Determination of Alcoholic Content and Other Parameters of Local Alcoholic Beverage (Tella) at Different Stages in Gondar, Ethiopia

Berihu Tekluu, Department of Chemistry, Andhra University, Visakhapatnam, Andhra Pradesh, India
Getachew Gebremariam, Department of Chemistry, Gondar University, Gondar, Ethiopia
Tewodros Aregai, Department of Physics, Andhra University, Visakhapatnam, Andhra Pradesh, India
Harikrishna Ramaprasad Saripalli, Department of Biotechnology, College of Natural and Computational Sciences, Aksum University, Axum, Ethiopia, N E Africa

ABSTRACT

The objective of this study was to determine the alcoholic content and other parameter of traditionally prepared fresh and matured tella (from gesho, and mixture of barley and sorghum), the obtained results compared with that of the standards (Dashen beer). The samples under study were collected from vending house of Gondar town. The alcoholic content and other parameters of locally prepared beverages were determined by standard methods adapted from quality control department of Dashen brewery and finally the results compared with the standards. The experimental results make it show that, apparent extract (EA), alcoholic content, original extract (OE), bitterness, pH and CO₂ content of tella were found lower than the standard, apparent degree of freedom (ADF) the same as the standard but the color of tella much higher than the standard.

Key words: Alcoholic content, Brewery, Gondar and Tella.

INTRODUCTION

The first historical evidence of alcoholic beverages came from an archaeological discovery of Stone Age beer jugs from approximately 10,000 years ago. The early men probably used fermented beverage as a substitute for save water (free from pathogens). The term “fermentation” derives from the Latin work fevere meaning “to ferment.” Fermentation is an ancient process dating back thousands of years. It was the means by which bread, wine, beer, and cheese were made.

In Ethiopia, the traditional cereal based fermented beverages and foods are still prevailing in both rural and some urban communities. In this country, being one of African countries, different types of traditional alcoholic beverages such as Tella, Korefe, Shamit, katikala/ Araki and Borde, tej, Araki and Tej are produced and consumed. Tella, Katikala/ Araki and Tej are alcoholic, while the rest are considered to be low or non-alcoholic beverages.

Traditional alcohols are more preferable by the people living in rural and small towns of Ethiopia, and its popularity is on the rise even in the big towns and cities. Drinking locally prepared alcoholic drinks is common in celebrating different festivities.

Borde is widely consumed in the southern and western parts of Ethiopia by both adults and children. It is an important product because it is consumed as a low cost meal replacement and therefore provides a cheap food alternative for the low-income group of consumers.

Shamita is another traditional beverage of Ethiopia. It is the local beer made among the Gurage ethnic group. It is a widely consumed beverage in different regions of Ethiopia.

Tella is one of the Ethiopian traditional beverages, which is prepared from different ingredients. It is, by far, the most commonly consumed alcoholic beverage in Ethiopia. Based on the ethnic group or regional and socio economic difference, tella has different names as well as cereal ingredients; Amhara tella, Tigray siwa, Oromo tella, and GurageTella. Amhara tella and Tigray siwa have Gesho (Rhamnusprenoids), Gurage tella is delicately aromatized with a variety of spices, Oromo tella has no Gesho, and it is thick and sweet. Tella is usually made by women, but men also prepare it in monasteries and church compounds. It is made from different cereals. tef and corn are the most popular, but in some areas barely, millet or sorghum can be used.

METHOD OF PREPARATION OF TELLA IN GONDAR TOWN

In Gondar town, tella is prepared in such a way that the clay container (insera) is first cleaned using semiza and water several times and after that smoked with wood from grawa for about 20 minutes, in order to get it as clean as possible. Germinated barely (bikil) was prepared at home, are dried and milled. For making bikil, the grains are moistened in water and the moist grains are placed...
between fresh leaves, left to germinate for three days and after that dried. The ground gesho leaves are placed in clay container with water and left to ferment for two days and asharo (mixture of barely and sorghum) was added for forming coloring of tella and the mixture is kept covered overnight, after which more water is added and the container is kept sealed for 5-7 days. After finishing these days it is ready for consumption.

EXPERIMENTAL

Sample collection
Samples of tella, from different places of Gondar were considered in this study. Fresh tella prepared (from wheat, gesho, and mixture of barley and mashila). The vending house is select randomly. The samples were collected in screw-capped plastic bottles.

Determination of alcoholic content and other parameters of Tella
The pH of the tella was measured by dipping the electrode of a digital pH meter (METTLER TOLEDO) to the sample. The determination of ethanol level and other parameters of tella, involve measurement of specific gravity. The excess carbon dioxide was removed by filtration to 1000ml conical flask at a temperature of 15 to 20 °C. While closed by hand until gases no longer escape from the samples was shaking. Immediately 100gm (±0.05) of sample was weighted into distilling flask and then 50ml of distill water was added. Initially containing 5ml of distilled water receiving cylinder was placed and distilled to 90ml of extract. The content of the receiver was made into 100gm (±0.05) with distilled water and the specific gravity was measured. The residue in the distillation flask was cooled to about 22°C and the specific gravity of the degassed sample was measured and calculated AC, EA, OE, ER, RDF and ADF. Tella was degassed without loss of foam and 10ml was taken, step by step 1ml of 3M HCl and 20ml of isooctane was added with magnetic stirrer was stirred for 15min on a low speed to avoid fobbing. The spectrophotometer was adjusted and the bitterness of the sample was measured. 250 ml of tella was taken and 20ml of sodium hydroxide was added. From this sample 10ml of was taken into 50ml of round bottom flask and added a few drop of sulfuric acid. 25ml Ba(OH) 2 was placed into another 50ml round bottom flask. The two flasks and the outlet of the air pump with hoses were connected and finally measured the carbon dioxide content of the sample. The color of tella was determined by taken100ml of sample and filtered through filter paper and discarded the first 25ml of the filtrate; the left sample was poured into the cell and placed the cell in the comparator (3000color comparator, lovibond) and was record the most exact match with the samples.

RESULT

Alcoholic Content and Other Parameters of Tella
Three samples of the local fresh tella were taken and their alcoholic content was found as 3.04% (v/v) but in the second and third stages it was increased to the values of 3.35 and 3.75% (v/v) respectively as indicated in table 1 below.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameters</th>
<th>Results</th>
<th>Dashen beer (Standard)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>first round</td>
<td>Second round</td>
</tr>
<tr>
<td>1.</td>
<td>Apparent extract (°p)</td>
<td>1.6</td>
<td>1.004</td>
</tr>
<tr>
<td>2.</td>
<td>Alcohol content (% v/v)</td>
<td>3.04</td>
<td>3.35</td>
</tr>
<tr>
<td>3.</td>
<td>Real extract (°p)</td>
<td>2.75</td>
<td>2.23</td>
</tr>
<tr>
<td>4.</td>
<td>Original extract (°p)</td>
<td>7.50</td>
<td>7.48</td>
</tr>
<tr>
<td>5.</td>
<td>Apparent degree of fermentation (%)</td>
<td>78.67</td>
<td>86.35</td>
</tr>
<tr>
<td>6.</td>
<td>Real degree of fermentation (%)</td>
<td>64.20</td>
<td>71.0</td>
</tr>
<tr>
<td>7.</td>
<td>Specific gravity</td>
<td>1.0056</td>
<td>1.0045</td>
</tr>
<tr>
<td>8.</td>
<td>pH</td>
<td>4.67</td>
<td>3.87</td>
</tr>
<tr>
<td>9.</td>
<td>Color (EBC)</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>10.</td>
<td>CO₂ content (%)</td>
<td>0.24</td>
<td>0.0404</td>
</tr>
<tr>
<td>11.</td>
<td>Bitterness</td>
<td>9.78</td>
<td>8.56</td>
</tr>
</tbody>
</table>

In this study the increase in the alcoholic content of the sample when it is kept for a longer period of time was due to the increase in the population of the organisms namely Saccharomyces cerevisiae and Lactobacillus species which produce yeasts that enhance the fermentation process and decreases the amounts of reducing sugar and total carbohydrate. According to the standard of European brewery convention (EBC) a good quality of industrial brewery have a range from 4.5 to 5.3% (v/v) ethanol content. In the year 1991, Sahle and Gashe,
reported that a good quality of tella consists the final ethanol content is in the range of 2-8% (v/v). In comparison, the alcoholic content of traditional beverages is almost similar to that of industrially produced brewery. Fite et al. had reported 3.81% (v/v) and Gizaw also reported that 6.36% (v/v) as a mean ethanol level of the sample of Tella. The difference in alcoholic content of traditional alcoholic beverages is due to the difference in way of preparation as well as fermentation. Moreover, conditions such as temperature, aeration, and strains of the microorganisms obviously affect the level of alcohols. In comparison the result of this study with the above report, the ethanol content of this study below the result of reported by Gizaw, but it is similar to the reported by Fite et al., Sahle and Gashe reported that a good quality of tella consists the final ethanol content is in the range of 2-8% (v/v). So in this case the results obtained in our study are within the range. The pH value of the sample was measured at different stages and the result showed that, the acidity has increased when it is kept for a longer time. According to most researchers assessment the pH value of good quality of ranges from 4 to 5 and particularly Gizaw, reported 4.51. In our study even though the pH value at first stage lies within in the reported stages the acidity has increased in the next stages due to the production of acetic acid by the microorganisms. In this study it was also found that the OE, bitterness and carbon dioxide content to be below the standard. However the color of the sample was found to be much higher than the standard. But the ADF of the sample was found within the range of the standard. The comparison of the results of the alcoholic content and other parameters of tella with the standard at different stages is shown in fig 1 below.

![Comparison of alcoholic content and other parameters of tella with standards at different stages](image)

CONCLUSION

From the result of this research, it is possible to say that when the sample of tella kept for a long period of time, it increases degree of fermentation and minimize the remaining unfermented compounds; as a result, the alcoholic (ethanol) content increases. Determination of the alcoholic content and other parameters of the first round tella was almost the same as the standard while the second and the third round were less than the standard. In most parameters the result shows that if the sample of tella kept for longer time, bitterness and shelf life decreases from time to time.

REFERENCES


