NEEDS AND POSSIBILITIES OF MINIMIZING OF MECHANICAL EXERTING OF LOWER EXTREMITIES DURING LANDING IN RECREATIONAL SPORTS

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INTRODUCTION

Many people prefer sport games to individual activities such as running or swimming because of **emotionality** and higher possibility of socializing. However, positives joint together **with performing** them are sometimes accompanied by problems - frequent injuries and pains of motion apparatus. The reason of this phenomenum has mechanical origin - inadequate claims on motion apparatus. Jumping and landing occurs frequently at these activities. Vertical jumping is a fundamental aspect of performance in a variety of athletic activities. Impact forces in landing from jumps utilized in volleyball can exceed the elastic limits of the cartilage (Stacoff, 1986). Good jumping mechanics is important not only with respect to performance success but in preventing and minimizing both traumatic and overuse injuries (Ridgway, 1990).

The objectives of our research were:

1. To record and to evaluate the reaction force of ground (RFG) during landing after vertical jump.
2. To find out the influence of warming-up to dynamic parameters of landing.

METHODOLOGY

Investigated subjects (total number 27) were divided into two groups. The first one consisted of athletes who develop mainly the strength of extensors of lower extremities (volleyball players), the second one of athletes whose sport specialization is not focused on strength abilities (endurance athletes).

Registration of time parameters of RFG was done by dynamographic platform KISTLER. Landings after the vertical jump with arm swing (JWAS), without arm swing (JWOAS), and landings after the jump-down from 0.6 m height without previous warming-up (JDWOW) and with previous warming-up (JDWW) were recorded and elaborated by computer.

RESULTS AND DISCUSSION

We have selected the following results from our findings:

Table 1: Magnitude of overload expressed by multiplier of an acceleration of gravity (g):

Landing after the JWAS	4.88 g
Landing after the JWOAS	4.28 g
Landing after the JDWOW	3.97 g
Landing after the JDWW	3.66 g

Table 2 : Maximal Force During Landing

	JWAS Group		JWOAS Group		JDWOW Group		. LDWW Group	
	I.	11	I	n	I	n	I	11
M	3559	3528	3264	3264	2950	2897	2915	2530
SD	1431	1264	1106	1368	1208	872	868	917

M - arithmetic mean . SD - standard deviation
Group I. - volleyball players
Group II. - endurance athletes

These values represent the average magnitude of overload. However, there were subjects in the investigated groups with overload 9 times higher than acceleration of gravity. It is noticable, that higher magnitudes of maximal force during landing - it means higher overload - were measured during landing after previous jump, although height of the level of **jump-down** was higher than the height of the jumps. Explanation reside probably in better psychic concentration and better readiness of muscles for attenuation of landing after the **jump-down** than after the jump.

RFG and time of amortisation of kinetic energy during landing after the **JDWOW** and the JDWW was observed to judge the influence of short warming-up. The differences confirm better attenuation of landing with previous warming-up. The RFG is lower - it means lower overload is attained - during landing after previous warming-up.

CONCLUSIONS

1. Higher overload is attained when some activity (take-off) precedes landing. This is usual for most landings.
2. More complicated is activity, which precedes landing, higher overload is attained. This is also usual for most athletic activities, jump with arm swing and with additional movements is more frequent than simple jump without arm swing and other movements.
3. Warming-up contributes to ability of athlete to decrease the overload during landing.

REFERENCES

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