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Upper Limb Injuries Secondary to Overuse in the Esports Community. Is this a rising epidemic?

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Abstract

Esports has increased in popularity over the last few years with increased viewership, revenues, participation, and an increase in the number of elite players. Over 400 fine motor movements per minute are carried out by esports players and with professional players reporting practising for over 10 hours every day, this would give rise to overuse injuries, especially in the upper limb. Carpal tunnel syndrome, lateral epicondylitis, and tendinopathies are reported to be the most common upper limb musculoskeletal injuries in esports players which can seriously jeopardise their career. With the worldwide increase in esports athletes we can only expect a concomitant rise in associated injuries. There is, however, very limited research on injuries sustained by esports players and ways to prevent such injuries with more studies being advocated to further this knowledge among the esports community.

Keywords: Esports; injuries; carpal tunnel syndrome; tendinopathy; hand; elbow

Highlights

- More than 400 fine motor movements per minute are carried out by a professional Esports player.
- Upper limb injuries can be career ending for a professional Esports player.

Introduction

In the last few years, esports have gained considerable popularity amongst the general population with viewership, prizes and advertising increasing on a yearly basis (1). Wagner (2) described esports as “an area of sport activities in which people develop and train mental or physical abilities in the use of information and communication technologies”. Whilst this is also true for video gaming, data consistently shows that esports have increased in popularity and has transformed from a vibrant niche culture into mainstream entertainment. It is expected to increase from a viewership of 454 million viewers in 2019 to 646 million viewers in 2023 (3). Along with viewership, commercial viability of esports and the increase in revenue during these events

have increased sponsorships and have placed esports events in the spotlight. This has driven a shift from playing video games as a leisurely activity to a potential professional activity. With revenue of 1 billion U.S. dollars generated in esports in 2019 (4), which is estimated to rise to 1.6 billion U.S. dollars by 2023, the future of esports looks bright (1)

Impact of COVID-19 on Esports

The emergence of COVID-19 in 2020 stopped all major traditional sporting events and mass gatherings with the 2020 Tokyo Summer Olympic Games and Euro 2020 being postponed. Some sporting events, such as Formula 1 and NASCAR, resorted to esports to continue captivating their fans. Esports were one of the few sports left available for viewership and although esports was not immune to the COVID-19 pandemic effects, the same pandemic helped increased awareness.

The emergence of esports on major television sporting networks has triggered once again the perennial discussion on whether esports classifies as a sport. However, the scope of this article is not to determine whether or not esports should be included amongst traditional sports, but one cannot deny that the esports community is on the increase and this is being enjoyed and viewed by millions globally.

Musculoskeletal Injuries

Early reports on hand and upper limb injuries coined the terms 'Nintendinitis' (5, 6) and associated long hours of playing computer games with hand injuries. Some elite esports players report practicing for 10 to 15 hours every day (7). This requires them to perform the same movements during the day using either a mouse and keyboard or a handheld device. More than 400 fine motor movements per minute are carried out by players with the shoulder, elbow and wrist to stabilise the upper limb girdle (8). Poor posture is often associated with long hours spent on a computer or television station and this can increase the risk of tendinopathies, nerve compression, and repetitive strain injuries amongst others (9, 10).

Musculoskeletal injuries are common amongst esports players with neck and back pain being reported in 42% of players. Wrist pain and hand pain are reported in 36% and 30% of players respectively (11) with some reporting that hand and wrist pain is present in more than 60% of esports players (12), (13). Most upper limb injuries seen in Esports players are related to overuse injuries. These repetitive strain injuries such as Carpal Tunnel Syndrome (14), tendinopathies in the shoulder and wrists (15), and lateral epicondylitis (16) are seen in occupations which predominantly require the use of hands or repetitive finger movements.

Carpal tunnel syndrome and other repetitive strain injuries have been associated with frequent computer use, frequent mouse use and years of computer use when studied in computer desk workers (17). The number of hours spent on computer stations may be similar between a professional esports player during training and a computer desk worker, however the intensity of mouse and keyboard movements are different.

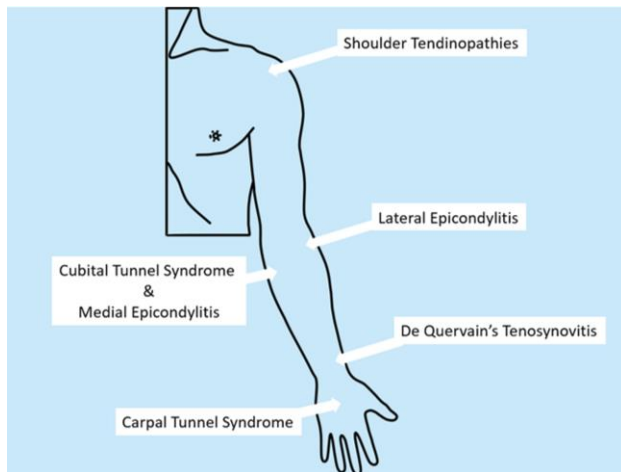


Figure 1 – Common musculoskeletal injuries found in esports players.

Carpal Tunnel Syndrome

Carpal tunnel syndrome is the most commonly diagnosed peripheral nerve entrapment syndrome in the upper limb (18). It is the result of compression to the median nerve in the carpal tunnel and gives rise to paraesthesia and weakness in the affected hand. This is normally secondary to exposure to repetitive movements of the wrist or vibration and is commonly found in occupations which involved repetitive movements such as office work (9). Computer desk workers were found to exhibit a high incidence of carpal tunnel syndrome which is a common reason for requiring time away from work (19). In one study, symptoms of carpal tunnel syndrome were seen in over 60% of gamers whilst more than 50% reported some functional impairment (20).

Lateral Epicondylitis

Lateral epicondylitis is also known as tennis elbow, however in the esports community this symptom is known as the ‘Mouse Elbow’ (21). Lateral epicondylitis is characterised by pain over the lateral elbow. It is caused by a tendinosis and inflammation of the origin of the common extensor origin at the elbow. This is normally associated with repetitive wrist extension and forearm pronation, movements that are extremely common among gamers. Lateral epicondylitis is also associated with radial tunnel syndrome which, like carpal tunnel syndrome, is a compressive neuropathy of the posterior interosseous nerve in the forearm. The pain from radial tunnel syndrome may start from the lateral elbow however this may also be located more distally in the forearm. Prominent esports players have lost their careers due to tennis elbow or radial tunnel syndrome (22). Repetitive movements which are done whilst using computers is associated with poor long-term prognosis in patients with lateral epicondylitis (23). On questioning, 11% of workers from 6038 participants report having lateral or medial epicondylitis, and 25% of those experiencing elbow pain finding it impossible to perform activities of daily living such as dressing, driving, or sleeping (16). Whilst lateral epicondylitis was found to be a psychologically distressing condition, a significant risk factor found to be associated with the presence of lateral epicondylitis was bending and straightening the elbow for more than 1 hour every day. With 10 hours and more of esports activity per day, esports players are at risk of developing lateral epicondylitis which would affect their performance both psychologically and physically.

Tendinopathies

Tendons exhibit cycles of injury, inflammation, and repair when they are chronically exposed to volume of work beyond their physiological capacity of recovery (24). These cycles will eventually lead to pain and swelling in the affected region. The shoulder, elbow, and wrist function together in synchrony to position the hand in the 3D space required for use. The hand is therefore held in the required position by means of isotonic and isometric muscle contractions of the shoulder, elbow and wrist to support the hand to perform the required function and thus serve as a stable base for the hand to perform more efficiently. These isotonic and isometric muscle contractions will occur constantly over a period of more than 10 hours every day as these esports players practice incessantly on a daily basis. Compounded by sub-optimal posture, pathological stresses will occur in the shoulder, elbow and wrist tendons, leading to tendinopathies. Suboptimal posture is frequently present in individuals working on computers which in turn leads to neck and shoulder pain (25). With less than 2% of gamers resorting to early medical attention (11), tendinopathies are normally diagnosed late and are thus potentially career ending. Several high profile gamers have been forced out of competitions or even retire in view of severe pain in the shoulders or wrists (26, 27)

Other Injuries

Other hand and upper limb injuries found in the esports community are De Quervain's tenosynovitis (Gamer's thumb) (28, 29), cubital tunnel syndrome (29) and medial epicondylitis (21, 29). These are all present in esports communities with lesser frequency, however further research is needed to find the prevalence of these conditions in this community.

Overuse Injuries in Occupations requiring Repetitive Movements of the Upper Limb

Certain occupations require workers to perform repetitive movements for prolonged periods of time. Factory workers in a production line sometimes perform the same movement for the duration of their work day. This is parallel to what happens frequently in the esports community where players perform the same movement for prolonged periods of time. Similarly, the hand and upper limb may be held in an unnatural position in order to perform the required task with the hand grasping a particular machine or controlling the wrist in an awkward position. The movements occurring in these occupations are similar to the movements done by esports players.

Occupations with high frequency of a particular movement in the upper limb were found to have a high risk of overload to the upper limbs (30). Furthermore, carpal tunnel syndrome was found to be higher in the factory worker population when compared to the normal population (31, 32). This is related to repetitive forceful movements of the wrist in addition to spasms of the wrist whilst grasping (33). These movements are very similar to the movements seen in esports players. Other overuse injuries found in occupations and are also associated with these repetitive movements are trigger finger, tendonopathies and De Quervain's Tenosynovitis (33).

Paucity of Research

The gaming community was estimated to be 2.4 billion people playing video games at all levels in 2019 with a projected yearly increase of 5.22% gamers. 5% of these are aspiring professional and elite gamers (34). As revenues in the esports world are increasing, more enthusiasts are turning professional and the number of teams will keep on increasing. More awareness of upper limb injuries in the esports community along with proper aid can encourage players to discuss these issues with their medical professional. All these reasons will mean that the number of people reporting musculoskeletal issues in the esports community will also rise. Upper limb injuries may be catastrophic to the professional esports player. However, it is surprising that even though the target population of esports players is huge, there is limited research on the quality and quantity of injuries sustained by esports players, and most of the information is found in small studies or case studies. There is also a paucity of data on effective preventative measures, use of ergonomic equipment as well as the best treatment options to return the esports player back to health. Much of the guidance currently available appears to be sourced from generic websites with little to no evidence behind the treatment options offered.

Conclusions

Several upper limb injuries may affect a professional esports player. Any upper limb injury can be devastating to an esports player and may lead to significant career breaks, and if ignored may be even a career ending injury. With esports popularity on the rise and more players resorting to playing at higher levels one would expect these injuries to become more frequent. More research is needed in order to study the nature of injuries sustained by these players, adequate preventative measures, and the best treatment options.

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