ASJP Algerian Scientific Journal Platform
مجلة المجتمع والرياضة
Society and Sports Journal
ISSN: 2602-7992 EISSN: 2710-8384
https://www.asjp.cerist.dz/en/PresentationRevue/493

Vol:4Issues: 2 (juin2021) p225/233

The effects of a training programme on the physical capacities of judokas under 12 years old.

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Received: 24 / 04 /2021 **Accepted:** 27 / 05 /2021 **Published:** 30 /06 /2021

Abstract: The aim of our study is to study the effects of a training program intended for judo practitioners and to assess its impact on the level of physical and technical preparation. The research sample consisted of 40 children of the same level, 20 of them belonged to the experimental group with an average age of 10 years, of which 20 belonged to the experimental group where they followed a training program while the control group followed the usual program proposed by the trainer. This experimental protocol has been published for three consecutive years. All participants underwent educational tests conducted at the beginning and end of each year.
Both groups underwent regular training for an hour and a half, three times a week for the entire trial period. The program we applied was repeated as follows:
To assess the development of our athletes, we used measurements of two indicators - height - weight and general physical tests (endurance test, speed test, flexibility, and coordination test, explosive strength test of the lower and upper limbs). The results recorded in the experimental group showed very significant gains in endurance, explosive strength of the lower limbs, speed, coordination, as well as mobility of the scapulo-humeral joint.
Keywords: Physical capacity, judokas, training program, physical preparation

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I- Introduction :

The judo fight is characterised by phases of standing up work (nage-wasa), meaning an isometric effort at the level of the higher part of the body as the fighter uses the static force and the dynamic work at the inferior part using static-dynamic force and even explosive force. There is a phase of floor work (ne-wasa) in which the effort is mainly isometric. (Leplaquait and Coll, 1995). These different efforts need a good development of muscular groups. A multifactorial approach would prepare better the would be athletes for performance.

In this context, Weineck (1983) asserts that sportive practice shows us clearly that maximum performances cannot be reached if there are no prior.

Building solid physical and technical bases in childhood and adolescence is of great importance. This implies systematically a long term planning for the training process. The structure of this training has to be apprehended under a static aspect, searching mastery of the proportion factors of physical and technical preparation and under a dynamic aspect for their succession and how they are to be arranged.

The training program should take into account the different steps of the body growth; thus the 10 years' age represents the best period in the learning process, an age during which the technics are rarely forgotten, they are even impossible to correct after this period. (Breingmann, 1973). At this age, the child has more capacity to perceive and deal with the information allowing him to acquire rapidly new physical fitness and motor skills. (Meinel, 1976)

Solid bases both physical and technical are to be built in early childhood and adolescence. This implies imperatively or systematically programming a long term training process. The structure of this training has to be apprehended under its static aspect aiming at the knowledge of the factors of the physical and technical preparation and under the dynamic aspect aiming their succession as well as their ordering.

The changes in the proportions of the body and the brutal acceleration of the development of the physical qualities during the body growth always go in pair with the readaptation of the capacity of coordination(Brand,1973). At this stage, the goal of training is mainly the improvement and the consolidation of the sportive technics and the already acquired movements (Meinel,1976).

According to Manno (1992), 50 % of the total time should be devoted to physical preparation,35-40 % for technical preparation and 10-15 % for the other aspects of the learning.

The results of an inquiry done purposely for our research show that 80 % of judo coaches have a wrong representation of the preparatory program of the young judokas and even the lack of specificity in the contents of the training. The objective of this research work consist of the study of a training oriented program and the evaluation of its impact on the level of both the physical and technical preparation of the young judokas. The hypothesis of a judicious choice of the means and the training methods and also a content more specific for the practice of the judo, taking into account the particularities of the growth phases would lead to better improvements in the performance.

Subject:

We realised our study on a sample of 40 children aged 10 to 11, all of them members of a national sports association of judo. They are divided in 2 groups of 20 subjects each: 20 of them as a witness group and the other 20 as the experimental group. The physical features of the sample are shown in table (01) below. The experimental group was given a specific training program (see annex) while the witness group followed the usual training program set by their coach. This experimental protocol was followed during 3 consecutive years. All the subjects had pedagogical tests at the beginning and at the end of each year.

Table (01): Average values of the physical characteristics of the young judokas

Caractéristics	Age (years)	Height (cm)	Weight (kg)
Expérimental group	11,25±1,04	145,10±1,07	39,45±0,92
Witness group	11,25±1,04	139,75±1,61	34,30±50

The two groups followed a daily training sessions of an hour and half, three times a week along all the period of experimentation. The number of sessions increased during the school holidays.

The specificity of the training is as follows: the 1st year was mainly physical, the 2nd year, technical and the last year both physical and technical.

II– Methods and Materials:

Tools:

For the anthropometric measures we used an anthropometer and a scale. A manual electric chronometer is used for measuring the time of execution in the 9 minutes' tests, a speed race of 30 meters and a boomerang test.

For the large facial split, the long jump and the medicine-ball shot tests, we used respectively a tape measure and a decametre. As for the monitoring of the fights to analyse the techniques, we used a camcorder, a television set and a videorecorder.

Anthropometric measures:

The body weight is measured in kilogrammes with the help of personal weighing machine.

The stature experimented in centime is measured with an anthropometre taking into account the vertex of the plan of the supporting surface. The vertex is the highest point of the head when this latter is horizontal.

Physical tests: Strength measuring tests:

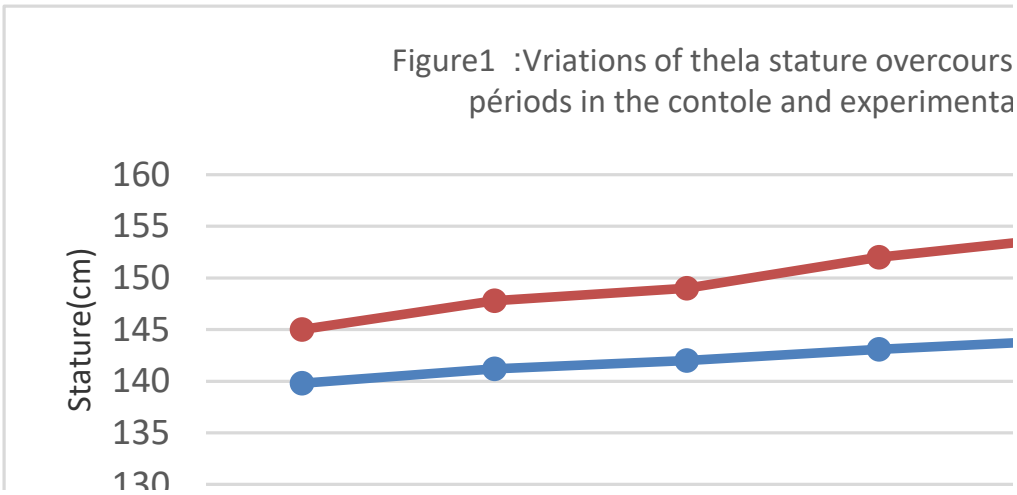
-9 minutes of Aahperd race (1976) To measure endurance.

- medicine-ball shot: this test is for the assessment of the explosive strength of the upper limbs.
- Standing long jump: to measure the explosive strength of the inferior limbs.
- Speed race (30 m) for the assessment of the capacity of the aeronobic threshold through maximum speed.
- Coxofemoral joint (hip joint): to assess the mobility of the pelvis.
- Scapulohumoral joint: to evaluate the mobility of the scapulohumoral joint.
- Boomerang test: to assess the coordination.

Statistical technique

All the reported values are average values ÷SEM. To compare the experimental group with the witness group, and for the comparison within the same group from one phase to another, we used respectively paired and unpaired tests. Pearson coefficient was used to the relation the different parameters, physical and technical. My data are developed with the help of the Excel 7 software. The significance level is always fixed at $p< 0.05$.

Results :



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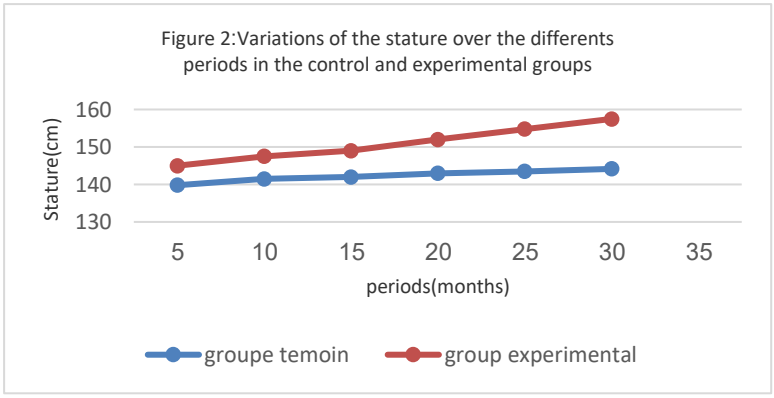

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Stature and weight:

Evolution in time: we notice a significant increase in the average values in stature and weight along the different steps (figure 5 a) within both the experimental group and the witness one ($p<0.001$)

Comparison between the two groups: In comparison with the witness group, the average values of the stature and weight have significantly increased with the experimental group (<0.05 – 0.001) at all steps.

Performance race (9mn):

Evaluation in time: Right at the end of the first step of the experimentation, we notice a significant increase in the 9 minutes' performance race ($p<0.001$) showing the evidence of the increase in the capacity of endurance within both groups. The most important increases are observed during the 1st step ($p<0.001$).

On another side, every phase of growth is followed a relative period of stabilization and this trend is shared by the 2 groups.

Comparison between the 2 groups: The values of the 9 minutes 'performance race at the beginning of the experimental period are similar within the two groups. But the differences in values become significantly important at the end of the 1st phase and continue until the last phase with higher values($p<0.001$) with the experimental group compared to the witness group.

Performances in the medicine-ball shot:

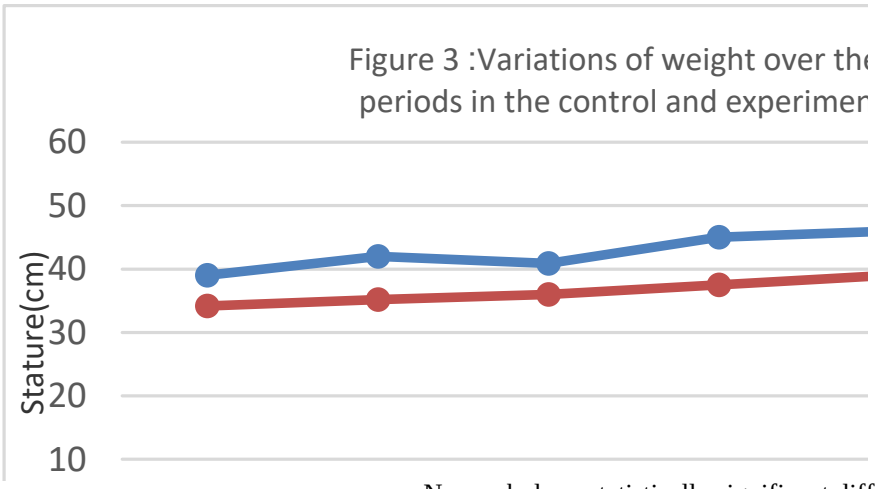
Evolution in time: The performances in the shot increase slightly during the 1st 3 phases with significant higher differences at the end of the experimental period, compared to results of the 1st phase ($p<0.001$) for the judokas who followed the experimental programme, while slight variations are recorded in the witness group within the 3 years' experiments

Comparison between the 2 groups: we notice that during the 1st 2 phases, the average values of the performances in the shot are similar in the 2 groups. In fact, the differences increase significantly in the last 3 phases in the experimental group ($p<0.001$).

Performance in the standing long jump:

Evolution in time: Our study shows an improvement in the performance in the standing long jump from a phase to another ($p<0.001$) with an increase of 40 cm at the end of the experimental period. Within the witness group, we notice an increase in comparison with the starting of the experimentation, but the differences become really noticeable only during the last 2 phases ($p <0.05$-0.001).

Comparison between the 2 groups: Starting from the 2nd phase, the values are significantly higher with the experimental group than the witness one ($p<0.05$-0.001). The differences become more important with a sharp growth in the experimental group at the beginning of the 3rd phase ($p<0.001$).



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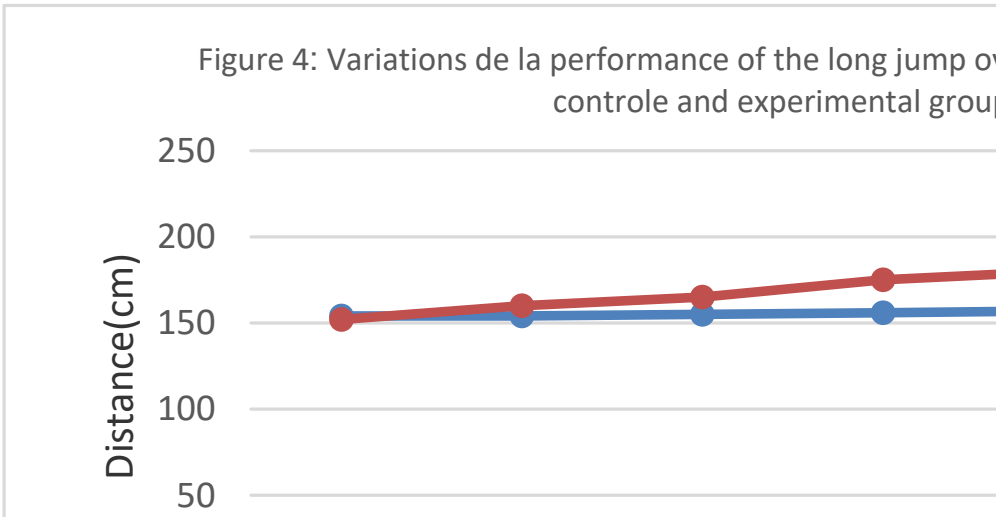

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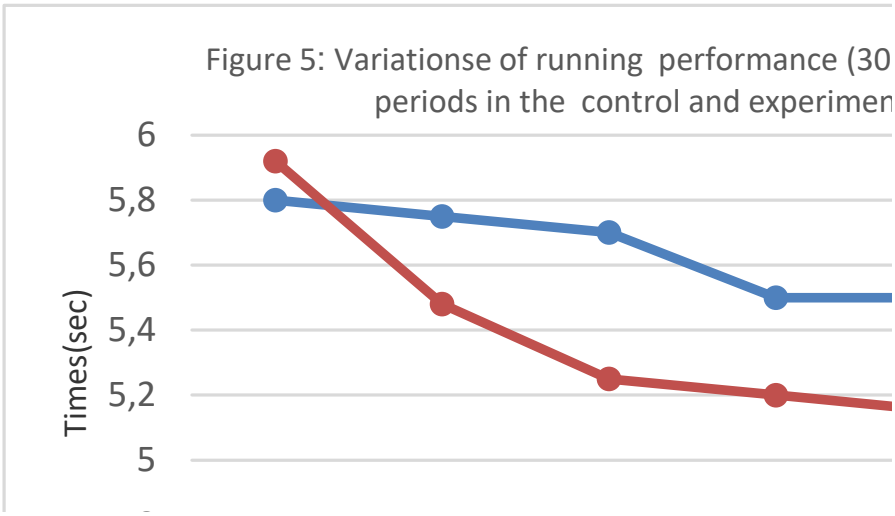
Performance in the speed race (30 m):
Evolution in time: We notice a progressive decrease of the average values in the time of execution of the 30 m race with the experimental group ($p<0.001$) but a sharp decrease during the 1st phase. Besides, with the witness group, a significant decrease in time is noticed during the 1st 2 phases (0.01; 0.01 respectively), followed by a relatively stabilised period covering almost the 3 last phases particularly between the beginning and the end of the experimentation (<0.05).
Comparison between the 2 groups: The performances of the speed race (30m) become significantly different at the beginning of the 2nd phase and continue up to the last one becoming more and more important (<0.05- $p<0.001$
coxofemoral joint mobility:
Evolution in time: Concerning the coxofemoral joint mobility, we notice a statistically significant increase with the experimental group (<0.01- $p<0.001$), an increase illustrated by a regressive curve with evident decreasing phases intersected with phases of relative stability. This improvement results in a reduction of 13 cm.
With the witness group, the differences become more significant from a phase to another just at the beginning of the 2nd stage ($p<0.01$ – $p<0.001$). In comparison with the beginning of the experiment, it is only at the end of the 3rd phase ($p<0.01$) that an improvement of only 7 cm is recorded.
With the witness group, the average values of the indexes of the joint mobility are statistically inferior ($p<0.001$) whereas, with the experimental group, a higher mobility is noticed at the level of the coxofemoral joint.
Scapulo-humeral joint mobility:
Evolution in time: We observe a statistically significant increase in the shoulders joint mobility from a phase to another ($p<0.01$ – $p<0.001$) and an important improvement with the beginning of the experiment in comparison with the start of the experiment expressed by an improve in the ration height/length.
With the witness group, it is not before the end of the 3rd phase that the differences become significant even compared with the preceding phase ($p<0.001$ – $p<0.01$) or the beginning of the experiment ($p<0.001$).
Comparison between the 2 groups: The results illustrate a more important mobility of the scapular-humoral joint in the experimental group compared to the other one and this starts just at the end of the 1st phase ($p<0.001$).
Capacity of coordination (boomerang test):
Evolution in time: We notice an important drop in time to perform the circuit of the 1st step ($p<0.001$), followed by a phase of stability, with at this level a significant global drop between the end of the 2nd phase and the end of the experimentation ($p< 0.001$). With the witness group, the drop from a phase to another becomes evident only at the end of the 3rd phase ($p<0.001$), with significant differences but less important in the last phase ($p<0.05$). In comparison with the beginning of the experimentation, the drop is statistically significant ‘$p<0.001$), translated through a global improvement in the capacity of coordination.



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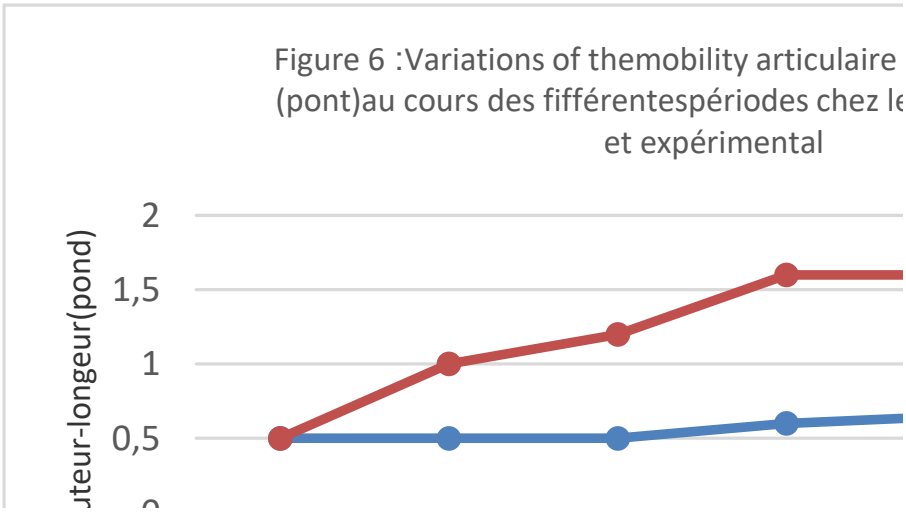
Comparison between the 2 groups: The experimental group is distinguished by a more important capacity of coordination illustrated through significant differences just at the end of the 1st phase ($p<0.001$). These differences become more and more important with time.



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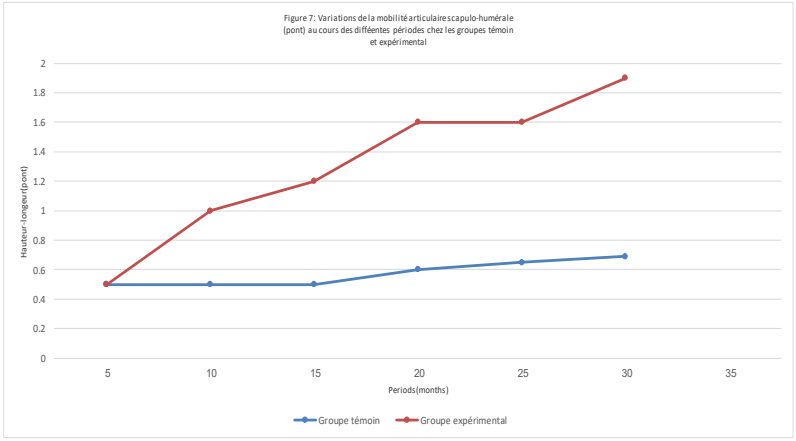

III- Results and discussion :

We demonstrated through this study that the training experimental programme had an important impact on the physical capacities from the 1st year and on the technical performances, from the 2nd year. In general, we noticed a progressive improvement of the performances with a positive impact more on the development of the physical qualities than the technical capacities, especially during the 3rd year.

Morphological features:

We have illustrated through our study that in time, a better growth of the height and weight occur in the experimental group while the proportions are similar to those reported by Trounine (1986) in the witness group. Trounine (1986) affirms that from the age of 10, children's height grows from 4 to 5 cm a year. The average weight values of the 2 groups at the beginning of the experiment were close to those reported by Gaul and coll. (1995) among athletes of similar age. The experimental group differs from the other at the very beginning of the study suggesting a positive effect of the chosen training programme.

Nevertheless, it is not easy to discern the effects of the programme from those due to the growth in weight. Indeed, according to Thomas (1975) the weight of the body is specifically individual and its components biologically regulated. Anyhow, the difference between the 2 groups tends to increase progressively reinforcing our conviction that a relatively more important improvement is confirmed through an increase of the indexes of the consequent force at the end of the study. These results go in the same path with those reported by Malina and Boucherd (1991).

Physical and technical capacities:

An important improvement is noticed in the endurance capacity, in the explosive force of the lower limbs, as well as in speed and coordination. The same goes for the Scapulo-humeral and the coxofumeral joints mobility with the experimental group in comparison with the witness group and this improvement starts from the beginning of the experimentation, apart from the explosive force of the upper limbs which seems to take a longer time to respond to the training programme. This relatively important increase in the physical capacities particularly endurance and strength-speed are features of the pre-adolescents as it is shown by different experts in the domain (Weltman and coll.1986; Manno,1989; Mercier and coll. 1992). The performances of the 30 m race considered as a test that evaluates the lactic anaerobic capacities (Marini and coll. 1982), is characterised by a clear improvement with time in the experimental group. These results as confirmed by the works of Fave-Javin and Eterrodi (Inbar and Bar-Or, 1986) are deficient among less aged children. We observed an improvement of the joint mobility with the experimental group in comparison to the witness group. This can be explained by the positive effects of the training programme. But it is established the growth leads to decay of the mobility (Frey, 1978) and flexibility seems to be the only factor of physical condition which reaches its climax throughout the passage from childhood to adolescence and then decrease noticeably later (Matvec, 1972). Moreover, our study shows that the capacity of coordination responds to the training early at the 1st phase, and even in a very significant way in the experimental group. This is mainly due to simultaneous improvements in the physical qualities as Hirtz (1981) claims.

IV- Conclusion:

We demonstrated through our study the undeniable positive effect of the training programme oriented mostly to the reinforcement of the length of work. Apart from the effects due to the training, the physical and technical performances have increased in both groups but with higher levels with the experimental group. This considerable increase with the latter illustrates the positive impact due to adequate choices of the processes and the optimisation of the means of training on the physical condition and the practice of judo. If the improvement of the physical capacities was already noticeable in the 1st year, the increase of the technical performances did not happen before the 2nd year. We think that this increase in the technical level is mainly due to the importance given to Ne-Waza, work in clearance from immobilisation and overturns. There is also evidence that

reinforcement of the physical qualities contributed largely to the rising of the technical level, particularly the part allotted to general endurance.

These various results lead us to the following recommendations:

-Evolution of endurance work in the proportion of 55-60% during the programme of the preparatory year with an emphasis on the physical side, and a progressive reduction of 20 to 50 % the technical sessions maintaining them when we move to the 3rd of the combined yearly programme.

- Work in flexibility and coordination should be maintained to the limits of respectively 20% -15%.
- Speed work starts within the proportions of 5% progressing in time without going over 20%.

-The reinforcement of the muscular strength varies from 10% to 20%.

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