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Common Trigger Points on College-Level Athletes with Various Sports

The purpose of this study was to investigate the distribution of trigger points(TrPs) on athletes with various sporting background. To achieve the purpose, a study was carried out through a survey from 180 athletes involved in 6 selected sports at Yong-In University. Selected sports included Judo, Taekwondo, Kendo, Ssi-reum(Korean traditional wrestling), Boxing, and Golf. An interview type survey and physical examination were conducted with each thirty athletes from each of the selected sports groups. Technical statistic(SPSS 15.0) was used to analyze the distribution of TrPs on these athletes. The most common TrPs observed in muscles of Trapezius, Quadratus Lumborum, Quadriceps in Judo. In Taekwondo, it was on the trapezius and triceps surae. Kendo athletes had TrPs at sites of trapezius, brachioradialis and triceps surae. Ssirem athletes were found to have TrPs on trapezius, deltoid and quadrates lumborum. In boxers, TrPs appearing at trapezius and brachioradialis were observed. Finally, Golf players were seen to have TrPs at trapezius, quadrates lumborum and brachioradialis. Hence, the analysis shows that there are significant differences of the distribution of TrPs according to the different sport items of the athlete.

Key words : *athlete; myofascial pain syndrome; sports item; sports injury; trigger point*

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INTRODUCTION

Sports refer to activities involving physical exertion and skill by a set of rules or customs and they are often undertaken competitively. Physical movements executed by an athlete are more structured and effective than the normal population for the sporting background the athlete acquires. Throughout history, improved life styles derived from industrial development and increased financial funding has led to great changes in the world of sports through professionalized subdivisions. Subsequently, the competitive nature of sports has risen. For this reason, sport players are often injured especially during competition periods. Sport injuries may arise from lack of skills or pre-exercises, overtraining, or physical or emotional distress. Each sport has different mechanisms of injury(1). Implication of sports injuries include not being able to participate in the sport or any related competitions(2). In addition, the pain may reduce their sporting abilities which are usually a crucial factor for the team to decide whether players play on or not(3).

Myofascial Pain Syndrome(MPS) is a frequent diagnosis and it comprises of approximately 30% to 70% of outpatients complaints in Korean physical therapy clinics(4). A source of data regarding prevalence of MPS outside Korea approximated to 85% of patients among 183 patients who visited a physical therapy clinic(5). Friction et al. reported that 55.4% of patients among 296 complained of cranio-cervical pain(6). It was also reported that 31% of patients who were referred from the internal medicine discipline, complained of MPS(5).

MPS in the upper extremities was commonly found with occupational health problems throughout the world(7). Kaergaard and Andersen(8) reported that MPS in the neck and shoulders comprised 15.2% in women who worked on sewing machinery controllers. It was found that 31.3% of wrist watch manufacturers also complained of MPS. MPS is not only common with the manufacturing industry but also common in the office environment especially with the use of computers. A research stated that MPS has 60% prevalence rate among post office workers (9). It is evident that extensive research has been performed about MPS in the occupational health aspect. However, research lacks in the field of sports.

The aim of this study is to investigate and analyze areas of injury, re-occurrences of pain after recovery and distribution of TrPs.

BACKGROUND

Trigger point(TrPs)

TrPs are pressure spot which is located in horizontally crossed muscle fibers. Points are normally found close to attachment sites of ligaments and tendons. When pressure is applied to the point it induces refered pain. Hypothetical explanations exists regarding characteristics of TrPs. Active TrPs exhibits high sensitivity with pain even in the absence of pressure. When pressure is applied, radiating pain frequently occurs. Inactive TrPs only produce pain by application of pressure. Even though the pain may radiate elsewhere, it is easily localized. If muscle is present with inactive TrPs, it tends to be more contractive and sensitive with stimulations. Muscle strength maybe lost which may eventuate to loss of functional ability. Active TrPs site that is allowed to continue for a prolonged period of time leads to a latent period, which may be changed to active state through stretches(10).

Symptoms

Active TrPs are most commonly identified by pain brought on by applying pressure. Inactive TrPs has different characteristics including increased muscle tension and presence of muscle contractures. Both active and inactive TrPs may lead to functional disability in sports. Interestingly, inactive TrPs may be stimulated more easily than the active TrPs. An acute key TrPs in a muscle can induce an acute satellite TrPs in another muscle. When key myofascial pain TrPs are weakened, satellite myofascial pain TrPs also are inactivated without direct treatment of it(11).

Manifestation

Activation of TrPs are seen as related to muscle overuse. This overuse may lead to muscle overload, which suggests that an active TrPs may be of acute, chronic or repetitive nature. In addition, inactive TrPs can convert to active TrPs when the muscle is in contraction. Active TrPs are usually made worse by further contracting the muscles. In case of paraspinal muscle, number of active TrPs has a closed relationship with level of neural deformations examined by EMG(12). Complaints from patients mainly refer to the TrPs most newly formed. Often when the new TrPs are treated, the pattern of pain returns to that which originates from the key TrPs. When the key is in inactive state, the patient does not need treatment, as symptoms do not persist. Also, it is important to note that! the sensitivity of the TrPss that affect the level and areas of referred pain not the size of the affected area.

Pain characteristics of TrPs

When patient acquires an active TrPs, they complain of vague area of pain. The pain is sensed from the muscle, joint and subcutaneous structures. Patients rarely complain of pain at a distinct area. TrPs may radiate far away from the origin of pain; however this all depends on individual muscle features. Development of an active TrPs are most prevalent in the middle aged group. After this period the chance of developing TrPs declines but the transition to an inactive state occurs. It is this presence of numerous sites of inactive TrPs that people experience muscle contractures and limitation of range of motion.

Stated that overuse physical workers have less number of active TrPs compared to stationary office workers. Active TrPs were found to be most commonly located in the cervical, shoulder, pelvic and the masticator regions. Other areas common with TrPs were upper trapizius, scalenes, sternocleidomastoid, levator scapulae and quatratus lumborum(11).

Mobility impairment

A main symptom of myofascial pain is movement imbalance. Imbalanced muscle tension leads to com

promised coordination of muscle movements. This functional impairment of muscle is easily found in athletes. Therefore athletes may have compromised skills due to this mobility impairment. For example, athletes who require agile ground skills to play sports, might suffer from chronic ankle instability arising from muscle imbalance and other associated factors. Sometimes athletes, who have MPS, drop object from hands. Muscle stiffness and weakness are at its strongest in the morning or after a period of rest. Muscle pain and tension may also refer reflex effects to the whole body. An example of this is when a patient experiences sciatica he may also experience limitation of jaw movement. This symptom can be recovered with TrPs treatment. Muscular pain does not relate to muscle contracture. Body weight could activate inactivated TrPs dramatically in the back, hands and feet.

Sensation changes

Sensation changes occur at pain reflex area. Level of sensation changes can be affected by aggravating factors such as activities and pain level. Strong activity of TrPs at muscles can make reflex effects at insensitive muscles. In other cases, when the reflex zone of active myofascial pain TrPs are overlapped with several muscles, referred pain can be extremely strong and the reflex zone can be hypersensitive in susceptibility.

Autonomic nerve symptoms

Autonomic nerve symptoms are classified by the presence of symptoms such as peripheral blood circulatory disorder, pilomotor dysfunction, sudoriferous dysfunction, vertigo and vomiting. Skin temperature or pain reflex is reduced in the affected area compared to the surrounding area. Low temperature(over 10 degree) will mean that the patients mainly feel cold sensation and pain in the arms and legs. The difference in the skin temperature may disappear after a TrPs treatment instantaneously or have a delayed effect after 1 to 4 hours. When a capillary is enlarged specific spots are 5 to 10 degrees higher than surrounding area. It can be relevant to activities of perspiration or changes in skin temperature as sweating decreases skin temperature.

METHOD

Subject

Pre-research of this study was conducted between 20 and 24 of March 2008. After that a modified questionnaire was made. Interview type of questionnaire was conducted between 1st and 8th of April 2008 from 6 sport players (n=180) who have MPS after sport injuries.

Data collection and tool

The aim of this study was explained to the volunteers before starting this study. A researcher directly interviewed with the volunteers to collect data. 30 athletes were randomly selected from 6 sports such as Judo, Taekwondo, Kendo, Ssireum, Boxing, and Golf. A questionnaire was modified by a researcher to update to the current status.

Statistical analysis

Collected data was changed to computerized symbols and then the data was analyzed by SPSS 15.0 program($p=0.05$). Descriptive statistics was used to calculate frequency and percentage of specific distribution among the subject. Contingency tables X^2 test was conducted to compare distribution of responses frequency.

RESULTS

General characteristics of the subject

30 male athletes were selected from 6 sports: Judo, Taekwondo, Kendo, Ssireum, Boxing and Golf. Ages of subjects were between 19 and 30 year old. 80% of the subjects were between the ages of 20 and 22. Mean height among subjects was 175.8cm and the standard deviation was 5.89. Ssireum athletes had higher values for this category than other athletes from other sporting background. Mean body weight was 77.1 kg and the standard deviation was 16.78. Ssireum athletes weighed significantly more than others especially compared to Taekwondo and Boxing athletes(table 1).

Distribution of TrPs that athletes have according to their sport items

The distribution of trigger points on athletes with various sporting background were as follows: In Judo, TrPs are most commonly found in trapezius,

Table 1. A general characteristics of a subjects

(Unit : person)

Item		N	Average	Standard deviation
Age	Judo	30	21.53	1.96
	Taekwondo	30	20.80	1.03
	Kendo	30	21.27	1.01
	Ssireum	30	21.20	1.13
	Boxing	30	21.00	0.91
	Golf	30	24.07	3.39
	Total	180	21.64	2.10
Stature	Judo	30	174.97	6.901
	Taekwondo	30	175.93	5.407
	Kendo	30	175.60	4.591
	Ssireum	30	179.33	4.097
	Boxing	30	172.60	7.546
	Golf	30	176.07	4.242
	Total	180	175.75	5.888
Body weight	Judo	30	80.60	12.886
	Taekwondo	30	66.23	7.295
	Kendo	30	75.27	8.021
	Ssireum	30	98.47	22.146
	Boxing	30	67.20	14.495
	Golf	30	75.00	6.034
	Total	180	77.13	16.776

quadrates lumborum and quadriceps. In Taekwondo, it was in trapezius and triceps surae. Athletes who Kendo had TrPs at sites of trapezius, brachioradialis and triceps surae. Ssireum athletes were found to have TrPs in trapezius, deltoid and quadrates lumborum. In boxers, TrPs appearing at trapezius and brachioradialis were observed. Finally, Golf players were seen to have TrPs at trapezius, quadrates lumborum and brachioradialis. There are significant differences of the distribution of TrPs according the sport items of the athlete(Table 2, Figure 1).

When the results are concretely reviewed, distribution of myofascial pain TrPs were shown in trapezius muscle most frequently in all athletes of Judo, Taekwondo, Kendo, Ssireum, Boxing, and Golf, and most of the cases was shown in muscles that are mostly used by each sport. Also, although myofascial pain TrPs of athletes by each sport is not accompanied with pain at present, it is characteristic as latent myofascial pain TrPs that is painful only when relevant region is stimulated.

DISCUSSION

Those results could be explained that, in the Golf, unlikely the sports games such as Judo, Taekwondo, Kendo, Ssireum, and Boxing that require the contacts of bodies, the bodies are not contacted and the waist is mainly used. This explanation is also confirmed by the study(13) reported that 190 from 500 pro Golfer responded in the questionnaire survey that the playing Golf, on the one hand, enhances the waist, on the other hand, causes injuries on it in many cases.

The results of previous studies on the injured parts of athletes according to the kind of sports games are as follows: It was reported that, in the Judo, the knee(38.5%) was most injured part(14); in the Taekwondo, the ankle joint(60.0%) was most injured one(15), in the Kendo, the ankle(57.1%) was most injured one(16), in the Ssireum, the knee and ankle(37.8%) were most injured one(17), and in the Boxing, in its athletic nature, the wrist joint (31.2%)were most injured one(17). Those results agree

Table 2. Trigger point distribution of exercise players by an item (Unit : person)

Muscles	Judo	Taekwondo	Kendo	Ssireum	Boxing	Golf	Total
Sternocleidomastoid m.	0	0	4	0	2	2	8
Trapezius m.	13	28	24	24	26	20	135
Supraspinatus m.	0	0	0	0	0	2	2
Infraspinatus m.	1	0	0	2	0	2	5
Deltoid m.	6	0	0	18	0	2	26
Rhomboid major Eminor m.	2	0	0	6	0	0	8
Subclavius m.	1	5	2	0	0	0	8
Pectoralis major m.	2	1	0	0	0	0	3
Pectoralis minor m.	2	0	0	0	0	0	2
Extensor digitorum m.	1	0	2	0	4	0	7
Extensor carpi ulnaris m.	1	0	4	0	4	0	9
Brachioradialis m.	2	2	14	4	16	12	50
Pronator teres m.	1	0	0	0	0	0	1
Flexor carpi radialis m.	1	0	0	0	2	0	3
Flexor carpi ulnaris m.	2	0	2	0	4	0	8
Biceps brachii m.	0	1	0	0	0	0	1
Triceps brachii m.	0	0	0	0	0	4	4
Quadratus lumborum m.	11	6	4	18	4	14	57
Multifidus m.	0	0	0	2	0	0	2
Gluteus medius m.	1	6	0	4	2	2	15
Quadriceps femoris m.	11	4	6	4	2	0	27
Tibialis anterior m.	2	8	4	2	4	0	20
Biceps femoris m.	5	4	8	0	6	0	23
Triceps surae m.	9	17	12	10	4	2	54

with them from this study that investigated the injured parts according to the kind of sports games.

It was shown that those results are moderately agreed with the distribution of injured parts and the myofascial pain spots. It was also shown that the distribution of injured parts of athletes and the myofiscial pain spots are various according to the kind of sports games.

CONCLUSION

The distribution of trigger points on athletes with various sporting background was as follows: In Judo, TrPs are most commonly found in trapezius, quadrates lumborum and quadriceps. In Taekwondo, it was in trapezius and triceps surae. Athletes who Kendo had TrPs at sites of trapezius, brachioradialis and triceps surae. Ssireum athletes were found to have TrPs in trapezius, deltoid and quadrates lumborum. In Boxers, TrPs appearing at trapezius and brachioradialis were observed. Finally, Golf players were seen to have TrPs at trapezius, quadrates lumborum and brachioradialis. There are significant differences of the distribution of TrPs according the sport item of the athlete.

Trapezius was found to be the muscle group which had the highest prevalence of TrPs among the athletes. Although active TrPs are adequately researched, it was found that further investigation examining prevention and treatment methods for latent TrPs are required.

A characteristic of TrPs were latent TrPs which only produced pain when it had stimulation. From this result, further investigations are required to develop a prevention program for TrPs and generalize a result of research. This research could be contributed to provide treatment information for injured areas and also it can be basic information to develop injury prevention program for TrPs.

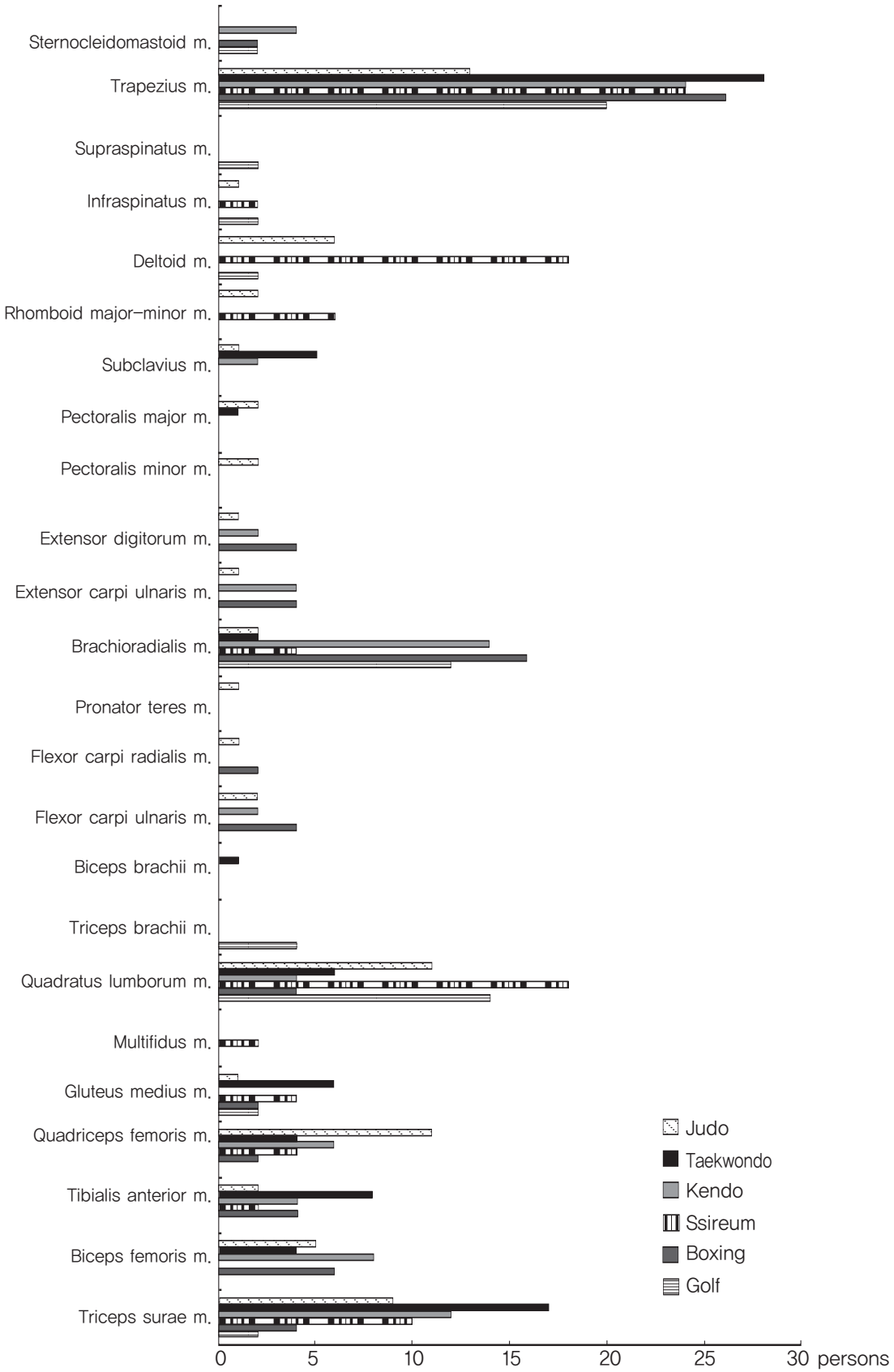

Fig. 1. Trigger point distribution of exercise players by an item

REFERENCES

1. Kim KH. A Clinical Analysis of Yudo Athletes' Sports Injury. Department of Protection & Sports, Graduate School of Industrial Information, Kyungwoon University 2007.
2. Jung YH. Study on Taekwondo Athletes' Sports Injury and Competition Anxiety. Department of Physical Education Graduate School of Education Chong-ju University 2006.
3. Choi DS. The Effects of Sports Massage to Fibromyalgia Syndrome Patients Quality of Life and Pain Level. Department of Graduate School Wonkwang University 2006.
4. Kim JM. Primary Medical Access of Myofascial Pain Syndrome. J Korean Acad Fam Med 2001; 22(9): 1315-1320.
5. Simons DG. Myofascial pain syndrome. Where are we? Where are we going?. Arch Phys Med Rehabil 1988; 69: 207-212.
6. Friction JR, Kroening R, Haley D, Siegert R. Myofascial pain syndrome of the head and neck, a review of clinical characteristics of 164 patients. Oral Surg Oral Med Oral Pathol 1985; 60(6): 615-623.
7. Kim JS, Kim IA, Lee SJ, Kim YK, Park SB, Ko JW, Song JC. Analysis of Shoulder Range of Motion in Shoulder Myofascial Pain Syndrome. The Korean Journal of Occupational and Environmental Medicine 2005; 17(4): 333-342.
8. Kaergaard A, Andersen JH. Musculoskeletal Disorders of the Neck And Shoulders in Female Sewing Machine Operators :Precalence, Incidence, and Prognosis. Occup Environ Med 2000; 57(8): 528-524.
9. Jang KU, Kang TD, Park JT, Kim DS, Park DH. The Prevalence and Ergonomic Analysis of Cumulative Trauma Disorders in the Paper Reviewing Workers. J Korean Acad Rehabil Med 2000; 25(2): 321-329.
10. Choi H. Understanding of Trigger Point and Trigger mechanism. Shin-Heong Med Science 2007.
11. Travell JG, Simons DG. Myofascial Pain and Dysfunction, The Trigger Points mannual. Vol 1 2nd ed. Baltimore:Williams & Wilkins 1992; 1-93.
12. Hong CZ, Chen YN, Twehous DA. Pressure threshold for referred pain by compression on the trigger point and adacent areas. J Musculoske Pain 1996; 4(3): 61-79.
13. Choi SS. A study on the exercise injury in the aspect of remedy by investigating golf club members. The graduate school of Yongin University 2000.
14. Park JY. The Study on Sport Injury According to the Individual Characteristics of athletes. Major in Physical Therapy Department of Physical Therapy Graduate School of Rehabilitation Health and Science Yong-in University 2003.
15. Shim IG. A Study non chief causes and Prevention of Sport Injuries for Students Majoring in Chivalry(Centering around Major in Judo and Tae Kwon Do). Department of Social Physical Education Graduate School of Social Education Myong Ji University 1996.
16. Seong IJ, A study on the sports injuries and rehabilitation of Kendo player. Major in Sports rehabilitation Graduate School of Sports Science, Kyonggi University 2004.
17. Jung BH. A study on the sports injuries of Ssirum player registered in university and company. Major in Exercise Prescription and Rehabilitation Graduate School of Sports Industry Kookmin University 2004.