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Methanol Content In Local Gins Consumed In some selected communities In Southern Part of Nigeria

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Abstract

Incidence of methanol contamination of traditionally fermented beverages is increasing globally resulting in the death of several persons. The work is an investigation of concentration of methanol in samples of local gin "ogogoro" from 24 communities in Anambra, Delta and Ogun States of Nigeria. Based on the findings, it was deduced that the samples got from five communities; Nise , Anambra Sate (0.1005mg/L), Awba-Ofemilli, Anambra State (11.37mg/L), Olomoro , Delta Sate (2.4715mg/L), Okwagbe, Delta State (1.9483mg?), Sapele, Delta State (0.200mg/L contained methanol in concentration above the permissible Standard set by European Union and National Agency for Food, Drug Administration and Control (NAFDAC)(0.05mg/L). Other samples from other communities contain methanol in concentration below the permissible level by NAFDAC. So these samples from five communities are not safe for consumption as continuous consumption can be very fatal for consumers.

Key Words: Alcohol, Methanol, Local Gin, Gas Chromatograph, Concentration

Introduction

Alcohol can be described as a psychoactive drug which has extensive applications in both industries and households. The net effect of alcohol consumption on health is detrimental, with an estimated 3.8% of all global deaths and 4.6% of global disability-adjusted life-years attributable to alcohol[1]. Alcohol can be produced locally or industrially in large or small quantities based on the available resources across the world[2]. Local gin also called Ogogoro or kai-kai in Nigeria, Akpetehie in Ghana is a West African alcoholic drink usually brewed locally, and also an essential part of numerous religious and social ceremonies[3]. Methanol, also known as wood alcohol, is the smallest member of aliphatic alcohol, it is ubiquitously present in the human body and it also appears in human blood and breath[4,5], a potent toxicant in humans, occurs naturally at a low level in most alcoholic beverages without causing harm. However, illicit drinks made from "industrial methylated spirits" [5% (v/v) methanol:95% (v/v) ethanol] can cause severe and even fatal illness[6]. Methanol poisoning is an uncommon but an extremely hazardous intoxication[7]. From 1902 to 2012, 912 methanol poisoning-related articles were published and indexed in the Scopus database. After screening, nineteen documents were found not related to methanol poisoning[8]. Several cases of methanol poisoning have been reported in India and elsewhere. For instance in 2008, over 180 persons were killed in Bangalore and in 2009, 138 were killed in Gujarat, India. In 2015, 27 persons died in India after consuming toxic ethanol. In 2009, 25 persons died in Indonesia after consuming fermented palm wine containing methanol. About 130 persons died in some India villages in 2011 linked to poisonous ethanol consumption[9]. Toxic alcohol poisonings with methanol or ethylene glycol have the potential to cause significant morbidity and mortality. In 2009, poison centers in the United States (US) received 8139 reports of toxic alcohol ingestion of which 29 died, and 259 had a major outcome (defined as life threatening, or resulting in significant residual

disability[10]. Series of poisoning caused by high level of methanol in alcoholic beverages appeared in the Czech Republic at the beginning of September 2012. The race against time begun as the Czech Republic started to solve problems with harmful alcohol, increasing numbers of poisoned people and the losses in lives. According to the Ministry of Health one hundred and twenty seven people were poisoned, forty two of them died after consuming dangerous alcohol since last autumn up to the April 2013[11]. On March 7, 2013 several patients were admitted to different hospitals with a variety of clinical features (gastrointestinal symptoms, dizziness, dyspnoea, and visual disturbances) within Tripoli, Libya (estimated population 1.1 million). The following days, many more patients were hospitalized at Tripoli Medical Centre (TMC), Tripoli Central Hospital, Alkhadra Hospital, Istiqlal Hospital in Tajoura, Zahra Hospital, and Zawia Hospital. They had reportedly been drinking Bokha (often distilled from figs). Acute methanol poisoning was suspected based on clinical presentation only, as no methanol or formate analyses were available[12]. Croitoru et al[4] , reported high methanol content in some alcoholic beverages in Romania in 2013. Morten et al[12], also reported a large outbreak which occurred in central Kenya. The majority of patients were reported to have been drinking toxic alcohol on May 4, 2014. On 14 April 2015, the disease surveillance and notification officer of the Irele local government area (LGA) of Ondo State, Nigeria was notified of a cluster of sudden deaths involving five persons at Irele and Ayadi communities in the LGA. Following this, an investigating team from the State was at the communities on the 15 April and confirmed a total of 12 deaths and two cases with histories of sudden onset of headache, blurring of vision, loss of sight, restlessness, seizure and deaths, features suggestive of acute methanol poisoning[13]. In may 2015, there was an outbreak of methanol poisoning in Rivers State Nigeria which involved 84 persons in five Local Government Areas. The poisoning was as a result ingestion of adulterated local gins[14]. In one of the Vietnam's worst deadly alcohol poisoning cases, seven people were killed while many others were hospitalized in the mountainous province of Lai Chau in 2017 after drinking alcohol bought from a commune on the Chinese border. Initial tests show that the methanol content in the alcohol consumed by the victims was thousands of times higher than permitted, according to the news agency[15]. More than 45 fatalities on account of drinking of illicit alcohol were reported in Karachi in the month of September 2011. This is not an isolated incidence of such nature. In the past many such and even more grave cases of mortalities have been reported from the city as well as other parts of the country because of the illicit alcohol poisoning[16] .

Method

Twenty four composite samples(ten samples were collected from each community and mixed- this will give us the average value for each community) of local gin were collected from twenty four communities in Anambra, Delta and Ogun states in Southern part of Nigeria. The Communities were Awka, Nise, Achalla, Okija, Arogbo, Sapele, Amansea, Nibo, Okpuno, Ezinato, Amanuke, Amawbia, Awba ofemili, Mbaukwu, Ebenebe, Isu Aniocha, Umuawulu, Mgbakwu, Ugbene, Isiagu, Olomoro, Okwagbe, Ugbenu and Urum. 10ml of each sample was extracted with 50ml dichloromethane, The dichloromethane layer was separated from aqueous layer. The dichloromethane layer extracts were concentrated . The gas chromatograph Buck 910 was checked to ensure that the following parameters were properly set; Detector time (250^0C), Injector Temperature (22^0C), Integrator chart speed (2cm/min). The temperature of the oven was set to 180^0C to allow the gas chromatograph to warm up. 1 microlitre of the sample was injected through the automatic injector with a syringe into the column to analyze. The GC analysis was completed in 30mins for each sample.

Results

Table1: The Methanol Concentrations in the Samples of Local Gin (mg/L)

Sample	Methanol Concentration (mg/L)
EZN	0.0197
ISG	0.0169
OKN	0.0159
AWK	0.0145
MBK	0.001
NIB	0.0193
UMW	0.0193
AMB	0.0344
NIS	0.1050
ACH	0.0196
AMS	0.0241
AMK	0.0205
AWF	11.3746
EBN	0.0203
ISA	0.0160
MGB	0.0207
UGE	0.0184
UGU	0.0135
URM	0.0208
OKJ	0.0364
ARG	0.0353
OLM	2.4715
OKB	1.9483
SAP	0.2000

CODES: EZN- Ezinato, ISG-Isiagu, OKN-Okpuno, AWK-Awka, MBK-Mbaukwu, NIB-Nibo, UMW-Umuawulu, AMB- Amawbia, NIS-Nise, ACH-Achalla, AMS-Amansea, AMK-Amanuke, AWF- Awba -Ofemili, EBN-Ebenebe, ISA-Isu Aniocha, MGB-Mgbakwu, UGE-Ugbene, UGU- Ugbenu, URM-Urum, OKJ-Okija, ARG-Arogbo, OLM- Olomoro, OKB-Okwagbe, SAP-Sapele

DISCUSSIONS

The result of the analysis showed that samples of the local gin collected from nineteen communities contained methanol in concentrations below NAFDAC permissible level(0.05mg/L). Samples collected from five communities- Nise(0.1050mg/L), Sapele(0.2000mg/L), Okwagbe(1.9483mg/L), Olomoro(2.4715mg/L) and Awba Ofemili (11.3746mg/L) contained methanol in concentration above National Agency for Food, Drug Administration and Control (NAFDAC) permissible level . This also exceeds the Maximum levels of methanol in the range from 0.05 g/liter for gin according to the EU [17] and 0.4g of methanol per litre of ethanol according to Australia New Zealand Food Standards Code – Standard 1.4.1 - Contaminants and Natural Toxicants[18]. The sample collected from Awba Ofemili contained very high concentration of methanol in concentration far greater than the maximum permissible level set by European Union and National Agency for Food, Drug Administration and Control. The high concentration methanol in five communities could be as a result of unhygienic and uncontrolled fermentation, insufficient distillation methods and poor adulteration of the local gin where fraudulent and greedy merchants

mix methanol with gin to cut cost of production. The presence of methanol in all the samples resulted during the fermentation process as methanol is also a byproduct of fermentation of Palm sap. Enzymatic treatment of pectin is occasionally used to increase ethanol yield, but this concurrently increases the methanol content[19,20]. It is also worrisome, considering that the community with the highest concentration of methanol is one of the communities known to have high consumption of local gins.

Conclusion

Methanol is a very poisonous substance especially when it is converted to formaldehyde and formic acid on ingestion[21]. Therefore there should be little or no amount of methanol in the local gins produced. From the result obtained, it could be concluded that some poor people in Nigeria could be at risk of methanol poisoning as these local gins are the most popular drinks among the poor populace in Nigeria

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