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Effect of Graston Soft Tissue Mobilization Technique on Muscular Force

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Abstract

Background: The Graston Technique (GT) is a form of manual therapy known as soft-tissue instrument-assisted mobilization and has been recently popular in World of Sport. GT has been used for muscular relaxation and for increasing range of motion (ROM) but when compared with classical stretching techniques GT usage has some advantages like less injury risk, fascial correction effect, less metabolic fatigue. While achieving muscular relaxation and increased ROM, static stretching creates energy expenditure and decreased alpha motor neuron activity. In GT these results are not expected due to its application characteristics. The focus of the article is to determine whether GT application creates muscular inhibition while relaxation of muscle comes out.

Participants: 103 amateur athletes participated the study as 49 people in GT application group (19,6±3 years) and 54 people in control group (19,6±3 years). Antebrachii flexors were targeted as application field. G+1 soft tissue mobilizator and sweeping technique were used for 1 minute on left and right forearms. Before and after application forearm isometric muscle strength was measured using digital hand dynamometer for both groups.

Results: In statistical analyzing IBM SPSS version 22 computer program and Paired Samples t Test were used and wasn't determined any significant difference between application and control group scores.

Discussions: The result that GT has no inhibition effect on muscles after application so it can be used a tool to make athletes having muscle stiffness and spasms prepare competition and training without decrement of muscle force.

Keywords: Graston Technique, Muscular Force, Muscular Inhibition

Introduction

The deviation of physiological and biomechanical parameters like blood lactate level, muscular hypertonicity, decreased range of motion (ROM) in joints, decreased glucose stores etc. should be reverted after training or competitions in Sport. At this point stretching exercises, muscle energy techniques, classical massage etc. are used for recovery of the athletes. Behind that some in these applications are used to prepare the athletes for completions or training sessions to increase motoric functions (Hausswirth, & Mujika, 2012). In recent years the studies determined that muscular fascia is affected negatively after physical effort and should be reverted in term of extensibility and metabolically (Hammer, 2008; Liptan, 2010; Purslow, 2002). The adhesions and collagen disturbances should be eliminated not to effect neuromuscular performance of the athletes (Hammer, 2008; Launder, Compton, McLoda, & Walters, 2014). The muscular fascia composed of collagen fibers, in addition to covering muscle fibers, has afferent receptors and with this feature it started to be accepted as an extension of somatosensory system (Schaefer, & Sandrey, 2012). Especially repetitive motoric movements creates micro inflammations on fascia and results in micro adhesions. After high intensity physical activities compositions of collagen fibers are affected negatively. So in this way neuromuscular coordination weakens (Khan, & Scott, 2009; Bozkus, 2013; Loghmani, & Warden, 2009; Howitt, Wong, & Zabukovec, 2006).

For some sports to prepare joints to competitions is important especially the ones which needs high range of motions. In that scope static stretching exercises are used before competitions or most time after physical activity high intensity to resolve muscular spasms (Portillo-Soto, Eberman, Demchak, & Peebles, 2014; Young, & Elliott, 2001). That method creates metabolic stress on muscles and force decrease before activity pain after activity in training and competitions (Shrier, 2000). For that reason a new method comes out to achieve muscular extensibility without lack of energy expenditure and hypotonicity of muscle.

Graston Technique is a tissue mobilization with an instrument usage which is inspired from Gua-shua that is a tool of Traditional Asia Treatment Approaches. The key point is to move fascia and to create a local warming for muscles to relax. The area which is a target for application determines which kind of GT mobilizator tool will be used. Mobilizator instruments are titanium covered and have different shapes and sizes (Gehlsen, Ganion, & Helfst, 1999; Heisey, & Kingsley, 2016). GT has a mechanical advantage instead of classical massage for relaxing muscles and tissues. GT is done with instruments so to create enough pressure on tissue needs less force than hand usage (Bentley, 2007; Carey, Hammer, & Vincent, 2001; Kim, Sung, & Lee, 2017).

The aim of the study is to determine whether GT would create a decrease on muscular force after application. As it was mentioned before if it is used before physical activity to achieve tissue warming and tissue extensibility for ROM and stiffness, a decrease of muscular force would come out and thus sportive performance could be affected negatively.

Material and Method

Participants

103 amateur athletes (49 for application group, 54 for control group) that have been studying in Duzce University participated to the study voluntarily. All information about the scope of the study was given to the participants before the study. It was told that they shouldn't use any alcohol in 48 hours, make high intensity physical activity in 24 hours and get any food intake in 2 hours before GT applications. The study was approved by Ethics Committee of Duzce University with the number of 2019/35 permission.

Procedure

Tanita SC-330 device was used for body composition (Barbosa, Barros, Post, Waitzberg, & Heymsfield, 2003) and Seca brand Stadiometre for height measurements. For muscle isometric strength measurements a digital hand dynamometer (Takei) was used and Hawk-Grip HG5 tissue mobilizator tool for GT application. In the application and test processes GT was applied on left and right antebrachii volar surface in the boundaries of medial epicondyle, pronator teres muscle lateral inferior border and flexor carpi ulnaris muscle line. The GT application technique was sweeping with 45 degrees inclined to cranial, light pressure, longitudinal touch and one direction for 1 minute. In this application the participants were sit on a chair with their forearms laid on an application table (Carey, Hammer, & Vincent, 2001). For GT application as a lubricant a baby oil was used and as a termination factor of GT application was to have an excessive hyperemia. The participants with allergic reactions were ruled out. All GT applications were carried out to application group by a certificated physical therapist on GT. For isometric muscle strength measurements all participants were sit on a chair with their forearms hanged down near the body. The wrist and elbow were in a neutral position. 3 measurements were taken with the period of 2 minutes and best score was recorded as data (Barut, Demirel, & Kıran, 2008).

Statistical Analysis

The data recorded were evaluated using IBM SPSS version 22 computer program. In the statistical analyzing *p* significance value was determined as below 0.05 and The Paired Simple t Test was used to compare the scores of both groups.

Findings

Table 1. Demographic Characteristics of the Participants

n=103	Body Weight (Kg, ± SD)	Body Height (Cm, ± SD)	Age (Years ± SD)
Application Group(n=49)	65,75±10,8	173,53±8,0	19,6±,3
Control Group (n=54)	70±12,7	175,40±7,3	19,3±1,9

SD: Standard Deviation

Table 2. The Results of Dynamometer Measurements

	n	Min. kg	Max. kg	Mean kg	SS kg	*p*
(AG) Before Application (Right)	49	22	62	43	11	*0.73*
(AG) After Application (Right)	49	23	64	43	10	
(AG) Before Application (Left)	49	21	61	43	9	*0.16*
(AG) After Application (Left)	49	21	63	42	10	
(CG) First Measurement (Right)	54	25	73	45	10	*0.28*
(CG) Second Measurement (Right)	54	24	65	44	9	
(CG) First Measurement (Left)	54	25	67	43	9	*0.28*
(CG) Second Measurement (Left)	54	24	63	43	9	

AG: Application Group CG: Control Group SD: Standard Deviation Min.: Minimum Max.: Maximum $p<0.05$

As seen in Table 2 in application there isn't any significant difference between pre-application and post application strength scores. The same result is available for control group too. So it can be concluded that GT doesn't create any decrease on muscular strength after application.

Discussion and Conclusion

There are enough study about GT to increase muscle extensibility (Moon, Jung, Won, & Cho, 2017; Kim, Jung, & Weon, 2014; Laudner, Compton, McLoda, & Walters, 2014). As it was told for same effect static stretching creates a mono synaptic inhibition on alpha motor neurons with the way of sensorial feedback system by Golgi Tendon Organs (GTO). In GT there isn't any stretching mechanisms activating GTO but even so there a kind of activation of sensorial receptors being on muscular fascia. So a question may come out that is there any alpha motor neuron inhibition created by fascial sensorial receptors. Vardiman et al. hypothesized that GT application pressure brings out some inflammatory mediators in muscle and these results in a decrease on neuromuscular activity (Vardiman, Siedlik, Herda, Hawkins, Cooper, Graham, Deckert, & Gallagher, 2015). After a 7 minutes application session on Gastrocnemius muscle group isokinetic muscular strength test was used and determined no force loss after application. Smuts et al. used hip abductors for testing. After a 2 minutes GT application after exercising he found a fast recovery in the application group (Smuts, 2013). Kim et al. used Quadriceps muscle group and compared effect of the GT application with 2 minutes and PNF techniques on muscular strength (Kim, Sung, & Lee, 2017). He found that PNF created a muscular inhibition but GT created a muscular strength increase on muscles. Burnside et al. used 2 Quadriceps muscles for an exercise period and after every exercise session GT was used to determine whether it would be a positive factor for recovering of muscle (Burnside, 2004). After 4 weeks period of the study he found that there isn't any positive effect on periodic muscular strength achievement. Literature shows no negative effect of GT on muscular strength and it may be hypothesed that the light mechanic pressure of GT application creates a vasodilatation in muscle and dermal tissues. In the application region a increase on viscoelasticity comes out thus collagen fibers holds more water and gains more extensibility (Hawkins, 2017). In this study small muscle groups were targeted for testing and after GT applications muscle strength on antebrachii flexor muscles didn't loose strength (Table 2). It's believed that the study would strengthen the results of other studies and contribute a positive factor for a common GT usage in Sport.

In that scope of the theory and the studies in the Literature GT application is more beneficial than other classical relaxing methods especially before high intensity activities like competitions in Sport. So that new approach should be implemented to avoid tissue injuries in the educational concept.

Conflict of Interest

There is no conflict of interest intellectually or financially.

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