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Study of phytochemical and antioxidant activity of *Cucumis melo* var. *agrestis* fruit

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Abstract

Cucumis melo var. *agrestis*, is an annual creeper, is available all over India and well known for its antioxidant property. In the present investigation, aqueous extract, and ethanolic extract of the fruits were made using hot extraction procedure using soxhlet apparatus, decoction and maceration. The qualitative phyto-chemical screening procedure was performed on each extract. Phyto chemical study reveals that carbohydrates, tannins, flavonoids, alkaloids, saponins, steroids & triterpenoids and glycosides were present in both the extracts. An attempt has been made to highlight this folk herbal medicine through present study which will assist in the identification of fresh as well as dried crude samples of fruits anatomically and physiochemically. The antioxidant activity is conducted by hydrogen peroxide in *In vitro* method on each extract and ethanolic extract showed significant action towards free radicals.

Keywords: *Cucumis melo* var. *agrestis*, antioxidant, Hydrogen peroxide.

Introduction

Now-a-days there is a renewed interest in drugs of natural origin simply because they are considered as green medicine and green medicine is always supposed to be safe. Another factor which emphasizes this attention is the incidences of harmful nature of synthetic drugs which are regarded as harmful to human beings and environment. The advantage of natural drugs is their easy availability, economic and less or no side effects but the disadvantage is that they are the victims of adulteration. The more effective the natural drug more is its demand and the chances of non-availability increases. To meet the growing demand, the natural drug is easily adulterated with low grade material. Adulteration or substitution is nothing but replacement of original plant with another plant material or intentionally adding any foreign substance to increase the weight or potency of the product or to decrease its cost. Therapeutic efficacy of medicinal plants depends upon the quality and quantity of chemical constituents. The misuse of herbal medicine or natural products starts with wrong identification [1].

Plant profile

Cucumis melo var. *agrestis*. The fruit of which is mainly consumed as a vegetable. It is commonly called as wild melon, small gourd, and wild musk melon [2].



Fig 1: Fruit of *Cucumis melo* var. *agrestis*

Table 1: Common Name for *Cucumis melo* var. *agrestis*

English	Cucumber, small gourd, wild musk melon
Danish	Agruk
Hindi	Kachari
Japanese	Kyuri
Telugu	Dosakaya
Malayalam	Velarikka
Chinese	Huángga
Spanish	Pepino

Table 2: Phytochemical constituents of *Cucumis melo* var. *agrestis* fruit

S. No	Phytochemical Constituents
1	Tannins
2	Alkaloids
3	Carbohydrates
4	Flavanoid
5	Saponins
6	Proteins
7	Glycosides
8	Steroids & Triterpenoids

Materials and Methods

Collection and authentication

Cucumis melo var. *agrestis* fruits were collected from local market of Nalgonda, Nalgonda Dist, Telangana, India. All plant materials were collected from the months of December to January 2014-15. The plant material was identified and authenticated by Mr. Siddulu lecturer and head of botany department, Nagarjuna Government degree college, Nalgonda.

Chemicals and Reagents all reagents of analytical grade and highly pure.

Morphological study

The drug was evaluated by its colour, odour, taste, size, shape and special features, like texture, touch, etc. evaluation was carried based on the morphological and sensory profiles of whole drug.

Microscopic study^[3]

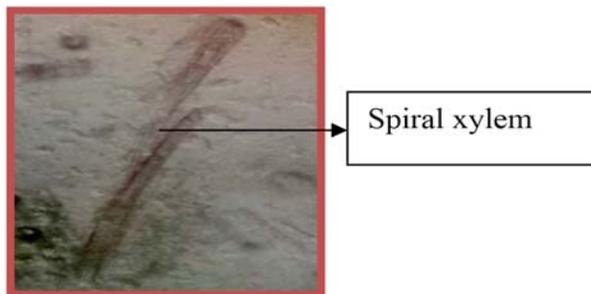
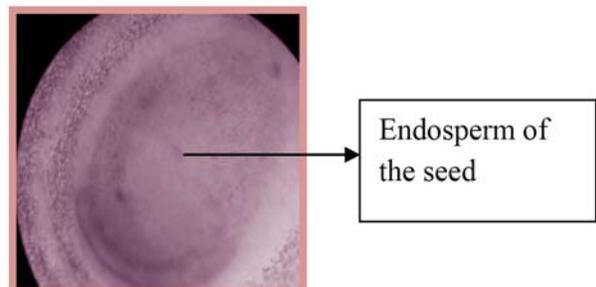
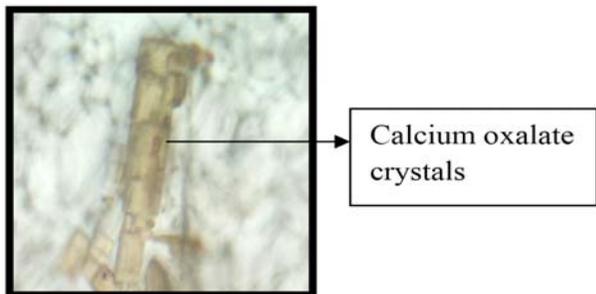
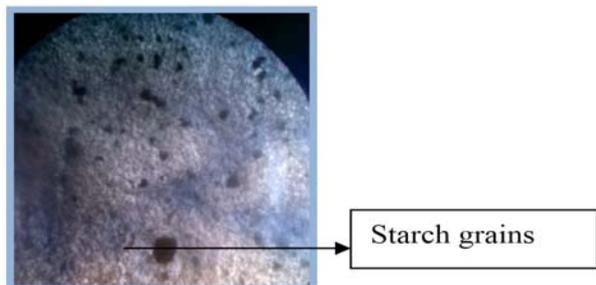


Fig 2: Microscopic characters of *Cucumis melo* var. *agrestis* fruit

Proximate analysis

Proximate analysis was carried out for the fruit powder of *Cucumis melo* var. *agrestis*^[4].

Table 3: Ash values of *Cucumis melo* var. *agrestis* fruits

S. No	Ash value	Peel	Pulp	Seed
1	Total ash value	6%	8.5%	10.96%
2	Acid insoluble ash	4%	3.3%	4.6%
3	Water soluble ash	3.2%	4.6%	5%

Table 4: Extractive values of *Cucumis melo* var. *agrestis* fruits^[4]

S. No	Extractive value	Peel	Pulp	Seed
1	Alcohol soluble	22.8%	25.4%	31%
2	Water soluble	15.5%	26%	19.8%

Extraction^[5-7]

Extraction, as the term is used pharmaceutically, involves the separation of medicinally active portions of plant or animal tissues from the inactive or inert components by using selective solvents in standard extraction procedure.

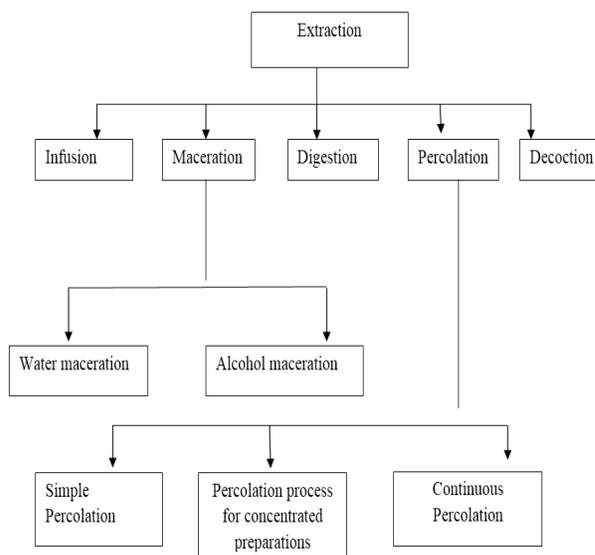


Fig 3: Flow chart of extraction procedures

a) Decoction

In this process, the crude drug (20g) is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered. This procedure is suitable for extracting water-soluble, heat-stable constituents. The starting ratio of crude drug to water (320ml) is fixed, e.g. 1:4 or 1:16; the volume is then brought down to one-fourth its original volume by boiling during the extraction procedure.

b) Maceration

1) Alcohol maceration

In this process the drug (20g) is placed with the whole of the alcohol (360ml) in a closed vessel for 7 days. During this period shaking is done occasionally. After 7days the liquid is strained and marc is pressed.

2) Water maceration

This method is similar to alcohol maceration where water is used instead of alcohol [6].

c) Continuous hot percolation process/soxhlet extraction

The drug (25g) to be is packed in a paper cylinder made from a filter paper and it is placed in the body of soxhlet extractor. The alcohol (200ml) is placed in the flask. The apparatus is fitted. The process of filling and emptying of the extractor is repeated until the drug is exhausted [7].

Table 5: % yield of different extraction methods

S. No	Type of extraction	(%)percentage yield w/w		
		Peel	Pulp	Seed
1	Decoction	14.05	25	52.05
2	Alcohol maceration	13	17.5	13
3	Water maceration	9.5	13.5	9.5
4	Percolation	14	14.8	12

Preliminary phytochemical screening after extractions the extracts were subjected to a vacuum rotary evaporator and concentrated extracts were obtained along with solvent recovery [7].

Table 6: Phytochemical screening of different extract of *cucumis melo* var. *agrestis* fruit

S.NO	Phytochemical constituent	Peel	Pulp	Seed
1	Carbohydrates	+	+	+
2	Tannins	+	+	-
3	Saponins	+	+	-
4	Flavonoids	-	+	+
5	Steroids& Triterpenoids	+	-	+
6	Protiens	-	+	+
7	Alkaloids	+	+	+
8	Glycosides	+	+	-

+ = indicates present, - = indicates absent

In vitro method employed in antioxidant studies [8, 9]

Free radical scavenging activity using hydrogen peroxide

The ability of *Cucumis melo* var. *agrestis* seed extract to scavenge hydrogen peroxide was determined. An aliquot of 0.6ml of hydrogen peroxide(43Mm) and 1.0ml of various concentration of extracts prepared using phosphate buffer (200-400µg/ml) were mixed, followed by 2.4ml of 0.1M phosphate buffer (p^H 7.4).The resulting solution was kept for 10 min and the absorbance was recorded at 230nm.All measures were repeated triplicate. For each concentration mixture without sample was taken as a control and mixture without hydrogen peroxide was taken as a blank. Ascorbic acid was used as a standard compound. The percentage scavenging of hydrogen peroxide was calculated as:

$$\text{Scavenging activity (\%)} = (A_0 - A_s) / A_0 \times 100$$

Where A₀ is the absorbance of the control

A_s is the absorbance of the sample

Table 7: Percentage scavenging of Hydrogen peroxide

S.NO	Concentration (µg/ml)	(%)Percentage scavenging of hydrogen peroxide			
		Ascorbic acid	Peel	Pulp	Seed
1	200	51.47%	36.80%	34.32%	21.77%
2	250	53.71%	38.91%	36.63%	35.07%
3	300	57.78%	40.91%	41.87%	36.95%
4	350	59.66%	44.09%	44.27%	38.20%
5	400	60.54%	44.84%	48.90%	39.78%

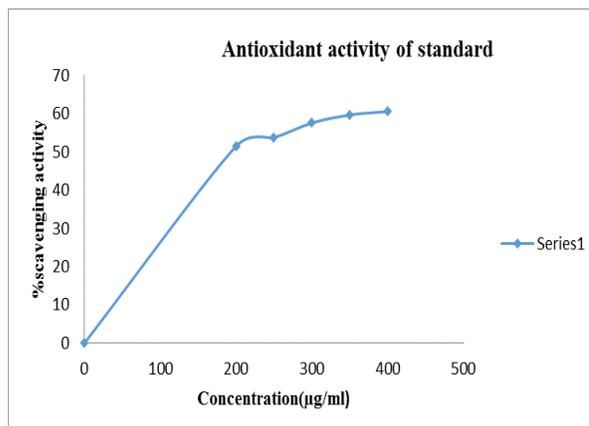


Fig 4: Hydrogen peroxide scavenging activity of Ascorbic acid (std)

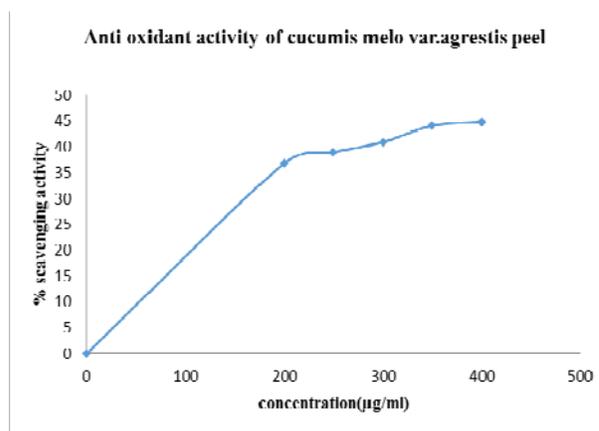


Fig 5: Hydrogen peroxide scavenging activity of *Cucumis melo* var. *agrestis* (peel)

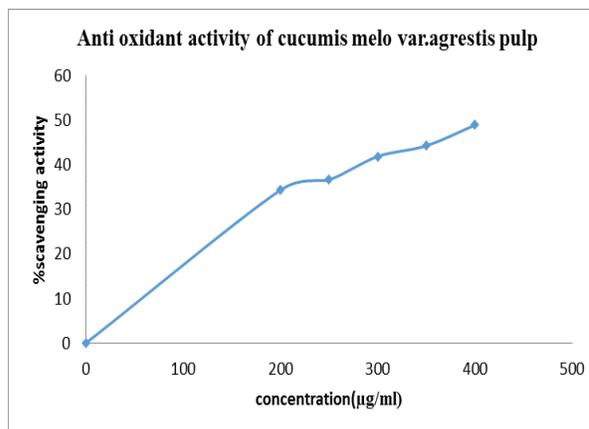


Fig 6: Hydrogen peroxide scavenging activity of *Cucumis melo* var. *agrestis* (pulp)

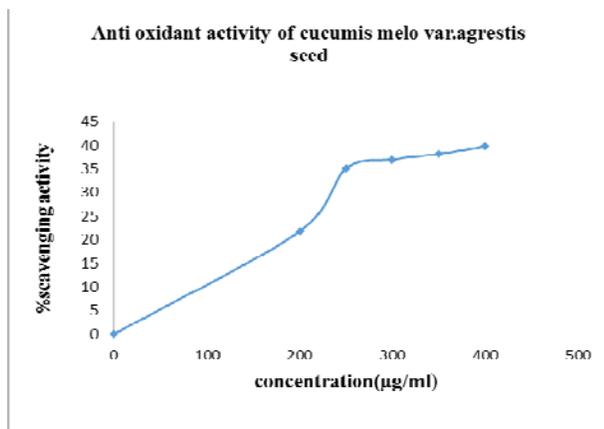


Fig 7: Hydrogen peroxide scavenging activity of *Cucumis melo* var. *agrestis* (seed)

Discussion

According to the World Health Organization (WHO, 1998), the macroscopic and microscopic description of a medicinal plant is the first step towards establishing the identity and the degree of purity of such materials and should be carried out before any tests are undertaken. In present study all the parameters are evaluated successfully as per auryveda pharmacopeia. The different extracts of the plant were subjected to the preliminary tests showed the presence of various constituents like Carbohydrates, saponins, tannins, flavonoids, steroids, triterpinoids, glycosides and alkaloids. The present finding reveals that *Cucumis melo* var. *agrestis* fruits efficiently shows *in vitro* antioxidant activity studies. The pulp extract showed significant action and the range of % scavenging activity from 66-112%.

Conclusion

Antioxidants are protective molecules also referred to as free radical scavengers. Fruits and vegetables are the main source of antioxidants in the diet, are associated with lower risk of degenerative disease. From the investigational reports of *Cucumis melo* var. *agrestis* fruit showed significant action to words free radicals. So, further the isolation, purification and characterization of *Cucumis melo* var. *agrestis* has to be done for the usage of antioxidant agent.

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