



Ethanol and Metallic Contents of Locally Brewed Alcohol in Plateau State, North Central Nigeria

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INTRODUCTION

Alcohol has been in existence for aeons of ages ago. Different regions and tribes globally have unique ways of preparing beverages and fermenting same. Alcohol is available in our environment in forms like Beer, Wine, Spirits, Palm wine, Burukutu, Pito, Ogogoro, and Guskolo (described by many as a concoction of unimaginable substances).^{1,2}

Plateau state is beautiful and described as the home of peace and tourism. Locally consumed alcohol here is mainly Burukutu, Pito, Palm wine, Moss, and Guskolo (though banned due to its lethal nature, still widely consumed). These drinks are consumed for many purposes like religious, cultural, leisure, and even marital occasions.³ They are all prepared differently. These all also have varying content of ethanol, zinc, iron, copper, acidity, and sugar.⁴

These contents all affect liver disease and health.⁵ A study done in 2020 at Jos, Nigeria on the metabolites in Native beverages showed about 83% of the metabolites were organic and so very acidic.⁶ This affects the liver in many ways.

Previous studies have been carried out on the contents of alcoholic beverages both in Nigeria and other parts of the world like the USA.⁷

The economic strength of people living on the plateau is still averagely below WHO recommended standard and so to a large extent affects the purchasing power of the populace. To this end, most locales can buy only the very affordable locally brewed alcohol (about 150 Naira {~ 0.38 dollars} per calabash).

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There are three senatorial zones in the state with a total of 17 local government areas (LGAs).⁸ The Northern and Southern zones have 6 LGAs each while the central zone has 5 LGAs.

This study aimed to determine the exact content of ethanol, Zinc, Copper, Iron acidity and sugar in these different drinks.

MATERIALS AND METHODS

Study area

Plateau state stands at about a height of altitudes ranging from 1,200 meters to 1,828 meters. It covers an area of about 26,899 square kilometres. There are about 3.5 people residing on the plateau according to the 2006 Census.⁹

Samples of locally brewed alcohol were collected at locations in the 3 geopolitical zones of the plateau on 3 separate days. The places visited were Plateau central (Kangvel and Yimtul in Pankshin LGA); Plateau North (Kwugia, in Jos south K-Vomin Jos-East LGA) and Plateau South (Tenzet in Shendam LGA). About 65mls of different types of Burukutu, Pito, Palmwine, and Guskolo (40 ml) were obtained and sent to the lab with

2 to 3 hours of collection for analysis. These locations were chosen because they were described by the locales as the 'happening spots' in those localities. In the lab, the percentage alcohol content was determined using a refractometer.

The samples (Burukutu and Pito) were also assayed for Zinc, Copper, and Iron using the Flame Atomic Absorption Spectrometry (FAAS) method. The contents of Zn, Cu, and Fe were recorded in mg/L.

Sugar content was determined using Brix Meter while the Titration method was used to obtain the percentage of acidity.

RESULTS

The mean volume of various calabashes measured was 65.0mls (ranged 62.5 to 70.3mls). For Guskolo, it was 40mls (ranged 39.0 to 41 mls). The contents are shown in table 1.

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Table 1: Content of locally brewed alcohol from Plateau State.

^Samples	Origin	Alcohol content (%)	Acidity (%)	Sugar (%)	Copper (mg/L)	Iron (mg/L)	Zinc (mg/L)
Palm wine A	Plateau North	8.0	0.72				
Palm wine B	Plateau Central	11.0	0.72				
Kass-Burkutu (Millet)	Plateau Central	9.0	0.072	2.90			
Naza-Burkutu (Guinea Corn)	Plateau Central	10.0	0.073	3.00			
Moss-Balwo (Maize)	Plateau Central	12.0	0.075	4.00	0.010	4.432	2.935
Kass Pito (Millet)	Plateau Central	9.5	0.044	3.00	0.019	6.366	3.339
Naza Pito (Guinea Corn)	Plateau Central	12.0	0.072	4.00			
Transparent Guskolo	Plateau North	29.0	0.001				
Coloured-Guskolo	Plateau North	30.0	0.001				
Coloured Gogoro	Plateau North	32.5	0.001				
Moss-Kass	Plateau North	8.0	0.066				
Burkutu (Guinea Corn)	Plateau North	8.0	0.036		0.021	3.780	2.731
Burkutu Mos Suwa (Guinea Corn)	Plateau South	7.0	0.043				
Burkutu Mos Kapa (Maize)	Plateau South	8.0	0.045				
Burkutu Mos Maar (Millet)	Plateau South	7.5	0.054				

Palm wine A and B are a notation for usual palm wine got from 2 different locations, Plateau North and Plateau Central respectively.

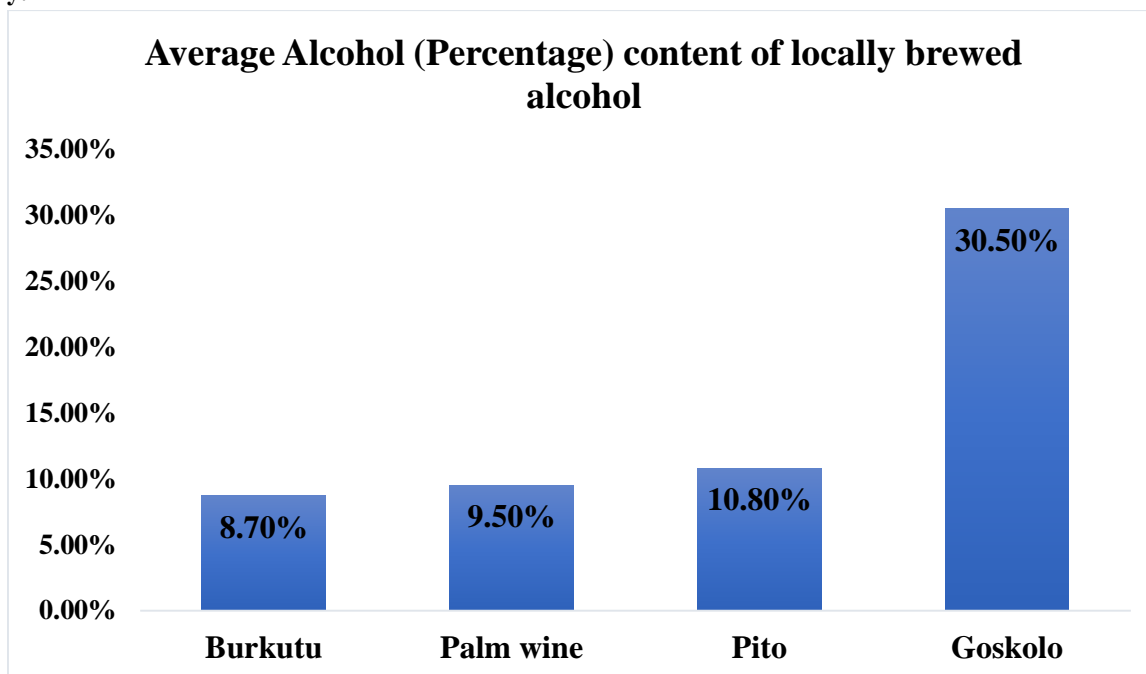


Figure 1: Bar charts showing the average alcohol (percentage alcohol) content of locally brewed alcohol.

DISCUSSION

The use of locally brewed alcohol has become increasingly popular in our environment. The contents assayed were alcohol, sugar, and acidity all in percentage (%); copper, iron,

and zinc in mg/L. These compositions showed trends that depict higher than initially seen levels, especially for alcohol content as the average percentage of alcohol was even higher than that seen in most beers and some spirits. In previous

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studies in 2014 by Iwegbue *et al.*¹⁰, the alcohol content of Burukutu and Pito in Southern Nigeria was between 3.0 to 6.0%. This is about half the percentages of Burukutu and pito in the index study (8.7% and 10.8% respectively). This difference may be due to methods of preparation that differ across cultural lines. Burukutu, one of the commonly consumed locally brewed alcohol among the participants was also a large part of the study by Okeke *et al.*¹¹ in JUTH about 20 years ago. But then, its content was not assayed and was just mentioned as the locally brewed alcohol used by participants.

In addition, the local gin, Goskolo which had an average of 30.5% of alcohol is less than the alcoholic content of its counterpart Ogogoro. Then the alcohol content of Ogogoro ranged between 40% to 60% in the same study by Iwegbue *et al.*¹⁰ in 2014.

Besides alcohol content, the sugar, zinc, and iron contents were higher than that recommended by the Nigerian Industrial Standard (NIS). NIS 217-2019 stipulates that flavoured and food drinks should have acidity $\leq 0.5\%$. NIS 378-2008 recommends that copper, zinc, and iron should all be ≤ 1.0 mg/L; the sugar should be $\leq 14.0\%$ in food drinks. Apart from copper, sugar, and acidity which fell within the required standards, the rest were all much higher. This is worrisome as many of our patients consuming locally brewed alcohol do take in a lot of alcohol, zinc, and iron (which is known to cause liver disease).¹² A study that looked at the contaminants of homemade alcohol across the globe found varying contents of mainly copper iron and zinc.¹³ Just like this study. But this had even much more

Furthermore, a study in Jos by Gazuwa *et al.*⁶ in 2020 on metabolites that could aggravate alcohol toxicity of Burukutu, Pito, and Goskolo showed the presence of mainly 6-Octadecanoic acid (38.50%), 9-Octadecanoic acid (39.40%), and 6-Octadecanoic acid (42.43%) respectively. These contents were assayed using Gas Chromatographic-Mass Spectrometer (GC-MS) technique.

This study, though conducted in Plateau State, is different from that by Gazuwa *et al.*² which was done with samples obtained only from the capital city Jos as against the 3 geopolitical zones of Plateau state in the index study. It also looked at metabolites generated during preparation and not alcohol content or metals like Zn, Fe, or Cu which the index study assayed.

An earlier study published in September 2014, surveyed metal in locally brewed beverages consumed in southern Nigeria. This was similar to the index study as it also assayed for Cu, Zn, and Fe. The average concentrations of the above metals were all lower than that in the 2014 study (Cu, Fe, and Zn were 0.0104mg/L, 4.86mg/L, 3.002mg/L respectively as against 0.09 mg/L to 0.6mg/L for Cu; 10.3mg/L for Fe in Burukutu; 3.86mg/L for Zn in Burukutu).¹⁰ This shows a need to regulate these metallic contents as both studies

showed that many of the metals were contained in this locally brewed alcohol in excessive quantity against the recommendation by the Standard organization of Nigeria (SON) 2007 and Nigerian Industrial Standard (NIS).

CONCLUSION

- Locally-brewed alcohol contains a higher percentage of alcohol than most available beers that were initially documented. Burukutu had 8.7%, palm wine 9.5%, Pito 10.8% and Goskolo 30.5% of ethanol. Burukutu and Pito also contain higher than standard recommended levels of Zinc and iron but have copper in the recommended quantity. Patients are usually advised to moderate alcohol consumption or even stop totally. This advice/counselling on alcohol consumption should be extended to people who also consume locally brewed alcohol like Burukutu, Pito, Palm wine, and Goskolo. This is because they all contain higher percentages of alcohol than beers.

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