

# The influence of the wrestling technique on contact efficiency of young male team handball players

## Authors' Contribution:

- A** Study Design
- B** Data Collection
- C** Statistical Analysis
- D** Manuscript Preparation
- E** Funds Collection

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## Abstract

### Background and Study Aim:

The purpose of this study was to determine the impact of learning of some wrestling techniques on the efficiency in a contact game.

### Material/Methods:

The research was conducted on a sample of 20 handball players (10–12 years). Experimental and control group rated the effectiveness in contact play before and after the treatment. The treatment consisted of learning and practicing five wrestling techniques applied on the preparation part of the training session.

### Results:

Initial testing did not show statistically significant differences in efficiency between groups in defense and in attack. Results of the final testing showed that statistically significant differences between the experimental (defense  $p=0.04$ , attack  $p=0.02$ ) and control group (defense  $p<0.01$ , attack  $p=0.03$ ). Analysis of differences between groups show that the experimental group achieved statistically significant ( $p<0.01$ ) better results in defense and attack performance.

### Conclusions:

The research has shown that teaching young handball players wrestling techniques can significantly improve their performance.

### Key words:

combat sports • handball players • learning • physical contact • efficiency

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## BACKGROUND

Over the centuries, many various sport training and combat methods have been used depending on the individual needs and philosophies of certain sport. Previous authors, including Kalina [1], recognized the importance of combat sports skills for physical and moral education of children and teenagers as well as for improving performance of athletes in other sport disciplines. To enhance performance, coaches now are devoting more training time to help athletes improve different aspect of their conditioning. This has caused significant positive changes in the coaching profession, creating the performance enhancement programs and the quality of the athlete sent out to compete in their perspective sport [2].

Handball game is characterised by its emphasized situation-related confrontation of opposing teams manifested

in frequent contacts between attack and defence players. The team in possession of the ball is confronted by the opposing players who attempt to disable the attacking team to score a goal and intercept the ball by appropriate contact actions [3]. For this purpose it is crucial to use different variants and training methods of certain game segments. One of the mentioned segments is contact game in attack and defence. It is impossible to perform contact actions in a quality way with no particular technical, tactical and condition preparation. Sport experts and scholars, whose aim is to foster the game and the selection of the athletes, test biomechanical [4], psychological [5,6], sociological [7,8] and physiological contact characteristics [9] in certain sport games.

Not rarely have the training contents of other sports or disciplines been used in the practice of sport games with the purpose of integrity of sport preparation [10,11].

**Combat sport** – is a competitive contact sport where two combatants fight against each other using certain rules of engagement.

**Physical contact** – contact activity between defence and attack players, in which defender with quality body control, footwork and hand movements try to stop attacker.

**Handball player** – is an athlete having mastered handball technique and participating in handball matches.

**Learning** – process of learning motor knowledge and skills.

**Efficiency** – difference between desired and achieved state of trained skills.

Handball contacts have features that can be seen in combat sports. Their connection lies in confronting the power of two players, the engagement of similar or the same musculature, anaerobic use of energy, the use of the same forms of power and similar techniques in resolving situation-related problems [12–14]. These data open some space to the logic of using certain elements of combat sports as an addition to the handball training with the aim of achieving more quality contact play [11,15,16]. The most recent studies on injuries in handball showed that the largest number of injuries occur during the physical contact [17,18] which clearly shows the force of contact in handball.

The most endangered positions during the attack are the pivots, being in the constant physical contact with the opposing defence players. The defence players, particularly in more aggressive defence formations such as 3:2:1, 3:3 and 5:1, act in purpose of interrupting the attack by a quick break with forceful contact. Most frequently this is done by half and centre positions [3]. Due to formerly stated reasons, but also to similar risky injury factors, the use of operators from the wrestling sport could improve efficiency, but also serve to prevent this type of injuries [19–21]. These data are the basis for the use of certain elements of combat sports as an addition to the handball contact training. This paper has the purpose of determining the influence of learning certain wrestling techniques on the efficiency in the contact game of young male handball players.

## MATERIAL AND METHODS

### Participants

The sample of this research comprised 20 boys aged 10–12 who play handball in Croatian first federal league. All have been engaged in handball for two years or longer, practicing 3 times a week.

### Measurements

The set of variables consists of four variables to evaluate efficiency in the contact game: efficiency in attack from the pivot position to evaluate the initial state (ATC\_I), efficiency in attack from the pivot position to evaluate the final attack (ATC\_F), efficiency in defence against the pivot position to evaluate the initial state (DEF\_I), efficiency in defence against pivot position to evaluate the final state (DEF\_F).

The evaluation of efficiency for both groups at the beginning and in the end of treatment was done in the following way: the efficiency in attack from the pivot position of was evaluated in a way that respondents

performed a technical element of the handball game in which they, with their backs to the goal and with a defence player behind them, catch the ball. After having caught it, follows a turn and a shot on the goal without the goalkeeper, but with set hanging targets (upper goal corners) and pins (lower goal corners) they try to hit.

The efficiency in defence against the pivot position was evaluated in a way that respondents were trying to stop the player in front of them by using a correct technique and upon receiving the ball were trying to score. Every respondent had ten attempts to receive the ball and score distracted by ten different opponents and also had ten attempts to distract the opponents in receiving the ball and trying to score.

Due to motivation effect, we simultaneously evaluated the respondents' activity both in defence and attack. After having analysed the video recordings of all the actions (attack and defence), they were marked according to six criteria: the reception of ball, turning towards the goal, correct use of a wrestling technique, a shot on goal, a shot in the goal frame and a shot on target. Each of the given criteria is given one point which is six points altogether. In ten attempts one could score the maximum 60 points in defence or attack. The average number of points in attack or defence in the initial and final evaluation is the final grade of a player. The evaluation by video analysis was conducted by wrestling and handball experts.

### Experimental procedures

The enlisted wrestling elements were integrated into handball training during a certain preparation period. Wrestling exercises were applied in the preparation part of the training for fifteen minutes from 15<sup>th</sup> July 2009 to 15<sup>th</sup> September 2009, three times a week (24 training sessions) under the surveillance of a wrestling expert. The sample was divided in two groups, one practising wrestling exercises, and the other doing preparation handball exercises at the same time. All the other parts of the training were done together by both groups. Five wrestling exercises were used to develop specific power and endurance as well as wrestling techniques of releasing from the back hold:

**Rotation:** there is a contact between the players, holding the opponents trunk with one hand and the opponents hand with the other. Every player has to be turned backwards to the centre. When the opponent turns him facing the centre, he is trying to rotate the opponent into a favourable position again.

**Fighting in the sitting position:** the players are sitting on a mat, leaning backwards and hooked their

**Table 1.** Descriptive statistics.

Variables	Group	N	MIN	MAX	X ±SD	KS
BH (cm)	E/C	20	148	171	158.72±5.64	0.14
BW (kg)	E/C	20	36	59	46.15±6.34	0.13
AGE (yrs)	E/C	20	10.0	12.0	10.85±0.67	0.28
ATC_I	E	10	1.60	2.70	2.22±0.35	0.23
ATC_I	C	10	2.00	2.90	2.48±0.27	0.23
ATC_F	E	10	1.30	4.10	2.83±0.83	0.21
ATC_F	C	10	0.60	2.50	1.83±0.55	0.23
DEF_I	E	10	2.60	4.60	3.52±0.58	0.15
DEF_I	C	10	2.90	4.40	3.78±0.64	0.29
DEF_F	E	10	3.40	5.10	4.17±0.59	0.18
DEF_F	C	10	2.50	4.00	3.17±0.55	0.20

BH – body height; BW – body weight; AGE – number of ages; ATC – attack activity grade; DEF – defence activity grade; I – initial testing; F – final testing; E/C – experimental and control group together; E – experimental group; C – control group; N – number of subjects; MIN – minimum value; MAX – maximum value; X – mean; SD – standard deviation; KS – Kolmogorov-Smirnov test; MaxD=0,30 for N=20.

forearms. Every player is trying to press the opponent on the mat by his chest.

**Defence from the back hold:** the players are standing one behind the other, and the one behind is trying to hold him with his arms while the first one is trying to prevent this (hands coming together).

**Defence from the back hold with the ball:** two players are standing one behind the other, while the third one is standing right across with a handball in his hand. A player is trying to prevent the back hold and at the same time is trying to catch the ball passed over by the other player.

**Releasing from the hold by the elbow:** two players are standing one behind the other, while the third one is standing across with the handball in his hand. The player behind the opponent holds him below the arms. The player in hold lowers his centre of gravity and receives the ball from the third player. After catching the ball with his left arm, he clutches to his opponents left forearm above the elbow. By using the lever on the opponents arm, he turns to the left side and shoots on goal. This sequence is followed if it is the case of a right-handed player, while if it is a left-handed player sequence is performed with a right hand.

#### Statistical analysis

After the video analysis the results were entered into STATISTICA ver.7 software. The methods of result processing involved the calculation of descriptive statistical

parameters including minimum (MIN), maximum (MAX), arithmetic mean (X), and standard deviation (SD). All the variables were further tested for normality of distribution using Kolmogorov-Smirnov test (KS). The difference between the experimental and the control group as well as the differences between initial and final testing was tested with univariate analysis of variance (ANOVA).

## RESULTS

The mean heights and weights in this study are very similar to records of young handball players (age 10–12) studied by Ibnziaten [22]. This data indicates representative quality of the sample. Kolmogorov-Smirnov test showed that all the variables were normally distributed (MaxD=0.43 for 0.01) which enable further statistical data processing using ANOVA (Table 1).

Table 2 shows there are statistically significant differences between the results of the initial and final testing in the experimental group during defence ( $p=0.02$ ) and attack ( $p=0.04$ ). The total grade of the group in the initial testing with attack techniques was 2.22 while in the final testing it was 2.83. Therefore, we can conclude that the respondents in the experimental group advanced in performing the attacking techniques. When comparing the total initial grade (3.52) and the final grade (4.17) of the defence activity of the whole group, the differences are in favour of the final testing grade; therefore in this case we again conclude the experimental group made progress in the tested defence elements.

**Table 2.** Analysis of variance (f-test) within the groups in initial and final testing.

Groups	ATC_I / ATC_F		DEF_I / DEF_F	
	F	p	F	p
Experimental	4.58	0.04*	6.19	0.02*
Control	11.12	<0.01*	5.20	0.03*

\* Significant difference between initial and final testing.

As in the experimental group, the control group showed statistically significant differences between the initial and final defence ( $p=0.03$ ) and attack testing ( $p<0.01$ ). By analysing total grades of the groups, we can conclude that the control group made a regression since the final grades were worse than the initial ones. In attack the initial grade was 2.48 and the final one was 1.83, while in defence the initial grade was 3.78 and the final one was 3.17.

Whether the experimental and control group differed in the initial testing was shown by the variance analysis in Table 3. It is evident there were no statistically significant differences between the groups in the initial testing considering both attack and defence. However, it is obvious there are statistically significant differences in the final testing between the studied groups on the significance level  $p<0.01$  both in defence and attack performance.

## DISCUSSION

The respondents of the experimental group, under the influence of specific training treatment, acquired certain motor knowledge which improved their performance in the tests. This should not be surprising if we compare it to some bibliography data. Schneider [23] draws a conclusion that specific knowledge enables children to process and remember information which they will use to apply strategies in a certain performance more efficiently. In terms of this, it is expected that the respondents achieve significant progress in 24 training sessions and show better results in tested performance.

The results of the control group were not better, but significantly worse with regard to the initial testing which is the consequence of the influence of the experimental group on the control one while doing the tests. All the respondents of the experimental group played in attack and defence against everyone from the control group and vice versa. Previously determined progress of the experimental group was manifested when playing in attack and defence and resulted in lower grades of the control group. The success of treatment was further proved by the comparison of results obtained by groups in initial

**Table 3.** Analysis of variance (f-test) between experimental and control group.

Variables	F	p
ATC_I	3.51	0.07
ATC_F	10.02	<0.01*
DEF_I	0.90	0.35
DEF_F	15.40	<0.01*

\* Significant difference between groups.

and final testing. In initial testing there were no differences between the groups, while in the final testing, the respondents in the experimental group showed statistically significant better results.

Evenness of the groups in the initial testing is rather logic considering the respondents are of the same age, they are the members of the same team and have been training together for several years. They have undergone the same training treatment which could not contribute to the initial differences of the tested element in handball performance.

It is evident that the group that used wrestling exercises through their training programme showed remarkable progress compared to the control group. The respondents in the experimental group may have, under the influence of the treatment, made some progress in certain specific motor abilities such as specific strength and power. They often develop superior strength, coordination, balance, proprioceptive awareness and flexibility on either their right or left side [24,25]. Several previous studies documented cases in which the respondents were more exposed to certain training stimuli achieve better results. French [26] have studied relations between learning and basketball performance in boys age 10–12 and have concluded that skills and knowledge particularly emphasized in training have crucial influence on the basketball performance of the boys. McPherson [27] had similar results in tennis where they compared children aged 10–12, but with different training experience. They have come to a conclusion that those with longer training experience not only achieved better results, but also brought more quality decisions and had a better technique, based on the greater knowledge fund. Similar features can be found in our research as well, in which the system of new knowledge, though not completely automated, brought significant advances in the performance of young handball players. The same information verifies the justification for implementation of wrestling programmes with the purpose of improving contact play in defence and attack as an additional training operator in handball training. The results of this research show that implementation of learning

wrestling techniques with young male handball players can remarkably improve their performance, similar to previous research that used combat sports elements as conditioning exercises in team sport training [2,28].

## CONCLUSIONS

Physical contact is the constituent element of all phases of a game of mostly all team sports. Further on, in some games physical contact directly determines situational efficacy and success in a game. Activity of the players in physical contact presents an important segment of the handball game which should be given special attention in a training process. The contact is present in all the phases of the game, mostly in position defence and position attack. In this paper we chose the elements of wrestling techniques that stimulate contact play.

The results of this research show that implementation of learning wrestling techniques with young male handball players can remarkably improve their performance. A certain number of contact stimuli may have created inhibiting influence on the fear of contact, frequently present in the beginners, and progress in certain specific motor abilities such as specific strength and power. All mentioned, along with learned wrestling techniques, enabled a more secure and quality performance.

The results can be used by handball or other sport experts dealing with contact in the structure of a certain game or a sport. The research is limited by a small sample and the young age of the respondents which leaves some space for the further study of this issue. Further on, it might be necessary to study the possible influence of the combat sports training on the development of particular motor abilities.

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