JOURNAL OF HUMAN SCIENCES

International Journal of Human Sciences (IJHS) ISSN:2458-9489

Established: 1999 - Registered: 2002 - DOI: 10.14687

- is one online academic journal that adheres to the highest standards of peer review and engages established and emerging scholars from anywhere in the world, and welcoming to contributions all kinds of scientific works in any disciplines, approaches and languages.
- Articles are published in the current issue as soon as they have completed the review process.

18th publishing year

One of the oldest e-journals

Current Issue: Vol. 13, No. 3 (September 1 - December 31, 2016)

INDEXES & DATABASES:

- IHS -
All Sciences h5-index and h5-median value

- Top publications -
Social Sciences h5-index and h5 median value

Google Academics

UHS European Community Research Portal

OpenAIRE

Validated

Index Copernicus International

J-Gate

EBSCO STM Source
Full Text Subject Title List

DIRECTORY OF OPEN ACCESS JOURNALS

WorldCat

Scilit

Michigan State University MSU Libraries
MICHIGAN STATE UNIVERSITY
Electronics Journal Library

Michigan eLibrary

Genamics

Journal of Human Sciences
ISSN: 2458-9489
Volume: 13 Issue: 3 Year: 2016

An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016)[1]

Eren Uluöz[2]

Abstract

In order to prevent injuries, reasons and risk factors should be known before injuries occur. In this context, the main purpose of this study was to investigate sports injuries that have occurred in matches in the First Turkish Men's Volleyball League during the period between 2011 and 2016.

In this study, 250 matches played in the Turkish Men's Volleyball League during the period between 2011 and 2016 have been analyzed. "A Sports Injuries Observation Form" developed by the researcher was used in the study. This form contains different variables related to sports injuries such as "number of injury", "injury sites of body", "severity of injury", "techniques-related injury", "injury reason" and "match duration". In addition to the researcher, two independent expert observers in volleyball have analyzed the match recordings and filled out the forms. All forms were crosschecked closely. The matches analyzed included 121.680 player hours defined as active playing time. Descriptive statistics were calculated for the variables such as mean, standard deviation, percentage and frequency. The Pearson coefficient was used to measure correlations between match durations and total number of injuries, number of temporary injuries, and number of serious injuries.

In these matches, 83 injuries have occurred. However, 68.67% (57) of all injuries were temporary injuries where players continued to the play following the minor treatment and where 31.33% (26) were serious injuries which hindered players and were not able to continue to the play. In this context, there were 0.33 injuries per match. Upper extremity injury rate was 61.45% (51) whereas the lower extremity injury rate was 38.55% (32). While "block" was the most dangerous technique of the play with 65.06% (54) injury rate, "spike", defense and other techniques had a slightly lower risk rate of 14.46% (12) and 20.48% (17), respectively. In other words, 79.51% (66) of the injuries occurred in front of the net where block and spike techniques were repeatedly performed.

In conclusion, injury risk was remarkable in volleyball. Especially, the players playing in the front area were at greater risk than back area players. Correct jumping and landing practices may reduce the injury risks. It has been suggested that there is relationship between injuries and the game rules related to net contact and middle line. Future studies should address the relationship between injuries and official game rules.

Keywords: Volleyball; Sport injuries, Competition, Men's first league, 2011-2016 period

[1] This study was presented in 14th International Sport Sciences Congress, November, 2016 Antalya/Turkey

[2] Ph.D. Lecturer, Çukurova University, School of Physical Education and Sports, Department of Training, euluoz@cu.edu.tr

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

Introduction

Volleyball is played by almost 200 million people worldwide in nearly 170 countries. Volleyball is one of the most popular sports in the world. (Verhagen et al., 2004). The sport of volleyball has continued to grow in terms of participation since its inception over one hundred years ago (Tilman et al., 2004). Since volleyball can be played with a small number of basic equipment such as a net and a ball, it is preferred by many people for recreational purposes.

Sports injuries constantly occur in volleyball ranging from recreational level to professional level despite the fact that the opposing team players are separated by a net. As volleyball is a non-contact game, the incidence of injuries might be expected to be low (Verhagen et al., 2004). Nevertheless, volleyball is a sport involving rapid and forceful movements of the body as a whole, both horizontally and vertically, and because of the large forces exerted in such movements, it is inevitable that injuries will occur (Watkins and Green, 1992).

All sport injures cause serious financial and psychological losses, both individual and public. Injuries are disturbing especially for elite athletes. Sports injuries constantly occur in power-based sports like volleyball. In order to prevent injuries, the reasons and risk factors should be known in advance. There are many studies related to reasons, preventions, injury sites of the body and incidence of sports injuries in volleyball. For example, a study focused on the fact that school sport injuries account for a significant morbidity among children and adolescents. Volleyball is popular among school sports and leads to frequent injuries in youth besides basketball and soccer (Knobloch et al., 2004). Solgard et al (1995) found out that all sports injuries in Denmark (n=5222) were prospectively recorded at the two casualty departments in Arhus, Denmark. Volleyball injuries (n=278) accounted for 5.3% of all sports injuries. An evaluation of the rehabilitation period and the consequences of the injuries were undertaken by a survey three years after the occurrence of injuries. The injury incidence was 1.9 injuries/1000 inhabitants/year. In a retrospective cohort study of ankle injuries performed after the 1991-1992 season in the top two divisions of the Norwegian Volleyball Federation, 63 injuries were found among 318 players during 60,612 hours of training and 928 matches. The study was limited to acute ankle injuries that caused an absence of one or more days from training or match play. The total injury rate was 0.9±0.12 per 1000 player hours: 0.7±0.11 during training and2.6±0.56 during match play (Bahr et al., 1994).

Another study has shown that a total of 377 injuries were reported for 456 matches, where an incidence of 0.8 injuries per match (95% confidence interval, 0.75–0.91) or 54 injuries per 1000 player matches (95% confidence interval, 49-60) have occurred. Half of all injuries affected the lower extremity; 24% involved the head or neck (Junge et al., 2004). Aagaard and Jorgensen (1996) found that a total of 70 female players reported 79 injuries and 67 male players reported 98 injuries, representing an overall incidence of 3.8 injuries per player per 1000 volleyball hours played. The injury incidence was the same for female and male players. Most injuries occurred in spiking (32%) and in blocking (28%). The injuries were predominantly either acute injuries to fingers (21%) and ankles (18%) or overuse injuries to shoulders (15%) and knees (16%). Shoulder injuries seemed to be a more serious problem in females. Verhagen et al (2004) reported 100 injuries, resulting in an overall injury incidence of 2.6 injuries/1000 hours. The incidence of acute injuries was 2.0/1000 hours. Ankle sprains (n=41) accounted for most of the acute injuries, and 75% (31) of all players with an ankle sprain reported a previous ankle sprain. Twenty five overuse injuries were reported. The overall incidence of overuse injuries was 0.6/1000 hours; the back and the shoulder were the most common body sites.

Verhagen et al (2004) have focused on the fact that in view of the global participation rate and the relatively high incidence of volleyball injuries upon comparing volleyball with high-intensity contact sports, preventive measures are definitely warranted in volleyball. Studies on volleyball injury incidence during training and match play, however, have mainly been retrospective, and reliable information from season-long prospective studies is scarce (Bahr et al., 1994; Shafle et al., 1990; Bahr et al., 1997; Aagaard and Jorgensen, 1996; Gerberich et al, 1997; Solgard et al., 1995).

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

In order to prevent injuries, reasons and risk factors should be known before injuries occur. In this context, the main purpose of this study was to investigate sports injuries that have occurred in matches in the First Turkish Men's Volleyball League during the period between 2011 and 2016.

Materials and Methods

Subjects: In this study, 250 matches were analyzed in the First Turkish Men's Volleyball League during the period between 2011 and 2016 years. The matches included were played in the normal season and the final-four competitions. The study was performed among 300 players during 121.680 player hours.

The Research Questions:

- What are the frequency and number of sports injuries?
- What are the rate, frequency and number of temporary sports injuries?
- What are the rate, frequency and number of serious sports injuries?
- Is there a correlation between match durations and number of injuries (total, temporary and serious)?
- Which parts of the body are subject to sports injuries more frequently?
- Which techniques have higher injury risks?
- Is there significant relationship between severity of injuries and injury sites of body?

Definition of Variables:

- The severity of injuries: This has been shown in terms of absence from a match or returning to play and has been described as temporary injuries and serious injuries.
- Temporary injuries: Injuries where continuing to play the match is ensured by minor medical treatment.
- Serious injuries: Injuries that lead to an absence from a match,
- Lower body injuries: Ankle, knee and leg injuries,
- Upper body injuries: Finger, wrist, elbow, arm, shoulder, back and head injuries.

Data Collection Instruments: In order to analyze the matches "The Sports Injuries Observation Form" developed for volleyball by the researcher was used. This form contains different variables related to sports injuries such as "number of injury", "injury sites of body", "severity of injury", "techniques-related injury", "injury reason" and "match duration".

Data Collection and Analysis Procedures:

Media player program: In order to watch all the video-recordings of matches a media player program for Windows was used. This media player program possessed forward, reverse and pause functions. In addition to these functions the program provided slow motion viewing and zoom screen display. These functions of the media player program allowed clear viewing and enabled filling out the forms with high accuracy. Each video-recording was played back manually (frame by frame) in order to accurately observe several aspects of an injury position.

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

The Observers: In this study, three observers were assigned to view and fill the forms. The researcher and two independent expert observers in volleyball analyzed the video-recording of matches and filled the forms twice, one month apart from each other. All video-recordings of the matches were stored as three copies in order to able their viewing by the observers (the researcher and two independent volleyball experts working as academician and trainer).

Reliability of Data Collection and Correctness of Form Completion (Triple-blind crosscheck): The researcher and the other observers have viewed the recordings and filled the forms twice, one month apart from each other. Each observer (the researcher and two expert observers) carefully compared his own first and second forms. As a result of these comparisons, first and second forms of the researcher showed 99.97% accuracy. Similarly, first and second forms of the other observers had 99.61% and 99.95% accuracy, respectively. Each observer has viewed the recordings of positions with conflicting codes again and corrected the missing codes. Thanks to these individual crosschecks, each observer ensured 100% consistency of his own first form with his second form. After these individual crosschecks, a triple comparison was performed among corrected individual forms of the observers. The triple comparison had 99.98% accuracy. All observers viewed the recordings of positions with conflicting codes again and corrected the missing codes. At the end of these crosscheck procedures, 100% consistency among all forms filled and corrected by the observers (researcher and two expert observers) was ensured.

Data Analysis: Descriptive statistics were calculated for the variables such as mean, standard deviation, percentage and frequency. The Pearson coefficient was used to measure correlations between match durations and total number of injuries, number of temporary injuries, and number of serious injuries. All of these data were treated as continuous variables. Chi-square test was performed on the injury sites of body, and on severity of injury. p-value was accepted for statistical significance at $p \leq 0.05$.

Results

In this study, it was found that 83 injuries among 300 players occurred during 121.680 player hours in 250 matches. Distribution of injury severity is shown in Table 1.

Table 1. Table of severity of injuries

	n	%
Temporary injuries	57	68.72
Serious injuries	26	31.38
Total	83	100

While temporary injuries were found as 68.72% of all injuries, serious injuries were found as 31.38%. The mean and standard deviation results related to per match and injuries are shown in Table 2.

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

Table 2. General descriptive statistics for matches and injuries

	n	Min	Max	M	SD
Match durations (minutes/per match)	250	61	166	97.13	25.18
Total number of injuries (numbers/per match)	250	0	4	0.31	0.57
Temporary injuries (numbers/per match)	250	0	2	0.20	0.41
Serious injuries (numbers/per match)	250	0	3	0.12	0.38

Overall duration of matches was found as 97.13±25.18. A total number of 83 injuries were observed for the 300 players in 25 different teams, representing an incidence of 0.28 injuries per player. However, incidence of temporary injuries was 0.19 and incidence of serious injuries was 0.12 per player. Analysis of the results was carried out for playing hours (1000 h), and the incidence of injuries was found as 0.68/1000 hours, temporary and serious injuries incidence were found as 0.47 and 0.21, respectively. Correlations between match durations and total number of injuries, number of temporary injuries, and number of serious injuries are given in Table 3.

Table 3. Correlations between match durations and total number of injuries, number of temporary injuries, and number of serious injuries

	n	Correlation coefficient	p-value
Total number of injuries	83	***0.27***	0.00
Temporary injuries	57	***0.25***	0.00
Serious injuries	26	***0.16****	0.00

*Correlation is significant at the 0.05 level, **Correlation is significant at the 0.01 level

These analyses indicated that there was a positive moderate correlation between match durations and the total number of injuries ($r=0.27$, $p<0.01$). Similarly, a moderate correlation was found between match durations and the number of temporary injuries ($r=0.25$, $p<0.01$). The results related to distribution of 83 injuries in sets are given in Table 4.

Table 4. Table of injuries among sets of matches

	n	%
First sets	20	24.11
Second sets	19	22.93
Third sets	21	25.32
Fourth sets	16	19.33
Fifth sets	7	8.41
Total	83	100

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

The third and first sets hosted more injuries, 25.32% and 24.11%, respectively. Contrarily, 19.33% and 8.41% of all injuries were lower than those that appeared in the fourth and fifth sets, respectively. Distributions of injury sites of bodies are given in Table 5.

Table 5. Result of injury site of the body

	n	%
Lower body injuries	51	61.44
Upper body injuries	32	38.56
Total	83	100

The rates for lower body injuries were higher than the rates for upper body injuries. Distributions of techniques related to injuries are shown in Table 6.

Table 6. Result of technique-related injuries

	n	%
Block	53	63.90
Spike	12	14.50
Defense and others	18	21.70
Total	83	100

Block positions in front of the net were found as the most risky actions in the matches. Results of the relationship between severity of injuries and injury site of the body are shown Table 7.

Table 7. Results of the relationship between severity of injuries and injury site of the body

Groups		Injury site of the body		Total	x^2	df	p
		Lower	Upper				
Injuries	Temporary	52.60% (30)	47.40% (27)	57	5.96	1	***0.012****
	Serious	80.80% (21)	19.20% (5)	26			
	Total	61.40% (51)	38.60% (32)	83			

*Correlation is significant at the 0.05 level

Chi-square (2X2) test performed has shown that there is a significant relation between severity of injuries and injury site of the body. Ratio of serious injuries that appeared in the lower body was significantly higher than those in the upper body, [X^2 (1) = 5.95, p=0.012]. As a result of this test, it was clearly shown that lower body injuries are more dangerous for players because of the high ratio of those that cause absence from matches.

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

Discussion

One of the major findings of the present study, with a total of 83 injuries observed for the 300 players, the incidence of injuries per player was 0.28. However, incidence of temporary injuries was 0.19 and incidence of serious injuries was 0.12 per player. When the high-risk sports were compared with volleyball, the injury rate of volleyball might be expected to be lower (Gabbett, 2002; Jerrett et al., 1999; Potter et al., 2011). For example, Hägglund et al., (2003) reported a sports injury incidence of 2.3 injuries per player in male Swedish soccer. Whereas, when volleyball is compared with the other sports branches accepted as having low risk, the injury incidence in volleyball seems to be higher (Parkkari et al., 2001; Smith and Krabak, 2002; Wan-Gent et al., 2007; Wikstrom and Andersson, 1997). Nevertheless, it was noted that an injury ratio of 0.28 per player, might be regarded as relatively normal since volleyball is a non-contact sport. On the other hand, intensive effort exerted in front of the net might increase the risk of injures in volleyball.

When the literature was reviewed, it was found that there were only a few studies on sports injuries in volleyball. Incidence, type, prevalence, epidemiology, severity, reasons, risk factors and causation were the most common subjects studied on sports injuries related to volleyball (Aagaard and Jorgensen, 1996; Agel et al., 2007; Briner and Kacmar, 1997; Bahr and Bahr, 1997; Verhagen et al.; 2004 Watging and Green, 1992;). In addition to these studies, causal comparative researches were conducted between volleyball and different types of sports (De Loes, 1995; Kujala et al., 1995; Lian and Bahr, 2005; Tenvergert et al., 1992; Rechel et al., 2008).

We focused on injury incidence, injury sites of the body, severity of injury, technique-related injuries, injury reasons and match durations in this study. Correlation between match durations and number of injuries (total, temporary and seriously) and significance of relationship between severity of injuries and injury sites of the body are the other issues emphasized in the present study. Incidence of injuries was found as 0.28 injuries per player (total of 83 injuries observed). However, incidence of temporary injuries was 0.19 and incidence of serious injuries was 0.12 per player. When the literature was analyzed, similar and different findings on incidence of injuries per player were noted. For example, Zetou et al. (2006) analyzed 114 Greek Volleyball players who participated in the Volleyball Championship including the A1 and A2 national division and the local championships, and reported that 363 injuries occurred, during a total exposure time of 134.200 h/year for 5 years, representing an overall incidence of 0.63 injuries per player. Similarly, Beneka et al (2009) conducted a study on 407 Greek male volleyball players. They reported 248 injuries over a total exposure time of 110.596 h, representing an overall incidence of 0.60 injuries per player. Zetou et al. (2006) and Beneka et al. (2009) found higher results than those found in our study. In addition to these studies, Aagaard and Jorgensen (1996) previously reported a rate of injuries corresponding to 1.5 injuries per player for Danish male volleyball players. As opposed to our study, Kugler et al (2006) reported 1294 injuries among 625 indoor volleyball players, representing an overall incidence of 0.22 injuries per player per year. It might be considered that differences of results between our study and other studies such as Zetou et al. (2006), Kugler et al (2006), and Beneka et al (2009) are due to differences of league levels and using different research methods employed in the studies. There are many studies related to sports injuries which focus on the relationship between sports injuries and performance levels. These studies report that elite players have lower injury rates than amateurs or un-elite players. (Adirim and Cheng, 2003; Bahr and Holme, 2003; Beneka el al., 2009; Van Mechelen et al., 1992). These factors might partly explain the differences in the researches results. In our study, the results were analyzed for player hours (1000 h), where the incidence of injuries was 0.68/1000 hours, temporary and serious injuries incidence were 0.47 and 0.21, respectively. Beneka et al. (2009) reported 2.4 injuries per 1000 h of training and games per player. Incidence of acute injuries was found as 2.0 per 1000 hours in another study carried out by Verhagen et al.

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences*, *13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

(2004). In addition to these previous studies Bahr and Bahr (1997) reported lower incidence of injuries as 1.7 per 1000 player hours. These results were extremely higher than our results. It might be considered that the studies have performed under different conditions such as wide range of ages, the various categories involved and under changed game rules. In addition to these factors, development of training techniques and capability of players might reduce the injury incidences.

Correlations between match durations and total number of injuries, number of temporary injuries, and number of serious injuries are given in Table 2. This analysis indicates that there is a positive moderate correlation between match durations and total number of injuries ($r=0.27$, $p<0.01$). Similarly, a moderate correlation was found between match durations and temporary injuries ($r=0.25$, $p<0.01$). Although there are no studies in which the correlation between volleyball injuries and match durations has been analyzed, a number of authors have suggested that there is a correlation between activity/training/match durations and sport injuries related to fatigue (Augustsson et al., 2006; Bahr and Holme, 2003; Beneka et al., 2009; Briner et al., 2010; Ma and Gong, 2007).

Distribution of injuries over sets was another result obtained in our study. The results attained related to distribution of 83 injuries in sets were observed. Third and first sets hosted more injuries, 25.3% and 24.1%, respectively. Contrarily, 19.3% and 8.4% of all injuries were lower than those that appeared in the fourth and fifth sets, respectively. Although there are no studies in the literature that can be compare completely with this point in our study, it might be thought that players might not be completely ready for high-power game actions in the first sets in case of inappropriate warm-up. Because of this reason, injury rates might be found relatively higher. Inappropriate warm-up periods were reported as one of the major injury reasons by Beneka et al (2009).

Severity of injuries has been the subject of focus in recent studies. In our study, while temporary injuries were found as 68.72% of all injuries, serious injuries were found as 31.38%. Beneka et al (2009) reported that the rates for mild, moderate and major injuries are 24%, 58.4% and 15.4%, respectively. The different results reported by Yang et al (2012) have shown that 40% of acute injuries are minor or moderate. Generally, sports injuries were categorized as minor, moderate and major injuries in literature. This categorization was used in recent researches performed on different sports branches (Beneka et al., 2009; De Loes, 1990; Kirialanis et al., 2002, 2003). In contrast with this classification, we have categorized severity of the injuries as temporary and serious injuries appropriate for analyses of volleyball injuries in matches.

The main criteria we have emphasized in classifying the injuries were to be able to continue the match or not. According to recent studies lower body parts are the most common injury sites for players. In our study the rate of lower body injuries was 61.44% and the rate for upper body injures was 38.56%. Similarly, Beneka et al found the rate of lower body injuries as nearly 63% (ankle:38,9%, knee: 24.4%). Bahr and Bahr (1997) and Verhagen et al (2004) have reported that nearly more than half of all injuries have appeared on the lower body of players. In addition to these studies, Junge et al (2006) have found out that 80% of all injuries were lower body injuries. We also found out a significant relationship between the severity of injuries and the injury sites of the body. Ratio of serious injuries that occurred in the lower body were significantly higher than those that occurred in the upper body, [$X2\ (1) = 5.95$, $p=0.012$]. Similarly, Verhagen et al (2004) have reported that players who suffered lower body injuries were absent from volleyball for longer periods than those players who suffered upper body injuries.

With regard to the high rate of lower body injuries, distributions of technique-related injuries shows that 78.40% of all injuries occur during actions performed in front of the net

(block: 63.90%, spike: 14.50%). The most risky technique was "block" in our study. Similar results have been reported in many studies related to the risk of techniques in volleyball. Bahr and Bahr (1997) have reported that injuries may be related to a specific court position. According to their findings 89% of injuries occur at the net. Ankle injuries occur mainly during landing after blocking; most other injuries are associated with take-off, landing or the actual spiking motion during attack. Bahr et al (1994, 1997, 2003) also focus on the fact that one of the main reasons for injuries that occur at the net is contact with an opponent player or team mate in the repetitive jumping position for block and spike.

Conclusions and Recommendations

In conclusion, significant injury risks are involved in different types of injuries at various severity levels. Especially, the players in the front area are at greater risk than those in the back area. The results of all these studies show that the rates for lower body injuries are significantly higher than upper body injury rates. Furthermore, net actions, especially blocks, are the most risky positions in volleyball injuries. Although volleyball is a non-contact sport, intensive effort actions performed in front of the net might increase the risk in all injures in volleyball. In order to reduce the risk of injuries, preventive applications may be implemented. For example, "rule changes related to net contact and regarding middle line where players may land on an opponent's or team mate's foot", "using preventive knee and ankle equipment", "receiving a post-injury medical treatment that ensures complete recovery", "performing correct specific jumping and landing practices" and "issuing written and/or practical injury prevention programs to players". These applications may reduce the risk of injuries in volleyball. It has also been suggested that there may be a relationship between the injuries and game rules related to net contact and middle line. Future studies should address the relationship between injuries and official game rules.

References

Aagaard, H., & Jorgensen, U. (1996). Injuries in elite volleyball. *Scandinavian journal of medicine & science in sports*, 6(4), 228-232.

Adirim, T. A., & Cheng, T. L. (2003). Overview of injuries in the young athlete. *Sports Medicine*, 33(1), 75-81.

Agel, J., Palmieri-Smith, R. M., Dick, R., Wojtys, E. M., & Marshall, S. W. (2007). Descriptive epidemiology of collegiate women's volleyball injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003-2004. *Journal of Athletic Training*, 42(2), 295.

Augustsson, S. R., Augustsson, J., Thomeé, R., & Svantesson, U. (2006). Injuries and preventive actions in elite Swedish volleyball. *Scandinavian Journal of Medicine of Science in Sports*, 16(6), 433-440.

Bahr, R., & Bahr, I. A. (1997). Incidence of acute volleyball injuries: a prospective cohort study of injury mechanisms and risk factors. *Scandinavian Journal of Medicine of Science in Sports*, 7(3), 166-171.

Bahr, R., & Holme, I. (2003). Risk factors for sports injuries—a methodological approach. *British Journal of Sports Medicine*, 37(5), 384-392.

Bahr, R., Karlsen, R., Lian, Ø., & Øvrebo, R. V. (1994). Incidence and Mechanisms of Acute Ankle Inversion Injuries in Volleyball A Retrospective Cohort Study. *The American Journal of Sports Medicine*, 22(5), 595-600.

Beneka, A., Malliou, P., Gioftsidou, A., Tsigganos, G., Zetou, H., & Godolias, G. (2009). Injury incidence rate, severity and diagnosis in male volleyball players. *Sport Sciences for Health*, 5(3), 93-99.

Briner Jr, W. W., & Kacmar, L. (1997). Common injuries in volleyball. *Sports Medicine*, 24(1), 65-71.

Briner Jr, W. W., & Pereira, F. (2010). Preventing Volleyball Injuries: Knees, Ankles, and Stress Fractures. *Coaching Volleyball*, 27, 16-20.

De Loes, M. (1990). Medical treatment and costs of sports-related injuries in a total population. *International Journal of Sports Medicine*, 11(01), 66-72.

De Loes, M. (1995). Epidemiology of sports injuries in the Swiss organization. *International Journal of Sports Medicine*, 16(02), 134-138.

Gabbett, T. J. (2002). Training injuries in rugby league: an evaluation of skill-based conditioning games. *The Journal of Strength of Conditioning Research*,16(2), 236-241.

Uluöz, E. (2016). An analysis of the sports injuries occurred in competitions in Men's Volleyball League during five year period (2011-2016). *Journal of Human Sciences, 13*(3), 5786-5795. doi:10.14687/jhs.v13i3.4300

Gerberich, S. G., Luhmann, S., Finke, C., Priest, J. D., & Beard, B. J. (1987). Analysis of severe injuries associated with volleyball activities. *The Physician and Sports Medicine,* 15(8), 75-79.

Jarrett, G. J., Orwin, J. F., & Dick, R. W. (1998). Injuries in collegiate wrestling. *The American Journal of Sports Medicine,* 26(5), 674-680.

Junge, A., Langevoort, G., Pipe, A., Peytavin, A., Wong, F., Mountjoy, M., & Dvorak, J. (2006). Injuries in team sport tournaments during the 2004 Olympic Games. *The American Journal of Sports Medicine,* 34(4), 565-576.

Knobloch, K., Rossner, D., Gössling, T., Richter, M., & Krettek, C. (2004). Volleyball sport school injuries. Sportverletzung Sportschaden: *Organ der Gesellschaft fur Orthopadisch-Traumatologische Sportmedizin,* 18(4), 185-189.

Kirialanis, P., Malliou, P., Beneka, A., Gourgoulis, V., Giofstidou, A., & Godolias, G. (2002). Injuries in artistic gymnastic elite adolescent male and female athletes. *Journal of Back and Musculoskeletal Rehabilitation,* 16(4), 145-151.

Kirialanis, P., Malliou, P., Beneka, A., & Giannakopoulos, K. (2003). Occurrence of acute lower limb injuries in artistic gymnasts in relation to event and exercise phase. *British Journal of Sports Medicine, 37*(2), 137-139.

Kugler, A., Späth, S., Krüger-Franke, M., Schurk, B., Feichtner, F., & Rosemeyer, B. (2006). Überkopfsportarten: Volleyball–Beachvolleyball. *Sports Orthopaedics and Traumatology Sport-Orthopädie-Sport-Traumatologie,* 22(4), 241-244.

Kujala, U. M., Taimela, S., Antti-Poika, I., Orava, S., Tuominen, R., & Myllynen, P. (1995). Acute injuries in soccer, ice hockey, volleyball, basketball, judo, and karate: analysis of national registry data. *The British Medical Journal,* 311(7018), 1465-1468.

Lian, Ø. B., Engebretsen, L., & Bahr, R. (2005). Prevalence of jumper's knee among elite athletes from different sports a cross-sectional study. *The American Journal of Sports Medicine,* 33(4), 561-567.

MA, J. R., & GONG, S. J. (2007). Analysis on Sports Hurt of Women Soft Volleyball Athletes in Chinese Colleges [J]. *Journal of Shenyang Sport Univresity,* 2, 027.

Potter, M. R., Snyder, A. J., & Smith, G. A. (2011). Boxing injuries presenting to US emergency departments, 1990–2008. *American Journal of Preventive Medicine,* 40(4), 462-467.

Rechel, J. A., Yard, E. E., & Comstock, R. D. (2008). An epidemiologic comparison of high school sports injuries sustained in practice and competition. *Journal of Athletic Training,* 43(2), 197-204.

Schafle, M. D., Requa, R. K., Patton, W. L., & Garrick, J. G. (1990). Injuries in the 1987 national amateur volleyball tournament. *The American Journal of Sports Medicine,* 18(6), 624-631.

Solgård, L., Nielsen, A. B., Moller-Madsen, B., Jacobsen, B. W., Yde, J., & Jensen, J. (1995). Volleyball injuries presenting in casualty: a prospective study. *British Journal of Sports Medicine,* 29(3), 200-204.

Tenvergert, E. M., Ten Duis, H. J., & Klasen, H. J. (1992). Trends in sports injuries, 1982-1988: an in-depth study on four types of sport. *The Journal of Sports Medicine and Physical Fitness,* 32(2), 214-220.

Tillman, M. D., Hass, C. J., Brunt, D., & Bennett, G. R. (2004). Jumping and landing techniques in elite women's volleyball. *Journal of Sports Sciences and Medicine,* 3(1), 30-36.

Van Mechelen, W., Hlobil, H., & Kemper, H. C. (1992). Incidence, severity, etiology and prevention of sports injuries. *Sports Medicine,* 14(2), 82-99.

Van-Gent, B. R., Siem, D. D., Van Middelkoop, M., Van Os, T. A., Bierma-Zeinstra, S. S., & Koes, B. B. (2007). Incidence and determinants of lower extremity running injuries in long distance runners: a systematic review. *British Journal of Sports Medicine,* 41:469–80.

Verhagen, E. A. L. M., Van der Beek, A. J., Bouter, L. M., Bahr, R. M., & Van Mechelen, W. (2004). A one season prospective cohort study of volleyball injuries. *British Journal of Sports Medicine,* 38(4), 477-481.

Watkins, J., & Green, B. N. (1992). Volleyball injuries: a survey of injuries of Scottish National League male players. *British Journal of Sports Medicine,* 26(2), 135-137.

Watkins, J., & Green, B. N. (1992). Volleyball injuries: a survey of injuries of Scottish National League male players. *British Journal of Sports Medicine,* 26(2), 135-137.

Yang, J., Tibbetts, A. S., Covassin, T., Cheng, G., Nayar, S., & Heiden, E. (2012). Epidemiology of overuse and acute injuries among competitive collegiate athletes. *Journal of Athletic Training,* 47(2), 198.

Zetou, E., Malliou, P., Lola, A., Tsigganos, G., & Godolias, G. (2006). Factors related to the incidence of injuries' appearance to volleyball players. *Journal of Back and Musculoskeletal Rehabilitation,* 19(4), 129-134.

DERGİNİN İNDEX BİLGİSİ (MAKALENİN YAYINLANDIĞI TARİHTE)

