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Comparative Analysis of Total Polyphenolic Content in Marketed Dental Powders

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Abstract : The main objective isto compare and analyze total polyphenolic content in marketed preparation of ayurvedic content in marketed preparation of ayurvedic dental powder with the help of UV spectrophotometry using Folin-Ciocalteu reagent. The method brought into play was colorimetric assay and for this purpose, a double beam spectrophotometer 1800 from Shimadzu Japan was used. The change in total polyphenolic content was expressed in gallic acid equivalent (GAE). The results designate that the method is useful analysis of polyphenolic content expressed as gallic acid equivalent and this method can be performed with ease. The UV-Vis spectrophotometric method narrated here was successfully validated.

Keywords : Polyphenolic Content, Analysis, Ayurvedic dental powder, Folin-Ciocalteu reagent, UV.

Introduction

Ayurvedic medications are polyherbal preparation where each herb comprises a variety of chemical components. Herbal medicaments have been enjoying its benefits among the consumers all around the world. Standardization and analysis of chemical markers in an ayurvedic formulation or any poly herbal formulation has always been a challenging task due to complexity of chemical nature¹. Since ancient time, medicated/herbal dental powders are in use for treatment of dental problems such as oral cavity, plaques and infection, the effect of which is attributed to the phytoconstituents present in it². Tooth problems like plaque, calculus, and other major diseases are caused due to bacterial action. These are mainly caused by ignorance and can be prevented using toothpastes or tooth powders³. Tooth powders can be used as a prophylactic cosmetic for tooth to prevent tooth decays and other tooth problems. Dental powder containing polyphenolics are widely used for their protective effect in oral hygiene. Polyphenols (PPs) prevent oral diseases via various mechanisms and exert preventive activity against infectious and degenerative diseases. Several herbal drugs are already documented for their beneficial effect in oral care⁴. Literature survey reveals that although dental powder containing polyphenolics are widely used but quantitative estimation of polyphenols in such preparation still needs to be emphasized.

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Polyphenols in plant extracts react with specific redox reagents (Folin-Ciocalteu reagent) to form a blue complex that can be quantified by visible-light spectrophotometry. The reaction forms a blue chromophore constituted by phosphotungstic phosphomolybdenum complex, where the maximum absorption of the chromophores depends on the alkaline solution and the concentration of phenolic compounds. The Folin-Ciocalteu method is described in several pharmacopoeias and is widely used for rapid determination of polyphenols in various samples

Experimental

Material & Method

All the chemicals used for antioxidant activity and total polyphenolics were of analytical grade purchased from SD fine chemicals. The chemicals included are Folin-Ciocalteu reagent, Gallic acid, Distilled water.

The selected marketeted dental powders are:

Sample 1 = Divya Dantmanjan (Divyapharma India)

Sample 2 = Dabur Lal Dant Manjan (Dabur India Ltd.)

Sample 3 = Vithoba ayurvedic Dant Manjan (Manisha Sales India)

Sample 4 = Vicco Vajradanti (Vicco Products Pvt Ltd India)

Extraction

Accurately about 1 gm (one gram) of each sample was extracted with water used in small portions till complete exhaustion. The sample solution was filtered to obtain a clear solution. The stock solution after suitable dilutions was used for further analysis.

Determination of total polyphenolic constituents

The total polyphenolic content of all the ayurvedic dental powder were determined by UV spectrophotometry using Folin-Ciocalteu reagent. The method utilized for the test was a colorimetric assay. The Folin-Ciocalteu reagent is sensitive to reducing compounds including polyphenols, thereby producing a blue color upon reaction. This blue color is measured spectrophotometrically which is an indicative of total phenolic content. A double beam spectrophotometer 1800 from Shimadzu, Japan was used.

Gallic acid was used as a standard and the total phenolic were expressed as Gallic acid equivalents. Concentrations of 2, 4, 5, 6, 8, and 10 mcg/ml of Gallic acid were prepared in distilled water. The standard solutions were mixed with 1 ml Folin- Ciocalteu reagent and 1 ml of saturated sodium carbonate solution in a 10 ml volumetric flask. The solutions were allowed to stand for 30 minutes at room temperature before the absorbance was read at 750 nm spectrometrically. Different concentration of all the ayurvedic formulation was separately treated in a similar way with Folin- Ciocalteu reagent.

The change in the total polyphenolic content at different time interval was calculated and expressed in GAE. All the determinations were performed in triplicate (The results of which are mentioned in Table 1).

Table 1: Total polyphenolic content in selected formulations as determined by Folin-Ciocalteu method

S.no.	Crude drug	Concentration(mcg/ml)	Absorbance at 760 nm	% GAE
1.	Sample 1	0.5	0.596	0.5448
2.	Sample 2	1.0	1.045	0.9738
3.	Sample 3	1.0	0.502	0.4840
4	Sample 4	0.5	1.499	1.3806

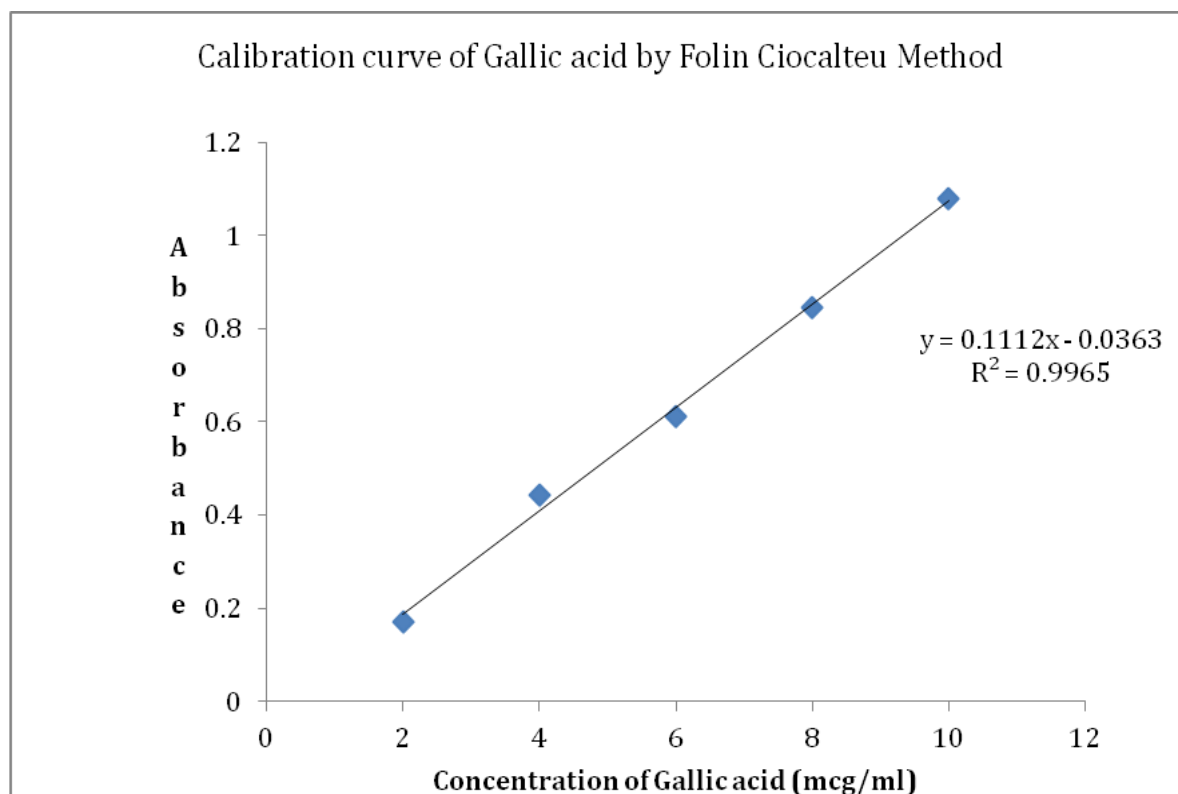


Figure 1: Calibration graph of gallic acid for total phenolic as determined by Folin-Ciocalteu method.

Results and Discussion

The results obtained from the above present investigation highlights total polyphenolic content in selected marketed dental preparations. The results indicate that the method is useful in comparative quantitative analysis of total polyphenolic content expressed as gallic acid equivalent.

According to studies performed, the % GAE of sample 1 was found to be 1.3806 % followed by Patanjali and Vithoba which was found to be 0.5448 and 0.4840 % respectively. The % GAE of Dabur was found to be 0.9738. The method is based on the use of economic solvents and requires less time and can be performed with ease.

Conclusion

The results show that the selected ayurvedic dental preparations contain several constituents responsible for therapeutic property. The UV-Vis spectrophotometric method described here was successfully validated as suitable for the determination of total polyphenols from dental products. This methodology using the Folin-Ciocalteu reaction complies with the requirements for analytical use and for ensuring the reliability of the results. With the ever-increasing demand for herbal formulations and its use, the standardization tool will help in securing the quality of the preparations.

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Authors Contributions

All the authors have contributed equally

Conflict of Interest

Declared none

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