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EVALUATION OF SELECTED CARDIO-INFLAMMATORY AND OXIDATIVE STRESS BIOMARKERS AMONG ADDICTED CONSUMERS OF OGOGORO (LOCAL GIN) IN AMASSOMA, BAYELSA STATE, NIGERIA

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ABSTRACT: Ogogoro is a local gin that is consumed indiscriminately in Nigeria and some West African countries. The aim of this study was to investigate selected cardio-inflammatory and oxidative stress biomarkers among ogogoro addicts in Amassoma, Bayelsa State, Nigeria. Three milliliters of blood specimens were withdrawn from each of the 34 participants that constituted this study, with 17 being experimental group and the other 17 being control group, these specimens were dispensed into lithium heparin anti-coagulated bottles respectively. Each of these specimen was spun at 1,500 revolution / minute with the obtained plasma used for the measurement of cardiac biomarkers: troponin-1 (immune-turbidimetry) method and creatinekinase-MB (immune-inhibition) method, inflammatory biomarkers: C-reactive protein (latex turbidimetry) method and interleukin 6 (ELISA) method, oxidative stress biomarkers: malondialdehyde (thiobarbituric acid) method, glutathione peroxidase (immune-inhibitory) method and 8-hydroxy-2-deoxyguanosine (ELISA) method. The data obtained from these measurements were analyzed using SPSS version 23.0 (SPSS Inc., Chicago, IL, USA; version 23.0) while student "t" test was used in comparing the values of the biomarkers between the control and experimental groups with $p < 0.05$ considered significant. The results revealed significant mean levels elevations in C-reactive protein ($p = 0.02$), interleukin-6 ($p = 0.02$), and malondialdehyde ($p = 0.01$) in the experimental group as compared with that of the control group while there was significant decrease in glutathione peroxidase ($p = 0.01$) in the experimental group compared with that of the control group. However, the other measured biomarkers: troponin-1 ($p = 0.58$), creatinekinase-MB (0.62) and 8-hydroxy-2-deoxyguanosine ($p = 0.67$) revealed no significant alterations in the experimental group when compared with the control group. In conclusion, ogogoro addicts are at the risk of inflammatory and oxidative stress disorders, hence it is recommended that addicts of this local gin should check these biomarkers regularly in any reputable health facility

Keywords: Ogogoro (local gin) addicts, cardio-inflammatory, oxidative stress, evaluation, Amassoma, Bayelsa State, Nigeria

1.0 INTRODUCTION

Ogogoro is a local gin which is otherwise known by the following nicknames in Nigeria baba-erin, oyinbogo, wuru, push me I push you, akpeteshie, sapele water, ufoiob, kparaga, kaikai, robirobi (Egoro *et al.,* 2018). This local gin which is very common in West Africa is distilled from the fermented sap of Raphia palm (*Raphia hookeri*), coconut palm (*Cocus-nucifera*) and oil palm (*Elaeis*

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guinesis) (Heap, 2008). In this distillation process, the trunk of this Raphia palm is incised following collection of the juice in a gourd which is tied to the trunk of the tree, this collection lasts for 1-2 days. After this, the sap is extracted and boiled which forms steam that condenses with the subsequent collection for consumption (Simon, 2008).

The production of this local gin which is known to contain ethanol as its active ingredient within a range of 30% to 60% is mainly done by brewers that are not professionals, which presumably is responsible for its adverse effects on humans, thus causing intoxication and neurotoxicity if consumed in large volume (Brust, 2010). Besides ethanol, it has been revealed via using gas chromatography that iso-propanol, n-butanol and n-propanol are found to be present in this local gin (Kennedy, 2021)

Research has shown that additives are usually being added to the content of this local gin by the brewers during the process of its production which is largely responsible for its toxicity (Patel *et al.,* 2015). The small scale brewing of this local gin serves as a major source of income for many household in Nigeria. Owing to the percentage of illiterates that are into the production of this local gin in Nigeria and their focus on expected profit with total disregard of the health implications, the toxicological constituents are therefore not properly monitored, thus brewed in an unhealthy state (Idonije *et al.,* 2012).

The indiscriminate consumption of this local gin was reported in 2002 to be responsible for 41% of fatal accidents on the road and systemic pro-inflammatory changes via routes of the intestines due to the alteration of intestinal microbiota composition which subsequently initiates and triggers the release of lipopolysaccharide (dysbiosis) as well as degradation of the integrity of the intestinal mucosal barrier (Egoro *et al.,* 2018) which in turn leads to its elevation in the portal vein, liver and systemic circulation. This situation eventually leads to the liver immune cells releasing reactive oxygen species, chemokines, leukokrienes and cytokines which triggers tissue inflammation that may influence the pathology of organs (Patel *et al.*, 2015)

In far back 2007, Osaretin and Chioma reported on the presumable danger of the chronic consumption of this local gin on human health which in turn attracted attention from the public. However, irrespective of their report, this gin is still consumed indiscriminately in different social and religious ceremonies, particularly in Nigeria. In view of this, we the authors decided to embark on this study which aimed to investigate the evaluation of selected cardio-inflammatory and oxidative stress biomarkers among addicted consumers of ogogoro (local gin) in Amassoma, Bayelsa State, Nigeria

2.0 METHODS

2.1 Experimental Scope

The research was carried out in Amassoma, situated in Bayelsa State, Nigeria. Amassoma is situated in Latitude 4° 55' 36.30" North and Longitude 6° 16' 3.50" East. The area is 1,698 km², with a population of 352,285 according to the 2006 census (Daupamo, 2018 and Egoro, *et al.,* 2024)

2.2 Ethical Approval

This research was carried out in compliance with the principle of Helsinki declaration of 1975 as revised in 2008 (WMA, 2008) after obtaining oral informed consent from the leaders of the community as well as all the participants who were pre-informed and told the reason why their blood specimens were needed for this research.

2.3 Study Population

The study population was made up of 34 apparently healthy participants with seventeen of them being ogogoro (local gin) addicts for 2 years (experimental group) while the remaining 17 are non-consumers of ogogoro (local gin) or any other brand of alcohol who eventually served as the control group. These apparently healthy participants both in the experimental and control groups who are within the age range of 34-52 years were subsequently categorized into the following groups as shown:

2.3.1 Control Group

This group was made up of seventeen apparently healthy participants aged between 34-52 years, who are non-consumers of ogogoro (local gin) or any other brand of alcohol

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2.3.2 Experimental Group
This group consisted of seventeen apparently healthy participants aged between 34 and 52 years, who are addicted consumers of ogogoro (local gin) on daily basis for a period of 2 years

2.4 Study Design
2.4.1 Inclusion Criteria
All the apparently healthy participants used for this study were not having any health issues and were not indicted as drug addicts, cigarette smokers, kolanut consumers and consumers of other brands of alcohol. These data were obtained via oral interrogation of the participants

2.4.2 Exclusion Criteria
Drugs, cigarette, kolanut addicts and consumers of other brands of alcohol, as well those suffering from one sickness or the other were excluded from this study.

2.5 Sample Collection
Five milliliters of blood specimens were withdrawn from each of the participants in the control and experimental groups respectively via venipuncture technique and dispensed into lithium heparin anti-coagulated bottles respectively
Each specimen was mixed homogenously in order to prevent blood clot. Thereafter spun at 1,500 revolution / minute for 10 minutes using a macro-centrifuge 800D model. The separated plasma sample was then used for the quantitative measurement of the following biochemical parameters: troponin-1 and creatinekinase-MB (cardiac biomarkers), C-reactive protein and interleukin-6 (inflammatory biomarkers), malondialdehye, glutathione peroxidase and 8-hydroxy-2-deoxyguanosine (oxidative stress biomarkers)

2.6 **Laboratory Analysis**
2.6.1 **Measurement of Cardiac Biomarkers**
2.6.2 **Troponin 1**
The dual vial liquid stable immune turbidimetry method as earlier described by Christenson *et al.* (2006) in Diazyme with catalogue number DZ145A United States of America and updated by Egoro *et al.* (2025) was adopted

2.6.3 **Creatinekinase-MB**
The immune-Inhibition method as earlier described by Rashmi and Binita (2020) in Atlas Medical unit 4 and updated by Egoro *et al.* (2025) was utilized

2.7 **Measurement of Inflammatory Biomarkers**
2.7.1 **C-reactive Protein**
The previously described latex turbidimetry method by Kari in 2007 in Spinreact Diagnostic, Spain and subsequently updated by Egoro *et al.* (2024) was update

2.7.2 Interleukin-6
The Enzyme Linked Immunosorbent Assay (ELISA) method as earlier described in E-EL-HO.102 catalogue and updated by Egoro *et al.* (2024) was used

2.8 Measurement of Oxidative Stress Biomarkers
2.8.1 Malondialdehyde
Thiobarbituric acid method as earlier described by Wali *et al.* (2020) and further updated by Emmanuel *et al.* (2023) was adopted

2.8.2 Glutathione Peroxidase
Immune-inhibitory method as described earlier in Atlas Medical unit, 4, William James House, Cowley Road, Cambridge, CB40WX by Paglia and Valentine in 1967 and subsequently updated by Egoro *et al.* (2023) was adopted

2.8.4 8-Hydroxy-2-Deoxyguanosine
The Enzyme Linked Immunosorbent Assay (ELISA) method as earlier described by Catherine *et al.* (2016) in Randox Laboratories Limited, UK and updated by Egoro *et al.* (2025).was adopted

2.9 Statistical Analysis
The results obtained from the experimental and control groups were expressed as mean ± SD and statistically analyzed using SPSS version 23.0 (SPSS Inc., Chicago, IL, USA; version 23.0). Student "t" test was used for comparing values of the biochemical parameters between

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the control and experimental group. Data were considered statistically significant at $p < 0.05$

3.0 RESULTS

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The measured cardio-inflammatory biomarkers in the control group were compared with those in the experimental group. The results are presented in Table 1

Table 1: Mean values of measured cardio-inflammatory biomarkers in the control group as compared with that of experimental group

Parameters	Control group (n = 17)	Experimental group (n = 17)	p – values	Remarks
Trop-1$^{\times}10^{-2}$ (IU/L)	1.50 ± 0.03	1.52 ± 0.05	0.58	NS
CKMB (IU/L)	12.00 ± 0.81	12.10 ± 0.84	0.62	NS
CRP (mg/L)	4.70 ± 0.52	12.82 ± 1.73	0.02	S
IL6 (pg/mL)	8.82 ± 0.47	14.55 ± 1.04	0.02	S

Keys: Trop-1 = Troponin-1, CKMB = Creatinekinase-MB, CRP = C-reactive protein, IL6 = Interleukin-6, S = Statistically significant, NS = Not statistically significant, n = Number of participants

As shown in this Table, the mean values of the cardiac biomarkers: troponin-1 ($p = 0.58$) and creatinekinase-MB ($p = 0.62$) revealed no significant alterations among the addicted ogogoro consumers (experimental group) as compared to the control group. However, there were significant elevation in the mean values of the inflammatory biomarkers: C-reactive protein ($p = 0.02$) and interleukin-6 alterations ($p = 0.02$) among the addicted ogogoro consumers (experimental group) when compared with the control group

The measured oxidative stress biomarkers in the control group were compared with those in the experimental group. The results are presented in Table 2.

Table 2: Mean values of measured oxidative stress biomarkers in the control group as compared with that of experimental group

Parameters	**Control group(n= 17)**	**Experimental group (n= 17)**	**p-value**	**Remark**
MDA (U/mL)	2.61 ± 0.02	6.25 ± 0.52	0.01	S
GPx (U/mL)	2.95 ± 0.81	1.70 ± 0.43	0.01	S
8-OHdG (pg/mL)	8.70 ± 1.10	8.72 ± 1.12	0.67	NS

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Keys: MDA = Malondialdehyde, GPx = Glutathione peroxidase, 8-OHdG = 8 – Hydroxy – 2 -deoxyguanosine, S = Statically Significant, NS=Not statistically significant, n=Number of participants

This Table, showed that the mean values of the oxidative stress biomarkers: malondialdehyde (p = 0.01) and glutathione peroxidase (p = 0.01) revealed significant elevation among the addicted ogogoro consumers (experimental group) as compared to the control group. However, there was no significant alterations in the mean value of 8-hydroxy-2-deoxyguanosine (p = 0.67) among the addicted ogogoro consumers (experimental group) when compared with the control group

4.0 DISCUSSION

In this study, selected cardio-inflammatory and oxidative stress biomarkers were quantitatively measured in some addicted consumers of a local gin in Nigeria otherwise known as ogogoro (experimental group) and compared with non-consumers of this local gin or any other gin (control group).

As shown in Table 1, the measured cardiac biomarkers: troponin-1 (p = 0.58) and creatinekinase -MB (p = 0.62) in the experimental group revealed no significant mean values alteration as compared with that of the control group. This finding which is indicative that addicted consumption of ogogoro does not have any deleterious effect on cardiac status is as established in this study since there is paucity of information / research work to compare our findings with

As shown further in this Table 1, the mean values of the measured inflammatory biomarkers: C-reactive protein (p = 0.02) and interleukin-6 (p = 0.02) were significantly elevated in the addicted consumers of ogogoro (experimental group) as compared with the control group. This finding is presumably influenced by the systemic response of these addicted consumers of ogogoro to toxic chemicals in this local gin, which could have led to the subsequent release of interleukin 6 as well as some cytokines that in turn had triggered the synthesis and release of C-reactive protein a presumption that is indicative of inflammatory disorder among these addicted consumers and is in agreement with the previous work of Egoro *et al*. (2018)

Table 2, revealed that the mean values of the oxidative stress biomarkers: malondialdehyde (p = 0.01) was significantly elevated in the experimental group as compared with that of the control group. This finding which may be attributed to the metabolism of the ethanol in ogogoro by acetaldehyde, thus generating reactive oxygen species leading to lipid peroxidation with the subsequent elevation of malondialdehyde is in agreement with the past work of Chima (2020), since there is scarcity of information / research work on the effect of addicted consumption of ogogoro on this biomarker in human model. As shown further in this Table, the mean value of glutathione peroxidase (p = 0.01) was significantly reduced in the experimental group as compared with that of the control group. This finding which is presumed to be triggered by the first line defense action of this anti-oxidant enzyme towards the inhibition of excessive production of reactive oxygen species following the addicted consumption of this local gin that may eventually lead to gross oxidative damage due to their ability to overcome the defense system of the body cell is in agreement with the past work of Adeyemi *et al.* (2018) taking into cognizance the lack of information / research work that are associated with human model

However, there was no significant alteration in the mean value of 8 - hydroxyl - 2 - deoxyguanosine (p = 0.67) an indication that addicted consumption of ogogoro does not alter deoxyribonucleic acid structure. This finding is as established in this study since there is paucity of similar research work to support our claim

Conclusion

It is concluded from this study that addicted consumption of ogogoro triggers inflammatory and oxidative stress disorders

Recommendations

1) Addicted ogogoro consumption should be avoided
2) Addicted consumers of ogogoro should endeavor to check their health status occasionally in any reputable health facility

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Conflicts of interest: None

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