Journal of Occupational Safety and Environmental Health
A Publication of the Society for Occupational Safety and Environmental Health
ISSN 2426-8685

EVALUATION OF THE EFFECT OF CHRONIC ADMINISTRATION OF LOCAL GIN (*OGOGORO*) ON SOME REPRODUCTIVE HORMONES IN ADULT MALE WISTAR RATS.

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Abstract

Alcohol-related disorders are important causes of morbidity and mortality globally. *Ogogoro* is one of the locally made alcoholic beverages, which is prepared by the distillation of the fermented sap of Raphia palms (*Raphia hookeri*) coconut palm (*cocus nucifera*) and oil palm (*Elaeis guinesis*). The aim of this study is to investigate the effect of chronic administration of local gin (*Ogogoro*) on some reproductive hormones in adult male wistar rats. Twenty (20) adult male wistar rats were divided into four groups of 5 rats (n=5) each. Group I (control) was administered with Normal saline 2ml/kg, Groups II-IV: *Ogogoro* 3.5ml/kg, 7ml/kg, 14ml/kg respectively. Administration was done orally once daily for eight (8) weeks, after which animals were euthanized and 5ml of blood collected through cardiac puncture. The serum was used to assay for follicle stimulating hormone, luteinizing hormones and testosterone for all the groups. One way ANOVA was used to compare the statistical significance of the results. The result showed a significant decrease in serum level of testosterone and serum luteinizing hormone (LH) in groups 3 and 4 respectively when compared to the control. There was no significant difference in serum follicle stimulating hormone between the groups when compared to the control at P> 0.05. This study has shown that chronic administration of 7ml/kg and 14ml/kg of *Ogogoro* significantly decreased serum testosterone and luteinizing hormone (LH) level which could invariably lead to male infertility.

Keywords: Ogogoro, Reproduction, Infertility, Follicle stimulating hormone, Luteizing hormone, Testosterone
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1. Introduction

Alcohols are hydroxyl derivatives with straight or branched chain aliphatic hydrocarbons (Brunton *et al*., 2011). Chronic alcohol consumption affects the body's reproductive system - the hypothalamus in the brain, the pituitary gland and the testes. The hypothalamus and the anterior pituitary gland have solely regulatory functions, which are mediated by the hormones secreted from these two organs. The third component, the testes also produces key hormones controlling male sexual characteristics and behaviors, the most important of which is testosterone. In addition, the testes are responsible for sperm production (kavitha *et al*., 2014; Rahman and Pang, 2016). Numerous studies have indicated that alcohol abuse in men can cause impaired follicle stimulating hormone, lutenizing hormone and testosterone production and shrinkage of the testes (testicular atrophy). These changes can result in impotence, infertility, and reduced male secondary sexual characteristics such as reduced facial and chest hair, breast enlargement, and a shift in fat deposition from the abdomen to the hip area according to Emanuele and Emmanuele, (2003); Oremosu and Akang, 2014; kavitha *et al*., 2014; Priya *et al*., 2014. It is reported that about 15% of couples of reproductive age are infertile and about 50% of these cases are male related, about 42% of men with infertility cases consume alcohol (McLachlan and Kreste, 2012; Lotti Maggi, 2014; Agawal *et al.,* 2015).

Local gins have different alcoholic contents, this depends on the type and method of preparation, ranging from 20-78 % ethanol (Adeleke and Abiodun, 2010; Idonije *et al*., 2012). *Ogogoro* is one of the locally made alcoholic beverages commonly consumed in the southern part of Nigeria, which is prepared by the distillation of the fermented sap of Raphia palms (*Raphia hookeri*) coconut palm (*cocus nucifera*) and oil palm (*Elaeis guinesis*) (Heap, 2008; Elijah *et al*., 2010; Idonije *et al*., 2012). A comparative biochemical and microbiological analysis of the local gin (*Ogogoro*) and the imported dry gin showed that *Ogogoro* has specific gravity (0.9897), PH (6.3), titratable acidity (0.8), total solid (1.2) and high percentage of ethanol content (37.6 - 78%) and impurities as against lower figures obtained for the imported dry gin (45%). There is equally marked similarities between the imported dry gin and the locally synthesized gin in the areas of total sugar, titrable acid, and in such observed characteristics as taste, aroma, and colour which may be due to the crude method of local gin production (Adeleke and Abiodun., 2010). Excessive consumption of the local gin (*Ogogoro*) increases body levels of the contaminants (impurities) present in the local gin resulting in increased toxic and carcinogenic effects as well as socio-political ills and vices (Idonije *et al.*, 2012).Though local gin (*Ogogoro*) is widely consumed in various part of Nigeria, however, there is paucity of literature on its effects on male reproduction. The aim of this study is to investigate the effect of chronic administration of local gin (*Ogogoro*) on some hormones of reproduction in adult male Wistar rats.

2. Materials And Methods

The local gin (*Ogogoro*) was purchased from the major distributor (Mr Festus) at No 43 Club Street, Sabon Gari Zaria, Kaduna State, Nigeria. The ethanolic content of the local gin was determined at the National Research Institute of Chemical Technology (NARICT) Zaria. Ketamine was purchased from Steve Moore Pharmaceuticals, Emanto, Zaria. Kaduna State, Nigeria.

Experimental Design

Twenty adult male wistar rats weighing between 150-250g were purchased from the animal house of the Department of Human Physiology, Faculty of Medicine, Ahmadu Bello University, Zaria, Kaduna, Nigeria. The rats were randomly assigned into four groups of 5 animals each (n = 5). They were then allowed to acclimatize and were fed with compressed grower mash and given access to water ad libitum before administration of *Ogogoro* commenced. A cannula was used to administer the local gin orally for eight (8) weeks.

Group I: normal saline 2ml/kg (Taati *et al*., 2010), Group II: Oral administration of local gin 3.5ml/ kg, Group III: Oral administration of local gin 7.0ml/kg, Group IV: Oral administration of local gin14.0ml/kg. At the end of the administration, animals were euthanized and 5mls of blood was obtained by cardiac puncture. Serum was used to assay for testosterone, follicle stimulating hormone and luteinizing hormones for all the groups (Dosumu *et al*., 2012; Oremosu and Akang, 2014).

Serum testosterone was estimated by direct immunoenzymatic method using reagent kit and, lutenizing hormone (LH) and follicle stimulating hormone (FSH) were estimated by microplate immunoenzymometric assay using reagent kit (Monobind, INC.USA) in Biomerieus

Statistical Analysis

Data obtained was expressed as mean ± standard error of mean (SEM). The results were analyzed using one-way analysis of variance (ANOVA), and Tukey post-hoc test for multiple comparism, values of $P < 0.05$ was considered to be significant.

3. Results

Serum FSH concentrations for the control and treated groups were as follows: Group I control (normal saline 2ml/kg); 8.22 ±1.2, treated groups: Group II (3.5 ml/kg); 7.24 0.66, Group III: (7 ml/kg); 6.22 0.24, Group IV (14 ml/kg); 5.36 0.50. There was no significant difference in all the treated groups when compared to the control at P> 0.05.

Serum LH concentrations for the control and treated groups were as follows: Group I control (normal saline 2ml/kg); 11.58 ±1.69, treated groups: Group II (3.5 ml/kg); 9.64±0.83, Group III: (7 ml/kg); 7.92±0.36, Group IV (14 ml/kg); 7.38± 0.39. There was significant decrease in groups III and IV treated with *Ogogoro* 7ml/kg and 14 ml/kg respectively when compared to the control at P< 0.05.

Serum Testosterone concentrations for the control and treated groups were as follows: Group I control (normal saline 2ml/kg); 7.14± 1.01, treated groups: Group II (3.5 ml/kg); 3.70 ± 0.26, Group III: (7 ml/kg); 3.70 ± 0.26, Group IV (14 ml/kg); 3.70 ± 0.26. There was a significant decrease in the level of Serum testosterone in the groups treated with *Ogogoro* (7 and 14 ml/kg) when compared to the control at P< 0.05.

Table I: Serum follicle stimulating hormone (FSH), luteinizing hormone (LH) and testosterone concentrations in adult male wistar rats treated with local gin (*Ogogoro*) for eight weeks

Treatment Groups	FSH (ng/ml)	LH (ng/ml)	Testosterone (ng/ml)
Control (1ml/kg normal saline)	8.22 1.21	11.58 1.69	7.14 1.01
Ogogoro (3.5 ml/kg)	7.24 0.66	9.64 0.83	5.04 0.23
Ogogoro (7 ml/kg)	6.22 0.24	7.92 0.36?	3.70 0.26
Ogogoro (14 ml/kg)	5.36 0.50	7.38 0.39	3.70 0.26

=statistically significant when compared to control

4. Discussion

From the present study, there was a significant decrease in serum luteinizing hormone levels, and non-significant decrease in follicle stimulating hormone compared to the control at P> 0.05. This result could be attributed to the disruption of the pituitary-testicular axis, hence resulting in an inhibitory activity of the adenohypophysis. The decrease in serum level of luteinizing hormone could suggest an impairment of spermatogenesis in experimental rats and reflects the germ cell loss or damage to sertoli cells, thereby affecting the feedback regulation of luteinizing hormone secretion from *Ogogoro* consumption. This result is in conformity with those of Dosumu *et al*., (2012) and Oremosu and Akang, (2014) on the effect of ethanol on male reproduction. However, this result is in contrast to the findings of Priya *et al*., (2014) which revealed elevated levels of FSH and LH in rats exposed to alcohol indicating an intact pituitary –testicular axis. This present

study shows a significant decrease in the level of serum testosterone in the groups treated with *Ogogoro* when compared to the control at $P< 0.05$. This could have been due to the redirection of the testicular enzymes from testosterone synthesis to alcohol breakdown thus resulting in decreased testosterone levels overtime. The result of this study could have also been due to the increased activity of the enzyme testosterone reductase which increases the breakdown of testosterone in the liver. In this study, the result of serum testosterone levels decreased with increasing doses of *Ogogoro*, inferring that excessive consumption of alcohol could be more detrimental to male fertility (Emanuele and Emmanuele, 2003; Kavitha *et al*., 2014). The result obtained could have also been due to the agonistic activity of alcohol on cortisol hormone, which consequently acts directly on the testes to inhibit production and release of testosterone, hence the decreased serum level in the treated groups. This result is in concert to the findings of Venkat *et al*., (2009). Alcohol consumption is also associated with increased production of beta-endophins within the testes which can induce Leydig cell and seminiferous tubule cell apoptosis (Emanuele and Emmanuele, 2003; Gao *et al*., 2003).

5. Conclusion

In conclusion, this study has shown that chronic administration of 7ml/kg and 14ml/kg of *Ogogoro* significantly decreased serum testosterone and luteinizing hormone (LH) level which could invariably lead to male

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