

OMEGA-3 FISH OIL AND CANNABIDIOL AMELIORATES HIPPOCAMPAL-HYPOTHALAMIC TOXICITY INDUCED BY SLEEP DEPRIVATION IN ADULT MALE WISTAR RATS

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ABSTRACT

Sleep deprivation leading to increased corticosterone secretion has detrimental effects on various aspects of health, including cognitive function. In Alzheimer's disease, the chemistry between the hippocampus and hypothalamus becomes particularly relevant. The hypothalamus regulates the stress response by modulating corticosterone levels, which may influence hippocampal function. Chronic stress and elevated corticosterone have been shown to impair memory formation and exacerbate the neurodegenerative processes characteristic of Alzheimer's disease

Methods: Thirty-five rats were divided into five groups. The control group received 1ml/kg of distilled water. Groups II to V were sleep-deprived for 18 hours daily using the multiple sleep deprivation platform. In addition, Group III was administered 200mg/kg omega-3 fish oil, Group IV received 10mg/kg cannabidiol, Group V received 200mg/kg omega-3 fish oil, and 10mg/kg cannabidiol. Once daily for 4 consecutive weeks, spatial memory behavioural tests using the Morris water maze were conducted. Experimentation and administration lasted for 21 days, after which the rats were humanely sacrificed. Blood samples were collected for corticosterone analysis, the skulls were opened, and the brains were harvested and fixed for histological studies

Result: Animals in Group II showed a significant decrease in the time taken for the experimental rats to locate the escape platform. There were significantly reduced corticosterone levels in Groups III, IV, and V, respectively, compared to Group II. Histoarchitectural distortions were observed in the hippocampal and hypothalamic regions in Group II; however, there were pronounced restorations in Group V.

Conclusion: Co-administration of omega-3 fish oil and cannabidiol showed ameliorative potentials in sleep-deprivation-induced dysfunction in the Hippocampal-Hypothalamic structures of Wistar rats by increasing spatial memory functions, reducing corticosterone, and restoring histoarchitectural distortions

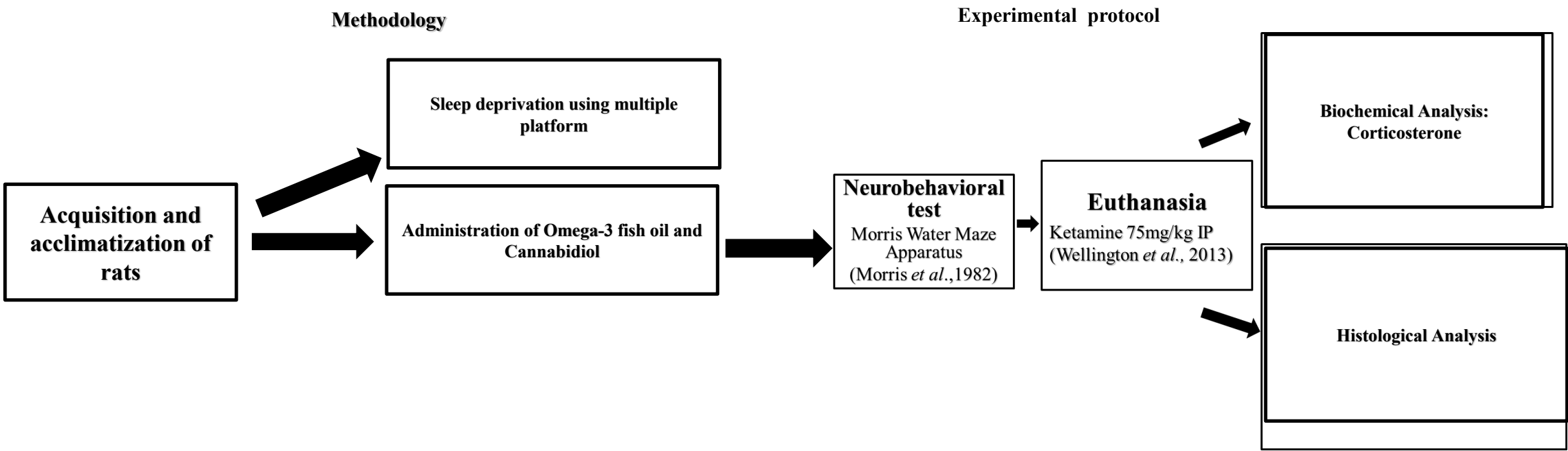
OBJECTIVES

The objectives of the studies were to evaluate the effects of Co-administration of Omega-3 fish oil and Cannabidiol ameliorates Hippocampal-hypothalamic toxicity induced by sleep deprivation in adult male Wistar rats on

- spatial learning and memory
- general histo-architecture of the hippocampus and hypothalamus
- Serum corticosterone level

MATERIALS AND METHODS

35 Adult Male Wistar rats (110-150g), Omega-3 fish oil, Cannabidiol, Light Microscope, Bouin's fluid for tissue fixation, Distilled water, Centrifuge, Digital weighing balance. Microtome, Glass slides, Cover slips, Phosphate buffer salt, Specimen bottle, H&E, Dissecting kit, Syringes, Anaesthesia (Ketamine), gloves and animal feed.



RESULTS

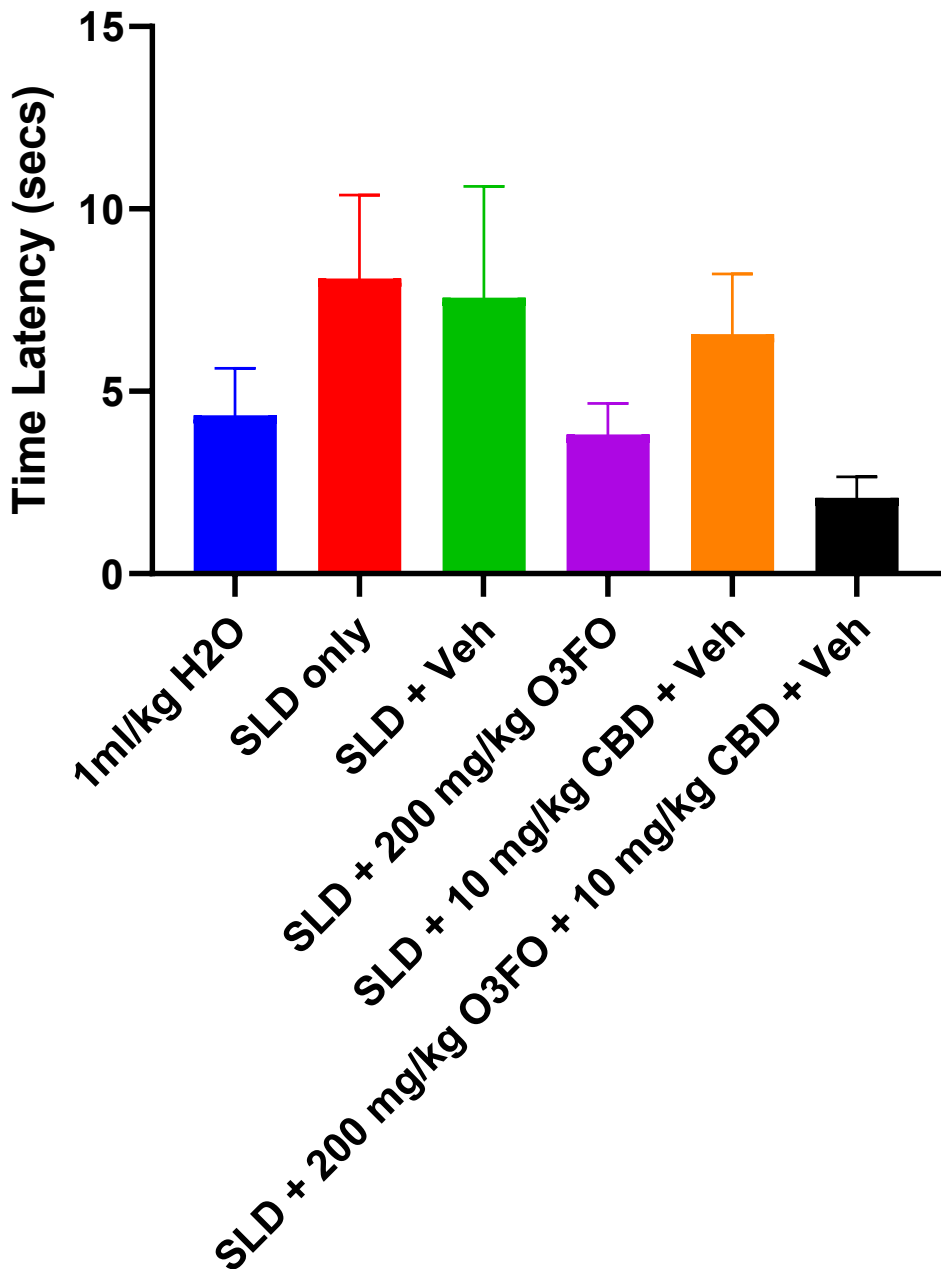


Fig 1: Morris water maze probe test following administration of cannabidiol and omega-3-fish oil in sleep deprived Wistar rat
n=7, one-way ANOVA followed by Tukey Post hoc test, p <0.05, OFO = Omega-3 fish oil (200m/kg), CBD = Cannabidiol (10mg/kg)

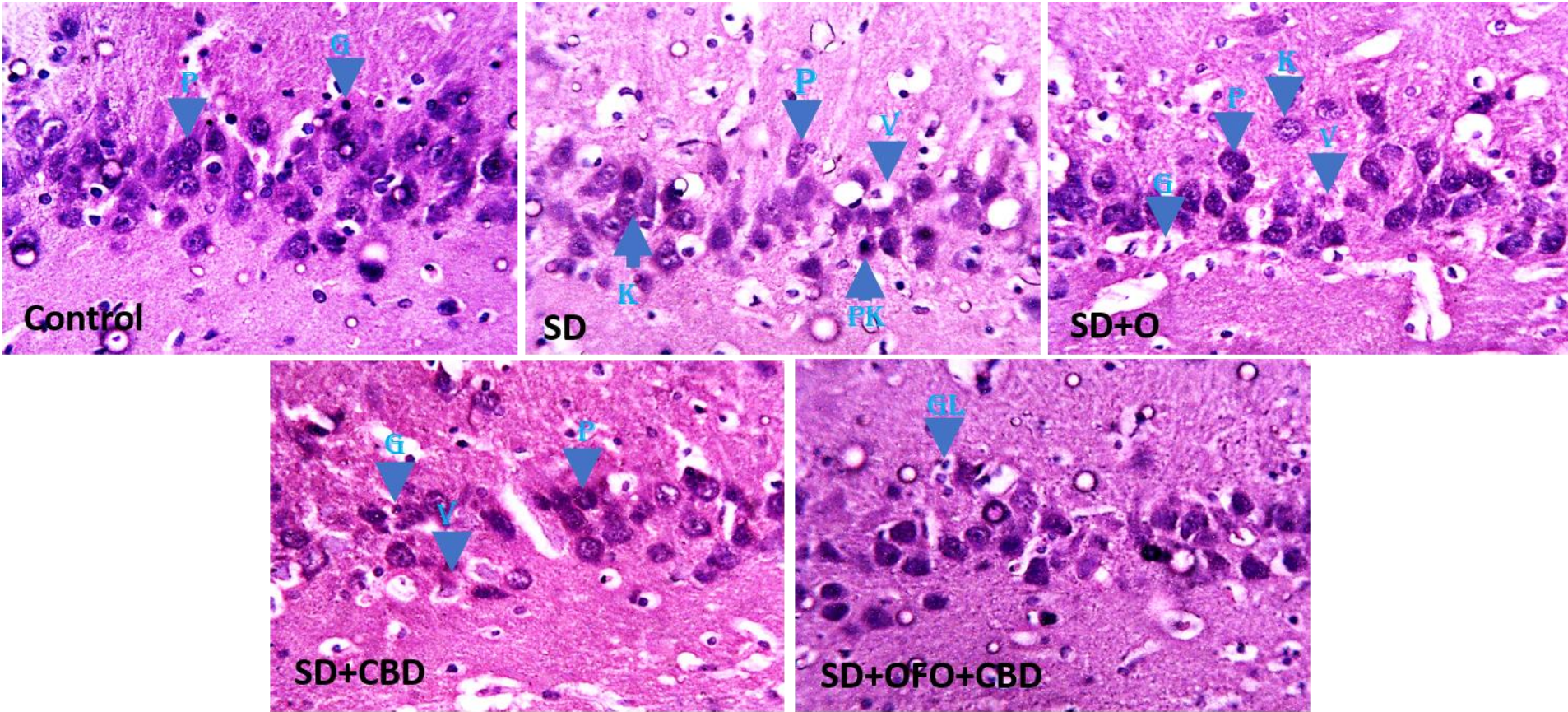


Fig 2: Photomicrograph of the CA3 region of the hippocampus of Wistar rats (H and E Magx200)
Control = (Control), SD = (Sleep deprivation only), SD+O = (Sleep deprivation + Omega 3 Fish Oil), SD+OFO+O3FO = (Sleep deprivation + Cannabidiol), SD+OFO+O3FO+O3FO = (Sleep deprivation + Omega-3 Fish Oil + Cannabidiol), PC-pyramidal cell, PK-Pkynosis, K-Karyolysis

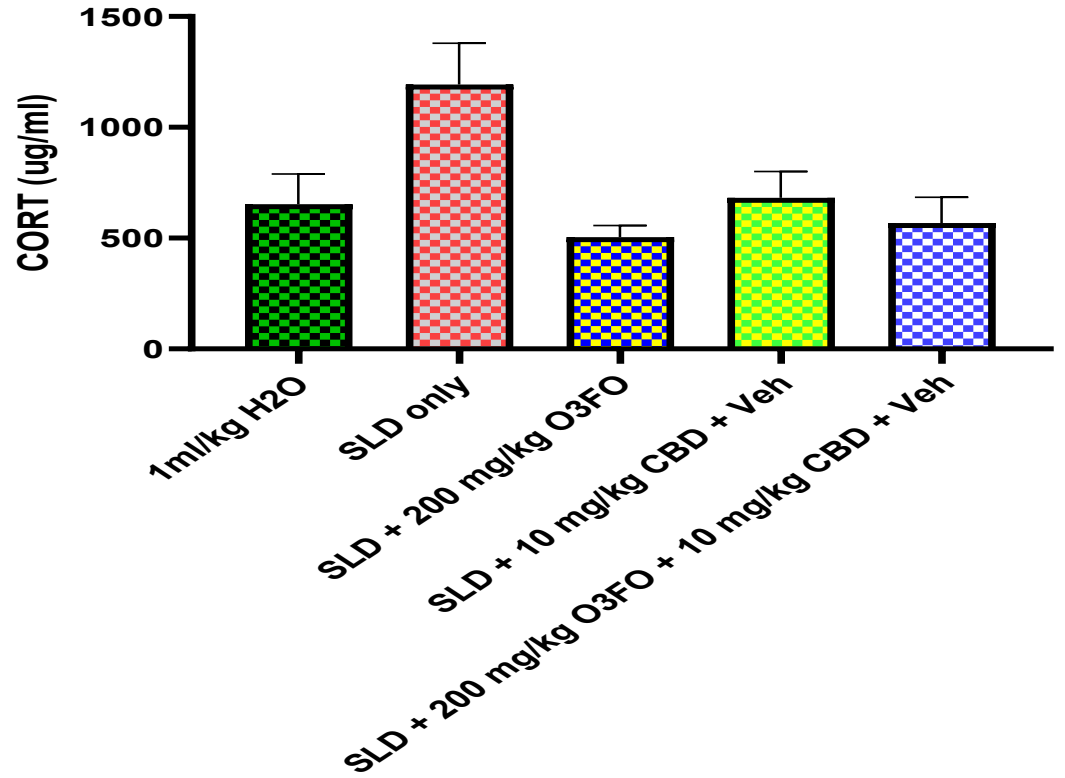


Fig 3: Corticosterone level following administration of cannabidiol and omega-3-fish oil in sleep deprived Wistar rat
n=7, one-way ANOVA followed by Tukey Post hoc test, p <0.05, OFO = Omega-3 fish oil (200m/kg), CBD = Cannabidiol (10mg/kg)

CONCLUSIONS

Co-administration of omega-3 fish oil and cannabidiol showed ameliorative potentials in sleep-deprivation-induced dysfunction in the Hippocampal-Hypothalamic structures of Wistar rats by increasing spatial memory functions, reducing corticosterone, and restoring histoarchitectural distortions

REFERENCES

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ACKNOWLEDGEMENTS

The technical staff of the Histology Unit of the Department of Human Anatomy, Faculty of Basic Medical Sciences, Ahmadu Bello University Zaria, Nigeria