



SPINAL MOBILITY DIFFERENCES BETWEEN HANDBALL AND FOOTBALL PLAYERS

RAZLIKE U MOBILNOSTI KRALJEŽNICE IZMEĐU RUKOMETAŠA I NOGOMETAŠA

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SUMMARY

Both handball and football are very popular in Croatia, as well as in Europe. Because of the specific movements handball and football players perform, good hamstring and lower back functioning is important. The aim of this paper was to show how different types of training (handball or football) affect flexibility and what the long term effects are.

Thirty seven men participated in the study divided into two groups: 16 handball players and 21 football player. Prior to the measurements, they warmed up for 10 minutes. Height, weight, body mass index and spinal mobility of the thoracic and lumbar spine as well as hamstrings flexibility were measured.

Statistical significant differences were found for height and weight in favor of handball players, as well as for posterior thoracic and lumbar mobility, lateral flexion and hamstrings flexibility.

Training helps development of specific needs depending on sport. Handball players achieved better results on spine mobility tests, maybe because of increased activity of the shoulder girdle due to specific training process.

Key words: handball, football, flexibility, mobility, measurements, spine

SAŽETAK

Rukomet i nogomet vrlo su popularni u Hrvatskoj, kao i u Europi. Zbog specifičnih pokreta koje izvode rukometaši i nogometaši funkcija mišića hamstringsa i mišića donjeg dijela leđa iznimno je važna. Cilj ovog rada je pokazati kako različite vrste treninga utječu na fleksibilnost, te kakav je dugoročni utjecaj tih razlika.

U istraživanju je sudjelovalo 37 sportaša podijeljenih u dvije grupe: 16 rukometaša i 21 nogometaš. Prije samog mjerenja sportaši su se zagrijali 10 minuta. Nakon toga izmjerene su im visina, težina, mobilnost torakalne i lumbalne kralježnice, te fleksibilnost mišića stražnje lože natkoljenice.

Rukometaši su statistički značajno viši i teži nego nogometaši, a statistički se značajno i razlikuju u vrijednostima posteriorne mobilnosti lumbalne i torakalne kralježnice, vrijednostima laterofleksije kao i u fleksibilnosti mišića stražnje lože natkoljenice.

Trening pomaže razvoj specifičnih ciljeva ovisno o sportu. Rukometaši su postigli bolje rezultate na testovima mobilnosti kralježnice, pretpostavka je da je to rezultat povećane aktivnosti ramenog obruča koji proizlazi iz zahtjeva sportske aktivnosti, te specifičnog trenažnog procesa.

Ključne riječi: rukomet, nogomet, fleksibilnost, mobilnost, kralježnica

INTRODUCTION

Flexibility is defined as the ability to perform movement in full range of motion and represents an important part of sport activities. All segments of our body are not flexible in the same way and that is considered to be one of the specific features of flexibility called regional flexibility difference. In rhythmic gymnastics and sport gymnastics a higher level of flexibility performance is demanded^{2,24}, whereas in other sports a regional flexibility is needed⁹ like in handball or football. In these sports often tested is hamstrings flexibility and lower back mobility^{5,18}. Because of the specific movements that handball and football players perform, hamstring and lower back normal functioning is important²³ but prone to injuries^{7,12,20}. Both handball and football are very popular in Croatia, as well as in Europe. A large number of young people are introduced to those sports and intensive trainings, so it is important to have information on health status of athletes. Quality and mode of training itself should be considered¹⁵. A small number of youngsters will succeed in those sports as professionals while most of them will be in lower categories or amateurs. No matter the level of competition, training leads to a number of positive changes and some negative ones like osteoarthritis¹⁹ or other unwanted health problems¹. Injury prevention in professional sport is crucial as well as in activities of everyday life. Thus, training should be conducted in such manner to decrease number of injuries. Injury prevention should therefore include testing, periodical flexibility tests³⁰ and quality of training itself should increase to prevent athlete's absence from the field³. Aim of this paper was to show aftermath of differences in training on flexibility and what are long term effects of those differences.

METHODS

Thirty seven men participated in the study and were divided into two groups: 16 handball players from 1st Croatian handball league North, mean age 19.9±3.1 years and 21 football player from 3rd Croatian football league, mean age 19.8±2.5 years. Frequency of training for both sport was three to four times per week. They volunteered for this research and given explanation on measurements before they started.

Height and weight were measured with Seca scale type 700. Participants wore shorts and t-shirts and were barefooted. Based on the acquired measures body mass index (BMI) was calculated. Prior to the measurements participants warmed up for 10 minutes. Sagittal mobility of the lumbar spine was measured using Schober's test and for the sagittal mobility of the thoracic spine Ott's sign was measured⁶. For the measurement of Schober's test participants stood erect. First mark was the lumbosacral junction marked by the dimples of Venus. A second mark was placed 10 cm above the junction. Participants were then asked to bend forward and backward as far as possible and the distance was indicated in cm³¹. Ott's sign measured the range of motion of the thoracic spine in the sagittal plane. This test assess to what degree the thoracic spine bends. The most prominent spinous process of cervical spine C7 was detected and marked in the relaxed standing position. Next mark was 30cm caudal. The person then bends forward and backward and changes in length were measured with a measuring tape. The lengthening 2-4 cm and shortening of 1cm are considered normal values²⁷. Indices were calculated as a sum of differences between flexion and extension and the resting position. Lateral flexion of the spine was measured using Fingertip-to-floor distance test as difference between the middle finger and the floor after the lateral flexion was performed. Hamstrings flexibility was measured using Back-against-the-Wall V-Seat and Reach Test²⁵ repeated three times and the best result was used.

T-test for independent samples tested differences between variables and the statistical significance was set at p<0.05. Statistical analysis was performed with MedCalc 10.2.0.0 (MedCalc Software, Broekstraat 52, 9030 Mariakerke, Belgium).

RESULTS

Handball players were taller and heavier and had higher values of body mass index compared to football players (Table 1). Posterior mobility of thoracic and lumbar spine, lateral flexion and hamstrings flexibility results were also significantly better in handball players than in footballers (Table 2). Also, sagittal mobility indices for thoracic and lumbar spine were significantly better for handball players than football players (Table 2).

Table 1. Mean values for the morphological characteristics
Tablica 1. Morfološke karakteristike nogometaša i rukometaša

Variables	Football players (N 21)	Handball players (N16)	Mean difference	Statistical significance
Body mass index (kg/m ²)	24.9±2.3	26.3±2.7	1.39	p=0.10
Weight (kg)	79.8±8.6	91.2±12.8	11.38	p=0.0027*
Height (m)	1.8±0.1	1.86±0.1	0.07	p=0.0016*

*statistical significance p<0.05

Table 2. Mobility and flexibility test results

Tablica 2. Rezultati testova mobilnosti i fleksibilnosti

Variables	Football players (N=21)	Handball players (N=16)	Mean difference	Statistical significance
Anterior lumbar spine mobility	5.1±0.8	5.6±1.1	0.53	p=0.11
Posterior lumbar spine mobility	2.7±0.8	3.3±1.0	0.6	p=0.05*
Anterior thoracic spine mobility	2.7±1.2	3.3±1.2	0.6	p=0.15
Posterior thoracic spine mobility	2.05±0.9	3.0±1.2	0.95	p=0.01*
Sagittal lumbar spine mobility index	7.8±1.0	8.9±1.3	1.13	p=0.006*
Sagittal thoracic spine mobility index	4.8±1.6	6.3±1.9	1.55	p=0.01*
Lateral flexion right side	21.7±3.5	28.6±5.5	6.96	p<0.0001*
Lateral flexion left side	21.6±4.1	28.5±6.0	6.93	p=0.0002*
Seat and Reach Test	57.05±8.2	73.8±12.7	16.76	p<0.0001*

*statistical significance p<0.05;

DISCUSSION

Statistical significant differences were found for height and weight in favor of handball players as well as for posterior thoracic and lumbar mobility, lateral flexion and hamstrings flexibility. Handball players are usually heavier and taller than the footballers^{13,17,21} and also more flexible maybe due to specific movements performed in handball. Similar results were obtained in other papers regarding flexibility in sport^{17,21} even though the competition level was different. No matter the competition level or type of sport flexibility tests on footballers and handball players performed by other researchers point out the same whereas other abilities such as static or dynamic balance tested found no differences which could be contributed to similar demands in football or handball like fast change of direction, dribbles etc.¹⁴. Lack of flexibility in football players was established by others also²⁹ that could indicate that training is not focused enough on keeping or developing flexibility. Baseline flexibility is likely to influence athletic performance⁸. Participants in this research were not professionals and play at lower competition level unlikely to play in professional league especially if we consider their age. When this is taken into consideration lack of flexibility is the major contributor to injuries and shows how incidence of injuries increases as

the level of competition decreases in handball²⁸ as well as in football³. Maintenance of flexibility is one of the important factors when avoiding low back injuries in young athletes²², and lack of lumbar spine flexibility is the one of major risk factor for injuries¹¹. Thoracic spine is not so susceptible to injuries in any of those sports¹⁶, but nevertheless, both have the highest incidence of injuries in young athletes¹⁰. Another question that emerges is the quality of life and health of athletes as the training and active playing is over⁴. It is very important to preserve the sagittal mobility of the spine because of dynamic balance in older age²⁶ and prevention of falling.

In this research we found that handball players are taller and heavier than football players and have significant better results for posterior thoracic and lumbar mobility, lateral flexion and hamstrings flexibility. This may be due to training and greater involvement of the shoulder girdle than in football players.

Training usually develops specific abilities for specific sport and focuses on results, but coaches and others involved in training should control its impact on musculoskeletal system and influence on athlete's health especially when career in sport is over. Injuries in sport cannot be eliminated but can be reduced by preventive activities.

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