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Original Research Article

Effect of Lacatomtom Drink on Spatial Memory in Male Wistar Rat

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ABSTRACT

Lacatomtom is one of the emerging psychoactive substances abused by youths in Nigeria. It's a mixture of tomtom candy and lacasera drink. The abuse of this substance has led to some psychosocial deficit, this deficit are thought to be as a result of memory impairment. This study is therefore designed to look at the effect of lacatomtom on spatial memory in male Wistar rats. Twenty (20) Wistar rats weighing 120-150 g were randomly divided, five (5) each in a group of four (4). Group A served as control and received 1 mL/kg distilled water orally. Group B received 1 mL/kg of Lacatomtom (LTT) orally, meanwhile group C took 1 mL/kg Lacasera (LC) orally. Group D received 1 mL/kg Lacawater (LW) orally. Animals were treated once, five minutes later, they were allowed to undergo the Y -maze test. Percentage alternations and number of entry was calculated for each group. Data were analysed using ANOVA at α 0.05. There was no significant difference in the arm entry in all the groups. Although the LTT group has the highest mean entry (14.8 ± 1.16) followed by the LC group (14.4 ± 1.21) and LW group (13.6 ± 0.93). The lowest entry observed was the control group (13.4 ± 1.21). There was a significant difference in the percentage alternation in the LTT group when compared to the control group. The findings from this study suggests that Lacatomtom alters the spatial memory function of the brain in Wistar rats through mechanisms that may be dependent on the activation of opoidergic system in the brain.

Keywords: Lacatomtom, memory, alternation, brain, opiodergic.

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	source are credited.

Introduction

Youths have been reported to increase their quest for psychoactive substances globally. In Nigeria, the desire to consume these substances has been attributed to psychological disorder, peer pressure, academic pressure and the need to perform extraordinarily during sex.^{1,2} Gigabyte as they call Lacatomtom appears dark brown as a result of dissolution of the tom tom.³ The consumption of Lacatomtom (LTT) is possibly necessitated by the ban on the importation and sale of codeine by the Federal government of Nigeria resulting in a sky rocketed price of the product. Therefore, the quest for cheaper alternatives has prompted the Nigerian youths to utilize new concoctions such as LTT.^{2,3} However, stimulant consumption among Nigerian youths has emerged as a critical public health concern, with far-reaching implications spanning psychological, physiological, and socioeconomic dimensions. Various studies,⁴ have underscored the profound psychological effects resulting from stimulant consumption.

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The physiological impacts include alterations in feeding and sleeping habits, disregard of personal hygiene, shaking sensations in arms and legs, reddened eyes, unexplained money demands, excessive quest for privacy, lack of coordination, kidney, lung, and liver diseases.

Short and long term effects on the brain have been attributed to substance use resulting in behavioral alterations, memory impairment, cognitive deficit and movement disorders.⁵

These effects alter behaviour, leading to decisions that are risky, making people to have injury and physical trauma such as burns, automobile crashes and violence.⁶ Meanwhile over time, substance use can affect the brain allowing addiction making withdrawal difficult and challenging.⁷

Lacatomtom (LTT), being an emerging substance, has scanty reports in the literature on its effect on the brain. This study is therefore designed to investigate the effect of LTT on spatial memory in male Wistar rats. The study investigated the effects of substance (Lacatomtom) abuse on spatial memory. The findings from this study could be used as preliminary data for further studies. Therefore, the article is important to scientific community.

Materials and Methods

Preparation of Lacatomtom

Sample Lacasera drinks (The Lacasera Company Plc, Nigeria) and tomtom candies (Cadbury Nigeria Plc, Nigeria) were purchased from Anyigba market, Dekina Local Government Area, Kogi State in Nigeria as shown in plate 1.



Plate 1: Map of Dekina Local Government showing Ayingba. Source: Benjamin Essien (2014)

Animals

Male Wistar rats weighing between 120-150 g were used for this study. They were acclimatized for 2 weeks at the Central Animal House, College of Health Sciences, Prince Abubakar Audu University, Anyigba. They were kept under standard laboratory conditions, and fed on rodent cubes. The study was approved by the college of health sciences research and ethics committee with the ethical number PAAU/CHS/PRV/CHSREC/Vol-1/029.

Experimental Design

Preparation of samples

Following the pattern of usage by the users of Lacatomtom drink, the samples were prepared as follows:

Lacatomtom (LTT) was prepared by dissolving 3 tom tom candies weighing 13.16 g in 350 mL of Lacasera (LC) drink thereby obtaining a concentration of 38 mg of tom tom in 1mL of Lacasera drink (38 mg/mL) LTT.

Meanwhile, the same procedure as above was followed by using distilled water as the solvent to get Lacawater (LW) at a concentration of (38 mg/mL) LW.

Animal Grouping

Group A: Served as control and received 1 mL distilled water orally

Group B: received 1 mL/kg of LTT orally

Group C: received 1 mL/kg Lacasera (LC) orally

Group D: received 1 mL/kg Lacawater (LW) orally

Animals were treated once, five minutes later, they were allowed to undergo the Y -maze test as described below.

Behavioral Assay for Spatial memory Y- MAZE TEST (YMT)

The effect of LTT on spatial memory function was investigated using the Y maze test as described.⁸ For a period of five minutes, each animal was placed at the centre of the maze and allowed to move freely. The sequence by which the animals enter the maze was recorded manually (i.e., ABCBAC). The apparatus was cleaned with 10% ethanol after each test to prevent odor bias. An actual alternation was determined from successive entries of the three arms on overlapping triplets set, in which three different arms are entered (i.e. BAC, CAB, ABC, and not CAC or BAB). Percentage alternation was given as (actual alternations/maximal alternations) X 100, where maximal alternation is the total number of entry minus two.

Statistical analysis

Data were presented as mean \pm Standard Error of Mean (SEM) using GraphPad Prism version 10. Comparisons between groups were made using the one-way analysis of variance (ANOVA) followed by Duncan post-hoc test. 95% confidence level, and at p < 0.05 was considered statistically significant

Results and Discussion

Effect of Lacatomtom (LTT) on number of arm entry in Y- maze Test

Figure 1 shows the effect of LTT on arm entry. There was no significant difference in all the groups. Although the LTT group has the highest mean entry (14.8 ± 1.16) followed by the LC group (14.4 ± 1.21) and LW group (13.6 ± 0.93). The lowest entry observed was the control group (13.4 ± 1.21).



Groups

Figure 1: Effect of Lacatomtom (LTT) on number of arm entry in Y- maze Test

Effect of Lacatomtom (LTT) on percentage alternation in Y- maze Test

Figure 2 shows the effect of LTT on percentage alternation. There was a significant difference (p<0.05) in the LTT group compared to control group. However, the LC and LW group percentage alternations were comparable but not significantly different at p<0.05) when compared with the control group.



Figure 2: Effect of Lacatomtom (LTT) on percentage

alternation in Y- maze Test

The present study looks at the effect of Lacatomtom on spatial memory in male wistar rats using the Y maze animal model of memory.

Spatial memory and learning is widely studied in experimental animals using the Y maze behavioural model. The Y maze paradigms is used to evaluate novel drugs for their effects on cognition and to test the memory function in rodents.^{9,10} Hallucinogenic drugs have been found to alter the learning capacity of rodents in the Y maze test.¹¹ In this study, LTT Significantly reduced the number of alternations when compared to the control group. This shows that the spatial memory was impaired. Different neurotransmitter in the central nervous system (CNS) play a key role in learning and memory.

There are several studies that illustrated that activation of opioid receptor impairs the memory in animals or in humans.^{12,13} This suggests that LTT may impair memory through mechanisms that are dependent on the activation of the opoidergic system in the brain. This finding is comparable with the work of Ali Hosseini-Sharifabad et.al¹⁴ 2015, where the acute and chronic administration of tramadol reversed the spatial memory capacity of rodents.

However, LTT, as observed in this study, increased the number of arm entries when compared with the other groups. Although this increase was not statistically significant.

This indicates that exploratory activity increased during administration with LTT compared with the control group, suggesting a moderate stimulation effect on motor behavior. This is consistent with other researcher.¹⁵

Conclusion

This study revealed that LTT impairs spatial memory in male Wistar rats through mechanisms that may be dependent on the activation of opoidergic system in the brain. More so, this study has also shown that exploratory activity increased with the administration of LTT.

Conflict of Interest

The authors declare no conflict of interest.

Author's Declaration

The authors hereby declare that the work presented in this article is original. Any liability for claims relating to this article will be borne by us.

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