JUMPING SKILLS OF JUNIOR BASKETBALLERS FROM IRAQ AND EGYPT

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INTRODUCTION

Physical efficiency is shaped under the influence of genetic and environmental factors. The difference between factors lies in that genetics to a higher extent affects the type of capabilities characterizing the individual. These amount to the, so-called, natural predisposals of the individual defining his motoric capabilities in accomplishing a motoric task. Thus, motoric efficiency is defined as a "current level of capability of the human body, permiting of objectives in different sports disciplines" (LUTFI, 1972). Motoric capabilities affect the successuful development of motoric abilities, the shaping of which is based on motoric talent developed by way of training. In measuring physical efficiency characterizing the given sports discipline, it had been necessary to link it with a set of primary abilities necessary to up-take the given discipline. Motoric efficiency is a notion pointing to development of the basic motoric abilities such as running, throwing or jumping (NASER, 1984).

While training an athlete, motor abilities must go hand in hand with the mastery of sports technique. In basket-ball, for example, jumping is part of motor ability, while the ability to combine jumps with running and handling the ball (a throw, a pass) belong to sports technique. They are the elements of the initial work with a candidate and for such a period the test which allows to observe the progress in combining motor ability with sports technique has been worked out. The aim of this paper is to present such a test and the example of its application for the youth of Iraq and Egypt who begin their basket-ball training.

This work has been devoted to develop a method for controling the motoric together with sports technique capabilities of young basketball players in Iraq and Egypt and their mutual comparison. These features include the jumping with and without the ball in hands.

MATERIAL AND METHOD

Test group: - The model group has been selected from among Iraqi and Egyptian basketball players aged 15 to 18. A total number of 105 players were tested, i.e. 15 persons in each age group, without the 15 years old group from Iraq. The players had undergone training for a period from 1 to 3 years, depending on year of birth.

Test components: - In discussing the notion of jumping efficiency several types of tests for basketball could be distinguished, i.e.:

1. Vertical jump — Vj
2. Vertical jump with ball and hand — VjB
3. Vertical jump from forward step — VjS
4. Vertical jump from forward step and with ball in hand. — VjSB

Jumps have been performed in front of the basked board in order to keep natural conditions. Centimetre scale which had been fixed to the board allowed to measure the height up to which the head of a competitor wearing a white cap had been risen. Body height and mass and arm span was measured and Rohrer's index was calculated for each subject.

RESULTS

Somatic typology of the examined juniors has been made on the basis of the complied anthropometric materials. Rohrer's index has been calculated and evaluated according to KOWALEWSKA (1974). Basket-ball players from Iraq represent athletic somato-type while these from Egypt are very slim and represent leptosomatic type (Tab.1).

Better results in basket-ball efficiency of the youth of Egypt may be due to more effective training, better motor coordination or to their morphological predispositions (they represent leptosomatic type).

TABLE 2
Means and standart deviations of basketball jumping skills (in cm)

Age group (years)	State	Vertical jump $\bar{x}$	$\pm$ Sx	t	Vertical jump with the ball in hand $\bar{x}$	$\pm$ Sx	t	Step and jump $\bar{x}$	$\pm$ Sx	t	Step and jump with the ball in hand $\bar{x}$	$\pm$ Sx	t
15	Egypt	21.53	3.23	-	18.46	2.75	-	27.6	3.21	-	24.53	3.28	-
	Iraq												
16	Egypt	24.44	4.15	2.33	20.64	4.86	2.55	29.44	4.66	1.47	26.24	4.62	2.04
	Iraq	20.84	4.02		16.78	2.85		26.78	4.87		22.58	4.89	
17	Egypt	29.94	7.46	3.09	20.60	6.48	3.84	34.14	6.79	3.21	30.94	6.64	3.83
	Iraq	22.34	5.34		18.07	5.325		26.74	5.328		23.47	3.01	
18	Egypt	40.68	5.32	5.81	36.42	5.34	5.88	47.35	4.53	6.98	43.42	6.74	5.30
	Iraq	30.19	4.16		25.99	3.95		35.79	4.22		32.39	3.08	

Difference is statistically significant at 0,05 level if "t" > 2,14.

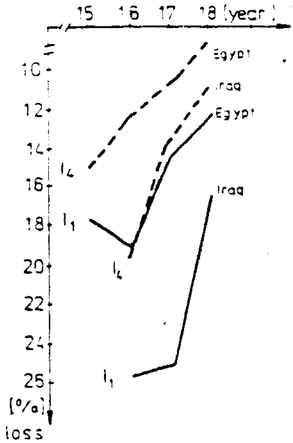

Figure 2: The negative influence of ball handling on jumping skill

$$I_1 = \frac{VjB - Vj}{VjB} \; 100 \; [\%]$$

$$I_4 = \frac{VjSB - VjS}{VjSB} \; 100 \; [\%]$$

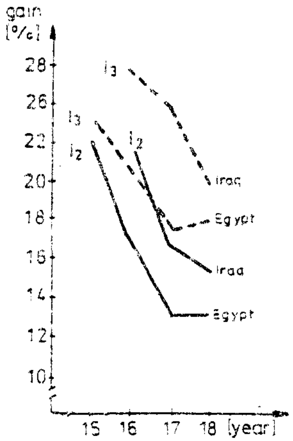

Figure 3: The positive influence of step forward in jumps with (I3) and without ball in hand (I2)

$$I_2 = \frac{VjS-Vj}{VjS} \quad 100\ [\%]$$

$$I_3 = \frac{VjSB-VjB}{VjSB} \quad 100\ [\%]$$

CONCLUSION

The test which has been applied allows easy and quick measurement of the jumping ability as the basic motor feature of a basket-ball player as well as the level of mastering the basic element of technique which is the skill to combine jumping ability with the handling of a ball. Only after mastering this activity one can teach effective passes of the ball or jump shots. The youth of Egypt show higher efficiency in jumping ability and technique than the youth of Iraq, though the progress of both features is similar for the two populations.

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STRUCTURAL VARIATIVITY AND RESULT OF MOTION

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Athlete's motion activities during exercises can be described according to wave theory (Popov G.I. 1987, 1989) and delineated in its terms, namely: wave front spreading velocity and kinetic energy flow.

This work aims at researches of optimality of wave processes in concrete realization according to criterion of javelin release velocity and what factors can maximize this indicator.

METHODS

Modelling of wave motion of multi-link system of athlete's body during javelin throw took place on the model of forced transverse oscillations of one-dimension beam system with distributed parameters (Yermolayev B.V., Popov G.I. 1989). The differential equation with singular coefficients is given below:

$$\left(1 + \mu_1 \frac{\delta}{\delta t}\right) \frac{\delta^2}{\delta x^2} \left[E\tau(x) \frac{\delta^2 V(x,t)}{\delta x^2}\right] + m(x) \left[\frac{\delta^2 V(x,t)}{\delta t^2} + \mu_0 \frac{\delta V(x,t)}{\delta t}\right] = q(x,t)$$

where:

$V(x,t)$ - equation of elastic line of beam system; $m(x)$,

$E\tau(x)$ - generalized functions, performing distributed properties and, probably, concentrated inclusions in mass and bending rigidity;

$$\mu_0 = \text{const},\ \mu_0\, m(x) \frac{\delta V(x,t)}{\delta t}$$ - intensiveness of exterior resistance forces;

$$\mu_1 = \text{const},\ \mu_1 \frac{\delta}{\delta x^2} \left[\frac{\delta^2}{\delta x^2} \left(E\tau(x) \frac{\delta^2 V(x,t)}{\delta x^2}\right)\right]$$ -intensiveness of interior friction forces;

$q(x,t)$ - disturbing exterior force (muscle momentum) including additional force (obtained in inverse problem) acting on pelvis joint and imitating coercion of another foot.

Values of parameters were chosen according to data from literature.

Boundary conditions in the edges of beam system:

$$\left.\frac{\delta^2 V(x,t)}{\delta x^2}\right|_{x=0} = 0, \quad \left.\frac{\delta^3 V(x,t)}{\delta x^2}\right|_{x=0} = 0$$ - free edge

$$\left.V(x,t)\right|_{x=l} = 0, \quad \left.\frac{\delta^2 V(x,t)}{\delta x^2}\right|_{x=l} = 0$$ - hinge edge

For non-established regimes of forced oscillations this solution is determined by means of expansion in series of proper forms of oscillations. Using spline-transformation of argument, this equation is transformed into differential equation with constant coefficients and singular right part. Solution of this equation can be obtained by means of operational method using functions according to Carson-Heaviside. Solution is finally performed through initial parameters and several influence functions, named generalized Krylov functions, belonging to class of splines.

As measure of energy balance of system intensivity of oscillation wave processes was taken kinetic energy flow transferred by transverse wave from link to link. The full energy of segment (l_i, l_{i+1}) is calculated according to formula shown below:

$$E = \frac{1}{-} \int_{li}^{li+1} m(x) \left(\frac{\delta V(x,t)}{\delta t}\right)^2 \delta x$$

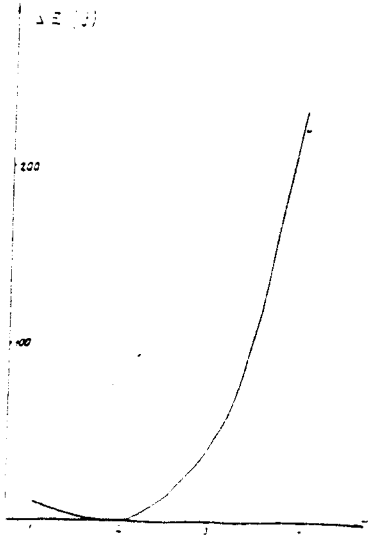
An example of energy flow variation for a concrete attempt of javelin throwing is shown in Figure 1.

Solution according to model was done in frames of direct and inverse problem of mechanics. Necessary kinematic data were obtained by means of biomechanic cinema: film camera "Actionmaster-500" and film analyzer "Nac Sportias". Precision of parameters: time t ± 0.01 sec, velocity - 3%.

RESULT and DISCUSSION.

To achieve given object the solution was done in frames of direct problem of mechanics. As a basic motion the real attempt with its distribution of muscle moment in joints and its energy flow along thrower's body was taken. Separate and simultaneous variation in time of muscle forces maximums on trunk (ΔT2) and shoulder (ΔT1). The distribution of javelin release velocities and places of local maximums under separate variation of moments of muscle forces relatively (with a shift ΔT) for shown links which corresponds to zero position in time axis is shown in Figure 2. Results of modelling of comprehensive variation in time ranges of moments of maximums in trunk and shoulder and determination of global maximum of javelin release velocity are shown in Figure 3. As we see, basic wave motion isn't optimal. If the quantity of rated values of javelin release velocities is determined in three-dimensional orthonormal basis (Fig. 4), it forms a surface with global maximum. Hence, regulation of motion structure of thrower's body multi-link system occurs through decrease of variativity of moments of muscle forces action, because perimeter of isochores decreases when approaching to global maximum. Hence, more perfect motion is characterized by more monotonous variation of velocity of wave front along athlete's body. The corresponding variation of energy flow value under variation of moments ΔT1 and ΔT2 has global maximum (Fig. 5) which coincides with global maximum of javelin release velocity. The isoenergetic line with zero flow variation corresponds to basic motion in Figure 5. The value of kinetic energy transferred to a javelin is -279 J.

Hence, using model developed by us it is possible to build a motion for a thrower, which allows under his physical conditions to achieve maximal realization of his motion possibilities. If conditions of javelin release correspond to Teraud's data (Terauds J. 1985), then an athlete can achieve his maximum sport result.



1 TRUNK CENTRE OF GRAVITY
2 SHOULDER CENTRE OF GRAVITY
3 FOREARM CENTRE OF GRAVITY
4 CENTRE OF GRAVITY OF HAND AND JAVELIN

Figure 1: The energy flow

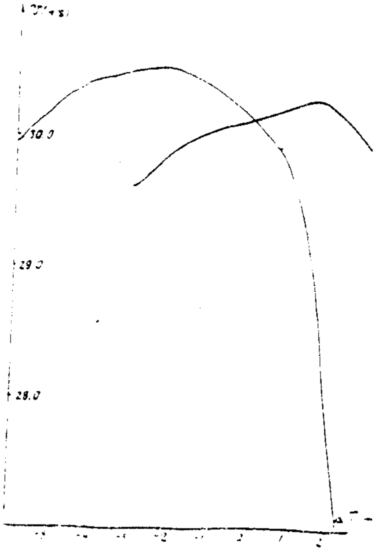


Figure 2: The velocity of javelin release by separate changing of maximum of muscle forces position in time.

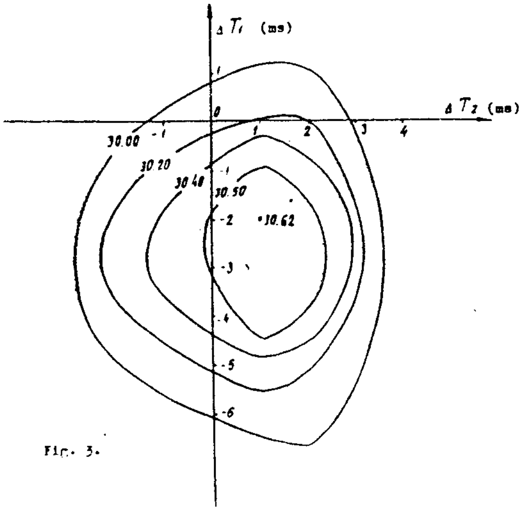


Fig. 3.

Figure 3: The velocity of javelin release by simultaneous changing of maximum of muscle forces position in time

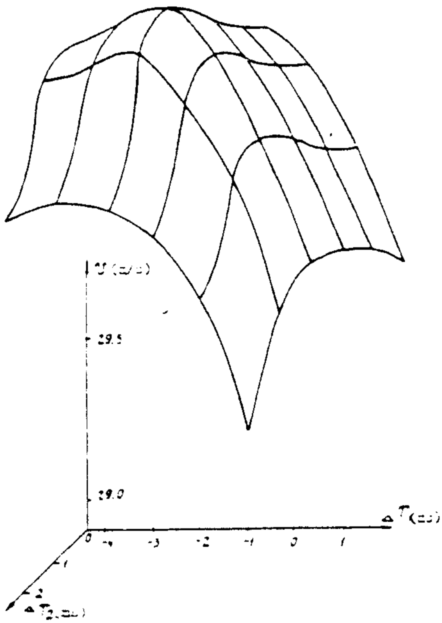


Figure 4: The velocity of javelin release by simultaneous changing of maximum of muscle forces position in time.

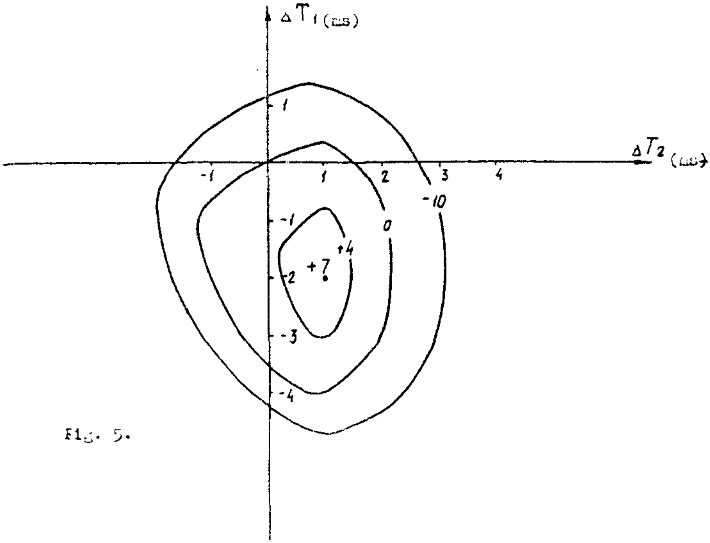


Figure 5: The energy flow value by simultaneous changing of maximum of muscle forces position in time.

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