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Research Article

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Samba fitness efficacy research based on analysis of body compositions changes

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ABSTRACT

This research tests body shape, heart rate, body composition, lung capacity, VO2max (relative value of maximum oxygen uptake),MVV(largest pulmonary ventilation volume) of 40 female college-age students that take dance training mainly through experimental measurement method and logical analysis method, and makes contrastive analysis of testing results before and after training. The conclusion is that long-term Samba training has significant influence on college student's body shape, body composition, heart and lung functions and so on each index, it can better body shape, reduce body fat percentage and strengthen heart and lung functions. That proofs the efficiency of Samba training to health.

Key words: Body Mass index, VO2max, largest pulmonary ventilation volume, lung capacity

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INTRODUCTION

Samba is a dance as general movement, from the aspect of human body parts, it should including upper limbs, lower limbs ,trunk as well as whole body motions; from the aspect of technical segments, it should including gravity center travel, rise and fall, swing etc.; from the aspects of motion directions, it should including forward, backward, left and right motion that enable whole body's each joint as ankle, knee, hip, elbow, shoulder and neck to get exercise, while each body part and limbs together with trunk these major muscle group get comprehensive training. Zhang Qiao-Zhen's research shows that normal continuously 10 minutes waltz and tango these modern dance would increase 60% to80% of human metabolic rate; while continuously 10 minutes of Cha-cha and Samba these Latin dance would increase more human metabolic rate. There are some other researches that show that half an hour's high strength sports dance that players do is equal to one day walk; that is to say, people can use short time exercise to achieve long time's efficiency. By some experts reckoning, the activity of continuously three sports dancing is equal to that of running (10-12 km/h),swimming (50-60 m/min),riding (25-30 km/h).Sports dance has a very importance effects on improving human metabolic function, because body would secrete some special substance in sports dancing, these substance would enable people at his freshest. According to medical reports, proper joint applying can cure joint discomfort. People that usually dance Samba can correct their crooked spine, prevent and cure slipped discs.

Horst.Misberger thought that sports dance is neither as intensive as sports nor as soft as dance. It has both cultural entertainments connotations and sports competitions' form, which is regarded as the eternal real art in western [1].After that, many scholars carried out lots of research of sports dance in competition and teaching aspects [2], He Zhong[3], Liu Guang-Hong[4], Liu Shao-Bo[5] etc. analyzed sports dance features and main factors based on item-group theory, respectively made broadly research on its technical features, basic elements, strength quality training, sensitive quality training and so on. Xie Chun-Xiang[6] analyzed key motions mechanics features and energy supply characteristics, Feng Lian-Shi[7] proceeded analysis of scientific monitoring in dance training, put forward multiple evaluation index, measurement technical methods and evaluation method, provided effective quantization scheme to scientific training. Some scholars also continuously made summary of experiences from

previous training and competitions, learn this item's sports rules , created training method, technical motion difficulties and create design thoughts, formed their own effective physical training content and method system.

The above researches have an effective influence on the development of competitive sports and improvement of competition performance; In schooling, Xie Xue-Feng[8] researched social environment and development model of sports dance setting, made feasible and necessarily analysis of sports dance class building in college and university; GuLanDanMu [9] Made summary of sports dance development from theory and make scientific prediction of its future development trend; Li Can[10] carried out empirical argument. All of these gained lots of scientific results, and also created social value. Follow by changing of life style, improving of habitants' life quality, increasing of Culture appeal, developing of comprehensive fitness exercise and so on,Liu Jun-Hua[11] analyzed dances' fitness value and culture connotation, Zhang Jian-Guo[12] made researched on dances' improvement efficiency on hermorheology of people that take exercise, Chen Dong[13] made an investigation of dance's improvement functions to health related physical fitness, Liu Guang-Hong[14] studied dance's slimming and bodybuilding efficacy. But lack of deeply research of dances improvement efficiency to current obesity and relative cardiovascular disease, this paper tried to do empirical study on it.

Research objects:
Select 40 Shanxi province school normal college female students that interested in Samba while not in P.E. major (never take sports dance class, better physiological condition, no serious illness in recently times) with age range from 19 to 23, their body morphological index statistics as following, reference Table 1.

Table 1: Research objects basic information

Item	Age±standard deviation	Height(cm)±standard deviation	Weight(kg)±Standard deviation
Gender（female）	21.6±0.93	161.98±11.12	52.54±14.46

Control of training experimental conditions:
Main training class is Samba. Every time before exercise, all should take 5 to 10 minutes warm-up from head to foot so as to fully open each body part, make sure make body warm with perspirations, avoid sports injury. In formal training, each part and joint can take 4 to 6 pieces of 8 beats, every group every time trains continuously 60 minutes, every week 3 times. In order to avoid the test interference from other sport or non-sport items, testing objects are required not to go in for other sports items except for dance training to avoid disturbing and interference with testing results.

EXPERIMENTAL SECTION

Documentary Method:
Looked up relative books on sports dance from college library and broadly read books about sports mechanics, sports physiology, sports medicine etc., strengthened relative knowledge guidance of sports measurement and evaluation, sports statistics, physical ability judgments, training strength monitoring principle and method , trial testing methods to research objects according to requirement of this test.

Experimental testing method:
This research selected 40 Samba enthusiasts from college students in Shanxi as research objects, made unified test with them by using same tester, same equipment at same time, and got experimental data before and after training. To ensure test accuracy, unified and standardized operational demonstration of equipment was made to every tester before measuring students.

Mathematical Statistics method:
Organized all the information achieved by testing, input it into computer after unifying classification, stored original information into Microsoft Excel software, adopted SPSS11.0 software to make normal statistical analysis of standard deviation, average number and difference significant correlation testing and handled it accordingly. Set correlation significance level $P<0.05$（* in this paper means $P<0.05$).

RESULTS

Changes of weight index (BMI) and body shape:
Height mainly reflects of human bones developmental situations that is a important symbol of human vertical development level. Height data is not only the important data to evaluate growing and developing level, but also used to evaluate physique as well as normal ability. Weight is the index of human horizontal development; it reflects increasing integrated status of human bone, muscle and internal organs and is the important symbol to measure

health and physical strength. Height standard weight refers to body mass index, while short as BMI, which means ratio between height and weight should within the proper range. Human body's girth, width and thickness as well as density all can be reflected by certain ratio between height and weight. Human's own conditions and external environment, such as human body shape development level and nutrition conditions as well as body uniformity's important index all can be reflect through BMI. Besides, BMI can indirectly reflect human body composition. According to China actual conditions, Ministry of Public Health of China regards person BMI in normal range when it in the range of 18.5-23.9 ,he is thought to be healthy .If BMI lower than the normal range, body cannot fully be supplied with necessary fat physiological function; immune function would be reduced because of too lower fat content. While BMI higher than the normal range that means the probability of suffering relative obesity chronic illness as high blood pressure, diabetes and dyslipidemia would be increased. "Three high'' diet habits happened to our country's habitants followed by their incomes increasing. Obesity presently has become the important lift style illness; early intervention should be made to obesity so as to avoid relative illness[15].

Table 2 comparison between body shape and BMI index

Item	Women	
	Before training	After training
Height（cm）	161.98±11.12	162.09±11.01
weight(kg)	52.54±14.46	50.65±12.75
BMI	20.03±0.92	19.19±0.70

P value before and after training：Height p=0.06 >0.05；Weight（kg）p=0.000<0.05；BMI Index P=0.000<0.05

Some says that his abdomen and waist is like with a "swimming ring", that indicates human abdomen and waist normally are not easy to get exercise. Samba is a dance as general movements; its unique feature is that can intensify hip twist, pelvis swing, which is the most effective way to against fat in abdomen and waist. It also has significant effects on weight losing, perfect bodily form building which other sports unmatched. Samba belongs to the flexible sports strength and controllable aerobic sports, which has some connections to fat consuming and reduce exercisers weight. According to sports physiological relative theory, take 3 to 5 times exercises every week with 20-30min duration, maximum heart rate of 60%-70%'s sports strength is most effective for stimulating body fat consumption and improving aerobic endurance. In Samba exercising, the players are always required to maintain the motions as rising head, keeping abs tight, keeping waist straight and clamping thigh. In dance, gravity center should keeping sink, using hip push footstep make movements, and the hip turning motion should be completed with thighs' strength. Therefore, dancers' waist, abdomen, hip and thigh these 4 parts all get fully exercise in training, fat get fully burned in dancing, long-term Samba exercises has effects on weight losing. In addition, equal length contract and stretch always doing in dance exercise that enable muscle get better exercise and let it has elasticity. Lean body mass refers to the sum weight of muscle and mineral substance, muscle weight possesses an important part while generally no big changes of mineral substance, therefore lean body mass majorly measured with the changes of muscle weight. People with big lean body mass looks solid and his muscle is very flexible. People will not surely have the big lean body mass if his weight is heavy, while on the contrast, the thin persons' lean body mass not surely is small. Individual BMI can fully explain the whole. Our research proofs that participants weight and fat reduce while their lean body mass is in the rise trend after 4 months Samba exercising. Test results indicate that participants' fat reduces from 20.13 to 19.19; it has obvious weight losing efficiency. From Table 2, it can be seen that height has been slightly increased after training, while statistics test analysis shows no significant change here (P<0.05) that has a connection with mature stability of college students body development. In weight, before and after training's average deviation is 1.89kg, significant changes are proofed by statistics test analysis (p<0.05), it indicates that Samba training can lose weight. BMI index reduced 0.84 shows that Samba training can improve body density and fullness.

Changes of body composition:

Table3：Comparison of body composition index

item	Before training	After training	Differences
weight（kg）	52.54±14.46	50.65±12.75	P<0.05
Body quality index(kg/m2)	20.03±0.92	19.19±0.70	P<0.05
Fat percentage（%）	20.37±0.28	14.45±1.27	P<0.05
Fat weight（kg）	10.70±0.89	7.32±1.47	P<0.05
Lean body mass（kg）	41.84±4.33	43.33±3.13	P<0.05
Muscle weight（kg）	38.04±4.33	39.33±3.13	P<0.05
Cell weight（kg）	24.70±0.76	25.42±0.82	P<0.05

Sports dance is a kind of skill exhibition sports items with a techniques core and strength quality insurance. From

strength quality effects on each dance techniques' forming, its technical features can be concluded as below 5 aspects: first is the control technique to maintain correct body posture; Second is the body gravity fast and rhythmic spring technique; third is the sports technique that body gravity moved in orbit form and elicitor; Fourth is hip and waist abdomen powerful twist technique; Fifth is chest, back, shoulder and arm's rhythm technique. Practices show that strength quality is the most core quality of each sports dancers 'body .Good strength quality not only can avoid dancer get injury in sports, extend sports life; but also can propel dancer quickly learn and master correct dance techniques and fully bring their technique level into play in competitions.

Since Samba is a dance that majors in movements of hip, waist, arm, abdomen and medial of thigh, muscles that join in exercises including waist abdomen's rectos abdominals, internal oblique, external oblique; waist back's erector spine, altissimo dorsa and so on hundreds of muscles. In training, trainers are required to maintain extending straight posture, while in dancing they should always keep posture of rising head, chest straight, contract abdomen, rise arm, waist straight, shoulders relaxed and naturally sink, knee relaxed, thigh internal contracting and lifting up. Trainers' waist and hip fully twist followed by music, the twist is helpful for burn the fat of waist, abdomen and arm, not only tight human external muscle, but also get exercise of internal organs enable such organs function to get improved, muscle strength to get developed so that activate potential ability of internal organs, improve body integrated quality, better female college students body shape from inside to outside. Due to arms motion should coordinate with body motion in dancing, arms swing are required to be natural extended, when swinging arm, body should generate force and drive upper arm, upper arm drives forearm and then forearm drives hand to make movement. Such flexible and changeable arm motions can effectively consume trainers upper arm fat to make its line soft and reduce its fat. After training for some time, trainers muscle elasticity is strengthened, that is helpful to maintain standard weight and build perfect bodily form. Besides, Samba requires trainers should keep better posture, pay attention to body balance and motion stability, together with high requests to dance's rhythm, line and rotation which can better help trainer correct their previous ill-natured body posture, make trainers shoulder back, spine, thorax, pelvis as well as lower limbs organ more close to perfect, body become more straight, shape more balanced. Experimental results as Table 3 shows, participants weight and fat has been reduced, lean body mass has been increased, muscle contents has been improved, cells proportions has been raised, each body composition index has significant changes through statistic test analysis($P<0.05$).

Changes of heart and lung function:

Table 4: Each index result of heart and lung function

item	Before training	After training	difference
Resting heart rate（times）	73.79±5.43	71.86±4.08	*
Lung capacity（l）	2.23±0.54	2.85±0.47	*
MVV（l/min）	109±6.37	117±6.68	*
VO2 max（ml/kg/min）	44.17±5.70	51.92±4.72	*

Note： stands for P <0.05*

Lung capacity is the maximal ventilation volume per one breath; it can reflect breath function's potential ability, which is one of the important physical ability indexes to reflect human growing and developing level. Researches show that human life has a very close relationship with lung capacity; people with high lung capacity usually live longer than that with low ones. When exercising, organism not only need to increase breath depth but also improve breath frequency so as to suit for sports strength, therefore, organism's breath function can be strengthened , lung and thorax flexibility can be enlarged, breath mechanic strength can be strengthen through sports exercises, then lung capacity also is increased accordingly, furthermore, lung's storing ability can be improved, breath organ's working ability can be strengthened, and lung's breath function can be improved. Samba is middle training strength, long duration aerobic sports, it's up to aerobic energy supply system to provide energy in sports, trainers in dancing should pay attention to the coordination between motions and breath, let breath organ and breath muscles group get fully exercises through continuously chest pressure's changing. Long term exercise can increase lung's flexibility, increase breath muscle's strength, lung capacity can be increased accordingly, and lung's breath ability can be improved. Followed by continuously increased training times and strength, trainers motion and steps would become more and more skillful, the tactic understanding among dance company would be increased, body sports range can be increased and so on. In training, trainers whole body large squares blood circulation get intensified, at the same time of oxygen fully glycolysis of body sweet, consume internal fat , body oxygen consumption continuously increased, heart pump load enlarged, heart's arteries blood flow increased, heart output increased. Li Na etc.[16], In 2001 research apply advanced clinical experimental techniques, divided health women into regular exercise group and amateur training group, make contrastive research on two groups heart and blood vessel system. It showed that sports dance training had an influence on autonomic nervous system's adjusting and heart function storing, while no significant influence to the thickness of ventricular muscle. From Table 4, it can be seen that participants heart

rate reduced from previous 73 times/minutes into 71 times/minutes, someone even more. Resting heart rate reduced obviously, it has significant change by statistics testing ($p<0.05$); Except for resting heart rate, other index all increased that have significant change by statistics testing ($p<0.05$). The reduction of participants' resting heart rate is because heart muscle function got exercised, blood supply of heartbeat per time would be increased, heart efficacy would be improved, transportation function rose, which indicated that long-term Samba training, can improve pumping ability when resting, the increase of lung capacity proofed that ventilation and aeration function were increased. On a whole, through participants test results, it can be seen that Samba is helpful for body shape and each organ, which can improve heart and lung's physical ability.

CONCLUSION

Sports dance had a long history and rich cultural exact details. Four months Samba training had an effect on fat reducing and weight losing to college students that enabled BMI index reduced into normal range. It improved college student's body composition, increased its muscle contents and lean body mass, reduced their resting heart rate, improved their lung capacity and strengthen their heart and lung function. Sports dance also possessed features as easy learning and developing, it's helpful for better body exercising and body building through long term adherence.

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