eSLEEP EUROPE
October 4-6, 2023 | Virtual Congress

“DEPRESSIVE-LIKE” BEHAVIOUR CAUSED BY FORCED SWIMMING RESULTS IN MINOR CHANGES IN SLEEP AND WAKEFULNESS

Oleksandr V. Shylo, Victoria V. Lomako

Institute for Problems of Cryobiology and Cryomedicine of the National Academy of Sciences of Ukraine, Kharkiv, Ukraine

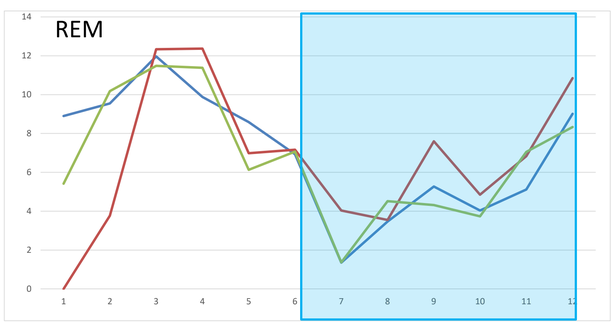
INTRODUCTION

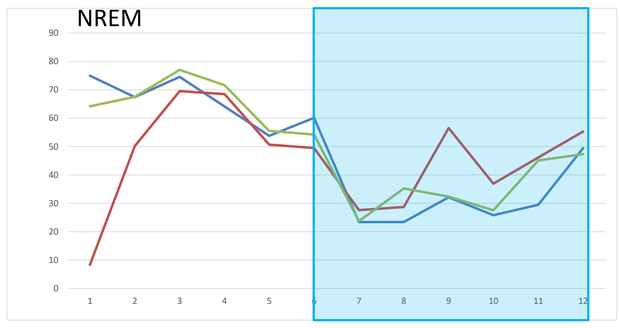
Depending on the nature of the stress, its effect on amount of the vigilance states and sleep architecture may vary dramatically. It is believed that coping with stress, namely, choosing a specific coping strategy may either reduce or enhance negative consequences of the effect of stress. Facing acute inescapable stress animals can choose certain coping strategies that can be graded like active or passive. The development of the latter is often referred to “depressive-like” state and considered as a form of adaptation to unpredictable and hazardous situations. How choosing a passive strategy to cope with stress affect sleep is still poorly studied.

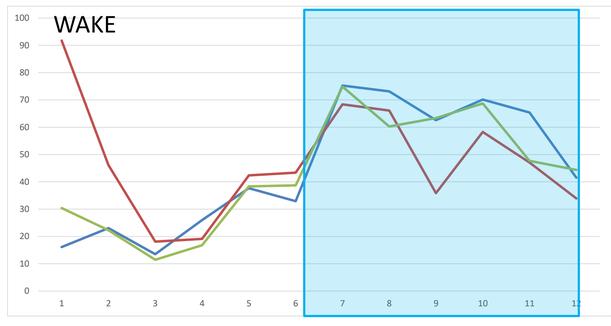
We aimed to examine the effect of forced swimming leading, to the development of “depressive-like” state on sleep and wakefulness in rats.

RESULTS

The experiments were performed in 7-8-month male white breedless rats (m=250-300 g, n=7). Rats were individually subjected to one 15min swimming session in a tank filled with water (26°C). Continuous EEG and EMG registration and locomotor activity video recording were performed before (-----), after (-----) and the day after swimming (-----).
Sleep stages were scored off-line by visual inspection of 4 s epochs. Data were means ± D, compared by ANOVA.

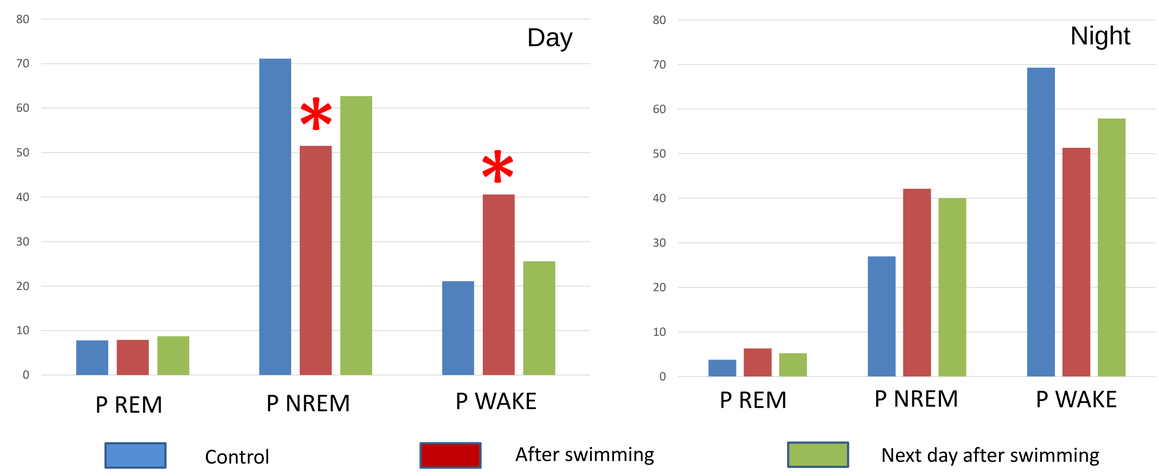




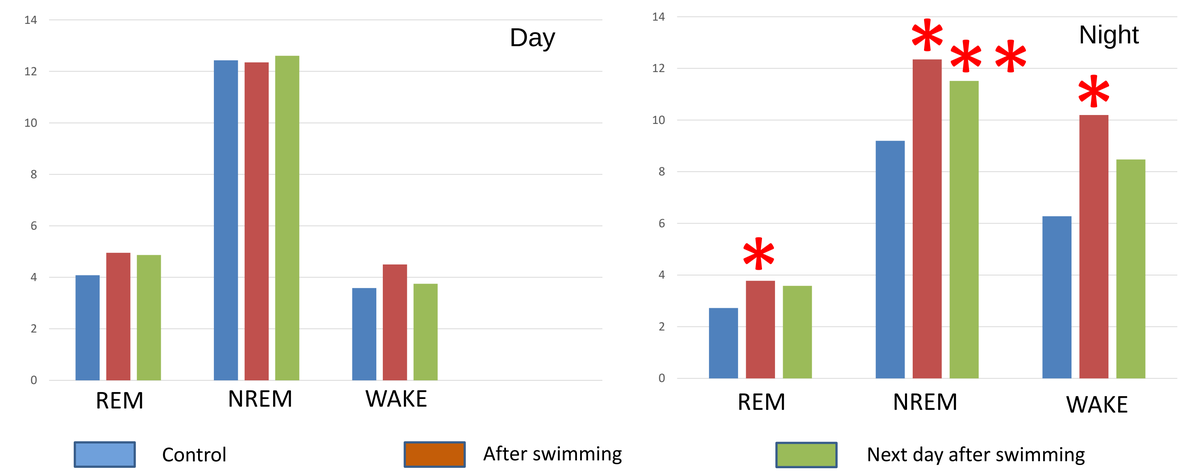


Changes in REM, NREM and WAKE amount (%, 2-hours interval)

Daytime Wakefulness percentage increased and NREMS percentage decreased from 24.99±21.71 to 38.55±18.38 (p>0.01, F=6.608, control vs swimming) and from 65.37±37.25 down to 53.75±9.52 (p>0.02, F=6.608, control vs swimming) correspondingly. Nighttime after swimming was marked by increasing in the number of episodes of all vigilance states compared to the control night: Wakefulness from 6.4±1.1 to 10.4±0.9 (p>0.008, F=7,709), NREMS from 8.7±1.2 to 12.6±3.9 (p>0.04, F=7.709) and REMS from 2.5±0.3 to s 3.8±0.2 (p>0.04, F=7,709).



Vigilance states percentage



Number of episodes

Only nighttime NREMS episodes number increased next day after swimming (8.7±1.1 vs 11.3±0.1, p>0.04, F=10,128, control vs next day after swimming).

CONCLUSION

Development of “depressive-like” behavior, as a passive strategy coping with inescapable stress, in forced swim test results in increase in Wakefulness percentage and decrease in NREMS amount during the daytime as well as increase in the number of episodes of all vigilance states during the nighttime immediately after swimming.

REFERENCES

Kowalczuk K, Krajewska-Kułak E, Sobolewski M. Relationships Between Sleep Problems and Stress Coping Strategies Adopted by Nurses Including Socio-Occupational Factors. Front Psychiatry. 2021 Jun 10;12:660776. doi: 10.3389/fpsyt.2021.660776. PMID: 34177648; PMCID: PMC8223071.

Commons KG, Cholanians AB, Babb JA, Ehlinger DG. The Rodent Forced Swim Test Measures Stress-Coping Strategy, Not Depression-like Behavior. ACS Chem Neurosci. 2017 May 17;8(5):955-960. doi: 10.1021/acschemneuro.7b00042. Epub 2017 Mar 22. PMID: 28287253; PMCID: PMC5518600.

Lopez-Rodriguez F, Kim J, Poland RE. Total sleep deprivation decreases immobility in the forced-swim test. Neuropsychopharmacology. 2004 Jun;29(6):1105-11. doi: 10.1038/sj.npp.1300406. PMID: 14970835.

Kim EJ, Dimsdale JE. The effect of psychosocial stress on sleep: a review of polysomnographic evidence. Behav Sleep Med. 2007;5(4):256-78. doi: 10.1080/15402000701557383. PMID: 17937582; PMCID: PMC4266573.

SteigerA., PawlowskiM.Depression and Sleep. Int. J. Mol. Sci. 2019, 20(3), 07; https://doi.org/10.3390/ijms20030607

CONTACT

Oleksandr V. Shylo, PhD, 23, Pereyaslavskaya Str., Institute for Problems of Cryobiology and Cryomedicine NAS of Ukraine, Kharkiv, 61016, UKRAINE. oleksandr.v.shylo@gmail.com

https://esleepeurope.eu/