



Review Article

Detection of Adulteration by Using Rapid Tests: A Review

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ABSTRACT:

Ayurveda is a traditional system of medicine in India which uses plants, minerals, and animal products as the main drug to cure various diseases and as well as for the better quality of life. The traditional system of medicine has become significantly more popular all over the globe because of the curative property less toxic and minimum side effects. One of the most critical issues involved in any herbal formulation is the quality of raw material. The study cannot be considered scientifically valid if the material used is not authenticated. The authentication of raw material is a burning problem nowadays. The adulteration is unacceptable because the adulteration may cause a variety of side effects. So an understanding of all the way of adulteration is necessary to rectify this illegal act and maximizing consumer's safety. This paper deals with the simple test to identify adulteration in the oil, Ghrita, milk, sugar, honey and salt which are the bases of many herbal formulations. Hence authentication of these products is highly necessary. Food safety and standards authority of India (FSSAI) has mentioned common quick tests for detection of some food adulteration at household which is very useful and easy to do. So here some important tests which are useful in ayurvedic drug preparation have taken from FSSAI.

KEY WORDS: Adulteration, Ayurveda, Raw materials, Herbal formulation.

INTRODUCTION:

Adulteration is defined as mixing or substituting the original drug material with other spurious, inferior, defective, spoiled, useless another part of same or different material or drug which do not conform with the official standards. Adulteration caused a variety of adverse effects from mild, moderate to severe life-threatening effect, adulteration either be intentional, unintentional, natural or metallic contaminants. The addition or subtraction of any material to food causes natural composition and quality of the product is affected. Food or any raw material is considered adulterated if a substance is added which injuriously affects it, cheaper or inferior material are substituted wholly or in part, it is an imitation or it is coloured or otherwise treated, to improve its appearance or if it contains any added substance injurious to health and whatever reasons its

quality is below the standard. The traditional system of medicine has become significantly more popular all over the globe because of curative properties, less toxicity and minimum side effects. The Ayurvedic system of medicine has been prevalent in India since the Vedic period and still remains the mainstay of medical relief to 60 per cent of the population of the nation. In earlier times the practitioner of Ayurveda (vaidyas) was them self collecting herb and other ingredients and preparing medicines. For the purpose of acquiring raw materials, vaidyas now depend on commercial organizations trading in crude herbal drugs¹. One of the most critical issues involved in any herbal formulation is the quality of raw materials. The product cannot be considered scientifically valid if the materials used are not authenticated. So these are the simple test for identification of adulteration in herbal

and animal products to know the product is original or adulterated. Food adulteration is an act of intentionally debasing the quality of food offered for sale either by the mixture or substitution of inferior substances or by the removal of some valuable ingredient. Food adulteration takes into account not only the intentional addition or substitution or abstraction of substances which adversely affects nature, substances and quality of food, but also their incidental contamination during the period of growth, harvesting, storage, processing, transport and distribution². Some of drug like *Madhu*, *Dugdha*, *Taila*, *Grita*, *Sharkara* & *Shinadhava* are the food material which is commonly used as the base of Ayurvedic formulations and in various ayurvedic *Samhitas* has mentioned their qualities and properties for the identification, authentication of the drug.

Aim:

Detection of adulteration in the commonly used raw material in ayurvedic drug formulation.

Objectives:

To detect adulteration in *MADHU*, *TAILA*, *DUGDHA*, *GHRUTA*, *SHARKARA*, *SAINDHAVA*

Ayurvedic Description: In Ayurveda, various *Samhitas* mentioned different properties of *Dugdha* (Milk), *Madhu* (Honey), *Ghruta* (Ghee), *Taila* (Oil), *Sharkara* (Sugar), *Saindhava* (Salt).

Milk -

Dugdha or *ksheera* is one of the foremost and most important dietary substances, and most of the Ayurvedic formulations prepared with the help of *Dugdha*. Ayurveda has described milk from various domestic and animal sources with their distinct properties and uses. Out of the 8 milk sources, cow milk is considered as best according to Ayurveda.

Dugdha ayurvedic properties -

Rasa (Taste) - *Madhura*(Sweet)

Guna(Properties)- *Shita*(cool), *Mrudu*(soft), *Snigdha* (unctuous), *Guru*(heavy), *Bahal*(thick), *Manda*(mild), *Prasanna*(pleasant)

Virya(Potency) - *Shita*(Cool)

Vipaka(Post Metabolic Taste) - *Madhura*(sweet)

Prabhava(Characteristic effect)- *Manasakara* (pleasant to mind)

Honey -

Acharya Charaka in *Charak Samhita sutrasthana* 5/12 has mentioned *Madhu* is one of those ingredients that can be taken on a daily basis as *pathya*. It is the best

Yogvahi (Catalyst substance) that is to say; it carries the properties of drugs added to it.

Oil -

Til taila(sesame oil) is one of the most widely used Ayurvedic medicine. *Acharya Charaka* has mentioned of all the varieties of oil; sesame oil is the best for improving strength. Out of hundred percent 90% of herbal oil of Ayurveda prepared with sesame oil base. Botanical name of sesame is *Sesamum Indicum* Linn. *Acharya Bhavprakasha* in *Bhavprakash Samhita* described qualities of *til* in detail. The black sesame is the best in use, white sesame is medium in quality and rest sesame is including red seeds are inferior in quality.

Tila taila properties-

Ras(Taste) - *Madhura*(Sweet), *Tikta* (Bitter)

Anurasa(sub-taste)- *Kashaya*(Astringent)

Guna(Quality) - *Sukshma*(minute), *Ushna*(Hot), *Vyavayi*(get absorbed & enter body very quickly), *Tikshna*(strong), *Vishada*(clear), *Vikasi*(loosens joints), *Lekhan*(scraping)

Vipaka - *Madhura* (Sweet)

Virya - *Ushna* (Hot)

Ghee -

Grita (Ghee) is one among the *Maha Snehas*. Among the four type of *Sneha*(oily material) ghee is the best, because of the power to assimilate effectively the properties of the ingredients added to it without losing its own properties. *Acharya* Charaka described in *Charak Samhita Sutrasthana grita* has vitiated *Pitta* & *Vata Doshas*, help to increase *rasa* (internal juices of the body), *sukra* (semen) and *oja*(immunity). *Grita* has *nirvapanam*(pacifies body fire). *Grita* softens and strengthens, protects and nourishes the skin. *Grita* balances all *doshas* it makes the voice soft and melodious.

Grita ayurvedic properties -

Ras - *Madhura*(Sweet)

Guna - *Snigdha* (unctuous), *Manda*(Slow), *Guru* (Heavy), *Bahal*(Thick)

Virya - *Shita* (cool)

Vipaka - *Madhura*(Sweet)

Sugar-

The traditional *Mishri* has its own medicinal values. *Mishri* or *Khanda Sharkara* has been used in Ayurvedic medicines for many decades. Sugar is *Netrya* (Good for eyes), *Saraka* (laxative), *Balya*

(improve strength), balances acid level in blood and balances *Vata dosha*.

Mishri ayurvedic properties -

Ras - Madhura

Guna - Snigdha, Manda, Guru, Bahal

Virya - Shita

Vipaka - Madhura

Salt -

Lavana(salt) as per Ayurveda has different opinions regarding basic element composition of salt taste. It is composed of *pruthvi*(earth) and *agni* (fire) as per *Acharya Sushruta*, *jala*(water) & *agni*(fire) as per *Acharya Charaka* and *Acharya Vagbhata*. There are five type of *lavana*(salt) i.e. *Saindhava*(rock salt), *Bidlavan*(sodium sulphate), *sourvachal*(black salt), *Romak*(earthen salt) and *Audbhid* or *samudra lavan* (common salt). In which *Saindhava lavana* is commonly used for the preparation of ayurvedic formulations. In *Rasaratnasamucchaya* six type of *lavana* described known as *shadalavana*.

Lavana ayurvedic properties -

Ras - Lavana

Guna - Rochana(improve taste), *Kledana*(it imparts moistness), *Ashuvilayana*(it melt and get distributed in the body very quickly), *Deepana*(increases digestion)

Virya - Ushna

Vipaka - Madhura

MATERIALS & METHODS:

MATERIALS:

Madhu (Honey)

Dugdha (Milk)

Ghrita (Ghee)

Taila (Oil)

Sharkara (sugar)

Saindhava (salt)

METHODS:

1. Honey:

Adulterant: Sugar, Water

Tests:

- Take a transparent glass of water. Add a drop of honey to the glass. Pure honey does not disperse in water; if it is dispersed in water indicate

adulteration.

- Take cotton wick dipped in a pure honey and light with a matchstick. Pure honey will burn if adulterated with water not allowed to burn and occurs cracking sound.

2. Milk:

Adulterant: Water, Detergent, Starch,

Chalk powder, Urea, boric acid

Tests:

- Put a drop of milk on the polished slanting surface. Pure milk either stays or flows slowly leaving a white trail behind. Milk adulterated with water will flow immediately without leaving a mark.
- Take 5-10ml of milk with an equal amount of water. Shake the contents thoroughly. If milk is adulterated with detergent, it forms a dense lather. Pure milk will form a very thin foam layer due to agitation.
- Boil 2-3 ml of sample with 5ml of water. Cool and add 2-3 drops of tincture iodine. Formation of a blue colour indicates the presence of starch.
- If the milk turns yellow when heated and leaves a bitter and soapy taste then it is sure shot sign of synthetic substance added to it.
- Take a teaspoon of milk in a test tube. Add ½ teaspoon of soyabean or *arhar* powder. Mix up the contents thoroughly by shaking the test tube. After 5 minutes, dip red litmus paper in it. Remove the paper after a ½ minute. A change in colour from red to blue indicates the presence of urea in the milk.

3. Ghee:

Adulterants: Mashed potatoes, sweet potatoes, Starch, vegetable oil, vanaspati or margarine, Animal body fats

Tests:

- Take ½ teaspoon of ghee in a transparent glass bowl. Add 2-3 drops of tincture iodine. Formation of a blue colour indicates the presence of mashed potatoes, sweet potatoes and other starches.
- Take about one teaspoon full of a melted sample of ghee with an equal quantity of concentrated hydrochloric acid in a test tube and add to it a pinch of sugar. Shake for one minute and let it for five minutes. The appearance of the crimson colour in lower of vanaspati or margarine.

4. Oil:

Adulterants: Water, Lard, Rice soup

Tests:

- Use chopsticks to dip in a drop of sesame oil into the water if sesame oil slick is small and thick and difficult to spread means it is adulterated, pure oil shows a colourless and transparent thin oil slick and forms small oil droplets.
- Heat sesame oil in the pan if it becomes white it indicates it is adulterated with lard and if it becomes muddy means it is oil mixed with rice soup.
- Take coconut oil in transparent glass place the glass in the refrigerator for 30 min after refrigeration if oil remains as separated layer mean it is adulterated.

5. Sugar:

Adulterants: Chalk powder, Washing soda, White powder stone

Tests:

- Take a transparent glass of water. Dissolve 10 gm of the sample. If sugar mixed with chalk powder, the adulterant will settle down at the bottom. Added to a glass of water will dissolve completely but impurities will sink to the bottom.
- Add few drops of hydrochloric acid, effervescence (give of bubbles) will indicate the presence of washing soda in sugar.

6. Salt:

Adulterants: Chalk power

Tests:

- Stir a ¼ teaspoon of a sample of salt in a glass of water. Pure salt is dissolved completely and gives a clear solution or gives a slightly turbid solution due to the presence of the permitted anticaking agent in the salt. If salt is adulterated, the solution turns dense white turbid in the presence of chalk powder and insoluble impurities will down in the bottom.
- Differentiation of common salt & iodized salt done with the help of following the testing method:

Cut a piece of potato, add salt and wait for a minute, add two drops add lemon juice. If it is iodized salt, blue colour will develop. In the case of common salt, there will be no blue colour.

DISCUSSION:

The study of detection of adulteration and authentication of Ayurvedic material is necessary for quality product and for the safety of human being. For small-scale drug preparation, these tests are very useful. Some tests which are mentioned in books are not always possible and they are time and money consuming. These tests can be done at home with easy techniques which can induce awareness among

the vaidyas and students about drug adulteration. Ayurveda has described various qualities and properties of raw materials but nowadays it is very difficult to authenticate raw materials so these are some simple test to rectify material is adulterated or not.

CONCLUSION:

Drug safety means assurance that the drug is acceptable for human consumption. It will provide confidence to vaidyas and students that the drug does not harm to patients. These simple tests are very useful to detect whether the material is original or adulterated and whether it is fit or unfit for Ayurvedic formulations. Adulteration of any materials like raw, in the process, finished can cause serious risk to a human being, it may cause the toxic effect to health. At small scale ayurvedic formulations these simple tests will help to identify adulteration quickly and are cheaper than other complex tests. Adulterated products are hazardous to the human body, therefore, we need to check this product for harmful ingredients.

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