



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2017; 6(5): 443-445  
Received: 03-07-2017  
Accepted: 04-08-2017

**Nawghare CG**  
Department of Food Engineering  
College of Food Technology,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
(MS) India

**Taur AT**  
Department of Food Engineering  
College of Food Technology,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
(MS) India

**Sawate AR**  
Department of Food Engineering  
College of Food Technology,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
(MS) India

**Correspondence**  
**Nawghare CG**  
Department of Food Engineering  
College of Food Technology,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
(MS) India

## Studies on the physico-phytochemical and anti-arthritis properties of hadjod (*Cissus quadrangularis*) Stem Powder

**Nawghare CG, Taur AT and Sawate AR**

### Abstract

*Cissus quadrangularis* (Family: Vitaceae) are widely used in the native system of medicine as well as in food item for various ailments in Maharashtra. Plants are a tremendous source for the discovery of new products of medicinal value for drug development. Today several distinct chemicals and nutraceutical derived from plants are important drugs currently used in one or more countries in the world. It is a rich source of calcium, carotene, glycoside and alkaloids it can be used as a nutritional food. In addition, The article reveals that wide numbers of phytochemical constituents have been isolated from the stem powder which possesses activities like anti-arthritis, anti-inflammatory, anti-tumor, gastro protective, antioxidant, antimicrobial and various other important medicinal properties. The hadjod stem powder at dose levels of 300mg/kg body weight showed promising anti-arthritis activity in the Alloxan- induced model in rats. Hadjod contains high amount of glycoside 2.34 (g/100g), anabolic steroidal substances and calcium. The stem powder also contain a rich source of mineral elements (mg/100g dry matter): calcium 33.3 (mg), The preliminary physico-phytochemical analysis carried out of stem powder which revealed interesting results are highlighted and discussed. The present study revealed the potential use of hadjod stem powder in the management of inflammation and arthritis confirming the folk core use of medicinal plants.

**Keywords:** *Cissus quadrangularis*, Vitaceae, Phytochemical, Medicinal plant, Hadjod.

### 1. Introduction

*Cissus quadrangularis* (Family: Vitaceae) is commonly distributed through out the hotter parts of India and Sri Lanka (Nadkarni, 1954; Chopra *et al.*, 1986) [3]. The stem of *Cissus quadrangularis* is also reputed in Ayurveda as alterative, anthelmintic, dyspeptic, digestive, tonic, analgesic in eye and ear diseases arthritic, in the treatment of irregular menstruation and asthma, in complaints of the back and spine. Scientific studies have revealed the *Cissus* extract to possess cardiogenic and androgenic property (Chopra *et al.*, 1986) [3].

According to W.H.O about 80% of world population depends on traditional system of medicine. India has a very vast resource of indigenous plants and minerals which are an excellent source of therapeutic claim. One of such medicinal plant of India is Hadjod (*Cissus quadrangularis*). The etymology of the local name signifies the plant's remarkable ability to cure bone fracture (*Had*~bone, *Jod*~setter). Phytoconstituents of the plant is remarkable and support its several therapeutic activities apart from single bone remineralisation. Today's pharmacological study over *Hadjod* proves the ancient classical references of the plant and re-establishes the plant's potentiality to cure several diseases. (Mukherjee *et al.*, 2016) [6]

*Cissus quadrangularis* is known as Adamant creeper in English, Hadjod in Hindi. It is a perennial plant that belongs to the grape family and is popularly known as Veldt Grape Devil's Backbone, or Asthisamharaka. The stem are useful for antioxidant, antimicrobial and as a lipid lowering agents in health and disease and also for the treatment of fracture bones, purgative and anti-arthritis. Administration of hadjod stem powder of *cissus quadrangularis* produce significant reduction of abrasion between bones, blocks the muscle damaging effect of cortisol and leads to the formation of new muscles.

The possibility for this anti-arthritic action may be due to the presence of phytoconstituents similar to glycoside, alkaloids flavanoid types in stem powder. (Udayakumar *et al.*, 2004) [15] Available data on the anti-arthritic effect of these plants remain meagre. Against this backdrop, the present work was undertaken to throw light on their pharmacological activities of the study plants. (Vijayakumari *et al.*, 2012) The aims of this study are to record the existing knowledge of medicinal uses and other uses of this plant and promote its usage. Hadjod is one such plant which is been studied for its medicinal properties like its useful in bonefractures (singh *et al.*, 1962; Udupa *et al.* 1964) [13]

Recent studies indicate that the main effective components of hadjod are glycosides, such as iridoid glycosides. (Ogugua *et al.*, 2013) <sup>[8]</sup>

### Materials and Methods

Fresh Hadjod stem were collected from Department of Botany and medicinal plant, VNMKV, Parbhani. The present investigation carried out in Department of Food Engineering, College of Food Technology, VNMKV, Parbhani. The air dried (shade) plant materials were powdered, which were subjected to determination of Qualitative phytochemical analysis and Quantitative estimation of total alkaloid, total flavonoids, total glycoside, saponins, tannin, calcium determined.

### Chemical Compositions

The proximate compositions hadjod stem powder for moisture, crude protein, crude fat, crude ash, carbohydrate and crude fibre and minerals were determined respectively (AACC, 2000). <sup>[1]</sup>

### Nutraceutical /phytochemical analysis qualitative analysis

Following standard protocols were used for qualitative analysis of samples to check for the presence of Alkaloids, Carbohydrates, Cardiac glycosides or iridoid glycosides, Flavonoids, Phenols, Saponins, Tannins, Terpenoids, Quinones and Proteins. (Prabhavathi *et al.*, 2016) <sup>[10]</sup>

### Test for Flavonoids

2 ml of each extract was added with few drops of 20 per cent sodium hydroxide, formation of intense yellow colour is observed. To this, few drops of 70 per cent dilute hydrochloric acid were added and yellow colour was disappeared. Formation and disappearance of yellow colour indicates the presence of flavonoids in the sample extract. Evans (2002)

### Test for Alkaloids

To 1 ml of each extract, 1 ml of marquis reagent, 2ml of concentrated sulphuric acid and fewdrops of 40% formaldehyde were added and mixed, appearance of dark orange or purple colour indicates the presence of alkaloids. (Harbone *et al.*, 1973) <sup>[4]</sup>

### Test for Saponins

To 2 ml of each extract, 6 ml of distilled water were added and shaken vigorously; formation of bubbles or persistent foam indicates the presence of saponins. (Trease and Evans, 1996)

### Test for Tannins

To 2 ml of each extract, 10% of alcoholic ferric chloride was added; formation of brownish blue or black colour indicates the presence of tannins. (Trease and Evans, 1996)

### Test for Glycosides

A quantity, 2.0g of the sample was mixed with 30ml of distilled water and 15ml of dilute sulphuric acid respectively and heated in a water bath for 5minutes. The mixtures was filtered and the filtrates used for the following test.

(i) To 5ml of each of the filtrate, 0.3ml of Fehling's solutions A and B was added until it turned alkaline (tested with litmus paper) and heated on a water bath for 2 minutes. A brick red precipitate indicates the presence of glycosides. (Ogugua *et*

*al.*, 2013) <sup>[8]</sup>

## Results and Discussion

**Table 1:** Organoleptic characteristics of hadjod stem powder

Organoleptic characteristics	Observations
Colour	Green
Taste	Astringent
Odour	Pungent
Texture	Rough

It could be observed from Table 5 that under normal condition of light the organoleptic characteristics of hadjod stem powder like colour was found to be pale green and the taste was astringent. (Shirane and Gogle, 2016) <sup>[12]</sup>. The stem powder had pungent smell and rough in texture. The astringent taste of hadjod stem powder was attributed due to tannin content. (Okwu and Josiah, 2006) <sup>[9]</sup>.

**Table 2:** Physical properties of hadjod stem powder

Sr. No.	Physical Properties	Result
1	Colour	Pale gray
2	Appearance	Powder
3	Particle size (mm)	0.2
4	Bulk density (g/ml)	0.55

\*Each value is average of three determinations

Table 2 showed the results of physical properties of hadjod stem powder. Results suggested that the highest bulk density (0.55 g/ml) of hadjod stem powder was due to the presence of smaller particles. This was also supported by the particle size of powder produced at 8 percent milling degree which had the highest value for the smallest particle size. These powders when viewed under UV light at 365 nm appeared green (*Cissus quadrangulis*) Under normal light, they are light green and green respectively The results for bulk density were similar with previously reported results of Rosniyana *et al.*, (2007) <sup>[11]</sup>.

**Table 3:** Chemical analysis of hadjod stem powder

Chemical constituents	Result (g/100g)
Moisture	4.8
Ash	18.02
Protein	17.5
Fat	10.3
Crude fiber	3.5
Carbohydrate	5.2

\*Each value represents the average of three determinations

The protein content of hadjod stem powder was 17.5g/100g, Proteins are necessary for health. Dietary proteins supply raw materials for the formation of digestive juice, hormones, plasma proteins, hemoglobin, Hormones, plasma proteins, hemoglobin, Vitamins, and enzymes, Carbohydrate content 5.2g in stem powder Carbohydrates supply energy for the immediate use of the body. The main source of energy soon after a meal is carbohydrate. Fat content 10.03g in stem powder. The ash content were obtained 18.02 and crude fiber was found 3.5gm similar result were obtained similar result were obtained (Udaykumar *et al.*, 2004) Followed by Table 3.

**Table 4:** Mineral profile of hadjod (*Cissus quadrangularis*) stem powder

Minerals	Per cent Composition (mg per 100mg)
Calcium(Ca)	3.33
Phosphorus (P)	0.20
Pottasium (K)	0.90
Zink (Zn)	0.866
Magnesium (Mg)	1.49
Iron (Fe) mg	735.55

\*Each value represents the average of three determinations

The role of various mineral elements in human system is well known. The extraordinary role of some minerals occurring in traces (Trace elements) in the biochemical functions of living organism and their utility in human and animal nutrition has been reported. The present study reveals that calcium was found in stem (3.33g/100g), Followed by Calcium plays an important role in living cells as an intracellular regulator or messenger. It helps to regulate the activity of skeletal muscle, heart and nervous tissues. Calcium is very important especially during infancy, pregnancy and lactation. Phosphorus was found in stem powder (0.20g/100g).The result obtained was in close agreement with result reported by Mertz walder, (1998). Followed by Table 4

**Table 5:** Qualitative analysis of hadjod (*Cissus quadrangularis*) stem powder

Tests	Intensity
Alkaloids	++
Saponin	++
Tannin	++
Flavonoid	+
Phytosterol	+
Glycoside	++

**Table 6:** Quantitative analysis of hadjod (*Cissus quadrangularis*) stem powder

Phytochemicals	Results (g/100g)
Alkaloids	4.33 g/100g
Saponin	2.60 g/100g
Tannin	3.85 g/100g
Flavonoid	7.86 g/100g
Phytosterol	1.85 mg/100 gm
Glycoside	234/100 gm

\*Each value represents the average of three determinations

Nutraceutical profile of hadjod stem powder was studied. The total alkaloids content were found 4.33 g/100g, while total flavonoids were found to be 7.86 g/100g. The tannin content was found to be 2.60 g/100g. saponin content was found that 3.85 g/100g .The phenol content was found 0.322 g/100g Also, glycoside were found 234g/100g. Tannins was attributed for analgesic and anti-inflammatory activities. Apart from this tannins contribute property of astringency i.e. faster the healing of wounds and inflamed mucous membrane (Okwu and Josiah, 2006) [9]. It could be noted that steroidal compounds are of importance and of interest in pharmacy due to their relationship with sex hormones (Anitha and Suji 2012) [2].

## Conclusion

It can be concluded that the Physico-phytochemical analysis and studies of *Cissus quadrangularis* have shown the presence of various versatile constituents such as glycoside, alkaloids, flavanoids, tannin, saponin, and calcium were

identified as major constituents of this plant. The present preclinical study had revealed the traditional use of *Cissus quadrangularis* and in treatment of arthritic. However the study also concludes that hadjod stem powder dose of 300mg/kg exhibited significant anti-arthritis activity than the lower doses of 200mg/kg. These effects may probably attribute to presence of phytochemical such as glycoside, alkaloid and flavonoids in *Cissus quadrangularis*. Because a lot of these secondary plant metabolites identified so far exhibit anti-arthritis properties. Hence one or more of these plant metabolites could be responsible for its antiarthritic activity.

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