

A Novel Approach On Synthetic Drugs: A Review Article

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Abstract

Medicinal plants constitute an effective source of Ayurvedic, Traditional and Modern system of medicine. A large percentage of plants used in the practice of Ayurveda and herbal medicines are subjected to controversial botanical source, adulteration and substitution.

Material & Methodology: *Information regarding the synthetic drugs are classified and presented systematically from classical Ayurvedic literature, journals, and internet media in regards to the understanding and relevance of the topic.*

Discussion: *A rational substitution of the herbal drug is done with synthetic drug based on the similarities of the Guna (qualities) and Karma (actions) of the drug. There should be wide and proper validation and authentication of the drug based on the Ayurvedic parameters and modern principles.*

Conclusion: *This systematic review is presented with view briefly summarizing the relevance of synthetic drugs and its usage across classical Ayurvedic literature with contemporary science.*

Keywords: *Synthetic Drugs, Ayurveda, Adulteration, Substitutions, Guna, Karma.*

Introduction:

Indian classical literature provides references to production and utilization of many drugs and elements with medicinal property since ancient times. As per Ayurvedic documented references, utility of gold had been recorded 3000 years ago for Medhya (Brain Tonics), Rasayana (Rejuvenation) and Vajikarana (Aphrodisiac) purposes. Various herbal and metallic drugs of synthetic origin are detailed and mentioned in Ayurvedic literature. Few useful and popular ones are – Kesar, Karpura, Vamshalochana, Madhu, Dugdha, Rasanjana, Elua, Ghruta, Manikya, Mukta, Pravala, Hingula, Sindhura, Kasturi, Kshara, etc. Today the world is facing an increasing trend of resource depletion across the nations. Extensive researches are conducted in this regard all over the world to find alternatives for the same.

According to the source of the origin, drugs are of three types viz. Natural Drugs, Semi-synthetic Drugs and Synthetic Drugs.

Those pharmaceutical substances which are synthesized /produced/manufactured entirely from chemical reactions between different chemical agents in a laboratory or industry are termed synthetic drugs. For example Navasagar, Vamshalochana etc.

Pharmaceutical products obtained from the natural sources and undergo chemical processes to achieve specific pharmacological properties are called semi synthetic drugs. For example Sugar, Honey etc. We find the reference from the classical Ayurvedic literature since ancient times regarding the artificial preparation of drugs of both herbal and metallic origin with therapeutic efficacy.

Materials and methods:

All the available and contemporary Ayurvedic and allied literatures were studied for comprehensive understanding of the subject. Information regarding the synthetic drugs are classified and presented systematically from classical Ayurvedic literature, journals, and internet media in regards to the understanding and relevance of the topic. A list of drugs are prepared and enlisted as below;

Synthetic musk: Ayurvedic classical references insight on the synthetically obtained musk.¹ Today synthetic musk is easily available in the commercial markets. The odor of the natural owes to a ketone called ‘Muscone’. There are multiple products commercially sold in the name of musk in the market. The compounds belong mainly to the following three groups-

- a) Nitrated tertiary butyl toluenes, e.g Trinitro tertiary butyl toluenes
- b) Tertiary butyl xylenes.
- c) Trinitro compounds-these are further divided into four groups-

- i. Cyanide musk e.g Dinitro tertiary butyl xylene cyanaide.
- ii. Aldehyde musk e.g Dinitro tertiary butyl xylene aldehyde.
- iii. Halgogen musk e.g Dinitro tertiary butyl xylene iodide.
- iv. Ketone musk e.g Dinitro aceto tertiary butyl toluene, Dinitro aceto tertiary butyl xylene.²

Artificial musk is insoluble in water but soluble in Cinnamein and benzyle benzoate. Artifical musk is adulterated with ‘Acetanilide’ and ‘Cinnamic acid’.

Madhu: Honey is widely used internally and externally both as a medicine and otherwise and supportive evidences of the same is available in detail in Ayurvedic literature. It is considered to be the best Yogavahi Aushadi Dravya. Varieties of commercially available honey are sold in the market. Synthetic honey or artificial honey is manufactured by acid hydrolysis of sucrose with added additional starch syrup, it consists of equal parts of glucose and fructose. Artificial honey (invert sugar cream) is manufactured by acid hydrolysis of sucrose. The creamy consistency may be achieved by addition of starch syrup. The mixture consists of equal parts of -> glucose and -> fructose, together with more or less starch which is composed of -> α -D-glucose chains. The older name artificial honey is derived from the manufacturing process.³

Milk: Milk is considered both as Aahara and Aushada in Ayurveda. This animal product is now made artificially in powder form and is available across the market. Synthetic milk is not milk but it is entirely a different component with a high degree of adulteration to increase the volume of milk and ultimately the margin of profit. Generally it is a mixture of water, pulverized detergent or soap, sodium hydroxide, vegetable oil, salt and urea. The simplicity and rapidity with which milk can be adulterated always tempted the unscrupulous milk vendors to indulge in fraudulent practices and adulterate the milk. The ever-rising greed has given way to the development of a new type of adulterated milk known as synthetic milk.⁴

Vamshalochana: Chemically is 90% silica in Vamshalochana. Nowadays, it is rare to found genuine Vanshlochan in the market, as it is very difficult to procure, costly, and naturally found in low amount. So as a substitute, synthetic Vanshlochan is routinely used in preparation of Ayurvedic medicines. Sometimes the starch of Arrowroot (*Maranta arundinacea*) and East Indian Arrowroot, Tvakshira, Tvakshiri (*Curcuma angustifolia*) are also used as substitute of Vanshlochan. Of course, the composition, properties and health effects of Genuine and Synthetic Vanshlochan differ greatly.

Vanshlochan contains about ninety to ninety seven percent of organic silica, Potash, iron and many other ingredients. The quality and chemical composition varies depending on various factors.

1. Silica 90.56%,

2. Potash 1.10%
3. Peroxide of Iron 0.90%
4. Alumina 0.40%;
5. Moisture 4.87%⁵

Kesar: Natural Kesar is obtained by drying part of the flower in a systematic method. Synthetically produced Kesar is available in the market which is not comparable to the original variety.

Karpoora: Synthetic camphor is extracted from Alpha-Pinene of Turpentine, then create a conversion Alpha-Pinene into Camphene, esterified to beryl acetate. Synthetic camphor is used within the manufacture of cellulose nitrate, polyvinyl chloride and plastics. It may also function medicine, antiseptic, insect powder, etc. Synthetic camphor is usually arranged from the camphor tree extracts. While the one produced utilizing chemical synthesis is termed synthetic camphor. One in every of the majorly significant raw material used within the production is turpentine oil. It includes two grades of merchandise completely separated based on its purity. Even though the technical grade is beneath 98% pure and utilized as a plasticiser, as a pesticide ingredient or within the generation of personal care products.⁶

Elua: This component is derived from *Aloe vera*, as per British Pharmacopoeia there are four available varieties namely;

- I. Curacao or Barbados aloes which is derived from *Aloe officinalis*,
- II. Socotrine aloes which is derived from *A. perryi*,
- III. Zangibar aloes which is derived from *A. perryi*,
- IV. Cape aloes which is derived from *Aloe ferox*.⁷

Rasanjana: It is a semi-synthetic drug which is derived from *Berberis aristata* and widely used in Ayurvedic formulations.⁸

Sharkara/Guda: It is a semi-synthetic drug which is derived from *Saccharum officinarum* and widely used in Ayurvedic formulations.⁹

Ghruta: Vanaspati is fully or partially hydrogenated vegetable cooking oil, often used as a cheaper substitute for ghee and butter. In India, vanaspati ghee is usually made from palm oil. Hydrogenation is performed using a catalyst known as "supported nickel catalyst", in reactors at low-medium pressure.¹⁰

Oil: Synthetic oil is a lubricant consisting of chemical compounds that are artificially made. Synthetic lubricants can be manufactured using chemically modified petroleum components rather than whole crude oil, but can also be synthesized from other raw materials. The base material, however, is still overwhelmingly crude oil that is distilled and then modified

physically and chemically. The actual synthesis process and composition of additives is generally a commercial trade secret and will vary among producers.¹¹

Hingu: Water based preparation process with no organic solvents and synthetic chemicals provided a unique green formulation suitable for food and nutraceutical applications.¹²

Discussion: A rational substitution of the herbal drug is done with synthetic drug based on the similarities of the Guna (qualities) and Karma (actions) of the drug. There should be wide and proper validation and authentication of the drug based on the Ayurvedic parameters and modern principles. WHO states on quality standards for medicinal plant materials, recommends rejecting a batch of raw material with more than 5% foreign matter never the less if it is from the authentic source.¹³ The collectors, vendors, traders and suppliers must have a good knowledge regarding the original source of raw material. A strict adherence and compliance to the safety, quality and standardization of Ayurvedic products and practices should be maintained uniformly.

Conclusion:

This systematic review is presented with view briefly summarizing the relevance of synthetic drugs and its usage across classical Ayurvedic literature with contemporary science.

Synthetic drugs are developed due to the following enlisted reasons.

1. It helps to enhance the potency of the drug so as to minimize the required dosage of the drug.
2. It enhances the spectrum of action of the drug.
3. Reduces the side effects.
4. Natural drugs may not be available throughout the year and across the world. Scarcity of the natural drugs promoted the need to develop synthetic drugs.
5. Cost effectiveness of the drug.
6. Large group of pathogens have become resistant to several traditional natural drugs like antibiotics, in order to save the life; synthetic drugs with more therapeutic efficacy against the resistant strains of pathogens are being prepared and introduced to the market.

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