

Review Article

Aromatherapy and Its Impact on Taekwondo Athletes' Performance: A Bibliographic Review

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Abstract

Taekwondo, a Korean martial art, has gained worldwide popularity thanks to its combination of physical, mental, technical and psychological components. The use of aromatherapy is a factor that has received attention in the field of sports performance enhancement. It is a practice of using essential oils (Eos) for their potential therapeutic effects, has been explored for its impact on physiological and psychological processes and its positive results are now becoming a trend in research on athletes' sports performance. An exhaustive inventory of studies and works dealing with the effect of aromatherapy on the performance of taekwondo athletes was carried out. The results show that for Taekwondo athletes, the use of aromatherapy can be a natural and complementary approach to improving their competitive abilities. Aromatherapy involves the use of essential oils derived from different plants to improve physical and mental well-being. Studies have indicated that certain essential oils, when diffused or applied topically, can have a positive impact on physical performance. They have also been shown to improve the body's ability to absorb essential vitamins and nutrients. In this sense, the application of these oils not only helps prevent and heal sports injuries, but also stimulate and relax the mind and body, leading to higher levels of physical fitness. Also, aimed at improving mood and performance in order to obtain a higher rate of sporting success as well as recovery after exercise. These oils can be used to speed recovery, reduce the effects of fatigue and increase the energy level of the mind and body. Therefore, the potential benefits of aromatherapy on competitive taekwondo athletes' performance warrant further research. This work is a bibliographic review of all the studies and works aimed at illustrating the listed effects of aromatherapy on the performance of Taekwondo athletes.

Keywords

Aromatherapy, Athletes, Essential Oils, Sports Performance, Taekwondo, Wellness

1. Introduction

Nowadays, sports involve high competitive levels imposing competitive pressures on athletes [1]. Controlling their

emotional state at the level of a competition remains a universal challenge for athletes. Staying calm, counteracting

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stress and anxiety are important factors affecting their performance. This effect generates consequences for athletes before, during and after the competition [2]. Secondly, another important aspect is physical fatigue after the competition. In addition, the major problem is the physical condition of athletes resulting from insufficient recovery capacity that can lead to their inability to use their physical strength to reach their performance potential and apply the skills necessary to compete in the next round. These factors will have a negative effect on the athlete's performance [1, 2]. Additionally, fitness-related conditions can lead to a loss of confidence and increased anxiety. Participating in sporting events with repetitive matches can lead to increased fatigue as energy reserves are quickly consumed. Moreover, the athlete may experience mental pressure and stress, including anxiety, which can lead to an inability to perform to their full potential and give their best in competition. Physical recovery is an important factor for athletes. If they are able to recover quickly after a competition or exercise, their ability to return to exercise will also improve [3]. Full recovery after exercise can take anywhere from 30 minutes to 1 hour. A common method is to rest for a one to two hours recovery period in a seated position. This allows the body to recover naturally after a sudden reduction in body capacity and function following high-intensity exercise. During this time, the body begins the recovery process, such as synthesizing adenosine triphosphate (ATP) or removing toxins, such as lactic acid from the muscles [4]. Taekwondo is a Korean martial art that has developed as an international competitive sport. Based on fast and powerful kicking techniques as well as punching techniques, Taekwondo is recognized for its dynamics and strategy, requiring strength, agility, flexibility and mental concentration from its practitioners [5]. Taekwondo has its origins in ancient Korean martial arts forms, but its modern form was established in the 1950s and 1960s [6]. It is characterized by a series of high kicking techniques, rapid punches and movements defense [5]. Taekwondo competitions are divided into two main categories. Kyorugi and technical events poomsae [6]. The Kyorugi takes place in a ring and involves clashes between two competitors, where speed of execution, precision of blows and tactical strategy are crucial. Poomsae tests assess the precision and fluidity of predefined technical movements [6]. Taekwondo requires a high level of physical fitness to succeed. Athletes must possess significant muscular strength, particularly in the legs to execute powerful and fast kicks. Flexibility is also key to achieving effective kicking heights and defensive positions. Endurance is necessary to maintain intensity throughout a fight or competition [5]. Due to the intense nature of Taekwondo training and competition, managing physical recovery is crucial to avoid injury and maximize performance. Additionally, managing stress and anxiety before and during competitions plays a crucial role in athletes' performance [1, 2]. In competitive sports, athletes are constantly looking for ways to improve their physical and mental abilities in order to gain an edge over their opponents.

One approach that has gained attention in recent years is the use of aromatherapy, a practice that uses essential oils to promote various physiological and psychological benefits. Taekwondo, a dynamic martial art discipline, requires a delicate balance of physical prowess, mental focus and emotional control, making it a fascinating area to explore the potential impact of aromatherapy [7]. Aromatherapy is an ancient therapeutic practice that uses essential oils extracted from aromatic plants to promote health and well-being. These essential oils are mainly obtained by steam distillation or cold pressing of plant parts such as flowers, leaves, stems, bark and roots. Each essential oil has a unique chemical composition that gives it specific properties, such as anti-inflammatory, analgesic, antibacterial, antifungal, and relaxing properties [8]. The applications of aromatherapy are varied and cover both physical and psychological aspects of health. Traditionally used for its calming and therapeutic effects, aromatherapy has become popular in various areas, including relaxation, stress reduction, sleep improvement, and even in medical settings for its antimicrobial, antiseptic, and analgesic properties [8]. In the sports field, aromatherapy is being explored for its potential implications on the physical and mental performance of athletes. Essential oils are often used to promote muscle recovery after exercise, reduce muscle tension and pain, as well as improve concentration, alertness and stress management before, during and after intense physical exercise [9]. They are also used to stimulate the functions of the body and mind to establish balance not only for better health but also the prevention of diseases. Essential oils have many virtues, including reducing stress and anxiety, vitalizing and increasing the feeling of refreshment, inducing tranquility, improving concentration, reducing inflammation and pain, and helping the body understand and overcome abnormal symptoms [10]. The results of this study can be used as scientific data to support that essential oils have a profound effect on humans both physically and emotionally. Research carried out mainly in Thailand has shown that the use of lavender essential oil has a relaxing effect; therefore, lavender is a good choice to use in relaxation studies according to [11]. Studies conducted mainly in Thailand have shown that the use of lavender essential oil has a relaxing effect [11]. These researchers showed no significant differences between the groups using lavender essential oil in aromatherapy and exercising on a treadmill for 15 minutes. However, the study found that the hardness of the exercise decrease for the group receiving lavender aromatherapy [11]. Existing research has revealed the multifaceted nature of Taekwondo training, highlighting its influence on various aspects of an athlete's development. The cognitive complexity inherent in forms of Taekwondo or Poomsae has been found to engage participants in a comprehensive process involving planning, problem solving and spatial awareness. Additionally, practicing Taekwondo has been shown to improve self-esteem and emotional regulation in adolescents with attention deficit hyperactivity disorder (ADHD), highlighting the potential of

this art to address unique challenges that this population faces [12]. The potential for aromatherapy to complement and potentially amplify the benefits of Taekwondo training remains a fascinating area of research. Taekwondo, as a demanding sporting discipline, requires a combination of physical strength, agility, flexibility and mental focus. Taekwondo athletes are constantly subjected to intensive training and stressful competitions, where managing physical and mental performance plays a crucial role in success [13]. Recent studies have concluded that *citrus sinensis*, sweet orange essential oil, has a significant effect on reducing stress and anxiety in patients consulting for cardiovascular [14], dental [15] and hemodialysis [16] diseases. Its application has a positive effect on vital signs [15, 17] and parturition problems [18]. Its application gave antispasmodic, anticancer and anti-flatulence effects. This essential oil improves digestion and acts as an antihypertensive, stimulates the central nervous system [19], reduces depression [20] as well as exhibits anti-inflammatory, antimicrobial and antifungal properties in skin lesions [21]. Likewise, in physical exercise, it acts as an analgesic for muscle pain post training [22], improves the mood and sleep quality. In addition, there was positive effect on the volleyball players team performance [23]. Effectiveness on cardiac activity, ventricular function and systolic blood pressure in female players during exercise [24] are other benefits of using this essential oil. While examining the effects of aromatherapy on the performance of Taekwondo athletes, it is crucial to understand how essential oils can potentially influence physical performance, post-exercise recovery and psychological aspects such as stress reduction and relaxation.

This introduction provides an essential contextual basis to further explore specific studies on the use of aromatherapy in Taekwondo athletes and its potential implications for improving sports performance.

2. Materials and Methods

An exhaustive inventory of studies and information available on the use of aromatherapy by taekwondo athletes was carried out and the effects of this use were listed.

3. Results

The use of aromatherapy has shown promising effects on the physical endurance of Taekwondo practitioners. Aromatherapy involves the use of essential oils derived from plants to improve physical and mental well-being. Studies have indicated that certain essential oils, when diffused or applied topically, can have a positive impact on physical performance. For example, certain aromas like peppermint and eucalyptus have been linked to increased alertness and improved respiratory function, potentially increasing endurance during strenuous physical activities [13]. By integrating aromather-

apy into their training programs, Taekwondo athletes can benefit from improved strength and stamina, leading to better performance results.

4. Discussion

In sports performance, aromatherapy has been explored for its potential benefits in improving the abilities and overall performance of athletes. Understanding the fundamental principles and origins of aromatherapy is essential to understanding its application in a sporting setting, such as in the case of taekwondo athletes [25]. Aromatherapy, a practice that has gained popularity in various fields including sports and fitness, is defined as the science of holistic healing using natural plant extracts called essential oils [8].

Results revealed a significant increase in confidence and relaxation in the aromatherapy group compared to the control group [26]. Also, significant differences between the experimental groups and the control group regarding cognitive anxiety and somatic anxiety were showed and the reduction in anxiety was greater in the aromatherapy group. Aromatherapy's mechanisms of action involve the inhalation or topical application of essential oils, which then interact with the brain's limbic system, responsible for emotions, memory and motivation [27]. Through these interactions, essential oils can cause various physiological and psychological responses that can influence sports performance, recovery and general well-being. Research has shown that aromatherapy massage can have a positive impact on physical performance, as demonstrated by studies in which athletes who received aromatherapy massage showed better results in performance tests such as the repetitive sprint test (RST) [28]. By understanding how aromatherapy interacts with the body and mind, athletes and coaches can explore the potential benefits of incorporating aromatherapy into their training and competition routines. In addition to improving physical endurance, aromatherapy has been suggested to influence muscle recovery in athletes, contributing to post-workout or post-competition recovery [29]. Essential oils such as lavender and chamomile are known for their calming and soothing properties, which can help reduce muscle pain, inflammation and fatigue. By incorporating massage or aromatherapy diffusions after exercise, Taekwondo athletes can speed up the recovery process, allowing them to maintain peak performance levels consistently. This approach aligns with the goal of optimizing muscle recovery to support overall physical performance and prevent injury [30]. Additionally, aromatherapy has been recognized for its potential to reduce stress and improve mental focus, essential elements for Taekwondo athletes striving to achieve peak performance [31]. Certain essential oils like lavender, rosemary, and citrus scents have been linked to stress reduction, relaxation, and improved cognitive function. By creating a calming, focused environment through aromatherapy practices, athletes can better manage their nerves before competition, maintain mental

clarity during training sessions, and improve their overall performance. The psychological benefits of aromatherapy can complement physical training efforts, contributing to a holistic approach to optimizing sports performance and well-being [9].

Aromatherapy has shown promising results in managing anxiety and stress levels in athletes, including taekwondo practitioners [32]. High levels of anxiety can negatively impact an athlete's ability to effectively manage stress, leading to decreased self-esteem and ultimately affecting their performance [33]. By incorporating aromatherapy practices, athletes can potentially alleviate these negative effects and improve their mental resilience and performance [31]. Using specific essential oils, such as lavender or chamomile, known for their calming properties, promotes relaxation and reduces stress levels. This can be particularly beneficial for Taekwondo athletes who face intense training schedules and the pressure of competition. Aromatherapy is known for its mood-enhancing properties, making it a valuable tool for athletes seeking to optimize their psychological well-being [29]. The scents of essential oils can influence emotions and mood, potentially promoting feelings of positivity, relaxation and focus. For Taekwondo athletes, maintaining a positive and positive mood is crucial for training motivation and mental strength [34]. By incorporating aromatherapy into their routines, athletes can create an environment that promotes a positive mindset, which can positively impact their overall performance during training and competition [13, 35].

In the area of cognitive performance and concentration, aromatherapy has shown potential benefits for athletes, particularly Taekwondo practitioners [14, 36]. Certain essential oils, such as peppermint or rosemary, are said to improve concentration and cognitive functions, which may be beneficial for athletes requiring acute mental acuity during training and competitions [15]. By incorporating aromatherapy techniques like diffusing oils or using them in massage therapies, taekwondo athletes can benefit from improved focus, mental clarity, and overall cognitive performance [37]. These practices can help optimize performance results and improve the athlete's overall well-being and competitive advantage. These results are consistent with those of [33] on the effects of essential oils on physical and emotional condition, which showed a positive link between emotional response and brain waves in both relationships [relaxation with alpha brain waves]. In this study, the results show a relaxation of thigh muscle tone and a reduction in heart rate in the experimental group, inducing physical recovery after moderate exercise in a short time before returning to the normal state of the body. Second, the combination of imagery and aromatherapy produced a real effect on psychic and physiological factors. Third, this memory recognition technique can interact with appropriate stimulation of olfactory capacity with a correspondence between imagery and aromatherapy as an important stimulant of emotional reactions [38]. [39] found that lavender essential oil had an effect on the brain's image-producing function as

well as its actual aroma. The effects of essential oils are determined by the active compounds in essential oils that can act on various neurotransmitter pathways, including *noradren-ergic*, *5-HTergic* and *γ -aminobutyric acid (GABA)-ergic*, and *DAergic* [40]. These compounds induce different beneficial effects. Regarding a skin absorption route, current literature has verified the active compounds in essential oils as safe and suitable skin penetration enhancers for hydrophilic skin and hydrophobic drugs while the mechanism of their effects through skin absorption still requires further investigation. Once essential oils are applied by topical absorption, they are dissolved in water such as baths or in an oily medium such as massage [41]. Essential oils can be absorbed through the skin in three possible ways: the intercellular route between skin cells, the transcellular route through the cells and through the hair follicles bypassing the *stratum corneum*, the outermost layer of the epidermis [42]. The inhalation route includes the olfactory and respiratory systems. The olfactory system includes the olfactory bulb regulating the transmission of the odorous signal located in the nasal cavity.

The olfactory system is linked to different parts of the brain such as the *hypothalamus* and the *hippocampus*. Chemical molecules are transmitted to the central nervous system after crossing the olfactory mucosa in order to trigger emotional reactions. Orally, essential oils and their metabolites are absorbed and transported throughout the body by the bloodstream. During their passage through the body, essential oil molecules exert notable effects through three modes of action, namely biochemical [pharmacological], physiological and psychological [43]. Four main dimensions are involved in sports performance, namely: [a] talent; [b] strength; [c] endurance; and [d] recovery. High-level sporting performance requires high aptitude of these fundamental elements [44]. Muscular strength and endurance refer to the ability of muscle groups to exert or maintain maximal, repetitive contractions that last long enough to cause muscle fatigue [45]. Recovery is a stage of restoring athletes' physical condition to its normal state before competition [46]. Helping athletes recover, sports massage can be applied as a treatment to specific parts of the body using the hands or special tools to improve blood circulation or reduce fatigue [47]. Thus, the proper functioning of the brain with the efficiency of its functions such as attention, spatial/working memory, executive function, vigilance, concentration can contribute to optimal sports performance. Essential oils can help improve sports performance by modulating psychological states, better alertness and less mental fatigue [48]. Athletes can use these oils to help with both prevention and healing. Essential oils play a major role in preparing the body and mind for optimal sports performance and post-exercise recovery.

In summary, aromatherapy presents interesting potential to influence both the physiological and psychological aspects of Taekwondo athletes' performance. Although more research is needed to corroborate these effects and establish specific protocols for use, the available evidence suggests that aro-

mathotherapy may be a beneficial complementary approach to supporting the performance and well-being of Taekwondo athletes and sportspeople.

5. Conclusion

The use of aromatherapy has shown promising effects on the physical and psychological performance of Taekwondo athletes. Understanding the principles of aromatherapy, including its mechanisms of action and commonly used essential oils, forms the basis of its application in sport. Aromatherapy's impact on physical performance, such as improving endurance, aiding muscle recovery, and promoting stress reduction and mental focus, highlights its potential benefits for athletes. Additionally, the psychological effects of aromatherapy, including anxiety and stress management, mood enhancement, and improved concentration and cognitive performance, further support its positive influence on well-being. be general of athletes.

As research continues to explore the relationship between aromatherapy and athletic performance, integrating aromatherapy into the training programs of Taekwondo athletes may prove to be a valuable tool in optimizing their performance and wellness.

Abbreviations

EOs	Essential Oils
ATP	Adenosine Triphosphate
ADHD	Deficit Hyperactivity Disorder
RST	Repetitive Sprint Test
GABA,	Gamma-aminobutyric Acid

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Author Contributions

Bahouq Madiha: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

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Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Smith DJ. A Framework for Understanding the Training Process Leading to Elite Performance. *Sports Med* 33.2003; 1103–1126. <https://doi.org/10.2165/00007256-200333150-00003>
- [2] Jones M, Meijen C, McCarthy P J, Sheffield, D. A Theory of Challenge and Threat States in Athletes. *International Review of Sport and Exercise Psychology*. 2009; 2(2), 161–180. <https://doi.org/10.1080/17509840902829331>
- [3] Halson SL. Recovery techniques for athletes. *Sports Science Exchange*. 2013; 26.120, 1-6.
- [4] Samuel S, Charles H, et Alexander, Brent N. Sleep, recovery, and human performance. Alberta. Canadian Sport Institute, 2019.
- [5] McLaughlin A. The Physical and Physiological Demands of Taekwondo Training and International Competition. Liverpool John Moores University [United Kingdom], 2019.
- [6] Moenig U, Kim M. The origins of World Taekwondo [WT] forms or p'umsae. Ido movement for culture. *Journal of Martial Arts Anthropology*, 2019; 19. 3, 1-10. <https://doi.org/10.14589/ido.19.3.1>
- [7] Szczuka E, Tomaszewski W, Szafraniec R, et al. Electrodermal activity of the skin assessed using Ryodoraku method after a single training session in taekwondo competitors. *Journal of Combat Sports and Martial Arts*, 2012; 2, 79-85. <https://doi.org/10.5604/20815735.1047652>
- [8] Tanu B, Harpreet K. Benefits of essential oil. *Journal of Chemical and Pharmaceutical Research*, 2016; 8.6, 143-149.
- [9] Kwon S, Ahn J, Jeon H. Can aromatherapy make people feel better throughout exercise?. *International journal of environmental research and public health*, 2020; 17.12, 4559. <https://doi.org/10.3390/ijerph17124559>
- [10] Seo JY. The effects of aromatherapy on stress and stress responses in adolescents]. *J Korean Acad Nurs*. 2009; Jun; 39.3, 357-65. Korean. <https://doi.org/10.4040/jkan.2009.39.3.357>
- [11] Hasanshahi S, Parvizi M, Bahrini M, Pouladi S, Mirzaei K. Investigating the effect of the aroma inhalation of orange and lavender essential oils in comparison with placebo on the level of anxiety in clients in a dental clinic in Shiraz. a double-blind controlled randomized clinical trial. *Journal of Medicinal Plants* 2020; 19.295-309. <https://doi.org/10.29252/jmp.19.74.295>
- [12] Kadri A, Azaiez F. The Effect of Taekwondo Practice on Anxiety in Adolescents with Attention Deficit Hyperactivity Disorder During Following Taekwondo Taegeuk Poomsae. *J Depress Anxiety*. 2021; 10.423.
- [13] Huang L, Ort   L. Aromatherapy Improves Work Performance Through Balancing the Autonomic Nervous System. *The Journal of Alternative and Complementary Medicine*. 2016; 23. <https://doi.org/10.1089/acm.2016.0061>

- [14] Abdi JH, Hejazi S, Tahmasebi H, Abdi JF. Effect of aromatherapy with orange essential oils on anxiety in patients experiencing coronary angiography. a randomized control trial. *Journal of Urmia Nursing and Midwifery Faculty*. 2018; 15. 806-14.
- [15] Nicolas R, Guillaume R C, Olivier H. Attentional processes and performance in hot humid or dry environments: review, applied recommendation and new research directions. *Movement & Sport Sciences - Science & Motricité* 2021, <https://doi.org/10.1051/sm/2021002.hal-03232037>
- [16] Kanani M, Mazloun S, Emami A, Mokhber N. The effect of aromatherapy with orange essential oils on anxiety in patients undergoing hemodialysis. *Journal of Sabzevar University of Medical Sciences*. 2012; 3.249-57.
- [17] Parvizi MM, Nimrouzi M, Bagheri Lankarani K, Emami Al-orizi SM, Hajimonfarednejad M. Health recommendations for the elderly in the viewpoint of traditional Persian medicine. *Shiraz E-Medical Journal* 2018; 19. <https://doi.org/10.5812/semj.14201>
- [18] Mahdizadeh A, Tafazoli M, Mazloun SR, Manteghi A, Asili J, Noras MR. Effect of orange scent on preventing of postpartum depression. a randomized clinical trial. *The Iranian Journal of Obstetrics, Gynecology and Infertility* 2018, 21.93-100. [Persian]. <https://doi.org/10.22038/IJOGI.2018.12139>
- [19] Ozgoli G, Shahveh M, Esmaeili S, Nasiri N. Essential oil of Citrus sinensis for the treatment of premenstrual syndrome; a randomized double-blind placebo-controlled trial. *Journal of Reproduction & Infertility*. 2011; 12.
- [20] Yim V, Ng AK, Tsang HW, Leung AY. A review on the effects of aromatherapy for patients with depressive symptoms. *The Journal of Alternative and Complementary Medicine*. 2009; 15.187-95. <https://doi.org/10.1089/acm.2008.0333>
- [21] Minouei S, Eslami G, Minaei TD, Teymouri E. Investigation on the effects of purified orange oil on facultative aerobic and anaerobic found in skin lesions of the patients. *Iranian Journal of Biology*. 2007; 20.190.
- [22] Mottaghy MR, Abbasnezhad A, Erfanpoor S, Mohammadzade Moghaddam H, Arbaghaei MR, Rouhani Z. A comparison of the effect of massage with lavender gel and piroxicam gel on exercise-induced muscle soreness in male students of gonabad university of medical sciences. *Quarterly of Horizon of Medical Sciences*. 2020; 26. <https://doi.org/10.32598/hms.26.3.1871.7>
- [23] Mehdifar F, Badami R, Meshkati Z. The effect of fragrances of lavender on the quality of sleep, mood, team cohesion and performance of women volleyball players. *Journal of Medicinal Plants*. 2019; 18.
- [24] Cosma G, Chiracu A, Stepan R, Cosma A, Nanu C, Păunescu C. Impact of coping strategies on sport performance. *J Phys Educ Sport*. 2020; 20.3, 1380-1385. <https://doi.org/10.7752/jpes.2020.03190>
- [25] Unknown, "Introduction aux huiles essentielles en aromatherapie - Bien-etre formations", Accessed 01. Jul 2024. <https://www.terra-formations.fr/introduction-aux-huiles-essentielles-aromatherapie/>
- [26] Ebrahimi S, Taghi Agdasi M, Mokaberian M. Analysis of the effect of inhaling orange essential oil on self-confidence and competitive anxiety of female athletics comparing with relaxation. *Int J Health Stud*. 2022; 8.3, 24-29 <https://doi.org/10.22100/ijhs.v8i3.921>
- [27] Argiris ET, Mavvidis A, Tsigilis N. Dealing with stress during tennis competition. The association of approach-and avoidance-coping with metacognition and achievement goal theory perspectives. *J Phys Educ Sport*. 2018; 18.4, 2454-2465. <https://doi.org/10.7752/jpes.2018.04368>
- [28] Sivaphongthongchai A, Nakkliang K, Thetsana P, Seepik, N, Thammarakkit T, Nopthaisong T, Phuneerub P. A review on seven selected essential oils used as aromatherapy to maintain sports performance. *Journal of Exercise Physiology Online*. 2023; 26.5.
- [29] Sharma, Preeti, Meena, Tilak. Aromatherapy for sports and fitness. *British Journal of Sports Medicine - BRIT J SPORT MED*. 2010; 44, <https://doi.org/10.1136/bjsm.2010.078725.10>
- [30] Unknown, "The Effectiveness of Aromatherapy in Reducing Pain". Accessed on July 1, 2024, www.ncbi.nlm.nih.gov/pmc/articles/PMC5192342/
- [31] Unknown, "Latvian academy of sport education". Accessed on July 1, 2024, www.lspa.lv/files/2023/Kopsavilkums%20ang%C4%BCu%20Oval.pdf
- [32] Seo JY. The effects of aromatherapy on stress and stress responses in adolescents. *J Korean Acad Nurs*. 2009 Jun; 39(3): 357-65. Korean. <https://doi.org/10.4040/jkan.2009.39.3.357>
- [33] Hira T, Yasmeen I, Muhammad Farhan T, Saima P, Tuba M. Impact of anxiety on performance of Taekwondo athlete through progressive muscle relaxation training webology (ISSN. 1735-188X). 2021; 18.6.
- [34] Hoxha, S, Ramadani, R. The Effect of Intrinsic Motivation and Work Engagement on Contextual Performance. *Migration Letters*, 2024; 21(5), 490-499. Retrieved from <https://doi.org/10.3390/su16177643>
- [35] Huang, Lin & Ort  , Llu  . Aromatherapy Improves Work Performance Through Balancing the Autonomic Nervous System. *The Journal of Alternative and Complementary Medicine*. 2016; 23. <https://doi.org/10.1089/acm.2016.0061>
- [36] Moss M, Hewitt S, Moss L, Wesnes K. Modulation of cognitive performance and mood by aromas of peppermint and ylang-ylang. *Int J Neurosci*. 2008; Jan, 118.1, 59-77. <https://doi.org/10.1080/00207450601042094>
- [37] Tirla A, Islam F, Islam MR, Ioana Vicas S, Cavalu S. New Insight and Future Perspectives on Nutraceuticals for Improving Sports Performance of Combat Players. Focus on Natural Supplements, Importance and Advantages over Synthetic Ones. *Applied Sciences*. 2022; 12.17, 8611. <https://doi.org/10.3390/app12178611>
- [38] Unknown. "Huiles essentielles: comment utiliser pour le sport?" micsim.com, Accessed on 01 Jul 2024. <https://www.micsim.com/utilisation-huiles-essentielles-sport/>

- [39] Unknown. "Le rôle du sport dans la réduction du stress - NATURVEDA Plantes et sante." naturveda.fr, Accessed on 01. Jul 2024, <https://naturveda.fr/blogs/actus-sante/le-role-du-sport-dans-la-reduction-du-stress>
- [40] Lizarraga - Valderrama LR. Effects of essential oils on central nervous system. Focus on mental health. *Phytotherapy Research*. 2021; 35.2, 657-679. <https://doi.org/10.1002/ptr.6854>
- [41] Michalak M. Aromatherapy and methods of applying essential oils. *Arch Physiother Glob Res*. 2018; 22.2, 25-31. <https://doi.org/10.15442/apgr.22.2.3>
- [42] Herman A, Herman AP. Essential oils and their constituents as skin penetration enhancer for transdermal drug delivery. A review. *J Pharm Pharmacol*. 2015; 67.4, 473-485. <https://doi.org/10.1111/jphp.12334>
- [43] Djilani A, Dicko A. The therapeutic benefits of essential oils. *Nutrition, Well-Being and Health*. 2012; 7, 155-179. <https://doi.org/10.5772/25344>
- [44] Unknown. "L'aromathrapie." pharmaciesmits.be, Accessed on 01. Jul 2024. https://www.pharmaciesmits.be/L-aromatherapie_424.html
- [45] Schoenfeld BJ, Grgic J, Van Every DW, et al. Loading recommendations for muscle strength, hypertrophy, and local endurance. A re-examination of the repetition continuum. *Sports*. 2021; 9.2, 32. <https://doi.org/10.3390/sports9020032>
- [46] Peiffer JJ, Abbiss CR, Watson G, Nosaka K, Laursen PB. Effect of cold-water immersion duration on body temperature and muscle function. *J Sports Sci*. 2009; 27.10, 987-993. <https://doi.org/10.1080/02640410903207424>
- [47] Ningsih YF, Kurniasih F, Puspitaningrum DA, Mahmudi K, Wardoyo AA. The effect of sport massage and Thai massage to lactic acid and pulse decreased. *Int J Adv Eng Res Sci*. 2017; 4.12, 237335. <https://doi.org/10.22161/ijaers.4.12.16>
- [48] Kennedy DO. Phytochemicals for improving aspects of cognitive function and psychological state potentially relevant to sports performance. *Sports Med*. 2019; 49.1, 39-58. <https://doi.org/10.1007/s40279-018-1007-0>