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Research article

THE COMPARATIVE EFFECT OF BEER AND PALM WINE ON BODY WEIGHT CHANGE IN SWISS WHITE MICE

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ABSTARCT: Beer and palm wine are two alcoholic beverages that play an important role in the Southern part of the Country. The long term effect of beer and palm wine on body weight change is not yet known. Following chronic consumption (4 weeks feeding) of beer and palm wine, body weight changes were studied in 30 Swiss white mice weighing between (15-30g). Mice in the control group (n=10) were fed normal rodent chow, mice in the beer group (n=10) were fed by gavage 1ml of star beer twice daily (morning and evening). Mice in the palm wine group (n=10) were fed by gavage 1 ml of palm wine twice daily. All animals were allowed free access to clean drinking water. Daily food intake, water intake and body weight change were measured. Daily food intake in the beer and control groups were significantly higher ($p<0.05$) than the palm wine group. Similar trend was obtained in the daily water intake. Body weight change was also significantly higher ($p<0.05$) in both beer and control groups when compared to palm wine group. The results showed that long term intake of beer caused increased food and water intake resulting in weight gain. On the other hand, long term consumption of palm wine caused decreased food intake resulting in weight loss.

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INTRODUCTION

Palm wine and beer are two alcoholic beverages that have gained a lot of cultural interest with high consumption rate among the educated and non-educated in Nigerian society (Akachukwu 2001). Due to their high consumption rate which cuts across the socio-cultural class, the interest to investigate their effect on body weight change arose. Many drinking sessions in the south-east part of the country often begin with small amount of palm wine spilled on the ground as a libation to appease the gods as sign of regard and respect to the deceased ancestors (Akachukwu 2001). Brewed beverages mainly prepared from malt and hops include beer, ale and stout (Eluwa et al 2009). Palm wine is milky in appearance and is obtained from the fermentation of sugary sap of various palm species in Nigeria. Palm wine is usually obtained from the sap of *Raphia vinifera,* and *Raphia hooderi* (raphia palm) and *Elaeis guineensis* (oil palm) by methods described by Bassir (1968), Faparusi (1966) and Okafor (1972). Okwu and Fred (2008) had reported earlier that palm wine contain bioactive compounds capable of stimulating the nervous system. Umoren (2014) had also reported that these two alcoholic beverages have a stimulating effect on the nervous system hence, can affect anxiety and fear; locomotor behavior in mice (Umoren et al 2015). The raffia-palm (Raphia hookeri Mann and Wendl) exhibit a wide range of biological and pharmacological activities such as anti-inflammatory (Roger 2002), diuretic, laxative, antispasmodics (Ekpa 1993), anti-hypertensive and antimicrobial function (Hutchinson et al 1993).

These functions are performed due to the chemical constituents comprising sugars, lipids, protein, vitamins, minerals and phytochemicals. These constituents are potential nutrients capable of influencing growth of living tissues (Ganong 2005). Beer is an enjoyable refreshing drink having a relatively low alcohol strength compared to other alcoholic drinks per volume. Beer has essential vitamins (particularly B vitamins), minerals and antioxidants from raw materials. It is made from soluble fiber, all of which contribute to a healthy diet, all essential for body growth. Therefore, given the chemical constituents of these two alcoholic beverages, there was need to understudy while comparing the effect of palm wine and beer on body weight change using Swiss white mice.

MATERIALS AND METHODS

Acquisition of palm wine and star beer

Fresh palm wine and star beer were bought from Edim-Otop in Calabar South Local Government area of Cross River State, Nigeria. Bottled star beer was obtained from Watt market in Calabar South Local Government area of Cross River State, Nigeria. They were stored in a cool dry place until required for constituting the palm wine and beer-treated groups.

Animal treatment

30 Swiss white mice weighing between (15-30 g), were kept in well ventilated space under room temperature (25 ± 2^0c) and 12/12 hours light/dark cycle, and allowed one week for acclimatization to the research environment before testing mice were housed singly in metabolic cages. Each mouse in each of the groups received 1 ml and 2 ml of palm wine (palm wine group), 1 ml and 2 ml of beer (beer group). Each mouse was given normal rodent feed and drinking water ad-libitum. This treatment was done for 28 days. Their beddings feed and water were hygienically handled and changed every 1-3pm daily throughout the period of this treatment.

Statistical Analysis

Data collected during the study were expressed as mean ± SEM. Analysis of variance (ANOVA) and a post-hoc data student t-test were used for analysis of data. Probability level $p<0.05$ was regarded as significant.

RESULTS

Water intake

The palm wine group of mice had less mean water intake when compared to the control and beer-treated group ($p<0.05$) respectively. Water intake did not differ in the beer-treated group when compared to control. The mean water intake is as shown in Table-1.

Food intake

The mean food intake for the beer-treated, palm wine-treated and control group of mice is shown in Table 1. Results obtained shows that there was increased food intake ($p<0.05$) in both the beer and palm wine-treated mice when compared to control. Food intake in the beer-treated mice was significantly higher ($p<0.05$) when compared to the palm wine-treated group.

Body weight change

Table 1 shows the mean body weight change for the control, beer-treated and palm wine-treated groups of mice. The results showed significant decrease ($p<0.05$) body weight in the palm wine-treated group of mice when compared to control. However, the body weight of beer-treated mice experienced significant increase ($p<0.05$) when compared to palm wine treated and control groups of mice.

Table-1: Showing water intake, food intake and body weight change among the various group.

Groups	Water intake (ml)	Food intake (ml)	Body weight change (g)
Control	1.2±0.22 to 4.32±0.342	3.17±0.357 to 9.03±0.345	3.98±0.352
Beer	1.9±0.139 to 3.82±0.218*	4.15±0.657 to 10.06±0.315*	4.62±0. 348*
Palm wine	0.9±0.635 to 1.767±0.435**	3.15±0.231 to 4.54±0.212**	2.12±0.421**

*=$p<0.05$ vs control; **$p<0.05$ vs control

DISCUSSION

In order to assess the comparative effects of beer and palm wine consumption on body weight change, daily water and food intake were measured daily and the mean weight obtained weekly for four weeks. At the expiration of experimental duration, it was discovered that the beer-treated group of mice had increased water and food intake as compared to the palm wine-treated group. It is believed that the chronic intake of beer caused the release of cytokines and chemokines which permeates the blood-brain barrier to stimulate the vegetative areas of the brain to cause an increase in thirst and hunger, leading to increased food and water intake Umoren et al (2012) which means decreased catabolism but increased anabolism resulting in increased pepsinogen production (Ganong 2005). This may also mean that there is an increased production of other tissue proteins leading to tissue growth (Hoffbrand et al 2006), which may cause increased body weight change as observed in the beer-treated animals.

There was a marked increase in body weight in the beer-treated mice when compared with the control group. Food is taken to maintain stability of body weight (Baynes et al 2006). The mechanisms that drive hunger and those that restrain it operate to control short-term eating behavior and long-term control of body weight and composition (Ulman et al 2008). Beer may possess appetite stimulating effects and this effect produces weight gain.

On the other hand, there was significant decrease in body weight in palm wine-treated mice when compared to control. Palm wine may possess appetite-suppressant effects and this effect produces weight loss in the animals.

In conclusion, these results indicate that consumption of beer increases food and water intake leading to increased body weight change while palm wine consumption decreases food and water intake resulting in reduced body weight change.

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