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Research Article

The Higher Rate of Injury Following the Covid-19 Lockdown Period in Elite Professional Footballers Highlights the Importance of Pre-Season Training

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Abstract

Background

The 'preseason' is an established element of the football season for players to gain fitness and improve performance following the start of the season. Although players are at greater risk of injury in the preseason period, it is questioned whether a preseason subsequently decreases the risk of injury in the season start itself. The aim of this study was to report the injury rate from post-lockdown professional football games of the 2019/20 season (no pre-season programme - NPP) and compare to the start of the 2019/20 season (full pre-season programme - FPP) and to the start of the 2020/21 season (reduced pre-season programme – RPP) to assess the role of pre-season training in injury prevention. We secondarily compared these rates to the rate of injury sustained during pre-season itself as described within current literature.

Methods

We compared injuries sustained across 4 European Professional Football Leagues (Premier League, Serie A, Bundesliga, La Liga) from the first 2 games for each team at the start of the 2019-20 season (FPP group), the re-start of football following lockdown (NPP group) and the start of the 2020/21 season (RPP). We recorded the frequency, injuries per game, contact and soft tissue injuries.

Results

234 games were reviewed. Injury rate per game in each cohort was as follows: FPP cohort - 0.13 per game, NPP cohort - 0.39 per game, RPP cohort - 0.45 per game. There was a statistically significant difference in injury rate between the FPP vs NPP cohorts (p=0.00001) and between the FPP vs RPP cohorts (p=0.00001). Pre-season injury rate as published in the literature equated to 0.007 injuries per 90 minutes.

Conclusion

Injuries in elite professional football were more common in the first 2 games following no or a reduced pre-season. We believe this highlights the importance of pre-season in injury prevention.

Keywords: Pre-Season; Injury; Football; Injury Prevention; Soccer

Introduction

The Covid-19 pandemic has brought about many changes to life globally with professional sport, including football being noticeably affected. Top leagues across Europe were suspended during the initial peak of the virus, the so-called 'lockdown' period. This occurred in February 2020 and lasted for a varying period of time between countries, roughly equating to 3 months of relative sporting inactivity. Whilst individual training programmers for footballers were implemented at clubs, this could not truly replicate normal training methods. This led to a period of detraining, which in turn increased the theoretical risk of injury [1,2]. 'Pre-season' is an established time prior to the start of the competitive season in which clubs train, increase fitness and play practice / warm up matches. It is suggested that this increases performance once the season starts itself [5-13]. Theoretically, preseason activities decrease the risk of injury to the player once the season starts [4]. Conversely, it has been suggested that injury risk is greater in the pre-season, especially during its early period [11]. Given the established practice of a pre-season period, it has never been possible to perform a direct comparison of injury rates in professional football following either the presence or absence of a pre-season.

Upon restarting games after the lockdown, there was no official 'pre-season' for the clubs and playing staff. This meant recommencing competitive football after a 3 months hiatus without any traditional 'pre-season' preparation, a situation that had not been encountered before. This offered an opportunity to assess the impact of preseason on injuries following the start of the season, allowing for the comparison of injury rates with and without pre-season training programmers.

Also due to the extended length of the 2019-2020 season as a result of Covid 19 virus the down time between its finish and the commencement of the 2020-2021 season was markedly reduced. Consequently, the standard post-season rest period for players before starting pre-season was reduced to approximately 2-4 weeks. As a result, the pre-season preparation for the 2020-2021 season was reduced in length and number of warm up matches played, if any. The aim of this study was therefore to report the injury rate from post-lockdown professional football games of the 2019-2020 season (no pre-season programme - NPP) and compare to the start of the 2019-2020 season (following a full pre-season programme - FPP) and to the start of the 2020-2021 season (reduced pre-season programme – RPP). We secondarily compared the rate of injury observed in the NPP group with the rates of injury sustained during pre-season itself that have previously been described within the literature.

Methods

The first two games per team for the 2019-20 season (FPP Cohort), the restart after lockdown (NPP Cohort) for the 2019-2020 season and the 2020-2021 season (RPP Cohort) across 4 European Professional Football Leagues were assessed. These leagues included English Premier League (EPL), Italian Series a (ISA), German Bundesliga (GB) and Spanish La Liga (SLL). Each game's match report was reviewed for injuries and where possible television footage of the game reviewed to provide detail regarding the injury in question. We classified an injury as being significant if it resulted in the player not being able to continue and defined by their being substituted, or in the event of all substitutions being used, the inability to return to play. The following data was recorded: Injury frequency, Rate of injury, Contact or non-contact injury, Soft tissue injury. We then compared the findings between the three groups.

Results

Cohort Injury Rates

In total 234 games were reviewed, 78 per cohort. Ten injuries were observed in the FPP cohort, 0.13 per game compared to 30 injuries in the NPP cohort, 0.39 per game and 34 injuries, 0.45 per game in the RPP cohort. (See table 1). There was a statistically significant difference in injury rate between the FPP vs NPP cohorts (p=0.00001) and between the FPP vs RPP cohorts (p=0.00001). There was no statistically significant difference between the NPP vs RPP cohorts (p=0.17943).

Table 1: Demonstrating the total number of injuries in each assessed cohort and the injury rate this produced.

Cohort	Total Number of Injuries	Injury Rate
FPP	10	0.13
NPP	30	0.39
RPP	34	0.45

Injury Rate & Downtime

The ratio of contact to soft tissue injuries was the same for all three cohorts (1:4). There was no significant difference in the length of downtime between the leagues stopping and restarting (92 -103 days) during the 2019-20 season. However there was a significant difference in time between the end of the 2019-20 season and start of the 2020-21 season in the German Bundesliga (82 days) compared to the other three European leagues (48 days each). There was no correlation between injury rate and length of downtime.

Injury Results by League

The rate of injury in the FPP cohort for each league was EPL 0.15, ISA 0.15, GB 0.11, SLL 0.1. This compared favorably throughout all 4 leagues in the NPP cohort. Rate of injury for each league as follows: EPL 0.3, ISA 0.55, GB 0.28, SLL 0.4. The RPP cohort also demonstrated an increased injury rate across all 4 assessed leagues when compared to the FPP cohort: EPL 0.3, ISA 0.4, GB 0.72, SLL 0.4. (Figure 1).

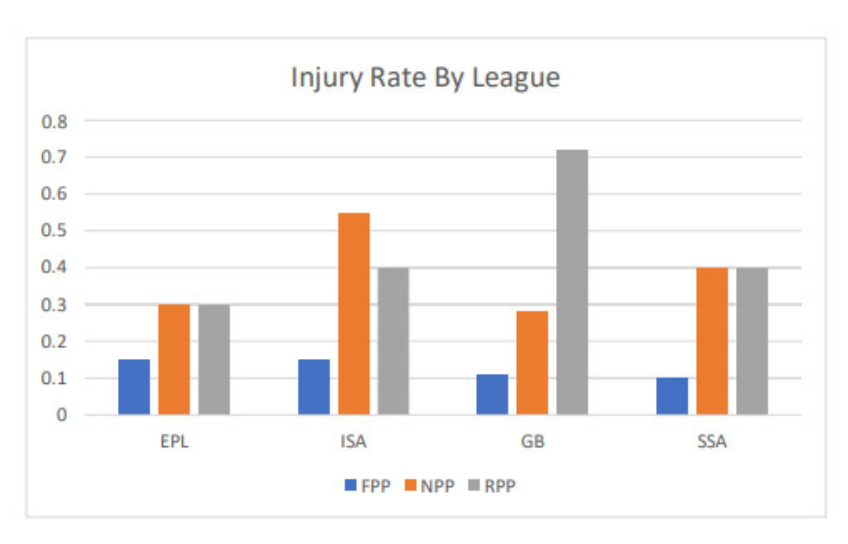

Figure 1: Breakdown of the injury rates of each European League during each group period.

Injury Results by Player Position

When comparing the number of injuries by player position in each of the 3 cohorts, the results were as follows. FPP: Goalkeeper 1 (10%), Defender 1 (10%), Midfielder 4 (40%), Forward 4 (40%). This increased in all outfield player positions in the NPP cohort: Goalkeeper 1 (3.3%), Defender 14 (46.7%), Midfielder 8 (26.6%), and Forward 7 (23.3%). It increased in all player positions in the RPP cohort: Goalkeeper 2 (5.7%), Defender 11 (31.4%), Midfielder 19 (54.3%, Forward 3 (8.6%). (Figure 2).

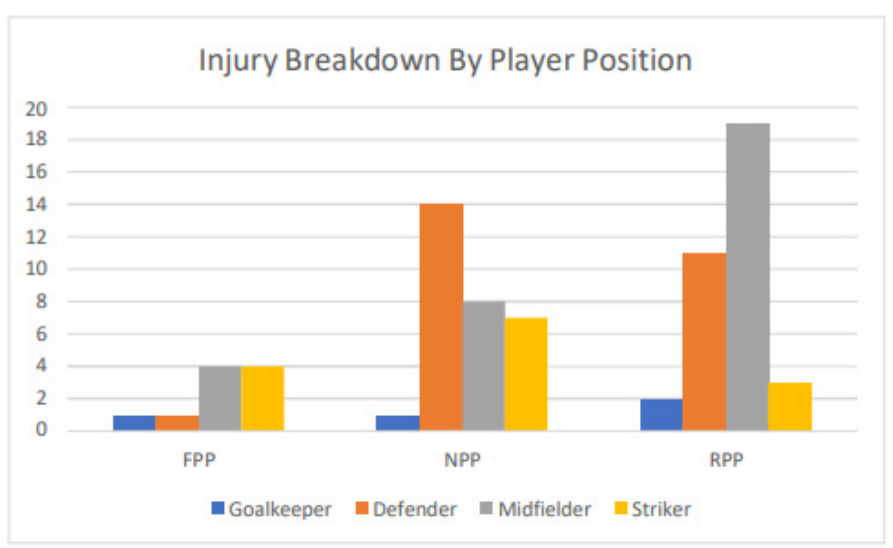

Figure 2: Breakdown of the number of injuries in each player position during each group period.

Additional Results

The range of injuries per individual team was 0-2 during the NPP cohort, 0-1 in the FPP cohort and 0-2 in the RPP cohort. The mean age of an injured player in each cohort was as follows: NPP 26.6 years, FPP 27.4 years and RPP 28.3 years.

Discussion

What This Study Offers

Previous studies have demonstrated benefits of pre-season such as improved anaerobic performance and hormonal parameters [4,5-15]. However, nobody has previously demonstrated a benefit of pre-season with regards to injury prevention or injury risk reduction. In fact, it has been postulated that the risk of soft tissue injury may actually be higher during the pre-season period than the professional season itself [3-10]. Previous comparative studies similar to this study have been logistically difficult to perform given the established use of a pre-season, therefore a definitive answer to the question regarding pre-season's influence on injury prevention during a professional football season has been left largely unanswered. The advent of the Covid-19 pandemic led to a disruption of the normal football season. This provided a unique situation as it was the first time competitive football in the modern era would start without an official pre-season. Consequently, this offered an opportunity to compare the impact of returning to professional football without a planned pre-season programme to the normal return after a planned pre-season programme. This study offers a direct comparison of return to professional football with and without a pre-season programme along with comparing it to a reduced preseason programme. As a result, we have been able to objectively assess the impact it has on injury prevention in professional football.

Our Results & Current Literature

Data was collected from the start of 2019-2020 season, the restart after lockdown forthe 2019-2020 season, and the start of 2020-2021 season. Effectively they were paired sample groups. A statistically significant increase in injury rate was found in the NPP and RPP cohorts compared to the FPP cohort. This offers objective evidence supporting the benefits of pre-season in reducing the risk of injury. This potentially offers some context to previous work suggesting injury risk during pre-season training is higher than during the season itself, consequently questioning its benefit [8-18]. Whilst it would seem reasonable to hold concerns about the risk of injury during a pre-season programme, the benefits this offers regarding injury prevention in the longer term once the season commences would outweigh this. Especially given the evidence linking in season injury rate and level of season success [6]. This does need to be put into context though as our data only spanned the first 2 games after either commencing the new season or recommencing the current season post lockdown. Furthermore, our data would also seem to contradict the belief the pre-season period is a period of increased injury risk when compared to the season itself. Published literature has noted an injury rate during a normal pre-season of 4.7 injuries per 1000 training hours and a competitive match injury rate of 9.4 injuries per 1000 match hours [5]. 1000 hours equates to 666.6 90-minutes matches. Therefore, the rate of injury per 90 minutes of pre-season training time can be used as a comparison to our recorded injury rates. This was calculated as 0.007 injuries per 90 minutes. Competitive match injury rate as published in the literature equated to 0.014 injuries per 90 minutes. From our study the injury rates in the NPP and RPP groups were significantly higher than the injury rate mentioned in this literature.

Physical Downtime & its Impact on Injury Rate

Interestingly there was no correlation between the length of down time between the 2019-20 and 2020-21 seasons and injury rate. German Bundesliga had an extra 34days rest when compared to the other 3 assessed leagues. Also, there was no statistically significant difference in injury rate between the NPP and RPP. This raises questions around detraining and retraining periods and what the optimum length and intensity of these periods should be. Something that has been questioned previously [12]. Our data would suggest that whilst a period of rest is beneficial to injury prevention, an extended period does not offer further benefit. This could in fact reduce cardiovascular fitness, increase fat mass and reduce fat-free mass, all of which would consequently increase the risk of fatigue and injury [6-17]. A greater increase in injury rate in outfield players vs goalkeepers was seen in both the NPP and RPP cohorts. This would appear to add further evidence supporting the importance of pre-season training and reducing prolonged down time periods in the maintenance of aerobic power and endurance given the increased milage covered per game by outfield players [9].

Study Limitations

There were a number of limitations to the study. All searches were done online rather than through a central database, information such as the length of absence in each injury was on occasion somewhat limited. Record of injury requiring substitution is open to interpretation and increased the risk of false positive inclusions and consequent type 1 errors in the data. Only top leagues across Europe were included in the study - potentially the injury rate may be more in lower league clubs with greater financial strains. In spite of this, the difference between FPP and NPP/RPP was so striking and consistent across the 4 leagues that we feel whilst not only statistically significant, but the difference is also of great clinical significance. In the NPP and RPP cohorts, all leagues permitted each team to make up to 5 substitutions per game apart from the EPL whom only allowing 3 substitutions per game in the RPP cohort. This discrepancy in allowed substitutions may have affected the number of injuries sustained due to the impact it had on minutes played per player and regularity of games played per player. Something that has been demonstrated to effect player fatigue both mentally and physically [14].

Conclusion

This study highlights the importance of an adequate amount of pre-season training, demonstrating it's an important protective factor for injury prevention. We recommend that pre-season continue to be conducted in elite professional football in order to avoid an increased rate of player injury as was observed when no pre-season was conducted. Given the findings of our work but the potential limitations involved, we would recommend similar studies be conducted in other sports to see if such a benefit in pre-season exists elsewhere. This is because it is unlikely a prospective randomized controlled trial (RCT) would be able to be performed in elite professional football due to the ingrained use of a pre-season programme. We believe a multi sports assessment would help to negate this by adding further evidence to this topic given an RCT in reality is unlikely to be possible.

Declarations

Competing Interests

There is no competing interest to declare for any of the authors involved in this study.

Financial Disclosure

No author involved in this study have benefited financially from its completion. There are also no competing interests to disclose. No funding was required.

Ethical Approval

Ethical approval was not required from the completion of this study.

Consent for Publication

All contributing authors consent for publication of this work.

Availability of Data

All data from this work is freely available for assessment as required.

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Author Contributions

All named authors contributed to the production of this work.

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