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Annotation: The article deals with the study of the change in the movements of the leg links when running on a turn, respectively, increased centrifugal force and shortened step. Analysis of angular indicators of running technique by static processing angular characteristics of running poses.

Keywords: space–time characteristics, analysis, running technique, static processing, angular indicators of running, higher running, increased running fit, bio-kinematic chain, shin lashing, turn, centrifugal force.

At the beginning of the experimental part of the work, when the stage of studying the space–time characteristics was carried out, it was assumed that a more or less clear picture of the features of the running technique on the turn would be obtained. However, as can be seen from the data analysis in the section, the answer is far from complete. On the contrary, there is a question of changes in the movements of the leg links when running on a turn, respectively, increased centrifugal force and shortened step. Therefore, it became necessary to analyze the angular parameters of the running technique. The data of this analysis are summarized in four tables 15-18. recall that the angular characteristics of running poses, which are traditionally used in athletics and are known to the vast majority of teachers and coaches, were subjected to static processing.

Comparing the angular indicators of running on a turn and running in a straight line, we can note the following. The technique of running on a turn has significant differences in three poses corresponding to the moment of the shin, the moment of setting the leg and the moment of vertical. It is seen that running on a turn requires less knee forward, more straightened in the knee joint of the leg when it is placed on the track and a higher running landing. This is characteristic of both running in the arena and running in the stadium.

Apparently, these changes are related to the need to adapt to dynamic overloads when running on a turn and curved running trajectories. In short, changes in leg movements can be expressed as "higher running" or "increased running fit". A smaller kickback is associated with a forced shortening of the step, which is necessary for running on a curved turn track. Such a whip allows you to put your foot closer "to yourself" in order to reduce the length of the steps. Setting a straighter leg allows you to achieve greater rigidity of the leg as a bio-kinematic chain, without which a high running fit is impossible. And these changes are necessary to withstand high overloads, recall that when running in the arena, they reach the greatest values, reaching up to 16 kGf in our studies.

Table 1.

Angular indicators of running technique in the arena, in degrees.

According to the running data, there are 16 sprinters.

Indicators	α post	α post	α post	α post	α post	α post
Running in a straight line	66,9±3,7	153,4±4,9	139,1±5,8	22,3±3,8	61,1±3,2	162,9±6,7
Running on a curve	67,2±4,3	158,6±5,1	145,2±6,1	21,9±3,2	62,2±4,7	163,4±5,9
Difference	-0,3	-5,2	-6,1	0,4	-1,1	-0,5

Designations: post – angle of the leg, post– angle in the knee joint of the supporting leg at the time of setting, post-angle. the angle in the knee joint of the supporting leg at the moment of vertical, n.torso. – the angle of the torso, otalk. – the angle of repulsion, K. S.vyl. – the angle in the knee joint of the supporting leg at the time of departure.

Note: angles are determined in traditional poses, respectively, Fig. 7; the difference of angular values, statically reliable, is emphasized.

Table 2.

Angular indicators of running technique in the arena. According to the data of 16 sprinters, the average height is 176.9±3.8 cm, body weight is 71.9±2.8 kg

Indicator	α overwhelmed	α razv.hips	α shoulder width	α under.hips	α exhaust
Running in a straight line	38,2±11,1 40,4±12,3	100,2±8,6 102,4±9,7	94,2±21,1 95,6±19,3	23,8±6,8 21,5±7,2	68,3±6,5 73,8±7,1
Running on a curve Difference	-2,2	-2,2	-1,4	2,3	-5,5

Designations: overflowing – the angle of overflowing of the lower leg, razv.hips – the angle of dilution of the hips, razv.shoulders – the angle of separation of the shoulders, under.hips – the angle of the hip lift, the kick – the angle of the shin kick.

Note: the angles correspond to Fig. 7; similar designations are contained in the following tables.

Table 3.

Angular indicators of running technique at the stadium. According to the running data of 14 sprinters, the average height is 178.3±4.2 cm, body weight is 74.3±3.2 kg

Indicator	α post	α post	α post	α n.tulov	α otalk	α K.S.vyl
Running in a straight line	66,2±2,6 67,5±2,5	152,8±5,8 157,6±4,9	139,5±4,3 146,2±5,2	22,4±4,7 23,8±3,9	60,8±2,1 60,6±2,9	161,9±6,7 162,5±7,1
Running on a curve Difference	-1,3	-4,8	-6,7	-1,4	0,2	-1,3

Note: here and in Table 18, the weight and height characteristics of the subjects, respectively, Table. 16.

Table 4.

Angular indicators of running technique in the stadium.

According to the running data of 14 sprinters

Indicator	α overwhelmed	α razv.hips	α razv.hips	α under.hips	α exhaust
Running in a straight line	42,3±7,7 40,3±10,4	105,6±7,1 106,1±5,7	95,7±22,3 96,4±21,9	18,1±5,2 17,8±6,3	67,7±4,5 72,3±6,7
Running on a curve Difference	2,0	-0,5	-0,7	0,3	-5,4

Without increasing the running fit, in which the leg is more straightened in the knee joint, and the angle difference in it reaches 6-70, it is apparently impossible to withstand such loads. The same can be done by comparing the running on the turn with a number of other locomotor acts. So, in long jumps with a running start, where the reaction force of the support is 2-2.5 times higher than in sprinting, the leg is placed on the bar much more straightened (38, 90). At the same time, it was proved that the increase in the range of jumps is associated with the stopping stop of the leg (116). Similarly to long jumps, the leg is placed more rigidly during high jumps (40) and triple jumps (24).

When jumping into the middle, as the height of the jump increases, the angle in the knee joints of the legs increases (27). Similarly, the leg is straightened more during various jumping exercises such as jumps and multi-jumps, which can be seen simply with the eyes.

In addition, the height of the running landing increases with the growth of the running speed and the reaction forces of the support (93, 115). When running in the decompensated fatigue phase, the leg is also placed more rigidly, since the leg muscles are no longer able to provide the usual articular angles (35).

And, finally, the running fit becomes higher when running with weights in the form of a vest (100) and a belt (81), similar to running according to the expression in our study. So, running on a turn is associated with the effect of centrifugal force on the sprinter. At the same time, as follows from sections 3.1 and 3.2, with an increase in centrifugal force, an increase in the angle of inclination of the runner's body is inevitable. In turn, at the same time, the component of the centrifugal force acting along the longitudinal axis of the sprinter's body grows, which presses him to the track. To withstand these overloads, the sprinter is forced to change the running technique – to increase the height of the running landing, increasing the stiffness of the supporting leg.

However, as follows from the survey of the subjects, almost all sprinters evaluate changes in their running technique in terms of weight as a decrease in running fit. Only a few people found it difficult to give the correct answer. Apparently, this assessment is related to the loading of the body – an increase in the force pressing the sprinter to the track is perceived as a decrease in the height of the running landing. By the way, 87% of the coaches surveyed also believe that when running on a turn, the landing decreases, the rest found it difficult not on the ability to visually assess the height of a running landing, but on their own feelings that they learned from personal sports experience.

Including scientifically analyzed the development of small business and business, and the legal basis, at this time financially support small business and business, the latter is amended and the rules for this branch of national legislation are added.

Now studying scientific heritage, socio-political activities and acquaintance youth charity of our above-stated ancestors is considered one of the main urgent objectives of the modern intellectuals.

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