

TERMITE ALATES (ODONTOTERMES OBESUS) USED AS FOOD FOR KOYA TRIBES IN PAKHAL WILDLIFE SANCTUARY, WARANGAL, TELANGANA

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ABSTRACT

Termites, especially Odontotermes sp. were playing an important role in ecology, entomophagy and other contexts such as Zootherapy around the world including Indian ethnic people. By food, value termites have a rich source of proteins, lipids, carbohydrates, enzymes, and minerals. The termites Odontotermes obesus had high levels of biochemical constituents such as proteins 66mg/ 100mg; carbohydrates 35mg/100mg; lipids 6.80mg/100mg and other enzymes. The results that Odontotermes obesus have more proteins followed by carbohydrates, lipids, and enzymes. In addition to their ecological importance, termites are a source of food and medicinal resources to ethnic people of Koya tribes from Pakhal Wildlife sanctuary, Telangana state. Therefore, there is an urgent need to focus on entomological research to the documentation of the utility of insects.

KEYWORDS: *Odontotermes Obesus, Biochemical Constituents, Carbohydrates, Proteins, Entomophagy, Zootherapy, Koya Tribes, Pakhal Wild Life Sanctuary*

INTRODUCTION

India is a tropical country, the diversity of insects is greater. So, a potential land for insect resource to be utilized their vast potential. Alfred et al., [1998] reports indicated 59,353 species of insects belonging to 619 families from India. Insects have played an important role in ecological, food and another context such as supplying raw material for dyes, poisons, traditional medicines, decoration objects, entertainment and even admiration also [Hogue CL,1987; Hoffmann HJ, 2006; Nonaka K, 1996].

The practice of insects as a part of the human diet is called Entomophagy [Figueirêdo, 2015]. Termites are the traditional food in many cultures of the world [Gagan Kumar Mahapatro, 2015]. In spite Entomophagy has the superior nutritional content of edible insects compared to other animals yet to become a day to day activity of most people in the US and Europe [html]. Termites, especially Odontotermes species are considered as delicious food in most parts of Asia and Africa [Gagan Kumar Mahapatro, 2015]. According to Entomological survey of America, by the weight termites are a better source of protein than beef, chicken, and pork. Insects are low in cholesterol and low fat [html].

Termites (eg. *O.formosanus*) have proteins, carbohydrates, lipids, essential amino acids and other nutrients as food.

Termites used as a nutritional food for pregnant women in Africa, Indian tribes of Kannikara, Palliyan and newlywed couple of (Chattisgarh) Indian tribes. Forbes, 1813; Raja BKC; Paul and Dey [2011a & 2011b] was observed Mysore, Karnataka local, Tamilnadu, Meghalaya tribes served termites as food for protein and carbohydrates.

Eentomotherapy is curing human and veterinary diseases by therapeutics based on insect medicines [Ranjith Singh, 2004]. Termites are commonly used in traditional medicine (Entomo-therapy). Termites are using in zotherapy, *O. formosanus* using for treat diseases Asthma [Alves, 2010]. People from North East India tribals using *Odontotermes feae* species for treat anemia, weakness, and anti-diarrhoeal activity, *Odontotermes alates* are used to treat ulcers [Senthilkumar et al., 2008].

The author himself a tribal and observed in Pakhal wildlife sanctuary, Warangal, Telangana; termites *Odontotermes obesus* being sold by Koya ethnic people roasted with maize or Bengal gram, spices & salts to enhance the taste. Despite well-known role of termites in food, medicine and byproducts, they attracted less attention of researchers in Telangana state, India. Therefore, there is an urgent need to focus on entomological research to the documentation of the utility of insects from various tribal communities in India.

Material & Methods

Animal materials are chosen for study

The termites collected from Pakhal wildlife sanctuary, from the month of June and July 2018.

Biochemical Estimations

Termites were homogenized (10%) in 10% Tri Chloro Acetic Acid (TCA) centrifuged at 2000 rpm for 15 min and the clear supernatant was used for the analysis of total proteins, carbohydrates and ninhydrin positive substances (FAA). The total protein content was determined through the method described by Lowry's method (1957). Ninhydrin positive substances were estimated by the method of Lee and Takahashi (1966) and the total carbohydrate content in the tissues was estimated by the method of Carroll et al., (1956). Total lipids by Vanillin method. GDH (Glutamate Dehydrogenase), LDH (Lactate dehydrogenase) and SDH (Succinate Dehydrogenase) were determined by the method of Nachlas et al., 1960, AchE (Acetylcholine esterase) was determined by the Ellman and Amders (1961) method. Estimation of nucleic acids DNA by DPA method and RNA by orcinol method.

Statistical Analysis: Statistical analysis was performed by one-way analysis of variance ANOVA to compare the results between the tissue components.

RESULTS

Table 1

S. No	Component	mg/g of Wet Weight of Tissue
1	Carbohydrates	35.26 ±0.67
2	Total Proteins	66.54±0.47
3	FAA	0.80±0.23
4	Total Lipids	6.80±0.53
5	DNA	0.75±0.77
6	RNA	0.89±0.29
		µmol. of formazan / g of tissue / hr
7	LDH	2.45
8	GDH	0.0028
9	SDH	0.00437
10	AchE	0.0241µmol / min / mg of tissue protein

Values are mean ±SE of six replicates, statistically significant (P<0.05)

LDH- Lactate dehydrogenase; SDH- Succinate Dehydrogenase

GDH- Glutamate Dehydrogenase; AchE-Acetyl choline esterase

DNA-Deoxy ribose nucleic acid; RNA- Ribose nucleic acid

Our present investigation of biochemical and enzyme estimations through spectrophotometer results were obtained as carbohydrates were 35.26 ±0.67, free amino acids (ninhydrin positive substances) were 0.80±0.23, total proteins were 66.54±0.47, total lipids were 6.80±0.53, DNA & RNA were 0.75±0.77 & 0.89±0.29 mg/g wet weight of all contents and LDH were 2.45, GDH was 0.0028, SDH was 0.00437 µmol. of formazan / g of tissue / hr and AchE 0.0241µmol / min / mg of tissue protein.

DISCUSSION

Earlier so many researchers like Roy & Rao, Wilsonand & Yesodharan, Thakur conducted studies on dietary investigations of various Indian tribes, a total 225 species of insects wererecorded as edible in India. Different types of insects, insect larvae, honey bees, some species of ants are food for tribes of M.P, Tamilnadu, Karnataka, Kerala, Odisha, Assam, and Andaman-Nicobar Islands [Wilsonand, 2005].

Many worker have been reported their biochemical or nutritional content of termites especially Odonotermes species such as, G.K Mahapatro [2015] reported that termites have Proteins (87%), carbohydrates (2.7%), amino acid (6.7%) and minerals were greater than conventional vegetarian food, salmon fish and chicken [Paul & Dey, 2011a & 2011b].

R.K Upadhyay et al., [2010] revealed results the termite, *O. besus* biochemical and enzymological variations in control was glycogen 3.26g/100g; amino acids 0.866g/100g; lipids 1.046g/100g; proteins 5.2g/100g; LDH 14.59 μ moles; AchE 0.0116 μ moles. Functional reproductives of *O.brunneus* Queen, King have proteins-67,45 mg/g; lipids-27,26 mg/g; carbohydrates- 38,59 mg/g. Wilasnand, [2005] reported that the nutrients in the termite *O. formosanus* had proteins- 47 μ l, lipids- 09 μ l, carbohydrates-02 μ l. Termites have more fat content in the insect group, thus energy content. *O. feae* Linn. Is one of the important insect food represents the cheapest source of animal protein in Manipur, India.

Preference given to insect species utilized as food by ethnic people of India depends on the insect's palatability and nutritional value as well as on local traditions and customs. Figueiredo et al., [2015] and V. Wilsanad [2005] reported a list of termites species used as food or feed in various regions of the world. Fourteen common termites and Six *Odontotermes* species were used as food in Asia & African continents, countries like South Africa, Zambia, Kenya, Uganda, China, and India. Two *Odontotermes* species was used in traditional medicine of India.

CONCLUSIONS

Termites form an important part of the human diet in the world, thus also in India across the tribal-dominated states. Termites have rich in Protein, followed by lipids, carbohydrates, and other biochemical constituents and enzymes. In South India especially in Telangana, *Odontotermes obesus* (local name- Oosillu) weretaken roasted with maize or rice. Adult termites were consumed by Koyatribes and other communities during the month of Jun-July. Therefore, there is an urgent need to focus on entomological research to the documentation of the utility of insects from various tribal communities in India.

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Conflict of Interest

The authors declare that there is no conflict of interest that would prejudice the impartiality of this scientific work.

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APPENDIX



Figure 1