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Value evaluation of nonlinear power cycle intervention in the training of high level basketball teams in universities

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ABSTRACT

The introduction of the theory of nonlinear power cycle intervention to the training of high level basketball teams in universities can adapt the sports teams training situation that the training conditions are limited, the training time is short and the competitive level of the athletes is different. Through the study of experimental teaching, this paper makes a comparison between the nonlinear power cycle intervention training and the cycle power training in the aspect of developing the maximum power of basketball players. The result shows that the maximum power' contribution rate and upgrade rate of nonlinear power cycle intervention training are much higher than the cycle power training's. It plays a very important role in enhancing the strength quality of the high level basketball players in universities. In this paper, the value evaluation of nonlinear power cycle intervention in the training of high level basketball teams in universities was discussed.

KEYWORDS

Nonlinear power cycle intervention; High level basketball teams in universities; Training.



Research method

This study uses the experimental method. It designs and completes the training experiment elaborately. The data analysis is realized by EXCEL software. TURKEY method is used to analyze the variance and the significance level is defined as $P \leq 0.05$.

Analysis and discussion

Design and implementation of training experiment plans of nonlinear periodic power (U P) and periodic power training (L P)

TABLE 2 shows the power intervention methods and test items of nonlinear periodic power (U P) and periodic power training (L P).

TABLE 2 : Power intervention methods and test items of nonlinear periodic power (U P) and periodic power training (L P)

Training plan A	Training plan B	Test content
Bench press	Bench press on cantboard	The maximum weight of bench press
Power clean	Prostrate birds	The maximum weight of full knee bend
Seated stretching legs	Seated bending legs	
Shoulder press	full knee bend	
Standing calf raise	Seated calf raise	

According to the test scores of TABLE 1, the 12 players of a high level basketball team in a university are divided into two groups which are nonlinear periodic power (UP) and periodic power training(LP). Every group has 6 players. This research arranges the power intervention for the nonlinear periodic power (UP) and periodic power training(LP)with the same training volume and training intensity. The training group of the periodic power training(LP)changes intensity weekly and the number of training group remained unchanged. Also, the research divides the 12 Training weeks into three smaller cycles. The changes of the number of repetitions performed as the following: 12-8-4-2RM, this is a reflection of the rule that the training intensity improves gradually and the amount of training decreases gradually. However, the group of nonlinear periodic power (UP) changes the training intensity as the training sessions as units. It arranges the power training on Tuesdays and Thursdays of every week, and there are significant differences in the training group and training intensity of every week (Figure 1). The test of (T1, T2, T3) is scheduled on Saturday of the 8th and 12th week, and the test items are maximum weight of full knee bend (1RM full knee bend) and the maximum weight of bench press (1RM bench press).

Comparison of the maximum power

This study analyzes the data of three test scores, uses the way of average value \pm standard deviation to show the test results after power training intervention of the nonlinear periodic power (U P) and periodic power training(L P) within three months in TABLE 2.

TABLE 2 : The comparison of three test scores of nonlinear periodic power (UP) and periodic power training(L P)

Item Group		pretest	T1	T2	T3
		X \pm S	X \pm S	X \pm S	X \pm S
1RM bench press (kg)	LP	72.4 \pm 2.25	74.5 \pm 4.22	76.2 \pm 3.44	80.55 \pm 3.12
	UP	71.8 \pm 2.68	73.9 \pm 3.88	79.28 \pm 2.86	86.46 \pm 2.84
1RM full knee bend (kg)	LP	158 \pm 14.42	160 \pm 14.82	168 \pm 15.26	175 \pm 15.64
	UP	159 \pm 11.86	161 \pm 14.98	168 \pm 14.28	177 \pm 13.52

Though the comparison with the pretest results, it proves the following view: there is no much difference between the two training methods in the test of 1RM full knee bend; the methods of nonlinear periodic power (UP) and periodic power training (LP) both can improve the maximum power. It is slower for periodic power training (LP) method to improve the bench press and the increasing rate of average test is lower than nonlinear periodic power (UP), which is controlled within 3 units. But, in the last test (T3) of nonlinear periodic power (UP), the increasing rate of once get up to 6 units, which are nearly twice of the periodic power training (LP). This reflects the nonlinear periodic power's (UP) characteristics of non periodic and jump. The stability of periodic power training(LP) method is better than the linear periodic power (UP) method in the aspect of standard deviation of the results improvement. There is no great difference between the two interventions for improving the average value of full knee bend. The Comparison of the scores of 1RM bench press after the interventions of LP and UP is shown as Figure 1.



Figure 1 : Comparison of the scores of 1RM bench press after the interventions of LP and UP

After three months' power intervention, shown as Figure 2, when testing the test results of bench press of LP and UP group, it can see that there is no significant difference and it is less than 0.05, which indicates a significant difference does not exist. However, in the test phase within the group, the intervention of the two groups was significantly less than 0.05, indicating that there are significant differences. It can be seen very clearly from Figure 2 that UP group is much higher than the LP group on the increasing rate of the power. The increasing rate from T1 to T3 in the LP group is 9%, while the increasing rate of the UP group is 17% at the same phase. By comparing the increasing rate of the three stage of two groups after intervention, it can be known that: in the stages of pretest and T1, the two intervention groups have the same scores increasing rate which both are 2.1kg, but in the stages of T1 and T2, the increasing rate of LP group is 67.9% of the UP group, after entering the stage of T2 to T3, the score increase rate of LP decreases obviously, slipping to 40.2% of the UP group and there is very obvious contrast between the two groups. It is more obvious for nonlinear power cycle training to improve the scores of the maximum bench press.

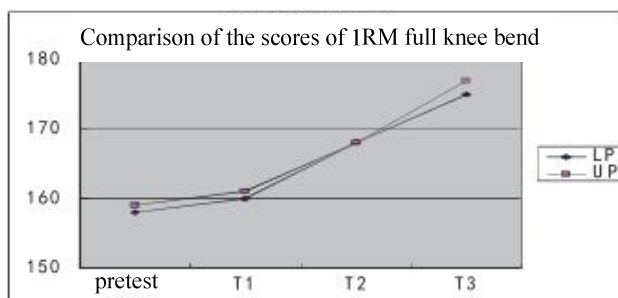


Figure 2 : Comparison of the scores of 1RM full knee bend after the interventions of LP and UP

The differences within the group are large relatively in the test of bench press. But in the test of full knee bend of UP and LP, there is no significant differences. Periodic training method and nonlinear periodic training method can make the basketball players' maximum power of legs improve rapidly, and the application of the training means and the test results of players are related with the low pretest baseline. However, in the three stages, the increasing rates of power in UP group are higher than that in LP group. The test result proved once again that the non periodic power intervention plays a significant role in promoting the improvement of maximum power.

Through the comprehensive analysis of the whole experiment, it can be drawn that in the first two months of the experiment, the adaptability of nervous system to the training stimulation determines the increase of the maximum power. After improving the recruitment degree of motor unit and increasing the muscle cross-sectional area, in the last month, the growth of power need to rely on the changes of muscle fiber cross-section. In the two power intervention training, for the increasing rate of arms' maximum power, the nonlinear power cycle training makes a high contribution. So, at the beginning of power training, the non-linear power training should be adopted training volume, and the training intensity should be combined scientifically and transformed high-frequency. This can make the neuromuscular system better and faster to adapt to the exercise stimulation.

THE DEVELOPMENT STRATEGIES OF HIGH LEVEL BASKETBALL TEAMS IN UNIVERSITIES

Improve the level of coaches, improve the quality of training

The level and ability of coaches are a crucial part in the high level competitive sports in universities. Because after having the basic training condition, the very important dynamic factors are coaches in competitive sports. The high level training methods of coaches play a very important role for the improvement of basketball players' physical quality and performance. So, the universities must to improve the level of coaches and create a high-quality coaches team by combining

the introduction and improvement. The main way to improve the technical level of athletes is the scientific training of the sports team, which requires the coaches can use the latest scientific research results in the basketball training, but also need to reform in training methods, training monitoring, training means and other aspects. The core of training is the improvement of training quality.

Increase the funds investment of sports team, ensure the materials in place

If without adequate funding investment, it is difficult for the high level basketball teams in universities to accomplish training. Basketball teams should not only ask the school leaders to give them financial support, but also seek financial support through a variety of ways, for example seek sponsorship from communities and enterprises. Using this method, they can get sports funds from multiple channels to ensure the sufficient financial support of the high level basketball teams' training. At the same time, the existing resources of schools should be make full use of and integration to give full play to the advantages of universities' scientific research, such as the training method of nonlinear power cycle intervention discussed above, which can raise the level of the players in basketball teams.

Universities should establish a reasonable training management team, and do a good for recruitment and selection

The improvement of training quality and creation of outstanding performance are the important goals for the management teams, so the management for the sports teams should around these goals. Reasonable and efficient management teams are the necessary and basic conditions for the sports team to achieve outstanding performance. The universities should set up special expert management teams, making the management teams of universities sports competition can carry out training activities reasonably under the guidance of the expert teams. The premise for universities to run high-level sports teams is to do a good job for recruitment and selection, because the universities in China adopt the academic-year system, and less funding for sports is the widespread situation in Chinese Universities. Many universities lack high-level athletes, so they must be careful when recruiting and selecting to ensure the elimination rate of enrollment as low as possible.

Improve the understanding to basketball league, coordinate and rationalize the various relationships and establish reasonable training systems

Currently, many universities lack sports funding. If they want to run high level basketball teams, it is necessary to obtain recognition and support from communities. This requires the universities put forward the relevant support policies to increase the investment funds as much as possible within the allowable range to ensure to training materials in place. The universities should be able to recognize the basketball league is a comprehensive arena, not only demonstrates the level of sports teams, but also reflects the power of universities. It has a direct relationship with the performance of athletes and the overall effect of these universities, so it is important to raise the understanding to basketball league and the enthusiasm to establish teams. With the acceleration of universities sports reform process, many athletes in universities are facing allocation difficulties after graduation and retirement, which also is the opportunity for universities to develop high level sports teams. There are two tasks for athletes in universities: the first one is to study scientific and cultural knowledge, and the second one is to improve the movement technology and competition level. But, there is a contradiction between the two tasks in time, so universities should coordinate and rationalize the various relationships and establish reasonable training systems. The new training system should be combined with education and training rules, and combined with the characteristics of athletic events. It should focus on the improvement of cultural knowledge and overall quality of the athletes, making the contradictory between learning and training get solutions. For the coordination and rationalization of a variety of relationships, it should be led by the principal's office, coordinate with the student affairs office, education office, sports department and other departments, deal with the relationship between athletes and teachers, so as to ensure the two main tasks of athletes in universities be completed.

CONCLUSION

For the enhancement of athletes' maximum power level, the nonlinear power training (UP) and periodic power training (LP) have a certain role. But, through the experiment intervention of this paper, it can be seen that the increasing rate of maximum power in nonlinear power cycle training (UP) is higher than that in periodic power training (LP) significantly, and there is no comparability between the two training periods. Both of them can be used as a principle to guide the training of basketball players in universities. Comparing the contribution to power enhancement, the training environment and competition features of high level competitive basketball sports comprehensively, the nonlinear power cycle training characterized by the high-frequency conversion training volume and training intensity has a more practice operating value for the power quality development of high level basketball players.

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