

## Research Article

### Empirical Research on Effect of Leopard Palm on Improving of Physical Fitness of Gymnast

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**Abstract:** In order to improve the physical fitness of gymnast effectively, the leopard palm food is applied in it. Firstly, the current exploitation and utilization status of leopard palm are obtained. Secondly, the nutritional measures situation of Chinese gymnast is analyzed. Thirdly, the basic function of leopard palm on improving physical ability of gymnast is discussed. Finally, the forty gymnasts are used as the experimental objects and the corresponding analysis is carried out, results show that the leopard palm food can improve the physical ability of gymnast effectively, which has wide application view.

**Keywords:** Gymnast, leopard palm, physical fitness

#### INTRODUCTION

The main content of leopard palm is konjac mannan, the content occupies the about 80%, konjac mannan has special physical property, firstly it has performance of imbibition, which has strong water performance under the effect of visual water group after inflation and konjac mannan is also the macromolecular polysaccharide and polysaccharide, which is not only hydrolyzed by digestive enzyme, but also can reduce the blood cholesterol and blood sugar, therefore it has many health function (Chen *et al.*, 2014).

The gymnast not only has good physical shape, but also has good function level, strong skill level and sufficient physical storage and then the gymnast can be fit for constantly changing rule and difficulty movement requirements. According to the research findings, the Chinese excellent gymnast has possessed the potential ability of world class players in physical shape and function, but the physical ability of Chinese gymnast with high level has restricted the development of gymnast competitiveness. In order to ensure that the gymnast can bear the overloaded stimulation, the proper nutritional supplement is critical (Mizutani *et al.*, 2014). The leopard palm can be applied in physical ability improvement of gymnast, with quick development of leopard palm food industry, the edible value and economic value of leopard palm can be fully embodied. And the healthy function of leopard palm food can be applied in the physical improvement of gymnast and the corresponding processing device and technology of leopard palm are made.

#### Exploitation and utilization status of leopard palm:

**Gel-food:** KGM of leopard palm is swelling capacity,

the soakage of it is 80-120 times of KGM, the aqueous solution of leopard palm has strong caking and gelation property and the irreversible elastogel can be formed after procession. The gelation property of KGM is used, a kind of food with different shapes can be generated through gelatum formed by KGM, which is named as gel-food. The konjak tofu is made by Chinese ancient people, which is just the gel-food. Chinese konjak tofu has 2000 years of history. The gel-food developed in current stage concludes fans, the cake, the film, the ball and the bionic food. The gel-food can be made as healthy food with different colors, bright, nutritious and delicious after cooking (Mikkonen *et al.*, 2009).

**Beverage food:** For juice, vegetables, tea drinks products and the konjac flour can be used as good thickener, suspension stabilizer. The pulps, vegetable juice, tea in drink do not precipitate and has good suspension and has invariant color. And the health function of such drinks can be improved. The using effect is better for low sugar, low calorie drinks, this kind of drink is named as drinking food of leopard palm, which is applied in the curing of the adiposity.

**Preserved foods:** The konjak powder can be used as the natural antistaling agent, 0.01-0.1% of konjak powder solution can be used as the coating antistaling agent of fruit, vegetable and aquatic product, which can play the role of anticorrosion and durability and it can be eaten with it, this kind of leopard palm food can be named as preserved foods. According to relating experimental results, satsuma orange can keep the appearance color and nutrient elements after storing for 120 days, the retention period of banana can be

improved from 5 days to 30 days and the spinach and tofu can be stored for over 10 days (Gu *et al.*, 2013).

**Accessory food:** The konjak powder can be added into the meat products to replace the amyloid with poor taste and loose organization and the meat products has flexible palatability, the inner quality and appearance shape of meat product can be improved. The konjak powder can be added into the bread, cakes and peach slices, then they will be loose and soft and it is rich in elasticity and has long retention period. The konjak powder is added into the boudin, jelly, candy to replace the agar and carrageenan, then the mouth feel and health function of them can be improved accordingly, this kind of food is named as accessory food.

The planting area of leopard palm in China is about 100 million ton and the output of fresh leopard palm is about 40 million ton and the output of konjak powder is about 2 million ton and the output of konjak powder represents around 20% of its total production. The dietary fiber has become the seventh nutritive element, which offers new resources for developing health food of leopard palm, it has a large market potential ability. There are thirty large type food factory using leopard palm as raw material in China, more than 170 small type food factory needs 2000 ton konjak powder every year. With improvement of people's living, the dietary pattern regulated constantly and the requirement of it in home market will reach about 1-2 million ton and about 70% of it can be used in the food production (Aprianita *et al.*, 2014).

#### **Nutritional measures situation of Chinese gymnast:**

The gymnast should control the weight and body fat level in order to complete the complex movement with high difficulty. The body fat content of excellent gymnast shows the negative correlation with motor skills, the lean mass shows the positive correlation with physical ability, strength, aerobic capacity and maximum quantity of respiratory oxygen. In order to keep the low body fat, the gymnast should control and reduce the body weight intermittently, the basic theory of reducing the body weight is to reduce the calories intake, improve heat consumption of organism and the create the negative balance of heat quantity and the stored fat can be consumed (Yang, 2014).

For the gymnast, long period proper reducing and controlling the weight and the preventing the big heat consumption can lead the adverse effect, for example, the slow growth and development, innutrition, dehydration, spirit burden, big pressure and poor sports ability. In recent years, the gymnast carries out strenuous exercise wearing a suit sweat to reduce weight. The reductive body mass by this method are most the components of body fluid, which belongs to the dehydration process and a lot of electrolytes will loose during this procession and the function of muscle and plasma volume will be affected greatly. The proper body mass reduced and controlled of gymnasts should use the controlling and reducing as principle. And

through controlling diet and improving the motion quantity the weight of gymnast and the body mass component reduced is general the fat.

During the procession of reducing weight of gymnast, the regulating and controlling of nutrition is important. The energy intake of female and male gymnasts is well below requirement recommendation. The gymnast generates the adaptive mechanism for low energy intake and the reservation of energy can be improved, the gymnast can improve the body fat through reducing the metabolic rate and improving the effect of insulin to food, then the body mass can improved, then the excessive calorie restriction is not benefit for keeping the body fat and the adverse circulation of restricting the diet in further will happen for the gymnast, during the procession of improving the physical ability, the gymnast will be affected by himself and outer pressure, the emotion of gymnast will be instable, the initiative active encouragement and psychological counseling should be carried out for the gymnast, the inner anxiety can be relieved and the negative effect can be eliminated effectively.

#### **BASIC FUNCTION OF LEOPARD PALM ON IMPROVING PHYSICAL ABILITY OF GYMNAST**

The high dietary fiber of leopard palm is an effective nutrient component and the function of improving the physical ability of gymnast is to develop the function of regulating the nutrient unbalance, which mainly is embodied in the following aspects:

**The leopard palm has the antiobesity action:** The high dietary fiber of leopard palm has strong expansion force and viscosity toughness, the expansion factor ranges from 80 to 100, which can satisfy the eating pleasure of people sufficiently and the gymnast is not fattening. The high dietary fiber of leopard palm can slow the passing speed of food from stomach to small intestine, postpone digestion and absorb the nutrient substance. The dietary fiber of leopard palm can expand blood capillary and reduce the blood pressure and cholesterol, which is an idea food for restricting the fat of gymnast.

**The leopard palm can relax the bowels:** The main measurement of preventing constipation is to add the intake quantity of dietary fiber, the dietary fiber can absorb the water and improve the volume of night soil. The bacterium of bowel can carry out glycolysis of dietary fiber and the low level aliphatic acid can generate, the enterocinesia can be stimulated and it is benefit for defecation. The dietary fiber of leopard palm digested in the bowel, the peristalsis of intestinal tract can be stimulated and the absorption of small intestine to water can be restricted and the relaxing the bowels can be obtained.

**The leopard palm can reduce the blood fat:** The dietary fiber of leopard palm can combined with cholesterol in alimentary canal and the neutral fat and cholesterol can be prevented to be absorbed and the active transformation of bile acid by ileum mucosa can be restrained effectively and absorb the choler, then the enterohepatic cycle of bile acid can be blocked, then the liver lipid can be reduced and the discharge capacity of steroid can increase, finally the body fat can be consumed. zymolysis of KGM can be carried out in large intesting, then the short-chain fatty acid can generate such as propionic acid, which can be absorb by the body, then the function of reducing the blood fat can be obtained.

**The leopard palm has hypoglycemic effect:** The dietary fiber of leopard palm can reduce blood sugar, the dietary fiber concluded in the leopard palm has big formula weight, high viscosity, which can postpone the absorption of amylaceum and the blood sugar after dinner can be reduced effectively. Then the burden of pancreatic island can be alleviated. The.

**The leopard palm has other healthy function:** The calcium of leopard palm is easy to be acquitted, especially the calcium in the acid solution has high elution rate. When people eat the leopard palm, the poltophagy leopard palm can contact with the acid gastric juice, then the calcium begins to be dissolved and then is be absorbed by intestines and stomach, then function of making up the calcium can be achieved. In addition, the leopard palm has the function of antibacterial and anti-inflammatory, improving oxygen resistance, expanding the peripheral vessel and restricting the myocardial contractive power.

China has rich resources of leopard palm and the price of leopard palm is relative low, therefore it is good food for improving the physical ability of gymnast and the correlating healthy food should be developed in further.

### EXPERIMENT DESIGN AND ANALYSIS METHOD

**Experimental subjects:** The gymnasts from national rhythmic gymnastics team are used as the experimental subjects and there are forty female gymnasts are confirmed as the experimental objects and the physical shape, the physical function and other indexes are tested, the physical shape concludes height, circumference and body content, the physical function concludes the physiological index and biochemical index (blood and urine).

The experimental objects can be divided into experimental and controlling group arbitrarily and the experimental group and controlling groups have 20 gymnasts respectively. The parameters of experimental group are listed in Table 1.

Table 1: The correlation parameters of experimental group

	Experimental group	Controlling group
Mean age/year	20.72±4.10	21.03±5.36
Mean height/cm	172.35±11.52	170.31±10.57
Mean weight/kg	49.59±8.65	48.83±9.30
Basin/cm	45.20±6.65	46.15±7.37
Achilles tendon/cm	28.54±10.37	29.20±11.46
Constitutional index/BMI	18.53±11.84	18.06±10.95
Lower extremity length/cm	98.53±15.29	97.25±16.38
Foot back height/cm	4.39±0.85	4.62±0.94
Body fat/%	12.83±2.47	11.96±2.28

During the experiment, the gymnasts in experiment eat the leopard palm food and the gymnasts in controlling group do not eat the health food, the experimental period is 12 months.

#### Analysis method:

**Literature data method:** The relating literatures and electronic documents about physical shape, physical function and physical ability training and the content is summarized and analyzed.

**Expert interview method:** Part of sports medicine experts, sports physiology expert, international rhythmic gymnastics referee, national coaches is interviewed. The relationship between physical ability improvement and physical shape are grasped and the effect of leopard palm on improving physical ability.

#### Mathematical statistics:

**Step 1:** Confirm the mother and sub indexes, the critical index in the effect of leopard palm on improving physical ability is used as the mother index and the vector of index value relating with the mother index is defined by:

$$Y_0 = (x_{10}, x_{20}, \dots, x_{n0})^T \quad (1)$$

where  $Y_0$  is the mother series.

The other indexes are used as sub indexes, the vector of index value relating with sub indexes is defined by:

$$Y_j = (x_{1j}, x_{2j}, \dots, x_{nj})^T \quad (2)$$

where  $Y_j$  is sub series.

**Step 2:** The initial handling is used for  $Y_0$  and  $Y_j$ , which can be defined by:

$$x'_{i0} = \frac{x_{i0}}{x_{10}} \quad (3)$$

$$x'_{ij} = \frac{x_{ij}}{x_{1j}} \quad (4)$$

And  $Y'_0 = (x'_{10}, x'_{20}, \dots, x'_{n0})^T$ ,  $Y'_j = (x'_{1j}, x'_{2j}, \dots, x'_{nj})^T$  and the initial index matrix is established, which is defined as  $B = (Y'_0, Y'_j)$ .

**Step 3:** The relational coefficient between  $Y_0$  and  $Y_j$  is calculated based on the next formulation (Zhao *et al.*, 2013):

$$y_{ij} = \frac{\min_{1 \leq j \leq m} \min_{1 \leq i \leq n} |x'_{i0} - x'_{ij}| + \mu \max_{1 \leq j \leq m} \max_{1 \leq i \leq n} |x'_{i0} - x'_{ij}|}{|x'_{i0} - x'_{ij}| + \mu \max_{1 \leq j \leq m} \max_{1 \leq i \leq n} |x'_{i0} - x'_{ij}|} \quad (5)$$

Then the relational matrix is confirmed, which can be defined by:

$$Y = \{y_{ij}\}_{n \times m} \quad (6)$$

**Step 4:** Compute the mean value of column for the relational matrix, which can be defined by:

$$y_i = \frac{1}{n} \sum_{i=1}^n y_{ij}, \quad j = 1, 2, \dots, m \quad (7)$$

**Step 5:** The normalization is applied in coping with  $y_j$  and the weighting value is confirmed through the next formulation:

$$\omega_k = \frac{y_k}{\sum_{k=1}^m y_k} \quad k = 1, 2, \dots, m \quad (8)$$

## RESULTS AND DISCUSSION

The basic heart rate and blood pressure of gymnasts during the procession of training are listed in Table 2.

From Table 2, the gymnasts in experimental group has stable basic physical ability and shows the good physical status and the blood pressure and heart rate of gymnasts in experimental group has lower value that that in controlling group. The gymnasts in experimental group can recover the fatigue after training quickly.

The hemoglobin, blood urea, creatine kinase and blood testosterone of gymnasts in experimental and controlling group are shown in Table 3.

From Table 3, the gymnasts in experimental group has better hemoglobin, blood urea, creatine kinase and blood testosterone value that that in controlling group and they can improving the physical ability quickly and they has better metabolic capability and they possesses the indefatigability.

The relational degree between the physical shape, physical function and the leopard palm are calculated based on the algorithm procedure mentioned above and the corresponding analysis results are shown in Table 4.

Table 2: Basic heart rate and blood pressure of gymnasts

	Experimental group	Controlling group
Basic heart rate/(time/min)	54.32±1.94	56.45±2.67
Systolic pressure/(kPa)	13.65±0.62	14.71±0.87
Diastolic pressure/(kPa)	7.39±0.43	8.72±0.38

Table 3: Hemoglobin, blood urea, creatine kinase and blood testosterone of gymnasts

	Experimental group	Controlling group
Hemoglobin/(g/L)	132.83±2.69	129.43±2.26
Blood urea/(mmol/L)	4.62±0.92	4.31±0.92
Creatine kinase/(ng/mL)	128.43±32.06	126.02±30.64
Blood testosterone/(ng/mL)	0.25±0.05	0.20±0.06

Table 4: Correlation coefficient between physical shape, physical function and the leopard palm

Item	Correlation coefficient
Physical shape to physical ability	0.853
Physical function to physical ability	0.897

From Table 4, the leopard palm has something with the physical shape and physical function of gymnast, the leopard palm can improve the physical ability of gymnast greatly.

## CONCLUSION

The leopard palm has special physical and chemical characteristic, therefore it has better application value in many fields, a further blending, modification and compounding can be carried out and then it can be applied widely. The leopard palm can improve the physical ability of gymnast effectively through experimental analysis and the gymnast can get good achievement.

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