

Implementation of the OSTRC Back Injury Prevention Program among Professional Basketball, Handball, Soccer, and Volleyball Players

Wesam Saleh A. Al Attar^{1,2,*}, Yousef M. Alshehre³, Khulud Alanazi¹, Hussain S. Ghulam⁴

¹Department of Physical Therapy, Faculty of Applied Medical Sciences, Umm Al Qura University, Saudi Arabia

²Discipline of Exercise and Sport Science, Faculty of Medicine and Health Sciences, The University of Sydney, Australia

³Department of Physical Therapy, Faculty of Applied Medical Sciences, University of Tabuk, Saudi Arabia

⁴Department of Physical Therapy, Faculty of Applied Medical Sciences, Najran University, Saudi Arabia

Received March 12, 2021; Revised April 12, 2021; Accepted May 23, 2021

Cite This Paper in the following Citation Styles

(a): [1] Wesam Saleh A. Al Attar, Yousef M. Alshehre, Khulud Alanazi, Hussain S. Ghulam, "Implementation of the OSTRC Back Injury Prevention Program among Professional Basketball, Handball, Soccer, and Volleyball Players," *International Journal of Human Movement and Sports Sciences*, Vol. 9, No. 3, pp. 577 - 582, 2021. DOI: 10.13189/saj.2021.090325.

(b): Wesam Saleh A. Al Attar, Yousef M. Alshehre, Khulud Alanazi, Hussain S. Ghulam (2021). Implementation of the OSTRC Back Injury Prevention Program among Professional Basketball, Handball, Soccer, and Volleyball Players. *International Journal of Human Movement and Sports Sciences*, 9(3), 577 - 582. DOI: 10.13189/saj.2021.090325.

Copyright©2021 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Abstract The Oslo Sports Trauma Research Center (OSTRC) back injury prevention program (IPP) is an evidence-based injury prevention exercise designed to prevent back pain and other related injuries. The aim of this study was to assess the implementation of the OSTRC Back IPP among professional basketball, handball, soccer, and volleyball players in the Gulf Cooperation Council (GCC) countries. The survey was developed by the study authors and it consisted of two sections: the socio-demographic and questionnaire assess the implementation of OSTRC Back IPP. A total of 360 athletes responded to the survey (response rate was 93.75%). The mean (\pm SD) of the total implementation score was 6.6 (\pm 1.8) out of 13. Jumping lunges exercise was the highest implemented exercise, making up 56.1% of the participated players, followed by the side plank and jump turns 53.3% and 53.1%, respectively. In contrast, the lowest implemented exercise was the rotational strength exercise which accounts for 46.4%. There were no statistically significant differences between the GCC countries in the implementation of all exercises except for the side lunges exercise. The rate of implementation of the OSTRC Back IPP among players was low in the GCC countries.

Keywords Back Injury Prevention, Basketball,

Handball, Soccer, Volleyball

1. Introduction

Back pain is a global issue which affects millions of individuals. Back pain represents about 7% of the general practitioner consultations and lead to a loss of 4.1 million working days yearly [1]. Back pain is not limited to inactive individuals; it also has significant impacts on players. The prevalence of back pain in athletes has been reported to be from 1.1% to as high as 30% depending on the type of sports [2]. Low back pain is the fifth most common disorder based on physician visits in the United States (US) [3,4]. Almost 7.6% of the US adults reported at least one episode of acute severe low back pain in a one-year period [5]. Almost 1% to 40% of the athletes complain of back pain [6]. Videman et.al [7] found a reduction in low back pain rates in athletes than general population.

Higher rates of back pain in sports are seen in gymnastics, weightlifting, diving, American football, golf, and rowing [6]. In gymnastics, the rate of back injuries/pain is 11% [8]. In professional golfers 90% of the

injuries involve the neck or back [9]. Injury rates reported in gymnastics, gym training, or dance for 15- and 16-year-old girls are higher than nonathletes [8]. For boys, sports such as gymnastics, volleyball, weightlifting, snowboarding, and downhill skiing are linked with a higher rate of low back pain, while aerobics and cross-country skiing show a lower prevalence.

The Federation International de Football Association (FIFA) reported that there are over 22 million youth soccer players worldwide [10]. In this group, the frequency of injury represents a major public health burden. An increasing number of active players leads to an increase incidence of injuries with a rise in treatment and loss of playing time, making an injury prevention program needed. The Oslo Sports Trauma Research Center (OSTRC) back injury prevention program (IPP) is an athletics evidence-based injury prevention exercise program designed to help reduce the occurrence of back pain and other related injuries. Implementing effective injury prevention strategies for athletes is, therefore, essential in reducing health care costs and decreasing risks for disability and inactivity during training. Therefore, this study aimed to assess the implementation of the OSTRC back injury prevention program among professional basketball, handball, soccer, and volleyball players in the Gulf Cooperation Council (GCC) countries.

2. Materials and Methods

2.1. Study Design and Questionnaire

This study was a cross-sectional survey targeting GCCs' players. The data collection tool and questions for the current study was developed by the study authors to collect information about the implementation of the OSTRC back injury prevention program. This survey consisted of two sections. The first section is the socio-demographic characteristics (country, age, gender, type of sport, and activity level) of the participants. The second section of the questionnaire assessed the implementation of 13 exercises that help in preventing back pain, and this is to be answered by "yes" or "no". These exercises include supine pelvic control, squat, backwards lunge, side lunges, thumps up, push up, rotational strength, side plank, jumping lunges, single led deadlift, side plank, jump turns, and flyer, as shown in Table 1. The survey was available in English and Arabic languages supported by videos demonstrating each stated exercise. This project was reviewed and ethically approved by the Biomedical Ethics Committee at Umm Al Qura University, approval number. HAPO02K012202010465. Consent was obtained from each participant in the study before data collection began.

Table 1. The OSTRC Back Injury Prevention Program Exercises

No.	Exercise	Description	Frequency
1	Pelvic control	Supine position with legs in cross. Tilt the pelvis backwards and forwards.	3 x 10-15 repetitions
2	Squat	Feet hip-width apart. Elastic band around knees. Sit down as if on a chair. Knees aligned with toes.	3 x 10-15 repetitions
3	Backwards lunge	Lunge backwards. Maintain upper body in upright position. Knees aligned with toes.	3 x 10 repetitions
4	Side lunges	Lunge sideways. Knees aligned with toes. Maintain upper body in upright position.	3 x 10 repetitions
5	Thumbs up	Prone position. Lift chest and arms extend legs from floor. Bring the arms to the sides and squeeze the shoulder blades together. Bring the arms along the sides of the body and squeeze the shoulder blades together. Thumbs up.	3 x 10-15 repetitions
6	Push up	Push-up start position. Keep elbows straight. Round the back and spread your shoulder blades apart. Back to start position.	3 x 15 repetitions
7	Rotational strength	Use elastic band. Alternate upper body rotations. Keep body position stable.	3 x 10 repetitions
8	Side plank	Support on elbow. Alignment from head to toes. Maintain pelvis in stable position.	3 x 20 sec
9	Jumping lunges	Alternating jumps. Soft landing in deep lunge. Knees in alignment with toes in landings.	3 x 10-20 repetitions
10	Single-leg deadlift	Find balance on one leg. Lift other leg and move upper body forwards. Keep back extended.	3 x 10 repetitions
11	Side plank +	Support on elbow. Alignment from head to toes. Maintain pelvis in stable position. Raise and lower upper leg.	3 x 20 sec
12	Jump turns	Elastic band as resistance. Jump in different directions. Knee aligned with toes.	3 x 10 repetitions
13	Flyer	Find balance on one leg. Maintain knee slightly bent. Move upper body forwards. Keep back extended. Rotate upper body to both sides.	2 x 5-7 repetitions

2.2. Survey Software and Administration

Players were invited to complete an online survey and the invitations were sent through basketball, handball, soccer, and volleyball Federations in United Arab Emirates, Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia. The invitation provided a brief background for the survey and encouraged players to participate. The survey was filled anonymously and electronically via online survey software (Google Forms), limited to one response only. Responses were voluntary and the distribution period was from June to October 2020.

2.3. Sample Size and Data Analysis

Considering a 5% margin of error at a 95% confidence level, 384 professional players in six GCC countries were invited to participate.

Data analyses were performed using SPSS (Statistical Package for Social Sciences) 25 (SPSS Inc., Chicago, IL, USA).

A Frequency test was used to calculate the percentages of all nominal variables. Moreover, the mean, standard deviation (SD), median, and range (minimum-maximum) of the total score were calculated. A chi-square test (χ^2) was used to compare the GCCs and the different types of sports with respect to different findings. However, one-way analysis of variance (ANOVA) was used to compare the total score among the GCC countries and the different types of sports. P value < 0.05 was considered significant.

3. Results

Table 2. Number of athletes participating from different countries of GCC

Countries	Frequency (%)
Saudi Arabia	54 (15.0 %)
Bahrain	58 (16.1 %)
Kuwait	64 (17.8 %)
Oman	75 (20.8 %)
Qatar	50 (13.9 %)
United Arab Emirates	59 (16.4 %)

Table 3. Types of sports in which the athletes were involved, and their percentage of participation

Types of Sports	Frequency (%)
Basketball	100 (27.8%)
Hand ball	75 (20.8 %)
Soccer	94 (26.1 %)
Volleyball	91 (25.3 %)

A total of 360 players from the GCC countries participated in the current study (response rate was 93.75%). The highest percentages were reported from Oman (20.8%), while the lowest participation was from

Qatar at 13.9%. Basketball players represented 27.8% of the respondents followed by 26.1% soccer players, as shown in Tables 2 and 3.

The implementation rate of the OSTRC back injury prevention program to prevent back pain among players in the GCC countries is shown in Table 4.

Table 4. Number of athletes performing different exercises form OSTRC back injury prevention program, and their percentages

Exercises	Frequency (%)
Pelvic control	178 (49.4 %)
Squat	179 (49.7 %)
Backwards lunge	187 (51.9 %)
Side lunges	183 (50.8 %)
Thumbs up	178 (49.4 %)
Push up	173 (48.1 %)
Rotational strength	167 (46.4 %)
Side plank	178 (49.4 %)
Jumping lunges	202 (56.1 %)
Single-leg deadlift	184 (51.1 %)
Side plank +	192 (53.3 %)
Jump turns	191 (53.1 %)
Flyer	182 (50.6 %)

Jumping lunges exercise was the highest implemented exercise, accounting for 56.1%, followed by the side plank and jump turns at 53.3%, and 53.1%, respectively. In contrast, the lowest implemented exercise was the rotational strength exercise, covering 46.4% of the participants.

The difference between the GCC countries in terms of implementation of the OSTRC back injury prevention program exercises is shown in Table 5. Overall, there were no statistically significant differences (all P values were > 0.05) between the GCC countries in the implementation of all exercises except for the side lunges exercise, where the difference was statistically significant (P = 0.04), being highly implemented in Kuwait at 64.1%. Also, a borderline significant difference (P = 0.054) was shown with the backward lunge exercise.

When the implementation rate was calculated by the sport type, the results revealed that there was a significant difference between the different sports participants in the implementation rate of the backward lunge exercise, where handball players showed the high implementation rate of 62.7% and volleyball players showed the lowest implementation rate of 41.8%, with a P-value of 0.013. Similarly, implementation of thumbs up exercise differed significantly (P = 0.017) between different sports players. It was implemented by 42.6% of soccer, 45.1% of volleyball, 48% of basketball, and 65.3% of handball players. Implementing other exercises did not differ significantly between other sports. Data is shown on Table 6.

The comparison between diverse types of sports by means of the total score is shown in the Table 7. The total mean (\pm SD) score was 6.6 (\pm 1.8). A borderline significant difference (0.053) was found between the mean total score of implementations of the OSTRC back injury prevention program. The highest mean (\pm SD) total score was

reported for the handball players at 7.11 (\pm 1.79), while the lowest one was for the basketball and soccer players at 6.41 (\pm 1.84), and 6.44 (\pm 1.83), respectively. When the mean of the total implementation score was calculated by country, the difference was statistically non-significant ($P = 0.806$), as shown in Table 8.

Table 5. Comparison among the countries of the GCC with respect to different points

	Saudi Arabia (n = 54)	Bahrain (n = 58)	Kuwait (n = 64)	Oman (n = 75)	Qatar (n = 50)	U.A.E (n = 59)	P-value
Pelvic control	23 42.6 %	30 51.7 %	32 50.0 %	39 52.0 %	28 56.0 %	26 44.1 %	0.718
Squat	22 40.7 %	30 51.7 %	33 51.6 %	41 54.7 %	21 42.0 %	32 54.2 %	0.503
Backwards lunge	22 40.7%	32 55.2%	32 50.0%	42 56.0%	34 68.0%	25 42.4%	0.054
Side lunges	29 53.7%	24 41.4%	41 64.1%	39 52.0%	28 56.0%	22 37.3%	0.040*
Thumbs up	23 42.6%	29 50.0%	34 53.1%	34 45.3%	29 58.0%	29 49.2%	0.648
Push up	25 46.3%	29 50.0%	31 48.4%	36 48.0%	21 42.0%	31 52.5%	0.928
Rotational strength	25 46.3%	31 53.4%	24 37.5%	35 46.7%	24 48.0%	28 47.5%	0.657
Side plank	25 46.3%	34 58.6%	31 48.4%	41 54.7%	19 38.0%	28 47.5%	0.334
Jumping lunges	32 59.3%	28 48.3%	36 56.3%	42 56.0%	28 56.0%	36 61.0%	0.815
Single-leg deadlift	32 59.3%	31 53.4%	30 46.9%	38 50.7%	24 48.0%	29 49.2%	0.805
Side plank +	28 51.9%	35 60.3%	32 50.0%	41 54.7%	26 52.0%	30 50.8%	0.887
Jump turns	26 48.1%	29 50.0%	34 53.1%	39 52.0%	24 48.0%	39 66.1%	0.378
Flyer	29 53.7%	29 50.0%	34 53.1%	39 52.0%	22 44.0%	29 49.2%	0.929

Table 6. Comparison of diverse types of sports with respect to different points

Types of Exercises	Basketball (n = 100)	Handball (n = 75)	Soccer (n = 94)	Volleyball (n = 91)	P-value
Pelvic control	49 49.0%	42 56.0%	44 46.8%	43 47.3%	0.630
Squat	43 43.0%	42 56.0%	43 45.7%	51 56.0%	0.169
Backwards lunge	46 46.0%	47 62.7%	56 59.6%	38 41.8%	0.013
Side lunges	46 46.0%	35 46.7%	49 52.1%	53 58.2%	0.319
Thumbs up	48 48.0%	49 65.3%	40 42.6%	41 45.1%	0.017
Push up	52 52.0%	30 40.0%	39 41.5%	52 57.1%	0.066
Rotational strength	47 47.0%	33 44.0%	37 39.4%	50 54.9%	0.192
Side plank	48 48.0%	44 58.7%	40 42.6%	46 50.5%	0.215
Jumping lunges	50 50.0%	44 58.7%	56 59.6%	52 57.1%	0.529
Single-leg deadlift	52 52.0%	43 57.3%	46 48.9%	43 47.3%	0.590
Side plank +	58 58.0%	37 49.3%	56 59.6%	41 45.1%	0.149
Jump turns	55 55.0%	48 64.0%	46 48.9%	42 46.2%	0.105
Flyer	47 47.0%	39 52.0%	53 56.4%	43 47.3%	0.524

Table 7. Comparisons of different types of sports with respect to total scores.

Types of Sports	N	Mean	Std. Deviation	Median	Minimum	Maximum	P-value
Basketball	100	6.410	1.8373	7.0	1.0	10.0	0.053
Handball	75	7.107	1.7902	7.0	2.0	11.0	
Soccer	94	6.436	1.8290	7.0	2.0	10.0	
Volleyball	91	6.538	1.8154	7.0	2.0	10.0	
Total	360	6.594	1.8319	7.0	1.0	11.0	

Table 8. Comparison among the countries of the GCC with respect to total score

	N	Mean	Std. Deviation	Median	Minimum	Maximum	P-value
Saudi Arabia	54	6.315	1.81	6.5	1.0	10.0	0.806
Bahrain	58	6.741	1.961	7.0	2.0	11.0	
Kuwait	64	6.625	1.98	7.0	1.0	10.0	
Oman	75	6.747	1.645	7.0	3.0	10.0	
Qatar	50	6.560	1.728	7.0	3.0	9.0	
UAE	59	6.508	1.906	7.0	2.0	11.0	
Total	360	6.594	1.832	7.0	1.0	11.0	

4. Discussion

The current study aimed to estimate the rate of implementing the OSTRC back injury prevention program among players in the GCC countries. The results showed low implementation rates of the assessed exercises which ranged from 46.4% to 56.1%.

To the best of our knowledge, and till the time of authoring this paper, there are no studies in the literature that assessed the implementation rate of OSTRC back injury prevention program, which make it difficult to compare our results. In the current study, the highest implementation score of the back-pain prevention exercises was shown from handball players, with the thumps up exercise being the highly implemented one at 65.3%. However, for other sports, despite being at substantial risk, the implementation score did not exceed half.

Available data across a range of sports, in some countries, suggests that, despite the availability of evidence-based injury prevention interventions, it is generally neither widely accepted nor well implemented [11–14]. This was the scenario in the current study. Overall, previous studies showed that within the community sport context, achieving widespread implementation of safety programs is challenging [15–17]. On the other hand, and in contrast to the low implementation rate in the current study, McCall et al. [18] reported a general high compliance to injury prevention measures. The differences in these findings might be attributed to the lack of knowledge about the OSTRC back injury prevention program, barriers to implement them, unavailability, or inadequate time and equipment.

Inadequate implementation knowledge was reported to

be a major obstacle to adopting a prevention program for anterior cruciate ligament injury [19]. Unfortunately, in the current study, we did not assess the reasons for non-implementation. Therefore, it is highly recommended that back-pain prevention program didactics and contents should be adjusted according to the coaches' educational backgrounds. Moreover, the current study findings supported the need to operationalize implementation efforts of sport back pain injury prevention in real-world contexts, as well as providing a foundation for the ongoing adaptation and improvement of the successful programs.

The results of the current study shed light on the rate of implementation of OSTRC back injury prevention program among professional basketball, handball, soccer, and volleyball players in the GCC countries and this can be the basis for future research in this regard. Therefore, educational programs for improving the awareness and benefits of such programs are highly recommended. Additionally, there is a need for further research studies addressing the causes of low implementation of back-pain prevention exercises among players.

The current study has some limitations. First, prevention program implementation is a complex process and the variable 'implement,' which was assessed in our study, is only one facet. Second, match exposure and playing year were not collected, which might reduce the comparability with other research and might affect the results of this study. Overall, and based on our data, future researches should aim to more precisely define and allocate the distinct factors contributing to concepts such as program usage, feasibility, or suitability. Despite these limitations, data were collected from different sports from the whole GCC countries. Therefore, the result could be

generalized to this region.

5. Conclusions

The results of this study showed that the rate of implementing the OSTRC back injury prevention program among players in the GCC countries was low. Future studies are needed to assess the reasons of lack implementation rates of this program between players.

Acknowledgements

The author(s) would like to thank all players who participated in this project.

REFERENCES

- [1] Parsons S, Ingram M, Clarke-Cornwell A, Symmons D. A Heavy Burden: the occurrence and impact of musculoskeletal conditions in the United Kingdom today, 2011.
- [2] Dreisinger TE, Nelson B. Management of back pain in athletes. *Sports Medicine*. 1996; 21(4): 313-320.
- [3] Deyo RA, Mirza SK, Martin BI. Back pain prevalence and visit rates: Estimates from US national surveys, 2002. *Spine*. 2006; 31(23): 2724-2727.
- [4] Hart LG, Deyo RA, Cherkin DC. Physician office visits for low back pain: Frequency, clinical evaluation, and treatment patterns from a US national survey. *Spine*. 1995; 20(1): 11-19.
- [5] Carey TS, Evans AT, Hadler NM, Lieberman G, Kalsbeek WD, Jackman AM, Fryer JG, McNutt RA. Acute severe low back pain: A population-based study of prevalence and care-seeking. *Spine*. 1996; 21(3): 339-344.
- [6] Bono CM. Low-back pain in athletes. *JBJS*. 2004; 86(2): 382-396.
- [7] Videman T, Sarna S, Battié MC, Koskinen S, Gill K, Paananen H, Gibbons L. The long-term effects of physical loading and exercise lifestyles on back-related symptoms, disability, and spinal pathology among men. *Spine*. 1995; 20(6): 699-709.
- [8] Petering RC, Webb C. Treatment options for low back pain in athletes. *Sports Health*. 2011; 3(6): 550-555.
- [9] Duda M. Golfers use exercise to get back in the swing. *The Physician and Sportsmedicine*. 1989; 17(8): 109-113.
- [10] Emery CA, Meeuwisse WH, McAllister JR. Survey of sport participation and sport injury in Calgary and area high schools. *Clinical Journal of Sport Medicine*. 2006; 16(1): 20-26.
- [11] Twomey D, Finch C, Roediger E, et al. Preventing lower limb injuries: Is the latest evidence being translated into the football field? *J Sc Med Sport*. 2009; 12: 452-6.
- [12] Hollis SJ, Stevenson MR, McIntosh AS, et al. Compliance with return-to-play regulations following concussion in Australian schoolboy and community rugby union players. *Br J Sports Med*. 2012; 46: 735-40.
- [13] Norcross M, Johnson S, Hoffman M. The prevalence of injury prevention program use by high school teams. *Br J Sports Med*. 2014; 48: 645.
- [14] Bahr R, Thorborg K, Ekstrand J. Evidence-based hamstring injury prevention is not adopted by the majority of Champions League or Norwegian Premier League football teams: The Nordic hamstring survey. *Br J Sports Med*. 2015; 49: 1466-71.
- [15] Donaldson A, Leggett S, Finch CF. Sports policy development and implementation in context: Researching and understanding the perceptions of community end-users. *Int Rev Sociol Sport*. 2012; 47: 743-60.
- [16] Chalmers DJ, Simpson JC, Depree R. Tackling Rugby injury: Lessons learned from the implementation of a five-year sports injury prevention program. *J Sci Med Sport*. 2004; 7: 74-84.
- [17] Finch C. A new framework for research leading to sports injury prevention. *J Sci Med Sport*. 2006; 9: 3-9.
- [18] McCall A, Dupont G, Ekstrand J. Injury prevention strategies, coach compliance and player adherence of 33 of the UEFA Elite Club Injury Study teams: A survey of teams' head medical officers. *Br J Sports Med*. 2016; 50: 725-730.
- [19] Joy EA, Taylor JR, Novak MA, Chen M, Fink BP, Porucznik CA. Factors influencing the implementation of anterior cruciate ligament injury prevention strategies by girls' soccer coaches. *J Strength Condit Res*. 2013; 27(8): 2263-2269.