



ERGONOMIC CONSIDERATION OF MOUSE IN COMPUTER USERS

Sharmila.S*, Tilak Francis T.G and Hemavathi.D

Assistant Professor, School of Physiotherapy, Vels university, Thalambur

*Corresponding Author Email: sharmilasubramani25@gmail.com

ABSTRACT

INTRODUCTION: Mouse grip force is applied between the thumb and little finger. The thumb designed solely as an opposing surface has low dexterity to resist the force applied by the fingers and so provide a grip for object manipulation. Location of mouse in a “non-optimal position” On the table (away from midline of the body). And working duration reported as possible risk factors for upper extremity symptoms. Hand fingers are curling inwards towards the palm more than those of the other hand is known as claw hand. The study aim is to analyze the ergonomics consideration to find the grip strength and grip positions of mouse in computer users in female populations. **METHODOLOGY:** 150 women’s in software profession was taken for the study with the Age group 20-30 years. And they were observed for 4 weeks for analyzing their mouse position during their work period, the variation of grip positions in mouse users were evaluated by asking the subjects to dip their hand in the ink and tap it on the paper and correlation of grip strength was evaluated using hand held dynamometer and the results were analyzed. **RESULT:** The result were analyzed using ANOVA to find out the correlation between the different grips and the grip strength in this study we found that most of the women’s are using claw grip compared to that of palm and finger grip. This study also proved that there is no correlation between altered grips and grip strength and the P value was found to be 0.0001 which is not significant. **CONCLUSION:** The present study concluded that 40% of female population are using in claw grip, 31% using palm grip, 29% using finger grip. But there is correlation between different grips and grip strength

KEY WORDS

Mouse users, mouse in different grip users, grip strength, hand held dynamometer.

INTRODUCTION

Hand is a vital and inevitable organ for humans. Its functions start from a fine to gross motor activities. Many daily functions and sports events require high activity of hands. Hands and forearm muscles are important in grip strength. It is exceptional at being free of periodic locomotor obligation and is committed completely for manipulative activities⁽¹⁾. Its adequacy in these functions is because of specific orientation of bones and muscles, which allows restriction of the mesh surface of the thumb relating surface of the other four fingertips in a firm handle, together with exceedingly apprehensive control and affectability of the fingers.

The physiological and biomechanical level may provide more insight and more effective for the mousing tasks. The repetitive use of mouse can cause the repetitive strain in turn leads to an undue emphasis being placed on the word. Am.J.Ind et.al., said that computer mouse users annually performance of muscular activity is not fully appreciated on a minute by minute basis, “Repetitive” especially when perceived as being “sat at a desk” work⁽²⁾

In normal, hand fingers are curling inwards towards the palm more than those of the other hand is known as claw hand. In the resting position also, the mouse users hand will be in the position of placing claw hand. Most of mouse grip force is applied between the thumb and

little finger. The thumb designed solely as an opposing surface has low dexterity to resist the force applied by the fingers and so provide a grip for object manipulation⁽³⁾.

Vernon T. Tol.et.al., said that the one weight of force applied to the thumb tip is equivalent to ten ounces of load at the carpal metacarpal joint of the base of the thumb. If applied for 3 hours per day over 222 days this equates to 750 tons of force applied through the carpometacarpal joint. One weight of force applied for a mouse per year is equivalent to the carpometacarpal joint moving a mouse weighing 750 ton for one second. In using palm down mouse, there is a lack of wrist twist, due to impairment was compensated by elbow abduction making it possible to place the hand flat⁽⁴⁾.

Mouse states that position away from the midline of the body results in unsupported the shoulder abducted and externally rotated and the arm in forward flexion of wrist. (franzblan. et.al.,)

Location of mouse in a “non-optimal position”. On the table (away from midline of the body). And working duration reported as possible risk factors for upper extremist symptoms (karlquist. et.al.,)⁽⁶⁾

Hence the aim of the study is to analyze the Ergonomics consideration to find the grip strength and grip position of mouse in computer users in female population.

METHODOLOGY

STUDY DESIGN : OBSERVATIONAL STUDY
SAMPLING METHOD : CONVENIENT SAMPLING
SAMPLE SIZE : 200
STUDY DURATION : 4 WEEKS
STUDY LOCATION : ACCENTURES (IT PROFESSION)

INCLUSION CRITERIA

- Age: 20 to 30years

- Female population
- Duration of mouse using: 2 -5years

EXCLUSION CRITERIA

- Any muscle injuries
- Any joint related injuries
- Trigger finger
- Mouse finger (using of their fingers over the mouse strain)
- Burns in the hand
- Major Fracture
- Any musculoskeletal problem (stress, strain)
- Carpel tunnel syndrome
- Tennis elbow

PROCEDURE

The subjects who fulfilled the inclusion criteria were taken for the study and the written informed consent was obtained from each participant. Among 200 subjects 150 were taken for the study. All the subjects taken in the study are women’s working in the IT sector for more than 2-5 yrs of duration for them both the hand grip position and Hand grip strength was measured. Measurement of the hand grip position was done by asking the subject to dip the hand in the ink and place it on the paper and immediately after that the hand grip strength was measured using the hand-held dynamometer. Procedure was demonstrated to the participant. The result were analysed by observing the position of the hand grip, grip strength was measured by values obtained in the dynamometer.

MOUSE POSTURE TYPE:

PALM GRIP:

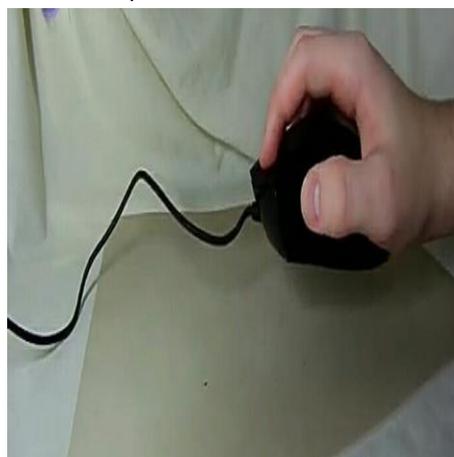
The most commonly used method to hold a computer mouse is what is known as the palm grip”.

The index and middle fingers are usually placed fully on the left and right mouse button respectively.



CLAW GRIP:

It is characterized by the arching fingers required to hold the mouse and press each mouse button.



FINGER GRIP:

It is considered to be a subset of the claw grip, where the user grips the mouse solely with the tip of his fingers. Fingertip grip is defined by the fact that there are 5 contact points made on the surface of the mouse.



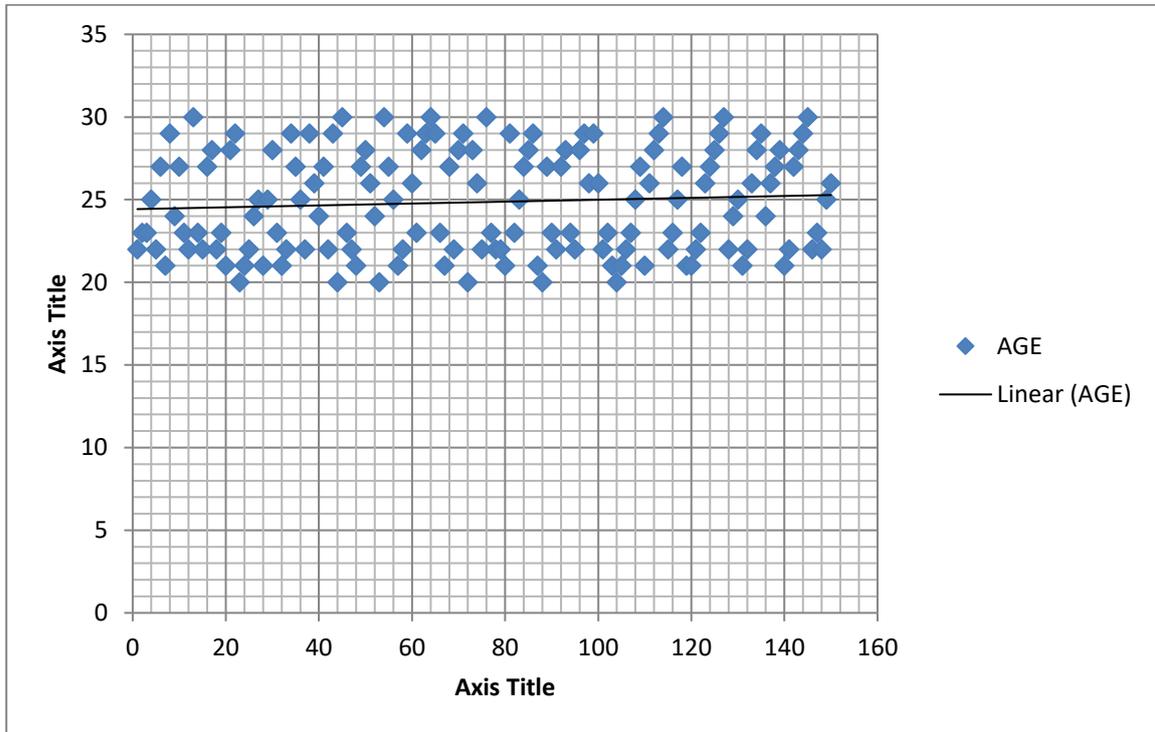
RESULTS:

The analyses of the results were done by using the analyses of co-variance (Anova) and the obtained values are marked in the scatter plot. The values for all the three grips was found to be different the claw hand was

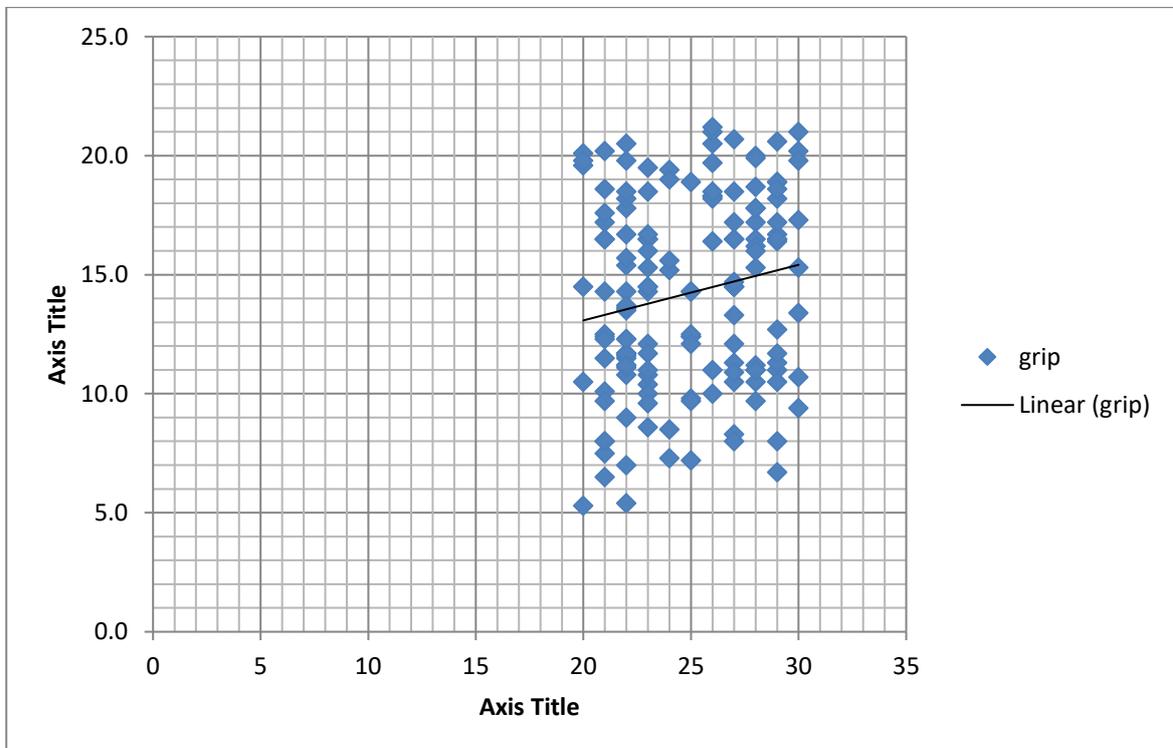
found to be 40% and palm grip was 31% and finger grip was 29%. The hand-held dynamometer was used to evaluate the grip strength and the mean value was found to be 14.286 ± 0.325 , and the p value was found to be 0.0001 which shows that there is no significant differences in the grip strength in all three grips

OUTCOME MEASURE	MEAN	STANDARD DEVIATION	t value	p value
Handgrip dynamometer	14.286	3.986	43.896	0.0001

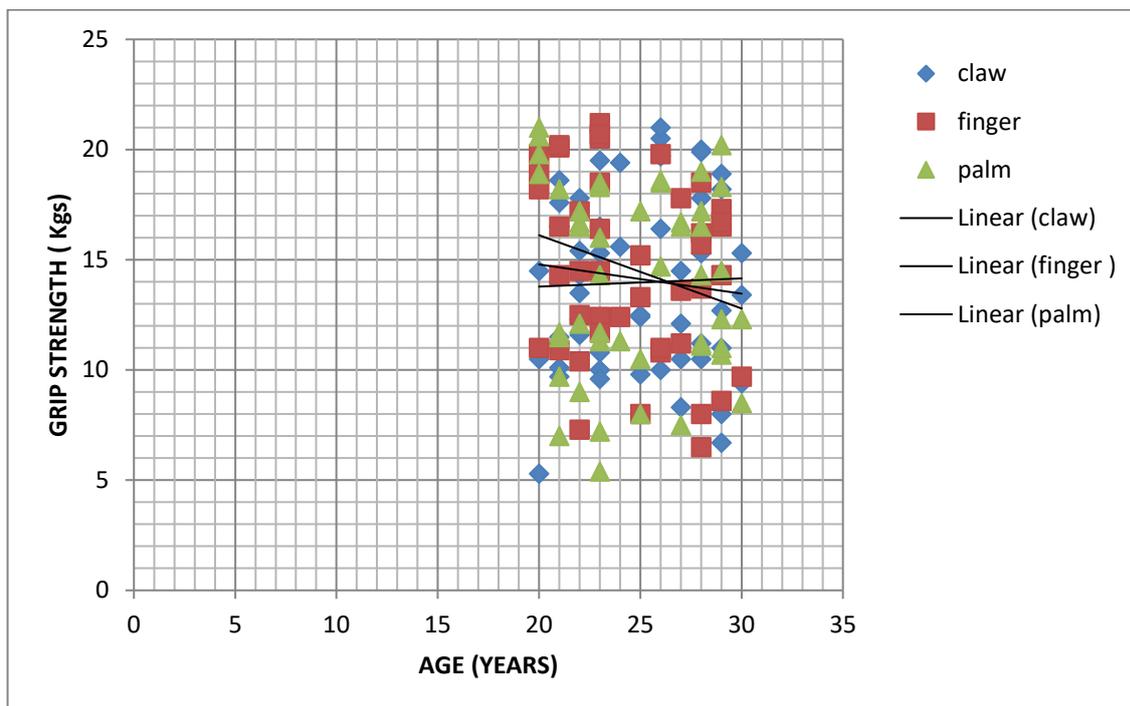
GRAPH
AGE:



GRIP STRENGTH:

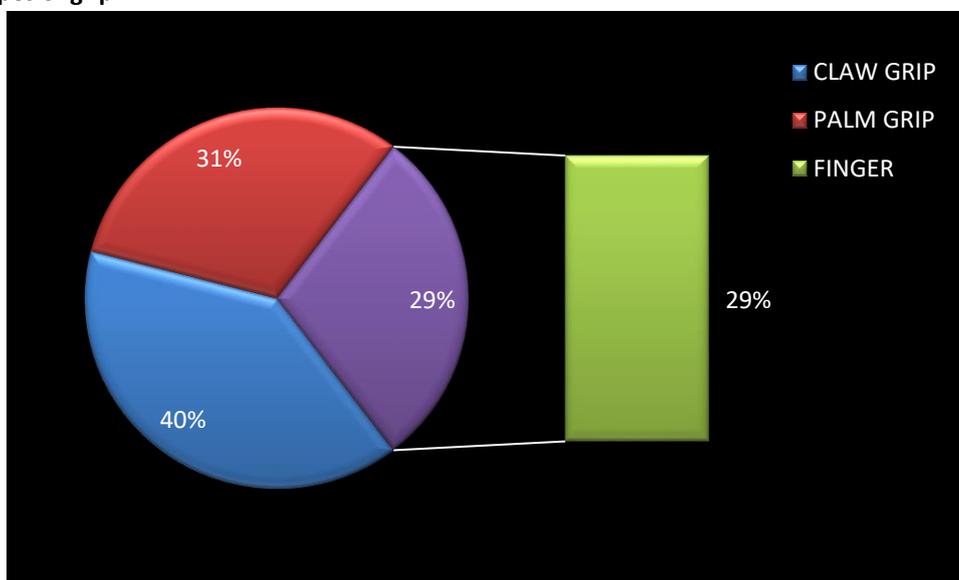


CORRELATION BETWEEN AGE AND TYPES OF GRIP:



TYPES OF GRIP:

Different types of grip:



DISCUSSION

In, the distal upper extremity, mouse users are reported to adopt working postures of wrist extension and ulnar deviation. (karlqvist et.al). The prevalence of musculoskeletal disorders among mouse users has been reported to be as high as 81% (kamwendo.et al., 2002)⁽⁵⁾. Age and gender have been reported by some authors

to have an effect on symptom prevalence (knave et. al., 2007)

Grasping any device to control it requires muscular activity above that of being at rest. The body in most cases has two sets of opposing muscles and even when at rest “they are busy doing nothing” and “working the whole day through”. Grip strength is the force applied by the hand to pull on or suspend from objects and is a

specific part of hand strength. In most finger extensor muscles open the hand in opposition to the flexor muscles that close it to facilitate grip. If the flexor muscles are used significantly more than the extensor muscles flexors muscles improved.

Most of mouse grip force is applied between the thumb and little finger. The thumb designed solely as an opposing surface has low dexterity to resist the force applied by the fingers and so provide a grip for object manipulation.

This study was a first study which is evaluating the different grip obtained by women's in the software profession and concluded that there is no correlation between age and the hand grip strength. Most of the mouse users can adopt the claw grip than the finger grip and palm grip. But there is no significant alteration in the grip strength. The study limits itself as an observational study and it was done only for women's in the software profession. Hence the further studies can be done as an experimental study which includes both the gender male and female population with more sample size which can enhance for the diagnosis of hand conditions.

CONCLUSION:

This study successfully concluded that claw grip was used by 40% of women's and 31% palm grip and 29% of finger grip and also proved that there is no significant difference between hand grip position and hand grip strength.

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***Corresponding Author:**

Sharmila.S

Email: sharmilasubramani25@gmail.com