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Pinch Testing Positions Among Certified Hand Therapists: A Cross-Sectional Survey

Abstract

Background: Pinch strength is indicative of later functional hand use following injury to hand. However, we believe clinicians (and more specifically CHTs) currently do not use a consistent measurement of pinch grip, despite availability of a “gold standard” of current (2015) ASHT standards for measuring pinch grip.

Methods: This cross-sectional survey (N = 175, 35% response) was designed to determine whether CHTs adhere to the standardized testing position for palmar pinch strength as recommended by the ASHT.

Results: Results determined that only 5.7% ($n = 10$) of the CHTs surveyed complete the entire ASHT standardized testing position. An additional 18.3% ($n = 32$) of the CHTs reported positioning the upper arm, forearm, and wrist per the guidelines, but did not hold under the gauge as recommended. The low percentage of adherence to this position contrasts with the majority of the CHTs (98.3%) reporting using standardized testing position for grip strength for at least 75% of attempts.

Conclusion: It is possible that the pinch guidelines are not as widespread in the literature, and therefore, clinicians are not able to reference the recommended standardized positions.

Comments

The authors report no conflicts of interest to disclose.

Keywords

pinch, gauge, strength, evaluation

Cover Page Footnote

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Injuries to the hand are often the result of machine trauma, lacerations, crushing injuries, and falls (Trybus, Lorkowski, Brongel, & Hladki, 2006). Hand trauma will, undoubtedly, complicate activities of daily living, such as dressing oneself, cutting one's food, and completing work tasks. To regain hand function and strength after an injury, patients are often referred to outpatient occupational therapists (OTs) or physical therapists (PTs) who specialize in rehabilitation of the hand. Most of these therapists have obtained the credential of Certified Hand Therapist (CHT).

During hand rehabilitation, range of motion and strength are measured and recorded at baseline and then again at regular intervals. Typical strength measurements include grip strength, lateral pinch strength, and palmar (tripod) pinch strength. Comparison of data from the affected hand to the contralateral hand, and also to the available normative data based on the patient's age, gender, and hand dominance, is helpful for interpretation of the findings (Casanova, 1992). Frequent reassessment of the hand's strength is useful to track progress toward resuming functional hand use or employment (Mathiowetz et al., 1985). This information is also useful in determining the need for vocational retraining (Bruyns et al., 2003). Studies have indicated that the loss of palmar pinch reduced the probability of return to work, with or without changing specific job duties (Chang, Wu, Lee, Guo, & Chiu, 2011). Measuring grip and pinch strength can provide early prediction regarding potential for return to work for patients with median and ulnar nerve injuries and can be a cost saving measure when used for early vocational retraining (Bruyns et al., 2003).

Research indicates that maintaining a standardized position leads to higher test-retest reliability with lower variability over time when discussing grip strength dynamometry (Lagerström & Nordgren, 1996). Therefore, one would reason that maintaining consistent standardized testing for pinch strength dynamometry would maximize reliability and validity as well. The most commonly recognized grip strength normative data used the following standardized test position: shoulder adducted and neutrally rotated, elbow flexed at 90 degrees, and forearm and wrist in neutral position (Mathiowetz et al., 1985). Until recently, there was not a definitive pinch strength testing position.

The Clinical Assessment Recommendations (2015), are available from the American Society of Hand Therapists (ASHT). Despite numerous brands and styles of pinch gauges, this text specifically recommends the B&L Engineering® pinch gauge. The exact positioning recommendations for the pinch gauge include the following:

The subject should be seated in a straight-backed chair (no arms) with the shoulder adducted and neutrally rotated, the elbow flexed at 90 degrees, the forearm in a neutral position, and the wrist in neutral or slight extension (0-30 degrees). The pinch gauge is lightly supported by the examiner. A common variation is to position the forearm in pronation for the tripod and tip pinch The pinch gauge is presented on its side at an angle of approximately 45 degrees. It is held between the pulp of the thumb and the pulp of the index and middle fingers. (Fournier & Bourbonnais, 2015, p. 10)

While this standardized pinch testing position recommends placing the forearm in neutral positioning, it does acknowledge that there is a common variation of forearm pronation. Research conducted by Halpern and Fernandez (1996) indicates that forearm posture has a significant effect on pinch strength, with forearm pronation decreasing strength by 7%. Woody and Mathiowetz (1988) found that while "scores were slightly higher in the pronated position for palmar pinch, they did not reach the 0.05 level of significance" (p. 125). Stegink Jansen, Simper, Stuart, and Pinkerton (2003) found that forearm position did not affect three-jaw chuck (palmar) pinch strength.

Purpose of the Study

The study's hypothesis is that a wide range of testing positions and pinch gauge brands are used for palmar (tripod) pinch assessment. However, if the clinician, payer, or physician compares data to the established norms, one would assume that validity of the data would be compromised if deviations occur from the standardized testing positions. Therefore, obtaining data regarding current trends in pinch measurement to guide future normative data collection, interpretation, and application is paramount.

Methods

Approval was obtained from the Institutional Review Board (IRB) at West Virginia University. The participants were selected from the Hand Therapy Certification Commission's website (n.d.). The primary investigator was blinded to the participants' demographic information to prevent selection bias. The participants included individuals with the designation of CHT with no regard to age, gender, or educational background (occupational therapy or physical therapy).

The participants were mailed a packet that contained a cover letter, a paper survey, and a return envelope. The paper surveys also contained a link to an online anonymous survey. The participant could choose to complete the survey on paper or online. After 4 weeks, a reminder postcard was mailed to encourage all participants to complete the survey. Five hundred participants were selected from across the United States.

Results

Five hundred surveys were mailed and 175 surveys were returned (35% participation). Descriptive data was analyzed using IBM SPSS Statistics for Macintosh (2016). Demographic data on the subjects were analyzed, including number of years practicing, education level, and educational background (occupational therapy or physical therapy).

Education

Of the total respondents, 53.7% ($n = 94$) had a bachelor's degree, 40% ($n = 70$) had a master's degree, 1.15% ($n = 2$) had an entry-level clinical doctorate (OTD or DPT), 4.0% ($n = 7$) had a post-professional doctorate (OTD or DPT), and 1.15% ($n = 2$) had a doctor of philosophy (PhD) or doctor of education (EdD). In regard to clinical background, 89.1% ($n = 156$) reported their background as an OT, whereas 10.3% ($n = 18$) reported their background as a PT, and 0.6% ($n = 1$) reported their background as both an OT and a PT.

Clinical Experience

This survey did not allow for less than 5 years of experience, as that is the minimum number of years for the CHT certification. Of the total respondents, 5.7% ($n = 10$) had 5 to 10 years of experience, 4.6% ($n = 8$) had 11 to 15 years of experience, 17.1% ($n = 30$) had 16 to 20 years of experience, 27.4% ($n = 48$) had 21 to 25 years of experience, and 45.1% ($n = 79$) had greater than 26 years of experience. The majority (75.4%) of the respondents were employed full time ($n = 132$), with 21.7% ($n = 38$) reporting they were employed part time, 2.3% ($n = 4$) reporting employment either casual/coverage/PRN, and one participant not reporting.

Number of Evaluations Completed Weekly

This survey attempted to determine the frequency with which the CHTs completed evaluations (either initial evaluation or re-evaluation) to determine their relative familiarity with evaluation procedures, especially pertaining to grip and pinch testing positions. Two of the respondents reported that they did not complete any evaluations during an average week (1.1%), while 32.6% ($n = 57$) reported completing 1 to 5 evaluations per week, 48.6% ($n = 85$) reported completing 6 to 10

evaluations per week, 12.0% ($n = 21$) reported completing 11 to 15 evaluations per week, and 5.7% ($n = 10$) reported completing greater than 16 evaluations per week.

Style of Gauge

The style of gauge was determined as well. The C-shape spring style gauge is recommended according to the ASHT guidelines (Fournier & Bourbonnais, 2015). However, only 33.7% ($n = 59$) of the respondents reported using this style of gauge. Hydraulic gauges were used by 46.9% ($n = 82$) of the respondents. In addition, 6.3% ($n = 11$) reported they used both styles, and 10.3% ($n = 18$) reported they were unsure what style of gauge they used.

Pinch Findings

The total number of CHTs following ASHT's exact guideline for pinch position (shoulder adducted and neutrally rotated, elbow flexed at 90 degrees, forearm neutral, wrist in 0-30 degrees extension [Fournier & Bourbonnais, 2015]) was 5.7% ($n = 10$). However, 18.3% ($n = 32$) of the CHTs position the upper arm, forearm, and wrist according to the guidelines but do not support the gauge as recommended.

The survey inquired about the frequency of using the standard grip testing position. In sharp contrast to the number of respondents who adhered to the pinch standardization, a large number of the respondents, 79.4% ($n = 139$), reported that they use the standardized grip test position every attempt, and an additional 18.9% ($n = 33$) reported that they use the standardized grip testing position during at least 75% of attempts. Therefore, 98.3% ($n = 172$) of the respondents reported that they use a standardized grip position for at least 75% of attempts.

A large area of variability in the positioning of the arm for palmar (tripod) pinch strength assessment was regarding the forearm. Responses regarding forearm position included: 27.4% ($n = 48$) test in forearm neutral, 42.9% ($n = 75$) test in forearm pronation, 9.7% ($n = 17$) test in a variety of ranges in mid-pronation, and 20% ($n = 35$) did not control for forearm position.

The CHTs who responded as following the exact ASHT protocol had the following trends: all were OTs, 80% ($n = 8$) had a bachelor's degree, 90% ($n = 9$) reported having at least 21 years of experience, 90% ($n = 9$) were employed full time, and 100% ($n = 10$) reported using the standardized grip test position for at least 75% of attempts.

Discussion

The total cumulative percentage of CHTs using the standardized grip strength testing position at least 75% of attempts is 98.3% compared to standardized pinch positioning of 5.7%. Inter-rater reliability is dependent on consistent reliance on standardized testing procedures. However, pinch strength dynamometry guidelines are not as easily accessible in the literature. At the time of data collection, the ASHT guideline book was only available to current members, which likely affected access to this information, as not all CHTs are members of ASHT.

Study Limitations

Of the respondents to this survey, 89.6% were OTs, 9.8% were PTs, and 0.5% reported education as both an OT and a PT. However, this is reflective of the current demographics: 85% of those with the CHT credential are OTs, 14% of those with the CHT credential are PTs, and 1% are both an OT and a PT (Hand Therapy Certification Commission, n.d.). Because the majority of the respondents were OTs, the findings cannot be generalized to all PTs.

Conclusion

The majority of the CHTs are consistently using standardized testing positions in grip strength assessments but not in pinch strength assessments. The largest area of variation is regarding the position of the forearm and whether the gauge is held during the testing procedure. This is an important area for future research.

Future studies should investigate the adherence of these testing positions by general OTs and PTs to determine if the fields vary. Trends in test position should be investigated to determine whether forearm position, especially, influences pinch strength. These findings will determine and guide updated normative data.

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