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STANDARDIZATION OF POLYHERBAL PREPARATIONS CONTAINING *ACACIA CATECHU*

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ABSTRACT

We have undertaken the steps to standardize polyherbal formulation containing *Acacia catechu*. *Acacia catechu* is commonly known as “katho”. *Acacia catechu* shows excellent results in the upper respiratory tract infection especially sore throat. The various lozenges are available for sore throat which contain candy in the sugar base. The manufacturers claim that since it is syrup base it is not harmful for the throat but it has been clinically proved that such types of lozenges are harmful to upper respiratory tract. Against that the Ayurvedic formulation containing *Acacia catechu* shows nice results. We have obtained polyherbal formulations containing catechu as one of the ingredient from Yash remedies, Ahmedabad named as Yastimadhuvati and Kanthmayurivati. Yastimadhuvati is a polyherbal formulation described in Bhaishajyasamhita while Kanthmayurivati is a patent and proprietary formulation of Yash Remedies, Ahmedabad. Both this preparations contain catechu as one of the ingredient. Indian herbal pharmacopoeia has elaborated the qualitative method to identify catechin by TLC method. Catechin with R_f value 0.82 was found to be present in Marketed sample of *Acacia Catechu* and Yastimadhuvati as well as Kanthmayurivati. Quantitative estimation of total tannins was carried out in all these three samples by Titrimetry method described in Indian Herbal Pharmacopoeia and it was found to be 12.05%, 15% and 16.48% respectively. It can be concluded that the Ayurvedic manufacturer has utilized right quality of catechu in the polyherbal formulation.

Keywords: *Acacia catechu*, Yastimadhuvati, Kanthmayurivati.

INTRODUCTION

The diverse culture of our country is a rich source of traditional medicines, many of which are of plant origin [1]. Scientific data on such plant derivatives could be of clinical use. Catechu or cutch (Katha in Hindi and Manipuri), the extract prepared from the heart wood of *Acacia catechu*, has been used for treating fever, diarrhea, leucorrhoea, piles. It also shows hypoglycemic property. Catechin is a polyphenolic antioxidant plant metabolite. The various lozenges are available for sore throat which contain candy in the sugar base. The manufacturers claim that since it is syrup base it is not harmful for the throat but it has been clinically proved that such types of lozenges does not are harmful to upper respiratory tract. Against that the Ayurvedic formulation containing *Acacia catechu* shows nice results. As catechin and other tannins present in catechu are having medicinal actions in the upper respiratory tract infections, we thought it worth to estimate them qualitatively and quantitatively in the marketed sample of *Acacia* and in polyherbal formulations. Catechin being the major active principles largely responsible for the bio- potency of *Acacia catechu*, is recognized as

analytical marker compounds for the quality control of ayurvedic preparations containing *Acacia catechu*. There are reports on the application of various analytical methods for isolation and quantitation of catechin present in *Acacia catechu* and other botanical sources [2]. Catechins are a group of flavonoids that exhibit antioxidant properties in a number of biochemical systems. Chemically, catechins are polyhydroxylated flavonoids with rather water soluble characteristics that differ in the number and position of the hydroxyl groups in the molecule [3]. It has long been postulated that due to such polyhydroxylated structure, catechins could act as antioxidants through the chelation of metals with redox properties. Catechins are present in body cells and fluids as a result of the ingestion of fruits, vegetables, and plant-derived foods and beverages, such as wine, tea and chocolate. Several epidemiological studies have indicated that a high content of polyphenol flavonoids in the diet could be associated with a lower risk of cancer and coronary heart disease mortality. These associations were stronger when the intake of catechins was particularly considered. The interaction of catechins with physiological lipid soluble antioxidants, such as a-

tocopherol and β -carotene, has been the subject of few studies [4]. The antioxidant capacity of catechins has been demonstrated in the protection of isolated LDL against *in vitro* oxidation, preventing lipid oxidation and α -tocopherol consumption. Catechin was effective in preventing the oxidation of plasma components and lipid soluble antioxidants (α -tocopherol and β -carotene), delaying the oxidation of these molecules in the presence of negligible ($< 5 \mu\text{M}$) concentrations of ascorbic acid. Catechins are differentiated from the ketone-containing flavonoids such as quercetin and rutin, which are called flavonols [5]. The term bioflavonoid was first used to describe the flavonols, but as an imprecise term has been loosely applied to the larger family of flavonoids, including also the polymeric hydroxyl-only containing flavan-3-ols (catechins). Catechins are abundant in teas derived from the tea-plant *Camellia sinensis* as well as in some cocoas and chocolates (made from the seeds of *Theobroma cacao*). The name of the catechin chemical family derives from catechu which is the juice or boiled extract of *Mimosa catechu* (*Acacia catechu*). Catechins constitute about 25% of the dry weight of fresh tea leaf, although total catechin content varies widely depending on clonal variation, growing location, seasonal/ light variation, and altitude. They are present in nearly all teas made from *Camellia sinensis*, including white tea, green tea, black tea. Catechins are also present in the human diet in chocolate, fruits, vegetables and wine and are found in many other plant species. Epigallocatechin gallate is the most abundant catechin in tea. epigallocatechin-3-gallate is an antioxidant that helps protect the skin from UV radiation-induced damage and tumor formation. Green tea catechins have also been shown to possess antibiotic properties due to their role in disrupting a specific stage of the bacterial DNA replication process [6]. Catechins, when combined with habitual exercise, have been shown to delay some forms of aging. Mice fed catechins showed decreased levels of aging. Oxidative stress was lowered in cell mitochondria, as well as increase in mRNA transcription of mitochondrial-related proteins. Foods containing certain flavonoids seemed to be protected from developing lung cancer. flavonoids that appeared to be the most protective included catechin, found in strawberries and green and black teas; kaempferol, found in Brussels sprouts and apples; and quercetin, found in beans, onions and apples [7]. Catechin and epicatechin are also selective monoamine oxidase inhibitors (MAOIs) of type MAO-B. Consumption of catechin rich foods is associated with a reduction of chronic disease risks. While promising, poor oral bioavailability of catechins from foods is believed to minimize the potential efficacy of these polyphenols. Many factors are believed to contribute to poor catechin bioavailability including: digestive instability, poor intestinal transport, and rapid metabolism and clearance.

MATERIAL AND METHOD

SYNONYMS

Kattha, Cutch
Khadir-catechu

BIOLOGICAL SOURCE

It consists of dried aqueous extract prepared from the heart wood of *Acacia catehu*.

Family – Leguminosae

DESCRIPTION

Colour :- Light brown to black

Odour :- None

Taste :- Very astringent

Size :- About 2.5 to 5 cm

Shape :- Cube or irregular fragments of broken cubes or brick shaped pieces.

MANUFACTURING OF ACACIA CATECHU

The heart wood obtained by felling the tree and separating the bark and sapwood, is cut into chips mechanically and put into extractors. The steam is passed through the drug for maximum extraction. The extract is concentrated under vacuum and is cooled by refrigeration. It is then centrifuged to isolate the cake of kattha. The cake is moulded in desired sizes and dried in proper condition. By this way, a good quality of kattha, ready for market is obtained. The mother liquor, left behind during centrifugation is concentrated, which on cooling gives cutch.

SOURCES

(+)-catechin and (-)-epicatechin are found in the traditional Chinese medicine plant *Uncaria rhynchophylla*. *Potentilla fragarioides*, also used in Traditional Chinese medicine, contains D-catechin. A racemic mixture of (+)-catechin and (-)-catechin is released from the roots of the invasive weed, *Centaurea maculosa*. It acts as a herbicide to inhibit competition by a wide range of other plant species. This phytotoxic compound inhibits seed germination and growth.

In food

l-Epicatechin can be found in cacao beans and was first called *kakaool*. The different other enantiomers can as well be found in chocolate where the different processes of fabrication can lead to epimerisation by heating.

Catechin

Acacia catechu contains about 10% of acacatechin. It is distereoisomer of 5,7,3',4'tetrahydroxy flavan-3-ols. Acacatechin is also known as acacia catechin. Acacatechin undergoes oxidation to catechutannic acid in presence of water and the latter constitutes about 30% of the drug. It also contains catechu red, quercetin, gum and quercitrin. Epigallocatechin gallate is the most abundant catechin in tea. Catechin and epicatechin are epimers, with (-)-epicatechin and (+)-catechin being the most common optical isomers found in nature. Catechin was first isolated from the plant extract catechu, from which it derives its name. Heating catechin past its point of decomposition releases pyrocatechol (also called catechol), which explains the common origin of the names of these compounds.

USES

As an Astringent externally for boil, Skin eruption and ulcers. It is uses in cough, diarrhoea, leucorrhoea, piles. Kattha has cooling and digestive properties. Catechin can reduce the risk of four of the major health problems: stroke, heart failure, cancer and diabetes. The juice of its fresh bark has been used in treatment of haemoptysis and gonorrhoea. Catechins have also been shown to possess antibiotic properties due to their role in disrupting a specific stage of the bacterial DNA replication process.

Experimental method

Sample of *Acacia catechu* was collected from Baroda market. We have obtained polyherbal formulations containing catechu as one of the main ingredient from Yash remedies, Ahmedabad named as Yastimadhuvati and Kanthmayurivati. Yastimadhuvati is a polyherbal formulation described in Bhaisajyasamhita while Kanthmayurivati is a patent and proprietary formulation of Yash Remedies, Ahmedabad. Both this preparations contain catechu as one of the ingredient.

Qualitative estimation by TLC method [9]

Reflux the powdered drug (0.25 g) with methanol (50ml) for 1 hour; cool, filter and further reflux the marc with methanol (50 ml) for 1 hour. Combine the filtrates and evaporate to dryness under reduced pressure. Dissolve the residue in methanol (10ml) and make up the volume to 25 ml with same solvent.

Reference solution: Dissolve catechin (25 mg) in methanol (100 ml).

Solvent System: ethyl acetate: methanol: water (50:28:20)

Visualization of spots: Spray the plate with vanillin hydrochloric acid reagent.

Evaluation: . Light pink (R_f 0.82) coloured spots corresponding to catechin is visible in both reference and test solution tracks.

Quantitative Estimation by Assay method [9]

Weigh accurately about (1g) of the powdered drug and introduced into a (250ml) glass stoppered flask, add water (100 ml), shake for 1 hour and keep overnight. Allow the solid material to settle and filter the liquid through a filter paper. Discarding first 20ml of the filtrate. Transfer 10ml of the filtrate to conical flask (1 litre), add water (750 ml) and indigosulphonic acid solution (25 ml). Titrate with 0.1 N potassium permanganate and shake vigorously till a golden-yellow end point (T2) is reached. Perform a blank determination (T1) and make necessary correction.

Each ml of 0.1 N potassium permanganate is equivalent to 0.004175 g of total tanins.

Preparation of Indigosulphonic acid solution

Dissolve Indigo carmine AR (1.0 g) in concentrated sulphuric acid AR (50.0 ml). Continue adding small quantities of the above mixture to chilled water in a volumetric flask taking care to mix the content of the flask thoroughly. Make up the volume with water.

CALCULATION

Quantity of total tannins (%) = $[(T2 - T1) \times \text{Actual normality} \times 0.004157 \times 1000] / W \times 0.1$

Where W = the weight of the plant in g.

RESULT

Catechin with R_f value 0.82 is found to be present in Marketed sample of *Acacia Catechu* and Yastimadhuvati as well as Kanthmayurivati. Two polyherbal formulations were also analysed quantitatively for the presence of catechin. Quantative estimation of Total Tannin is carried out in all these three sample by Titrimetry method described in Indian Herbal Pharmacopoeia and it was found to be 12.05%, 15% and 16.48% respectively.

PLANT PROFILE [8]

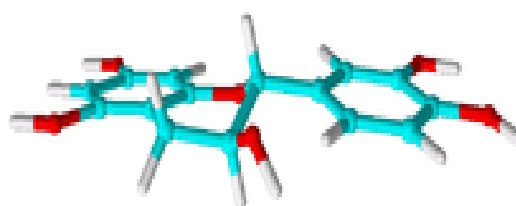
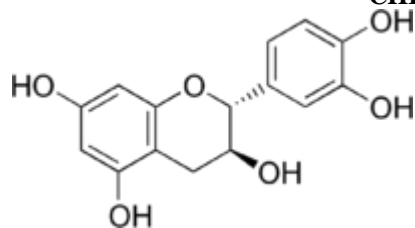
catechu flower



catechu bark



CHEMICAL CONSTITUENTS:



Kanthmayuri Vati (Patented product of Yash Remedies, Ahmedabad)



<u>Name of Ingredient</u>	<u>Quantity</u>
Yastimadhu	10 Parts
Bibhitaka	12 Parts
Cardamom	12 Parts
Menthol	03 Parts
Pepper nigrum	12 Parts
Clove	12 Parts
Catechu	12 Parts
Fennel	12 Parts
Sugar	15 Parts

Yastimadhu Vati (Bhaisajya Sanhita Page No. 481)



<u>Name of Ingredient</u>	<u>Quantity</u>
Yastimadhu	10 Parts
Bibhitaka	12 Parts
Cardamom	12 Parts
Menthol	03 Parts
Pepper nigrum	12 Parts
Clove	12 Parts
Catechu	12 Parts
Fennel	12 Parts
Sugar	arts

DISCUSSION AND CONCLUSION

The total tannins present in the polyherbal formulations are comparable with that of the market sample of *Acacia catechu*. Total tannin is mainly represented as catechin. As far as catechin content is concerned the market samples appears to be of good quality.

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