IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Assessment Of Hand Discomfort And Pinch Grip Strength Among School Students With Different Types Of Pinch Grip Pattern Using Cornell Hand Discomfort Questionnaire.

[1]Greeshma Girish, [2]Neenu Scaria,[3]Ashik A M [4]Adithya Lekshmi B,[5] Majida Parvil

Assistant professor,BPT Intern,4th year BPT Student, 4th year BPT Student, BPT Intern

Medical Trust Institute OF Medical Sciences,kochi,kerala,india

ABSTRACT

BACKGROUND: Hand is an important structure used for reaching holding object predominantly for grasp and grip strength. Writing is an activity that requires physical mechanical skills. Hand discomfort and pain are pervasive among school students, impacting academic performance and overall well-being. Understanding the relationship between pinch grip patterns, pinch grip strength, and hand discomfort is crucial for prevention and intervention.

OBJECTIVE: To assess hand discomfort in school students having different type of pinch grip pattern and pinch grip strength

METHOD: This cross-sectional study investigated hand discomfort and pinch grip strength among 200 school students (ages 12 -15). Pinch grip patterns were assessed using observational analysis with a standardized classification system. Hand discomfort was evaluated using the Cornell Hand Discomfort Questionnaire (CHDQ). Pinch grip strength was measured using a hydraulic pinch gauge.

RESULTS: A total of 200 subjects who satisfied the inclusion criteria participated in this study. Among them 80 students have dynamic tripod, 77 students have dynamic ,43 students have lateral tripod. According to statistical analysis dynamic Tripod Grip pattern have the better pinch grip strength and lowest hand discomfort while lateral tripod have lowest pinch grip strength and most hand discomfort.

CONCLUSION: This study shows that hand discomfort is nearly greater among school students with lateral tripod and have slightly lower pinch grip strength compared to others

KEY WORDS: *hand discomfort, pinch grip patterns, pinch grip strength, school students*

INTRODUCTION

The human hand plays a crucial role in grasping and manipulating objects, particularly for fine motor tasks like writing. Handwriting is a complex activity requiring coordinated physical and mechanical skills, serving as a primary means of communication. Children typically begin exploring writing around age 2 through scribbling, recognizing purposeful mark-making by age 3, and forming numbers and letters by ages 4-5. Initially, their pen grip quality is poor due to immature fine motor skills, but with practice, grip strength, hand-eye coordination, and handwriting quality will improve.(1)

Ann-Sofie Selin's comprehensive research on pencil grip strengths in school-age children revealed significant diversity, underscoring the importance of understanding individual variations. The study identified seven distinct pencil grip types, each with its unique characteristics and implications for handwriting efficiency and overall hand function

The dynamic tripod grip emerged as the most recommended and widely adopted method, characterized by the thumb, index, and middle fingers working in harmony to control the pencil

Other grip types include lateral tripod with Thumb and index finger on either side of the pencil , Dynamic quadrupod with Thumb, index, middle, and ring fingers all engaged ,Lateral quadrupod: A variation of the lateral tripod with additional finger support.

Handwriting remains a vital skill in education, playing a crucial role in academic success, particularly in note-taking, report writing, and examinations. However, difficulties in handwriting can lead to significant challenges, including the inability to complete written exams due to discomfort, reduced writing speed, and legibility, as well as an increased risk of cumulative trauma and injuries. Research has shed light on the prevalence of handwriting-related issues, revealing that a staggering 93% of students experience pain while writing, with many facing significant discomfort during writing tasks.

NEED OF THE STUDUY

Handwriting remains a vital skill in education, playing a crucial role in academic success, particularly in note-taking, report writing, and examinations. However, difficulties in handwriting can lead to significant challenges, including the inability to complete written exams due to discomfort, reduced writing speed, and legibility, as well as an increased risk of cumulative trauma and injuries. Research has shed light on the prevalence of handwriting-related issues, revealing that a staggering 93% of students experience pain while writing, with many facing significant discomfort during writing tasks.

RESEARCH METHODOLOGY

STUDY SETTING

Vocational Higher Secondary School (VHSS) Irimpanam , Kochi

STUDY DESIGN

Cross sectional study

SAMPLING TECHNIQUE

Purposive sampling

SAMPLE SIZE

200

STUDY DURATION

3 months

INCLUSION CRITERIA

•Male and female school students

• Right side dominant students,

• Age 13 to 17

• Students who can read English

EXCLUSION CRITERIA

- Students having history of recent surgeries splints and implants
- Non cooperative candidates
- Differently abled students.

OUTCOME MEASURES

- Cornell hand discomfort questionnaire.

MATERIALS USED

Cornell hand discomfort questionnaire

Camera

Pen

Paper

Hydraulic pinch gauge

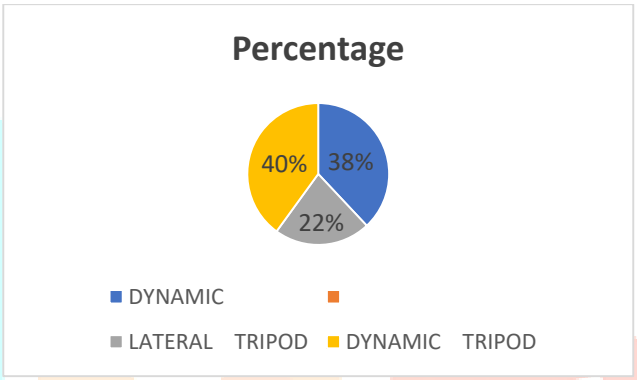
PROCEDURE

After the approval, based on the inclusion and exclusion criteria a total of 200 students were selected for the study. The entire selected students were informed in detail about the type and nature of the study. Cornell hand discomfort questionnaire were distributed among school students. Then students were asked to fill the questionnaire. According to purposive sampling students were selected on the basis of hand discomfort score. Others were excluded. Those who reached in inclusion criteria were said to be write something. The pattern and pinch grip were identified using mobile phone camera. Categorize Cornell hand discomfort questionnaire on the basis of different pinch grip pattern among school students. Identification of group having minimum hand discomfort and maximum hand discomfort is done. Then pinch grip strength among these groups were identified using hydraulic pinch gauge

STATISTICAL ANALYSIS

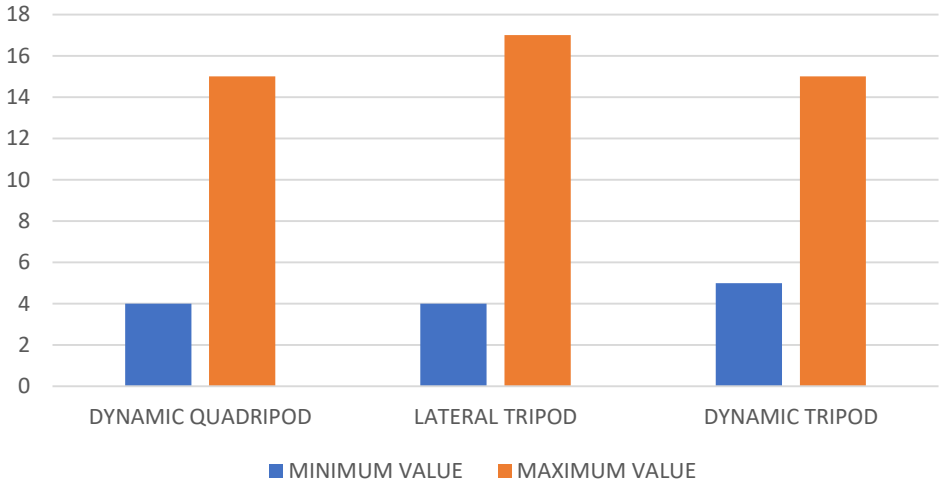
PATTERN	TOTAL	%	BOYS	%	GIRLS	%
DYNAMIC	77	38%	42	54.5%	35	45.4%
LATERAL TRIPOD	43	22%	23	51.6%	20	46.5%
DYNAMIC TRIPOD	80	40%	49	61.2%	31	38.75 %

Table 1: shows that the number of students in each pinch grip pattern and the number of boys and girls in each pattern



PATTERN	MEAN	SD	MINIMUM VALUE	MAXIMUM VALUE
DYNAMIC	9.71	2.32	4	15
LATERAL TRIPOD	9.6	2.66	4	17
DYNAMIC TRIPOD	9.8	2.5	5	15

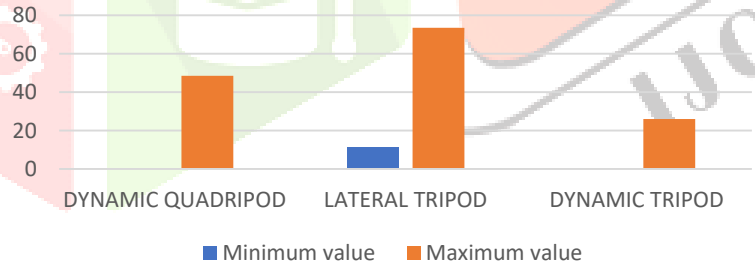
Table 2 Shows:Pinch Grip Strength In Each Pattern



Graphical representation of Pinch grip strength in each pattern

PATTERN	FREQUENCY	PERCENTAGE	MEAN
DYNAMIC QUADRIPOD(N=77)	72	93.5%	16.9091
LATERA TRIPOD(N=43)	43	100%	24.4070
DYNAMIC TRIPOD(N=80)	72	90%	11.2188

Table 3 Shows: Discomfort In Each Pattern



Graphical representation of Discomfort In Each Pattern

DISCUSSION

The purpose of the study was to find out which type of pinch grip pattern has the least hand discomfort and also their pinch grip strength. A total of 200 students both males and females were taken. Their discomfort is assessed using Cornell Hand Discomfort questionnaire and their pinch grip pattern has been identified using a mobile phone camera.

Among 200 students 77 shows dynamic ,43 shows lateral tripod and 80 shows dynamic tripod. Their pinch grip pattern was measured by hydraulic pinch guage. Dynamic tripod pattern shows least hand discomfort while lateral tripod shows highest hand discomfort. The dynamic tripod pinch grip pattern have better pinch grip strength comparing with other two pattern

The Dynamic Tripod Grip, once considered the "golden standard" of grips, enables efficient, accurate, and swift writing. This grip is characterized by the harmonious functioning of the thumb, index, and middle fingers.Benefits of the Dynamic Tripod Grip include Improved handwriting legibility, Reduced fatigue,Enhanced writing fluency,Better overall fine motor control. Pencil shaft rests on the middle finger while Ring and little fingers curl gently into the palm The Web space opens and becomes circular.The Writing tool held closer to the nib and the Movement generated from fingertips The Hand, wrist, elbow, and shoulder remain stabilized .This make the grip pattern more comfortable.The human hand's ability to grip objects is vital for daily activities, which require coordination between fingers and the thumb.

The pinch grip strength, specifically between the thumb and one finger, is essential for tasks like holding a pen or pencil. Research has linked pinch grip strength to handwriting quality, with studies showing a correlation between the two.Research suggests dynamic grip patterns may offer advantages over lateral tripod grip patterns, particularly in terms of pinch grip strength. This is because Dynamic Grip Pattern Involves flexible, adaptive finger movements.It also encourages active participation of all fingers, enhances grip stability and control.while Lateral Tripod Grip Pattern which typically involves thumb, index, and middle finger Often used for holding small objects.They May lack the adaptive flexibility of dynamic grip patterns.Studies indicate that dynamic grip patterns Distribute forces more evenly. They Utilize intrinsic hand muscles effectively and demonstrate improved pinch grip strength.The frequently recommended traditional dynamic tripod grip is still a grip to encourage. Its functional attraction lies in a combination of mobility and stability without unwarranted pressure involved.

The studies suggest that the pencil grip can have a effect on the writer by increasing endurance of writing.It's also crucial to consider a child's physical development when teaching pencil grip. During exams, students must write quickly and legibly to showcase their knowledge within time constraints. To achieve this, two key factors are required that is efficient handwriting technique and avoiding of painful pen grips and speeds.Ergonomic posture also have an important role

They should Seated comfort with knees at 90 degrees, Feet flat on floor with Slight forward lean and Forearms on desk, elbows slightly bent and Non-dominant hand adjusting paper. By mastering these elements, students can focus on conveying their knowledge without discomfort or fatigue.An inappropriate pencil grip can cause tension in the fingers, wrist or even the arm or shoulder. The pressure exerted by the fingers on the pen accentuates these pains. It is often linked to the tension and excessive pressure mentioned above, but also to the use of an unsuitable pen grip pattern An improper pen grip can cause a number of disadvantages it can strain the muscles and ligaments in your hand, causing pain and fatigue.It can make handwriting slow and difficult to read. It can also make it hard to see what you're writing.An improper grip can cause the learning difficulties if left uncorrected.

Training a child with a better grip pattern can enhance their writing skill and fluency . It also helps in reducing the pain and discomfort while writing.A dynamic tripod grip helps children to write efficiently, effortlessly and for a greater endurance. Writing will become an automatic task, so that children can spend more time concentrating on what they want to write, rather than how to go about writing it. Developing the

correct skills required for using a pencil efficiently will also help to develop other fine motor skills, including typing skills.

An improper pen grip can cause a number of disadvantages it can strain the muscles and ligaments in your hand, causing pain and fatigue.It can make handwriting slow and difficult to read. It can also make it hard to see what you're writing.An improper grip can cause the learning difficulties if left uncorrected.Pencil grip development is a common concern for many parents, teachers and therapists as this can lead to difficulty with handwriting tasks in the future. There are several different reasons why a child holds their pencil the way they do. We want to be sure a child is progressing through the proper grasps in a typical pattern. If this does not occur, children may develop an immature grasp. One of the most common reasons for this is that they are participating in writing before their hands are developmentally ready for the task. It is very important to modify a child's pencil grip as early as possible to avoid developing an inappropriate pencil grip leading to difficulty with handwriting

An immature or poor pencil grip tends to block the finger movements, which results in the child moving from the wrist or from the arm in order to write.If your child's pencil grip blocks finger movements, it may cause unnecessary fatigue, discomfort and messy work.This in turn may affect handwriting, because the child will be using the wrist and arm muscles to move the pencil and form the letters.The tripod grip encourages students to build flexibility and strength when fluently writing in the classroom.The tripod grip is also beneficial to students as it supports their fingers and wrists whilst they are writing. The aim is that, once they have mastered this grip, they can draw, colour and write without experiencing pain or discomfort when writing.

CONCLUSION

This study shows that dynamic tripod grip have lower level of discomfort and enhanced pinch grip strength, while lateral tripod grip exhibit higher level of discomfort and reduced pinch grip strength .These findings suggest that adopting the Dynamic Tripod Grip can lead to improved hand function, reduced fatigue, and minimal hand discomfort.

LIMITATION

1. Manual errors may have been present while conducting the study.
2. Correlation was not done separately for men and women participants.
3. The present study was conducted in a small population ,large sample size is recommended for wider generalization
4. As the study done at a specific school, we can do further study in other school as well.
5. Since students complete the questionnaire individually errors may occur either intentionally or unintentionally.

SCOPE OF THE STUDY

1 Large sample size is required for wider generalization.

2 Approximately equal ratio of male and female population recommended for the study.

3 Inclusion criteria for the age can be extend to different age

REFERENCES

1. Khutale S, Malawade M. Prevalence of pain while writing in students and its correlation with writing speed. ijamscr

2. Selin AS. Pencil grip: a descriptive model and four empirical studies (Doctoral dissertation, Åbo Akademi-Åbo Akademi University).

3. Matthiesen N, Wegener C. The discomfort of writing in academia. In Educational Dilemmas 2019 Jan 18 (pp. 112-125). Routledge.

4. Chang SH, Chen CL, Yu NY. Biomechanical analyses of prolonged handwriting in subjects with and without perceived discomfort. Human movement science. 2015 Oct

5. Udo H, Otani T, Udo A, YOSHINAGA F. An electromyographic study of two different types of ballpoint pens investigation of a one hour writing operation. Industrial Health. 2000

6. Asiri A, Albassri D, Alswayyed T. The prevalence of hand pain and its risk factors among dental students in Riyadh, Saudi Arabia

7. Kadaskar V, Borkar T. A study to evaluate the correlation between pinch grip and handwriting among school going children in rural areas. International Journal of Research and Review. 2020
8. van Drempt N, McCluskey A, Lannin NA. A review of factors that influence adult handwriting performance. Aust Occup Ther J. 2011 Oct
9. Bladon E. An investigation into the prevalence of non-tripod pengrip and its implications for secondary school writers (Doctoral dissertation, Middlesex University).
10. Baur B, Fürholzer W, Jasper I, Marquardt C, Hermsdörfer J. Effects of modified pen grip and handwriting training on writer's cramp. Arch Phys Med Rehabil. 2009 May;90(5):867-75. doi: 10.1016/j.apmr.2008

11. Ziviani J. Qualitative changes in dynamic tripod grip between seven and 14 years of age. Developmental Medicine & Child Neurology. 1983 Dec

12. Sassoon R, Nimmo-Smith I, Wing AM. An analysis of children's penholds. InAdvances in Psychology 1986 Jan 1 (Vol. 37, pp. 93-106). North-Holland.

13. Dennis JL, Swinth Y. Pencil grasp and children's handwriting legibility during different-length writing tasks. The American Journal of Occupational Therapy. 2001 Mar

14. Schwellnus H, Carnahan H, Kushki A, Polatajko H, Missiuna C, Chau T. Effect of pencil grasp on the speed and legibility of handwriting in children. The American Journal of Occupational Therapy. 2012 Nov