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Expert Report / Uzman Raporu

Exemplifying successful sports event amidst the pandemic: the case of the Turkish women's football super league

Pandemide başarılı bir spor etkinliği: Türkiye kadınlar futbol süper ligi örneği

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ABSTRACT

Objective: The aim of this study is to define the COVID-19 positivity rate, transmission routes and clinical symptoms in the group of female football players competing in the Turkish Women's Football Super League, where the bubble protocol was implemented during the full lockdown period when the cases peaked.

Material and Methods: A retrospective observational study was carried out to include a total of 557 participants during the Turkish Women's Football Super League 3-week event (April 17-May 5, 2021). This event was held within the scope of the bubble protocol developed for sports events during the full lockdown period of the pandemic. Regular reverse transcriptase PCR (RT-PCR) screenings were carried out as part of a standard procedure (48-72 hours prior to hotel check-in, upon arrival, and the day before matches) to assess the possible presence of the COVID-19 virus carriage.

Results: In the pre-arrival test, COVID-19 was detected in 5.03% of football players (19/377). A positivity rate of 0.27% (1/367) was found in football players at the entrance to the hotel facilities. Of the tests performed to footballers during the "Bubble", COVID-19 has been detected in 0.54% (2/367). Tests of 1 team manager and 2 referees, who were in the "bubble protocol" but not in contact with players, were positive. All 6 detected cases were asymptomatic. 5 cases later showed flu-like symptoms. It was revealed that 5 out of 6 cases had contact with a positive case before the tournament.

Conclusion: The bubble protocol, which includes testing, advanced hygiene, social distancing and daily symptom monitoring strategies can minimize the transmission of COVID-19 and provide a safe environment for sports organizations.

Keywords: *COVID-19, lockdown, bubble protocol, football*

ÖZ

Amaç: Bu çalışmanın amacı, vakaların zirve yaptığı tam kapanma döneminde balon protokolünün uygulandığı Türkiye Kadınlar Futbol Süper Ligi'nde mücadele eden kadın futbolcu grubunda COVID-19 pozitiflik oranını, bulaş yollarını ve klinik semptomları tanımlamaktır.

Gereç ve Yöntemler: Türkiye Kadınlar Futbol Süper Ligi'nin 3 haftalık (17 Nisan - 5 Mayıs 2021) etkinliğinde toplam 557 katılımcının dahil edildiği retrospektif gözlemsel bir çalışma yapılmıştır. Bu etkinlik, pandeminin tam kapanma döneminde spor etkinlikleri için geliştirilen balon protokolü kuralları ile gerçekleştirildi. COVID-19'un olası varlığını değerlendirmek için standart bir prosedürün parçası olarak (otele girişten 48-72 saat önce, varışta ve maçlardan bir gün önce) düzenli ters transkriptaz PCR (RT-PCR) taramaları gerçekleştirildi.

Bulgular: Geliş öncesi yapılan testte futbolcuların %5,03'ünde (19/377) COVID-19 tespit edildi. Futbolcularda otel tesislerine girişte %0,27 (1/367) pozitiflik oranı tespit edildi. "Balon protokolü" sırasında futbolculara yapılan testlerin %0,54'ünde (2/367) COVID-19 tespit edildi. Balonun içinde bulunan ancak oyuncularla temas halinde olmayan 1 takım yöneticisi ve 2 hakemin testleri pozitif çıktı. 6 vakanın tamamı tespit edildiğinde asemptomatikti. 5 vaka daha sonra grip benzeri semptomlar gösterdi. Turnuva öncesinde 6 vakadan 5'inin pozitif vakayla teması olduğu ortaya çıktı.

Sonuç: Test, gelişmiş hijyen, sosyal mesafe ve günlük semptom izleme stratejilerini içeren balon protokolü COVID 19'un bulaşmasını en aza indirebilir ve spor organizasyonları için güvenli bir ortam sağlayabilir.

Anahtar Sözcükler: *COVID-19, tam kapanma, balon protokolü, futbol*

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INTRODUCTION

Football is the most popular sport worldwide. Major sports organizations have many physical, cultural, economic and psychological benefits, and these organizations have become a giant industry (1). COVID-19 has caused the postponement or cancellation of football organizations like many sports organizations in 2020 (2).

FIFA has made recommendations and prepared guidelines for a safe return to football, aiming to minimize the transmission of COVID-19 under pandemic conditions (3) Recommendations shaped on the basis of social distance, hygiene and mask use include personal hygiene practices, common area surface cleaning, smart design for common areas, travel and accommodation planning, and appropriate screening and isolation techniques, taking into account the needs of sports organizations (3, 4). Many sports events have been resumed and completed with the measures taken in the light of these guidelines (5, 6).

In the bio-safe bubble protocol, it is ensured that all players, team and league officials are gathered in the same facility and that people who are not guaranteed to be infected from outside cannot enter the facilities except mandatory circumstances (6). In addition, this protocol is to facilitate the implementation of routine testing, hygiene, social distance, and symptom monitoring strategies. Many organizations in different sports branches were held with similar protocols (7, 8).

Turkish Women's Football Super League was discontinued in March 2020 due to the COVID-19 pandemic and the season was not completed. The 2020-2021 season was played in Antalya with the bubble protocol. The present study describes the COVID–19 positivity rate among participants in the Turkish Women's football Super League with the bubble protocol in place.

MATERIAL and METHODS

We conducted a retrospective observational study to examine the results of the COVID–19 test among all Turkish Women's Football Super League participants to determine the efficiency of the bubble in reducing the risk of COVID–19 transmission during a football organization. This 3–week event (April 17 to May 5, 2021) was hosted without spectators. 16 teams participated, 24 matches were played, including quarterfinals, semi–finals, and finals, and were hosted within bio–secure places.

We also evaluated the weekly national incidence of RT–PCR–confirmed COVID–19 cases per 100,000 population (Population of Türkiye: 83.6 million) during the tournament. Turkish Ministry of Health COVID-19 Information Platform (COVID19.saglik.gov.tr) was used to retrieve information on the incidence of COVID–19 in Türkiye (9).

All procedures of the study were in accordance with the principles of the Declaration of Helsinki (2008). Our study was approved by the ethical committee of XXXXX (File no: 2022/71). In addition, necessary permissions were obtained from the COVID-19 Scientific Research Evaluation Commission of the Turkish Ministry of Health.

"The bubble" protocol

The tournament implemented within a bubble protocol that included regular PCR testing, daily symptom assessments, available healthcare support, and strict measures to limit interaction with people not in the designated bubble. The primary aim of this approach was to effectively reduce the risk of COVID-19 transmission by isolating athletes, referees, team members and officials from outside parties. This protocol was regularly evaluated and developed in line with the recommendations of the Turkish Ministry of Health. See Table 1 for a comprehensive overview of the COVID-19 measures covered by the bubble protocol, from participants' arrival to their final departure at the end of the event.

Table 1. COVID-19 measures implemented in the buble protocol

- Each team designated one individual, preferably a healthcare worker, responsible for daily symptom monitoring. If any symptoms were detected, the tournament's medical team has to be promptly notified.
- Access to amenities such as pools, spas, saunas, and fitness rooms was prohibited.
- Prior to training sessions and matches, body temperatures were taken. Any temperature exceeding 37.8 degrees Celsius was considered indicative of a potential case.
- The wearing of masks was compulsory within indoor areas.
- Time spent by teams in the dining area was capped at 20 minutes per meal.
- During meal times, all hall windows were required to remain open.
- Transfers between rooms and visits to other rooms were not permitted.
- Locker rooms and showers were off-limits during training sessions.
- Locker room use was allowed during matches, though shower use remained restricted.
- Safety protocols at the stadium were designed in alignment with the Turkish Football Federation's guidelines for COVID-19 prevention during competitions.

Mandatory PCR testing at least 48 hours prior to hotel arrival was a requirement for all teams and staff, test results to be submitted to the federation before teams depart. Any individual with positive PCR result was immediately excluded from the group. The teams were also responsible for disclosing all contacts of confirmed positive cases.

A PCR test was performed within one hour after arrival at the hotel, and each team was informed on the established protocols and procedures to follow in case of a positive subject. Those awaiting test results remained in quarantine in their rooms and had meals delivered directly to rooms. People whose PCR tests were negative were given accreditation cards and the verification process was meticulously inspected by the Turkish Football Federation (TFF) officials in all areas.

Routine PCR testing was performed the day before of each team's scheduled match and was supplemented by additional PCR testing where contact or suspicion warranted such action, as determined by the medical team supervising the tournament (see figure 1).

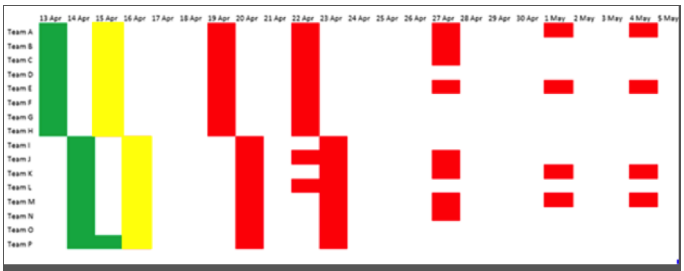

Figure 1. Testing protocol. Red colour indicates testing at bubble hotel. Green colour indicates testing at pre-travel and yellow colour indicates testing at arrival.

In addition, PCR tests were performed on individuals who did not have close contact with the teams, such as drivers, ball boys and security guards, one day before the relevant match. Officials who tested negative were then given accreditation for their designated matches. Entry permission to the facility is only given to individuals with accreditation from the TFF and strict measures have been taken to meet this requirement.

Positive case management

All negative results were reported to individuals via SMS message. Positive cases were informed by the tournament doctors. Their overall health status and symptoms were documented, and they were promptly isolated. If the positive case had a roommate, it was considered as a close contact. Contact tracing for each positive case adhered to guidelines from the World Health Organization and the Ministry of Health of Türkiye (10).

Individuals who tested positive were isolated for 10 days, following the COVID-19 guidelines established by the Ministry of Health that were applicable during the tournament (10). The tournament medical team conducted daily medical check-ups during this isolation period. Isolation concluded upon obtaining a negative PCR test result at the end of 10-day period.

Contact and suspect case management

Individuals displaying symptoms such as headaches, coughing, weakness, widespread muscle discomfort, flu-like manifestations, and loss of taste or smell were regarded as potential cases. Suspected cases underwent a comprehensive medical assessment, were given pertinent information, and were placed in quarantine. PCR tests were administered on two occasions with 48 hours apart. Quarantine of those who had two consecutive negative PCR test results and were asymptomatic was terminated.

The contacts of the positive case were determined according to the COVID-19 (Sars-Cov-2 Infection) Contact Tracking, Outbreak Management, Home Patient Monitoring and Filiation guideline dated March 29, 2021 (10). (Table 2)

Table 2. Evaluation of contact status

Close (high risk) contact

- People sharing a room with a COVID-19 patient
- People who face, talk and spend time with a COVID-19 patient for more than 15 minutes at a time, without following the mask rules, at a distance of less than 1 meter

Contact (low risk)

Following the mask rules

- Persons who have been in the same indoor environment (meeting room, bus, shuttle, etc.) for more than 15 minutes with a COVID-19 patient
- Teammates and technical staff of the COVID-19 patient

Individuals in close proximity to confirmed cases underwent quarantine, which concluded on the 7th day for those with a negative PCR test and absence of symptoms. Those who were identified as low-risk contacts were advised to self-monitor for COVID-19 symptoms and could continue participating in the tournament while adhering to mask usage, physical distancing rules, and frequent hand hygiene.

Individuals whose contact classification couldn't be definitively determined through contact evaluation were allowed to engage in outdoor sports activities following the principles of "fair play" as long as they remained asymptomatic. However, they were excluded from other team activities and followed a semi-quarantine regimen.

Local COVID data and statistical method

Descriptive statistical methods were used in the study. The nationwide occurrence of SARS-CoV-2 cases in Türkiye was computed on a per-100,000 basis for each week, with separate calculations made for the period encompassing April

17 to May 5, 2021 (9). These calculations were based on population figure of 83.6 million (11).

Cases identified through routine PCR testing were documented separately for three distinct scenarios: prior to the trip, upon hotel entry, and within the isolated tournament environment. Furthermore, the COVID-19 incidence among football players was computed per 100,000 individuals on a weekly basis during the tournament, with the total case count derived from the number of participants.

RESULTS

COVID-19 infection in the general population:

From March 11, 2020, when the first case was detected in Türkiye, to April 13, 2021, the weekly number of COVID-19 cases in Türkiye was 84 per 100,000. During the tournament, Türkiye registered a weekly occurrence of 346 cases per 100,000 population. The country-specific data were sourced from the Ministry of Health COVID-19 Information Platform (9). Given the substantial caseload during the tournament's timeframe, Türkiye made the decision to implement a comprehensive nationwide lockdown, from April 29 to May 17, 2021.

COVID-19 infections among football players and staff

The tournament included the participation of 16 teams from 12 different cities. 567 participants consisting of 367 athletes, 138 team employees, 38 referees, 22 employees of the TFF and 2 tournament doctors were in the "bubble" system. In addition, 57 participants consisting of field officers, ball boys and security guards participated in the matches from outside of the bubble.

567 individuals underwent testing 48 hours prior to the commencement of the tournament (pre-travel test). The resultant positivity rate was calculated at 3.52% (n=20), with football players exhibiting a positivity rate of 5.03% (n=19).

Upon their entry to the hotel premises, the observed positivity rate stood at 0.53% (n=3), whereas football players displayed a lower positivity rate of 0.27% (n=1). This calculation encompasses the tests conducted at the conclusion of the isolation period for the individuals who had previously tested positive, before their integration into the designated "bubble." Positive cases were granted entry into the "bubble" upon their team's request, contingent on the condition that two successive negative PCR test results were obtained subsequent to the 10-day isolation period (refer to Figure 2 for more clarity).

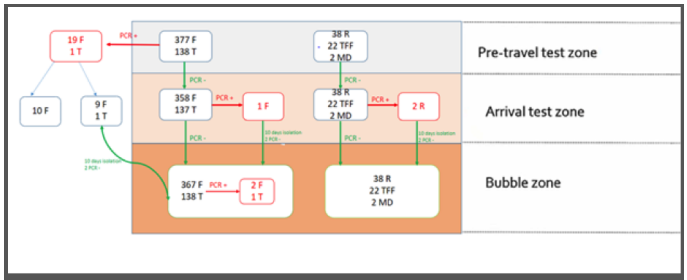

Figure 2. Routine RT-PCR testing results by zones

557 individuals were tested in the bubble, a total of 3 (0.53%) positive cases were detected. Among 367 football players, 2 (0.54%) positive cases were detected. This data implies that, during the bubble period, there was an occurrence of 200 cases per 100,000 individuals per week among female football players.

Contact tracing of positive cases

The contact tracing process was initiated for the 6 positive cases identified through testing upon hotel entry and within the designated "bubble." Investigation revealed that 5 of these cases had established contact with an already positive individual prior to the event. Among these, 2 cases (comprising 1 team personnel and 1 football player) had interacted with positive family members, 2 cases (consisting of 1 referee and 1 football player) had engaged socially with friends who later tested positive. A notable example was when a referee, who also worked in healthcare, contacted a colleague at work who tested as positive.

Intriguingly, the source of infection remained inconclusive for a football player who tested positive on the 20th day of the "bubble" and had experienced COVID-19 infection 6 months ago. This case emerged following a 15-day within the "bubble." Notably, no confirmed instances of transmission were identified within the controlled "bubble" environment.

Symptomatology of positive cases

All of the 6 positive cases were identified through routine testing and showed no symptoms at the time of detection. Thereafter, all the cases manifested symptoms except the football player, who had been diagnosed positive on the 20th day of tournament. The symptoms were mild, resembling a common cold, and longed for less than a week. None of the cases exhibited signs of severe symptoms such as breathlessness, high fever, or low blood oxygen levels. Consequently, hospitalization was unnecessary for any of the cases. Further information regarding the positive cases, encompassing their contact history, symptomatology, and prior infection history with COVID-19, has been summarized in Table 3.

Close contacts of positive cases

Throughout the tournament duration, two individuals who had close contact with positive cases were identified. The first individual shared accommodations with the football player who tested positive. It's noteworthy that their rooms were positioned on different floors within the same building. She was exclusively permitted to take part in outdoor sporting activities. However, their involvement in other team-related undertakings, such as team meals and bus travel, was withheld. This set of restrictions was lifted following two successive negative PCR tests implemented 72 hours apart. Furthermore, this individual remained free of any symptoms during this period.

The second contact was the roommate of the athlete who was diagnosed with COVID-19 on the 20th day of the tournament. As a precautionary measure, this individual underwent quarantine. Successive PCR testing consistently yielded negative outcomes, confirming the absence of infection.

Table 3. Contact history, symptomatology, and previous COVID-19 infection history of positive cases

	detected day	Contact of a confirmed case	Symptom	Close contact in bubble	transmission someone	Reinfection
positive 1 (Footballer)	1 (arrival test)	from prior to the event	flu-like (after testing)	-	No.	No.
positive 2 (Referee)	1 (arrival test)	from prior to the event	flu-like (after testing)	-	No.	No.
positive 3 (Referee)	1 (arrival test)	from prior to the event	flu-like (after testing)	-	No.	No.
positive 4 (footballer)	5	from prior to the event	flu-like (after testing)	one	No.	No.
Positive 5 (Team official)	5	from prior to the event	flu-like (after testing)	-	No.	No.
Positive 6 (footballer)	20	None	None	one	No.	yes (6 months ago)

DISCUSSION

Professional sports organizations started again by developing preventive strategies after the incubation period of SARS-CoV-2, the transmission routes and the course of the disease were understood. However, events without necessary precautions have failed to prevent the spread of SARS-CoV-2. For example, after a high school wrestling tournament in which 10 teams participated, the PCR test was applied to 54 participants (41.5% of the total 130), 38 positive results were obtained, and the minimum contamination rate was determined as 30.2% (12). Similarly, in the U20 Finnish Ice Hockey league, which resumed its activities through PCR testing only on symptomatic individuals, an asymptomatic carrier infected 22 of 28 teammates, resulting in 49 positive cases in 5 ice hockey teams (13).

The Bundesliga, Germany's top-tier professional football league, resumed play on May 16, 2020, after implementing a comprehensive strategy to prevent the spread of COVID-19 (14). This strategy included the introduction of routine PCR tests two weeks prior to the league's restart. Athletes who tested negative in two consecutive PCR tests were permitted to participate in regular team training. Subsequently, PCR testing continued twice a week to maintain the safety of the players and staff. Notably, all positive cases were identified during the initial testing phase when teams reconvened for training. Throughout the season, rigorous testing measures ensured that no further positive cases were detected, resulting in a successful completion of the season without any COVID-19 incidence (14). Similarly, the 2020 NBA Playoffs took place in Orlando within a closed campus environment known as the NBA bubble. In preparation, players and personnel underwent a two-week period of PCR testing and quarantine before arriving on campus. Upon entry to the campus, individuals underwent two more PCR tests. Throughout their time within the bubble, a strict protocol of daily PCR testing was enforced. This comprehensive testing regimen, along with the isolation measures in the bubble, led to the containment of COVID-19 (6). Remarkably, no positive cases were reported among players, staff, or other involved parties, as confirmed by media reports (15, 16).

In the Turkish Women's Football Super League, routine PCR testing and pre-season quarantine measures were not implemented during the initial team gatherings for regular training. Instead, the mandatory PCR test was conducted 48 hours before teams arrived at the hotel. In contrast, the Bundesliga and NBA took a different approach. They administered routine PCR tests and enforced quarantine procedures two weeks prior to the season's commencement. This proactive strategy enabled the identification of all asymptomatic carriers before the season began, accounting for the COVID-19 incubation and contagion period.

In our study, the pre-arrival PCR test successfully identified 80% (20 out of 25) of potential carriers, preventing their inclusion in team travel. Subsequently, a second PCR test conducted upon hotel arrival detected 92% (23 out of 25) of potential carriers prior to entering the bubble. Importantly, among the cases identified on the 5th day of the bubble, there was no subsequent transmission of the virus to other individuals.

Recent research has indicated the potential for transmission from asymptomatic carriers, and their viral load appears comparable to that of symptomatic individuals (17, 18). When we consider the settings where contamination might arise within sports organizations, both in-competition and out-of-game environments, outdoor football play offers a distinct advantage. This stands in contrast to activities like ice hockey and wrestling, which have previously reported increased contagion risks from asymptomatic carriers. Although the risk of transmission of COVID-19 has not been determined in indoor and outdoor sports activities in general, it is thought that the risk of transmission is higher in indoor sports (19). Notably, two separate studies exploring infection risks during football competitions and training have revealed that effective preventive measures substantially mitigate transmission risks. Furthermore, despite football being a contact sport, our analysis suggests that the cumulative duration of close proximity (within 1.5 meters) between two players during matches is generally less than 90 seconds (14, 20). This limited contact duration could contribute to the decreased likelihood of in-competition transmission (21).

Evidence suggests that the primary context for potential contagion within sports organizations lies in non-competitive settings (20). These non-competition environments, such as social gatherings, locker rooms, and shared meals, often witness a decreased adherence to preventive measures like social distancing, mask usage, and hand hygiene, consequently elevating the risk of infection (20). To counteract this increased risk, stringent hygiene protocols are of paramount importance. Careful arrangement of communal spaces and dining areas to adhere to social distancing norms, limitations on room visits, avoidance of locker room and shower facilities during training, and the effective enforcement and monitoring of mask compliance in enclosed spaces all play an important role in curbing the potential for contagion, even within a confined bubble housing two carriers.

Notably, the positive case detected on the 20th day of the bubble exhibited a 15-day gap from the previously identified cases. Given the absence of contact with positive or suspicious cases, we posit that transmission did not occur within the bubble itself. This underscores the significance of diligently upholding preventive measures to thwart any possible instances of transmission.

Due to the high number of cases during the tournament, a full lockdown was declared between April 29 and May 17, 2021 in the country, and according to the information obtained from the COVID-19 Information Platform, 327 cases per 100,000 per week were detected in Türkiye (9). Considering that PCR is performed only on symptomatic people in and 90% of cases cannot be detected (14, 22, 23), it can be assumed that approximately 3270 cases per 100,000 were present. The corresponding figure for the players in the bubble was 200 per 100,000 (2 in 367) per week. In this period when the number of cases is at its peak, the fact that there are fewer cases compared to the general population, the completion of the tournament without any intra-bubble contamination and without cancelling any matches reveals the success of the bubble system.

Limitation

Particularly during the initial test conducted prior to hotel arrival (the first test), PCR alone might not sufficiently differentiate between previous and current infections. In these scenarios, the integration of antibody testing, along with medical insights and medical background, could aid in dispelling uncertainties. It's worth noting that the absence of antibody testing in our study represents one of its limitations.

The emergence of new variants and the initiation of vaccination efforts may have changed the virus behaviour. Such changes can lead to the development of strategies that deviate from our usual ways of handling positive cases and contacts, arranging smart layouts for common areas, and organizing travel and accommodation logistics. However, these strategies are based on core principles that include keeping distance, wearing masks, and adhering to hygiene protocols, serving as preventative measures against all droplet-borne ailments, including COVID-19.

CONCLUSION

The bubble management has ensured the safe execution of a national football organization even in a time period when the daily number of COVID-19 cases is quite high. The key to preventing viral transmission may lie in the rapid identification and isolation of infected individuals, as well as the basic measures of contact tracing and daily symptom monitoring. Effective adherence to social distancing, mask-wearing, and stringent hygiene protocols within the bubble can effectively curb the transmission of the virus, even when individuals who are infected but show no symptoms are present. During viral pandemics such as SARS-CoV-2,

which spread through droplets, sports organizations can confidently proceed with the implementation of the bubble protocol.

Ethics Committee Approval / Etik Komite Onayı

The Ethics Committee of Istanbul University Istanbul Medicine Faculty approved all procedures and the experimental design (date: 28/01/2022 and number: 2022/71). The study protocol is in accordance with the latest version of the Declaration of Helsinki.

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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Author Contributions / Yazar Katkıları

Concept: ENT, IB; Design: ENT, IY, BB; Supervision: IY, BB; Materials: ENT, IB ; Data collection and/or processing: ENT, IB; Analysis and Interpretation: ENT, IY, BB; Literature review: ENT, IB, IY; Writing manuscript: ENT, IY; Critical reviews: IY, BB. All authors contributed to the final version of the manuscript and discussed the results and contributed to the final manuscript.

REFERENCES

1. Carmody S, Murray A, Borodina M, Gouttebarge V, Massey A. When can professional sport recommence safely during the COVID-19 pandemic? Risk assessment and factors to consider. *Br J Sports Med.* 2020;54(16):946-8.
2. Drewes M, Daumann F, Follert F. Exploring the sports economic impact of COVID-19 on professional soccer. *Soccer Soc.* 2021;22(1-2):125-37.
3. FIFA. COVID-19: Medical Considerations for a Return to Footballing Activity 2020 [Available from: https://digitalhub.fifa.com/m/1646d5fc62614ee7/original/cpng0f3y5pclmxn0prdb-pdf.pdf.
4. McElheny KD, Little D, Taylor D, Manzi JE. Communicable illness mitigation strategies for traveling elite sporting organizations. *Sports Health.* 2021;14(4):532-37.
5. Vaudreuil NJ, Kennedy AJ, Lombardo SJ, Kharrazi FD. Impact of COVID-19 on recovered athletes returning to competitive play in the NBA "Bubble". *Orthop J of Sports Med.* 2021;9(3):23259671211004531.
6. Haislop T. NBA bubble, explained: a complete guide to the rules, teams, schedule & more for Orlando games. Sporting News Accessed May. 2020;10. [Available from: https://www.sportingnews.com/us/nba/news/nba-bubble-rules-teams-schedule-orlando/zhapahcwqkhmcexggabo66913]
7. Massey A, Lindsay S, Seow D, Gordon J, Lowe DJ. Bubble concept for sporting tournaments during the COVID-19 pandemic: Football Club World Cup. *BMJ Open Sport Exerc Med.* 2021;7(2):e001126.
8. Robinson PG, Murray A, Close G, Kinane DF. Assessing the risk of SARS-CoV-2 transmission in international professional golf. *BMJ Open Sport Exerc Med.* 2021;7(2):e001109.
9. T.C. Saglik Bakanligi COVID-19 Bilgilendirme Platformu [Available from: https://COVID19.saglik.gov.tr/TR-66935/genel-koronavirus-tablosu.html.
10. T.C. Sağlık Bakanlığı COVID-19 (SARS-CoV-2 ENFEKSİYONU) Temaslı Takibi, Salgın Yönetimi, Evde Hasta İzlemi ve Filyasyon Rehberi 2021 [Available from: https://toraks.org.tr/files/mf/site/4-598571451819648868O-f8972a33.pdf.
11. Adrese Dayalı Nüfus Kayıt Sistemi Sonuçları 2022 [Available from: https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2020-37210.
12. Atherstone C, Siegel M, Schmitt-Matzen E, Sjoblom S, Jackson J, Blackmore C, et al. SARS-CoV-2 transmission associated with high school wrestling tournaments—Florida, December 2020-January 2021. *Morb Mortal Wkly Rep.* 2021;70(4):141.
13. Kuitunen I, Uimonen MM, Ponkilainen VT. Team-to-team transmission of COVID-19 in ice hockey games-a case series of players in Finnish ice hockey leagues. *Infect Dis* 2021;53(3):201-5.
14. Meyer T, Mack D, Donde K, Harzer O, Krutsch W, Rössler A, et al. Successful return to professional men's football (soccer) competition after the COVID-19 shutdown: a cohort study in the German Bundesliga. *Br J Sports Med.* 2021;55(1):62-6.
15. Mack CD, DiFiori J, Tai CG, Shiue KY, Grad YH, Anderson DJ, et al. SARS-CoV-2 transmission risk among National Basketball Association players, staff, and vendors exposed to individuals with positive test results after COVID-19 recovery during the 2020 regular and postseason. *JAMA Intern Med.* 2021;181(7):960-966.
16. Pegher K. Coronavirus Today: The NBA's bubble worked 2020 [Available from: https://www.latimes.com/science/newsletter/2020-10-12/coronavirus-today-nba-bubble-success-COVID-lakers-coronavirus-today.
17. Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med.* 2020;382(12):1177-9.
18. Yu X, Yang R. COVID−19 transmission through asymptomatic carriers is a challenge to containment. Influenza Other Respir Viruses. 2020;14(4):474-5.
19. Pauser J, Schwarz C, Morgan J, Jantsch J, Brem M. SARS-CoV-2 transmission during an indoor professional sporting event. *Sci Rep.* 2021;11(1):1-5.
20. Schumacher YO, Tabben M, Hassoun K, Al Marwani A, Al Hussein I, Coyle P, et al. Resuming professional football (soccer) during the COVID-19 pandemic in a country with high infection rates: a prospective cohort study. *Br J Sports Med.* 2021;55(19):1092-8.
21. Knudsen NS, Thomasen MM, Andersen TB. Spread of Virus during Soccer Matches. Preprint. 2020. [Available from: https://www.medrxiv.org/content/10.1101/2020.04.26.20080614v1.full.pdf+html
22. Long Q-X, Tang X-J, Shi Q-L, Li Q, Deng H-J, Yuan J, et al. Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. *Nat Med.* 2020;26(8):1200-4.
23. Knabl L, Mitra T, Kimpel J, Rössler A, Volland A, Walser A, et al. High SARS-CoV-2 seroprevalence in children and adults in the Austrian ski resort of Ischgl. *Commun Med.* 2021;1(1):1-9.