ISSN : 2350-0743

www.ijramr.com

International Journal of Recent Advances in Multidisciplinary Research

Vol. 08, Issue 07, pp. 7128-7131, July, 2021

RESEARCH ARTICLE

EFFECT OF KINESIOTAPING ON DIFFERENT HAND GRIP STRENGTH IN COMPUTER USERS

Haytham M Elhafez[1,*], Aya SA Sedek[2] and Amr S Shalby[3]

[1]Professor of Physical Therapy, Basic Science Department, Faculty of Physical Therapy, Cairo University, Egypt, Dean Faculty of Physical Therapy, Suez University

[2]B.Sc. Physical Therapy, Faculty of Physical Therapy, Cairo University, Egypt

[3]Lecturer of Physical Therapy, Basic Science Department, Faculty of Physical Therapy, Cairo University, Egypt

ARTICLE INFO

Article History:

Received 15th April, 2021
Received in revised form
20th May, 2021
Accepted 25th June, 2021
Published online 30th July, 2021

Keywords:

Kinesiotaping,
Different Hand Strength,
Power Grip, Precision Grip,
Computer Users.

ABSTRACT

Background*:** In tandem with current technological advancements, the quest for innovative treatment methods capable of enhancing musculoskeletal functioning is rising. Because of its wide mobility and the sensitive capacities of its surrounding tissues, which allow grasping and sensation, the human hand is undoubtedly the most significant and complicated structure of the upper extremity. Its vital duties, and because handgrip strength plays such an important part in daily activities, this study looked at the effects of kinesiotaping on different handgrip strengths in computer users. ***Aim of the study*:** The present study aimed to investigate the effect of kinesiotaping on power hand grip and precision hand grip in computer users. ***Subjects and Methods*:** Thirty computer users voluntarily participated in this study, their ages were ranged from 20 to 45 years, they assigned in one single group, power hand grip was measured using hand held dynamometer, and precision hand grip was measured using pinch gauge for all participants for both right and left hands. Then kinesiotaping was applied on the wrist joint of both hands, and all measures was taken again. ***Results: It was observed that a significant increase in strength values occurred in the right hand and the left hand compared to the initial values, in both the power and precision hand grip strength, In the comparison of handgrip strength between the dominant and non-dominant hands, it was observed that the dominant hand (right hand) demonstrated greater handgrip strength at all the assessment times. ***Conclusion:*** kinesiotaping has a positive effect on the improvement of both power grip strength and precision grip strength of both right and left hands.

INTRODUCTION

Hand grip strength estimation is imperative in determining the efficacy of treatment strategies and hand rehabilitation. This strength is the result of a maximum voluntary forceful flexion of the fingers by an individual under normal conditions (Oseloka, 2014). Grip strength is crucial for the human body while performing prehensile and precision hand functions. The human hand is a complex structure tailored to the functions of manipulation, and the hand conveys sensory information to brain about temperature, form and texture of the objects it controls (Alahmari *et al*., 2017). Contemporary technology revolution has made our lives with so much convenient that people would hardly imagine life without computer, internet, cable TV, cellular phones, various tools and gadgets. Computers are one of the main tools in businesses, educational institutes, offices, homes and even in cars. On one hand, these technologies including computers have made lives so much easy but on the other hand have created many risks for human health.

*Corresponding author: *Haytham M Elhafez,* Professor of Physical Therapy, Basic Science Department, Faculty of Physical Therapy, Cairo University, Egypt, Dean Faculty of Physical Therapy, Suez University.

The negative risks associated with the usage of these technologies are increasing with their growing demand day by day (Ellahi *et al*., 2011). The search for new therapeutic approaches capable of preventing and treating musculoskeletal dysfunctions is progressively increasing in conjunction with current technological innovations. In this context, taping techniques have developed as a complement to the treatment of musculoskeletal dysfunctions, and has improved over time to provide therapeutic effects which do not hinder the functionality of a particular body segment. In 1973, Dr. Kenzo Kase developed an elastic tape with elastic properties similar to the skin, and named it Kinesiotape (Lee, 2010). The kinesiotaping method originated from the hypothesis that an external component could aid the functions of muscles and other tissues (Kase, 2003). It is thin and elastic by design, and can stretch to 40% to 60% of its original length, which makes it very elastic compared to traditional taping materials, allowing complete range of motion (Kase, 2003; Thelen *et al*., 2008).

Various authors have described the benefits of Kinesiotaping as being dependent on the stretch of the tape and the form of placement on the skin, which elicits: positional stimulus and correction of muscle function; improvement of facial tissue alignment; facilitation of bodily fluid circulation; repair of injured tissues; sensory stimulation assisting or limiting movement, thereby improving proprioception; edema control by guiding lymph toward lymph nodes; and correction of joint position (Thelen, 2008). If an individual is unable to pinch their index finger and thumb, a pathological indication of damage to the anterior interosseous nerve between the two heads of the pronator muscle is concluded. This is known as anterior interosseous nerve syndrome (AINS). AINS can be caused by compression of the nerve between the heads of the pronator teres muscle. The anterior interosseous nerve can also become prone to entrapment in select individuals with abnormalities such as an atypical head of the flexor pollicis longus muscle; found in approximately 52% of the population (Jones, 2014). Purpose of this study was To investigate the effect of Kinesiotaping on power hand grip and precision hand grip, of computer users. As well it was hypothesized that; There is no statistical significant effect of Kinesiotaping on power hand grip and precision hand grip, in computer users.

METHODOLOGY

This study was conducted on computer users in Faculty of Physical Therapy, Cairo University, and in El Nasr club. The protocol of this study was approved by the ethical committee of Faculty of Physical Therapy. This study was cross section study. Thirty computer users' volunteers, their ages range is between 20 – 45 years old, assigned in one single group, participated in this study.

Inclusive criteria: A completed informed consent form and commitment to participate in all phases of the trial were required as inclusion criteria. Subjects who use a computer for at least 2-3 hours each day were among the requirements. The ages range from 20 to 45, and there is no surgery or previous fracture in the hand.

Exclusive criteria: The exclusive criteria included the followings; Outside of the defined age range; using a computer for less than 2-3 hours daily; and the existence of limiting variables that may have impacted the results, such as cardiac, hormonal, or osteomyoarticular diseases. Participants with congenital or acquired joint or bone abnormalities in either of the upper extremities; Use of anabolic drugs; central or peripheral neurological impairments The study excluded participants who had had an upper-extremity injury or surgery within the previous six months, as well as those who had used pharmaceutical drugs during the 24 hours prior to the commencement of the trial.

Instrumentation

Dynamometer. The instrument utilized to measure handgrip strength is a JAMAR® dynamometer, which has been validated as a gold standard tool for this purpose by the American Society of Hand Therapists (ASHT). This instrument allows simple and quick readings of handgrip strength, which is measured in kilograms/force.

Pinch Gauge. It is the instrument used to measure precision hand grip, the strength reading can be viewed as pounds or kilograms, the results are consistent with published, Baseline® and Jamar® studies. The Baseline® hydraulic pinch gauge uses the hydraulic system of the hand dynamometer to assure convenience, product reliability and measurement

Procedures: Initially, the subjects sat on an adjustable chair which was adjusted so that the subjects' backs were straight, with their knees and hips in 90° of flexion with their feet on the floor. The shoulders were positioned in adduction next to the trunk with the elbows in 90° of flexion, the forearm and wrist in the neutral position, and the arm unsupported, while the dynamometer was held for each reading, as recommended by the ASHT (Boadella, 2005). The subjects performed the handgrip movement with maximum effort, only during exhalation and after a verbal cue given by the examiner: "one, two, three, go". Three measurements were made for each hand power grip, alternating the test sides, starting with the right hand a rest interval of 60 seconds was provided between trials in order to avoid muscle fatigue during the assessment. Subjects were instructed to maintain maximum contraction for 5 seconds in each trial, since research has demonstrate that peak force is reached between 3 to 10 seconds of contraction. The average of the three trials will be calculated for each grip. The same procedure was done for measuring precision grip using pinch gauge. The subjects should have the skin of their wrist and hand cleaned with a cotton pad and 70% alcohol before the application of Kinesiotaping technique. After that all the subjects will receive Kinesiotaping applied firmly around the wrist joint, in sitting position with forearm supported and wrist in 15 degrees of extension. Taping was given with 15% of tension. The handgrip strength (power and precision) was reassessed, for both dominant and non-dominant. Then the results were analyzed.

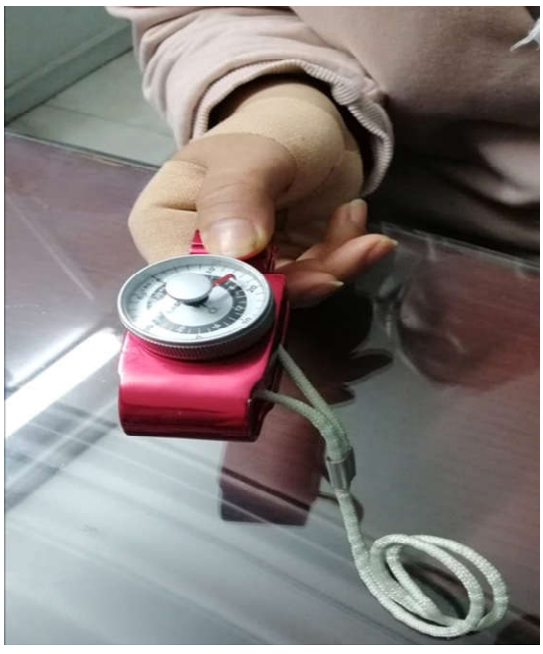

Figure 3.6 Precision grip measurment

Statistical analysis: It includes: the mean (X): as an average describing the central tendency of observation. The standard deviation (SD): as a measure of the dispersion of the result around the mean. Inferential statistics: The student's t-test was used to determine the effects of Kinesiotaping on handgrip strength (power and precision). The level of significance will set at P value equal to or less than <0.05.

RESULTS

Demographic data of the studied subjects: Group (A) consisted of 14 subjects with mean age, body mass, height, and BMI values of 30.86 ± 6.29 years, 71.29 ± 16.37 kg, 162.21 ± 5.9 cm, and 26.93 ± 4.89 kg/m² respectively. Group (B) consisted of 16 subjects with mean age, body mass, height, and BMI values of 38.44 ± 8.45 years, 84.75 ± 20.83 kg, 169.81 ± 9.06 cm, and 29.12 ± 5.49 kg/m² respectively.

Power Grip: As illustrated in figure (2), the Mean ± SD values of the power grip in the right and left hands were comparing both groups, the results of group (B) is greater than group (A), in power grip strength pre and post application of the tape, in both the right and left hands, which mean that all results came in favor to subjects who use computer > 4 hours more than those who use it ≤ 4 hours, as illustrated in figure (3) for the right hand, and in figure (4) for the left hand.

Precision Grip: Comparing both groups, the results of group (B) is greater than group (A), in precision grip strength pre and post application of the tape, in both the right and left hands, which mean that all results came in favor to subjects who use computer > 4 hours more than those who use it ≤ 4 hours, as presented in figure (4) for the right hand, and in figure (5) for the left hand.

DISCUSSION

The results of current study show that kinesiotaping had a positive effect on the improvement of both the power and precision hand grip strength of both right and left hand. Comparing both groups, the results of group (B) is greater than group (A), in power grip strength pre and post application of the tape, in both the right and left hands, which mean that all results came in favor to subjects who use computer > 4 hours more than those who use it ≤ 4 hours. In the comparison of precision handgrip strength between the dominant and non-dominant hands, after the application of kinesiotaping, it was observed that the dominant hand (right) demonstrated greater precision grip strength by 5.95% than the left hand in group (A), and by 8.76% in group (B). The results revealed that there was a statistical significant improvement of the precision grip strength after the application of kinesiotaping in group A, the percent of improvement was 10.45% for the right hand and 11.88% for the left hand, in group (B) , the percent of improvement was 11.43% for the right hand and 9.29% for the left hand. Comparing both groups, the results of group (B) is greater than group (A), in precision grip strength pre and post application of the tape, in both the right and left hands, which mean that all results came in favor to subjects who use computer > 4 hours more than those who use it ≤ 4 hours. The results of this study came in accordance with Kenso Kase, 2016 who said that the Kinesiotaping method can improve the strength of muscles weakened by correcting muscle function with stimuli and reinforcement. In agreement with the results of current study, another study investigated the immediate and delayed effects of two directions of Kinesiotaping on maximal isometric strength of the wrist and finger muscles of healthy adults. Nineteen healthy junior college students participated in that study. Inhibition and facilitation KT techniques were separately used to tape the dominant and non-dominant forearms of the participants, respectively. Maximal isometric strength of wrist extension, middle finger extension, and the grip of both hands were measured before taping, immediately after taping, and after 24 h of taping (with the tape in situ). Compared with the baseline, the average maximal isometric strength of middle finger extensors increased considerably after application of the facilitation Kinesiotape. No significant time effect was observed on the middle finger extension strength on the dominant side or on the wrist extension and grip strength on either side. With regards to the stretch applied to the tape, the results of the current study came in accordance with some authors who did not specify how much was utilized in their studies (Hsu *et al*., 2009). Other studies simply do not follow the standards recommended by the Kinesiotaping Association. An example of this is related to the tension for muscle activation, which has been established to be between 25% and 35%. Nevertheless, some authors have opted to utilize 15% to 20% of tension (Chang, 2010) and even 120% (Vithoulka *et al*., 2010). Also a simple tape just placed without tension as performed for the control group in Lemos *et al*, (2015) study with no specific direction, will elicit tape stimulus and some effects should be apparent. Kinesiotape applied to the skin without tension will exert minimal tensions during body and skin movements. No tension is also used in the Kinesiotaping method for patients that are high sensitive to external stimulus. So it can't be called placebo, it is just a different degree of stimulus (Lemos *et al*., 2015). The results of the current study agreed with Kahanov, (2007) who found that the application of kinesiotaping can be used to produce increased sensory stimulation of the mechanoceptors in ligaments and tendons to assist or limit motion while relying on the stretched tape for corrective posture, a light tension kinesiotaping technique may be applied to facilitate muscle contraction of injured muscles. Several authors report that kinesiotaping may have a potential for facilitation of muscle strengthening due to the support provided by the tape that contracts during movement of the joints (Kahanov, 2007). The results of the current study disagreed with a study on 19 healthy students (11 women and eight men), Kuo *et al*, (2013), who applied inhibition and facilitation methods of Kinesiotaping on dominant and non-dominant dorsal of forearm and hand, respectively. I and Y shape applications with 10% stretch were used in facilitation and inhibition methods, respectively. They measured grip strength before taping, immediately and 24 hours afterward (with the tape in situ). They reported that Kinesiotape did not affect grip strength (Kuo, 2013) The results of the current study agreed also with Zahra *et al*, (2020), who stated that using of kinesiotaping, lead to the increase in Key pinch force and decrease in the upper limb disability (Zahra, 2020). Therefore, it is recommended that the exercise program be included in the personnel work program to improve performance. It is also recommended that further studies be conducted to investigate the use of kinesiotape in different organs and their effects on improving the pain and performance of workers and employees as well as men.

Conclusion

Kinesiotaping has a positive effect on the improvement of both power grip strength and precision grip strength of both right and left hands in computer users.

Conflict of interest: There is no conflict of interest.

REFERENCES

1. Oseloka IA, Bello BM, Oliver HW, (2) *et al*. 2014."Association of handgrip strength with body mass

index among Nigerian students".J Pharmacy BiologSci; 9(1): 1–7.
2. Alahmari KA, Silvian SP, Reddy RS, (3) *et al*. 2017. "Hand grip strength determination for healthy males in Saudi Arabia: A study of the relationship with age, body mass index, hand length and forearm circumference using a hand-held dynamometer". J Intern Med Res; 540-548.
3. Ellahi A, Khalil M, Akram F, 2011. "Computer users at risk" Health disorders associated with prolonged computer use pp. 171-182.
4. Lee JH, YooWG, Lee KS 2010."Effect of the head-neck rotation and kinesiotaping of the flexor muscles on dominant- hand grip strength". J Phys TherSci, 22: 285–289.
5. Kase K, Wallis J, Kase T 2003."Clinical Therapeutic Applications of the Kinesiotaping Method", 3rd ed. Tokyo.
6. Thelen MD, Dauber JA, Stoneman PD (2008): "The clinical efficacy of kinesiotape for shoulder pain: a randomized, double-blinded, clinical trial". J Orthop Sports Phys Ther, 38: 389–395.
7. Jones, J & Gallard, F 2014.RadioPaedia.org, accessed 25 April 2020, <http://radiopaedia.org/articles/anterior-interosseous-nerve-syndrome-1>.
8. Boadella JM, Kuijer PP, SluiterJK, (1) *et al*. 2005."Effect of self-selected handgrip position on maximal handgrip strength".Arch Phys Med Rehabil, 86: 328–331.
9. Hsu YH, Chen WY, Lin HC, (2) *et al*. 2009. "The effects of taping on scapular kinematics and muscle performance in baseball players with shoulder impingement syndrome". ElectromyogrKinesiol, 19: 1092–1099.
10. ChangHY, Chou KY, LinJJ, (2) *et al*. 2010."Immediate effect of forearm Kinesiotaping on maximal grip strength and force sense in healthy collegiate athletes". Phys Ther Sport; 11 (4): 122-7.
11. Vithoulka I, Beneka A, Malliou P. and (3) *et al*. The effects of kinesiotaping on quadriceps strength during isokinetic exercise in healthy non athlete women. IsokinetExerciSci, 2010, 42: 11–16.
12. Lemos TV, Pereira KC, Protássio CC, Lucas LB, Matheus JPC. 2015. The effect of Kinesiotaping on handgrip strength. *J Phys Ther Sci.,* 27(3):567–70.
13. Kahanov L. 2007. "Kinesiotaping, part 1: an over view of its use in athletes". Human Kinetics. 12:17 – 18.
14. KuoYL, Huang YC. 2013. "Effects of the Application Direction of Kinesiotaping on Isometric Muscle Strength of the Wrist and Fingers of Healthy Adults: A Pilot Study". J. Phys. Ther. Sci. 25: 287–291, 2013
15. Zahra O, Fadaei F, 2020. "The simultaneous effect of Kinesiotaping and exercise on maximal key pinch force in Electronically Company". Iran Occupational Health; 17: 66.

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