Scientific health benefits of *Namakeen Chai/Jya* (salted tea): A traditional tea beverage of Bhotiya tribal community in higher altitudes of Uttarakhand

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*Bhotiya* is a primitive tribal community in the high altitude hills of central Himalaya. The community is globally well known for its ethnic knowledge. They have the old tradition of preparing beverage "Namkeen chai" or "Jya" (salted tea) which is considered incredibly energetic and nutritive for health. The beverage is prepared by using the *Taxus baccata* L. bark, milk, *ghee*, and salt. It has a noteworthy role in depicting the socio-economic and cultural life of Bhotiya tribe of Uttarakhand. Biochemical analysis of the *Taxus baccata* bark was done to determine total phenolic content, total flavonoids and anti-oxidative properties. This paper deals with the documentation of procedure for preparing “Namkeen chai” by the Bhotiya tribal community and its scientific health benefits.

**Keywords:**  Antioxidants, Biochemical properties, *Bhotiya* tribe, Himalaya, *Taxus baccata* L.

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Hot beverages have been an integral part of Indian culture and societies. The most popular and famous hot beverage now a days is tea. The tea existed in India as a flora before it was discovered in Assam. It is called that the tea and its features are mentioned in the *Ramayana*¹ but it was not like *Camellia sinensis*. That was a herb brought from Himalaya for medical purpose². There is a historical record that in the 12th century *Ahom*, original people of Assam, used to drink tea in daily life. But that custom was not well acquainted with other people. According to Chinese legend, tea as a drink was first discovered in 2727 BC, when the Emperor Shen Nong was purifying water in the shelter of a tea tree, and several leaves blew into the pot. As a result, the leaf of superb fragrance, colour and taste made the emperor rejoice. Tea soon became a daily drink in Chinese culture³. Tea (*Camellia sinensis*) as a beverage was introduced in India by the British in the mid of the 19th century. Even in 19th century, tea was not well known among the Indian, because in initial phase they produced tea only for themselves or for marketing purpose. Tea became popular in India since 20th century⁴ and now most of the household takes tea as beverage. There are many traditional beverages preserved and conserved by the traditional people of India through their culture and practices. *Jya* or *Namkeen chai* (Salted tea) is one such traditional beverage of Bhotiya community of the higher hills of Uttarakhand. The Bhotiyas are one of the tribal or primitive traditional communities inhabiting the northern most border areas of the central Himalayas. They are semi-nomadic in nature and are considered as a crossbred probably between ‘Khsa’ and ‘Hunas’, i.e., Indo-Aryans and Mongoloids⁵. Tea has been an integral part of the *Bhotiya* culture as a daily drink since long. The cultural traits of Bhotiyas reflect close links with the Tibetans, acquired through generations of association through trade. They stand distinct from Tibetans with regard to their character and mode of economy. Both the culture are similar in socio-economic perspective⁶. The cultural faith, indigenous knowledge, and traditional culture of Bhotiya tribe are facing severe challenges due to acculturation and Sanskritization through migration of younger population to cities. A gap of cultural beliefs and practices of local inhabitants with those of the urban migrants is developing and as a result, the inheritance of traditional wisdom is fading at a faster rate. Hence, documentation of indigenous knowledge of traditional
tea preparation has become very important. The present paper is an attempt to document the preparation of traditional tea Jya (Namkeen Chai) and its health benefits.

**Methodology**

The study was carried out during 2015-2016 at Munsiyari development block, District Pithoragarh of Kumaun Himalaya. Under the Tribal Sub-Plan, the villages of Munsiyari were surveyed. A training program on improved hill agricultural practices for the tribal farmers was conducted during 2016 and 30 trainee tribal farmers were invited to come with their traditional practices in Hawalbagh experimental farm of ICAR-Vivekananda Krishi Anusandhan Sansthan, Almora so that the traditional practices could be documented in lab condition. Data about the preparation the tradition of namkeen chai were collected by personal interview, observation, and the key informant interview. A semi-structured interview schedule was prepared for the purpose of data collection. Tools of Participatory Rural Appraisal (PRA) were used to collect information about the socio-economic conditions and livelihood pattern. In our lab, farmers were told to prepare the Namkeen Chai or Jya. The weights or volume of each ingredient were measured with electrical weighing balance and volumetric flask. Afterwards, biochemical analysis of tea (procured from the market) and Namkeen Chai or Jya ingredients (bark of Taxus baccata) were done through the following methods:

**Determination of total phenolic content (TPC)**

The total phenolic compounds were determined by Folin-Ciocalteau reagent. To the freshly prepared aqueous extract (0.1 mL), 0.9 mL distilled water, 0.5 mL Folin-Ciocalteau reagent and 2.5 mL of sodium carbonate solution were added sequentially and the final solution was mixed thoroughly in vortex shaker. The reaction was kept for 40 min at 30 °C, after which the absorbance was read at 725 nm. TPC was calculated from standard calibration curve based on tannic acid 10-100 µg.

**Determination of total flavonoids**

Total flavonoids were estimated using the standard method with some modifications. To the freshly prepared aqueous extract (0.1 mL), 0.9 mL methanol, 2.5 mL of 1% vanillin reagent and 2.5 mL of 9M HCl was added. The solution was mixed thoroughly and an absorbance at 500 nm was recorded after 20 min of incubation at 30 °C. Total flavonoids content was calculated from the standard calibration curve based on catechins 10-100 mg.

**Determination of antioxidative properties**

Scavenging effects on 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2-azobis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS) free radicals by extract was measured following standard methods, respectively. DPPH and ABTS radical scavenging activity was expressed in per cent inhibition. The total antioxidant activity (TA) of the extract was estimated using the phospho-molybdenum method based on the reduction of Mo (VI) to Mo (V) by the sample analyte and subsequent formation of specific green phosphate/Mo (V) compounds. Total antioxidant activity was expressed as mg gallic acid equivalent/gram dry weight (mg GAE/g DW).

**Observations and discussion**

The Bhotiya community in Munsiyari has been traditionally preparing a special traditional tea known as “Namkeen Chai” or “Noon Chai” (salted tea). The ingredients for preparing “Namkeen chai” are Taxus bark, common salt, purified home made butter (Ghee) and sometimes they add dry walnut kernel powder (Juglans regia L.), black pepper (Piper nigrum L.) powder (Fig. 1). The villagers take the beverage with the murmur, roasted puffed rice (Oryza sativa L.) or sattoo, a flour made with a mixture of fried buckwheat (Fagopyrum esculentum) locally known as pinna. Apart from that wheat (Triticum aestivum L.) and millets flour are generally prepared.

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![Fig. 1 — Ingredients for preparation of namkeen chai: satoo (A), ghee (B), salt (C), milk (D), Taxus barks (E) & murmur (F)](image-url)
The namkeen chai preparing procedure has been documented. It is prepared as per the following procedure: the preparation begins with the boiling of water in a pan and mixing *Taxus baccata* bark (Fig. 2) in it for about 10-15 min. When the water takes brownish-red colour they pour it into wooden / bamboo blender (Locally known as *Dumma*) (Fig. 3) and add milk, common salt as per requirement, ghee as per the weather, black pepper powder as per taste and dry walnut powder (optional) (Table 1). The mixture is blended for at least 3 to 5 min by the loosely packed wooden piston in *Dumma*. Then the mixture is poured in wooden bowls or cups and served with sattoo or murmur (Fig. 4).

In preparation of “Namkeen Chai,” the quantity of ingredients differs according to family status and economy. Black pepper powder and common salt are used as per the taste of the people whereas ghee is used as per the weather. In summer time they reduce the quantity of ghee ranging from half to one teaspoon for serving four people where as during rains and winter they use 2-3 teaspoons. Ghee is considered as the source of energy and immunity which keeps the body warm and invigorates during severe winter and snowfall. Mixing walnut powder in “Namkeen Chai” depends upon the family prosperity and status of the guest at the house. The prosperous family generally uses half to one teaspoon of walnut powder for serving four people. Serving the tea to the guest is part of their gesture and hospitality. Sattoo is not served all the time with the tea but preferred in morning before going for grazing the lamb or to an

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>For 5 cup of Namkeen chai</th>
<th>Ingredients /cup</th>
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<tbody>
<tr>
<td>Bark (<em>Taxus baccata</em>)</td>
<td>3 g</td>
<td>0.60 g</td>
</tr>
<tr>
<td>Salt</td>
<td>10-20 g / as per taste</td>
<td>2-4 g / as per taste</td>
</tr>
<tr>
<td>Milk</td>
<td>0.63 L</td>
<td>0.12-0.15 L (1/2 cup)</td>
</tr>
<tr>
<td>Ghee</td>
<td>54 g</td>
<td>12 g</td>
</tr>
<tr>
<td>Puffed rice (<em>murmur</em>)</td>
<td>150 g</td>
<td>30 g</td>
</tr>
<tr>
<td>Roasted wheat/millet powder (<em>Sattu</em>)</td>
<td>70 g</td>
<td>70 g</td>
</tr>
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</table>

(Source: Authors measurement during experiments)
apple orchard. The inhabitants of the region usually take "Namkeen Chai" 5-7 times during winter and 3-4 times during summer. Children are also served the tea in lesser quantity while the elders are served in larger quantity.

The drink is in their tradition from long ago. When their ancestors had to migrate from high hills to low hills during the onset of winter season, they used to drink this beverage along the way. In several family festivals they used to serve a cup of Namkeen Chai or Jya to all the family members. These traditions still remain the same.

Biochemical characteristics of the beverage

The two beverage, i.e., tea (chai) and salted tea (namkeen chai) are different from each other. The tea or “chai” is the beverage prepared by using Camellia sinensis leaves where as the salted tea “namkeen chai” is prepared by Taxus baccata bark. To make a comparison between the antioxidant metabolites and activities, Taxus baccata bark and market tea the samples were analyzed in the Biochemistry lab.

Table 2 gives a comparison of the antioxidant metabolites (Total phenols and total flavonoids) and activities of the tea used for daily tea making with the Taxus baccata bark; one of the ingredients of Namkeen chai and it was found that the antioxidant metabolites and activities in Taxus baccata bark were less compared to the market tea but in Taxus baccata bark good amount of the total polyphenols (26.09 mg/100 mg) were found which is comparable to the total polyphenols content of market tea (29.69 mg/100 mg). The results are in agreement with the previous study. The higher amount of total phenols and flavonoids may be due to the increasing the amount of theaflavin and thearubigins during the fermentation and other methods during the preparation of marketable tea. From the table, it may be concluded that antioxidant metabolites, free radical scavenging activities against DPPH and ABTS and the total antioxidant activities of the Taxus baccata bark and the market tea are comparable (Table 2).

Reason behind preferences of “Namkeen Chai” by Bhotiya community

During observation and interaction, the people were asked about their preference for salt. Some of them replied “it is our tradition and is being followed from time immemorial by our ancestor”, but many of them replied it feels good especially after coming back to home from work. The Bhotiya community is very hard working. Their body exertion during grazing, fodder collection and other livelihood practices is more because of high altitude and difficult topography. Different works of literature explain about the preference of salt after heavy work or exercise. Exercise increases sweating rates, sweat contains about 0.3 % NaCl and sodium loss. The key electrolytes lost are sodium and chloride, at concentrations of about 15–80 mmol/L. A variety of other minerals, including potassium and magnesium, are also lost in small amounts. Several experimental protocols of exercise reliably show a sodium (Na) loss from sweating can exceed up to 10 g per day equivalent to 25 g of salt (NaCl) by perspiration in physically active men. Furthermore, during exercise, there is increase in the sympathetic release of renin, the enzyme that promotes angiotensin II, and the conditions of increased plasma angiotensin II and aldosterone are for the arousal of a potential sodium hunger.

Perceived benefits of “Namkeen Chai” by Bhotiya community

The local people prefer the traditional “Namkeen Chai” as (1) it helps in rejuvenation after heavy body exertion during work. It may be because the appetite for potential sodium hunger gets satisfied after taking the tea. (2). It provides energy, warmth and immunity to them during severe cold and winter due to the use of Ghee in tea preparation. Ghee is one of the essential dietary ingredients to improve Ojas. The term ‘Ojas’ is used to represent immunity. (3) Some of the younger people explained that the tea is good for diabetic patients. Naturally, when a diabetic person intakes salt instead of sugar it may help to reduce his/her sugar level in the body. Literature also says consumption of tea 4 or more times a day may lower the risk of type 2 diabetes. (4) “Namkeen Chai” is preferred by Bhotiya women as it helps in reducing stress. (5) During travels in the hill by motor vehicle or bus, they prefer the traditional tea to reduce nausea and headache caused due to altitude sickness.

<table>
<thead>
<tr>
<th>Table 2 — Comparison of the antioxidant metabolites and activities Taxus baccata bark and market tea</th>
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<tbody>
<tr>
<td>Biochemical characteristics</td>
</tr>
<tr>
<td>Total phenols (mg/100 mg)</td>
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<tr>
<td>Total flavonoids (mg/100 mg)</td>
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<tr>
<td>DPPH (% inhibition)</td>
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<tr>
<td>ABTS (% inhibition)</td>
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<td>Total antioxidant activity (mg GAE/g DW)</td>
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(Source: biochemical analysis at ICAR-VPKAS, Lab)
Conclusion
The traditional values, cultural faith and indigenous knowledge of the Bhotiyas are highly rich. The emergence of the indigenous knowledge system in this part of high altitudes of the Central Himalaya was due to the cold climatic conditions of the Bhotiya dominated areas. The way, the community have carved a niche in making the living on the surrounding natural resources for adaptation to the emerging circumstances in the region, is highly appreciative. Indigenously prepared tea “Namkeen Chai” is such a technical time tested knowledge which they are following from long ago and presently the health benefits are being explored with the advancement of science and technology. However, there is a shift in lifestyle due to the intervention of outside forces, which have been damaging the traditional and self sustaining systems in the name of development through the introduction of the outside made products. Presently the Taxus baccata tree species is in danger and urgently needs conservation. Hence, documentation of indigenous knowledge such as the traditional tea preparation and its scientific health benefits has become increasingly important.

Acknowledgement
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References
1 Anonymous, A Hindu religious epic in Sanskrit, believed written in the 3rd century, BC.
7 Singleton VL & Rossi JA, Colorimetry of total phenolics with phosphomolybdate-phosphotungstic acid reagents, Am J Enol Viticult, 16 (1965) 144-158.
17 Charak Muni, Charaka Samhita (25/40) explains about the ojas by taking ghee in 25th chapter of Sutrasthana of Charaka Samhita 40th sloka.