Original research article

THE IMPACT OF STATIONARY BALL-HANDLING DRILLS ON FUNDAMENTAL OFFENSIVE BASKETBALL SKILLS IN 13 AND 14-YEAR-OLD BASKETBALL PLAYERS

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Abstract. *The aim of this study was to investigate the effect of no dribble stationary ball-handling drills on basic offensive skills in basketball. The participants were 121 young male basketball players aged 13-14 (M=13.59±0.54) who spent at least two years training basketball (M=3.30±0.74). Three no dribble stationary ball-handling drills were used as the independent variables: Double Leg-Single Leg (Dlsl30), Body Circles (Hwlb30) and Pretzel (Blur30). Three tests of offensive basketball skills, suggested by AAPRHED (1984), were used as the dependent variables: Speed spot shooting (Shooting), the Passing test (Pass) and Control dribble test (Dribble). The impact of independent variables on the individual dependent variables was tested by using a regression analysis – the Stepwise method. The results showed that there was a significant impact of no dribble stationary ball-handling drills on basic offensive skills in basketball. The Body Circles drill had a significant impact on all three basketball skills, the Pretzel drill had an influence on shooting and passing, and the Double Leg-Single Leg on passing and dribble. These results justify the use of no dribble stationary ball-handling drills in learning fundamental offensive basketball skills.*

Key words: *no dribble drills, shooting, dribble, passing*

INTRODUCTION

Basketball is a complex polistructural activity (Karalejić, & Jakovljević, 2008). Achieving a good result in basketball (Jakovljević, 1997), as in most sports, mostly depends on the quality of technical skills, i.e. their efficiency (Kuleš, & Marić, 1989;

Savić, 1987). Basketball skills contain a range of motor activities (elements) which players apply during the game, both during the phase of offence and defense. Basketball players perform a number of more or less complex activities (Trninić, Karalejić, Jakovljević, & Jelaska, 2010a; 2010b). In order to be able to perform these activities successfully, it is necessary for them to possess excellently developed basketball skills, both technical and tactical. Basketball skills, the basis of which is the basketball technique, contain stylized motor structures specific for basketball, which a player uses in order to solve certain situations in a game (Karalejić et al., 2008). This is why it is essential that these skills should continuously be perfected and their efficiency improved. The specification equation of success in basketball is, among the factors which influence success, recognized as a factor of specific basketball motor structure which is composed of two dimensions: explosive strength and coordination (Pavlovič, 1983). Coordination training, especially its factor of kinetic sensitivity, is a very important part of basketball training, especially in young players (Glasauer, & Nieber 2000; Ljach, 2002; Kubaszczyk, 2001).

Kinesthetics is a sensor modality which refers to the positions of the body and limbs in space, gained through information received only from proprioceptors which are situated in the vestibular apparatus, joints, tendons and muscles. Therefore, kinesthetics is a real sense which is derived from these transmissions (Sage, 1985; Potach, & Borden, 2000). Several earlier basic studies (Phillips, 1941; Phillips & Summers, 1954; Fleishman & Rich 1963; Dickenson, 1969) conducted with the aim to research the role of kinesthetic sensitivity and the acquisition of motor skills have found that there was a correlation between performance and the kinetic sensitivity of subjects while performing various tasks. It was determined that subjects with a high kinesthetic sense performed better during initial learning tasks than those with a low kinesthetic sense, and also that the kinesthetic sense was more important in early than in later phases of motor learning. This emphasizes the importance of the role of training in order to improve the kinesthetic sense in acquiring motor skills essential for the successful demonstration of sports and also the basketball technique.

Selected aspects of motor coordination are very important for the selection of young players, especially in the

selection of prospective top players (Zwierko, Lesiakowski, & Florkiewicz, 2005). They require specific coordination, especially in elements performed with a ball. The successful performance of basketball elements with a ball (passing, shooting and dribbling) usually implies good ball control, as well as speed and precision. Since the ball is seen as a foreign body, especially in the case of the beginners, it is necessary to make it feel like a part of the body through adequate training. This is why stationary ball-handling drills are also used in the training of the youngest basketball players (Prudden, 2006; Newton, 1994; Beecroft, 1994). These exercises are usually divided into two groups: with and without dribbling. Exercises without dribbling usually consist of circling the ball around parts of the body (Body Circles drills: circles around one or both leg, around the waist, around the head/neck…), passing the ball between one's legs (Figure 8 – without dribble) or other ways of manipulating the ball (slaps, fingertips, drops…). Exercises usually last between 30 and 60 seconds and are to be performed as fast as possible. Basically, they do not contain basketball skill moves and movements in the form used during a basketball game, but they are specific since they are performed with a ball. This is why they are considered to create good grounds for learning basic basketball skills, and improve speed and quickness in playing with a ball (Prudden, 2006). On the other hand, since these exercises are static, their positive transfer to basketball skills could be doubtful.

The aim of this paper was to research the influence of good performance of stationary ball-handling on offensive basketball skills – passing, shooting and dribbling. It was assumed that these exercises would positively transfer onto chosen offensive basketball skills.

METHOD

Participants

The research was carried out on the sample of 121 young basketball players aged between 13 and 14 (M=13.59±0.54). In order to be included in the research, they had to have trained basketball for at least two years (M=3.30±0.74). The average height of the participants was 178.80±11.54cm, and body mass 63.04±11.56kg. The participants voluntarily agreed to participate in the research.

Sample of variables and tests

Independent variables (ball-handling) were measured using three stationary ball-handling drills, which do not include dribbling: *Double Leg-Single Leg, Body Circle and the Pretzel* (Newton, 1994; Beecroft, 1994; Lehmann, 1981). These drills were also used as tests (Abd Al Jabar, 2015; Jakovljevic, 1997; Lehmann, 1981).

Double Leg-Single Leg (Dlsl30). The player assumes an offensive stance with feet shoulder-width apart. He holds the ball with both hands inside of the right knee. He makes a side step with the right foot and circles the right leg; then brings the right foot back to the previous position and circles the ball around both legs. After that, he takes a side step with the left foot and circles the left leg; then brings the left foot back to an offensive stance position and circles both legs. The player tries to make as many circles as possible for a period of seconds. Every circle counts as one point.

Body Circles (HWLB30). The player assumes an offensive stance and circles the ball around his head, then around his waist, and finally around his knees. He must complete a full circle each time. After that he continues to repeat these circles for a period of 30 seconds. Every circle counts as one point.

The Pretzel (Blur30). The player holds the ball with both hands, between his legs. The left hand is behind the left leg and the right hand is in front of the right leg. He drops the ball and quickly catches it before it hits the ground. When catching, he moves his left hand in front of the left leg and the right hand behind the right leg and catches the ball. He drops the ball again and switches his hands back to the starting position and catches it. He must repeat this action and try to repeat it as many times as possible in 30 seconds. Every catch counts as a point.

Dependent variables (fundamental offensive basketball skills) were measured using three basketball skill tests suggested by the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD, 1984): Speed spot shooting, Control dribble and Passing. Every test has a very high ICC, respectively: 0.87, 0.95 and 0.90 (AAHPERD, 1984).

Speed spot shooting (Shooting). The purpose of this test was to measure skill at rapid shooting from five positions (central, two 45° positions, and two short corner positions) at a distance of 3.66 m. The player had three trials of 60 seconds each (the first one was a practice trial) and the last two were recorded. During each trial, not more than four lay-up

shots may be attempted, but not two in succession. The final score is the sum of the points of the two trials.

The Passing Test (Pass). The purpose of this test was to measure skill in passing and recovering the ball accurately while moving. Six squares (A, B, C, D, E, F) of 60.96 cm were marked on the wall, so that the base of the

squares was either 91.44 or 152.40 cm from the floor (Figure 1). The start line was marked on the floor at a distance of 243.84 cm from the wall. The player had three trials of 30 seconds each (the first one was a practice trial) and the last two were recorded. He passed to the target in line and back. Each hit to the target or the boundary lines of the target counted as two points, and each pass hitting the intervening spaces on the wall counted as one point. The final score was the total of two trials.

The Control Dribble Test (Dribble). This test assesses the dribble skills of a player. Six cones are placed in the lane and the player must dribble in the course which was marked in Fig. 2. Upon hearing the signal, the player starts to dribble. He has to dribble at a distance of 17.9 m as fast as possible. There were three trials, and the sum of performance times of the last two was recorded. Time in seconds and hundreds of seconds was determined using an electronic timing system (Micro Gate, IT). All of the tests were performed in a basketball gym under stable environmental conditions (an ambient temperature of 19-21°C and relative humidity 40-50%).
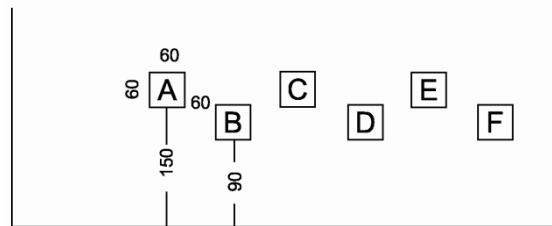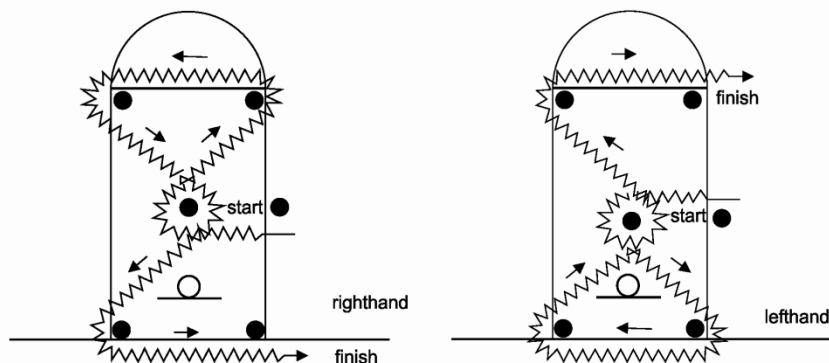

Fig. 1 Passing test

Fig. 2 Control dribble test

Data analysis

In the data analysis, the following elementary descriptive parameters were calculated: means (M), standard deviations (SD), maximum (Max) and minimum (Min) values. The regression analysis – the Stepwise method was applied for the assessment of the impact of the independent variables on the dependent variables. The statistical analysis was performed using an SPSS 17 statistical program.

RESULTS

The basic descriptive parameters of all the variables: means (M), standard deviations (SD), maximum (Max) and minimum (Min) values are shown in Table 1.

Table 1 Means (M), Standard Deviation (SD), Maximum values (Max) and Minimum values (Min) of all the variables

Variables	M	SD	Max	Min
Dlsl30 (point)	37.05	7.21	51.00	8.00
Hwlb30 (point)	41.72	4.58	58.00	32.00
Blur30 (point)	42.44	11.48	65.00	8.00
Shooting (point)	31.06	5.95	44.00	16.00
Dribble (s)	16.08	1.06	19.26	13.47
Pass (point))	94.55	11.46	127.00	69.00

Tables 2, 3 and 4 show the results of the regression analysis – the Stepwise method. The results of the regression analysis for the dependent variable *Shooting* and independent variables – *Hwlb30*, *Dlsl30* and *Blur30* are shown in table 2. The values of the final regression coefficient (R=0.53) and determinant coefficient (R^2=0.28) indicate the impact of two variables *Hwlb30* and *Blur30* on the *Speed spot shooting test* results. The variable *Hwlb30* was extracted in the first step and variable *Blur30* in the second step.

Table 2 Results of the regression analysis, Stepwise method: dependent variable – Shooting, independent variables – Hwlb30, Dlsl30 and Blur30

Model Summary				ANOVA	
Model	R	R^2	F	Sig.	
1	0.46	0.22	32.07	0.000	
2	0.53	0.28	22.68	0.000	
Coefficients					
Model	B	Std.Error	Beta	t	Sig.
1 (Constant) First step	5.85	4.48		1.30	0.194
Hwlb30	0.60	0.11	0.46	5.66	0.000
2 (Constant) Sec. step	5.86	4.31		1.36	0.176
Hwlb30	0.46	0.11	0.35	4.08	0.000
Blur30	0.15	0.04	0.28	3.26	0.001

Table 3 displays the results of the regression analysis for the dependent variable *Dribble* and independent variables – *Hwlb30*, *Dlsl30* and *Blur30*. The values of the final

regression coefficient (R=0.52) and determinant coefficient (R^2=0.27) indicate the impact of two variables *Hwlb30* and *Dlsl30* on the *Control dribble test* results. Again, the variable *Hwlb30* was extracted in the first step, but in the second step, the variable *Dlsl30* was extracted.

Table 3 Results of the regression analysis, Stepwise method: dependent variable – Dribble, independent variables – Hwlb30, Dlsl30 and Blur30

Model Summary			ANOVA	
Model	R	R^2	F	Sig.
1	0.44	0.20	28.77	0.000
2	0.52	0.27	21.67	0.000
Coefficients				
Model	B	Std.Error	Beta	t	Sig.
1 (Constant) First step	20.36	0.83		25.37	0.000
Hwlb30	-0.10	0.02	-0.44	-5.36	0.000
2 (Constant) Sec. step	21.05	0.79		26.52	0.000
Hwlb30	-0.82	0.02	-0.35	-4.23	0.000
Dlsl30	-0.42	0.01	-0.29	-3.45	0.001

The results of the regression analysis for the dependent variable *Pass* and the predictors – *Hwlb30*, *Dlsl30* and *Blur30* are shown in table 4. The values of the final regression coefficient (R=0.49) and determinant coefficient (R^2=0.22) indicate the impact of all three independent variables on the *Passing test* results. In the first step, the variable *Hwlb30* was extracted, in the second the variable *Blur30* and in the third the variable *Dlsl30*.

Table 4 Results of the regression analysis, Stepwise method: dependent variable – Pass, independent variables – Hwlb30, Dlsl30 and Blur30

Model Summary			ANOVA	
Model	R	R^2	F	Sig.
1	0.40	0.16	22.15	0.000
2	0.46	0.21	15.96	0.000
3	0.49	0.22	12.33	0.000
Coefficients					
Model	B	Std.Error	Beta	t	Sig.
1 (Constant) First step	53.18	8.85		6.01	0.000
Hwlb30	0.99	0.21	0.40	4.71	0.000
2 (Constant) Sec. step	53.12	8.58		6.19	0.000
Hwlb30	0.73	0.22	0.29	3.27	0.001
Blur30	0.26	0.09	0.26	2.90	0.004
3 (Constant) Sec. step	48.45	8.77		5.52	0.000
Hwlb30	0.64	0.23	0.26	2.84	0.005
Blur30	*0.21*	0.09	0.21	2.27	0.025
Dlsl30	0.29	0.14	0.18	2.05	0.043

DISCUSSION

The participants achieved almost good results in stationary ball-handling drills according to universal norms for basketball players given by Lehmann (1981). There are no data on the results of these three drills for 13 and 14 year-old basketball players, so the results of our participants could be incorporated into a database to which talented 13 and 14 year-old basketball players could be compared. The values of all three dependent variables belong to the highest 25% for players of this age according to AAHPERD. It could be said that this was a consequence of the nature of basketball practice (training method) in Serbia, with a preference for those particular skills amongst other basketball skills.

The results of three regression analyses indicate a moderate but significant influence of independent variables on the results of the three applied basketball skills tests.

It could be noticed that in all three regression analysis, the variable *Body Circles (HWLB30)* was extracted in the first step, and that it had the highest regression coefficient value (R=0.40-0.46), i.e. coefficient of determination (R^2=0.16-0.22). This was expected in a way, taking in consideration the motor structure of this exercise. Namely, a basketball player had two basic tasks while performing this exercise: one was circling the ball around certain body parts, which takes place on the horizontal plane, and the other was a successive change of position height. In this way, the exercise gains in complexity coordination wise, engages a higher number of muscles when compared with two other exercises and requires better intermuscular coordination.

In the second phase of the regression analysis, in which the variable *Shooting* was the dependent one, variable *Blur 3o* was extracted. It can be assumed that the connection was in the fact that in both activities there was a need for quick manipulation with the ball, i.e. quick arm work, and at the same time keeping control, especially while performing the *Speed spot shooting* test.

In the regression analysis in which the dependent variable was *Dribbling*, in the second step the variable *Dlsl30* was extracted. This exercise requires good control of the ball while circling the legs but also good, well coordinated, foot work. Besides that, the player is in a lower position, very similar to the position of a player during dribbling. Thus, it is possible to explain the influence of this variable on the dependent variable *Dribbling*.

The regression analysis, in which the dependent variable was *Passing*, had three phases, i.e. all three independent variables were extracted. Bearing in mind that in all three independent variables there is a need for good ball control, which means both holding and manipulating it, it was expected that they would influence an activity such as passing. Still, the final coefficient of determination here had the lowest value, which was expected, considering the fact that the activity of passing implies horizontal launching of the ball, i.e. ball flight. This means that a player spends a considerably longer time without the ball, i.e. the intervals of time before new contact with the ball are considerably longer when compared to ball handling drills.

This shows that players who achieved better results in stationary ball handling drills also achieved better results in basketball skill tests. It can, therefore, be assumed that there is a positive transfer from independent to dependent variables.

It is indicative that arm manipulation was essential for the motor performances of both independent and dependent variables focused on in this study. It is known that it is based on good kinetic sense and that the quality of improving kinetic sense depends, most of all, on proprioceptors. They are sensitive to changes in both external and internal forces, regarding

the fact that they send the information on locomotor dynamics to conscious and subconscious parts of the central nervous system. CNS is therefore enriched with kinetic information on the position and movement of the body and parts of the locomotor system in three-dimensional space. This is how, based on the higher number of qualitative proprioceptor information during the preparation of the movement which follows, a higher quality of motor performance is achieved.

Therefore, by putting one's body or its segment in a number of training situations, which will provoke a variety of proprioceptor activations, and at the same time an efficient kinesthetic sense which results from a qualitative transfer of this proprioceptive information (Sage, 1985), it could be assumed that a basketball player would react with precision and in an optimal way in a situation when it is necessary to perform the assigned motor activities. It would be realistic to expect that a positive transfer to dependent variables would occur, after practicing motor acts (independent variables) which require a high level of proprioceptor activation and, as a consequence, a qualitative kinesthetic sense.

These results are in accordance with current research, which dealt with coordination in young basketball players, and in which the connection of motor coordination skills with technical skills, including the connection with the overall performances of players was emphasized (Zwierko et al., 2005; Kubaszczyk, 2001; Mikolajec, & Rygula, 1999).

Since poor performance of many sport-specific skills (as well as basketball skills) in young athletes is the consequence of poorly developed movement skills (Bogdanis, Ziagosa, Anastasiadis, & Maridaki, 2007), exercises of coordination, especially during the phase of initiation when fundamental movements should be developed, are especially recommended (Bompa, 2005). The same is recommended for young basketball players' training (group of authors, 2008; Prudden, 2006). Relatively complex exercises which contain more than a single task and which engage several muscle groups should be used, i.e. the exercises which influence the development of inter-muscular coordination. Special attention should also be paid to the development of the kinesthetic sense for manipulative movements with the ball during the ages from 7 to 12.

CONCLUSION

Determining the impact of stationary ball-handling drills on fundamental offensive basketball skills in young basketball players was evaluated in a relatively small number of studies. On the other hand, these exercises are frequently used in young players' training and are recommended by a number of experts (group of authors, 2008; Prudden, 2006).

The results of this study indicate a moderate but significant influence of stationary ball-handling variables on the shooting, dribbling and passing skills. This shows that it is well justified to use stationary ball-handling drills in basketball training practice. In all three regression analysis, the *Body circle drill* was extracted in the first step. This implies that relatively more complex exercises which consist of several tasks and engage several muscle groups should be used in practice.

This study has certain limitations. Firstly, there is a relatively small number of independent variables. It would be useful in future studies to increase the number of independent variables with various motor tasks. Secondly, the range of dependent variables should be extended to complete the performance of basketball players, i.e. their success in the game. Thirdly, the sample of players should be extended to include other ages (players under the ages of 12, 16 and 18).

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UTICAJ STATIČNIH VEŽBI KONTROLE LOPTE NA OSNOVNE KOŠARKAŠKE NAPADAČKE VEŠTINE KOD KOŠARKAŠA UZRASTA OD 13 I 14 GODINA

Cilj ove studije je bio da se ispita efekat statičnih vežbi kontrole lopte, koje ne sadrže dribling, na osnovne napadačke veštine u košarci. Uzorak ispitanika su sačinjavali 121 mladi košarkaš uzrasta od 13 i 14 godina (M=13.59±0.54) koji su u sistemu organizovanog košarkaškog treninga najmanje dve godine (M=3.30±0.74). Primenjene su tri statične vežbe kontrole lopte, koje ne sadrže dribling: Okretanje lopte oko jedne i obe noge (Dlsl30),Okretanje lopte oko celog tela (Hwlb30) i "Treperenje" (Blur30). Za procenu napadačkih košarkaških veština primenjena su tri testa, preporučena od AAPRHED (1984): test brzog šutiranja (Shooting), test dodavanja (Pass) i test kontrole driblinga (Dribble). Uticaj nezavisnioh varijabli na zavisne je testiran primenom regresione analize – Stepwise metod. Rezultati su pokazali da statične vežbe kontrole lopte, koje ne sadrže dribling, značajno utiču na osnovne košarkaške veštine u košarci. Vežba Okretanje lopte oko celog tela ima značajan uticaj na sve tri napadačke veštine, vežba "Treperenje" ima uticaj na šutiranje i dodavanje, a vežba Okretanje lopte oko jedne i obe noge na dodavanje i dribling. Ovi rezultati pokazuju da statične vežbe kontrole lopte, koje ne sadrže dribling treba korisitit u procesu učenja osnovnih napadačkih veština u košarci.

Ključne reči: *vežbe bez driblniga, šutiranje, dribling, dodavanje*