



Prevalence of Sports Injuries before and during COVID-19 Quarantine among Adults of Riyadh, Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. The manuscript has been read and approved for submission by all the authors listed above. All authors believe the presented manuscript is representative of their work. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study aims to compare the incident rate of sports injuries before and during the COVID-19 quarantine among active and nonactive adults and identify and compare patterns, types and sites of sports injuries.

Study Design: Cross-sectional study.

Place and Duration of Study: A self-administered online survey was conducted in Riyadh, Saudi Arabia, between June 2020 to November 2020.

Methodology: We conducted a descriptive, cross-sectional web-based survey on active and nonactive adults of Riyadh, Saudi Arabia. A total of 537 respondents from Riyadh completed the questionnaire. The study included adults active during quarantine who are also residents of Riyadh. Residents of other cities and respondents younger than age 18 or older than 64 were excluded.

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Results: A total of 537 participants fulfilled the criteria. More than half of the respondents were aged 18 to 24 years (54.7%). Of those who did not exercise before quarantine, 42.9% (n = 91) started during quarantine, while 26.5% (n = 86) of respondents who exercised before quarantine stopped during the quarantine. Running and walking were the most common sports practiced by 70.9% of respondents during quarantine and 63.1% before the quarantine. Muscle strain/tears were the most common injuries before quarantine (26.2%), while bruises were the most common injury during quarantine (28.6%). Soccer and basketball were the most affected by quarantine.

Conclusion: The number of active individuals had increased during quarantine. Paradoxically, the prevalence of sports injuries decreased. Soccer and basketball were the most significantly affected by a lack of participation during the quarantine; both were a common cause of sports injuries. Medical providers should investigate and support preventive measurements on sports that cause most injuries.

Keywords: COVID-19; quarantine; injuries; physical activity; prevalence; sport.

DEFINITIONS, ACRONYMS, ABBREVIATIONS

COVID-19: coronavirus disease-2019

1. INTRODUCTION

Routine exercising and physical activity positively affect patient well-being. The impact varies from improving mental health to enhancing immunity, and protecting against chronic disease (for example, cardiovascular disease, diabetes, cancer, hypertension, obesity, osteoporosis, and premature death) [1-4]. Sports are not limited to a specific age, and they are available for everyone [5,6]. Many physical activity types depend on exercise sites (namely, indoor or outdoor) and intensity. Exercise intensity can range from light to extreme activities, such as CrossFit, weightlifting, riding bikes, running, playing football, and swimming.

However, ever the beginning of 2020, the coronavirus disease-2019 (COVID-19) pandemic presented a significant disruption in routines worldwide. The virus responsible for COVID-19 originated in Wuhan, Hubei province, China, in December 2019 and is transmitted by inhalation or contact with infected droplets. The symptoms are fever, cough, sore throat, breathlessness, fatigue, and malaise. The disease severity is mild in most people, yet older populations and those with multiple comorbidities may progress to severe acute respiratory distress syndrome and multi-organ dysfunction [7,8]. Moreover, the pandemic forced people to change their routines to keep up with routine changes. Like many countries worldwide, Saudi Arabia was among the first countries to implement early and original precautionary measures to prevent the pandemic. The Saudi Arabian government implemented stringent regulations to decrease

the number of COVID-19 cases; some of the taken measures were suspending all kinds of activities such as tourism, Umrah, and pilgrims, not to mention the massive lockdown which went from partial lockdown into twenty-four hours quarantine and many other methods were taken [9].

Therefore, those who desired to exercise to change their routine from a public gym to home-based workouts, while others recently started participating in sports to change their routine. Previous literature illustrated the impact of COVID-19 on lifestyle and habits, not only locally in Saudi Arabia, but the changes that occurred worldwide and implied on individuals of all ages. On the contrary, Some individuals developed negative habits such as increased use of electronic devices, leading to a more sedentary lifestyle [10,11,12]. With these routine changes, sports or physical activity-related injuries are common and could arise due to many factors such as lack of knowledge or proper equipment handling, among other reasons.

Sports injuries are defined as any damage to the body tissue that occurs due to performing an exercise [13,14]. Injuries might be minor, such as bruises, sprains, simple cuts, or severe and significant injuries such as fractures and joint dislocation [15]. Furthermore, seeking medical intervention might be difficult during the pandemic because of quarantine rules; this neglect or delay in seeking medical intervention may lead to further complications and mobility limitations.

We conducted this study to compare the incidence and identify patterns of sports-related injuries before and during the COVID-19 quarantine. Furthermore, this study aims to identify the types and locations of the various

sports in which participants engaged. Lastly, we also examined the effect of quarantine on the given activity and the types of individuals who sought management of their injuries. We hypothesized that there would be a reduction in sports injuries during quarantine due to safer practices and reduced use of heavy equipment. To date, there are scarce data and limited studies that measure sports-related injuries during quarantine in Riyadh, Saudi Arabia. Moreover, there is no available research that measures the rate of home sports-related injuries.

2. MATERIALS AND METHODS

2.1 Study Design

We conducted this cross-sectional study to compare the incidence rate of sports injuries before and during quarantine among active and nonactive adults and identify any pattern of injuries. We also examined the types and sites of activity related to injuries among the public in Riyadh, Saudi Arabia's most populated city (population: 8,446,866 in 2018) [16]. The study was conducted from June to November 2020 among people living in Riyadh. All participants were informed of the study's objectives; informed consent was provided for inclusion, and questions were to participants included, demographic data, COVID-19 and sport activity level before and during quarantine, sites and types of injuries; the questionnaire used the commonly used name among the public to identify injuries as for their resolution, it included whether if they sought proper medical intervention or only home-based intervention — the study adhered to the tenets of the 2013 Declaration of Helsinki, it fully committed to protect the privacy of participants personal information [17]. The data used for this study were collected by an online survey distributed via online channels (for example, social media platforms) and used a Google form web-based survey to collect data. We used conventional sampling and used a sample size of 385 respondents, large enough to reach a confidence interval of 95% as calculated using the Raosoft Sample Size Calculator (Raosoft, Inc. Seattle, WA).

2.2 Statistical Analysis

Descriptive analysis was performed; counts and percentages were used to summarize the distribution of responses. We used the chi-square test of independence to compare

responses before and during the COVID-19 pandemic. Bar plots were used to visualize responses to various questions; hypothesis testing was performed at a 5% significance level. Statistical analysis was performed using R version 3.6.3 (R Core Team, Vienna, Austria).

2.3 Inclusion and Exclusion Criteria

The study included adults active during quarantine who are also residents of Riyadh. Residents of other cities and respondents younger than age 18 or older than 64 were excluded.

3. RESULTS AND DISCUSSION

3.1 Results

A total of 603 respondents completed the questionnaire; 537 respondents from Riyadh completed the questionnaire (Table 1). Of the total respondents, 66 participants were excluded because they did not fit inclusion criteria. Men comprised 53.6%, and women comprised 46.4% of the respondents. More than half of the respondents were age 18 to 24 (54.7%), while respondents aged 25 to 34 represented 24.4% of the participant population. The remaining 3 age categories represented less than 25% of the respondents. The respondents' average weight was 71.5 kg, and the average height was 168 cm. Most respondents did not have any chronic diseases (90.6%), and 7.8% were diagnosed with COVID-19. Of these, 81% were managed using self-isolation, and only 3 respondents (7.14%) were hospitalized. Approximately one-third of the respondents with COVID-19 reported fever, while 30.9% reported cough, and 14.3% reported shortness of breath.

We noted a statistically significant change ($P < 0.001$) in performing exercise before and during the pandemic (Table 2). Of those who did not exercise before quarantine, 42.9% ($n = 91$) started exercising during quarantine, while 26.5% ($n = 86$) of respondents who exercised before quarantine stopped during the quarantine as shown in Fig. 1. During quarantine, (37.1%) of participants lost weight while 20.6% gain weight; the rest of the respondents, 42.3%, reported no weight change during the quarantine. Half of the respondents exercised only indoor during the pandemic (44.2%), and 11.5% performed only outdoor exercise during the quarantine. The remaining 44.2% performed both indoor and outdoor exercise during the pandemic. We found

varying patterns in exercise performance before and during quarantine ($P < 0.001$, Table 2). Exercise frequency increased in respondents who exercised 1 to 2 times, 3 to 4 times, and 5 to 6 times per week before the pandemic and decreased in those who exercised daily before the pandemic. Also, we noted a statistically significant difference in the distribution of exercise duration before and during the quarantine. Exercise duration did not change for those who practiced < 30 minutes before the quarantine. On the other hand, the duration drastically increased in those who performed 30 to 60 minutes of moderate exercise before the quarantine. Roughly half of the respondents who exercised for > 60 minutes before the quarantine continued to do so during the quarantine. Table 2 shows that the percentage of respondents who

suffered from injuries decreased during the quarantine (before quarantine: 34.5%; during quarantine: 10.6%; $P < 0.001$). The frequency of injury resolution slightly varied before quarantine (83%) and during quarantine (68.6%; $P > 0.05$), although the proportion of respondents who seek medical intervention was significantly lower during the quarantine (22.9%) compared to before the quarantine (45.5%; $P < 0.05$).

Running and walking were the most commonly practiced sports by 70.9% during quarantine and 63.1% before the quarantine (Fig. 2). Soccer and basketball were the most affected by quarantine: soccer participation fell from 21.85% to (3.9%), and basketball participation fell from 2.77% to 0.9%. Weightlifting was practiced by

Table 1. Descriptive statistics for the study sample (N=545)

Demographic data	n (%)
Age:	
18-24	298 (54.7%)
25-34	133 (24.4%)
35-44	52 (9.54%)
45-54	43 (7.89%)
55-64	19 (3.49%)
Gender:	
Female	253 (46.4%)
Male	292 (53.6%)
Height (cm)	168 (8.81)
Weight (kg)	71.5 (17.2)
Chronic disease	
No	475 (90.6%)
Yes (for example, diabetes, hypertension, dyslipidemia, asthma)	49 (9.35%)
Diagnosed with COVID-19:	
No	495 (92.2%)
Yes	42 (7.82%)
Type of management:	
Hospitalized	3 (7.14%)
Nothing done	5 (11.9%)
Self-isolation	34 (81.0%)
Symptoms:	
None	16 (38.1%)
Fever	16 (38.1%)
Cough	13 (30.95%)
Shortness of breath	6 (14.29%)

Categorical variables were summarized using counts and percentages, and continuous variables were summarized using mean ± standard deviation

Abbreviation: COVID-19, coronavirus disease-2019

Table 2. Exercise status before and during the quarantine

	Before, n (%)	During, n (%)	P
Numbers shows participants exercise before and/ or during quarantine	N=325	N = 330	
Exercise	537	537	< 0.001
No	212 (39.5%)	207 (38.5%)	
Yes	325 (60.5%)	330 (61.5%)	
Weight change during the quarantine:		325	
Decreased		121 (37.1%)	
Increased		67 (20.6%)	
Remain the same		137 (42.3%)	
Type of exercise during the quarantine		330	
Both		146 (44.2%)	
Indoor		146 (44.2%)	
Outdoor		38 (11.5%)	
Sports (days per week)	325	330	< 0.001
1-2 times per week	67 (20.6%)	82 (24.8%)	
3-4 times per week	104 (32.0%)	115 (34.8%)	
5-6 times per week	114 (35.1%)	72 (21.8%)	
Everyday	40 (12.3%)	61 (18.5%)	
Practice duration for sports (per day)	325	330	< 0.001
< 30 min	26 (8.00%)	86 (26.1%)	
30 – 60 min	205 (63.1%)	191 (57.9%)	
> 60 min	94 (28.9%)	53 (16.1%)	
Sport injury	325	330	< 0.001
No	213 (65.5%)	295 (89.4%)	
Yes	112 (34.5%)	35 (10.6%)	
Seek medical intervention	112	35	0.03
No	61 (54.5%)	27 (77.1%)	
Yes	51 (45.5%)	8 (22.9%)	
Injury resolved:	112	35	0.1
No	19 (17.0%)	11 (31.4%)	
Yes	93 (83.0%)	24 (68.6%)	

Statistical analysis was performed using the chi-square test of independence

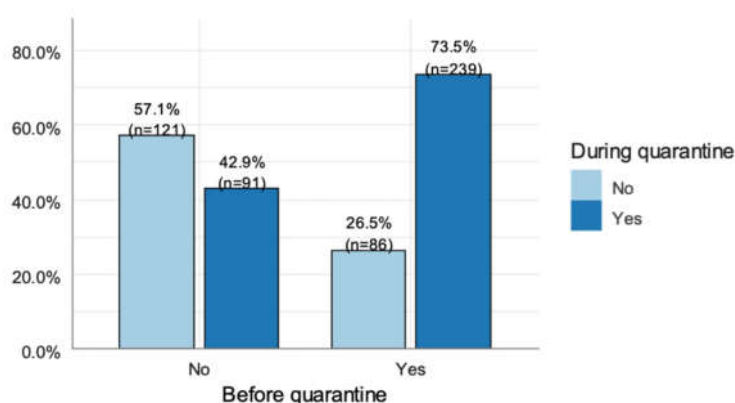


Fig. 1. Distribution of exercise before and during the quarantine

approximately half of the respondents 48.9% before quarantining and 30.6% during the quarantine. The treadmill was used by 45.5% of respondents before quarantine and 32.4% of the

respondents during quarantine. Finally, aerobics was practiced by 20.3% of respondents before quarantine and 24.6% of the respondents during quarantine.

Muscle strain/tears were the most common injuries before quarantine (26.2%; Fig. 3). Laceration/cuts occurred in 22.1% of respondents before quarantine, and bruises occurred in 21.3% before the quarantine. During quarantine, bruises were reported by 28.6% of the respondents, while muscle strain/tears were reported by 20% of the respondents.

Lower limb injuries constituted 65.6% of injuries before quarantine (n = 80) compared to 48.6% (n = 17) during quarantine (Fig. 4). Upper limb injuries were reported in 26.2% of respondents before quarantine and 42.9% of respondents during quarantine.

3.2 Discussion

Sports injuries are common in both orthopedic emergencies as well as outpatient clinics. Sports injuries range from mild (those that do not need medical intervention) to critical or severe (those that require intervention). We found a slight increase in exercise performance during the COVID-19 quarantine and a significant change in sport-related injuries. Of those who completed the survey, 49.9% of participants started to work out due to various reasons such as changing routine, plenty of free time, and reducing stress. Conversely, 26.5% of participants stopped exercising during the quarantine, most likely due to the closure of facilities and social distancing requirements. Indoor exercise significantly increased compared to outdoor, which might be

due to quarantine. The remaining 44.2% of respondents performed both indoor and outdoor exercise. Another study found that outdoor activity was higher during quarantine.¹⁸ That same study showed that team sports were practiced more often than solo sports before the quarantine [18]. Our study found that, during quarantine, the number of solo sports players markedly increased, likely due to the need for social distancing. Soccer and basketball had the most significant decrease in participation during quarantine, reflecting reduced sports injuries. In a study comparing the incidence of injuries in several sports, soccer and basketball participation were associated with the highest number of injuries [19]. Regarding the type of injuries, this study showed that the most common type of injuries before the quarantine was muscle strain/tears (26.2%), while bruises (28.6%) were the most common type during the quarantine, which were likely due to respondents practicing more light activities and a decrease in extreme forms of activities. A similar study conducted in Brazil had a similar finding in that before quarantine, muscle injuries accounted for 45.4% of injuries, while bruises only accounted for 5.3% [20]. A different study reported that joint injuries (43.6%) comprised the majority of injuries, followed by muscle strains (27.7%), making bruises (26.7%) the third most common form of injury [21]. A study in Portuguese found that most injuries were joint injuries (30.8%), followed by muscle strains (23.1%) [22].

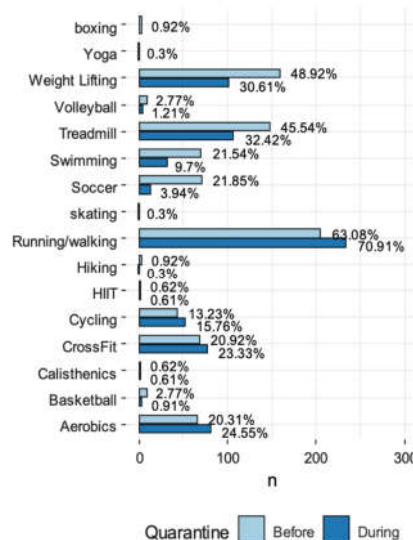


Fig. 2. Types of exercise before and during quarantine
Abbreviation: HIIT, high-intensity interval training

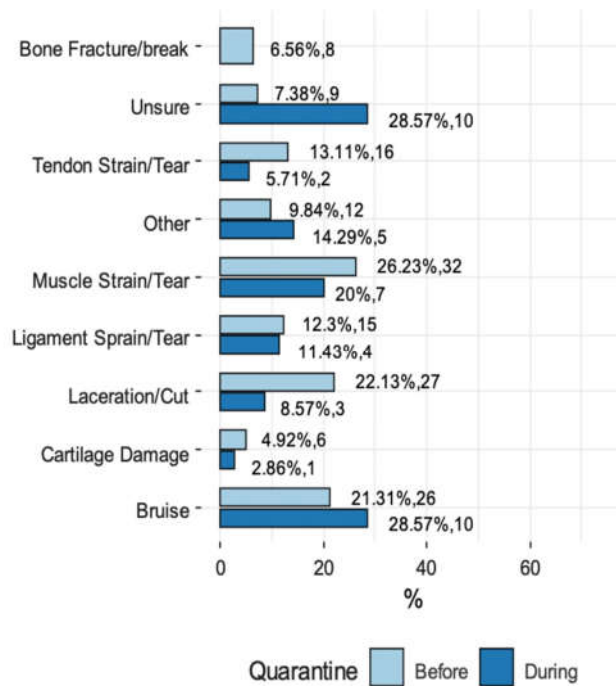


Fig. 3. Injuries sustained before and during quarantine

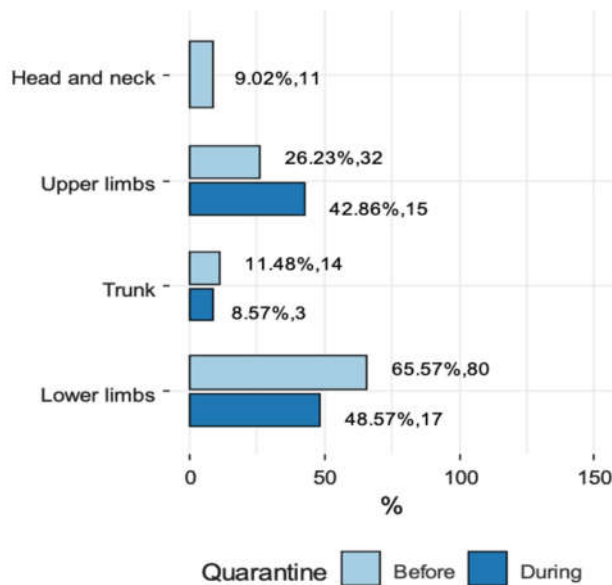


Fig. 4. Site of injury before and during quarantine

Throughout quarantine, the incidence of sports injuries has reduced from 34.5% to 10.6%, except for upper limb injuries, which saw an increase to 42.9% from 26.3%. The increase in upper limb injuries is most likely due to lockdown periods which induced a change in population

habits and behavior; the isolation may have also led to unsafe engagement and exercising. In this study, the most frequent injury location before and during quarantine was the lower limb (before quarantine, 65.6%; during quarantine, 48.6%). The lower limbs were a common injury site, likely

because many sports require excessive use of lower limbs to perform the exercises. Similar findings were observed with multiple previous studies conducted in Jeddah, Kuwait, India, and Mangalore, which reported high-frequency injuries in lower limbs [18,20,23,24]. On the other hand, a Portuguese and Netherlands study showed similar findings where the upper limb had a higher frequency of injury location [22,25]. Seeking medical interventions for injuries during quarantine became significantly low (22.9%) compared to the time before the quarantine (45.5%), an overall reduction of 22.6% between the 2 periods, which might be due to the strict COVID-19 regulation of emergency departments and surgical units that required adaptation of the spaces and emergency rooms that impacted the maximum capacity of the medical centers or due to the decrease in the number of injuries [26,27]. Similarly, in Brazil, an epidemiological study related to CrossFit athletes showed similar findings in which 42.0% of participants who get injured reported seeking a health care professional to diagnose or treat an injury [28]. A Portuguese study reported contradictory findings where 71.8% of people who get injured sought medical intervention, and an Indian study reported that 68.8% of injured participants underwent some form of intervention [22,23].

4. CONCLUSION

Sports injuries can be an obstacle that faces any active individual who performs sports. There was a massive decrease in injuries in 2020 due to COVID-19 restrictions. Quarantine was considered the most effective solution to help in reducing the spread of the virus. This study aimed to compare the incident rate and pattern of sports injuries before and during quarantine among sport-active and non-sport active adults. Although the number of sports players had increased during quarantine, there was a decrease in sports injuries. Bruises were the most common injuries during quarantine compared to muscle strain before the quarantine. Lower limbs are the most common site of injuries before and during the quarantine.

Nevertheless, there was an increase in the incidence of upper limb injuries. Injuries from team sports such as soccer and basketball were reduced dramatically due to restrictions. Therefore, a safer approach to practicing sports can help in reducing the number of sports injuries. Identifying possible underlying causes of gym-based and home-based sports injuries will

help prevent future injuries and improve participant safety. Healthcare provider including doctors, nurses, pharmacist and physiotherapist should have at least an overview on common forms of sport injuries to provide the most suitable care for the patient.

5. LIMITATIONS

This study was limited by the lack of literature regarding sports injuries during COVID-19 quarantine. In addition, the cross-sectional design allows for the introduction of recall bias from respondents and the self-reported nature of the questionnaire.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Fig. 1. Elucidation

The x-axis «yes/no» respondents exercised prior quarantine, while the y-axis «yes/no» on the right of those who practiced during quarantine.

The reason behind doing it that way is to illustrate the groups below.

Prior quarantine: in (Table 1) 121 participants did not exercise before the quarantine. In contrast, the figure shows that 91 of the participants did so during quarantine. While during quarantine, 86 participants stopped exercising.

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