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Assessment of the Quality of Local Gins in Bayelsa State : Determination of Methanol Content in Local Gins

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ABSTRACT

Methanol is a poisonous contaminant contained in alcoholic liquor including local gins produced and consumed by local people in Bayelsa State and other parts of Nigeria without quality control checks especially for methanol content. Samples of local gin were bought from six major gin-producing camps in Bayelsa State; Camp A, Amassoma; Camp B, Ekowe; Camp C, Peremabiri, Camp D, Ayama-ebeni, Camp E, Akede; and Camp F, Toru-ebeni. Local gins were bought from thirty hang out places; fifteen from Yenagoa city (labeled YEN 1 – YEN 15) and fifteen from Amassoma (labeled AMASSOMA 1 – 15), all in Bayelsa State. These samples were analyzed for methanol and ethanol by gas chromatography with mass spectrometric detection. The samples from the camps showed ethanol content that ranged from 35.4% - 60.2%; methanol, 0.02 % - 0.09%. Samples from hang out places in Amassoma showed ethanol content that ranged from 20.36% - 50.44%; methanol, 0.01% – 0.08%. Samples from Yenagoa hang out places showed ethanol content that ranged from 20.12% – 48.65%; methanol, 0.01% – 0.08%. The % methanol in all samples were within the EU recommended permissible levels; 40% ethanol: 0.4% methanol. Therefore, local gins produced and consumed in Bayelsa State are safe for consumption in respect of methanol content.

Keywords : GC, MS, Local Gin, Methanol, Ethanol

I. INTRODUCTION

Alcohol has been associated with both positive and negative effects, with alcoholics and alcohol consumers believing that it helps to reduce stress, improve mood, enhance friendship, prevent some gastro-intestinal diseases and improve the body's general well-being[1].

The negative effects associated with consumption include the health risks like cancer, stroke, diabetes, dementia and liver diseases [2]; some of these effects could be acute or chronic depending whether the tolerable limit is exceeded in a single or cumulative consumption respectively.

Methanol is found naturally in fruit juice and distilled spirits such as whiskey, wine, beer and gin. Methanol also forms when fruits and vegetables are physically prepared for consumption by slicing,

chopping, pureeing and juicing. The production of free methanol in all these instances is the result of reaction of pectin; a principal component of plant cell walls and the middle lamella between them. Pectin is hetero-polysacharride contained in the primary cell walls of terrestrial plants. It is produced commercially as a white to light brown powder, mainly extracted from citrus fruits. Pectin will breakdown to methanol when the plant cell walls and middle lamellae are disrupted, and this can happen through physical process of food preparation. Methanol is also produced when pectin is digested after eating fruits and vegetables.

Methanol similar to ethanol but the end product after it is digested by the body is formaldehyde, which is poisonous. This is responsible for "alcohol poisoning". Methanol poisoning leading to blindness has been known to occur on consuming even small amounts.

The initial symptoms of methanol poisoning may be delayed for as long as 12 to 18 hours as the body metabolizes methanol to formate, and can consist of weakness, dizziness, headache, nausea vomiting and blurred vision. In severe cases of accidental or reckless ingestion, methanol poisoning may lead to permanent blindness or death.

For instance, cases of death following alcohol consumption in Benue State-Nigeria have been reported[3]. Also, some villagers in Agulu, Anaocha LGA of Anambra State-Nigeria have confirmed an unpublished report of the death of two middle-aged men following consumption of locally brewed alcohol in June 2012.

While naturally occurring methanol can be 0.7% in alcoholic beverages with 40% ethanol, current European Union regulations limits the naturally occurring methanol to 0.4% in liquor with 40% ethanol [4].

Traditional alcoholic beverages have been consumed in Nigeria and other West African communities for centuries, and western commercial spirits, beers and wines have been available since pre-colonial days [5].

In many African countries, traditionally brewed alcoholic beverages are usually poorly monitored for strength and quality. This is because they are produced in remote villages and homes and are often out of reach of local governments and regulatory bodies.

Besides anecdotal evidence and limited results, there is no systematic information about the quality of unbranded alcoholic beverages in Nigeria by independent researchers available [6].

Five major contaminants contained in alcoholic liquor (local or branded) include methanol, benzene, toluene, ethyl acetate and ethyl carbamate. Some researchers who found interest in determining some contaminants in alcoholic liquor are given in Table 1.

Table 1. Review Citation

S/N	Research work	Reference
1	Quantitation of alcohols in orange wine fermented by four strains of yeast	[7]
2	Analysis of Some Contaminants Commonly Found in Alcoholic Beverages	[8]
3	Characterization of palm sap	[9]
4	Studied GC Determination of Acetone, Acetaldehyde, Ethanol, and Methanol in Biological Matrices and Cell Culture	[10]
5	Characterisation of palm wine yeast isolates	[11]
6	Studied Rapid Quantitative Analysis of Ethanol and	[12]

	Prediction of Methanol Content in Traditional Fruit Brandies from Romania, using FTIR Spectroscopy	
7	Spectroscopic Determination of Methanol Content in Alcoholic Drinks	[13]

Against the backdrop of instances of methanol poisoning, this present work was aimed at determining methanol (a contaminant) in local and branded alcoholic liquor.

II. METHODS AND MATERIAL

GC (Shimadzu Lab Solution) equipped with a QP5050A MSD

Sampling

Samples of local gin were bought from six major gin-producing camps in Bayelsa State; Camp A, Amassoma; Camp B, Ekowe; Camp C, Peremabiri, Camp D, Ayama-ebeni, Camp E, Akede; and Camp F, Toru-ebeni. Local gins were also bought from thirty hang out places; fifteen from Yenagoa city (labeled YEN 1 – YEN 15) and fifteen from Amassoma (labeled AMASSOMA 1 – 15), all in Bayelsa State.

Gas chromatographic analysis.

Samples were analyzed for methanol and ethanol using gas chromatograph with mass spectrometric detection. Chromatographic analyses were done on 5% Carbowax on CarboBlack B column with the following analysis conditions: 0.5 µL injection volume; oven temperature, 65 ^{o}C (hold at 5 minutes) to 150 ^{o}C at 4^{o}C/ min; injector/detector temperature, 200 ^{o}C to 205^{o}C; carrier gas, nitrogen; column flow rate, 20 mL/min.

III.RESULTS AND DISCUSSION

The results of analyses of the gins from the different gin-producing camps are shown in Table 2. It results show some variability in % of methanol and ethanol; 35.4 % to 60.2% for methanol content and 0.02% to 0.09%. Despite these variabilities, the methanol contents in the different gins are within EU recommened values, that is, 40% ethanol:0.4% methanol.

Table 2. *Composition (methanol and ethanol) of local gins from production camps*

Sample	% ethanol determined	%methanol determined
Camp A	52.8	0.07
Camp B	60.2	0.09
Camp C	35.4	0.02
Camp D	42.9	0.03
Camp E	45.65	0.04
Camp F	55.43	0.06

EU permissible value; 40%:0.4% respectively of ethanol and methanol [4]

The determination of methanol and ethanol in the local gins bought from the fifteen hang out places in Yenagoa are shown in Table 3. The ethanol content in % ranged from 20.12% – 48.65% and that of methanol content ranging from 0.01% – 0.08%. Again, some variabilities of composition are observed. However,comparison of these values with EU recommended values (40%:0.4% respectively of ethanol and methanol) indicate that all values are within the recommended values.

Table 3. Composition (methanol and ethanol) of local gins from hand out places

Sample	% ethanol determined	%methanol determined
YEN 1	42.86	0.07
YEN 2	42.67	0.05
YEN 3	36.43	0.06
YEN 4	37.39	0.04
YEN 5	41.39	0.05
YEN 6	42.83	0.04
YEN 7	20.12	0.01
YEN 8	41.01	0.08
YEN 9	30.25	0.05
YEN 10	48.65	0.01
YEN 11	23.58	0.04
YEN 12	25.87	0.04
YEN 13	40.36	0.01
YEN 14	43.47	0.02
YEN 15	44.36	0.01

EU permissible value; 40%:0.4% respectively of ethanol and methanol [4]

The methanol and ethanol contents of the local gins from Amassoma hang out places were determined. The ethanol content in % ranged from 20.36% - 50.44% and methanol content in % ranged from 0.01% – 0.08%. despite the sample –to –sample variability, methanol content of the different samples are within the EU recommended values, that is, 40% ethanol to 0.4% methanol.

Table 4. Composition (methanol and ethanol) of local gins from hand out places

	% ethanol determined	%methanol determined
AMASSOMA 1	50.44	0.08
AMASSOMA 2	20.36	0.01
AMASSOMA 3	23.21	0.02
AMASSOMA 4	42.47	0.02
AMASSOMA 5	43.33	0.07
AMASSOMA 6	30.25	0.03
AMASSOMA 7	35.36	0.01
AMASSOMA 8	23.14	0.06
AMASSOMA 9	25.36	0.04
AMASSOMA 10	37.14	0.01
AMASSOMA 11	45.01	0.01
AMASSOMA 12	42.65	0.02
AMASSOMA 13	38.62	0.03
AMASSOMA 14	37.25	0.01
AMASSOMA 15	23.45	0.01

EU permissible value; 40%:0.4% respectively of ethanol and methanol [4]

IV.CONCLUSION

The % methanol in local gins produced and consumed in Bayelsa State are within the EU recommended limit and are therefore safe for consumption in respect of the methanol content. However, as a precaution measures, Federal regulatory agencies such as NAFDAC should be encouraged to carry out routine analysis on commonly sold local gins in markets in order to prevent sale of adulterated or contaminated drinks.

V. REFERENCES

[1]. Fekadu A, Alem A, Hanlon C. "Alcohol and Drug Abuse in Ethiopia: Past, Present and Future", African J. Drug Alcohol Stud. Volume, 6, pp. 39-53, 2007.

[2]. Rehm J, Sempos CT, Trevisan M. "Average volume of alcohol consumption, patterns of drinking and risks of coronary heart disease-a

review", J. Cardiovasc. Risk, volume, 10, pp. 15 - 20, 2004.

[3]. Dimah A, Gire JT. "The health and economic consequences of alcohol use in central Nigeria", African J. Drug Alcohol Stud. volume, 2, pp. 44-53, 2004

[4]. EU Official Journal of the European Union on the definition, description, presentation, labelling and the protection of geographical indications ofspirit drinks and repealing Council Regulation (EEC) No 1576/89, 2008

[5]. Obot IS. "Nigeria: alcohol and society today", SSA volume, 102, pp. 519 - 522, 2007

[6]. Ejim OS, Brands B, Rehm J, Lachenmeier DW. "Composition of Surrogate Alcohol from South-Eastern Nigeria", African J. Drug Alcohol Stud., volume, 6, pp. 64-74, 2007

[7]. Okunowo, Wahab Oluwanisola and Osuntoki, Akinniyi Adediran. "Quantitation of alcohols in orange wine fermented by four strains of yeast",African J Biochemistry Research Volume 1, issue 6, pp. 95-100, 2007

[8]. Osobamiro T. "Analysis of Some Contaminants Commonly Found in Alcoholic Beverages" American-Eurasian J Scientific Research, volume 8, issue 1, pp. 53-56, 2013

[9]. Naknean P, Meenune M, Roudaut G. "Characterization of palm sap harvested in Songkhla Province Southern Thailand", Int. Food Res. J. volume, 17, pp. 977 - 986, 2010

[10]. Helena Pontes, Paula Guedes de Pinho, Susana Casal, Helena Carmo, Agostinho Santos,, Teresa Magalhes, Fernando Remio, Flix Carvalho, Maria Lourdes Bastos. "GC Determination of Acetone, Acetaldehyde, Ethanol, and Methanol in Biological Matrices and Cell Culture", J Chromatographic Science, volume 47, pp. 272 - 278, 2009

[11]. Nwachukwu I, Ibekwe V, Nwabueze R, Anyanwu B. "Characterization of palm wine yeast isolates for industrial utilization" Afr. J. Biotechnol. Volume, 5, issue, 9, pp.1725 - 1728, 2008

[12]. Teodora Emilia COLDEA, Carmen SOCACIU, Florinela FETEA, Floricuta RANGA, Raluca Maria POP, and Mira FLOREA. "Rapid Quantitative Analysis of Ethanol and Prediction of Methanol Content in Traditional Fruit Brandies from Romania, using FTIR Spectroscopy and Chemometrics" Not Bot Horti Agrobo, volume 41, issue, 1, pp. 143 - 149, 2013

[13]. Vaskova H. "Spectroscopic Determination of Methanol Content in Alcoholic Drinks" Internatonal J Biology and Biomedical Engineering, volume, 8, pp.27 - 34, 2014

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