

太极拳运动促进健康独特优势的动作解剖学分析

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摘要: 太极拳运动的所有价值主要从其独特的动作组合展现出来的。是否可以从解剖学专业的角度解释太极拳和其他运动相比的主要动作特点? 太极拳运动对人体健康促进是否存在不可替代性? 带着以上问题, 以二十四式简化太极拳为例, 从人体环节调动的数量、肌肉调动的数量、关节活动的角度、肌肉收缩的速度等进行对比分析, 找到太极拳与其他项目运动的关键性解剖学差别。为太极拳运动促进人体健康提供解剖学证据支撑。研究通过对比分析和数理统计等方法将太极拳运动和其它类体育项目进行解剖学对比分析。其他项目选取包括田径类的跑步和标枪两个项目, 球类运动中的足球和网球项目, 水上项目中的自由泳。二十四式简化太极拳的动作运行轨迹、运行模式等与以上几个运动项目对比有非常独特的差别, 主要体现在以下几个方面。首先是关节活动的角度分析, 肩关节活动(前屈、后伸、内收、外展、内旋、外旋)角度之和计算, 太极拳明显高于所列举的运动。另外从肘关节、膝关节、髋关节等几个关节活动角度进一步分析, 太极拳仍然高于其他几个项目。第二, 从关节的均衡性发展分析。太极拳与单纯的跑步项目相比上肢活动范围更广, 上下肢发展更加均衡, 与足球运动相比太极拳的上下肢均衡锻炼优势同样比较明显。太极拳与网球运动和投掷项目相比, 左右上肢发展更加均衡。自由泳项目相与太极拳在肢体均衡性角度比较接近。第三, 从非重复性骨骼肌数量调动的角度分析, 排除受外力影响情况, 太极拳调动骨骼肌数量高于其他几个项目。投掷项目中不断重复优势肢体的固定动作, 其调动的肌肉数量始终围绕在投掷单侧肢体关节周围, 跑步调动肌肉数量单一而重复, 网球运动运用最多的正反手击球和下肢跑动多是重复性动作, 足球同样在奔跑、射门和传球等过程中大量重复动作, 游泳与跑步类似是重复最多的运动之一。第四, 从骨骼肌收缩速度分析, 太极拳是所列举项目中速度最慢的, 骨骼肌离心收缩更明显, 远固定支持运动较多。对骨骼肌的力量增加和肌肉损伤保护作用兼备。短跑项目骨骼肌收缩速度较快, 短时间收对骨骼肌的损伤较大, 马拉松等收缩速度相对较慢但重复收缩次数过高, 同样容易对骨骼肌同样产生损伤。投掷项目、网球运动需要在 0.12-0.17 秒时间内完成肌肉收缩完成投掷和挥拍动作。游泳项目骨骼肌收缩速度较慢, 其主要原因是来自水的阻力。以上四个方面可以清晰的了解到太极拳的解剖角度独特之处, 解剖学的独特之处进而影响了对人体生理的刺激不同。关节的角度活动的不同决定了肢体活动的范围, 当人体各关节在其基本物力结构的限制下, 通过肢体锻炼达到其活动正常范围的

界限,符合人体的自然进化规律,自然对人体健康带来相应的促进作用。人体均衡性发展是健康的基础条件,人体的单个关节出现明显落后其他环节的现象,都将破坏人体的整体平衡,如上下肢或左右肢非均衡发展,除了在力量耐力等运动是更容易造成损伤,其毛细血管的数量、血液循环效率都存在差异对身体其他器官必然带来影响。当部分关节长期非均衡使用锻炼,就会因为运动不足或运动过量而损伤。骨骼肌调动的数量体现了交感神经、副交感神经和自主神经的协调能力,当调动的肌肉数量恰到好处完成目标动作要求的速度和角度,则是以最高效率完成了相关运动。从骨骼肌的肌丝滑动学说可以了解到,肌肉收缩速度越快,粗肌丝和细肌丝承受的张力越大,对应产生细微的肌丝损伤越多,当增加足够的符合,重复足够的次数损伤就会逐渐累积形成大面积损伤。对太极拳运动动作的解剖学客观分析总结发现,与足球、田径、游泳、网球等项目相比,太极拳的关节活动的总体范围更大,关节的均衡发展程度更高,非重复性肌肉调动的数量更多,骨骼肌收缩的速度相对较慢。这些解剖学特征正是太极拳运动促进健康优势所在,从解剖学动作的不同导致更深层次的生理学变化不同,再从人体的生理变化进一步影响整个人体各系统的协调工作,最终促使身体健康得到保持和促进。仅从太极拳的外在形式的不同可以证实其对人体健康的独特优势,太极拳对人的内在的思想层面的影响同样值得深入研究。太极拳与其他运动项目相比对健康的促进的优势,首先从外在动作形式开始,再到神形的统一,其外在在动作的解剖学差异,就是其健康促进优势的有力依据。

关键词: 太极拳; 健康促进; 运动解剖学; 对比优势

Anatomical Analysis of the Unique Advantages of Tai Chi Exercise in Promoting Health

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Abstract: What is the unique health value of Tai Chi exercise? Can we explain the anatomical characteristics of Tai Chi compared to other sports from an anatomical perspective? Is Taijiquan exercise irreplaceable in promoting human health? With the above problems in mind, take the Twenty four Style Simplified Taijiquan as an example, and make a comparative analysis of the number of human links mobilized, the number of muscles mobilized, the angle of joint activities, and the speed of Muscle contraction, to find the key anatomical differences between Taijiquan and other sports. Provide anatomical evidence support for promoting human health through Tai Chi

exercise. The study conducted anatomical comparative analysis between Tai Chi and other types of sports through methods such as comparative analysis and mathematical statistics. Other events include running and javelin in track and field, football and tennis in ball games, and Freestyle swimming in water sports. There are very unique differences in the movement trajectory and mode of the 24 style simplified Tai Chi compared to the above sports, mainly reflected in the following aspects. The first is the angle analysis of joint activities. The sum of the angles of Shoulder joint activities (flexion, extension, adduction, abduction, internal rotation, external rotation) is calculated. Taijiquan is significantly higher than the listed movements. Furthermore, from the perspective of joint movements such as elbow, knee, and hip joints, it can be further analyzed that Tai Chi is still higher than other sports. Secondly, analyze the balanced development of joints. Compared with simple running events, Tai Chi has a wider range of upper limb activities and a more balanced development of the upper and lower limbs. Compared with football, Tai Chi also has significant advantages in balancing upper and lower limb exercises. Compared to tennis and throwing events, Tai Chi has a more balanced development of the left and right upper limbs. Freestyle swimming is similar to Taijiquan in terms of limb balance. Thirdly, from the perspective of non repetitive skeletal muscle movement, excluding the influence of external forces, Tai Chi exercises have a higher number of skeletal muscle movements than other events. In the throwing event, the fixed movements of the dominant limb are constantly repeated, and the number of muscles mobilized is always around the joint of the throwing unilateral limb. The number of muscles mobilized in running is single and repetitive. The most commonly used forehand and backhand strokes and lower limb running in tennis are repetitive movements, while the foot ball also repeats a lot of movements in the process of running, shooting, and passing. Swimming and running are similar to one of the most repetitive movements. Fourthly, based on the analysis of skeletal muscle contraction speed, Tai Chi is the slowest among the listed items, with more pronounced centrifugal contraction of skeletal muscles and more support for far fixed movements. It has a combined effect on increasing the strength of skeletal muscles and protecting against muscle damage. Skeletal muscles contract faster in sprint events, and short-term contraction can cause significant damage to skeletal muscles. Marathons and other events have relatively slow contraction rates but high repeated contractions, which can also easily cause damage to skeletal muscles. Throwing events and tennis need to complete Muscle contraction to complete throwing

and swing in 0.12-0.17 seconds. The slow contraction speed of skeletal muscles in swimming events is mainly due to resistance from water. The above four aspects provide a clear understanding of the unique anatomical perspective of Tai Chi, which in turn affects the different stimuli to human physiology. The different angles and activities of joints determine the range of limb activity. When each joint in the human body is limited by its basic material structure and reaches the limit of its normal range of activity through limb exercise, it conforms to the natural evolution laws of the human body and naturally brings corresponding promoting effects to human health. The balanced development of the human body is a fundamental condition for health. The phenomenon of a single joint significantly lagging behind other links in the human body will disrupt the overall balance of the body. For example, the uneven development of the lower limbs or left and right limbs is more likely to cause damage in sports such as strength and endurance, and differences in the number of capillaries and blood circulation efficiency will inevitably have an impact on other organs of the body. When some joints are exercised unevenly for a long time, they may be injured due to insufficient or excessive exercise. The number of skeletal muscles mobilized reflects the coordination ability of Sympathetic nervous system nerve, Parasympathetic nervous system nerve and autonomic nerve. When the number of muscles mobilized is just enough to complete the speed and angle required by the target action, the relevant movement is completed with the highest efficiency. It can be learned from the muscle silk sliding theory of skeletal muscle that the faster the Muscle contraction speed is, the greater the tension the thick muscle silk and the thin muscle silk bear, and the corresponding more subtle muscle silk damage will be generated. When enough coincidence is added, the damage will gradually accumulate to form a large area of damage after repeated enough times. An objective analysis and summary of the anatomy of Tai Chi movements found that compared to sports such as football, athletics, swimming, and tennis, the overall range of joint activity in Tai Chi is larger, the degree of balanced development of joints is higher, the number of non repetitive muscle movements is more, and the speed of skeletal muscle contraction is relatively slow. These anatomical features are precisely the advantages of Tai Chi in promoting health. Different anatomical movements lead to deeper physiological changes, and then further affect the coordination of various systems in the human body, ultimately promoting the maintenance and promotion of physical health. The unique advantages of Tai Chi in terms of its external form alone can be confirmed for human health, and

the impact of Tai Chi on people's internal thinking is also worthy of in-depth research. Compared with other sports, Tai Chi has the advantage of promoting health, starting from the form of external movements and then to the unity of spiritual form. The anatomical differences in external movements are a strong basis for its health promotion advantages.

Key words: Tai Chi, Health promotion;, Sports anatomy;, Comparative advantages