

Utilization of snails as food and therapeutic agents by Baiga tribals of Baihar tehsil of Balaghat District, Madhya Pradesh, India

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Abstract

We explored the indigenous local knowledge associated with the use of snails by Baiga people in Baihar tehsil of Balaghat district in central India through interview with a semi-structured questionnaire. Results revealed that Baiga people widely accept snails of 3-5 morpho-groups belonging to Ampullariidae, and Viviparidae family as food. Besides, use of snail as therapeutic agents for ailments like body ache, joint pain, digestion, weakness of bones etc. were found common. Hand-picking of snails from the wild environments as well as agriculture field was the primary way of harvesting edible snails. We advocate the development of a farming system for the continuous supply of snails as a food resource, advancement of scientific investigation of functional properties of them, economic progress of the region and therefore the overall sustainability.

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Introduction

The term “Traditional Food” refers to all food items accepted within a particular culture and available from the surrounding local natural resources (Kuhnlein and Receveur, 1996). Like any conventional food system, the traditional food system also encompasses the entire range of sub-systems of production, aggregation, processing, distribution, consumption, and disposal (FAO, 2018). The choice of traditional foods is mainly driven by two factors *viz.* ecology and culture. Therefore, the changes in social and political structures resulting in relocation, migration, urbanization, industrialization, etc. can affect the ecology and the

environment of a traditional community and the indigenous local knowledge (ILK) associated with utilization of local ecological resources, which in turn affects the availability of the traditional food, its quantity, and quality.

A large amount of evidence has shown that the dietary shift of traditionally living people is neither planned nor directed (Kuhnlein and Receveur, 1996) and often results in negative consequences regarding a community’s health (Ghosh *et al.*, 2018). Globalization of food patterns, the influence of western diets, loss of biodiversity as well as lack of dietary diversity have added to the burden on human health of especially traditionally living peoples (Hu, 2008). Not only from the perspective of nutrition but

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also from the most pertinent issue of the current era, i.e. the sustainability point of view, we cannot find the present form of the conventional, i.e. “western” food system to be viable in terms of the environment. Keeping these points in mind, in order to address food, nutrition, and environmental security seriously, it ought to be our duty to include traditional food systems in our quest to explore and record hitherto underutilized resources; resources which regrettably were neglected and ever so often brushed off as irrelevant in the past. However, to succeed an amalgamation of modern food technology with traditional cultural methods is required.

Like many other traditional communities, the Baiga people of Central India are a technologically unsophisticated ethnic group with their own social norms, customs, beliefs, and practices. The natural resources they use for food and therapeutic purposes are obtained mainly from the forest ecosystem. The name ‘Baiga’ means *medicine man*. Baigas live predominantly in the forest-covered areas of Baigachak in Mandla, Dindori, and Balaghat districts and are highly dependent on agriculture and forest products. Baigas do not plough the land, because as they believe that land is their mother and must not be hurt. They have developed a unique agro-ecological way of cultivation known as ‘bewar’ or ‘dahiya’ in which the focus is the untilled land on which they grow several crops together. Besides staple crops like paddy, maize, black gram, pigeon pea (in *kharif*) and chickpea, lentil, green pea, mustard and wheat (in *rabi* season), kodo (*Paspalum scrobiculatum*), kutki (little millet *Panicum sumatrense*) and finger millet (*Eleusine coracana*) are the most popular food plants of the Baiga people. In addition to the foods

of plant origin, Baigas, along with other tribes, also use many animal species as food and for medicinal purposes (Bagde and Jain, 2015; 2017). One such example is the snails. Numerous species of molluscs have been accepted as food among many different communities around the globe and scientific reports have demonstrated the considerable nutritional value of edible snails as they are especially rich in protein and minerals of nutritional benefits, but contain only small amounts of fat (Ghosh *et al.* 2016; 2017).

However, there is very little information available regarding uses by the Baiga community of molluscs generally and snails in particular. As a result of the dietary transition in concert with many other underutilized foods (Mal, 2007), the consumption of snails by the Baiga has almost certainly decreased in recent years (although scientific data to back up this statement are unavailable). To provide some data that can be used in the future as a reference point in time (a ‘yardstick’ so-to speak) with regard to the various uses of snails by the Baiga community, we undertook the present study fully aware of its limitations. Nevertheless, the information we were able to obtain must be considered useful in attempts to promote snail meat as an alternative source of nutrition and should encourage further scientific investigations into the edible snails’ health-related functional properties, nutritive value and content of likely bioactive compounds.

Methods

Surveyed area and respondents

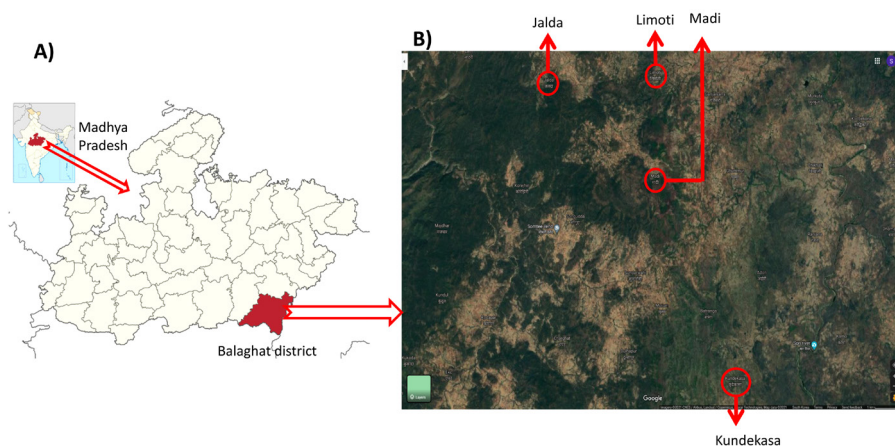


Fig. 1. Geographical location of the surveyed area. A. Location of Madhya Pradesh state in the India and Location of Balaghat district (in Madhya Pradesh) where Baihar tehsil situated. (Map obtained from www.wikipedia.org) B. Location of villages where surveys were conducted (satellite view was obtained from google map)

Table 1. Description of study area as per census of 2011 and demography of respondents of the survey (data on the description of villages have been obtained from <https://villageinfo.in/madhya-pradesh/balaghat/baihar.html> accessed on 16th June 2021)

	Madi	Jalda	Limoti	Kundekasa	Ronda	Baihar tehsil		
Description of study area (villages)								
Panchayat	Ghummur	Navhi	Adori	--	--	--	--	
Area (hectares)	711.86	2257.28	832.06	1033.7	--	--	--	
Population	377	664	669	425	2	284,352		
Household	86	135	135	86	1	63,910		
						Respondents	Total	%
Age group	<20	1	1	--	--	--	2	2.0
	21-40	20	26	5	6	1	58	57.4
	>41	7	16	10	4	4	41	40.6
Gender	F	13	12	4	3	1	33	32.7
	M	15	31	11	7	4	68	67.3
Livelihood	Small holder farming	20	16	9	2	2	49	48.5
	Labourer	8	26	5	8	3	50	49.5
	Others	--	1	1	--	--	2	2.0

To record the various uses of snails, we conducted extensive field surveys in five villages, namely Madi, Jalda, Limoti, Ronda and Kundakasa of Baihar tehsil of the Balaghat district of Madhya Pradesh (Fig. 1). Baihar tehsil has an area of 1,347 square kilometers area. It is bordered by the Mandla district in the north and northwest, Chhattishgarh state in the east, northeast, and southeast, Lanji tehsil in the south, Kirnapur tehsil in the southwest, and Paraswada tehsil in the west. According to the 2011 census the tehsil has a population of 284,352. The villages are mainly inhabited by members of the Baiga ethnic population.

We have randomly selected households and interviewed one individual per household. The surveys were carried out during the months of June and August 2019. Table 1 represents the demography of the respondents of the study. We have interviewed a total of 101 respondents (33 females and 68 males).

Interview

Kind persistence and expressing a positive attitude towards the consumption of lesser known foods of animal origin, including snails, by humans were necessary to create an environment of trust. The people were then interviewed with a semi-structured questionnaire which included fundamental queries in order to obtain information on the vernacular names of the edible snails,

seasonal availabilities, mode of preparation, assumed therapeutic value, cultural attributes related to snails, etc. We have recorded the respondents' ages, gender, profession, and educational level. The objectives of the survey were explained to all the respondents and their verbal consent to use their responses for academic purposes was obtained.

Data analysis

Data obtained through the interview were organized systematically and recorded in the Microsoft Excel spreadsheet for qualitative and quantitative analysis, where applicable.

Results

Figure 2 represents the responses on the consumption of snails among the respondents of the respective villages. The majority of the respondents stated that they consumed snails. For example, 96.4, 90.7, 93.0, 90.0 and 100% of the respective respondents from Madi, Jalda, Limoti, Kundekasa, and Ronda village said that snails represented a planned component of their diet. Overall, 93% reported to consume edible snails. Only 7% of respondents had apparently no habit to eat snail. No gender bias was found in connection with the consumption of snails. Although many

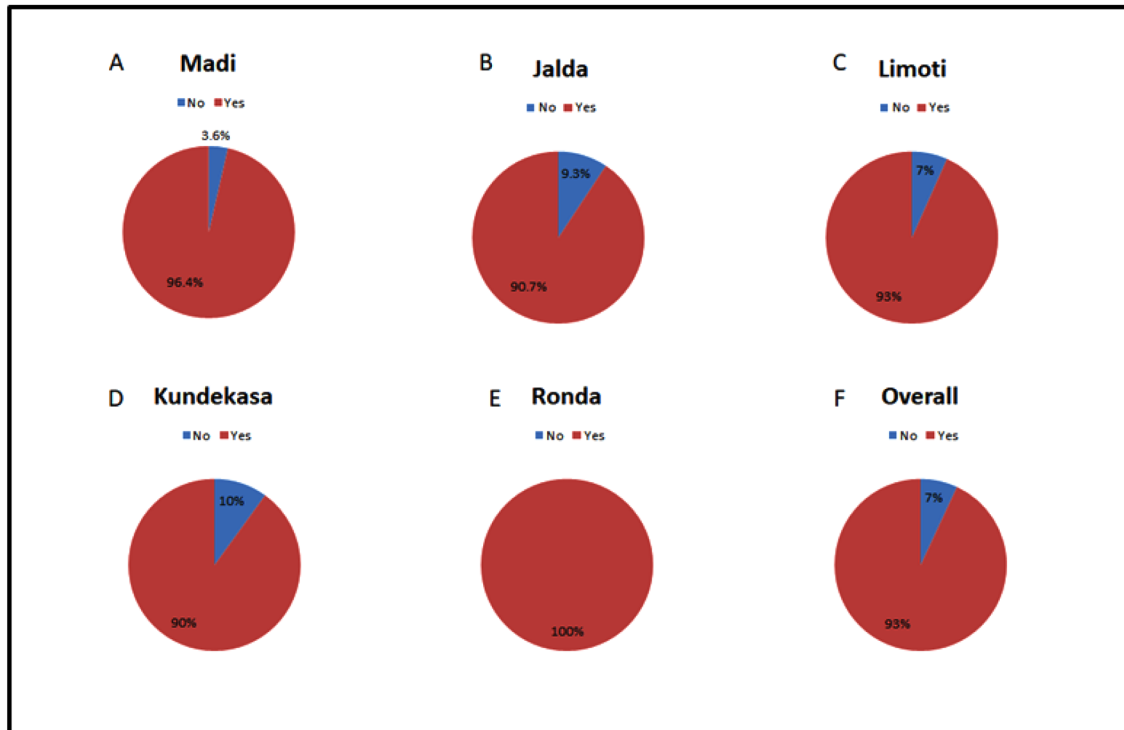


Fig. 2. Responses on the consumption of snails among the respondents of the respective villages A. Madi, B. Jalda, C. Limoti, D. Kundekasa, E. Ronda and F. represents the overall scenario of snail consumption response.

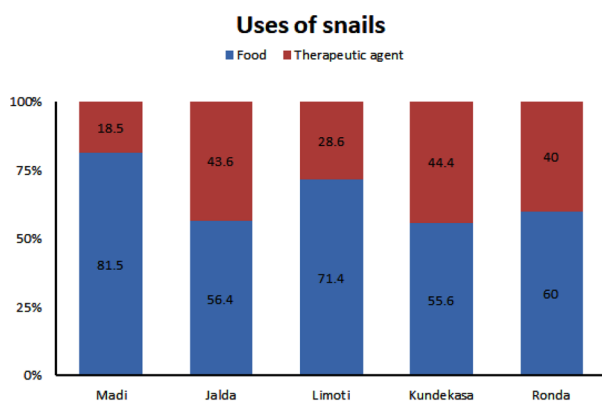


Fig. 3. Uses of snails in various purposes

respondents mentioned that they consumed several species of snails, they nevertheless use the same vernacular name for all of them, which is *ghonghikida*, but often *sankholi* for among other, non-tribal people, is used to describe snails. Although not identified up to species level, the edible snails were 3-5 morpho-groups belonging to Ampullariidae, and Viviparidae family. However, the molecular identification of the species remains as a task of near future.

Figure 3 represents the purposes that the snails are used for by the inhabitants of the surveyed five Baiga villages. Majority of the respondents (55.6 to 81.5%) reported that they consume edible snail as food while the others (18.5 to 44.4%) reported the therapeutic uses of edible snails. Respondents mentioned protein and energy as the primary trigger for their snail consumption. The use of snail as food includes 3 responses i.e. (a) as protein source, (b) as energy source, and (c) just as food. Although a few respondents from Madi (11.1%), and Jalda (5.1%) indicated that they consume snail as source of protein, respondents from Kundekasa (55.6%), and Ronda (60%) were found more to use snail as protein source.

Table 2 represents the therapeutic purposes mentioned by the respondents during the surveys. To increase bone strength was mentioned by the highest number of respondents; it was followed by body aches and digestion trouble. Members of other villages listed problems with blood circulation, weakness during pregnancy, improvement of eyesight, wound healing, beautification, and cardiac ailment. Apart from their consumption as food, snails also use in different ways for therapeutic and purposes. To cite, ash obtained from the burning of snail is mixed

Table 2. Use of snails for different therapeutic purposes

Therapeutic purposes	Number of respondents
Bone strength	10
Body ache/Joint pain, headache	8
Stomach ache and Digestion	7
Energy during pregnancy	3
Blood circulation	3
Beautification	3
Improvement of eye sight	2
Healthy heart	2
Wound healing	2

with mustard oil and used for body massage to treat the body ache. Snail slime is appreciated for improving the brightness of the skin. Besides the snails' uses as food and their uses in folk therapies, snails are also involved in some magico-religious practices.

Snails are generally harvested from wild environments, e.g. primarily agricultural and cultivated land, forest, water bodies, rivers, etc. Figure 4 shows the collection sites of the edible species and the agro-ecology of the area. However, according to the majority of the respondents, the time to collect them is curtailed by the seasonally occurring rainy season. With regard to preparing the edible snails as food, two main types were described. According to a few respondents, people first remove the hard shell and then mix the edible snail body with salt and pepper. Snails well mixed with spices are then wrapped with leaves of the Mahul (*Bauhinia vahlii*) and roasted over fuel wood. Another preparation process involves boiling the snails,

followed by the removal of the shell and cooking the soft flesh like it were a meat curry (often with onion, ginger, garlic and spices) to be consumed with rice or *roti*. A few respondents indicated that without proper cooking or frying the consumption of snails could lead to, what they termed as, "food poisoning".

Discussion

The use of snail as food and therapeutic purposes is common in several communities of the world including India (Meyer-Rochow 2017). Prabhakar and Roy (2009) documented ethnomedicinal uses of different molluscan species (including snails) i.e. *Bellamya bengalensis*, *Pila scutata*, *Lamellidens* sp. among the people of the northern part of Bihar. The indications mentioned were asthma, arthritis, joint pain and rheumatism, conjunctivitis, rickets, cardiac ailments, blood pressure, anaemia, and night blindness (Prabhakar and Roy, 2009). Bagde and Jain (2017) mentioned that eating cooked garden snails with cumin powder for five days would treat tuberculosis and ground shells of garden snails with honey was a good remedy against cold. Consumption of *Lamellidens* shell powder with honey, according to Prabhakar and Roy (2009), is used to treat giddiness and dehydration among the Baiga people. A similar preparation but with whole snail paste and honey is used to treat headache.

The high mineral (and especially the calcium) content of snails and their shells presumably helps strengthening bone tissue in human consumers. Increasing the dietary protein intake, moreover, enhances intestinal calcium absorption (Food and Nutrition Board, IOM, 2011) and the high protein content of edible snails could possibly assist in increasing calcium absorption. On the other hand, edible snails generally

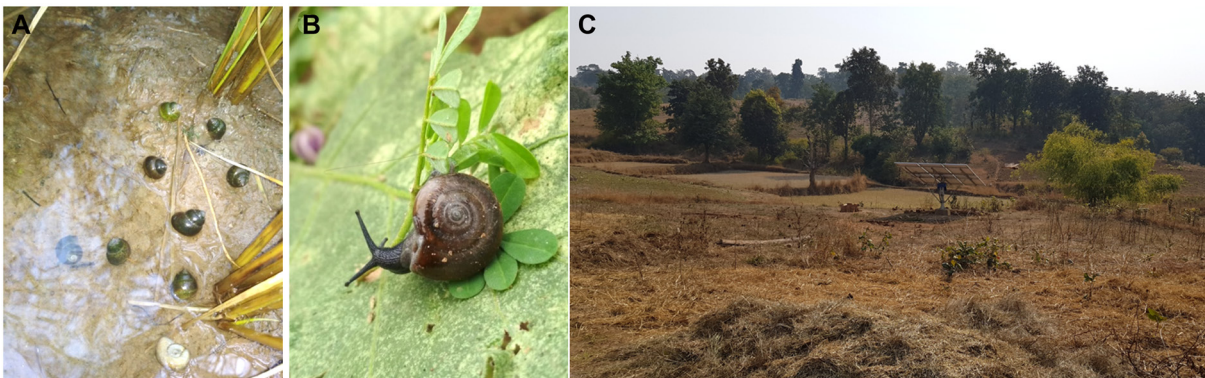


Fig. 4. A. Edible snail species in the agricultural field (Photo credit: Mr. Kisan Korram) B. Edible snail species from the forest (Photo credit: Mr. Kisan Korram) C. Agro-ecology of the region (Photo credit: Sampat Ghosh)

contain only low amounts of fat, but fat with low atherogenic and thrombogenic indices that are indicative of the snail fat's high nutritional quality and suggest that its consumption would therefore not elevate cardiac ailments.

The intake of protein by the Baiga people of Baihar has been estimated as 43 g per day (Chakma *et al.*, 2014), which is lower than the recommended dietary allowance (RDA) of 60 g per day (NIN, 2011). Similarly, the reported intake of 161 mg of calcium per day (Chakma *et al.*, 2014) was much lower than the RDA value of 600 mg per day (NIN 2011). Although a few years earlier in 2002, the intake profile of Baiga people of Baigachak in the Dindori district was comparatively better, accounting for protein and calcium intakes of 51.5 g and 447.5 mg, respectively, but even then the intake did not meet the recommended allowances (Chakma *et al.*, 2009). Pulses are the major source of dietary protein, although the consumption of meat and meat products has been increasing (Chakma *et al.*, 2009; 2014).

These earlier studies showed that the intakes for almost all the nutrients were lower than the respective RDA values and this worrisome situation exists not only for the Baiga but for all other tribes of the region, namely Abujhmaria, Bharia, Birhor, Hill Korwa, Kamar of Madhya Pradesh, and Chattishgarh (Chakma *et al.*, 2006). The prevalence of undernutrition is more common among the Baiga women, for 73.6% of the women were classified in the underweight category (Mehta and Chakravarty, 2020). The pattern found in connection with adolescent girls was very similar (Varoda *et al.*, 2020). In a recent qualitative study on the nutritional status of Baiga children of Balaghat district by Shirisha (2019), it could be shown that their dietary condition was also of concern. Therefore, the inclusion of edible snails could be beneficial for people of all ages and the population as a whole.

However, proper cooking is very important as it would ensure the safety of snail meat. Snails often function as intermediate hosts to a variety of parasites harmful to humans and animals (Fu and Meyer-Rochow, 2012). *Angiostrongylus* infections can occur in connection with the consumption of raw or undercooked snails (Lv *et al.*, 2009; Tsai *et al.*, 2001), because the primary route for the transmission of human angiostrongyliasis is through ingestion of undercooked, contaminated apple snails, land snails or slugs. Another issue, for which cooking would not be the

solution, is the contamination of edible snails, particularly from the agricultural field, with pesticides and heavy metals.

Conclusion

Despite our plea to increase snail consumption, uncontrolled harvesting from the wild cannot be advocated as it may threaten biodiversity and lead to unpredictable consequences. Instead, the development of a farming system should be encouraged. Besides the continuous supply, it ensures biodiversity conservation and also can be a sustainable way of income for people linked with the snail farm and the marketing of the product. Also, harvesting from wild areas can contain risks regarding hygiene and product health. To the best of our knowledge, snaileries have yet to be established in the surveyed area, which means that currently there is no continuous supply of edible snails. Many respondents mentioned that they could not eat snails, even if they would like to, because snails are available mainly in the monsoon season. Scarcity and lack of resource availability may play a crucial role in the decline of using this resource, but can be overcome by rearing edible snails under controlled conditions in snailery.

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Conflict of interest

The authors have no conflicts of interest to declare.

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