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SPECTROPHOTOMETRIC STUDIES OF A COLONIAL ASCIDIAN *ECTEINASCIDIA VENUI* MEENAKSHI, 2000

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ABSTRACT

Ecteinascidia venui commonly available in Tuticorin coast was screened for its chemical value. Anlaysis of carbohydrates, proteins, lipids, phenols and flavonoids were done by Spectrophotometry method. A maximum of 45.82% flavonoids, 20.68% protein, 9.77% lipids, 9.21% phenols and 4.57% carbohydrates were observed in Ecteinascidia venui. Flavonoids are ubiquitous and serve as chemical messengers, antioxidants, antimicrobials and biological response modifiers in living organisms. Proteins lead to the formulation of a protein rich diet to fight against protein energy malnutrition. The present observation suggests need for further investigation of Ecteinascidia venui so as to isolate secondary metabolites.

KEY WORDS

Carbohydrates, Colonial ascidian, Ecteinascidia venui, Flavonoids, Lipids, Phenols, Protein

INTRODUCTION

Ascidians are marine sedentary organisms. They occur as the major components of fouling community settling on all kinds of surfaces, hard rocks, stone, hull of ships, branches, roots of trees, algae, floating objects, sand and muddy surface [1, 2]. Ascidians are considered as a nuisance as they grow on all underwater marine structure and are usually thrown away. Such discards may have a wealth of natural products [3]. Hundreds of new compounds have been isolated from ascidians, the majority of which are amino acid derivatives. Some ascidians are widely enjoyed as food in Japan, particularly in Hokkaido and Tohoku districts because of the high amount of proteins, carbohydrates and other essential micronutrients [4]. Like other marine food products, ascidians are delicious, relatively easily digestible and offer minerals, iodine and vitamins [5]. Increased proteins content has been observed in the flesh of *Microcosmus sulcatus* which is a common food item of the people in certain parts of Mediterranean [6]. The continued chemical interest in this group of animals, has led to the isolation of an increasing number of non-nitrogen containing metabolites [7, 8]. Ascidians contain a wealth of interesting pharmacological substances [9]. One of the reasons for the ecological success of this group is their ability to synthesise secondary metabolites with important defensive roles, including antimicrobial peptides, cytosine like compounds, lectins and antileukemic compounds [10-13]. A review of literature shows that chemical investigation of *Ecteinascidia venui* has not been attempted. Hence the objective of the present investigation is to identify the chemical constituents like carbohydrates, proteins, lipids, phenols and flavonoids with the aid of spectrophotometer.

MATERIALS AND METHODS

Collection of animal material:

Ecteinascidia venui was collected from Tuticorin coast in the month of May 2013 by SCUBA diving. Molluscan shell, calcrete rock fragments and other epibionts attached to the colony was carefully removed. Identification up to the species level was carried out based on the key to identification of Indian ascidians [8]. A voucher specimen AS 2247 has been submitted in the ascidian collections of the museum of the Department of Zoology, A. P. C. Mahalaxmi College for Women, Tuticorin – 628002, Tamilnadu, India. (**Figure 1**)

Figure 1: Colony of *Ecteinascidia venui* Meenakshi, 2000

Systematic position:

Ecteinascidia venui belongs to Phylum: Chordata, Subphylum: Urochordata, Class: Ascidiacea, Order: Enterogona, Suborder: Phlebobranchia, Family: Perophoridae, Genus: *Ecteinascidia* and Species: *venui*

Preparation of powder and extract:

The collected specimen was washed several times with fresh sea water. Epibionts and other particles like sand and shell pieces adhering to the surface of the specimen were carefully removed. Brought to the laboratory and washed again. The whole colony was dried in shade and homogenized to get a coarse powder. 0.5 g of the dry powder was ground in a mortar and pestle with ten times volume of 80% ethanol. The homogenate was centrifuged at 10,000 rpm for 20 min and the supernatant was collected. The residue was re-extracted with five times the volume of 80% ethanol, centrifuged and the supernatants were pooled and evaporated to dryness. The residue was dissolved in 10% TCA for carbohydrates and proteins; chloroform for lipids; ethanol for phenols and flavonoids.

Chemical analysis:

Total free sugar was estimated by following Anthrone method [14]. Protein content was estimated by following Lowry *et al.,* method [15]. Lipids were estimated by Bragdon method [16]. Phenols were estimated by Folin-ciocalteu reagent method [17]. Flavonoids were estimated by Aluminum chloride method [18]. Elico SC-177 Scanning mini spectrophotometer was used for the measurement of absorbance.

RESULTS AND DISCUSSION

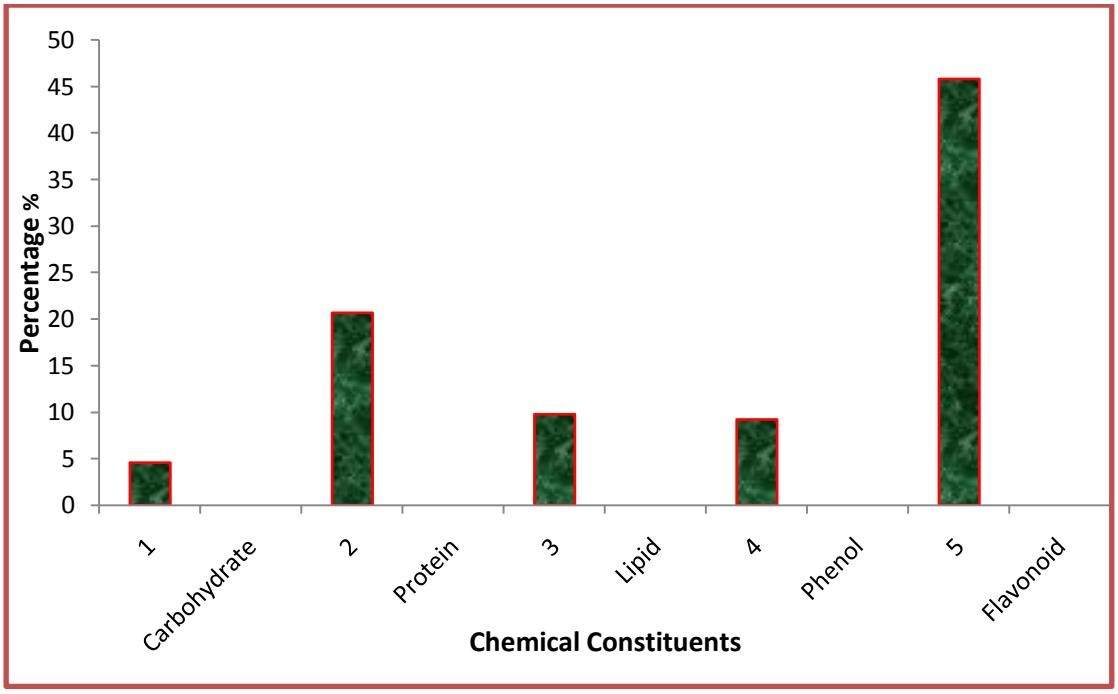
The results of the present study are given in **Table 1**. It is also represented in **Figure 2**. Present study indicates that *Ecteinascidia venui* contain very low amount of carbohydrates. *Ecteinascidia venui* contain only 4.57% carbohydrate. This may indicate that carbohydrates play an insignificant role in the energy reserves of these ascidians which are sedentary animals with hermaphroditic gonads. It was supported by early work also [19]. Present study indicates that *Ecteinascidia venui* contain 20.68% protein. Higher percentage of proteins may be attributed to the continuous breeding activity of these tropical ascidians [20]. Present study indicates that *Ecteinascidia venui* contain 9.77% lipids. Lipids act as energy reserve to assist recovery during maturation of gonads and spawning. It was supported by previous studies [20]. Present study indicates that *Ecteinascidia venui* contain 9.21% phenols. Phenols are a class of antioxidants which act as free radical terminators [21-23]. The greater amount of phenolic compounds leads to more potent radical scavenging effect. HPTLC studies of the simple ascidian

Microcosmus exasperatus have revealed the presence of phenolic compounds such as gallic acid, ferulic acid, caffeic acid [24]. Present study indicates that *Ecteinascidia venui* contain a high amount (45.82%) of flavonoids. Preliminary research indicates that flavonoids may modify allergens, viruses and carcinogens, hence may act as biological "response modifiers". *In vitro* studies show that flavonoids also have anti-allergic, anti-inflammatory, antimicrobial, anticancer, antitumour, antioxidant and anti-diarrheal activities [25-29]. A comparison of result shows *Ecteinascidia venui* has high percentage of flavonoids than the other chemical constituents.

Table 1: Chemical Constituents present in *Ecteinascidia venui*

S.No	Chemical constituents	Percentage %
1.	Carbohydrates	4.57
2.	Proteins	20.68
3.	Lipids	9.77
4.	Phenols	9.21
5.	Flavonoids	45.82

Figure 2: Chemical Constituents present in *Ecteinascidia venui*



CONCLUSION

Ascidians are consumed by many people in the Far East and certain parts of the Mediterranean. They have realised and increasingly appreciated the food value of ascidians because of their low calorific values and very high proteins content. Ascidians are not only important as food but also as tonics to cure many diseases. The present investigation revealed that the colonial ascidian *Ecteinascidia venui* contain significantly high amount of flavonoids and proteins when compared to carbohydrates, phenols and lipids. The scavenging property of *Ecteinascidia venui* may be due to hydroxyl groups existing in the phenols and flavonoids. This result indicates that *Ecteinascidia venui* can become an important source of compounds with health protective potential.

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