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Impact of Ginger Oleoresin on Leaf Tripe of *Sapumhicha*

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Abstract

The main objective of the study is to examine the impact of ginger on the leaf tripe of '*SapuMhicha*'. *SapuMhicha* is a special dish consisting of buffalo leaf tripe stuffed with bone marrow; it is boiled and fried. This dish is popular in Kathmandu Valley, especially in Newar community. The use of ginger makes this dish tasty and hygienic. It is indigenous knowledge and practice; with this, it can be preserved for a certain time period. Ginger is valued in nutritional importance as it contains fiber. Ginger contributes to minimizing Microbial growth that helps to stimulate the digestive system. The use of ginger in a tripe recipe makes low microbial. This study focuses on this indigenous knowledge of how ginger enhances leaf tripe to use for a long time. The impact of ginger on leaf tripe is tested using the AOAC direct moisture determination method on different days from 1 to 16 at normal room temperature. The result was that the impact of ginger on tripe leaf was positive i.e. low microbial growth was noticed. The result showed that ginger enhances the shelf-life of tripe at room temperature as it can be stored for a certain period of time and remain suitable for use.

Keywords: Ginger, indigenous food, leaf tripe (*Sapumhicha*), self-life, nutritional composition

Introduction

Nepal is rich in culture having their own food habits oriented from their ancestors since immemorial time. Indigenous foods are prepared using locally available raw materials through indigenous practice. Newari foods are famous in this regard. Newa cuisine is a subset of Nepalese cuisine which is the most celebrated food variety in the country (Vaidya et al., 1993). *SapuMhicha* is prepared of buffalo leaf tripe (like a leaf so it is

called leaf tripe) stuffed with bone marrow and it is called a tripe bag also. A tripe is the stomach tissue of a ruminant that is used as food. It is the shape of the leaf so-called leaf tripe. Shelf life is related to the freshness of foods, it is the time period for which an item remains usable and fit for consumption. *Sapumhicha* is prepared using leaf tripe and bone marrow. As bone marrow contains a high amount of fat, lipid oxidation remains a major concern for the shelf life of this product. The formation of oxidative products such as fatty acid hydroperoxides and secondary degradation products is responsible for off-flavors (Dandlen et al., 2010).

Sapumhicha is one of the nutritious Newari cuisines whose proper documentation is lacking. So, it is important to study such indigenous practice and promote it. Furthermore, rare works on the collection of important information on *Sapumhicha* regarding its nutritive value, quality, and shelf life evaluation are done. Indigenous food such as *Sapumhicha* is generally consumed within a few days at room temperature whereas for a week; the role of ginger oleoresin in preserving this dish for a certain time is observed.

Ginger oleoresin is an oily liquid containing oxy methyl phenols like shagoal, zingerone and gingerol, which are probably responsible for its antioxidant properties (Bode & Dong, 2004). It possesses anti-inflammatory and anti-oxidative properties due to the biological constituents of phenolic substances. Literature suggests that rumen meat also known as *tripe* is one of the main underutilized high proteinaceous by-products of buffaloes. To preserve its long life, the role of ginger is vital. In Nepali cuisines, gingers are used for taste and delicious, though their nutritional value makes food hygienic. Ginger holds up to 3% of an oil that causes the aroma of the flavor. It boosts the motility of the gastrointestinal tract and has analgesic, sedative, and antibacterial properties (Malu et al., 2009). Ginger rhizome(root) has a powerful proteolytic enzyme, which is used as a tenderizing agent for tough meat (Lee et al., 1986). The buffalo rumen meats were prepared tripe with 5.0% ginger extract and; all microbial counts were within the acceptable limits up to a storage period of 15 days at 25 ± 1 °C (Anandh et al. 2014).

Ginger (Zingiber officinale-scientific name) is widely used in many countries as a food condiment and as a medical herb and shows strong antimicrobial, antioxidant and various pharmacological effects due to its content of phenylpropanoid-derived compounds and gingerols. Ginger has been used as a spice for over 2000 years (Bartley & Jacobs, 2000). In the process of preparation of Sapumhica, ginger oleoresin is mixed with bone marrow. A weighed amount of bone marrow is filled through the open end (made manually) of the tripe and then finally tied with thread. Control *Sapumhicha* without the use of spice is also prepared. The shelf life of *Sapumhicha* (control, spiced) was evaluated at room temperature. Such a type of indigenous knowledge and practice needs to be further assessed and explored and this study will fill the gap by studying the impact of ginger on buffalo tripe.

Terminologies :

Leaf tripe:

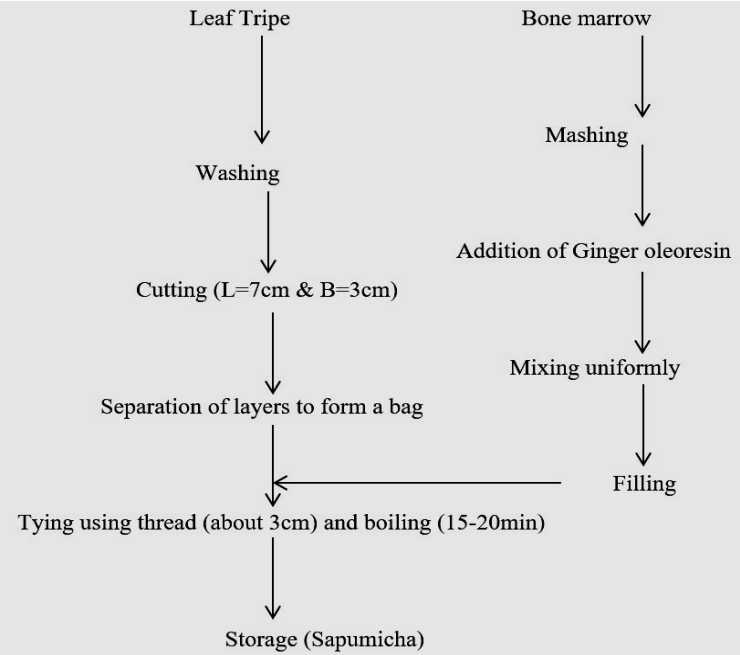
Tripe is one of the important underutilized high-proteinous by-products of buffaloes. Ruminant animals have multi-chambered stomachs, and tripe generally comes from either the rumen, reticulum, or omasum chambers. Tissues from the rumen are usually quite smooth, and are often known as "flat tripe." Before cooking, the tripe is thoroughly washed and it is often bleached. Because it is extremely tough and requires lengthy periods of slow cooking to tenderize it, tripe can be bought readymade. It provides Selenium which is an essential mineral that acts as an antioxidant to limit cell damage from harmful compounds called free radicals. It also helps with immune function, thyroid function, and the creation of DNA.

The traditional method of Sapumhicha making:

Bone marrow is stuffed in leaf tripe of buffalo. It is then tied with thread and steamed/boiled. It is made by frying into oil then a small amount of salt, chili powder, and cumin powder may be added for taste. It is served for special occasions. It is served especially to the son-in-law when he comes to his wife's house for the first time after their marriage. It is also prepared during various Newari *jatra*. The religious importance of

Sapumhicha was that it was served to show their respect towards their son-in-law because this delicacy is served to honor a man when he goes to the home of his wife's parents.

Figure 1: Pre-operation procedure of Sapumhicha



Objectives and Methodology

The general objective of this work is to study the effect of ginger oleoresin on the shelf life of *Sapumhicha*. This study was carried out to study the methanolic extract of ginger oleoresin on the shelf life of *Sapumhich*a by incorporating ginger oleoresin till 16 days of storage at room temperature. The quantitative method was adopted for the study, 7cm with 3 cm breadth of leaf tribe was taken, then filled with 5 gm of bone marrow tied with 3 cm thread and finally boiled for 15 to 20 minutes to prepare the study

experimental sample with ginger oleoresin. However, the control sample was left without ginger oleoresin. The laboratory tests were made to assess the impact of ginger on Sapu Micha food using the AOAC method. The objective of AOAC is to test food items that affect public health. AOAC (Association of Official Analytical Chemists) is used by government agencies for the analysis of foods, drugs, feeds, etc related to health, agriculture, and the environment (AOAC, 2005).

It is an experimental study with a control and sample group. The ginger oil was extracted added to bone marrow and boiled, then *Sapumicha*. It is stored from day 1 to day 16 and observed microorganism growth on day 1, day 6, day 12, and day 16, these microorganism growth number was observed with AOAC reference value. The macro-nutrient such as protein and fat content was compared with reference values. In the experiment, moisture is tested to examine the food deterioration ratio. Low moisture value represents the food shelf life longer. The experiment of the sample was done at room temperature. The result was recorded on day 1, day 6, day 12, and day 18. Moisture plays an important role in the growth of microorganisms. The moisture content in bone marrow is 7.54 gm per 100 gm.

During the experiment, the nutritional composition including moisture, protein, and fat was tested. Low moisture contributes to making tripe edible and longer lasting than the control sample group. Similarly, change in microbes was tested during the experiment making control and sample groups, and was compared to these two groups. Low microbes indicate that the leaf tripe is edible. However, ginger oleoresin was prepared in the laboratory.

In the preparation of ginger oleoresin, ginger was washed and sliced to the thickness of 3mm to facilitate drying. Ginger was dried at 85^0C for the first three hours and at 65^0C in a cabinet dryer with up to 10% moisture content. The dried ginger was ground. The obtained powder was vacuum-packed and stored at ambient temperature for extraction. The extraction of oleoresin from ginger was performed by the solvent extraction method by using ethanol as solvent. The obtained extract was evaporated in a water

bath shaker maintained at 60^0C to evaporate Ethanol. Obtained oleoresin was further dried in a hot air oven at 40^0C for 24 hours to obtain dry extract as described by (Hasan *et al*., 2012). The yield percentage of oleoresin was calculated using the following formula and then they were stored at 4^0C. The oleoresin obtained by the soxhlet extraction method (by using methanol as solvent) was Pale yellow to light amber. The oleoresin yield of ginger was 9.25±0.98%. The obtained yield was closed with 10.23% by (Tewtrakul*et* et al, 2007) and the yield depends on the quality of the crop.

Result and Discussion

This result is based on the experiment done between the control and sample groups. In the sample group, the effect of chemicals and microbes was observed. It was observed that the impact of ginger oleoresin was 0.8 percent on a leaf tripe recipe named *Sapumhicha*. The result found that there is a positive impact of ginger oleoresin on enhancing the shelf life of *Sapumhicha*. The results were examined based on chemical composition and changes in microbial growth.

Chemical composition of Sapumhich:

The moisture content of *Sapumhicha was* found to be 41.588±45.51 and it was noticed that the addition of oleoresin did not affect the moisture content, and fat content on these products. The protein content was found to be 3.644±9.05, It was noticed that the addition of ginger oleoresin (0.8%), was significant. The low moisture helps in preserving the foodstuff for a long.

Table 1: Chemical composition of Sapumhicha

Parameter	**Sapumhicha**
Moisture (gm)	41.588±45.51
Protein (gm)	3.644±9.05
Fat (gm)	44.210±43.358

Change in microbes during storage of *Sapumhicha:*

The microbiological analysis of the meat product is of great importance regarding consumers' health and the shelf life of the product. The coliform counts for all the values were recorded to be zero. Coliforms were observed in the violet-red bile agar VRBA plates which indicate a hygienic condition of the products. *Sapumhicha* incorporated with oleoresin showed the lowest yeast/mold count than the control. The obtained results were in agreement with Naveena (2001), who reported that there was no significant difference in total plate count, yeast, and mold count between control and ginger-treated spent hen meat samples.

The change in microbes during storage of *Sapumhicha*is shown in Table 2. Yeast and mold count did not show any significant difference among different days but the control had a non-significantly higher load as compared to the treated sample. On days 1, 4, 8and 12, yeast and mold count did not bring any significant variation. However, it always remained highest in all the storage intervals for the control sample. This indicates that natural preservatives used in the study could not inhibit yeast and mold successfully. These findings are in agreement with the results of Naveena (2001), who reported that there was no significant difference in total plate count, yeast, and mold count between control and ginger-treated spent hen meat samples.

Table 2: Microbial quality of Sapumhicha

	Day1	**Day4**	**Day8**	**Day 12**	**Day16**
Yeast and mold count(log cfu/g)					
S c	1.51±0.48		2.21±0.06	2.50±0.08	2.53±0.086
	2.56±0.09				
S o	1.51±0.47		1.15±0.37	1.25±0.07	1.29±0.075
	1.31±0.1				
Total plate count (logcfu/g)					
S c	1.6±0.02		3.5±0.12	6.1±0.5	6.3±0.5
	6.51±0.9				

S 0	1.6±0.5 3.35±0.21	2.1±0.1	2.5±0.8	2.85±0.191
Coliform count (log cfu/g)				
S c	ND ND	ND	ND	ND
S o	ND ND	ND	ND	ND

**The values in the table are the arithmetic mean of triplicates with their standard deviation (±).*
S c = Control sample, S o = Oleoresin treated sample. ND= Not detected

The overall mean for total plate counts was increased significantly with an increasing storage period. However, the overall treatment means of total plate count indicated that the counts were higher for the control and lower for the ginger extract-treated *Sapumhicha* sample, although the differences between treatments were non-significant. Similar results of increasing total plate count with increasing storage period were also reported by Naveena et al. (2001) for smoked spent hen meat treated with ginger extract. The coliform counts for control and oleoresin incorporated sample were recorded to be zero. The low coliform indicates that the food is edible.

Based on the above discussion and data, the following major points are noted:

- Ginger oleoresin incorporated *Sapumhicha* Sample did not show significant differences in terms of physiochemical properties when compared to the control.
- *Sapumhicha* sample with the incorporation of 0.8% ginger oleoresin was found mostly acceptable by consumers due to its antioxidant properties.
- The incorporation of ginger oleoresin improved the microbial quality of *Sapumhicha* sample.
- The coliform was not detected among the samples on different days.

Conclusion

In order to extract the ginger oleoresin ginger was washed, trimmed, sliced, and dried. The dried ginger was ground and it was then extracted in ethanol using a soxhlet apparatus. After the extraction, the solvent was evaporated, and thus obtained oleoresins were analyzed for antioxidant activity. *Sapumhicha* was prepared using leaf tripe and bone marrow of buffalo meat in which oleoresin was incorporated at 0.8% along with a control sample stored at Room temperature. In which addition of 0.8% oleoresin to *Sapumhicha* sample was selected for chemical *analysis* and microbial enumeration.

The comparative analysis of moisture content in *Sapumhicha* at room temperature was recorded. The incorporation of ginger oleoresin showed a decrease in viable counts of bacteria, yeast, and mold due to the presence of phenolic compounds. Similarly, the peroxide value of *Sapumhicha* sample also decreased with the addition of ginger oleoresin due to the antioxidant properties of ginger oleoresin. The Sample with 0.8% oleoresin was found to be the best among the three samples. This was due to better taste and flavor attributes. This research showed that the quality and the shelf life of the Sapumhicha sample can be increased by incorporating ginger oleoresin as ginger shows the preservative effect and controls the oxidation process during the storage period. Different formulations using various spices can be done for the preparation of *Sapumhicha*. The use of different packaging materials can be done to elongate the shelf life of products. Study of antimicrobial and antioxidant effects of combined spices can be studied. Storage stability on different storage temperatures can be studied. Modern filling methods can be used to fill bone barrow on leaf tripe. This technique can be used in many foodstuffs where there is a lack of refrigerators and this indigenous knowledge and practice should be known widely.

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