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# Combination of Tapping with Eccentric Exercise and Passive Stretching on Handgrip Ability of Elbow Tennis Patients

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## ABSTRACT

Tennis elbow is a complaint of pain in the forearm which usually radiates to the dorsum of the hand due to inflammation or non-specific degeneration of the extensor carpi radialis brevis (ECRB) muscle in the lateral epicondyle of the humerus as a result of repetitive hand activities. This study aims to determine the differences in the effects of tapping and eccentric exercise with tapping and passive stretching on increasing grip strength in tennis elbow patients. This research was an experimental study with a randomized control group pretest-posttest design. This research was conducted on the campus of the Department of Physiotherapy, Poltekkes Kemenkes Makassar, Indonesia. The population was 45 patients who have tennis elbow, aged between 30-45 years, and do not have other neuromusculoskeletal disorders. The sample was obtained using the Lemesow formula so that a sample size of 40 subjects was taken using a simple random sampling technique, then divided into two groups randomly, namely the group given tapping and eccentric exercise and the group being given taping and passive stretching. Both groups were given the intervention three times a week for four weeks. The results of the Wilcoxon test analysis showed that tapping and eccentric exercise interventions significantly increased gripping ability with p-value = 0.000 (<0.05) while tapping and passive stretching interventions showed a significant increase in gripping ability with p = 0.003 (<0.05). The results of the Mann-Whitney test analysis showed that there was a significant difference between groups in the ability to grip with a p-value = 0.006 (<0.05). Thus it can be concluded that the intervention with a combination of tapping affects the gripping ability of tennis elbow patients.

**Keywords**: tennis elbow; eccentric exercise; passive stretching; tapping; grip strength

## INTRODUCTION

Tennis elbow is a common problem that causes elbow pain whenever the patient grips something, the forearm is pronated, or the wrist is fully flexed. Each of these maneuvers provides a stretch that originates from the common extensor tendon at the lateral epicondyle. This condition begins with micro damage that repeats for a long time and forms granulations, cannot do activities properly, sometimes the patient feels his arm is weak, so that the object he is holding suddenly falls [1, 2]. As a result, micro damage causes pain and weakness in the muscles so that patients with tennis elbow experience problems in carrying out activities such as grasping, it can cause limitations in the range of motion of the joints in the forearm[3]. Complications of tennis elbow occur after 24-72 hours after engaging in unusual activities, especially wrist extension[1].

Tennis elbow or also called lateral epicondylitis, is a pain in the elbow due to excessive use, especially in tennis players or sports using rackets, but some sports and other activities are also a high risk[4]. Clinically, lateral epicondylitis or tennis elbow is characterized by tenderness over the lateral epicondyle of the humerus and pain in the extension of the wrist or middle finger. It is a common symptom affecting 1-3% of the population [5] and generally affects the middle-aged without a predisposition to gender. The extensor carpi radialis brevis muscle is the muscle most commonly affected [6] as a result of repetitive motion or excessive loading involving gripping movements [7]. Tennis elbow can occur at any age but is most commonly seen between the ages of 30 and 60 [8]. The results estimate the prevalence in Sweden between 1 and 3%, where the age interval between 40-50 years has

increased to 19%. In the United States, the prevalence is 7.4% in industrial workers and 40-50% in tennis players who regularly play [9].

Many efforts have been made to overcome the problems caused by tennis elbow, but so far it has not been optimally resolved. The results of a study in which Kinesio tapping can have the effect of reducing pain during extension with resistance in patients with chronic lateral epicondylitis [10]. Kinesio taping can function to modulate muscle activity, provide strength and reduce pain in lateral epicondylitis patients who do not receive facilitation or inhibition techniques [11]. In another study, wrist extensor strengthening exercises and scapular stabilization exercises had the effect of reducing pain due to lateral epicondylitis [12]. Physical therapy using tapping with a counterforce elbow band has the same effect on reducing pain in patients with lateral epicondylitis, but the use of tapping is more effective in increasing holding strength [13]. In another study to overcome problems caused by tennis elbow, it was found that the provision of tapping and deep friction massage was effective in reducing pain, improving function, and increasing muscle activity in tennis elbow patients [14]. The efforts that have been made above have not been able to solve the problems that arise in patients with tennis elbow, so the researchers offer a method to reduce problems in patients with tennis elbow, namely by providing a combination tapping intervention with eccentric exercises and passive stretching to improve grip ability, patients with tennis elbow. This effort is carried out with the hope that giving tapping will provide a mechanism for muscle facilitation to contract coupled with the presence of eccentric muscle contractions to allow the ability of the muscles when gripping to increase. Likewise, tapping and passive stretching will have a relaxing effect on the muscles so that they are more likely to contract properly. Thus it is clear that this study will compare the benefits of the two combination therapy techniques in tennis elbow patients to easily perform gripping movements well.

Due to the increasing prevalence of events in the community, especially among working people of productive age, this research needs to be carried out to overcome problems and increase productivity in activities.

## METHODS

This study used a quasi-experimental type of research by using a two-group pretest-posttest design. The data used was the grip strength of the fingers and forearm using a hand dynamometer, which was carried out twice, namely measurements before being given the intervention and measurements after being given the intervention. This research was conducted on the campus of the Department of Physiotherapy, Poltekkes Kemenkes Makassar, Indonesia. The population was 45 patients who have tennis elbow, aged between 30-45 years, and do not experience other neuromusculoskeletal disorders that can interfere with the research process. The sample was obtained using the Lemesow formula so that a sample of 40 subjects was taken using a simple random sampling technique, then divided into two groups randomly, namely the group that was given tapping and eccentric exercise three times a week for four weeks in 3 sets with 8 repetitions in each time of exercise, while tapping is done vertically on the extensor carpi radialis brevis muscle twice a week for four weeks. Meanwhile, in the group that was given tapping and passive stretching, a dose of vertical tapping was given to the extensor carpi radialis brevis muscle twice a week, then the stretching exercise for 15 seconds was repeated six to eight times at a frequency of three times a week for four weeks.

The research data that had been obtained was analyzed using the Kolmogorov-Smirnov statistical test to determine the normality distribution, then followed by a comparative statistical test. This research had been approved by the Health Research Ethics Commission of the Makassar Health Polytechnic with the number: 392 / KEPK-PTKMS / VII /2021.

## RESULTS

The research subjects were patients with tennis elbow conditions, aged between 30-45 years, and did not experience other neuromusculoskeletal disorders that could interfere with the research process, where the number of subjects was 40.

Table 1. The characteristics of respondents based on age and gender

| Variable | Frequency | Percentage |
|---|---|---|
| Age (years) | | |
| 30 – 35 | 5 | 12.5 |
| 36 – 40 | 12 | 30 |
| 41 – 45 | 23 | 57.5 |
| Gender | | |
| Male | 27 | 67.5 |
| Female | 13 | 32.5 |

The results of the analysis showed that the most subjects who experienced tennis elbow were aged 41-45 years, namely 23 people or 57.5% and the lowest was 30-35 years, namely 5 people or 12.5% with the most gender

being male, namely 27 people or 67.5% and the lowest was female as many as 13 people or 32.5%. Thus it can be concluded that most patients who experience tennis elbow are aged 41-45 years with the male gender.

To determine the effect of the intervention on the muscle contraction ability of the fingers and forearms of tennis elbow patients, the measurement of the ability to grip the fingers and forearm muscles was carried out using a hand dynamometer before and after the intervention three times a week during the week, in both treatment groups.

The results of the analysis on the ability to grip the fingers and forearm muscles before and after the tapping and eccentric exercise intervention, showed a difference, where before the intervention the grasping ability was 15.50 + 5.01 kg and after the intervention 22.40 + 5.04 kg, while the tapping and passive stretching interventions obtained the ability to grip the fingers and forearm muscles before the intervention 16.10 + 6.15 kg and after the intervention, the value was 17.60 + 6.61 kg. More details can be seen in table 2.

Table 2. Analysis of finger and forearm muscle gripping skills in tennis elbow patients before and after intervention

| Treatment | Measurement time | | | | T | p |
|---|---|---|---|---|---|---|
| | Pretest | | Posttest | | | |
| | Mean | SD | Mean | SD | | |
| Tapping and eccentric exercise | 15.50 | 5.01 | 22.40 | 5.04 | -3.939 | 0.000 |
| Tapping and passive stretching | 16.10 | 6.15 | 17.60 | 6.61 | -2.991 | 0.003 |

The results of statistical tests using the Wilcoxon test showed that there was a significant difference in the ability to grip the finger and forearm muscles of tennis elbow patients before and after the intervention of tapping and eccentric exercise with a p-value = 0.000 (<0.05), meaning that the provision of tapping and eccentric exercise can improve grasping ability. finger and forearm muscles in tennis elbow patients. Likewise, the tapping and passive stretching interventions showed a significant difference in the ability to grip the finger and forearm muscles of tennis elbow patients before and after the intervention with a p-value = 0.003 (<0.05), meaning that the provision of tapping and passive stretching can improve the ability to grip the finger muscles and tennis elbow patient forearm.

The results of the analysis of the ability to grip the finger and forearm muscles after inter-group intervention obtained results, where the value of the tapping and eccentric exercise intervention was 22.40 + 5.04 kg and the tapping and passive stretching intervention obtained the value of grasping ability that was 17.60 + 6.61 kg. More details can be seen in table 3.

Table 3. Analysis of finger and forearm muscle gripping skills in tennis elbow patients between groups

| Treatment | Ability to grip after intervention | | Z | p |
|---|---|---|---|---|
| | Mean | SD | | |
| Tapping and eccentric exercise | 22.40 | 5.04 | -2,732 | 0,006 |
| Tapping and passive stretching | 17.60 | 6.61 | | |

The results of the analysis using the Mann-Whitney test showed that there was a significant difference in the ability to grip the finger and forearm muscles of tennis elbow patients between groups, where the p-value = 0.006 (<0.05). This means that there is a difference in the effect of tapping treatment and eccentric exercise with tapping and passive stretching on the ability to grip the finger and forearm muscles of tennis elbow patients. Thus, it can be concluded that giving both interventions has an effect on increasing grasping ability, but tapping and eccentric exercise interventions have a greater effect than tapping and passive stretching interventions.

## DISCUSSION

This study aims to study the effect of combined tapping and eccentric exercise therapy with tapping and passive stretching on the ability to grip the finger and forearm muscles in tennis elbow patients. The research samples were male and female with ages between 30-45 years. The results of the analysis showed that the age of the most samples who experienced tennis elbow at the age of 41-45 years for the male sex. This can happen because that age is the age at which a person has the peak of his activity or productive group, this is in line with the results of research which states that tennis elbow occurs due to excessive and repetitive loading movements with ages between 40-50 years[15]. The incidence of tennis elbow in workers is quite high, between 0.9 and 4.9 per 100 worker years. Although in this study there were more male samples, it does not mean that more men experience tennis elbow, because the incidence of tennis elbow does not depend on gender[16]. Tennis elbow is

more influenced by repetitive movements of the hands, namely those whose work involves repetitive arm and hand movements[9].

Giving tapping and eccentric exercises can improve the ability to grip the finger and forearm muscles in tennis elbow patients. Tennis elbow occurs as a result of repetitive and long-lasting movements resulting in micro trauma to the extensor carpi radialis brevis muscle tendon, causing pain and even decreasing the ability to grip the finger and forearm muscles. Interventions of tapping and eccentric exercise will overcome the problem of pain and gripping strength through a mechanism, where tapping can provide a relaxing effect on injured muscles, but on the other hand, it provides facilitation to work[3]. reduce pain[2]. Eccentric exercise will have a suppressive effect on the injured tendon so that it forms dense collagen in the tendon as a result of mechanoreceptor stimulation so that it can accelerate the healing of inflammation in the tenocytes which causes pain to decrease. Eccentric exercise also causes stretching of the tendon and muscle units so that relaxation and pain reduction can occur[17],[12],[18], and eccentric exercise can maintain impaired muscles[19]. Eccentric exercise can overload muscles with low energy and induce muscle activity patterns thereby optimizing muscle strength, stretching, and coordination[20]. Likewise, tapping and passive stretching interventions affect the ability to grip the finger and forearm muscles of tennis elbow patients. This can be achieved because in patients with tennis elbow there is inflammation of the muscle tendons and a decrease in elasticity accompanied by pain. Therefore, passive stretching can overcome the problem by elongating the contractile and non-contractile tissues in the muscle-tendinous unit. The stretching will cause the elasticity of the muscle-tendinous tissue to increase resulting in relaxation and decreased pain[21]. Stretching can also cause an increase in tendon collagen and stimulate collagen cross-linkage formation[22]. Thus the intervention of tapping and eccentric exercise with tapping and passive stretching can increase the strength of gripping the finger and forearm muscles.

The provision of the two interventions affected increasing the ability to grip, but the tapping intervention and eccentric exercise gave a greater effect than the tapping and passive stretching interventions. This mechanism occurs because the two intervention methods affect the muscles and tendons so that they can cause healing of the inflammation that occurs and the stretching causes the elasticity of the muscle-tendon tissue to increase so that pain is reduced which gives maximum impact to muscle contraction. The difference in effect between the two intervention groups was due to the effect of eccentric exercise which can reduce pain and improve tendinopathy and increase muscle function ability[23], [24], [25]. Thus the intervention with tapping and eccentric exercise is more effective than the intervention of tapping and passive stretching to increase the ability to grip the fingers and forearm muscles in tennis elbow patients.

## CONCLUSION

Based on the results of the analysis of the data obtained, it can be concluded that the tapping intervention with eccentric exercise and tapping intervention with passive stretching both affect the ability to grip the finger and forearm muscles, but the tapping intervention and eccentric exercise provide a maximum effect on the ability to grip the muscles. fingers and forearms of tennis elbow patients.

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