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Determination of Alcoholic Content and Other Parameters of Locally Prepared Alcoholic Beverages (*Korefe and Tej*) at Different Stages in Gondar Town

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ABSTRACT

The object of this study was to determine the alcoholic content and other parameters of traditionally prepared fresh Korefe from wheat, barley and Gesho and fresh Tej from honey and leaves of Gesho and its result was compared with the standard value. In addition to this the study was concerned to investigate the effect of keeping longer time on the amounts of alcoholic content and other parameters of these beverages. In this study Dashen beer is taken as a standard for both samples.

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1. Introduction

The first historical evidence of alcoholic beverages came from an archaeological discovery of Stone Age beer jugs from approximately 10,000 years ago¹. The early men probably used fermented beverages as a substitute for save water (free from pathogens)². Alcoholic drinks consist primarily of water, alcohol and varies amount of sugars and carbohydrates (residual sugar and starch left after fermentation)³. Alcohol in traditional beverages serves as source of calories valuable to the calorie-deficient villager. The primitive beverages provide not only

calories but also vitamins B, due to residues of the substrates, the fermenting yeasts and other microorganisms⁴. In Ethiopia (Africa), the traditional cereal based fermented beverages and foods are still prevailing in both rural and some urban communities. In this country, different types of traditional alcoholic beverages such as *Tella*, *Korefe*, *Shamit*, *katikala/Araki*, *Bordeand Tej*⁶⁻⁸ are produced and consumed. *Tella* and *Tej* have more alcoholic content, while the rest have low contents or non-alcoholic beverages in comparison to *Tella* and *Tej*⁹. Traditionally prepared alcohols are more preferable for people living in the rural and small towns of Ethiopia, and its popularity is on the rise even in the big towns and cities. It is associated with celebration, and

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drinking, in all cultures, which is an essential element of festivity⁷. In Ethiopia, traditional alcohol drinks can be divided into three main groups. The first group is *Tella* and *Tej*, dubbed “the good ones” and perceived as harmless social drinks. *Tella* is usually made by women, but men also prepare it in monasteries and church compounds. It is almost never sold in bars but is the beverage of choice for family occasions and Christian religious celebrations. It is very popular and highly valued as its production requires considerable skill and patience. *Tej* is a typical Ethiopian honey wine or mead. It was reserved for the upper classes in the past; it is now widespread among all social groups, drinks on secular holidays, at weddings, served in bars as well as small cafes across the country. The second group consists of the “local beers,” collectively referred to as *Borde* and *Korefe*. *Borde* is a typical beverage mostly used in the Southwestern part of Ethiopia; it is considered as drinks for the lower classes, and it is prepared by women from fermented Maize, Sorghum, Barley, or a mixture of the three. *Borde* can be very broad in reliability and when necessary substitute meals (example, during long walking trips in the country side). *Korefe* is a common drink for *Begemder*, and prepared by women from fermented Sorghum or Barley. The third group is the local *Araki* or *Katikala*, a home-distilled drink. This beverage is more expensive than beer and is popularly viewed as very strong and challenging to the users.

2. Method of preparation of *Korefe* and *Tej* in Gondar town

Korefe is the name of the local beer made in *Begemder* (Gondar area) Province among the *Koumant* ethnic group. Dehusked barley is left in water overnight, and after that toasted and milled. It is mixed with water and dried *Gesho* leaves and fermented in a clay container for 2-3 days. When the beverage is needed, a small quantity of the dried mixture is taken, more water is added and after a day's fermentation the beverage is ready for consumption.

Tej (*honey wine*) is prepared from honey, water and leaves of *Gesho*. Sometimes people prepared from mixture of honey and sugar for commercial purposes. In cases where sugar is used as part of the substrate, natural food coloring is added so that the beverage attains a yellow color similar to that made from honey. It was also added different concoctions such as barks or roots of some plants or secrete herbal ingredients to improve flavor or potency and to attract customers. Due to concoction, adulteration practices and possibly some other reasons, producers usually are not willing to tell about additives used and their composition. During the preparation of '*Tej*', the fermentation (in pot) is seasoned by smoking over smouldering *Gesho* stems and olive wood. One part of honey mixed with 2 to 5 (v/v) parts of water is placed in the pot, covered with a cloth for 2 to 3 days and fermented after which wax and top scum is removed. Some part of the most is boiled with washed and peeled *Gesho* and put back to the fermenting must. The pot is covered and fermented continuously for another 5 days in warmer weathers, or for 15-20 days, in colder places. The mixture is stirred daily and finally filtered through cloth to remove the sediments and *Gesho*. Fermentation of *Tej*, like other traditionally fermented alcoholic beverages, relies on the microorganisms present in the substrates, fermentation vats or equipment.

3. Experimental

3.1. Sample collection

In this study, the samples of *Korefe* and *Tej* were collected from different places of Gondar. Fresh *Korefe* was prepared from wheat, barley and *Gesho* whereas fresh *Tej* was prepared from honey and leaves of *Gesho*. The vending house was selected randomly. The samples were collected in screw-capped plastic bottles.

3.2. Determination of alcoholic content and other parameters of *Korefe* and *Tej*

The pH of the *Korefe* and *Tej* was measured by dipping the electrode of a digital pH meter to the samples. The determination of ethanol level and other parameters of *Korefe* and *Tej* were measured to the specific gravity. The excess amount of carbon dioxide was removed by filtration to 1000 ml 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 100 gm (± 0.05) of the sample was weighed into distilling flask and then, 50 ml of distilled water was added. 5 ml of distilled water initially containing receiving cylinder was placed and distilled to 90 ml of extract. The content of the receiver was made into 100 gm (± 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. *Korefe* and *Tej* were degassed without loss of foam and it was taken 10 ml step by step and 1ml of (3M HCl) and 20 ml of iso-octane was added with magnetic stirrer and stirred for 15 min in a low speed to avoid fobbing. The spectrophotometer was adjusted and the bitterness of the sample was measured. 250 ml of *Korefe* and *Tej* were taken and 20 ml of sodium hydroxide was added. From this sample, 10 ml of the mixture was taken into 50 ml of round bottom flask and it was added a few drops of sulfuric acid. 25 ml of Ba(OH)₂ was placed into another 50 ml 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 *Tej* and *Korefe* was determined by taking 100 ml of sample and filtered through filter paper and discarded the first 25ml of the filtrate; the left sample was poured into the cell and the cell was placed in the comparator (3000 color comparator, lovibond) and the most exact match was recorded with the samples.

4. Result and Discussion

4.1. Alcoholic Content and Other Parameters of *Korefe*

Three samples of local *Korefe* were taken and their alcoholic content of the samples were found within the range of the standard values and its value has increased in the next stages due to enhanced fermentation by the same organisms which produces the yeasts that are responsible for the fermentation process as shown in table 1.

As clearly shown from table 1 the pH of the samples was measured at different stages. The result showed that from the first stage to the third stage, acidity is continuously increased due to production of excess acetic acid. Original extract of the samples were shown that its value was found within the range of the standard. Even though the EA of the sample is higher in the first stage, it is decreased in the next stage. The ADF of the samples at first stage is lower than the standard but in the

second and third stages the same as the standard value. The bitterness and CO₂ content of the sample was decreased when measured from first to third stages and in all cases they are below the standard. Color of the sample was measured at different stages and has the same value in all stages. According to the EBC, the color of the standard values ranges from 7.5 to 8.5 but it is slightly lower compared to the standard and the reported one by the different scholars. The above results indicated that the sample has flatness (shelf life is low).

Table 1 alcoholic content and other parameters of Korefe

s.n	Parameters	Results			
		first round	Second round	Third round	Dashen (Standard)
1	Apparent extract (°p)	3.72	1.35	1.24	2-2.5
2	Alcohol content (% v/v)	4.08	5.40	5.44	4.5-5.3
3	Real extract (°p)	5.57	3.30	3.18	-
4	Original extract (°p)	11.67	11.56	11.50	11.5-12
5	Apparent degree of fermentation (%)	64.61	88.32	89.48	≥79
6	Real degree of fermentation (%)	53.80	72.7	73.6	-
7	Specific gravity	1.0145	1.0052	1.0048	-
8	pH	4.05	3.42	3.29	4-4.5
9	Color (EBC)	7.0	7.0	7.0	7.5-8.5
10	CO ₂ content (%)	0.04	0.02	0.01	0.47-0.53
11	Bitterness	4.24	3.94	3.45	17-20

4.2. Alcoholic Content and Other Parameters of Tej

Alcoholic content of *Tej* was determined using the same procedure as *Tella* and *Korefe*. The ethanol content was increased from first to third stages and in all cases it was found higher than the standard as shown in table 2 below.

Table 2 alcoholic content and other parameters of Tej

S.N	Parameters	Results			
		First round	Second round	Third round	Standard (dashen)
1	Apparent extract (°p)	4.32	1.22	0.74	2-2.5
2	Alcohol content (% v/v)	7.48	8.99	9.13	4.5-5.3
3	Real extract (°p)	6.84	4.29	4.05	-
4	Original extract (°p)	17.76	17.59	17.58	11.5-12
5	Apparent degree of fermentation (%)	76.58	93.06	95.79	≥79
6	Real degree of fermentation (%)	63.70	77.30	78.60	-
7	Specific gravity	1.017	1.0047	1.0033	-
8	pH	3.67	3.62	3.60	4-4.5
9	Color (EBC)	4.50	5.5	5.5	7.5-8.5
10	CO ₂ content (%)	0.31	0.2	0.045	0.47-0.53
11	Bitterness	6.19	10.51	11.50	17-20

The alcoholic content of *Tej* was reported by different scholars such as Bahiruet *et al.*,¹⁰ found between 6.98% and 10.9%, Desta,¹¹ 6.07%, Vogel and Gobezie⁶, 7% to 14% and Gizaw⁷, 11.47% (v/v). As compared to

the previous reports, it has similar results with Bahiruet *et al.*,¹⁰ Vogel and Gobezie⁶ whereas compared to Gizaw⁷, and Desta¹¹ result, it is below or less. The pH value of the sample was measured at different stages. Its acidity was increased from first to third stages. As reported by Gizaw⁷, the pH of *Tej* was given 3.77 and similar results was also reported by Bekele, *et al.*,¹² and the *Tej* sample was collected from Addis Ababa and the pH value varied between 3.07 and 4.90. When compared to the previous result, it is similar to the reports have been conducted by Bekele, *et al.*,¹² and similar results have recorded, but below result is reported by Gizaw⁷, and it is also below the standard value. It is clearly stated that, *Tej* has OE ranged from 17.76 to 17.58°P. These values are almost similar with Belgium beverages, that ranges from 17.17 to 20.37°P Anita, V. *et al.*,¹³ but higher than the standard. The EA of the sample at the first stage was above the standard while it becomes lower than the standard in case of second and third stages. Even though the ADF of the sample at the first stage is lower than the standard, in the second and third stage is the same with the standard one. The bitterness, color and CO₂ content of the sample was decreased from first to third stages and in all cases they are below the standard.

5. Conclusion

From the result of this research, it is possible to say that when the sample of *Korefe* and *Tej* 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. Alcoholic content and other parameters of *Korefe* shows in all round was less than the standard. In most parameters the result shows that if the sample of *Korefe* kept for longer time, bitterness and shelf life decreases from time to time whereas the carbon dioxide content reached almost to zero. Though the result of *Tej* shows that the alcoholic content is much higher than the standard and when kept for longer time it shows significant difference in all parameters from the standard.

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