Estimation of transaminases activity in burukutu consumers in Dakachi, Zaria, Nigeria

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Abstract: The serum levels of transaminase enzymes in fifty burukutu (BKT) consumers from Dakachi drinkers and fifty healthy non alcoholic drinkers without any liver disease in Zaria, Kaduna state were investigated. These were further divided into light (0.5 – 2.50 liters/day), moderate (2.51 – 5.0 liters/day) and heavy drinkers (5.10 liters and above/day). Their blood samples were taken to estimate the activites of Alanine transaminase (ALT) and Aspartate transaminase (AST) enzymes in serum and the result indicated an increase in the level of burukutu subjects compared with the control. The serum activities of AST and ALT obtained from BKT consumers were 55.12±30.54 IU/L and 25.10±12.99 IU/L respectively whereas the control were 31.76±11.30 IU/L and 14.86±6.04 IU/L respectively. The values of AST and ALT in light, moderate and heavy drinkers were 35.12±15.77 IU/L and 16.62±0801 IU/L, 38.08±20.36 IU/L and 18.92±10.34 IU/L, 61.00±38.10 IU/L and 33.17±19.58 IU/L respectively. Those for control were 28.27±11.52 IU/L and 13.27±07.05 IU/L respectively.

Keywords: Burukutu, Alanine transaminase, Aspartate transaminase, Serum, Liver, Activity, Enzyme

INTRODUCTION

Alcohol is a widely used drug that contributes to illness and tolerated socially and physiologically. Out of the three main forms of alcohol[1]: Isopropyl alcohol (rubbing alcohol), Ethyl alcohol (grain alcohol) and Methyl alcohol (wood alcohol), Ethyl alcohol is the only one that can be consumed. Locally made alcoholic beverages in Nigeria's conventional setting include Burukutu, Pito, Kain-Kain, palm wine, duma, ogogoro. The percentage content of alcohol in alcoholic beverages which are usually produced through fermentation except palmwine which is obtained naturally from the sap of palm tree vary ranging from 2-4% in burukutu, 2-8% in palmwine, 30 – 60% in gin, ogogoro and brandy[2].

Burukutu is a popular indigenous alcoholic beverage produced and consumed in Northern Guinea, Republic of Benin, Ghana [3,4,5] and in the central and Northern part of Nigeria. It has vinegar – like flavor produced mainly from the grains of guinea corn of the species *Sorghum vulgare* and *Sorghum bicolor.* Sorghum has been known to constitute a major source of protein and carbohydrate. Burukutu has been reported to contain vitamins, iron, magnesium, manganese, phosphorus, calcium, 26.7g starch and 5.9g of protein per litre [6]. It is locally produced by the germination of sorghum (guinea Alcohol is a widely used drug that contributes to illness and tolerated socially and physiologically. Out of the three main forms of alcohol[1]: Isopropyl alcohol (rubbing alcohol), Ethyl alcohol (grain alcohol) and Methyl alcohol (wood alcohol), Ethyl alcohol is the only one that can be consumed. Locally made alcoholic beverages in Nigeria's conventional setting corn), drying under the sun and without removing the sprouts, milling and slurring in water for saccharification and fermentation. After 1-2 days of fermentation, the broth is sieved, boiled and matured for 2days and pasteurized at 60-65^{0}c for 30minutes[7,8] . The process of production of burukutu involves malting, mashing, fermentation and maturation [9]. It is produced at cottage level and has a short shelf life of 1-8 days. The short shelf life may be due to very low titratable acidity (0.4-0.6% as acetic acid); alcohol content (4-10% v/v), high concentration of vitamin and fermentable sugar[10].

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Apart from the central nervous system, kidney and to a lesser extent the skeletal muscle, the liver is another organ in the body that is affected by excessive consumption of alcohol[11] when ingested. Depending on the amount of alcohol consumed, about 90 -98% is metabolized in the liver to acetic acid and 2-10% excreted in urine, breadth and sweat[12]. The two transaminase enzymes of diagnostic importance are alanine amino transferase (ALT) and aspartate amino transferase (AST). ALT is present in moderately high concentration in the liver and low in cardiac muscle and other tissues [13]. Although serum levels of both AST and ALT become elevated whenever diseases affect liver cells integrity, ALT is the more liver – specific enzyme. Serum elevations of ALT activity are rarely observed in conditions other than parenchymal liver disease (cirrhosis, carcinoma, hepatitis, obstructive jaundice or liver stroke) moreover its elevation persists longer than those of AST activity[14].Whole blood, plasma or serum and urine samples are commonly used for analyses and based on the liver metabolism of BKT, this research was aimed to determine scientifically if there is damage to the liver using the serum of volunteers of both burukutu consumers and non consumers in Dakachi, Zaria, Nigeria by estimating the presence of transaminase enzymes.

MATERIALS AND METHODS

Subjects: Fifty (50) subjects in all known to consume Burukutu in three categories: heavy (5.01 Liters and above per day), moderate (2.51 – 5.00 liters per day) and light drinkers (0.50 – 2.50 liters per day) were recruited for this study. Another fifty healthy volunteers with normal health status, no liver disease and do not consume alcohol took part in the study as control.

Collection of specimen: Blood specimen (5ml) were collected from each subject by venipuncture of the anticubital vein by using a sterile 22G needle and syringes, after sterilizing the site with methylated spirit. They were allowed to clot inside the specimen bottle at room temperature, the clotted blood were spun at 4000 rpm for 10 minutes in a centrifuge machine Uniscope Model SM-112 Surgifriend medicals, England and the sera were separated from the cell. These were used immediately for the analysis of the above-mentioned analytes.

Estimation of AST activity: Serum AST activities were estimated by the colorimetric method of Reitman and Frankel (1957)

Principle; oxaloacetate reacts with aspartate in the reaction in which aspartate decarboxylate spontaneously to pyruvate which is measured by hydrazone formation with resultant development of brown colour which was measured at 510nm Spectophotometer (4054 UV/Visible spectrophotometer)- LKB Biochrom Ultrospec plus Biochrom, Cambridge England.

Estimation of ALT activity: Serum ALT was estimated by the colorimetric method of Reitman and Frankel (1957).

Principle: the pyruvate produced by the transamination activity of glutamate pyruvate transaminase reacts with 2, 4-dinitrophenylhydrazine to give a brown colour hydrazone which is measured colorimetrically at 510nm using Spectrophotometer (4054 UV/Visible spectrophotometer)- LKB Biochrom Ultrospec plus Biochrom, Cambridge England.

RESULTS

Serum transaminases (AST, ALT) assay have been measured among selected Burukutu consumers and control subjects. The values are presented in Figure 1. The serum activities of ALT and AST obtained from Burukutu consumers were 55.12 ±30.54 IU/L and 25.10 ±12.99 IU/L respectively whereas control subjects were 31.76 ±11.30UI/L and 14.86 ±6.04 UI/L respectively at the ratio of AST being twice more than ALT. The difference in AST and ALT between control subjects and burukutu consumers were statistically significant (P ≤0.05).

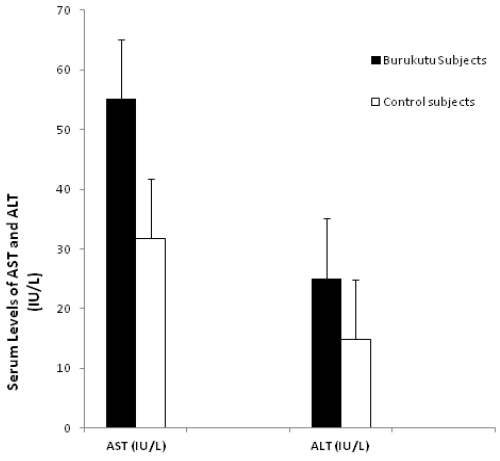

Fig. 1. Mean serum transaminases (AST & ALT) levels in Burukutu consumers and control subjects

Figures 2 and 3 below show the mean serum levels of AST and ALT respectively in both control and burukutu consumers divided into Light (consumes 0.50-2.50 liters of burukutu per day), Moderate (2.51-5.00 liters per day) and Heavy (5.01 liters and above per day) drinkers. The activities of AST and ALT in heavy drinkers were higher than the values in both the light and moderate drinkers hence in all the ratio of AST to ALT in all categories of drinkers still remained 2:1.

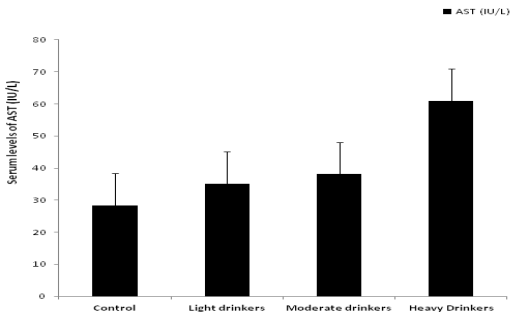

Fig. 2. Mean serum levels of AST in the control subjects, light, moderate and heavy drinkers of Burukutu

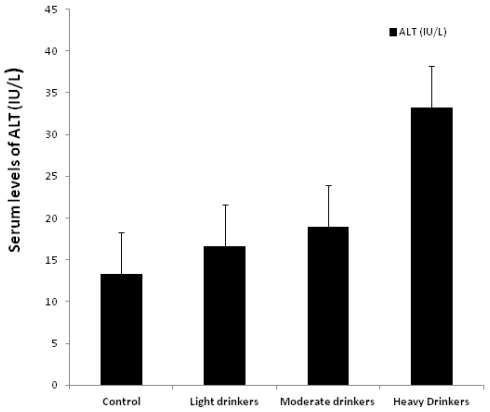

Fig. 3. Mean serum levels of ALT in the control subjects, light , moderate and heavy drinkers of Burukutu

DISCUSSION

AST and ALT activities in 50 Burukutu consumers and 50 controls were run to access the level of activities of these enzymes in serum of involved individuals. The results showed that there was statistically significant difference between the serum AST and ALT in Burukutu consumers and controls. The elevation in activities of AST and ALT as reported in this research could be ascribed to the effect of alcohol on the liver cells as reported by[15]. Similarly, the research work revealed a ratio of 2:1 of AST and ALT in Burukutu subjects. The ratio of AST being twice more than the value of ALT has been used as a diagnostic aid suggestive of alcoholic liver disease. The activities of these enzymes in circulation are seen to rise when the liver cell is pathologically damaged. This increase could be due to leakage of the enzyme from cell of the organ or alteration in enzyme production[16].

The serum AST and ALT activity in light and intermediate drinkers showed some elevations when compared with control. More so, a very high significant elevation was observed in heavy drinkers. These findings are in agreement with [17], which stated that excessive consumption of Burukutu affects liver metabolic processes. In this research, it was observed among Burukutu subjects that the amount and quantity of consumed burukutu seems to be as important as their drinking pattern (quantity consumed per day). From the history of consumption, the research also revealed that longtime consumption is associated with rise in the activities of AST and ALT which equally agrees with [18] that longtime history or chronic consumption of alcohol is associated with liver cells damage. Liver cells or hepatocytes can only metabolize certain amount of alcohol per hour, so when excess alcohol is consumed than the liver cells can metabolize, the cells become affected. Alcohol is metabolized more slowly than it is absorbed[19,20]. The transaminases have been reported to be released above normal value in such conditions.

Statistical comparison of the level of AST and ALT according to sexes of burukutu consumers was not possible due to few numbers of female volunteers. However, it was reported that a high value of the transaminases in female than male which was related to reduce alcohol dehydrogenase enzyme in gastric mucosa leading to increased blood level of alcohol, hence the effect on the liver thereof [21].

CONCLUSION

Burukutu is a beverage drink with significant amount of alcohol content of about 4-10% [22], and that alcoholic infiltration of liver cell affects the level of AST and ALT as good makers in such condition, the following observation were deducted;

That burukutu consumers have high levels of serum activities of AST and ALT than those for control subjects, as such its consumption significantly raised the level of AST and ALT, due to the effect on the liver cells. Similarly, it was equally observed that longtime history of consumption also affected the level of AST and ALT.

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