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Original Article

ANALYTICAL COMPARISON OF COGNITIVE AND ANXIETY BEHAVIOUR MODELS STUDY INVOLVING MORINGA OLEIFERA EFFECTS IN RODENTS EXPERIMENTATION

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ABSTRACT

Usually, cognitive and anxiety related behaviour have association with networks of specialized neural cells linked with the central nervous system (CNS). Several formulated rodents - base models of experimentation have been innovated in studying these phenomena. In this research, two models of study for cognitive and anxiety behaviour parameters each were examined alongside effect of Moringa oleivera administration in rodents. Morris water maze and novel object recognition test were comparatively used for cognition study, whereas elevated plus maze and light /dark box were adopted to investigate anxiety behaviour parameters. Mice were appropriately grouped following a study design, and implementation that accommodated evaluation of study models as well as the moringa treatments effect. The observed outcomes show that analysis of parameters for cognitive behaviour as independently assessed by both models tally. Similarly, that for anxiety behaviour was in tandem. And in all, moringa oleifera had health benefits of improving cognitive function and reducing anxiety without withdrawal effects.

KEYWORDS: Moringa oleifera, learning, memory, anxiety, stress, withdrawal

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INTRODUCTION

There are various experimental animal models being used in behavioural neurosciences that aim to contribute to the prevention and treatment of cognitive and affective disorders in human beings which include learning / memory disorders, anxiety and depression[1]. Commonly such selected animals are deemed to have experiences which are similar to humans' such as pain, anxiety, or sadness as well as capacity or tendency to acquire new information from environment[1].

Comparing validity, efficacy, and extrapolative relevance of such category or spree of studies is also significant in considerations to determining furtherance of these alongside ethical care[2]. Thus, indicating the essence for researchers being careful to consider ethical implications and animal welfare when conducting these studies. Ethical guidelines and animal welfare regulations are in place to ensure that animals used in research are treated with care and respect[2].

Some of these models of experimental preparations have been innovated and modified to suit being used in a particular species for intent of understudying occurrence in some other species[3]. Pain models of animal investigation are in this regard commonly designed to mimic distinctive clinical disorders as to evaluate base line mechanisms as well as potential curative measures; which may extrapolate for related species[3].

Meanwhile, appreciation of some cognitive abilities have also been modally mimicked in experiments that previews certain parameters such as swim latency, quadrants duration, annulus crossing, that are embedded within the Morris Water Maze innovated by Morris as reported by crawley[4] , and adopted by Joffa's team[5].

Similarly, a novel object recognition test procedure is developed to ascertain recognition memory in rodents, with principle premised on the animal's innate tendency of exploring new environment once placed in new space; wherein mice able to recall a familiar object explores it in longer duration[5].

In the same vein, different models of mice neurobehavioural experiment were developed to understudy anxiety and depression. For instance an elevated plus maze as well as light and dark box apparatus are used to investigate parameters such as closed and open arm entries and duration, head dipping, rearing, grooming, urination, defecation, light and dark box entries and duration in order to deduce anxiety patterns [6,7]. Whereas forced swim test and nesting behaviour test are developed to assess parameters that portray depressive traits and social behaviour[8,9]

The current research however sought to examine comparatively two experimental study models each adopted for cognitive and anxiety behaviour investigation independently, wherein effects of administration of a medicinal plant – Moringa Oleifera on these neurobehaviour was simultaneously evaluated.

METHODS

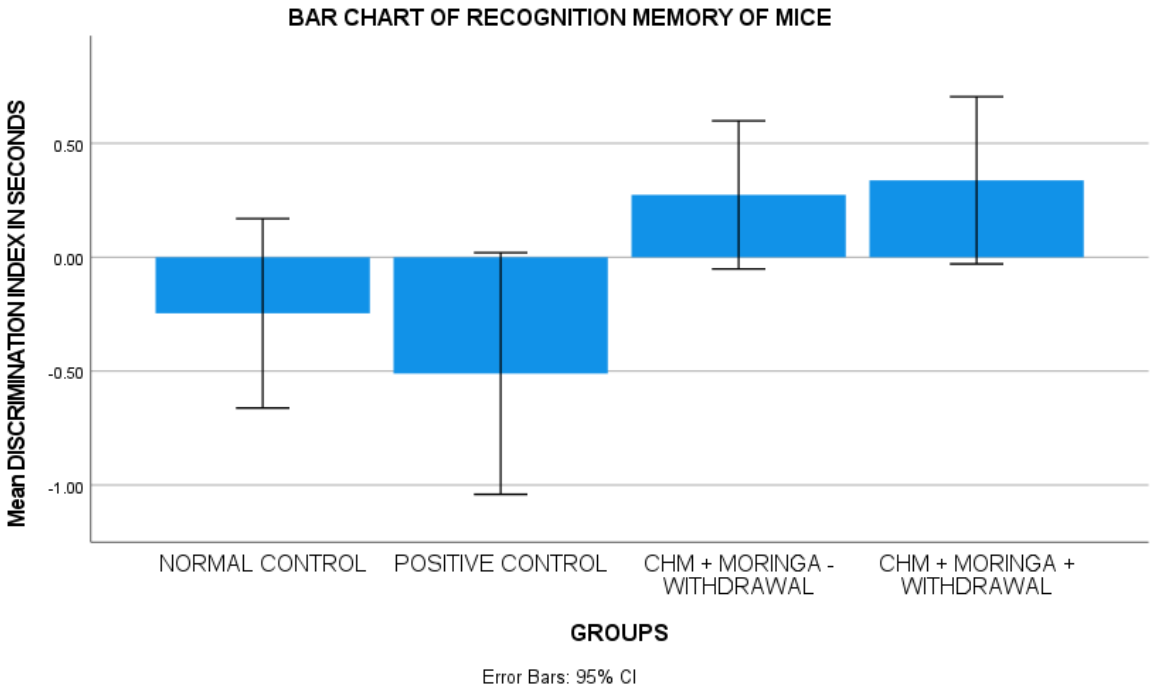
Both sexes of mice (albino) having being acquired were kept under laboratory experimental condition standard for rodents as typical for neurobehaviour investigations. Obtained fresh leaves of moringa oleifera were duly processed into suitable form specified in study design[8]; which had 4 groups of five animals each designated Normal control (1), stressed + moringa treatment – withdrawal (2), Moringa + withdrawal (3) and stressed +

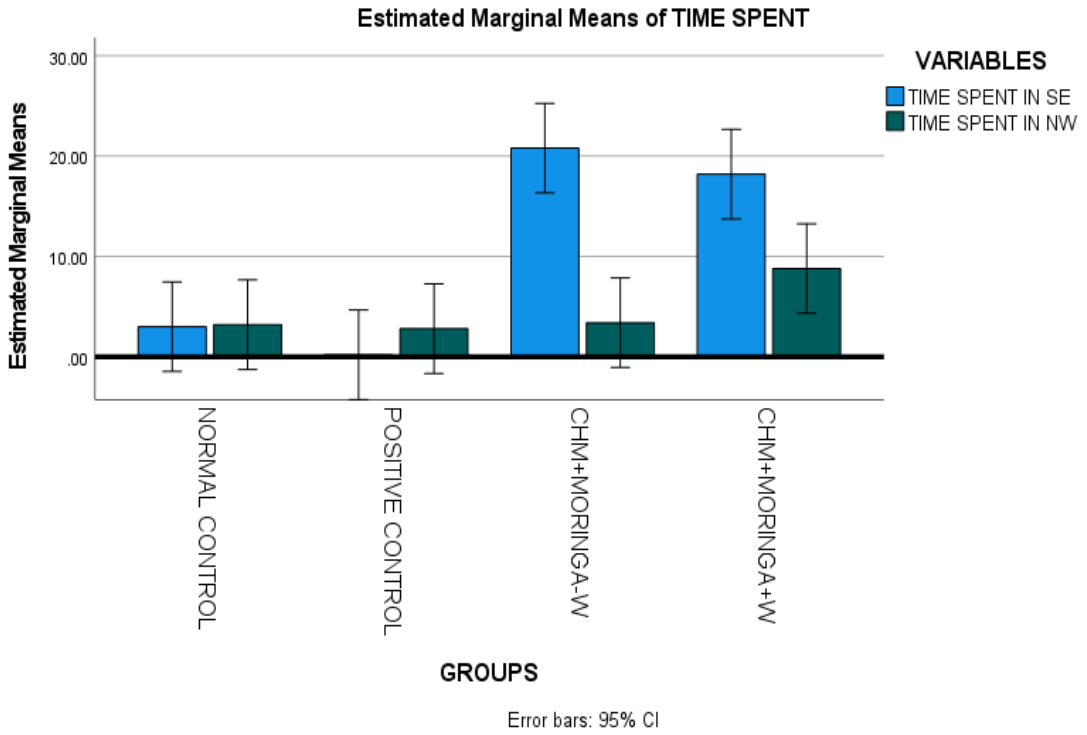
moringa + withdrawal (4). Stress exposure was achieved in line with procedure of [10]

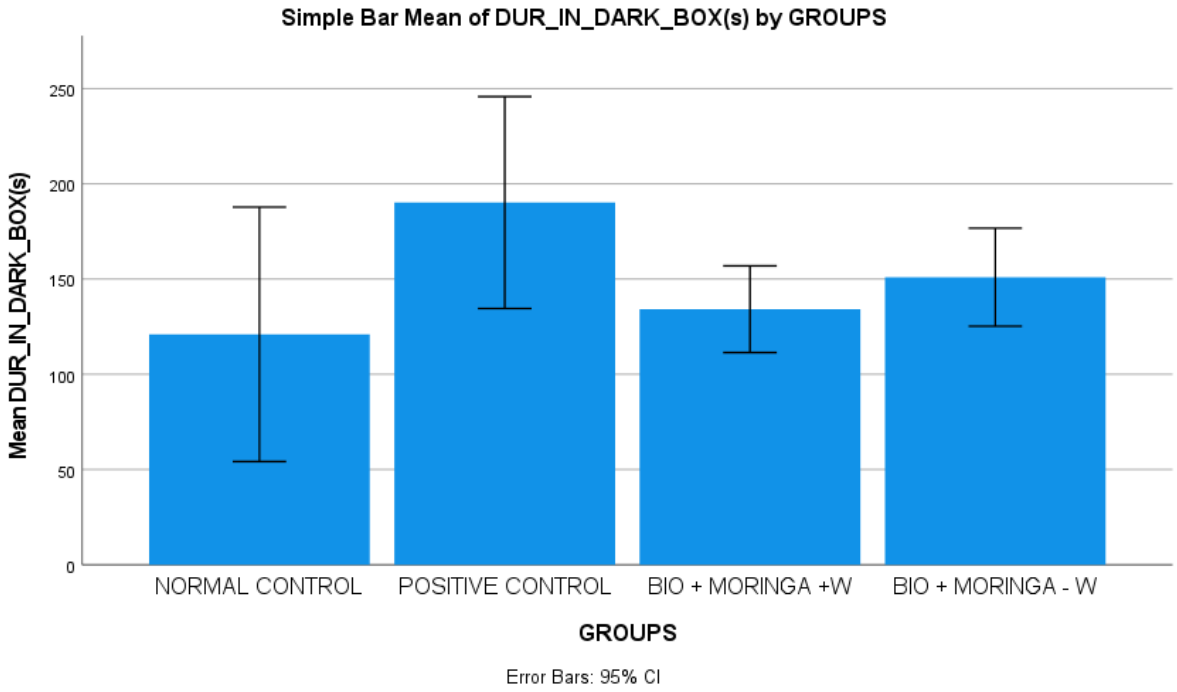
The animals were subjected to those preselected study models following administration of treatments reeled in the design; and parameters previewed in the MORRIS WATER MAZE (MWM) with principle premised on innate capacity of mice within a pool swim, using visual cues in locating escape platform and as done for novel recognition test (NOR)[11,12].

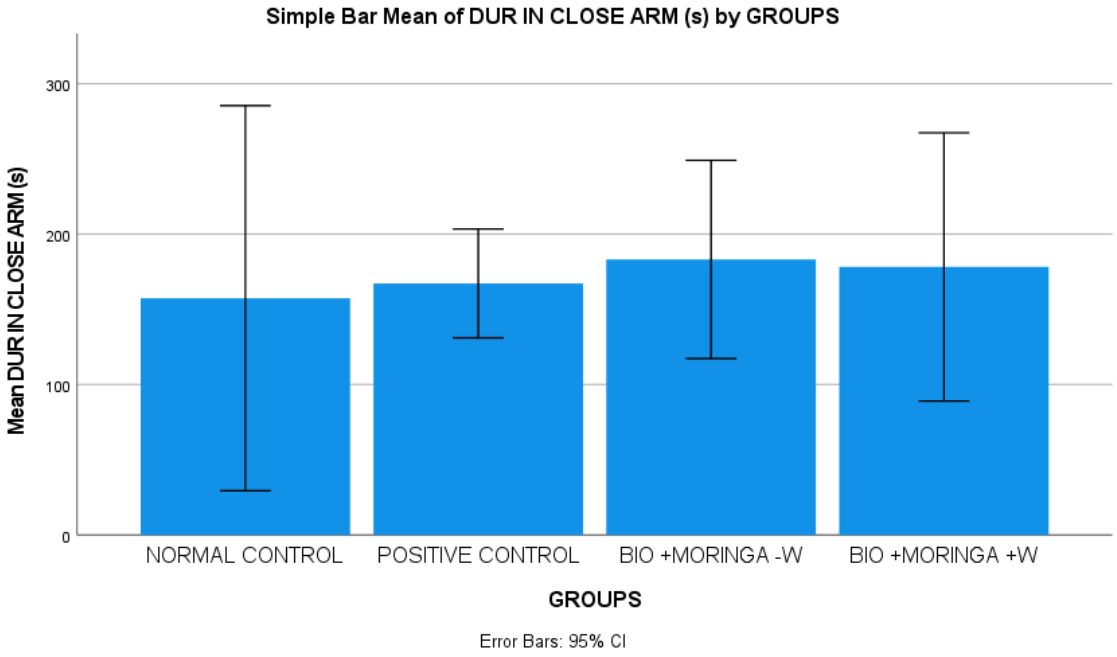
Again, the elevated plus maze and light and dark box were utilized to assess anxiety patterns or parameters (such as exploring the open and closed arms, head dipping urination etc marking some measure of comportment as against being overtly alert with anticipation[5,6,7]

RESULTS




Estimated Marginal Means of TIME SPENT
Estimated Marginal Means
30.00
20.00
10.00
.00
VARIABLES
TIME SPENT IN SE
TIME SPENT IN NW
NORMAL CONTROL
POSITIVE CONTROL
CHM+MORINGA-W
CHM+MORINGA+W
GROUPS
Error bars: 95% CI


Simple Bar Mean of DUR_IN_DARK_BOX(s) by GROUPS
Mean DUR_IN_DARK_BOX(s)
250
200
150
100
50
0
NORMAL CONTROL
POSITIVE CONTROL
BIO + MORINGA +W
BIO + MORINGA - W
GROUPS
Error Bars: 95% CI



DISCUSSION

Moringa oleifera which is considered as herbal remedy is being investigated by our team of researchers in recent times for various effects on neurobehaviour parameters, with a view to contribute in the pool of knowledge towards intervention in neurodegenerative disorders[5,13]. In the present study, the herb was administered to rodents in a study design aimed at investigating effects of its continuous administration and sudden withdrawal on anxiety and cognitive behaviour; while comparatively evaluating the experimental study models.

COMPARISON OF VISUO-SPATIAL ACTIVITY IN MORRIS WATER MAZE TO RECOGNITION MEMORY IN THE NOR TEST

A comparison of the two paradigms used to assess learning and memory showed the same trend in all experimental groups except normal control group compared to the non- withdrawal group in the novel object recognition test which showed significant difference. This could be attributed to the easy nature of the task which takes 3 days compared to the Morris water maze which takes about 8 days to complete.

COMPARISON OF ANXIETY BEHAVIOUR PATTERNS IN ELEVATED PLUS MAZE AND LIGHT AND DARK BOX APPARATUS

Both measures indicate no significant difference between the Moringa-withdrawn and continuously treated groups, suggesting that the anxiolytic effects of Moringa might persist even after withdrawal. These results corroborate several studies reporting Moringa oleifera as possessing anxiolytic properties, meaning it may help reduce anxiety symptoms[14]

CONCLUSION

Conclusively, the observed outcomes show that analysis of parameters for cognitive behaviour as independently assessed by both models tally. Similarly, that for anxiety behaviour was in tandem. And in all, moringa oleifera had health benefits of improving cognitive function and reducing

anxiety without leaving trace of withdrawal effects.

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