

**THE SIGNIFICANCE OF THE INJURY PREVENTION IN RELATION
TO THE KNOWLEDGE LEVEL OF BASKETBALL COACHES IN SLOVAKIA**

ODNOS ZNAČAJA PREVENCIJE OZLJEĐIVANJA I ZNANJA O PREVENCIJI
KOD SLOVAČKIH KOŠARKAŠKIH TRENERA

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SUMMARY

The aim of the work was to contribute to the knowledge in the field of injury prevention in Slovak basketball. There was used ex post facto research method. To process and gather data we used basic logical methods, comparative analysis, frequency and percentage analysis, and Chi-square. According to the Slovak coaches, the most effective measures of injury reduction are Longer regeneration (over 82%) and Better athletic preparation (over 80%). The most frequent prevention measures they use are Stretching (96,7%), Warm-up (85,1%) and Strengthening (65,3%). The additional measures most frequently used are Taping (69%) and Ortheses (66,7%). The coaches demanded prevention measures mainly for Knee (95%) and Ankle (83,7%). We evaluated differences between current international trends in injury prevention and situation in Slovakia. Differences were statistically significant in the questions dealing with Reduction of injuries, Applied prevention measures, Additional prevention measures and Demands. Also there were evaluated the differences between the Slovak coaches according to the coaching levels. Even though we presumed that there would be no differences among the levels, in fields of Applied prevention measures, Additional prevention measures and Demands there were statistically significant differences ($p < 0,1 - 0,01$). The work has been a part of a pilot project "Safety in Sports". The aim of the project has been to widen the consciousness in the field of injury prevention in Europe and consequently to help the coaches reduce injuries among their players. We presume a substantial contribution of this work and related activities for Slovak basketball, considering in Slovakia there is a very little attention contributed to this matter.

Key words: basketball, injury prevention, knowledge level, Slovak coaches, project "Safety in Sports".

SAŽETAK

Cilj rada bio je pridonijeti znanju na području prevencije ozljeda u slovačkoj košarci. Korištena je ex post facto istraživanja metoda. Za obradu i prikupljanje podataka upotrijebili smo osnovne logičke metode, komparativnu analizu, frekvencije i postotke i hi-kvadrat. Prema Slovačkim trenerima, najučinkovitije mjere smanjenja ozljeda su duži oporavak (preko 82%) i bolja tjelesna priprema (preko 80%). Najčešće preventivne mjere koje koriste su istezanje (96,7%), zagrijavanje (85,1%) te vježbe snage (65,3%). Kao dodatne mjere najčešće se koriste taping (69%) i ortoze (66,7%). Treneri zahtijevaju provođenje preventivnih mjera prvenstveno za koljeno (95%) i gležanj (83,7%). Razlike između trenutnih svjetskih trendova u prevenciji ozljeda i situacije u Slovačkoj su statistički značajne u pitanjima koja se bave smanjenjem ozljeda, primijenjenim mjerama prevencije i dodatnim preventivnim mjerama. Također su ocijenjene razlike između slovačkih trenera različitih razina. Iako je postojala pretpostavka da nema razlika među razinama, u području primijenjenih mjera prevencije i dodatnih preventivnih mjerai potreba nađene su statistički značajne razlike ($p < 0,1 - 0,01$). Rad je dio pilot projekta "Sigurnost u Sport". Cilj projekta je proširiti svijest u području prevencije ozljeda u Europi i time pomoći trenerima smanjiti učestalost ozljeda. Rad doprinosi prepoznavanju problem au ovom području u Slovačkoj s obzirom da se u Slovačkoj tome ne pridaje dovoljna pozornost.

Ključne riječi: košarka, prevencija ozljeda, razine znanja, slovački treneri, projekt "Sigurnost u Sportu"

INTRODUCTION

Basketball can be considered a popular modern sport which is widespread over the world. In the EU-27 region approximately 1.7 million basketball players regularly participate in basketball training and competition (3). The assessed numbers of the FIBA report a worldwide number of 450 million players in 213 countries either on competitive or recreational level.

Basketball is a dynamic sport and even though it is defined as a noncontact by the official rules of FIBA (2) the body contact occurs frequently during the game. This and the other factors such as quick direction changes, cutting maneuvers, dynamic starts and stops, twisting or turning and single-leg landings (1,3,7) can be the cause of injuries in basketball.

There are several ways of determining the frequency of injury occurrence. One of them (8) suggests that an injury rate can be computed as a function of 1000 athlete exposures. An athlete exposure has been defined as one athlete participating in one practice or contest where he or she is exposed to the possibility of injury.

Taking 1.7 million licensed basketball players in the European area into consideration, assuming an overall incidence of 3-6 injuries per 1000 hours of basketball exposure, one has to face at least 720,000 basketball-related injuries a year, not including injuries during recreational basketball (4).

Our work originated as a part of the project called "Safety Management in High Risk Sports in Collaboration with European Sports Associations" ("Safety in Sports"). The project has been accepted for co-funding in the framework of the EU Health Programme 2008 - 2013 and it is realized under the auspices of Austrian Road Safety Board (KfV), Department of Sports Medicine and Sports Nutrition of the Ruhr-University Bochum (RUB), Consumer Safety Institute (CSI) and European Association for Injury Prevention and Safety Promotion (EuroSafe). The aim of the project is to increase the knowledge on the prevention for acute and chronic sports injuries and to reduce the magnitude and severity of sports related injuries in Europe (8).

Injury prevention in basketball should be one of the things a good coach is familiar with. Keeping a team healthy is often necessary for keeping a high level of performance of the team. However to obtain information on this matter can be a problem in Slovakia. We have researched the available information on the Internet, as well as the database of study materials and books. We have not found any recent sources that would deal primarily with the injury prevention in basketball.

SUBJECTS AND METHODS

The aim of the work was to contribute to the knowledge in the field of injury prevention in Slovak basketball.

We wanted to determine whether the knowledge in the field of injury prevention would differ in dependence on the coaching level and whether the knowledge in the field of injury prevention of the Slovak coaches in general would differ from the current trends in the injury

prevention.

Our research was conducted by ex post facto research method. The sample consisted of 157 basketball coaches from Slovakia. The sample selected on the bases of combined purposeful and random sampling. Firstly we were concerned with the level of their coaching education. For the purposes of processing the information in international scale there was an adjustment of the Slovak coaching levels carried out. Coaches were divided into 6 levels – none (15,9%), 1 (5,7%), 2 (26,1%), 3 (26,8%), 4 (13,4%), 5 (12,1%). There was a majority of male coaches – 74,8%. In average coaches in the sample were 36,01 years old.

The questionnaire method was used to gather data from the coaches. English version of the questionnaire was provided by the Department of Sports Medicine and Sports Nutrition, Ruhr University Bochum as a part of research needed for the pilot project "Safety in Sports". The questionnaire was translated to Slovak language and consequently distributed among coaches during the time period from September 2009 to March 2011. It was distributed during various seminars for basketball coaches.

The questionnaire consists of three parts. First one was dealing with the personal information and the other two were dealing with the issue of the injury prevention in basketball. Parts two and three consisted of thirteen questions, out of which there were 7 closed questions and 6 open-ended questions. We analyzed 7 questions which were dealing with:

1. The importance of injury prevention (**Importance**),
2. The popularity of injury prevention measures among players (**Popularity**),
3. The most likely causes of injuries (**Causes**),
4. The most effective measures of the reduction of injuries (**Reduction**),
5. The most frequently applied injury prevention measures (**Prevention measures**),
6. The most frequently applied additional injury prevention measures (**Additional prevention measures**),
7. The demands for injury preventions measures (**Demands**).

As a part of the "Safety in Sports" project there has been created a toolkit (Inventory on the Burden of Basketball Injuries, Existing Prevention Measures and Safety Promotion Strategies) of the prevention measures. For the detailed process of making the inventory see references (1,5).

In order to compare the state of the knowledge of the Slovak coaches with the current trends we used content analysis method to evaluate the occurrence frequency of the issues in the Inventory corresponding to the issues that were dealt with in the questionnaires, more specifically in: Reduction, Applied prevention measures, Additional prevention measures and Demands.

To process data in our work we used basic logical methods (analysis, synthesis, induction, deduction), as well as comparative analysis, frequency and percentage analysis.

To evaluate the coherence between qualitative variables (differences between the knowledge of Slovak coaches and current trends and differences between the Slovak coaches according to the coaching level) there was applied Chi-square (χ^2).

RESULTS

First issue dealt with was the opinion of the coaches on **importance of the injury prevention** in Slovak basketball. Coaches were supposed to evaluate on a scale from 1 to 4; 1 being a very important issue. In average, over 50% of the coaches consider injury prevention an important issue. Over 30% percent of the coaches consider injury prevention an important issue. Less than 15% consider this a medium important or not important issue.

Another question was how coaches perceive their players like the injury prevention measures they take (**popularity**). The coaches could answer on a scale 1 -5, 1 being do not like it at all and 5 being like it very much. In average over 50% of the coaches think that their players

are in the middle of the 5-point scale. Over 26% would put their players in the level 4 of the scale. In levels 2 and 5 there are around 10% of the players. Only 1.6% of the coaches think that their players do not like prevention measures at all.

In the next question there was dealt with the most likely injury **causes**. Although the opinions of the coaches slightly differ depending on the coaching level, all the levels consider Lack of regeneration, Poor physical condition and Insufficient warm-up the most probable causes of injuries in basketball.

In another question there was dealt with the opinions of the coaches on the most effective measures of **injury reduction** (Figure 1). The two most effective measures are considered to be Longer regeneration (over 82%) and Better athletic preparation (over 80%). These results are consistent with the findings of the most likely injury causes – the two most frequent were Lack of regeneration and Poor physical condition. Other measures of injury reduction are Prevention Programs, Physiotherapy, Better equipment, Protective equipment, Modification of rules, Less matches.

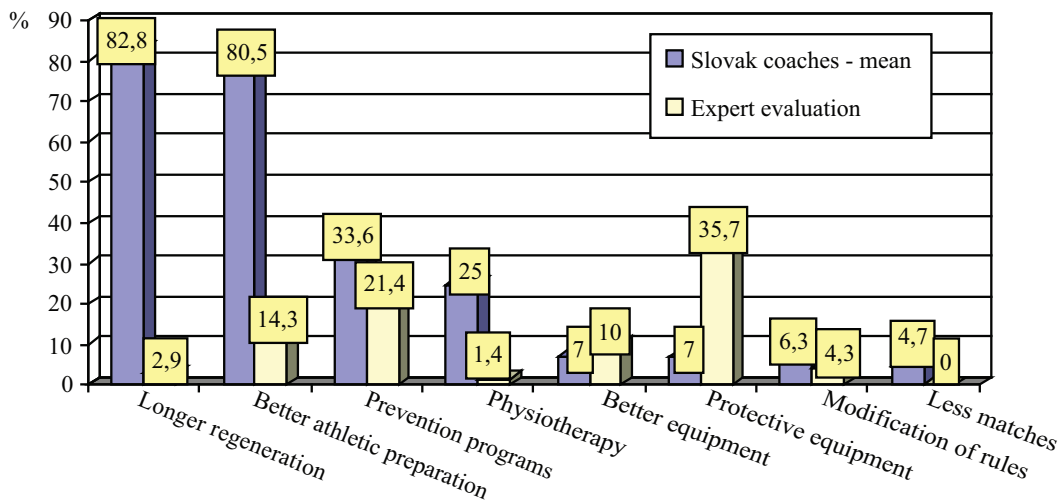


Figure 1. The most effective measures of the injury reduction - opinions of Slovak coaches according to the coaching level – mean compared to the expert evaluation ($p < 0,001$).

Slika 1. Najučinkovitije mjere prevencije ozljeda Slovačkih trenera različite razine u usporedbi s evaluacijom eksperta ($p < 0,01$).

Another field of our interest was which **prevention measures** are actually carried out by Slovak coaches (Fig 2). In average their players perform following injury prevention measures: Stretching (96,7%), Warm-up (85,1%), Strengthening (65,3%), Coordination exercises (59,5%), Athletic drills (54,5%), Balance exercises (38,8%) and Physiotherapy, Mobilisation exercises, Cool-down, Technique training (all of those less than 7%).

Interesting fact is, that even though majority of the coaches make their players to warm up (over 85%), almost a half of the coaches state the Insufficient warm-up to be a significant injury cause. This seems to be confusing and it might suggest that the coaches do not know, whether their warm-up strategies are sufficient for their players to obtain accurate warm-up in respect to the level of performance.

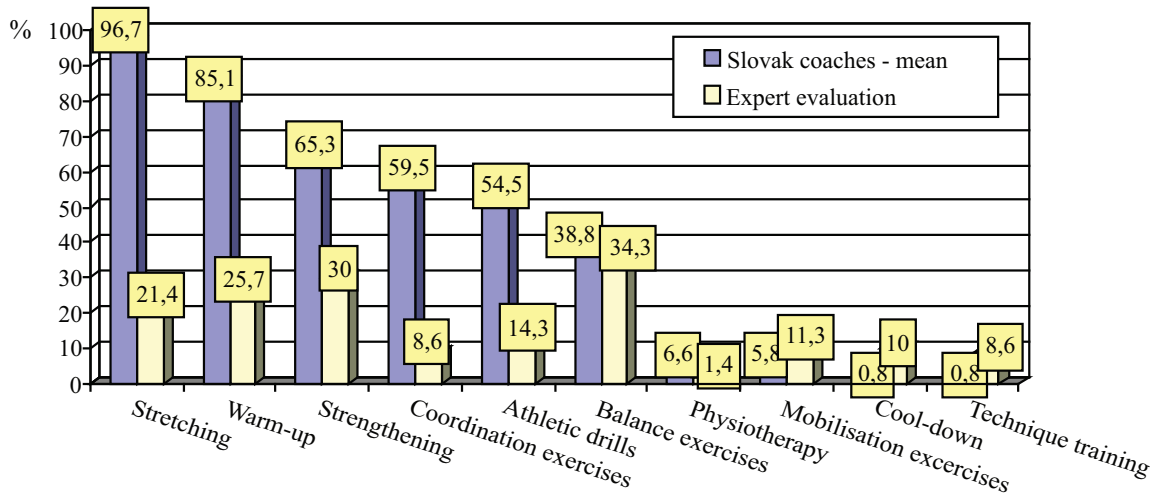


Figure 2. The most frequently applied injury prevention measures - which of them are carried out by Slovak coaches according to the coaching level – mean compared to the expert evaluation (p<0,01).

Slika 2. Najčešće primjenjivane mjere prevencije ozljeda između Slovačkih trenera različite razine u usporedbi s evaluacijom eksperta (p<0,01).

Another question we were dealing with were the most frequently applied **additional prevention measures** (Figure 3). In average the two most used are Taping (69%) and Ortheses (over 66%). Much less common are Protectors, Medical/nutritional supplements,

Mouthguards, Physiotherapy and Massage. It is interesting that Physiotherapy is considered to be the fourth most effective way of injury reduction, but it is almost the least used prevention measure.

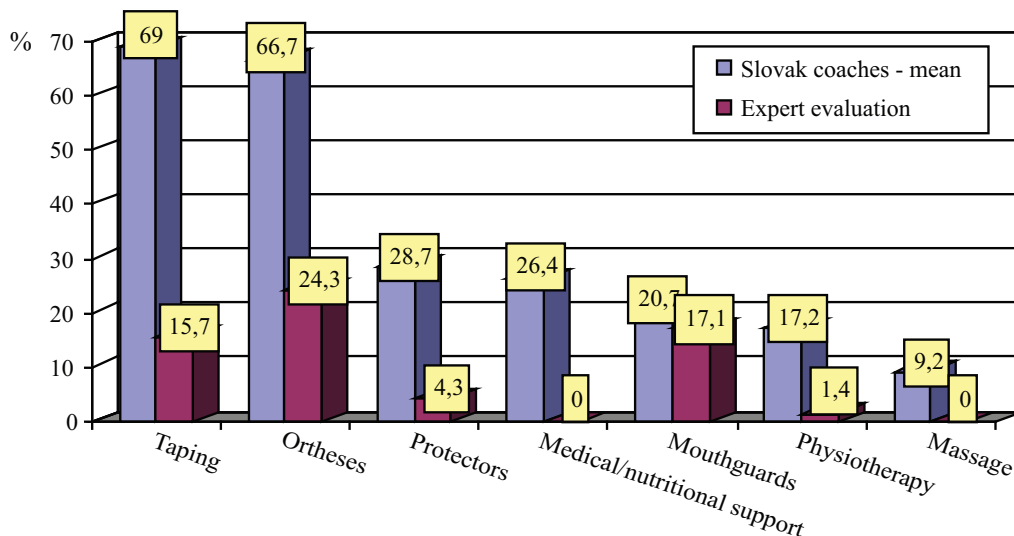


Figure 3. The most frequently applied additional prevention measures - which of them are carried out by Slovak coaches according to the coaching level – mean compared to the expert evaluation (p<0,01).

Slika 3. Najčešće primjenjivane mjere prevencije ozljeda između Slovačkih trenera različite razine u usporedbi s evaluacijom eksperta (p<0,01).

Lastly, we asked coaches for the **demands** for injury prevention measures they had (Fig 4). Most of them (almost 95%) demanded measures for Knee injury prevention. Almost as much (83,7%) demanded measures for Ankle injury prevention. Next critical group were Fingers (over 48%). Minority of the coaches demanded injury prevention measures for Shoulder, Back and Head.

In those four questions (Reduction, Applied prevention measures, Additional prevention measures and Demands) we aimed to compare our coaches to the opinions of experts, who chose the most valid materials for the inventory. We have also evaluated the significance of the differences between Slovak coaches depending on the coaching level.

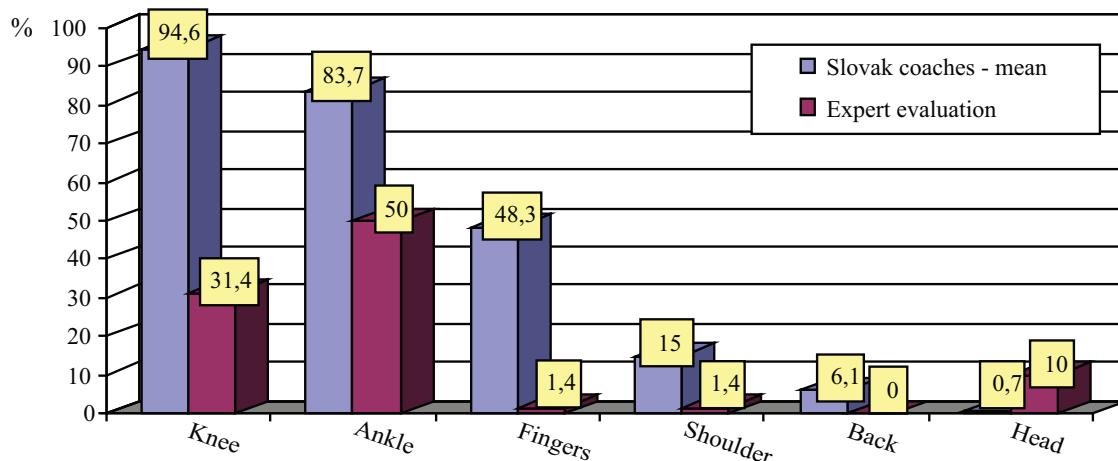


Figure 4. Demands for injury prevention measures among Slovak coaches according to the coaching level – mean compared to the expert evaluation ($p < 0,01$).

Slika 4. Potrebe za mjerama prevencije ozljeda između Slovačkih trenera različite razine u usporedbi s evaluacijom eksperta ($p < 0,01$).

Figure 1 shows, that there is a different order of the means of reduction between Slovakia – mean and the experts (altogether). Chi-square analysis showed, that this difference is statistically significant ($p < 0,001$). Tab 1

shows that there are some differences between the coaches according to the coaching level. However, those differences were not statistically significant ($p > 0,1$).

Table 1. Differences between the Slovak coaches according to the coaching level in the mater of the most effective measures of injury reduction.

Tablica 1. Stavovi i razlike Slovačkih trenera različitih razina o najefikasnijim mjerama prevencije ozljeda

Reduction	coaches mean	Coaches - according to the coaching level - order				
		p>0,1	p>0,1	p>0,1	p>0,1	p>0,1
Chi - square	order	level 1	level 2	level 3	level 4	level 5
Longer regeneration	1.	1.-2.	1.	2.	1.	2.
Better athletic preparation	2.	1.-2.	2.	1.	2.	1.
Prevention programs	3.	3.	3.	3.	4.-5.	3.
Physiotherapy	4.	4.	4.	4.	3.	4.
Better equipment	5.-6.	5.-8.	5.	7.-8,	6.-7.	6.-8.
Protective equipment	5.-6.	5.-8.	6.-8.	5.-6.	4.-5.	6.-8.
Modification of rules	7.	5.-8.	6.-8.	5.-6.	6.-7.	6.-8.
Less matches	8.	5.-8.	6.-8.	7.-8.	8.	5.

Fig 2 shows differences in the questions of applied prevention measures between the experts and Slovak coaches. Chi-square analysis showed, that those too are statistically significant ($p < 0,01$). Differently from the question of injury reduction, the coaches in different coaching levels use different prevention measures in the training process (Tab 2) Those differences were statistically significant ($p < 0,01$).

Figure 3 shows differences in the field of applied additional prevention measures between the opinion of experts and Slovak coaches. Chi-square analysis showed, that they are statistically significant ($p < 0,01$). In Tab 3 there can be seen statistically significant differences between the opinions of the coaches on additional

prevention measures according to the coaching level ($p < 0,01$).

Fig 4 shows differences in the field of demands for injury prevention measures between the opinion of experts and Slovak coaches. Chi-square analysis showed, that they are statistically significant ($p < 0,01$). From Tab 4 we have evaluated that there are statistical differences among the coaches according to the coaching level on the significance level ($p < 0,01$) and ($p < 0,05$).

DISCUSSION

As the project “Safety in Sports” is international, Slovakia was not the only country that made research in

Table 2. Differences between the Slovak coaches according to the coaching level in the mater of the applied prevention measures.

Tablica 2. Razlike Slovačkih trenera različitih razina prema upotrebljenim mjerama prevencije ozljeda

Applied prevention measures	coaches - mean order	Coaches – according to the coaching level - order				
		p<0,1 level 1	p<0,01 level 2	p<0,01 level 3	p<0,01 level 4	p<0,01 level 5
Chi - square						
Stretching	1.	1.	1.	1.	1.	1.
Warm-up	2.	2.-3.	2.	2.	3.-4.	2.
Strengthening	3.	4.	3.	3.	5.	3.
Coordination exercises	4.	2.-3.	4.-5.	4.	2.	5.
Athletic drills	5.	5.	4.-5.	5.	3.-4.	4.
Balance exercises	6.	6.	6.	6.	6.	6.
Physiotherapy	7.	7.-10.	7.	8.	8.-10.	7.
Mobilization exercises	8.	7.-10.	8-10.	7.	7.	8.
Cool-down	9.-10.	7.-10.	8-10.	9.-10.	8.-10.	9.-10.
Technique training	9.-10.	7.-10.	8-10.	9.-10.	8.-10.	9.-10.

Table 3. Differences between the Slovak coaches according to the coaching level in the mater of the applied additional prevention measures.

Tablica 3. Stavovi i razlike Slovačkih trenera različitih razina prema upotrebi dodatnih mjera prevencije ozljeda

Additional prevention measures	coaches - mean order	Coaches – according to the cocaching level - order				
		p>0,1 level 1	p<0,01 level 2	p<0,05 level 3	p<0,05 level 4	p<0,01 level 5
Chi - square						
Taping	1.	2.	2.	1.-2.	1.	1.
Ortheses	2.	1.	1.	1.-2.	2.	2.
Protectors	3.	3.-6.	4.	3.	6.	5.
Medical/ nutritional suport	4.	3.-6.	5.	4.	3.	3.
Mouthguards	5.	7.	3.	6.	7.	4.
Physiotherapy	6.	3.-6.	6.-7.	5.	4.-5.	6.
Massage	7.	3.-6.	6.-7.	7.	4.-5.	7.

Table 4. Differences between the Slovak coaches according to the coaching level in the mater of the demands for injury prevention measures.

Tablica 4. Stavovi i razlike Slovačkih trenera različitih razina prema potrebama za preventivne mjere

Demands	Coaches - mean order	Coches – according to the coaching level - order					
		p<0,01 no level	p<0,01 level 1	p<0,01 level 2	p<0,01 level 3	p<0,01 level 4	p<0,01 level 5
Chi - square							
Knee	1.	1.	1	1.	1.	1.	1.
Ankle	2.	2.	2.	2.	2.	2.	2.
Fingers	3.	3.	3.-4.	3.	3.	3.	3.
Shoulder	4.	4.-5.	3.-4.	4.	4.	4.	4.
Back	5.	6.	5.-6.	5.	5.	5.	5.
Head	6.	4.-5.	5.-6.	6.	6.	6.	6.

injury prevention in basketball. The other country was Sweden (the results were processed by Ruhr-University Bochum).

Swedish coaches were provided with the same questionnaire as the Slovak coaches. However, there were a considerably lower number of coaches to fill in the questionnaire (only 27). Swedish coaches did not mention their age. There was a slightly different male to female ratio (74% male and 26% female). We can also conclude that the Swedish coaches were in higher coaching levels than Slovak coaches, because majority of them were in two highest coaching levels.

In the area of popularity among players, Slovak coaches tend to think that their players like the prevention measures. Meanwhile Swedish coaches think that their players do not like the prevention measures very much. This leaves a space for improvement on the part of Swedish coaches – to make the prevention measures more interesting and enjoyable for their players.

There is a big difference between Slovak and Swedish coaches in the opinions on the most likely injury causes. According to Slovak coaches (83%), the most likely cause is Lack of regeneration, meanwhile only 33% of the Swedish coaches agree with this. Swedish coaches consider the most likely cause Poor physical condition, which ranks second for Slovak coaches (58%).

Slovak and Swedish coaches agree on the most effective measures of injury reduction. Those are Longer regeneration (82% of Slovak coaches and 50% of Swedish coaches) and Better athletic preparation (80% of the Slovak coaches and 54% of Swedish coaches).

The prevention measures carried out by the Swedish coaches were Strengthening (69%), Warm-up (46%) and Stretching (39%). Those are the prevention measures most frequently carried out by Slovak coaches as well, however in slightly different order. The prevention measure carried out the most is Stretching (over 96% of the coaches). It is followed by Warm-up (85% of the coaches) and by Strengthening (65% of the coaches).

In the question of additional prevention measures carried out by the coaches there are some differences between Slovak and Swedish coaches. The most commonly used additional prevention measures among Swedish coaches there are Protectors (70% of the coaches). Slovak coaches think that protectors are the third most commonly used prevention measure (28% of the coaches). The most often used additional prevention measures among Slovak coaches is Taping (66% of the coaches), which is the second most commonly used additional prevention measure among Swedish coaches (37% of the coaches).

Both Slovak and Swedish coaches need more information on knee, ankle, shoulder, wrist and finger injuries.

CONCLUSION

According to the Slovak coaches, the most effective measures of injury reduction are Longer regeneration (over 82%) and Better athletic preparation (over 80%). The most frequent prevention measures they use are Stretching (96,7%), Warm-up (85,1%) and Strengthening (65,3%). The additional measures most frequently used are Taping (69%) and Ortheses (66,7%). The coaches demanded prevention measures mainly for Knee (95%) and Ankle(83,7%).

We established that there were statistically significant differences between the knowledge of the Slovak coaches and the current trends. We assume that this is due to lack of information on the subject of injury prevention in Slovak language, as well as the fact, that this subject is not officially included in the process of the coaching education.

There were significant differences among the Slovak coaches according to the coaching level in relation to the knowledge level (with the exception of the question dealing with the means of reduction). We assume that this is caused by the fact that some of the coaches have more developed language skills and therefore are able to educate themselves on individual bases by using foreign sources of information.

Based on those findings we recommend making the injury prevention and obligatory and inseparable part of coaching education in Slovakia. This can be carried out by means of university studies (IV. – V. qualification level) and non-university studies (I. – III. qualification level). We suggest that the implementation of the gathered data into the current lectures for coaches takes place. We also recommend actualization and innovation of the current subject contents with regard to the problematic of injury prevention.

Faculty of Physical Education and Sports has been involved to this project in order to improve the current situation. One of the main reasons of processing the results of the questionnaire was to determine demands of the coaches and areas of deficit in their knowledge. The obtained information will be used as a guideline for producing vocational materials in Slovak language (in form of DVDs, CDs, papers, leaflets, etc.).

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