



Proprioception influence on rhythmic gymnastics sport skills formation based on physiology theory

Zhe Wang

Public Physical Education Department, Xuchang University, Xuchang, China

ABSTRACT

By collecting and sorting of cross-disciplines information, make multiple disciplines documents summarize of sports physiology, sports anatomic, sports training, sports psychology, and converge with this paper rhythmic gymnastics research related other fields, such as basketball, football, gymnastics, dance and so on. Apply document literature method card effects of proprioception play in rhythmic gymnastics items; carry out combined and comprehensive statements on definite dimensions functions such as selection, training, injury prevention and rehabilitation and so on. Research shows that proprioception can culture, consolidate and develop rhythmic gymnastics skills; on the other hand, sports skills can also promote proprioceptors function to get further improved and developed, therefore their positive interaction let muscle motions analysis ability as well as motions time judge accuracy get fast improvement, which are proprioception proactive effects on sports.

Key words: Rhythmic gymnastics, proprioception, effects

INTRODUCTION

Event-group that rhythmic gymnastics belongs is skill leading type. For example, female programs in Olympic Games have just aesthetic and accuracy requirements [1]. The event can be both group event and also individual event. Accompany by music, gymnasts should hold light apparatus together with body motions that shows perfect combination, combine competitive and art into one, which is rhythmic gymnastics important characteristics and essential difference from other items [2].

Target of competitive rhythmic gymnastics is to further improve sports skill, and get good results in match. In recently years, our country rhythmic gymnastics has made rapidly development, achieved good results in some major matches [3]. It stems from two aspects factors, first is academic experts get lots of research results through deepen researching and exploring on sports physiology, sports psychology, sports biomechanics and others disciplines. Such rich and precious results provide firm foundation for rhythmic gymnastics development and fully bring scientific guiding into play [4]. Second is from strict requirements to gymnasts. No matter in preliminary selection or following culturing and training as well as final attending to match, all are very important [5]. Every stage has high requirements. With constant maturity and improvements of competitive rhythmic gymnastic, high standard and serious requests are gradually adopted on gymnasts' body control as well as apparatus motion ability [6]. Especially for gymnasts, higher body difficulty is required as well as apparatus continuously updating and improving. Therefore, under such development trends, proprioception as sports skill foundation has gradually become the core that attracts expert's attention in sports fields [7]. However, through documents sorting, it still can be found that few researches made on rhythmic gymnastics, while empirical research even more rarely made, most of them are major on theoretical research [8].

This research especially explores proprioception effects on rhythmic gymnastics on the basis of previous research

results by stating proprioception internal mechanism and analysis of domestic current research status in this field. The purpose is bringing into rhythmic gymnastic research from brand new perspectives; explore influence factors on rhythmic gymnastics development so as to provide scientific guiding on its competitive results as well as injury and illness prevention.

EXPERIMENTAL SECTION

RESEARCH METHOD

Research in this paper adopts document literature method, utilizes Chinese and English periodicals database, searches recent 10 years Chinese and foreign rhythmic gymnastics related Chinese and English documents and looks up relative sports almanac. Based on information sorting, seize Chinese and foreign research current status as well as the field research trends to some extent. Meanwhile, broadly read books related to sports physiology, sports anatomy, sports training and sports psychology so on. Through these relative documents gathering, it provides firm theoretical foundation for this research, at the same time provide reasonable research frame for this research.

CURRENT STATUS OF PROPRIOCEPTION RESEARCH

Proprioception define

Feeling refers to reflections in the brain from receptor that under every healthy searching stimulation, it divides into two categories that is normal feeling and special feeling (as Table 1 shows). Deep sensation also called proprioception, one important composition part that pass feeling into access, which plays equal important role as skin feeling, vision and audition. Proprioception is feeling that produced by muscle, tendon, and joint and other sports organs itself in different status (motion or rest) (for instance, when people close their eyes, he would feel each body part locations). Each kind of receptors contains in muscle, tendon and joint capsule, so that when muscles are extended, specific traction and shrinkage degree can be felt. When proprioceptors get external stimulation, somatic feeling would be generated; this feeling is proprioception [9].

Table 1: Feelings classification

Normal feeling	superficial sensation It is skin mucous membrane sensation, like pains, temperature feeling and touch.
	deep sensation(proprioception) Comes from muscle, tendon, eriostemon and joint proprioception, as sports sensation, location sensation and vibration sensation
	cortex sensation(compound sensation) Including positioning sensation, two points distinguishing sensation, graphics sensation and stereo gnosis so on.
Special feeling	Such as vision, audition, smell and gestation etc.

Proprioceptors (as Figure 1 shows) not only can feel stress and mightiness degree generated by skeletal muscle, tendon and ligament changes due to sports, but also can transfer such degree changes, transfer converted nerve impulse through pivot system to human body, which can make human feel changes that body location in space, posture, and motions so on, these body internal information is called proprioception information, it including joint changes, muscle stretch strength as well as body spacious location and so on. Such feeling to human especially plays an important role in gymnasts adjusting body directions. Proprioception a large system contains two kinds of subsystem, one of them is sports system that can feel all fours and body other parts relative location, and the other kind is balance sense system, it can feel body variant postures and spacious location.

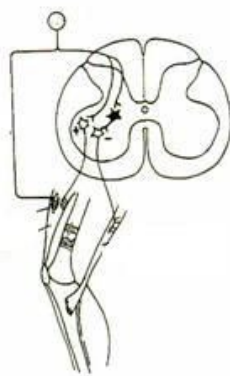


Figure 1: Proprioceptors

Current status of domestic research

Domestic research on proprioception is mostly focus on proprioception test method and proprioception rehabilitation training. Through documents gathering, it has been found that so little research are made on common people proprioception influence by competitive sports and human proprioception as well as sport training in sports fields. Some scholars put forward the shortcomings in such aspects research, such as Yu Fang point out presently less research made on sports kinematics proprioception, deepen exploration should be highlighted in sports proprioception training method, and explore deeply from relationships between proprioception and traditional muscle training. Considering shortcomings in above three dimensions research, she mentioned that such problems should apply empirical research way to carry out exploration [10].

It is still little shown of rhythmic gymnastics exploration from proprioception perspective in domestic academic circle, some representative articles as "Proprioception accuracy and gymnastics teaching correlation research" is researched by experiment method for proprioception individual differences and others exploring. And some relative sports item research play a certain guiding role in gymnastics.

PROPRIOCEPTION EFFECTS ON RHYTHMIC GYMNASTICS

Selection and ability evaluation

The development of competitive sports actually is the continuously exploring of human extremes. Rhythmic gymnastics is a typical item that pursuit extreme in competitive sports. It has been continuously moving forward in the process of continuous challenge human difficulty, sports apparatus difficulty. Gymnasts can get good results through long-term hard training. But with continuous development of science and technology, competitive sports culturing has also gradually focused on high efficiency and return. Due to gymnasts sports life is relative limited and short, selection plays an important basic role in good results getting [11].

Our country rhythmic gymnastics selection including some dimensions, such as techniques, body shape, mentality index, and physiology function and so on. Body shape features plays a very important role in exhibiting aesthetic event-group gymnasts competitive ability. Detailed body shape reference testing table (as Table 2 and Table 3). It can be found that proprioception has significant difference due to it is the foundation of skills forming. In gymnasts training process, proprioception sensitiveness level and its accuracy play important roles. It is the important factor that gymnasts get further development and achieve good scores in gymnastics. Some level test can get acknowledge of gymnasts technical levels in this stage, but cannot find its proprioception degree. Therefore, proprioception should be regarded as one of the important index for rhythmic gymnastics selection, ability evaluation and defining.

Table 2: Table of Male excellent rhythmic gymnasts' body shape testing results

Index	height/cm	weight/kg	Quenelle index	body fat percentage/%	shoulder width/cm
range	154.00~178.00	50.00~73.00	310.56~439.76	8.60~14.60	34.00~46.00
Average number	167.19±4.47	62.65±5.23	374.56±27.52	10.62±1.45	37.03±5.23
index	Pelvis width/cm	Waist circumference/cm	upper limbs length/cm	Lower limbs length/cm	
range	23.00~28.00	64.80~81.50	64.80~77.20	77.10~91.00	
Average number	25.74±1.88	73.97±3.46	70.73±8.96	83.09±3.35	

Table 3: Table of female excellent rhythmic gymnasts' body shape testing results

Index	height/cm	weight/kg	Quenelle index	body fat percentage/%	shoulder width/cm
range	147.00~166.40	42.00~66.00	267.52~407.45	10.90~21.70	32.50~40.00
Average number	157.5±14.27	52.77±5.35	334.71±28.73	14.90±2.34	36.23±1.47
index	Pelvis width/cm	Waist circumference/cm	upper limbs length/cm	Lower limbs length/cm	
range	23.00~29.00	58.80~76.00	59.50~66.00	67.50~91.50	
Average number	25.56±1.32	67.93±3.6	65.17±2.6	81.40±4.18	

Sports skill formation and consolidation

Proprioception and sports skill: Sports physiology points out that all movement of athletes is establish on proprioception. Because the base that athletes possessed all sports skill is a complicated, chained, proprioception sports conditioned response which fully reflects the important role and huge practical significance that proprioception plays in sports skill training and forming process.

Skills cultivation comes from multiple sensory perception mutual actions, and finally formed results. In learning process of rhythmic gymnastics sports skills, proprioceptors plays a information input role, and jointly complete skills training by cortex sports nerve pivot and brains cortex function mutual action and coordination. Conduct to make memory trace active sports system is the origin of proprioception impulse, on the basis of impulse, complete same sequence motions forms. In the whole process, motions should experience repeatedly correcting so that

achieves continuous skills and exquisite techniques. Meanwhile, proprioception that comes from muscle and joint transfer into impulse plays crucial function and effects, it can make conditioned stimulation deeply strengthen so that establish sports conditioned response, and further form into sports skills.

Sports system and proprioception system supplement each other. Only athletes possess good proprioception function, at the same time take scientific and rational special training, then motion function can be formed. After long time sports training, proprioceptors internal mechanism get further improvements and promotion, propel to muscle sports analysis and judge level and accuracy improvements so that can bring good effects and functions into play in sports. Proprioception is also called as “pale sensation”, which is because athletes’ proprioception ability can gradually clearly correctly indicate in awareness and discovers their own sports motions after long time training.

Rhythmic gymnastics requirements to proprioception level

Sports skills are also called as “sports dynamic stereotype”. Different sports items ask for different requirements of proprioception function. Rehabilitation and health care as well as sports training’s proprioception function have remarkable differences. The later pays more attention to mutual dynamic states transformation between body stability and instability. Proprioceptors impulse transfer as well as its precise awareness ability of time and space is an important insurance to correct.

Complete special complex motion techniques. When body controlled by close-circle (with reflection), body can still choose vision to do information reflection so as to correct motion. But once it in the state without reflection, vision is unable to make effects. Therefore, only individuals possess stable, adjusting and coordinated body function proprioception ability, can get an advantage in high techniques and difficulty required sports items, and can get good results. Rhythmic gymnastics including two main techniques, which are body motion techniques and apparatus motion techniques. Among them, base of rhythmic gymnastics is a multiple styles and comprehensive contents body motion. Body motions divides into body basic group motion, body other group motion, technical motion group such three categories, and details can refer Table 4.

Table 4: Body motions classification

body basic group motion	body other group motion	technical motion group
jump, turn, balance, flexible/wave	Dancing posture, travel, skip, single-foot jump, circle, spin	roll, walkover, cartwheel

Rhythmic gymnastics body difficulty motions should complete its minimum standards fixed posture according to rules guiding so can conform to requirements. Meanwhile, judge would also evaluate score with gymnasts completing conditions in whole sports process, therefore their motions quality is the key whether they can get high scores or not. Rhythmic gymnasts not only should possess good physical quality, but also good drive ability to body, and such ability is depend on proprioception stability and sensitiveness. Cooperation level among sports muscles and body gravity center control ability in high speed sports are an important factor that decide sports technical level, the importance of proprioception is not its strength in attending to sports but focus on proprioception effects as coordinate, stability and control in sports.

Influence on rhythmic gymnastics special performance

Proprioception function as acuteness and its effective function that plays build a stable platform to sports engine body reasonable operation. At the same time, it can improve limbs motion ability as well as efficiency so that make whole promotion of platform. Every kind of ability in sports has special significance, muscle ability on the basis of good proprioception and nerve governing can play active role in improving rhythmic gymnastics special performance.

Due to entire exercises in rhythmic gymnastics match is accompanied by music, complete high standard difficulty motions in short time and also should be confront to intensive competitive pressure, inevitably appears some small errors, therefore proprioception should be applied to make technical handling and correcting on such errors, then it is very important to possess a set of “quickly receive, fast cooperation, fast reflection” pivot system operation function and “proprioception” fast adaptation ability.

Sports injury

Sports medicine experts pay more and more attention to proprioception and injury. Lots of scholars makes analysis of rhythmic gymnastics injury from such perspective, find that direct cause to most of injuries is due to proprioception in the poor stable and acute states. Many joint injury direct causes is the appearance of joint proprioception disturbance, and injury further leads to aggravated disturbance, vicious circles happens to the two generates joint secondary injury. Through preventive proprioception training, vulnerable part stability can be increased so as to reduce the risk of secondary injury, propel to damaged part function recovery and further achieve

the purpose of preventing injury.

Others

Training method of proprioception is still quite traditionally, most are focus on static force training method application. But such method can not meet sports demand. And traditional training method mainly is from rehabilitation and medical fields can not reflect sports kinematics features and cannot closely combine normal training and specials. Some scholars puts forward puff extension method and think it can change flexibility, more research on such fields. More research together with same results, more applied in Chinese and foreign before and after training, is worthy of further promotion. Scholar Li Ling in his research puts forward some common proprioception training forms, including integrated sensation training, location sensation mechanism initiative training method, direct help method, and passive complete motion experience method.

In documents sorting process, discover that it is quite little shown of empirical research on proprioception in rhythmic gymnastics field, and not yet form into completed theory system, no unified standard or authority statement on proprioception training and test method in rhythmic gymnastics field in China.

CONCLUSION

Through deepen research with documents literature, it has been found that research on effects and relations between competitive sports and human proprioception and sports training in sports field is relative rare. Especially, proprioception effect and function research in the rhythmic gymnastics is even more rare. Due to athletes sports life is extremely limited, every athlete own proprioception function development degree is decisive to his further development in sports items. Therefore, this paper put forward to bring proprioception into rhythmic gymnastics selection and ability evaluation index range. On one hand, proprioception can culture, consolidate and develop rhythmic gymnastics skills, at the same time, on the other hand, sports skills can also propel proprioception to be further improved and developed, therefore positive interaction between the two let muscle sports analysis ability and precise judge of motion time get fast promotion, which is proprioception active roles that play in sports. Two major techniques in rhythmic gymnastics put forward high level requirements to gymnasts' proprioception. Gymnasts' proprioception should go through whole body different part coordinate, stable and control to segments sports so as to fulfill maximum sports efficiency. "Fast receive, fast cooperation, fast reflect" mechanism and "Proprioception" fast adaptation ability is the important insurance for rhythmic gymnasts get enviable results in important matches. Proprioception function can utilize developing nerve control and coordinate function to let its sensation stability and sensibility get deeply development, reduce injury risks, and achieve objectives of injury prevention.

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