International Journal of Bio-pharmacology, Biotechnology and Allied Sciences

IJBBAS, June, 2020, 1(3): 264-272 Review Article www.ijbbas.in

DRUG ADULTERATION: A REVIEW TO SUCCINCT

Nayak R.R.

Centurion University of Technology and Management, Jatani, Bhubaneswar.

***Corresponding Author: Rahul Rosan Nayak**

Email ID: rahulroshannk@gmail.com

Available online at: www.ijbbas.com

Received 2nd may. 2020; Revised 12th may. 2020; Accepted 5th June. 2020; Available online: June. 2020

ABSTRACT

Crude drug adulteration and replacement is a raging issue. Undoubtedly, replacement is effective in areas where there is no supply of particular crude product and or undesirable adverse effects of preferred crude drug and other products of equivalent pharmacological impact and less unwanted after effects are accessible. But in other situations, it is unethical since turning genuine medicines into substandard medicines will trigger a range of harmful effects including life-threatening reactions including mild to moderate to extreme. Therefore, to rectify this unlawful act and optimize the health of customers, knowledge of all means of adulteration and replacement is required. By the conclusion of this study the American Botanical Council's Botanical Adulterant System is also illuminated.

Key words- Drug, Adulterant, crude, medicine.

INTRODUCTION

Introduction-

The more accurately described adulteration as synthetic medication tends to be real at first glance as its morphological resemblance and at times chemically indistinguishable. It is partly or entirely a deliberate or unintended replacement of a synthetic drug with certain compounds that are either equal or inferior in medicinal or chemical properties. Herbs substitution is the need of the hour as needed medicinal plants are red listed. The most important replacement parameters are pharmacological function, rather than anatomy or constituents. Substitution of herbs accomplished several aims but fundamental was to have a medicinal benefit close to that of the initial drug. It enabled the practitioner with wider flexibility for the usage of herbs that are readily accessible, expense-effective and also most suitable for the clinical situation. The medication's adverse reaction in which the product needed has undesirable side effects along with therapeutic results. For example, abortive impact of some medication during pregnancy is minimal, replacement with other blunt medication is preferable **[1].** When Conventional Chinese Medicine was part of China's national public healthcare program in the mid of 1950s, the awareness that the replacement was less effective was fairly replaced by local species of essential herbal medicines for the official source product. For eg, in the People's Republic of China's Pharmacopoeia of 1985, Lonicera japonica (Caprifoliae, Japanese honeysuckle flowers) is the official source plant for the herb jin yin hua. Three species are classified as compatible replacements for the Lonicera japonica, Lonicera confusa ,Lonicera hypoglauca and Lonicera dasystyla. *Further*, *nine* species are recognized in specific regions as being acceptable as local substitutes. *In* this case, local replacements are appropriate where the official species are not accessible **[2].**

Under substandard circumstances, the undesirable feature of replacement is. That becomes fatal at times. Adulteration has triggered a range of adverse events from mild (anaphylactic reactions, exhaustion, stomach distress, mood disruptions or myasthenia, diarrhea, discomfort, and pulmonary complaints) to serious (confusion, convulsions, dermatitis, lethargy or seizures, leukopoenia, sensory disorders, vomiting) to extreme (carcinomas, cerebral oedema, stroke, intracerebral haemorrhage, overdose, metabolism) **[2].**

Ginger Jake Outbreak is one such case. It was an effort to make ginger fluid extract more palatable by deliberately applying plasticizers such as dibutyl phthalate and ethylene glycol to the illegal liquor marketed as a medical −fluid extract during the 1920's prohibition of alcohol in the United States. Finally, to level away the flavor, tri-ortho-cresyl phosphate (TOCP) was applied to the concentrate. It had been the ginger extract's poisonous substance. Symptoms of the TOCP toxicity had a lag duration of ten to twenty days after apparent gastrointestinal symptoms. The neurotoxic effects of the following involved lower extremity discomfort and paraesthesia, then gradual muscle weakening normally progressed into lower extremity paralysis. The effects is attributed to axonal degeneration of peripheral nerves and spinal cord degeneration of anterior horn cells. Hundreds of patients suffered as a consequence of chemical responses from February to March 1930, **k**nown as Inferiority when natural constituents fall below the appropriate minimum norm. Through proper selection of plant content, it can be avoidable **[3]**. Drug constituent degradation involves two styles. Spoilage is triggered by infestation of the microbial or other disease. This leaves a drug inappropriate for usage. Careful drying and handling practices may help prevent this. Whereas degradation is the loss of useful product constituents by maltreatment or ageing or intentional component extraction and the selling of the residue as original medication.

Materials other than product ads consist of 3 forms. Admixture is the introduction by mistake or inattention of one object to another. Sources include the presence of soil / stones on an underground portion (roots, rhizome) by irresponsibility / ignorance, and unintentional and co-collection of 2 related plants **[4].** Sophistication is the purposeful insertion of spurious / inferior content meant to defraud. i.e Add yellow starch powder to ginger(Zingiber officinale) and Carica papaya seed to black pepper (Piper nigrum) seeds. Total substitution is the inclusion of a totally new article in lieu of what is necessary. One reason is the availability of cheap cotton seed oil, instead of pure olive oil **[5].**

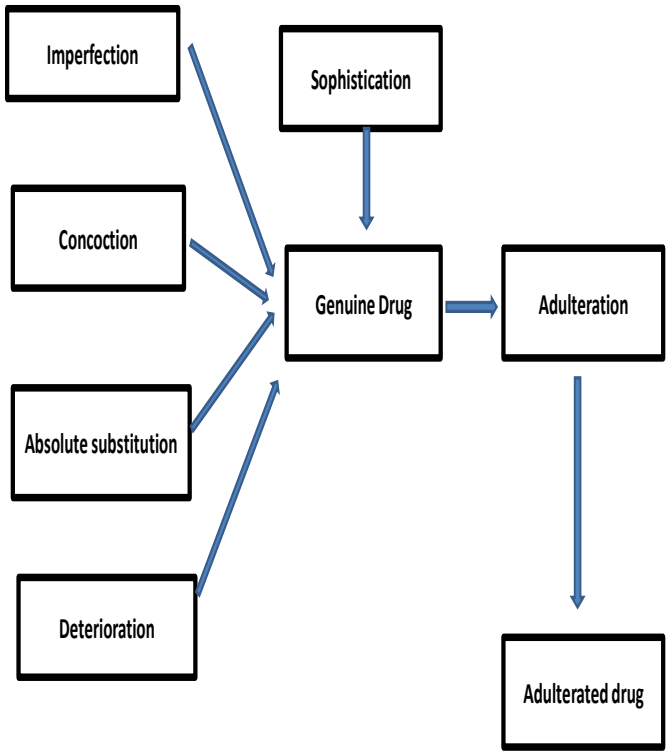

Figure-1: Factors in authentic crude product that cause adulteration.

STANDARDS FOR A DESIRABLE SELECTION

Drug would have identical chemical components as well as therapeutic effects.

Substitution of entirely different drugs

Solanum xanthocarpam (Yellow-berried Nightshade) and Clerodendron indicum exhibited antihistaminic activity and were employed in pulmonary-related diseases.

Tribulus terretris (Chota Gokhru) Family's chemical constituents: Zygophyllaceae and Pedalium murex (Large Caltrops / Bara Gokhru) Family: Pedaliaceae differ. This includes diosgenin,alkaloids, rhamnose, chlorogenin and rutin. In comparison, Pedalium murex contains vanillin, flavonoids,ursolic acid and alkaloids. But the nephroprotective, diuretic, and hepatoprotective effect of both organisms is confirmed **[5].**

Override of species in the same family

Thorn apple (Datura stramonium) and Black datura (Datura metel) Family chemical constituents: Solanaceae are alkaloids such as,atropine, hyoscyamine scopolamine. Such alkaloids are demonstrated in pulmonary tract as bronchodilator and inhibitor of mucus membrane secretions. Therefore, both species are helpful for respiratory tract disease.

Substitution of different sections of plant

The Sida cordifolia roots were considered to be official product. Root contains sitoindoside and glycoside of acyl steryl. Whole plant includes, hydrocarbons, alkaloids, ephedrine, and fatty acids. Specific plant extracts exhibit antioxidant, antibacterial, hepato-protective, hypoglycemic and cardio-tonic activity. Roots and aerial sections are both equally successful under the conditions described above **[6].**

ADULTERING REASONS

Vernacular name misunderstanding

The same vernacular name of dissimilar species and specific names of the same species gives rise to misunderstanding and encourages adulteration. Parpatta in Ayurveda means Fumaria parviflora. "Parpadagam" in Siddha means Mollugo pentaphylla. Since the names in traditional medicine systems are identical, these 2 herbs are often interchanged or adulterated or replaced **[7].**

Failure to identify credible source

Nagakesar is one of the most popular Ayurvedic medicines. The bona fide source is Mesua ferrea. Product samples, however, are adulterated with Calophyll uminophyll flowers because manufacturers are unaware of that. The existence of two-celled ovaries will easily distinguish authentic flowers while in the case of dubious flowers they are single celled.

Morphological similitude

Mucuna pruriensis has been adulterated with other morphologically related seeds of the Papilionaceae. Widely known adulterants are *Mucuna utilis* (sold as white variety) and *Mucuna deeringiana* (sold as greater variety). In addition to this *Mucuna cochinchinensis,* the Indian markets also sell *Canavalia ensiformis & Canavalia virosa*. Genuine seeds are up to 1 cm long and have a glossy black and brown mosaic pattern on their surface. The *Mucuna deeringiana* and *Mucuna utilis* are larger in size (one point five to two centimeter) **[10,11].** Thus *Mucuna utilis* is white or colored with a buff and *Mucuna deeringiana* is dull black.

Lack of credible plant

Hypericum perforatum is grown and sold at European markets. In India Hypericum perforatum species is very small in accessibility **[8].** Nonetheless, the plentiful Indo-Nepal species Hypericum patulum, marketed in Hypericum perforatum label. Business sample is an entire plant with flowers, so it is easy to botanically classify them. Hypericum perforatum stem's transverse segment anatomically has hollow pith, compact thin phloem and lack of oxalate calcium crystals. Although as a larger phloem, Hypericum patulum is a partly hollow pith with the production of calcium oxalate crystals **[9].**

Color resemblance

It is well known that product ingredients can be modified or replaced by other plant organisms over time. It is well established that components of the crop may be changed over time or substituted with other plant species. Arnebia euchroma var is well understood to differ. The present source is euchromae. The distinction is that Arnebia euchroma succeeds Ventilago madraspatana in producing a red dye **[12].**

Madraspatana Ventilago. Ventilago madraspatana hasn't been spotted on the market lately. Whatever is present on the market, originates from Arnebia euchroma in the form of Ratanjot **[13].**

TYPES OF ADULTERATION:

Replacing natural substances with superficially identical but cheaper ones:

Adulterated item has no connection to legitimate substance, that may or may not encompass any medicinal or toxin element. As *Ailanthus altissima* (Ailanthus) is replaced by *Atropa belladonna* (Belladonna), *Cassia acutifolia* (senna), *Mentha longifolia* (mint) etc.; *leaves of Phytolacca* americana (pokeweed) and *Scopolia japonica* (Japanese belladonna) are replaced by *Atropa belladonna* (Belladonna); leaves of *Xanthium strumarium* for *stramonium* and *dandelion* Anethum sowa (Indian dill) with *Anethum graveolens* (European dill)**[14].** .

Replacement with a medication developed artificially:

Use of artificially fabricated drugs as a replacement for the main drug. Examples include synthetic sugar for honey, yellow colored paraffin wax for bees wax, compressed chicory instead of coffee and nutmeg (Jaifal) basswood properly cut and shaved **[15].**

CONCLUSION:

After exploring the mechanisms of adulteration, further knowledge and analysis needed to resolve and reduce the adulteration of illegal acts, to improve the protection of consumers. We can take advantage of research journals, expert analysis, pharmacology, kinetics / dynamics, interactions, harmful impacts, toxicology and dosing to help with this. The multiple reports of harmful impacts and dangers associated with botanical health products, the distribution and widespread sale of adulterated products and the labeled rise in deceiving advertising assertions on the web demand stimulate action to protect public health. Of this purpose there is a need for effective and coordinated action to inform the public and government on the urgent need for current regulations protection and government support to enforce it.

The Botanical Adulterants Program of ABC-AHP-NCNPR is highly appreciated in this regard and off course will play an important role in eliminating this bug, adulteration from our world.

REFERENCE

[1]. Poornima, B. (2010). Adulteration and substitution in herbal drugs a critical analysis. *IJRAP*, *1*(1), 8-12.

[2]. Posadzki, P., Watson, L., & Ernst, E. (2013). Contamination and adulteration of herbal medicinal products (HMPs): an overview of systematic reviews. *European journal of clinical pharmacology*, *69*(3), 295-307.

[3]. Ernst, E., Pittler, M. H., Wider, B., & Boddy, K. (2006). The desktop guide to complementary and alternative medicine. Edinburgh; Edinburgh: Mosby.

[4]. Foster, S. (2011). A brief history of adulteration of herbs, spices, and botanical drugs. *HerbalGram*, *92*, 42-57.

[5]. Prakash, O., Jyoti, A. K., Kumar, P., & Manna, N. K. (2013). Adulteration and substitution in Indian medicinal plants: an overview. *J Med Plants Stud*, *1*(4), 127-132.

[6]. Hedberg, I. (1993). Botanical methods in ethnopharmacology and the need for conservation of medicinal plants. *Journal of ethnopharmacology*, *38*(2-3), 113-119.

[7]. Nesbitt, M., McBurney, R. P., Broin, M., & Beentje, H. J. (2010). Linking biodiversity, food and nutrition: The importance of plant identification and nomenclature. *Journal of food composition and analysis*, *23*(6), 486-498.

[8]. Marcus, D. M., & Grollman, A. P. (2002). Botanical medicines--the need for new regulations. *The New England journal of medicine*, *347*(25), 2073.

[9]. Ahmed, S., & Hasan, M. M. (2015). Crude drug adulteration: a concise review. *World J Pharm Pharm Sci*, *4*(10), 274-283.

[10]. Snyman, T., Stewart, M. J., Grove, A., & Steenkamp, V. (2005). Adulteration of South African traditional herbal remedies. *Therapeutic drug monitoring*, *27*(1), 86-89.

[11]. Ang, H. H. (2008). Lead contamination in Eugenia dyeriana herbal preparations from different commercial sources in Malaysia. *Food and chemical toxicology*, *46*(6), 1969-1975.

[12]. Ang, H. H., and K. L. Lee. "Contamination of mercury in tongkat Ali hitam herbal preparations." *Food and chemical toxicology* 44, no. 8 (2006): 1245-1250.

[13]. Miller, L. G., Hume, A., Harris, I. M., Jackson, E. A., & Kanmaz, T. J. (2001). Adulteration: its various meanings. *Pharmacotherapy*, *21*(6), 770-771.

[14]. Zhang, J., Wider, B., Shang, H., Li, X., & Ernst, E. (2012). Quality of herbal medicines: challenges and solutions. *Complementary therapies in medicine*, *20*(1-2), 100-106.

[15]. Oxman, A. D., & Guyatt, G. H. (1991). Validation of an index of the quality of review articles. *Journal of clinical epidemiology*, *44*(11), 1271-1278.