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IMPACT OF BILATERAL TRANSFER ON SHOOTING WITH THE DOMINANT HAND IN BASKETBALL

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SUMMARY

This work deals with verification of hypothesis based on the principle of hemispheric bilateral transfer by which it is possible to influence the activity of dominant upper extremity positively with right-handed people through aimed training of non-dominant upper extremity. On the basis of this hypothesis I suppose that shooting effectivity will increase and individual shooting abilities of upper right extremity will improve with right-handed players in basketball. By using specialized training aimed only at non-dominant left hand with the category of older girls between 14 and 15 years. Having used hand Tapping and Edinburgh questionnaire to determine laterality, the level of right/left-handedness was settled with every participant and a suitable group of 15 players was chosen from the results as an experimental group. There were only dominant right-handed players in every group. After performing complex of shooting tests from a spot in different positions, one group underwent 10 weeks training of non-dominant hand. After finishing it they performed the same battery of tests and the results were evaluated by non-parametric Wilcox pair test, t-test for pair values and by testing of two chosen percentage values the result were settled. By using the mentioned tests our hypothesis about transfer of handedness was not confirmed for transfer from non-dominant left hand to the dominant right one of the chosen age group. On the contrary it showed that training of non-dominant upper extremity had positive influence on improving shooting ability of left hand, which shows high effect of the process on non-dominant hand. When we look at statistic significance in comparison with the non-specialized group without special training our hypothesis was not confirmed even for non-dominant hand.

Key words: laterality, measurement of handedness, human brain, asymmetry of brain hemispheres, interhemispheric transfer of the information, motor learning

INTRODUCTION

A man belongs to a great group of creatures whose body is symmetrical to one axis at the first sight. When we study human body and its functions in detail we find out that it's not a perfect copy to the axis of symmetry. According to Synek (1991) asymmetry of the body is evident in shape as well as in function.

It's possible to see clear difference in motion skills, mainly in dexterity of upper and lower extremities, which is probably influenced by cerebral hemispheres and their composition asymmetry. This motor superiority is called laterality. In connection with it we often speak of dextral (right-handedness) and sinistral (left-handedness), where superiority is most visible. It's necessary to realize that the basis of laterality, mainly functional, doesn't lie in any deviation of pair organs, but it correlates with functions of adequate brain spheres (Drnková, Syllabová, 1991).

When studying regulation of upper extremities motion it's necessary to aim at mainly the following spheres: brain hemispheres, cerebral cortex and cerebellum. Brain hemispheres are divided by a deep cut from each other -issura longitudinalis cerebri. At the bottom of this cut there is a massive bunch of fibers – corpus callosum. It is a white mass containing paths called commissural, that connect the same spots in both hemispheres. The main task of these paths is to transfer information from one hemisphere to another. Such double information runs in both hemispheres and ensures stability of brain. Impulses from its own body and man's surrounding are changed after contact with a nerve cell in the sense centre or outside it, into agitation running through nerve fiber to mostly spinal chord, enter it and run towards brain. While doing so nearly all paths at a certain point cross front-back axis so that all impulses started on the left side come to the right half of the brain and vice versa impulses from the right half come the left one. The same crossing happens when the brain answers (Synek, 1991).

According to research of an English scientist Sperry (1973), activation during motor tasks may be done from dominant as well as non-dominant hemisphere.

Concerning mutual relation of hemispheres there is no superiority or inferiority, but mutual cooperation. Only coordinated, undisturbed activity of both hemispheres enables optimal analysis of a signal from periphery, working out adequate motor programmes and ensuring specific human psychic functions. There is no real dominance between hemispheres as there haven't been found out any morphologic or activity differences between both halves of the brain, the existing differences of the right resp. left half may be explained also by its more frequent usage caused by right-handed civilization (Drnková, Syllabová, 1991).

Cerebral cortex is the highest level of brain into which information goes and is processed. Impulses going from cortex lead to activity and at the same time cortex is the part of complex circles of agitation which together with other subcortex structures influence and control the acting.

According to Čihák (1997) primary, secondary, supplementary and tertiary cortex spheres are being distinguished. Concerning control of upper extremities motion – primary cerebral cortex is important (Marieb, 2005), Čihák calls it primary motor cortex sphere, which leads to contractions of muscles on the other side of the body to the agitated spot. Irritation calls for simple movements such as flexion, extension of one or more joints. The

second important sphere is by Marieb (2005) premotor cortex, Čihák (1997) calls it premotor cotex sphere, which is activated during preparation of a complicated free movement and execution of movements needing eye control. On irritation of subellementary cortex sphere, its back part, movements of extremities muscles are initiated by Čihák (1997). They are complicated movements and tonic contractions of muscles. As the sphere increases its metabolic activity before performing the movement, it's considered as the place where movement is initiated and prepared, the performance itself is then passed on to secondary and primary motor spheres.

"Cerebellum first accepts information on the planned movements from cerebral motor cortex, then it compares it to body movements going on then and lastly it sends instructions to cerebral cortex. It must then accommodate movements in process so that the planned movements may be realized. By using this feedback from cerebellum, cerebral cortex may correct motor orders again and send them to spinal cord. Good, well coordinated movements are the result of it" (Marieb, 2005, p. 381).

According to Abernethy (1997) function of this part of brain is regulation of muscle tone, coordination of the main movements, timing and learning.

"As transfer we understand the influence of abilities, skills and knowledge gained by one activity to the level of the second one, or as the effect, which has influence in one motion activity task on the result in the second one" (Čelikovský, 1977, p. 73). Bilateral transfer concerns by Čelikovský (1977) the activity of symmetrical body organs (i.e. transfer from left to right hand).The effect of transfer needn't show in only one measurement, but also backwards. Concrete analysis by Čelikovský (1977) shows, that transfer is considerably influenced by character and kind of the given motion task, as well as starting level of abilities. When we look at the influence of time interval – it has been confirmed by this author that longer time interval gives less positive transfer.

Indian scientists Kumar and Mandal (2005) dealt with bilateral transfer of skillfulness with left-handed and right-handed people. They were dealing with speed of performance and correctness of performing that skill. They found out that bilateral transfer was bigger from non-dominant side to the dominant one, but it was bigger with regards to speed and not correctness.

Marzi, Bisiacchi and Nicoletti showed in 1991 during their studies to faster hemispheric transfer from right to left with the right-handed, which would mean faster transfer from upper left extremity to the right one. Already Taylor and Heilman in 1980 proved bigger left-right transfer of a hand during motor skills as opaque direction with the right-handed. This phenomenon was confirmed also by Marks (1996), Thutom et al. (1997).

In the next scientific studies the authors Hartmann, Stockelt and Weigelt (2006) were dealing with the question of effect of bilateral training of sport skills, in particular the study on children from specialized basketball school. This experiment was dealing with gradual training for both hands, which is different from our applied research. From the above mentioned researches it indirectly comes out that aimed influence on non-dominant hand should have positive impact on the dominant one, but disregarding laterality of the player. We are trying to follow if it's possible to influence precision of performance in the given activity by activating only the right cerebral hemisphere with the right-handed players. That's why specialized training of the other side is not included.

During running process of motor learning the player has acquired necessary motion experience and has formed his own idea of movement and is able to control and regulate his motions during performance there comes the question then if the training of non-dominant extremity helps him to improve not only coordination and regulation of the performed movement, but if it helps him to achieve better shooting successfulness of the dominant extremity, which is a determining factor for basketball. Hypothesis is based on the principle of hemispheric bilateral transfer, by which it is possible to influence positively the activity of dominant upper extremity with right-handed players through aimed training of non-dominant upper extremity. The aim of this study is to show that participants of age category 14–15 years are able to improve accuracy of shooting of dominant right hand after training aimed at the left hand.

METHODS

Participants

The chosen group was formed by two parts – experimental group (E) – consisting of 15 older juniors from two Prague teams. The players of the given category were 14–15years old. Comparative group (K) was also a Prague team of 15 participants of the same age as experimental group. The teams participate in the highest Prague competition of the given category and also got on to junior league of the whole Czech Republic. The average length of training years was 5.29 with experimental group and 5.33 with the comparative one. They all practice 4 times a week regularly and they have matches in their competition nearly every weekend. With regards to the years of training, they have gone through motor learning of shooting from a spot mostly in two phases minimum, but it hasn't been finished or automatic. That's the source of fluctuations and instability of technique.

Experimental group underwent specialized training of non-dominant hand twice or three times a week lasting about 20 minutes in average. Participants of experimental group E went through 10.17 sessions from 15 possible. Comparative team K – we were in touch with coaches because of sessions contents during experiment and they were mostly aimed at activities of an individual, shooting technique at normal level, mainly by dominant hand.

Procedure

Participants took an objective exam of manual proficiency at the beginning, suitable for examination of accuracy of gentle hand movement coordination called Tapping. The task is to do as many dots as possible in 30 seconds on appropriate half of a paper, one hand is being tested after the other. From the results of Tapping hand test we may count laterality and its grades with the help of indexes. When evaluating it we count all dots by each hand and to process acquired data we use the formula to count index of laterality by Kohlíková (2002):

$$IH = \left(\frac{\text{right hand}}{\text{right hand} + \text{left hand}} \right) \times 100$$

where right hand means number of dots made by right hand, left hand means number of dots made by left hand, IH index of handedness, for which is valid $0 < IH < 100$, $IH < 50$ describes left-handedness, $IH = 50$ means mixed handedness, $IH > 50$ describes right-handedness.

By the achieved value it may be found out what type of laterality is the tested individual. For evident right-handedness the values will move within bigger range, with index smaller than 50 the range of values will be smaller. This phenomenon is caused by the influence of right-handed civilization and pushing individuals to partly accommodate. If index moves round 50, the individual will be less settled. In the table 2 there is evaluated every player according to reached index. Right handed is marked as R, left handed is marked as L and mixed handed as A.

The next test that the players went through is called Edinburgh questionnaire. There are 10 questions by Oldfield (1970). The task of the tested one is to choose and mark preference of a hand during activities like writing, drawing, painting, throwing, using knife and fork, a toothbrush, knife (without a fork), holding spoon, using a rod (upper hand), friction of matches and opening a box (upper lid). Respondent chooses from options:

a) I always use right hand;
b) I rather use right hand;
c) Both hands are suitable at equal measure;
d) I rather use left hand;
e) I always use left hand.

After getting results from Edinburg questionnaire the quotient of laterality is set by Oldfield. When evaluating the answer is c) ignored and vice versa, the answers are given a) and e) double significance. Formula for setting quotient of laterality (QL) by Oldfield (1970):

$$QL = \frac{\sum_{n=1}^{10} X(i,R) - \sum_{n=1}^{10} X(i,L)}{\sum_{n=1}^{10} X(i,R) + \sum_{n=1}^{10} X(i,L)} \times 100$$

where n is added to all questions in the questionnaire. X(i, R) means number of answers a), b), when a) is counted twice. X(i, L) means number of answers d), e), when e) is counted twice. For the result is valid $-100 \leq QL \leq +100$. The bigger value of quotient with the player either to negative or positive way, the stronger dominance is. Negative values show left-handedness; on the contrary positive values show right-handedness. The values moving round zero show to unsettled individual (mixed handedness).Participants are divided into 21 groups according to exactly by border limits. For evaluation of the laterality quotient the following scales are valid by Oldfield (1970):

When forming overall assumption of laterality the results of both previous measurements were compared, which helped to estimate more precisely the tendency to set preference of individual participants. According to this measurement we were able to choose suitable players for the quasi-experiment. Our hypothesis is based on the principle of hemispheric bilateral transfer. Thanks to it, it's possible to influence positively the activity of dominant right upper extremity with right-handed people, which happens through aimed training at non-dominant upper extremity.

Table 1. Setting grade of laterality by Edinburgh questionnaire given by Oldfield (1970)

Right-handed			Left-handed		
Level	QL	Judgment of laterality	Level	QL	Judgment of laterality
1	48 ≤ QL < 60	R1	1	–42 ≤ QL < –28	L1
2	60 ≤ QL < 68	R2	2	–54 ≤ QL < –42	L2
3	68 ≤ QL < 74	R3	3	–66 ≤ QL < –54	L3
4	74 ≤ QL < 80	R4	4	–76 ≤ QL < –54	L4
5	80 ≤ QL < 84	R5	5	–83 ≤ QL < –76	L5
6	84 ≤ QL < 88	R6	6	–87 ≤ QL < –83	L6
7	88 ≤ QL < 92	R7	7	–90 ≤ QL < –87	L7
8	92 ≤ QL < 95	R8	8	–92 ≤ QL < –90	L8
9	95 ≤ QL < 100	R9	9	–100 < QL < –92	L9
10	QL = 100	R10	10	QL = –100	L10
Mixed handedness					
Level			QL		
A			–28 ≤ QL < 48		

On the basis of this hypothesis we suppose, that shooting effectivity will increase and individual shooting performance from the spot will improve in the right upper extremity with right-handed players between 14 and 15 years of age. So that we only included dominant right-handed participants in our experiment. Shooting test was realized as a closed skill with relatively unchanged conditions, only distance was changed and a shooting angle, but no outside element takes part in the test, which would disturb the

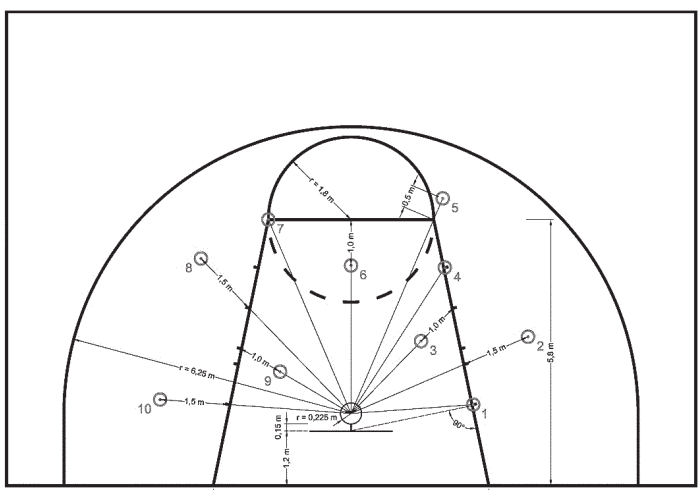

Figure 1. Marking shooting positions in shooting test

workout of shooting. It is a complex of test batteries. Within the territory of two-point experiment there were at first asymmetrically chosen and numbered spots with different distance from the basket, positions were measured by a measuring tape and given as the connecting line of two points. The beginning was in vertical projection of the middle of a circle formed by basket rim to floor level and further was given by an intersection of a line bordering penalty area and line for rebounding in penalty throws.

10 different positions were marked this way by measuring tape nearer or further from the basket on the left or right side of two-point attempt territory. Three players always took part in the test, cameraman and scorekeeper and two basketball balls were at disposal. Player n. 1 was tested, player n. 2 rebounded the ball after each attempt and passed the ball to player n. 3 standing by player n. 1 at non-shooting side. The task of player n. 3 was to pass the ball exactly to the shooting player to waist height to the nearer hand. The tested player had two attempts from every spot and could then move to the next spot. 20 attempts went on like that by right hand first, then by left hand the same try. When the first player finished shooting, positions changed. After all three players passed the test, another three came. Not to disturb concentration of the shooting player, other players were training on the other half of the court.

They always had to shoot directly to basket, without using the board. If the ball touched the board the try was evaluated by the worst mark. The try was always recorded by the same person and written in a table. Evaluation was as follows:

1 – the ball didn't even touch the rim, only board, construction or even wasn't thrown as far as the basket;
2 – the ball touched the rim from outer side, without any chance to fall in, it bounced outside the goal;
3 – the ball touched the rim from above, or outside and then fell out of rim. It wasn't clear, if the try would be successful or not;
4 – the ball touched the rim from above or outside and then fell in. But t wasn't clear if it would fall in or not;
5 – the ball touched the rim from inner side so that successful score was evident;
6 – the ball went through the centre of the circle without touching the rim.

All given information and testing rules were explained in advance and shown to the players. After passing the shooting test and evaluation by marks, data were put down in the table. It was necessary to form average mark for shooting with right hand from the table and the same for shooting with left hand. 10-week period of training aimed at left hand was thus finished by shooting test again with the same conditions as at the beginning. The gained results from the shooting tests, introductory and final were transformed to table to compare the tendency of improvement. To process the results parametric t – test for dependant values was used. Non-parametric test was chosen as the next test – Wilcox pair test. The groups E and K are regarded as special, testing is done separately with each group.

To compare both groups parametric t – test for independent choices was used, so was the counting advance when evaluating in percent. It was testing of two chosen percent values. The result of this test is if evaluation or difference between percent improvement of both groups is accidental or not. We again use test of zero hypothesis when evaluating this test. Table value t with probability 99% is $t = 2.58$ and with 95% it is $t = 1.96$.

RESULTS

19 players took part in introductory playing of group E and 16 players of the group K. From group E four players didn't fulfill the condition of right hand dominance. Final testing ran with lowered participation, though, the reason being long-lasting injuries and illness. We managed complete testing with 15 players of the group E and 15 players of the group K.

Table 2. Total judgment of laterality from the test Tapping hand and Edinburgh questionnaire

Proband	Tapping	Questionaire	Tapping judgment	Questionaire judgment	Total judgment
E1	56.43	100	R	P10	R
E2	54.89	100	R	P10	R
E3	57.39	100	R	P10	R
E4	56.51	100	R	P10	R
E5	56.92	100	R	P10	R
E6	55.25	100	R	P10	R
E7	54.01	100	R	P10	R
E8	54.92	100	R	P10	R
E9	53.92	100	R	P10	R
E10	53.90	100	R	P10	R
X1	48.69	–16,67	L	A	A
E11	52.87	71	R	P3	R
E12	51.05	100	R	P10	R
E13	54.40	100	R	P10	R
E14	53.18	88	R	P6	R
E15	54.21	100	R	P10	R
X2	46.22	–100	L	L10	L
X3	43.31	–86,67	L	L6	L
X4	50.69	23	L	A	A
K1	52.03	100	R	P10	R
K2	54.17	100	R	P10	R
K3	55.49	100	R	P10	R
K4	53.47	100	R	P10	R
K5	51.10	100	R	P10	R
K6	60.00	100	R	P10	R
K7	54.66	85,61	R	P6	R
K8	53.24	67	R	P2	R
K9	53.85	100	R	P10	R
K10	50.90	100	R	P10	R
K11	56.51	100	R	P10	R
K12	54.27	100	R	P10	R
K13	56.09	100	R	P10	R
K14	53.33	100	R	P10	R
K15	52.70	100	R	P10	R

It comes out of evaluated data that two tested players were found to be mixed-handed – ambidexterity (A), in the table they are marked as X1 and X4, two tested players were found to be left-handed (L), and they are marked as X2 and X3 in the table. On the basis of hypothesis these players had to be excluded from the result evaluation of the whole quasi-experiment. With other players the result was relatively clear, the values show evident right-handedness, in the table we marked them as E1 to E15 and K1 to K15.

Evaluated attempts from the shooting test were put down to the table and average mark of each participant was counted individually. We at first evaluated the results for the right hand. The group E improved after the specialized training program by 0.27 point in average mark in comparison with group K. By using the method where every group is regarded individually, we used t – test for pair values of the depending samples. For the group E it is clear in comparison with final value of the tested criterion t = 0.723 with table value t = 2.144 on the surface of significance $\alpha = 0.05$, that zero hypothesis can't be refused again, by which we can't judge statistically significant difference between results of November and January measurement. Testing criterion t = 0.776 with the group K in comparison with table value t = 2.144 on the level of significance $\alpha = 0.05$ brought the same result as with group E. Achieved improvement with both groups in the first and second testing isn't statistically significant.

By using non-parametric Wilcox pair test we regarded the groups individually. For the group E we find out that comparing testing criterion T = 46 with the table value $T_{005} = 25$ (for 15 non-zero differences), that in level of significance $\alpha = 0.05$ we can't reject zero hypothesis, it's impossible to say that there will be some improvement in time. When we look at the group K we compare testing criterion T = 42 with table value $T_{005} = 21$ (for 14 non-zero differences), we find out the same result as with group E.

Graphs of average success of right-hand shooting with individual groups in both measurements show, that there has been some improvement but it is minimal. In

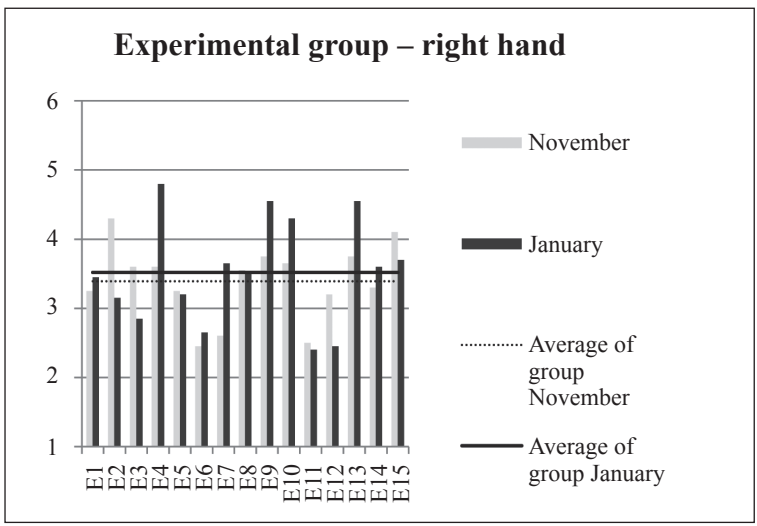

Figure 2. Average success of right-hand shooting with experimental group

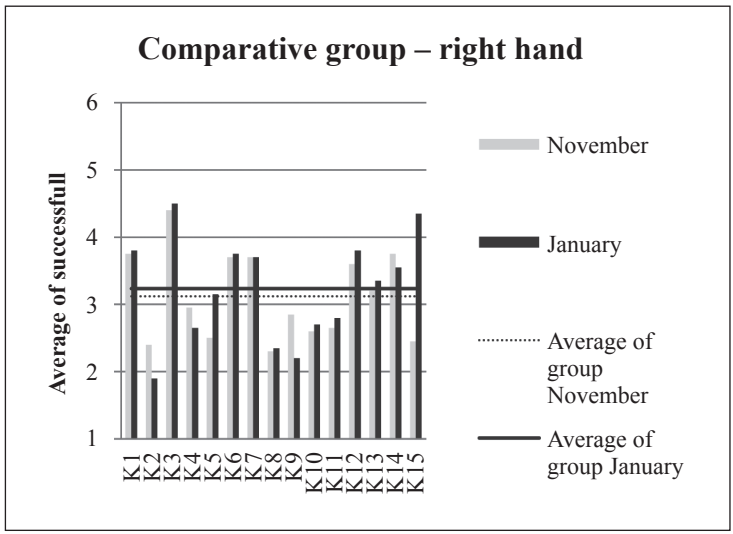

Figure 3. Average success of right-hand shooting with comparative group

percentage there has been 3.84% advance with experimental group, whereas with comparative group it was 3.74% advance.

To compare both groups by method of advance counting evaluated by percent values it is testing of two chosen percent values. p_s is appointed at the beginning. We put $m_1 = 8$ and $m_2 = 10$ into numerator. The numbers mean the number of participants that have improved after total summing of both tests. We get $p_s = 60$. By using formula for counting testing criterion t, when we take for p_1 3.84 and for p_2 3.74, we get t = 0.05. Compared to table value with probability 95% is t = 1.96. Our result value is lower – of which it comes out that zero hypothesis can't be rejected. On the basis of our research we can't judge to statistically significant difference between groups E and K in right hand shooting. The result in practice means, that the demanded effect of improvement of dominant right hand through training of left hand wasn't proved.

When we look at the results of left hand we again used all methods as in previous case. It comes out of the results that the group E improved after passing the training program by 7.133 points in average mark in comparison with group K. When evaluating statistical significance of the difference between results of November and January measurement with group E t – test was again applied for pair values of the depending choices. According to this test by comparing testing criterion t = 2.862 with table value t = 2.144 at the level of significance $\alpha = 0.05$ it is possible to assume statistically significant difference between measurement in November and January. The same test applied for the group K didn't reject zero hypothesis being on the level of significance $\alpha = 0.05$.

By using non-parametric Wilcox pair sequence test for the group E comparing testing criterion T = 17 with table value $T_{005} = 25$, we find out in level of significance $\alpha = 0.05$ we can reject zero hypothesis and it's possible to say with 95% probability, that effect of training taken by the group E to improve in left hand shooting is positive. When we look

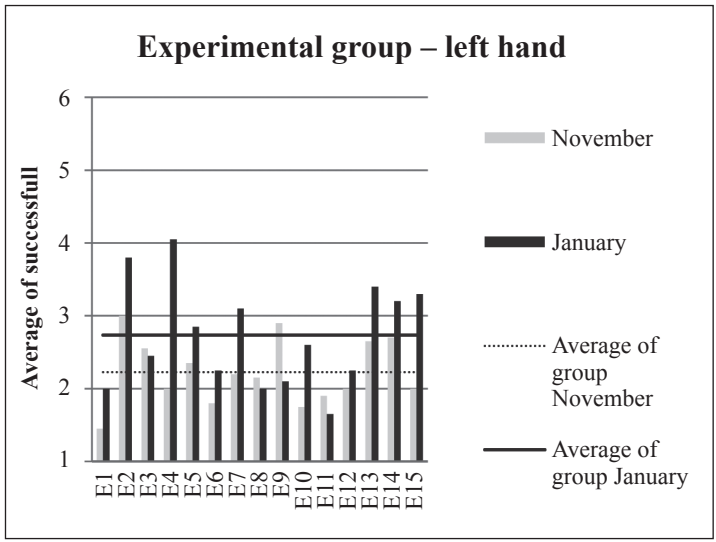

Figure 4. Average successfulness in left hand shooting with experimental group

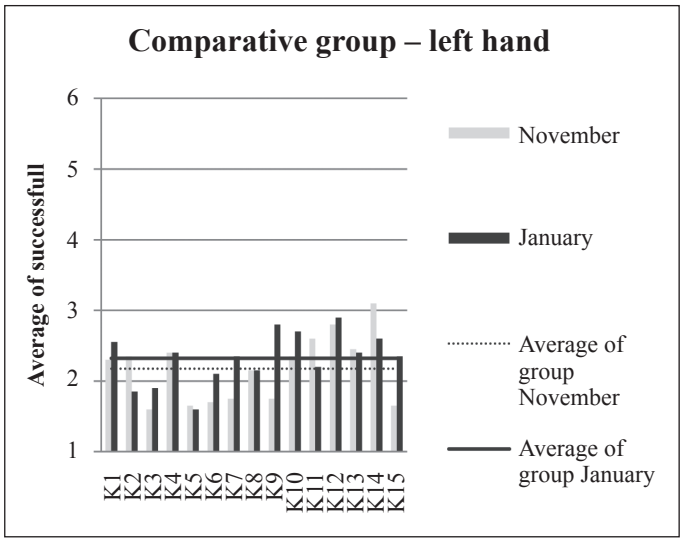

Figure 5. Average successfulness of left hand shooting with comparative group

at group K we compare by testing criterion T = 29.5 with table value T_{005} = 17 zero hypothesis wasn't rejected at the level of significance $\alpha = 0.05$.

Evaluation by two chosen percent values reaches values for $p_s = 63.33$, where $m_1 = 11$ and $m_2 = 8$. Using the formula for counting testing criterion t, where $p_1 = 22.75$ and $p_2 = 6.9$, we get t = 0.9. Compared to table values with probability 95% is t = 1.96. Our result value is again lower, from which it follows that we can't refuse zero hypothesis. On

the basis of our research we can't judge statistically significant difference between groups E and K even with left hand shooting.

From evaluation of average successfulness of left hand shooting in both groups evident improvement may be seen with experimental group. Average successfulness increased in all players except for two participants and with quite significant difference.

From percentage point of view it is 22.75% improvement in experimental group and 6.9% improvement with comparative group. The used tests show though, that we can't assume statistically significant difference on the basis of our research between groups E and K, even if at the first sight significance is evident.

The offered training passed by experimental group, has quite a high effectivity for left hand shooting, as the results of pair t – test showed with group E, but it hasn't got statistical significance in comparison with the group that didn't take any specialized training.

DISCUSSION

From the results of this quasi experiment it is evident, that there was slight improvement with all teams in dominant right hand shooting, which is caused to certain extent by regular training and permanent process of motor learning. From percentage point of view and the following evaluation by different tests the hypothesis of transfer of handedness with motor information wasn't confirmed in the tested group E.

But what is well seen in successfulness of left hand shooting is a considerable advance of participants after specialized training. The aimed training at often omitted non-dominant hand, of course, caused improvement concerning technique and also successfulness in shooting. The hand was then better skilled in coordination of movements and at the same time its strength increased by using it. There was positive reaction of the coach who noticed during matches in critical moments when under stress, that the player managed to score with non-dominant hand from non-dominant side without any pushed warning, which is definitely positive on the whole trying and a prove of gradual learning of given motion and its gradual automation. The fact, that our hypothesis wasn't confirmed, might be caused by unfinished motor learning, from which fluctuations may come and instability of technical performance and eventually relatively great range of values of point sums with both teams.

The number of participants recruited for testing wasn't sufficient from statistical point of view. In current situation in sport, not only basketball, we often meet with early specialization, the laws of child organism development are overlooked. The clubs are trying to achieve good results and only things with fast effect are being trained. At present it is not possible to get larger number of groups participating in the tests. Coaches aren't willing to disrupt their training cycle.

CONCLUSION

This work deals with new possibilities of shooting successfulness improvement in basketball as well as transfer of information from right cerebral hemisphere to the left one.

We were interested if it was possible to improve successfulness of shooting by left hand specialized training of technique by transfer to the extremity on the other side.

The following conclusions come out of the taken quasi-experiment:

This quasi-experiment didn't clearly confirm our hypothesis. Improvement is visible with all teams for both hands. This phenomenon is natural and logical thanks to permanent development of players, their rather frequent participation of training sessions, matches and tournaments. The started trend should, of course, continue, until motor learning itself is finished and phase of variable creativity is achieved, missing the phase of placebo when substantial stagnation of performance happens.

But it comes out of this quasi-experiment, that possibilities of improvement in scoring by non-dominant hand are evident. With this phenomenon it is necessary to say, that even if this extremity isn't much used during matches, its sudden unexpected usage may lead not only to surprised opponent, but also to increased variety of scoring, which would mainly be appreciated by under-basket players and situations, when the player is near the basket with a ball. The training of non-dominant hand itself is also a significant factor when compensating disbalances being formed in this team sport game.

The results of this study are used in the learning process at the Faculty of Physical Education and Sport.

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EFEKT BILATERÁLNÍHO TRANSFERU NA STŘELBU DOMINANTNÍ RUKOU V BASKETBALE

LENKA HORŇÁKOVÁ

SOUHRN

Práce se zabývá ověřením hypotézy založené na principu hemisferického bilaterálního transferu, podle kterého lze příznivě ovlivnit u pravorukých osob činnost dominantní horní končetiny, a to tréninkem zaměřeným na nedominantní horní končetinu. Na základě této hypotézy předpokládám, že nastane zvýšení střelecké efektivity a střelby z místa pravou horní končetinou u pravorukých hráček v basketbalu, použitím specializovaného tréninku zaměřeného pouze na levou ruku u kategorie starší žákyně ve věku 14 a 15 let. Použitím testu Tapping rukou a Edinburghského dotazníku pro určení laterality se stanovila míra rukovosti každé zúčastněné probandky a na základě toho byla vybrána vhodná skupina 15 probandek jako experimentální a 15 probandek jako komparativní. V každé skupině se nacházely pouze dominantně pravoruké probandky. Po provedení souboru testových baterií střelby z místa z různých pozic, byla jedna skupina ošetřena desetitýdenním tréninkem na nedominantní ruku. Po závěrečném absolvování stejného souboru testových baterií a vyhodnocení výsledků pomocí neparametrického Wilcoxova párového pořadového testu, t-testu pro párové hodnoty a testováním dvou výběrových percentových hodnot byl stanoven výsledek. Použitím zmíněných testů nedošlo k potvrzení hypotézy o převodu dovednosti při přenosu motorické informace z nedominantní levé ruky na pravou ruku dominantní pro vybranou věkovou kategorii. Naopak se ukázalo, že ošetření tréninkem na nedominantní horní končetinu má pozitivní vliv na zlepšení střelby levou rukou, což ukazuje na efektivitu absolvovaného procesu na ruku nedominantní. Při pohledu na statistickou významnost se však hypotéza nepotvrdila ani pro nedominantní ruku.

Výsledky této studie jsou využívány v pedagogickém procesu na FTVS UK Praha.

Klíčová slova: lateralita, měření rukovosti, mozek, asymetrie mozkových hemisfér, mezihemisférický přenos informací, motorické učení

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