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Esports Athletes Training and Competition Related Injuries and Specialized Rehabilitation Approaches

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Abstract. As the sport rapidly spreads all over the world, professional athletes experience high-pressure training regimes, which cause the emergence of training-related injuries that put their career lives and performance under stress, which is why the development of specific rehabilitation approaches to address the issue of training-related injuries in the esports medical field is of utmost importance. The study focuses on the prevalence, the types, and risk factors of injuries among esports players and explores special rehabilitation strategies based on the peculiarities of physiological and psychological requirements. Findings suggest that esports athletes are also prone to musculoskeletal injuries (mostly wrists tendinitis and cervical strain) and neuropsychological problems such as fatigue and anxiety. In the study, it was found that a physical therapy (including manual therapy and specific exercise programs), psychological interventions (mindfulness training and stress management), and ergonomic modification were a valid way to decrease the chances of injury reoccurrence and can increase the performance indexes. The dual physical and mental health problems are suggested to be handled by offering a multidisciplinary rehabilitation model encompassing the sports medicine professionals, psychologists, and ergonomic specialists. The present research can serve as evidence-based practices in the field of injury prevention and rehabilitation to advance the concept of athlete-centered care protocols in the esports sector and facilitate the sustainable evolution of professional esports players.

Keywords: Esports, musculoskeletal injuries, physical therapy, exercise therapy.

1. Introduction

E-sports, also known as esports, began its appearance in the sphere of digital gaming at the beginning of the 21st century and rapidly transformed itself into a popular cultural phenomenon in the whole world. Based on the 2018 data, the approximate number of esports activity participants in the world amounted to 395 million. Such an impressive number does not only highlight the fact that it has a vast popular base, but it also shows how esports evolves to the stage of a socially-driven trend. Due to the rapid growth of the industry, and the high level of professionalization in the industry, esports is a recognized field in international sports organizations, and gives players with extraordinary capabilities and tactical gameplay a career development path. Supported by famous corporate sponsors, such athletes become professional esports participants performing on the

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international tournaments on the basis of this full-time job. Not only do they make them prestigious, but also offer them hefty cash prizes and sponsorship opportunities [1].

However, as esports has become professionalized and popular, the possible health-related problems of the phenomenon have slowly become of interest to the general population and science. Because esports activities usually require the players to sustain prolonged sitting positions and undertake high-rate repetitive motion, the attributes of the two aforementioned strains of sedentary and repetitive motion may exert adverse impact on the musculoskeletal system, which includes pain and injury in the neck, back, and wrists [2]. Even though health risks are gaining momentum, the academic research on them was rather limited in the early years. A reference to four major databases of 2002 to March 2018 revealed less than 200 scholarly papers that were published in various fields on esports, which demonstrated the scarcity of research at that point. Until approximately 2020, when the esports industry started to mature, and the topic of health issues gained critical importance, the amount of associated research started to record a considerable increase, and more academic attention gets paid to this direction [3]. Even though individual studies have made an attempt to study the incidence of pain among participants in esports, these research studies do not provide extensive, systematic, and integrated research results that can fully reveal the full range of pain-related problems and factors affecting them. In order to fill this gap in knowledge, this systematized review and meta-analysis study will aim to thoroughly investigate the incidence, prevalent types and the intensity of pain in different regions of the body among esports players and also evaluate the effectiveness of the current pain treatment measures and the rehabilitation strategies. The results will be needed to provide scientific information and practical advice to the health management and future studies on esports.

2. Analysis of the common injuries and causes of esports players

2.1. Musculoskeletal system injuries

2.1.1. Upper extremity injury

The prevalence of musculoskeletal conditions is found to be more than 70 percent of esports related health conditions (mostly the upper extremity and lumbar spine) due to long-term repetitive fine motor activities and fixed non-sedentary postures. An American 153 player study by Clement et al. that used a questionnaire revealed the wrists, then cervical and lumbar regions, with minor digital and shoulder injuries also being reported, and upper extremity injuries as the most prevalent musculoskeletal complaint in esports [4].

Video game controllers that use the first-person shooter (FPS) genre commonly utilize the thumb as the main hand control over its flexibility and movement capabilities [5]. Thumb Overuse: Thumb overuse injuries are also referred to as PlayStation thumb (previously arcade finger or trigger finger), and are characterized by the presence of cutaneous blistering, edema and paresthesia due to very quick repetitive button pressing. Overuse tenosynovitis in the flexor pollicis longus (FPL) or extensor pollicis longus (EPL) tendons associated with the long flexor and extensor muscle used in the process of button manipulation is also common with the development of prolonged button manipulation. Strain injuries are common among the younger populations and do not require aggressive measures like surgery or NSAIDs, but conservative measures such as NSAIDs and activity modification respond well to them.

The repetitive high-intensity manual procedures might also lead to complete FPL and EPL tendon rupture, or avulsion of the metacarpophalangeal joint capsule. Tear and tendinopathy of extensor

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carpi radialis brevis (ECRB) is a common occurrence with EPL tendon avulsion occurring at Listers tubercle. They are acute traumatic injuries in the main cases of professional sports, and are accompanied by surgical repair or rebuilding.

The chronic hand and wrist pathologies like palmar pressure ulcers, joystick fingers and space invader thumb are a result of repeated joystick and mouse activities. Joystick fingers Tenosynovitis of the long or ring fingers, which is characterized by palpable nodules of flexor tendon in young people and which responds to corticosteroid injections. This is the space invader wrist, which entails a non-specific strain of the capsule, extensor digitorum communis tenosynovitis and De Quervain tenosynovitis [6]. One of the most significant risk factors involved in these injuries is continuous gaming of 6-8 hours, without taking any adequate rest.

Surface electromyography (EMG) is an effective measure that can be used to determine muscle fatigue and avoid musculoskeletal injuries. A suitable local study was able to track the muscles in the forearms of 15 esport trainees and report high fatigue occurrences, even following a period of 40 minutes of high frequency mouse use. The results of another EMG testing proved that IEMG and MF values were lowered in various forearm extensor muscles that established muscle fatigue as a progressive and increasing affair in regards to time spent gaming [7].

2.1.2. Lumbar injury

The available scientific literature on sports medicine confirms that long sedentary positions increase the risk of lumbar strain and muscle disorders of the neck significantly in esports players [8]. The held posture of flexed sitting that is accompanied by flexion of the cervix and extension of the arms forces the shoulder and neck muscles to be in continuous stationary contraction that results in fatigue, instability of soft tissue, local inflammation and edema. With time, it lowers the strength and endurance of the muscles, damages the cervical and lumbar stability, and leads to the syndrome of chronic neck and shoulder pains.

Even prolonged sitting affects the hip position: hip flexors become shorter and hip extensors become longer leading to muscle imbalances, pelvic misalignment and compensatory contractions of the lumbar muscles. The constant payment undermines the lumbar muscles and causes long-lasting lower back pain. Moreover, bad sitting posture also causes upper cross syndrome, which is characterised by tight pectoral muscles and long upper back muscles aggravating imbalance and pain of the spine.

2.2. Neurological and psychological conditions

Permanent esports also present a case of peripheral neurological injury and psychosomatic disease, which is not highly regarded yet is quite important to the overall health of athletes in the long run. Belyea CM et al. confirmed that there is upper limb neuropathy, especially ulnar neuropathy caused by prolonged gaming [5]. The compressions of the Guyon canal that causes distal ulnar neuropathy of deep motor branches lead to repeated compression of the hypothenar eminence by controllers. The research also connects cubital tunnel and carpal tunnel syndrome to long-term gaming and this has been attributed by Geoghegan to extended flexion of the wrist with compression of the nerve [9].

One of the studies evaluated esports players in terms of VAS (pain/fatigue), DASS-21 (emotional state), and PSQI (sleep quality) and found that scores in pain, sleep, posture, craniovertebral angle and psychological stress differ significantly between groups ($P \leq 0.01$, $P < 0.05$) [10]. All in all,

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there is an increased physical and psychosomatic load of esports athletes that is associated with several negative health outcomes.

2.3. Other health conditions

An analysis of intestinal markers of permeability in esports athletes revealed high levels of zonulin (66.33 ng/l) and LPS endotoxin (0.88 EU/ml) with 67% and 86% of the athletes having above normal levels of the two markers respectively [11]. These results show an intestinal microbiota dysbiosis and derailed intestinal barrier permeability, which are associated with excess body mass, unhealthy diets, and sedentary lifestyle. BMI needs to be observed regularly, because with lack of physical activity, the risk of the metabolic and cardiometabolic diseases that are dangerous in the future is increased. 6-point.

3. Specialized rehabilitation approaches for esports athletes

3.1. Rehabilitation methods for musculoskeletal system injuries

3.1.1. Physical therapy

Specific treatment of esports athletes is focused on the treatment of fatigue of soft tissues as a result of overuse, the correction of the posture and musculoskeletal position, neuromuscular control and psychosomatic stress reduction through a complex of physical, exercise, manual, and psychological interventions [12]. According to Chinese scholars of sports rehabilitation, specific forearm relaxation after the training (static stretching, foam rolling, fascia gun massage, etc.) can help overcome fatigue and can be used to recover muscle functions that consume less space. Contrast therapy (40 o C to 45 o C; 4 o C to 10 o C; 1:3 or 1:4 ratio; 2 to 3 sessions) enhances the elasticity of the vascularity and the local circulation to speed up tissue healing. The IR therapy, MFT, and ultrasound also elevate pain threshold, decrease tension in tissues and spur healing.

3.1.2. Exercise therapy

According to the relevant research, the lumbar strain rehabilitation process of the esports participant is based on the targeted core muscle training (pectoral, abdominal, lumbar) [8]. Strength training through core and pilates, posture therapy, and aquatic work make the muscles strong, repair tissue, and reestablish the stability of the spine. Domestic rehabilitation research proves that proprioception, coordination, and aerobic exercise are important in the enhancement of motor dysfunction and symptoms of chronic injury, which enhance operational performance. Fakoya et al. affirm the existence of effective non-surgical treatment of Quervain tenosynovitis which is non-surgical rehabilitation. Therapeutic ultrasound (3 MHz) enhances tissue extensibility, tendon healing, when used after pain, during rehabilitation exercises (ROM) to repair APL and EPB tendon gliding, beginning with isometrics and moving on to antigravity. Kinesio taping is the intervention which is completed between the muscle branches (where they enter and leave muscle) and muscular origin area and is used to decrease the level of interstitial pressure and to relieve pain due to nociceptor decompression [13].

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3.1.3. Manual therapy

Manual therapy is also essential in the process of rehabilitating esports athletes, especially in treating the injuries of the musculoskeletal system. It serves to significantly relieve the pain and soft tissue hypertonicity and pain, improve local circulation of blood and repair damaged tissues through professional manual techniques. As an example, when repetitive strain injuries are observed to the hands and wrists, manual therapy involves the use of selective massage and joint mobilization to provide relief to the symptoms of tenosynovitis and capsular sprains. Also, when it comes to lumbar injuries, manual therapy helps in balancing spinal biomechanical systems, providing back the lumbar stability, and in preventing the occurrence of the chronic pain. Manual therapy, physical therapy, and exercise therapy will give the best rehabilitation, and the individual can resume training faster.

3.2. Intervention for neurological and psychological conditions

Earlier findings on the topic of esports health associate chronic lumbar strain in athletics with comorbid depression and anxiety, which manifest as insomnia, lack of attention, loss of appetite, and emotional distress [8]. Psychological stress deteriorates due to chronic somatic pain, and a vicious physical-psychological cycle is formed, disrupting recovery. To reduce the negative emotions, psychological interventions comprise of supportive communication, suggestive therapy and music therapy. Family members and frequent counseling decrease the exaggeration of symptoms and make the patient more compliant. Non-random rest plan and sleep management are also contributing to the relief of neurological fatigue and general psychosomatic condition.

4. Preventive strategies for esports players' injuries

4.1. Development of a scientific training program

The overall esports athlete health management is based on prevention, paying attention to the correction of poor posture, overtraining, and the lack of rest, and a holistic program covers training, physical training, education, and team support. The scientific training courses should be based on the physiological state and the competition time of athletes, and the compulsory rest periods after every 40 minutes of high-intensity activity should be implemented to prevent repetitive strains injuries. The intensity and the duration of training is to be controlled, and the recovery form is to be organized so that overtraining, muscle strains, and psychological burnouts could be avoided, and therefore, the long-term competitiveness could remain.

4.2. Physical training and functional enhancement

The physical training and functional improvement must focus on systematic exercises of the core muscle groups with a major focus on enhancing strength and endurance of the major body parts like lumbar, abdominal, and thoracic ones. Also, the flexibility training, the balance, and the limb coordination exercises must be included to boost the dynamic stability and movement efficiency fully, thus giving the strong physical background to the functioning of the high-intensity esports.

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4.3. Health education and cultivation of self-protective awareness

In a bid to spread health education and awareness on self-protection, it may be arranged at periodical intervals and provide education to the participants in a systematic manner, through regularized sessions of specialized lectures, workshops, or online courses, on how to avoid sports injuries, their etiology, and managing them. It includes, but is not confined to, the good sitting position, the use of the ergonomic equipment, and efficient daily stretching and relaxation exercises. These programs are meant to assist the participants develop healthy training concepts and prevent the prevalent occupational musculoskeletal disorders proactively.

4.4. Enhancement of the team support mechanism

DiFrancisco proposed an integrated esports health management model requiring a multidisciplinary team: physiotherapists, strength coaches, nutritionists, sports medicine physicians, psychologists, and optometrists [14]. This team oversees posture assessment, injury treatment, training guidance, and holistic health monitoring, reducing injury rates, extending career longevity, and improving competitive performance.

5. Conclusion

In this paper, the systematic study of the injury and rehabilitation approaches of esports athletes is presented, which is extremely important due to the necessity to pay specific attention to health management in this new area. The results indicate that musculoskeletal disorders (over 70% prevalence), particularly upper extremity injuries and lumbar spine issues, are the primary health risks, compounded by neurological complications, psychological stress, and metabolic disturbances. There are some specialized rehabilitation methods, such as physical therapy (contrast therapy, ultrasound), exercise therapy (core strengthening, Pilates), manual therapy, and psychological therapy, that proved to be effective in recovery of injuries. The measures to prevent injuries include scientific training and physical conditioning, health education, and support of multidisciplinary teams, which are all necessary to minimize the occurrence of injuries. The research in this study will be a gap in the existing literature in the field of health research on esports since it will offer a helpful framework on how to think and approach problems about the health risks of athletes, as well as offer practical solutions to the clinicians, trainers and organizations. Weaknesses are based on the use of cross-sectional studies and the lack of long-term data on the progression of injuries. The next generation of research efforts ought to be made on longitudinal injury monitoring, individual rehabilitation regimens, and the construction of evidence-based preventive interventions delivered based on the esports-specific requirements.

References

[1] Giakoni-Ramírez F, Merellano-Navarro E, Duclos-Bastías D. (2022) Professional Esports Players: Motivation and Physical Activity Levels. Int J Environ Res Public Health. 19(4): 2256. doi: 10.3390/ijerph19042256.
[2] Soffner M, Schmidt A, Tomschi F, Hilberg T. (2026) Do Esports Players Experience Pain? Pain Prevalence of Esports Players: a Systematic Review and Meta-analysis. Sports Med Open. 12(1): 1. doi: 10.1186/s40798-025-00971-1.
[3] Tang D, Sum RK, Li M, Ma R, Chung P, Ho RW. (2023) What is esports? A systematic scoping review and concept analysis of esports. Heliyon. 9(12): e23248. doi: 10.1016/j.heliyon.2023.e23248.
[4] Clements A J et al. (2022) Analysis of musculoskeletal injuries mmong collegiate varsity electronic sports athletes [J]. Cureus, 14(11).

DOI: 10.54254/2753-7048/2026.33025

[5] Belyea CM et.al. (2025) Upper Extremity and Musculoskeletal Injuries Related to Videogame and Augmented Reality Game Usage: A Narrative Review Article. Curr Rev Musculoskelet Med. 18(5): 201-206.
[6] Wang Jingwen. (2014) Study on Muscle Fatigue and Surface Electromyographic Changes in Upper Limbs During Mouse Operation in E-sports Athletes [D]. Tianjin University of Sport.
[7] Li Xiaohan, et.al. (2022) Research and Analysis on Anterior Arm Muscle Fatigue and Operational Performance During Electronic Sports Athletes' Gameplay [C]// China Sports Science Society. Abstracts of the 12th National Sports Science Conference—Poster Exchange (Sports Training Branch). Ningbo University; 663-665.
[8] He D. (2023) Research Status of Rehabilitation Training Methods for Lumbar Strain in E-sports Athletes [J]. Contemporary Sports Science and Technology, 13(26): 33-36.
[9] Geoghegan L, Wormald JCR. (2019) Sport-related hand injury: a new perspective of e-sports. J Hand Surgery: Eur Volume. 44(2): 219–20.
[10] Unuz H, Kirmizigil B. (2025) The effects of e-Sports on physical and psychosomatic parameters: non-randomized controlled trials. J Sports Med Phys Fitness. 65(10): 1371-1380.
[11] Paulina MK et.al. (2025) Level of intestinal permeability markers and selected aspects of diet and BMI of Polish e-sports players. J Health Popul Nutr. 44(1): 90.
[12] Huang R et al. (2023) Research progress on the characteristics of sports injuries in e-sports and methods for prevention and rehabilitation [J]. Sports Science and Technology Literature Bulletin, 31(05): 262-265.
[13] Fakoya AO et.al. (2023) De Quervain's Disease: A Discourse on Etiology, Diagnosis, and Treatment. Cureus. 24; 15(4): e38079.
[14] DiFrancisco et al. (2019) Managing the health of the eSport athlete: An integrated health management model [J]. BMJ open sport & exercise medicine, 5(1): e000467.