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Original Research Article

Socio-cultural factors associated with mushroom consumption among tea garden population of Dibrugarh, Assam

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ABSTRACT

Background: Major challenge with climate change in India is sustaining food supply for economically disadvantaged leading to widespread malnutrition and related illnesses. Aim of the study was to assess the socio-cultural factors associated with mushroom consumption among tea garden population of Dibrugarh, Assam.
Methods: Community based cross-sectional study was conducted in which 6 tea gardens were selected based on high mushroom consumption. From each selected tea garden, 35 households were covered using simple random sampling technique and data was collected using a semi structured questionnaire.
Results: Majority (61.72%) of the respondents were males, 69.04% belonged to lower middle socioeconomic status (class IV). Easy availability (80%) during monsoon was common reason for consumption. Most of them (95.71%) used traditional identification methods. Traditional cooking methods were followed, with the assumption that those rendered all mushroom edible. Majority believed that lemon could dilute toxins in case of accidental poisoning.
Conclusions: There was a need to make community aware of scientific identification of edible mushroom to prevent morbidities and mortalities arising out of it.

Keywords: Ethnomycological knowledge, Malnutrition, Mushroom consumption, Tea garden population, Traditional practices

INTRODUCTION

Impending issue of malnutrition and the reduction in food production pose a serious concern; forcing community for low-cost, high-quality substitute nutritional supplies.[1] Being a very nutrient-dense vegetable, mushrooms have the potential to provide prompt solutions to the current issues of food and nutritional security.[1] With their remarkable nutritional and therapeutic qualities, mushrooms grow on wastes without requiring more land, making mushroom farming a suitable approach to solve this challenge.[2] Mushrooms production expected to increase to 20.84 million tons may clearly benefit farmers to utilize agricultural wastes and reduced reliance on land.[3]

Mushrooms or macro-fungi are fleshy, spore-bearing fruiting plant having both edible and toxic variety.[4] It is considered a healthful cuisine good for people of all ages with overall carbohydrate content of mushrooms ranged from 26 to 82% (dry weight basis), crude fiber is made up of chitin and partially digested carbohydrates, larger amount of polyunsaturated fatty acids with negligible lipid content and ergosterol instead of cholesterol which is a precursor to synthesize vitamin D.[5] Edible mushrooms typically have a high protein content, though this might vary significantly from 12 to 35%. About 80% to 90% of mushrooms are made up of water, 8% to 10% fiber; while it's a great source of vitamins, particularly C and B (niacin, folic acid, thiamine, and riboflavin), minerals potassium, sodium, phosphorous and trace amount of copper, zinc and magnesium although it lacks

calcium and iron.[6,7] Studies have demonstrated the presence of bioactive substances and immune-modulating substances.[7] Research gap still exists in nutritive value of Indian mushrooms.[8] Community members mostly collect this natural commodity for their own use and to make a living by selling it in nearby marketplaces without much ethnomycological knowledge.[9]

In Dibrugarh, Assam, India, wild edible mushrooms constitute a vital natural food supply for the tea garden community. Not all wild mushrooms that grow in similar environments and with similar habitats are edible but ethnomycological knowledge among tea gardens population is very poor.[10] Therefore this study was planned the objective to find out the socio-cultural factors associated with mushroom consumption among tea garden population of Dibrugarh.

METHODS

Study design

A community based cross-sectional study was conducted in Dibrugarh, Assam, India from October 2022 to October 2023. In Dibrugarh, there are 144 tea gardens of which 6 tea gardens were selected for the study based on high mushroom consumption. From each selected tea gardens, 35 households were covered using simple random sampling technique culminating to a total sample size of 210. A semi structured questionnaire was used to capture data on socio-cultural factors, knowledge regarding identification and cooking practices.

Data collection technique

Ethical approval was obtained from the institute ethics committee (H) of Assam Medical College and Hospital, Dibrugarh, Assam, India. Data was collected through personal interviews using a pre-designed format by house to house visit after obtaining written informed consent from the study participants. One individual from each selected household were interviewed.

Questions were asked related to the socio-demographic characteristics, use of mushroom as a food, traditional methods of identification of wild edible mushrooms, traditional cooking methods and mushroom poisoning.

Data analysis

Data were entered and analyzed using SPSS statistics version 25.0. Quantitative data were presented in frequencies and percentages.

RESULTS

Socio-demographic characteristics

Age distribution of the respondents was: 41 to 50 years (29.53%), 31 to 40 years (27.75%) and 21 to 30 years (21.53%). Caste wise distribution was Bhumij, Gorh, Moran, Munda, Santhal and Tanti. Majority were males (61.72%) by gender and 69.04% belonged to lower middle socioeconomic status (class IV) according to modified B. G. Prasad classification (May 2022).

Use of mushroom as food

Majority use mushroom as food due to easy availability (80%), while 4.29% consume because of its nutritive value. Only 7.14% study population were involved in cultivation and/or marketing of mushroom. Consumption of mushroom was found to be more common in Moran (25.84%) and Munda (30.62%) communities (Table 1).

Table 1: Use of mushroom as food.

	Frequency	%
Use of mushroom as food		
Culturally accepted	20	9.52
Easy availability	168	80.00
Good taste	13	6.19
Nutritive value	9	4.29
Family members involved in collecting mushrooms		
Men	111	52.86
Women	99	47.14
Involvement in cultivating and/or marketing of mushroom		
Yes	15	7.14
No	195	92.86

Traditional identification methods

Knowledge to identify edible mushroom was acquired either from their parents or grandparents. It was found that most of them (95.71%) pluck pale-coloured mushrooms which are considered as non-poisonous whereas bright coloured or colourful are considered as poisonous. After plucking of mushrooms, if the colour changes to white then it is considered as poisonous by 39.52% participants. According to 27.14% of participants, edible or non-poisonous mushrooms have flat, rounded cap, 57.14% check the aroma while plucking mushrooms and if it feels familiar and pleasant it is considered non-poisonous. If the stem becomes black on breakage, then it is considered poisonous and unfit for consumption (Table 2).

Traditional cooking methods

Everyone believed that mushrooms can be made edible by soaking in warm water for 1 to 2 hours before cooking. If mushroom turns red on boiling in water, then it is considered poisonous. If the characteristic smell of mushroom gets stronger while cooking then it is considered poisonous. While cooking mushrooms, 79.04% of the participants add brinjal or brinjal leaves and then if the curry turns dark green or blue, the curry is discarded as it is considered inedible or poisonous. When

brinjal or brinjal leaves are not available then some of them put 1 rupee silver coin in the curry while cooking mushrooms and if the colour of the curry turns darker then it is considered poisonous (Table 3).

Table 2: Traditional identification methods.

	Frequency	%
Knowledge of how to distinguish between poisonous and non-poisonous mushrooms	207	98.57
Source of knowledge- from parents/ grandparents	207	98.57
If colour changes to white after plucking then considered poisonous	83	39.52
Pluck pale-coloured mushrooms	201	95.71
Check aroma while plucking mushrooms	120	57.14
Aroma feels familiar and pleasant if non-poisonous	120	57.14
Mushrooms having flat, rounded cap are non-poisonous	57	27.14
If stem becomes black on breakage then considered poisonous	120	57.14
Habitat from where mushrooms were collected		
Cultivation in fertile land	3	1.43
Dead, rotten wood/tree trunks	3	1.43
Grassy areas frequented by cattle	51	24.29
Manure rich soil	47	22.38
Roots of bamboo trees	12	5.71
Tea garden areas	94	44.76

Table 3: Traditional cooking methods.

	Frequency	%
Mushrooms can be made non poisonous or edible by soaking	205	97.62
If mushroom turns rice red on boiling then considered poisonous	84	40.00
If the characteristic smell of mushroom gets stronger while cooking then considered poisonous	78	37.14
Addition of brinjal/brinjal leaves along with mushrooms during cooking	166	79.04
Brinjal/brinjal leaves when added the curry turns dark green/blue if poisonous	166	79.04
Cook with 1 rupee silver coin when brinjal/brinjal leaves not available	76	36.19

Mushroom poisoning

Majority of the study participants believe that lemon can be used for diluting toxins in case of accidental poisoning following consumption of cooked mushrooms. It was reported that around 4.29% of the study participants or their family members were affected by mushroom poisoning in the past 1 year (Table 4).

Table 4: Mushroom poisoning.

	Frequency	%
Any member of the family affected by mushroom poisoning in the past	9	4.29
Home remedies like lemon used for diluting toxins in case of poisoning	174	82.86

DISCUSSION

Mushroom was used as food due to easy availability, collected equally by men and women; which was not a regular activity and generally collected while returning from work from tea gardens. The socio-cultural traditions followed by the communities helped in transfer of knowledge on the use of mushroom as food from one generation to the next, also found in a similar study by Sarma et al, Assam, India.[11] However they have less knowledge regarding nutritive value of mushrooms.

Traditional identification methods were to distinguish between edible and dangerous mushrooms. They employed multiple criteria to evaluate the edibility of wild mushrooms. To identify edible mushrooms, they mostly employed morphological traits such size, shape, color, scent, habitat, and color changes.[12] Mushrooms that are brightly colored and have pointed cap are considered to be poisonous. Similar findings were reported in a study by Mishra et al in Uttarakhand, India.[13] The bulk of the mushrooms were harvested from tea garden locations; other habitats included grassy areas used by livestock, dead, rotting wood or tree trunks, manure-rich soil, and bamboo tree roots, usually in the monsoon season. They avoid gathering mushrooms in regions where snake habitat is known to exist. Insects and worms on the mushrooms, as well as animals grazing on them, suggested that they were edible to people. Similar

findings were reported in studies by Borah et al in Assam, India and Mu et al in Africa.[14,15]

Traditional cooking methods like elderly women in the household cross-check collected mushrooms during washing followed by soaking in warm water for 1to 2 hours.[14] During cooking, they use brinjal, brinjal leaves or silver coin for detecting toxins. Similar findings were reported from a study by Borah et al in Sikkim, India.[16] After cooking, they usually feed stray dogs first, followed by consumption by the older members of the family and finally the younger members. But reports of poisoning cases coming to nearby hospital gave evidence of frequent poisoning and related morbidities and mortalities indicating non-practice of the stated norm. But no scientific study validating such practice could be found. Administrative data from a nearby tertiary care Hospital documented admission of 35 cases in a month (April 2022) of which 16 expired (case fatality rate 45.7%). This indicates the necessity of further exploring the burden and epidemiological pattern of the disease.

Mushroom poisoning may lead to different morbidities like nausea, vomiting, dizziness, stomach pain, diarrhoea and also may cause mortality which is preventable.[17] The current study documented poor scientific knowledge and practice leading to more vulnerability of the people living in tea estates. Practice of certain traditional remedies like use of lemon and locally made rice beer for addressing any accidental mushroom poisoning which was also reported in a study by Borah et al, Assam, India was evident in the current study.[14] Tea garden population is a vulnerable population, in terms of social development, rigid customs and beliefs and illiteracy. Nutritional status is closely associated with demographic, socio-economic, cultural practices and household food security. Therefore, there is a need to explore the scientific basis of traditional practices and to improve the knowledge and promote evidence-based practice.

Again, malnutrition among tea garden population in Assam is a major health issue. A study conducted in tea garden population in Assam in 2007 reported prevalence of underweight among children to be 59.9% and thinness among adults to be 69.9%.[18] As malnutrition is rampant in tea garden population, it often drives individuals to use mushrooms as cheap food source, despite risks of poisoning. Therefore, there is a need to promote healthy cooking practices as mushroom is rich in nutrient content and easily available during monsoon when other vegetables become costly.

Limitation of the study is that recall bias is expected as information was gathered using questionnaire.

CONCLUSION

Dissemination of scientific knowledge regarding identification of mushroom and cooking methods is essential to avoid preventable morbidities and mortality from mushroom poisoning. The surveillance system needs to be strengthened further for early detection of cases to avoid morbidity and mortality and also frontline workers of both health and nutrition sector can be capacitated to make the community aware.

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