completed successfully. His persistent encouragement and advices to tackle the difficulties have been immensely helpful. His insightful feedback pushed me to sharpen my thinking and brought my work to a higher level.

I thank my fellow colleagues for their invaluable suggestions and unconditional help.

Dr. Devendra V. Sinai Paraz

BIBLIOGRAPHY

- Gaunt M. Look-Alike, Sound-Alike Drug Names [Internet]. 2010 [cited 27 August 2021]. Available from: <https://www.pharmacytimes.com/view/medicationsafety-1210>
- Guide on handling look alike, sound alike medications. 1st ed. Selangor, Malaysia: Pharmaceutical Services Division Ministry of Health Malaysia; 2012.
- List of Confused Drug Names [Internet]. 2019 [cited 27 August 2021]. Available from: <https://www.ismp.org/recommendations/confused-drug-names-list>
- Look-Alike Drug Names with Recommended Tall Man Letters [Internet]. 2016 [cited 27 August 2021]. Available from: <https://www.ismp.org/recommendations/tall-man-letters-list>
- Look-Alike, Sound-Alike Medication Names Patient Safety Solutions. J QUALITY PATIENT SAF. 2007; 33(7): 430-433. Available from: [https://www.jointcommissionjournal.com/article/S1553-7250\(07\)33049-3/](https://www.jointcommissionjournal.com/article/S1553-7250(07)33049-3/)
- Managing High-Alert/Hazardous and Look-Alike-Sound-Alike Medications in Ambulatory Care Settings [Internet]. 2020 [cited 27 August 2021]. Available from: <https://www.jointcommission.org/resources/news-and-multimedia/blogs/ambulatory-buzz/2020/01/08/managing-high-alert-hazardous->

and-look--alike-sound-alike-medications-in-ambulatory-care-settings/

- Rataboli P, Garg A. Confusing brand names: Nightmare of medical profession. J Postgrad Med, 2005; 51(1): 13-16. Available from: <https://pubmed.ncbi.nlm.nih.gov/15793332/>
- Rataboli P, Khandeparkar A, Khandolkar S, Chawla L. Confusing brand names - algorithms to assess the confusability to dispensers and risk to patients. 2015 [cited 27 August 2021]. Available from: <http://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20150201>
- Special Edition: Tall Man Lettering; ISMP Updates Its List of Drug Names with Tall Man Letters [Internet]. 2016 [cited 27 August 2021]. Available from: <https://www.ismp.org/resources/special-edition-tall-man-lettering-ismp-updates-its-list-drug-names-tall-man-letters>

ABBREVIATIONS

- ISMP - Institute of Safe Medication Practices
- ERP – Error reporting program
- WHO – World Health Organization
- LASA – Look alike Sound alike