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OCCURRENCE OF LOWER EXTREMITY MUSCULOSKELETAL INJURIES DURING THE LOCKDOWN IN ATHLETES

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ABSTRACT

Background of the Study: Lockdown was implemented worldwide to limit the spread of COVID-19. This sudden implementation of lockdown causes significant lifestyle changes for every individual. Along with the general population, it also has psychological, behavioral, and physical consequences on athletes. The study objective is to determine the occurrence of lower extremity musculoskeletal injuries during the COVID-19 lockdown in athletes.

Methodology: Retrospective cross-sectional study design was used, and participants were recruited by a non-probability convenient sampling technique. A sample size of 147 was taken as calculated by the Raosoft software, and the study was completed 6 months. Both male and female athletes between the age group of 18-35 years, participants who did not participate in any official training session during the lockdown and registered at domestic level for at least 2 years were recruited from Pakistan Sports Board and Wapda Sports Complex Lahore. Data was collected using a semi-structured questionnaire. Nordic Musculoskeletal Questionnaire was used to identify the problematic painful areas of body. Data entry, analysis, and interpretation were done by using SPSS software version 22.0.

Results: The mean age and BMI of participants were 25.6531±4.49 (years) and 23.28±3.24 (kg/m2) respectively. From the total, 39.5% of participants reported lower extremity musculoskeletal injuries. And most reported problematic areas include lower back and knee. 75% of participants continue to do workouts at home as a prevention strategy against injury occurrence.

Conclusion: This concluded that the occurrence of lower extremity musculoskeletal injuries during the lockdown was moderate.

Keywords: *Athletes, COVID-19, lockdown, lower extremity, lower limb, quarantine, SARS-CoV.*

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Introduction

In December 2019, various cases of atypical respiratory disease were reported in Wuhan, China, and rapidly expanded from Wuhan to other areas of the world. Soon it was tracked down that the novel coronavirus was responsible for all that disaster. This novel virus was termed severe acute respiratory syndrome coronavirus – 2 (SARS – CoV-2) because of its high resemblance to SARS – CoV, which causes acute respiratory distress syndrome[1]. On February 11, 2020, the World Health Organization (WHO) named this pneumonia-like symptom causing virus Coronavirus disease-19 (COVID-19)[2]. This outburst of SARS-CoV-2 was considered to have originated from the seafood market in Wuhan, China, via zoonotic transmission. With further research, it was identified that human-to-human transmission was also the cause of this outbreak[3]. The main target of this virus was the human respiratory system, whereas the involvement of other systems was also reported [4]. In Pakistan, the first case of COVID – 19 has been reported on February 26, 2020, in Karachi, Sindh province, and it was confirmed by the Ministry of Health, Government of Pakistan.[5].The constantly increasing ratio of positive cases focused the administration to work on a high level of action plans and management policies. On February 12, the "National Action Plan for Preparedness & Response to Coronavirus Disease (COVID-19) Pakistan" was presented, and this plan aimed to limit the spread of COVID-19 along with emergency measures for efficient and time-effective response to potential COVID–19 events[6]. Different initiatives were taken by the government of Pakistan, such as COVID–19 test facilities, quarantine centers, treatment opportunities, and spreading awareness among the public about the spread of the virus and its preventive measures to fight against this COVID-19 outbreak. This sudden implementation of the lockdown causes significant lifestyle changes for every individual. Limited outdoor activities and social distancing affect the daily activities of the individuals[7]. Life has become difficult as everyone has to stay healthy and safe while adopting new norms such as maintaining social distance, personal protective measures, and surface, and environment cleansing into daily long-term practice[8].Along with the general population, this unusual situation has psychological, behavioral, and physical consequences on athletes as well. COVID-19 causes the postponement of all sports events, restriction of outdoor activities, and closure of fitness centers and gyms. All of these factors forced the athletes to alter their exercise programs and train at home without any supervision provided by the coaches and medical staff. Physical inactivity or prolonged breaks from training cause deconditioning of physiological systems, including the musculoskeletal, respiratory, neuromuscular, and cardiovascular systems as well as it also reduces physical capabilities such as power, strength, endurance, speed, and flexibility[9]. In team sports during the offseason physical inactivity shows a negative impact on the fitness and mental well-being of athletes[10]. Several studies reported psychological disorders due to physical inactivity caused by the lockdown, such as anxiety, post-traumatic stress disorders, and depression[11]. Women tended to perceive more stress than men[12]. No significant differences in perceived stress and psychological states were found between professional and non-professional players[13]. Studies have shown that sleep disturbances and mental health concerns are closely interrelated in the athletic population[14]. A possible relationship exists between sleep quality and individual match performance, and player efficacy[15]. It is therefore, important for athletes to maintain a balance between intensity and frequency of training and develop management strategies for physical and psychological health. Overtraining causes fatigue, performance decline, decreased motivation, and emotional instability[16], while undertraining increases the risk of injury[17]. Risk factors for sports injuries fall into the genetic, psychological, morphological, and biomechanical categories[18]. Improper joint biomechanics, weakness in muscles, tendon, and ligaments, and insufficient planning and implementation of the training session are associated with sports injuries. Other than intrinsic factors some extrinsic factors, also affect the occurrence of injuries in athletes. These extrinsic factors include environment, weather conditions, atmosphere, and the type of sports equipment used[19]. To limit the reversal of training-induced adaptations, various exercise strategies are used by the athletes. Engaging in some alternate mode of training to avoid the detraining effects is the most common method used by the athletes. This type of detraining prevention using alternate

ways of training is known as cross training effect[20]. A study was conducted to determine the impact of COVID – 19 shutdown measures on the training habits and perception of athletes in the United States. A total of 105 participants completed this survey. This study showed that 99% of athletes continued to receive guidance from the coaches, but there was a significant decrease in self-reported participation time, especially sports specific activities[21]. A self-administered web-based survey was conducted to investigate the training exercise and injury prevention programs used by the athletes during the COVID–19 quarantine period. The results of this survey showed that 61% of the participants continued to do training at home during the quarantine period to maintain their physical activity level and limit the occurrence of injury upon their return to sports[22]. Other cross sectional study was conducted to determine the impact of Coronavirus on the perception of elite and semi- elite athletes. 692 participants were recruited in this study, and a Google form link was used to conduct this study. The author concluded that COVID–19 had a physical, nutritional, and psychological impact on the return to sports and the general health of athletes[23]. A cross-sectional study was conducted through Google form link to determine the impact of lockdown on musculoskeletal health due to COVID – 19 outbreak in Bangladesh. 230 participants between the age group of 18-60 years participated by random sampling method. The study concluded that a strong association was seen between pain intensity, increased television watching time, use of mobile phones, and sleeping duration during the lockdown[24]. In another study, author studied the impact of the COVID-19 lockdown on the epidemiology of soccer muscle injuries. The results of this study showed no significant differences between the pre and post-lockdown risk ratio for injury, and the incidence of muscle injuries among Italian professional soccer players had no significant changes after the COVID-19 lockdown phase[25]. A case-controlled study was conducted to compare the effect of 3 months of lockdown on musculoskeletal pain, coronophobia and sleep quality among individuals who stay at home and those who continued to work. The author concluded that individuals who stayed at home had more low back pain and coronophobia than those who continued to work, however the sleep quality was similar in both groups[26]. Previously available studies were related to the physical activity, psychological well-being of an individual or intellectual disability, or other short-term impact of a pandemic. But the literature is scarce regarding the various effects of the pandemic on the musculoskeletal health of athletes. In this retrospective study, we aim to investigate the impact of a pandemic on lower extremity musculoskeletal injuries in athletes who require more utilization of their lower limbs for sports activities (i.e., footballers, cricketers, rugby players, runners, sprinters, hockey, and volleyball players). The findings of this study will rebound to the benefit of athletes considering how pandemic-related restrictions affects the health of athletes, their performance, and return to sports. So, in the future, better management approaches will be considered in such pandemic conditions to minimize their effects on the health and performance of athletes. The objective of this study is to determine the occurrence of lower extremity musculoskeletal injuries during the COVID–19 lockdown in athletes.

Methodology

This retrospective cross–sectional study is conducted using non – a probability convenient sampling technique. Data was collected from Wapda Sports Complex and Punjab Sports Board Lahore. This study was completed over a duration of 6 months, from November 2021 to May 2022. The sample size, as calculated by the Raosoft software, was 147, according to the population of our article[24]. The participant selection criteria included: both male and female Football, Rugby, Cricket, Sprinting, Hockey, and Volleyball players, between the age group of 18 – 35, athletes who did not participate in any official training sessions during the lockdown tenure implemented in Pakistan, athletes playing at a national domestic level for at least 2 years, and willing to participate in the study. The exclusion criteria were participants with a history of RTA during the pandemic, a history of falls during the pandemic, individuals infected with COVID – 19 virus during this duration, and participants with any associated musculoskeletal disorder during the

pandemic. Semi–structured questionnaire was used for the data collection purpose. This questionnaire is composed of a Nordic Musculoskeletal questionnaire (NMQ) and a part of the musculoskeletal Health Questionnaire. NMQ follows a logical order covering all major body points and identifies the painful and consequential problematic areas[27]. At the same time, musculoskeletal health questionnaire is used to measure musculoskeletal health status as it allows the participants to report musculoskeletal symptoms and their effect on the quality of life in a systematic way[28]. Those participants who qualified for the inclusion criteria were recruited into the study and requested to fill out the questionnaire. Data received from these questionnaires were then analyzed using SPSS software version 22.0. For the quantitative variables, descriptive statistics were expressed as mean and standard deviation, and frequencies were calculated for qualitative variables. And data was presented in the form of tables, Pie charts, Bar charts, and Histograms. Ethical clearance has been obtained from the institutional review board of PSRD College of Rehabilitation Sciences, and permission for data collection was also sort from the study settings in the form of documentation having reference no. Ref: PSRD/CRS/GA/REC/Letter-09. The nature and purpose of the study were informed, followed by the informed consent from the participants through consent forms written in both English and Urdu.

Results

The demographic data obtained from the participants showed that the mean age of participants was 25.65± 4.49 (years) and BMI was 23.28 ± 3.24 (Kg/m^2). The mean years of experience of playing at the domestic level was 3.95 ± 2.36. Of the total 147 participants, 111 were males, and the rest 36 were females. 34.0% of the participants were cricketers, 12.2% footballers, 16.3% rugby players, 11.6% runners, 10.2% basketball players, 8.8% hockey players, 3.4% sprinters, and 3.4% volleyball players. 2.7% of the participants belong to low socioeconomic status, while 89.9% and 7.5% of participants belong to medium and high socioeconomic status. No previous history of surgery was reported by 95.2% of athletes on the other hand 4.8% said a history of prior surgery of the appendix, ACL, and ankle. According to the data, 39.5% of participants reported lower extremity musculoskeletal injuries during the lockdown. Among those who reported lower extremity musculoskeletal injuries, the major areas of injuries, along with their types are shown in Table 1.

Area of injury	Frequency (Percentages)
Hip/Thigh	11(7.5%)
Knee	16(10.9%)
Ankle/Feet	12(8.2%)
Lower back	19(12.9%)
No injury reported	89(60.5%)
Total	**147**

Table1: Frequency of Area of Injury

40.8% of the participants reported a previous history of trouble, while the remaining had no such history present. Among those, 19.0% of athletes reported a history of trouble during the best 12 months, 16.3% during the last month, and 6.1% reported trouble present even at the time of data collection. And problematic areas includes lower back (18.4%), right hip/thigh (4.1%), left hip/thigh (0.7%), right knee (5.4%), left knee (6.8%), right ankle (2.7%), and left ankle (4.1%). The History of the last 12 months of these participants about seeing a doctor or physiotherapist, took medications and sick leaves because of the trouble are shown in Table 2.

Body region involved	Prevented From Doing Work F (%)	Seen a Dr./Pt F (%)	Take Medications F (%)	Taken Sick Leaves F (%)
Lower Back	22(15.0%)	20(13.6%)	20(13.6%)	21(14.3%)
Hip /Thigh	7(4.8%)	7(4.8%)	4(2.7%)	7(4.8%)
Knees	9(6.1%)	11(7.5%)	8(5.4%)	11(7.5%)
Ankle /Feet	11(7.5%)	11(7.5%)	11(7.5%)	11(7.5%)

Table 2: Frequency of history of best 12 months and effect of injury on anxiety, sleep, and fatigue

The 4.8% of athletes reported 0 missed days because of injury, 10.9% reported 1-2 days missed, 9.5% reported 3-7 missed days, 5.4% said 8-10 missed days, 1.4% said 15-30 missed days, 1.4% said 1 month, 4.1% said 2 months missed, 3.4% said 3-6 months missed, 1.4% 6-12 months missed and 0.7% reported over 1 year missed. 19.7% of athletes thought their activity level was similar to before the injury. Effects of injury on the anxiety, sleep, and fatigue of participants are shown in Table 3.The results of our study showed that when athletes were asked about their perception of the cause of their injury, 4.1% thought that it occurred because of inadequate workout at home, 12.9% because of lack of proper training sessions, 3.4% not because of busy with routine work, 7.5% because of too much routine work, 4.1% because of inactivity, 0.7% because of spending more time watching TV, 2.7% because of spending more time on mobile phones, 2.7% because of disruption of daily lifestyle due to corona, 0.7% because of doing household work, 0.7% because of excessive sleep and 0.75 because of sitting all the day. The workout duration before and during the COVID lockdown is shown in Table 4. From the total of 147, 24.5% of participants do not do any kind of workout at home during the pandemic situation on the other side, 75.5% of participants continue to do workout at home. Most of the exercises that athletes did during lockdown were brisk walking (12.9%), running (12.9%), stretching (11.6%), squats (8.8%), lunges (6.8%), planks (3.4%), bridging (2.7%), dumbbells. (2.0%), sit-ups (2.0%), skipping (0.7%), ladder squats (0.7%), stepping (0.7%), and ladder jump (0.7%). Detailed scoring of results was obtained based on options chosen by the participants and showed that 58 participants (39.5%) reported lower limb musculoskeletal injuries, while the remaining 89 participants (60.5%) didn't report any injury during the lockdown period.

Discussion

COVID – 19 pandemic affected the lifestyle of every individual living all across the world. Life has become difficult as everyone has to stay healthy and safe. This unusual situation has physical, physiological, and behavioral consequences on the life of athletes as well. It is, therefore important for the athletes to maintain a balance between intensity and frequency of training and develop management strategies for physical and psychological health. Overtraining causes fatigue, performance decline, decreased motivation, and emotional instability, while undertraining increases the risk of injury. In this study, 147 athletes were taken according to the inclusion criteria. 111 were males, and the rest 36 were females. The mean age of participants was 25.6531 ± 4.49 (years), and the mean BMI was 23.28 ± 3.24 (Kg/m²). In this study, I found that 39.5% of the participants suffered from lower extremity musculoskeletal injuries due to the lockdown, while 60.5% didn't report any musculoskeletal injury during this period. This surprising decrease in the injury incidence has sparked heated debate and hypotheses regarding the underlying cause. During the lockdown, athletes did not entirely stop training, as the results showed 75.5% of participants continued to do workouts at home. The majority of athlete responses appear to be overcoming obstacles, continuing with alternative training strategies, and adapting to retain their physical fitness and avoid the risk of post-lockdown injuries. While some athletes were able to manage the pandemic, others were unable to. According to the previous literature, the restrictions due to lockdown and the break in training sessions causes the detraining effect and increases the risk of injury. Our study showed that, fortunately, the occurrence of lower extremity injuries was less in athletes as in Pakistan the duration of lockdown was of very short tenure, and most of the athletes

continue to train at home by themselves as a prevention strategy to maintain their physical activities. During home-based training, the inclusion of a training plan devised by the coaches or technical team was a significant variable linked to injury risk. G de Paula Ati reported that intrinsic a extrinsic factors such as environment, weather conditions, and sports equipment used also affect the occurrence of injuries in athletes[19]. Krutch et al. in their prospective cohort study, reported that the incidence of an injury was significantly lower on returning to sports when compared to pre lockdown period. The athletes continued to train individually, and training regimens included a part of endurance, strength, and general conditioning elements. For the previously trained athletes, this lockdown period may be proved as a golden chance period to recover from those injuries[29]. Pak J. et al. reported that the positive social media interaction and training guidelines from the coaches help the athletes to stay motivated and continue to train at home[30]. RCT-based prospective cohort study was conducted to determine the effectiveness of home-based injury prevention programs during COVID in the reduction of injury. The authors concluded that these programs proved effective in reducing the number of injuries in semi-professional football players after the COVID outbreak[31]. Evidence suggests that cessation of training results in a decrease in the physical fitness and performance of athletes due to muscular, morphological, and functional changes. Furthermore, high levels of stress during the COVID-19 period can impair athlete's mental health and fitness. As a result, they are at risk of getting non-contact injuries once they begin regular exercise at pre COVID-19 level. Therefore it is crucial to communicate with athletes, sports federations, and those involved in sports programs about how to resume sports activities and training properly. Athlete health and safety may be jeopardized due to a lack of awareness about the proper way to return to sport among athletes, trainers, and physical therapists[22].Limitations of this study include: a small sample size, which can affect the results of the study, and pre-lockdown data was not taken. Further studies should be made to compare the pre and post-lockdown occurrence rate, and work should also be done to determine the occurrence of upper extremity musculoskeletal injuries.

Conclusion

This retrospective cross-sectional study concluded that the rate of occurrence of lower extremity musculoskeletal injuries during the lockdown was low. As most of the athletes continue to do workout at home, and most of the exercises that athletes did during lockdown are brisk walking, running, stretching, and bridging. Most of the reported problematic areas of injury include: the lower back region, followed by the knee, ankle, and hip/thigh.

AUTHORS' CONTRIBUTION:

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Ghazal Azhar, Ghousia Ifthikhar, Dr. Haseeb Ullah Ammad

Acquisition, Analysis or Interpretation of Data: Dr. Haseeb Ullah Ammad, Dr. Adeela Asif, Ghazal Azhar, M. Faheem Afzal

Manuscript Writing & Approval: Ghousia Ifthikhar, Dr. Haseeb Ullah Ammad, M. Faheem Afzal, Ghazal Azhar, Dr. Adeela Asif

All authors acknowledge their accountability for all facets of the research, ensuring that any concerns regarding the accuracy or integrity of the work are duly investigated and resolved.

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