

# Cannabidiol and its potential use by athletes

Vinícius Vaz<sup>1</sup>, Anderson dos Santos<sup>2</sup>, Priscila Morelhao<sup>3</sup>, Sergio Tufik<sup>4</sup>, Monica Andersen<sup>5</sup>, and Cynthia Gobbi<sup>6</sup>

<sup>1</sup>CESUMAR

<sup>2</sup>Unespar

<sup>3</sup>Universidade Federal de São Paulo

<sup>4</sup>UNIFESP

<sup>5</sup>Universidade Federal de São Paulo

<sup>6</sup>Universidade Unicesumar

April 16, 2024

## Cannabidiol and its potential use by athletes

Vinicius S. Vaz<sup>1</sup> PT, Anderson B. dos Santos<sup>1</sup> PT, Priscila K. Morelhão<sup>2</sup>PhD, Sergio Tufik<sup>2</sup> MD PhD, Monica L. Andersen<sup>2</sup> PhD and Cynthia Gobbi<sup>1</sup> PhD

<sup>1</sup>Universidade Cesumar (UniCesumar), Maringá, Paraná, Brazil.

<sup>2</sup>Universidade Federal de São Paulo, Escola Paulista de Medicina, São Paulo, Brazil.

## Corresponding author:

Cynthia Gobbi, PhD

Department of Physical Therapy, Universidade Cesumar (UniCesumar)

Av. Guedner, 1610-Jardim Aclimacao, Maringá-PR, 87050-900

Phone: +55 (44) 99166-8665

E-mail: [cynthiogobbi@hotmail.com](mailto:cynthiogobbi@hotmail.com)

## Acknowledgments/Fundings

Our studies are supported by grants from the Associação Fundo de Incentivo à Pesquisa (AFIP). MLA and ST are Conselho Nacional de Desenvolvimento Científico e Tecnológico CNPq fellowship recipients.

## Conflicts of interest

The authors report no conflicts of interest.

Dear Editor,

Maintaining a competitive and healthy environment in professional sport is a significant challenge. The World Anti-Doping Agency (WADA) is in charge of deciding what substances are permitted or prohibited in or out of competition. Cannabis use has been prohibited by WADA since 2003, but a phytocannabinoid called cannabidiol (CBD) was removed from the list of non-permitted substances in and out of competition in 2018<sup>1</sup>. CBD seems to have pharmacological properties, and could be a potential approach to handle different impairments, like psychological and neurological disorders and pain<sup>2,4</sup>. However, CBD is still illegal in many countries and the “taboo” around the substance has resulted in the creation of a barrier to research into

CBD and its pharmacological management. The consequent relative lack of good evidence in respect of its properties is an issue that has been cited by different authors<sup>3-5</sup>.

Studies demonstrated that cannabis usage is a common practice among some athletes<sup>6,7</sup>, with the majority using it for recreational purposes and some reports of its sport-related use. There is growing evidence about the consumption of cannabinoids for the treatment of pain<sup>2</sup>, anxiety and sleep problems<sup>8</sup> in the general population. Different possibilities are being explored for the use of cannabinoids in health care, and although not yet fully understood, the endogenous cannabinoid system (ECS) has been a target in some approaches. Research showed that the ECS plays an important role in a range of processes, particularly in respect of the control of pain<sup>3</sup>. Few studies on the use of cannabinoids by athletes focused on their effects on performance. The results have been contradictory, reporting both decrement and improvement<sup>9</sup>.

One problem that is a frequent concern among athletes is sleep disturbance and poor sleep quality<sup>10</sup>, particularly, but not solely, before competition periods<sup>11</sup>. Sleep problems can alter the levels of blood hormones and cytokines that are related to muscle recovery<sup>12</sup>. While the potential mechanisms are not yet fully elucidated, they can affect cognitive responses<sup>13</sup>. Some limited data from cannabinoid studies and athletes' personal reports have suggested that the administration of CBD may result in better sleep quality<sup>8</sup>. It is possible that cannabinoids could have an indirect effect on athlete's performance by promoting better sleep quality, rather than by directly enhancing their power or endurance. Data in relation to this latter hypothesis is contradictory and lacking in quality.

Some data suggested that the endocannabinoid system appears to be involved in the regulation of the circadian sleep-wake cycle<sup>14</sup>. CBD described to have different effects on the sleep-wake cycle at different dosages, with a low dosage having a stimulating effect and a high dosage, a sedating effect<sup>15</sup>. Pre-clinical studies with CBD suggested that it influences sleepiness and sleep time<sup>16</sup>. More research is needed to understand if cannabidiol could have the potential to help athletes to manage sleep impairments. However, the absence of clinical trials, the low quality of some studies and the barriers to conduct research into cannabidiol limits decision making. Since the literature is controversial among cannabis intake and sleep quality, pre-clinical studies are needed to investigate, in fact, the effects of CBD into sleep, and establish whether it has any direct effect on performance. In this way, it could be possible to understand if there is any safe dosage that would help sleep quality and recovery in athletes, conducting clinical studies that could show the effects of CBD into these conditions, and it's potential to be a valid approach to help athletes while not conflicting with the current WADA rules.

## References

1. World Anti-Doping Agency. WORLD ANTI-DOPING CODE 2015 with 2018 amendments.
2. Nutt DJ, Phillips LD, Barnes MP, et al. A Multicriteria Decision Analysis Comparing Pharmacotherapy for Chronic Neuropathic Pain, Including Cannabinoids and Cannabis-Based Medical Products. *Cannabis Cannabinoid Res* . 2021. doi:10.1089/can.2020.0129
3. Ware MA, Jensen D, Barrette A, Vernec A, Derman W. Cannabis and the Health and Performance of the Elite Athlete. *Clin J Sport Med* . 2018;28(5):480-484. doi:10.1097/JSM.0000000000000650
4. Nguyen T. Working out with weed. *Nature* . 2019;572(7771):S14-S15. doi:10.1038/d41586-019-02529-0
5. McCartney D, Benson MJ, Desbrow B, Irwin C, Suraev A, McGregor IS. Cannabidiol and Sports Performance: a Narrative Review of Relevant Evidence and Recommendations for Future Research. *Sport Med - Open* . 2020;6(1):27. doi:10.1186/s40798-020-00251-0
6. Brisola-Santos MB, Gallinaro JG de ME, Gil F, et al. Prevalence and correlates of cannabis use among athletes-A systematic review. *Am J Addict* . 2016;25(7):518-528. doi:10.1111/ajad.12425
7. Zeiger JS, Silvers WS, Fleeegler EM, Zeiger RS. Age related differences in cannabis use and subjective effects in a large population-based survey of adult athletes. *J Cannabis Res* . 2019;1(1):7. doi:10.1186/s42238-019-0006-9

8. Babson KA, Sottile J, Morabito D. Cannabis, Cannabinoids, and Sleep: a Review of the Literature. *Curr Psychiatry Rep* . 2017;19(4):23. doi:10.1007/s11920-017-0775-9
9. Trinh K V, Diep D, Robson H. Marijuana and Its Effects on Athletic Performance: A Systematic Review. *Clin J Sport Med* . 2018;28(4):350-357. doi:10.1097/JSM.0000000000000471
10. Bender AM, Samuels CH. Comment on: “Does Elite Sport Degrade Sleep Quality? A Systematic Review.” *Sport Med* . 2017;47(7):1453-1454. doi:10.1007/s40279-017-0712-4
11. Juliff LE, Halson SL, Peiffer JJ. Understanding sleep disturbance in athletes prior to important competitions. *J Sci Med Sport* . 2014;14:1-20. doi:10.1016/j.jsams.2014.02.007
12. Dáttilo M, Antunes HKM, Galbes NMN, et al. Effects of Sleep Deprivation on Acute Skeletal Muscle Recovery after Exercise. *Med Sci Sport Exerc* . 2020;52(2):507-514. doi:10.1249/MSS.0000000000002137
13. Fullagar HHK, Skorski S, Duffield R, Hammes D, Coutts AJ, Meyer T. Sleep and Athletic Performance: The Effects of Sleep Loss on Exercise Performance, and Physiological and Cognitive Responses to Exercise. *Sport Med* . 2015;45(2):161-186. doi:10.1007/s40279-014-0260-0
14. Sanford AE, Castillo E, Gannon RL. Cannabinoids and hamster circadian activity rhythms. *Brain Res* . 2008;1222:141-148. doi:10.1016/j.brainres.2008.05.048
15. Gamelin F-X, Cuvelier G, Mendes A, et al. Cannabidiol in sport: Ergogenic or else? *Pharmacol Res* . 2020;156:104764. doi:10.1016/j.phrs.2020.104764
16. Suraev AS, Marshall NS, Vandrey R, et al. Cannabinoid therapies in the management of sleep disorders: A systematic review of preclinical and clinical studies. *Sleep Med Rev* . 2020;53:101339. doi:10.1016/j.smrv.2020.101339