The Moberg Pickup Test:
Results of Testing with a Standard Protocol

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ABSTRACT: The purpose of this study was to propose a standard protocol for administering the Moberg pickup test. One hundred subjects (53 male and 47 female subjects, aged 11 to 77 years) volunteered. A wide variety of occupations were represented. No subjects had a history of upper extremity dysfunction. The materials and the testing procedures were clearly described to the subjects. Both hand dominance and gender difference were found to have significant effects on test performance. Norms were established for dominant/nondominant hands and for male/female subjects. Standard scores were calculated and used for comparison. The inter-rater reliability of the test was also determined. Administered with a standard protocol, the Moberg pickup test is a valuable test of functional sensibility. It is simple and quick to administer, easy to replicate, and inexpensive to acquire.
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Functional sensibility assessment is essential for evaluating the sensory recovery of repaired nerves. It is often assumed that perception of touch, perception of pin prick, or two-point discrimination correlates with functional recovery. However, our clinical impression is that often the results of these tests do not correlate well with functional sensibility. It was this observation that stimulated Dellon to investigate alternative testing procedures in the late 1970s and early 1980s.[1]

Moberg defined hand function as precision sensory and gross sensory grip.[1] He reasoned that whenever precision sensory grip is possible, protective sensation is always present.[2] He introduced the pickup test to evaluate the functional sensibility of an injured hand.[3] The test has been recommended as an important sensory assessment.[3–7] The test results have a functional value because they reflect manual performance.

Performing the test requires precision sensory grip and the ability to perceive constant touch. The patient is asked to pick up a number of small objects (e.g., paper clip, coin) and place them in a small container. Each hand is tested separately. The same procedures are repeated with the patient blindfolded. However, there has been no formal means of measuring performance, although the fingers used to pick up the objects and the time taken to accomplish the task are usually noted. The test has not had a standard testing protocol, and no norms have been established.

The pickup test was quantified in the mid 1960s at Brooke Army Medical Center.[3] For young men, 5 to 8 seconds to complete the test was considered a normal result. However, the range was relatively wide for clinical comparison. Influential factors like gender difference, hand dominance, and occupation were not addressed.

In 1972, Dellon[4] tried to standardize the test items and established normal values for performance with ten normal adults. The small subject population was a limiting feature of the data.

PURPOSE

The objectives of this preliminary study were to propose a standard protocol for administering the pickup test, to establish normative values for the test, and to assess the inter-rater reliability of the test.

MATERIALS AND METHODS

Subjects

One hundred subjects (53 male and 47 female subjects, ranging in age from 11 to 77 years) volunteered to participate (Figure 1). A wide variety of occupations were represented; among the subjects were students, clerks, laborers, construction workers, and garment workers. No subjects had a history of upper extremity dysfunction.

At the time of this study, Ms. Ng and Mr. Ho worked in the Occupational Therapy Department of the David Trench Rehabilitation Centre in Hong Kong.

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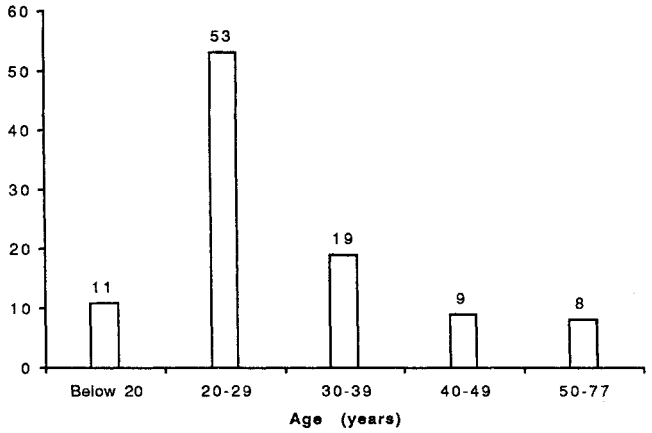

FIGURE 1. Number of subjects in each age group (N = 100).

Methods

Twelve small, common metallic items were selected for the test. These included a 50¢ coin, $2 coin, wing nut, key, key chain, nail, square nut, hexagon nut, washer, paper clip, safety pin, and press stud. In addition, a stopwatch, a plastic display sheet (60 × 30 cm), a small container, and a pair of eye shades were required (Figure 2).

The plastic display sheet was placed lengthwise about 15 cm from the edge of table, to define the test area. The small container was put at the center of the display sheet. The subject was informed that the test is timed. Before starting the test, the subject was seated in a chair facing the display sheet. The hand being tested rested on the same side as the 12 items, which were randomly placed.

Standard instructions and procedures were used in administering the test. On a verbal cue, the subject picked up the test objects one by one and placed them in the small container as quickly as possible (Figure 3). Subjects were reminded not to use trick movements (e.g., sliding an object to the edge of the display sheet instead of picking it up with the fingers). The time required to accomplish the task was recorded, in seconds, by the examiner. Three trials were performed.

The dominant hand was tested first, followed by the nondominant hand. If the subject was ambidextrous, the hand used for writing was considered dominant.

The test procedures were repeated with the subject blindfolded (Figure 4). After all subjects had been tested, 14 subjects were selected at random, and their performances were scored independently by two different raters on different days.

RESULTS

Of the scores for the three trials in each part of the test, only the best score was used for calculation and for comparison. The mean scores and the standard deviations for open eyes/closed eyes and for dominant hand/nondominant hand are shown in Table 1. The scores for both male and female subjects are shown in Tables 2 and 3.

Statistical Analysis

A paired group *t*-test was used to analyze the results between the dominant and the nondominant hands of each subject. Results were subdivided into four groups (Table 4). The results suggested that there were significant differences in all four groups ($p < 0.01$).

A one-way ANOVA was used to analyze the results between male subjects and female subjects. They were subdivided into four groups (Table 5). The results suggested that there were significant differences in all four groups ($p < 0.01$ for the two dominant-hand groups and $p < 0.05$ for the nondominant-hand groups).

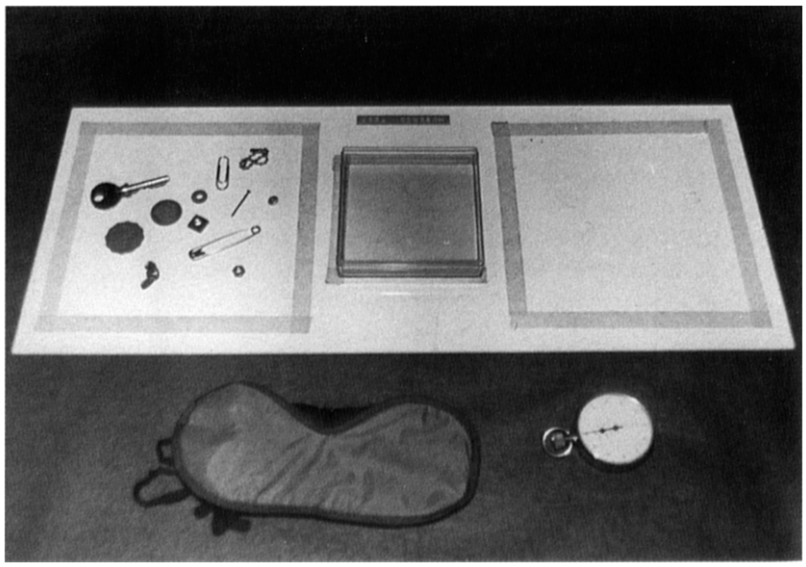

FIGURE 2. Set-up of the Moberg test, with common metallic items on the left and a small container in the middle. A pair of eye shades and a stopwatch were also required for testing.

FIGURE 3. A subject performs the test while the examiner times the trial.

FIGURE 4. The test procedure is repeated with the subject blindfolded.

The norms of the pickup test were calculated according to the differences in gender and hand dominance (Table 6).

For inter-rater reliability, Pearson's correlation coefficients were calculated on the basis of the 14 randomly selected subjects. The results were subdivided into two groups (Table 7). The results were considered reliable at an r value of 0.6 and a p value less than 0.01.

Standard scores were calculated as follows and were used for comparison in subsequent test performances:

$$\text{Standard score} = \frac{x\text{-mean}}{\text{SD}}$$

DISCUSSION

Performing the test required, in the subject, the ability to perceive constant touch (to locate the objects) and precision grip (to pick up the test items). Cutaneous feedback is essential for gripping objects.[8] With the eyes open, subjects may use visual cues to compensate to a certain extent for the lack of cutaneous feedback. When blindfolded, subjects rely totally on digital sensibility to locate objects. Hence, it takes subjects longer to complete the test when blindfolded than when their eyes are open.

Other factors that may affect the results are:

- The amount of time a subject spent searching for test items when blindfolded. The plastic display sheet helps define the test area. Also, having one hand stabilize the small container at the center probably helps the subject judge how far to reach.
- The effect of learning, although the test items are placed randomly on the display sheet.
- Physical factors, such as temperature of the environment, subjects' motivation and cooperation, and the time of the day.
- Fingernail length.

TABLE 1. **Test Results for All Subjects (N = 100)**

	Mean	*SD*
Eyes open		
Dominant hand	11.1	1.4
Nondominant hand	11.6	1.6
Eyes closed		
Dominant hand	21.3	3.2
Nondominant hand	22.2	3.6

TABLE 2. **Test Results for Male Subjects (n = 53)**

	Mean	*SD*
Eyes open		
Dominant hand	11.5	1.3
Nondominant hand	11.9	1.4
Eyes closed		
Dominant hand	22.1	3.2
Nondominant hand	22.9	3.4

TABLE 3. **Test Results for Female Subjects (n = 47)**

	Mean	*SD*
Eyes open		
Dominant hand	10.6	1.4
Nondominant hand	11.3	1.7
Eyes closed		
Dominant hand	23.3	3.0
Nondominant hand	21.4	3.6

TABLE 4. **Analysis of Differences by Hand Dominance**

	Pairs of Hands	df	t-*Test*	*Significance*
Group 1: Eyes open, male	53	52	3.296	$p < 0.01$
Group 2: Eyes closed, male	53	52	3.184	$p < 0.01$
Group 3: Eyes open, female	47	46	4.330	$p < 0.01$
Group 4: Eyes closed, female	47	46	3.416	$p < 0.01$

TABLE 5. **Analysis of Differences by Sex**

	No. of Subjects				
	Male	*Female*	**df**	*One-way ANOVA*	*Significance*
Group 1: Eyes open, dominant hand	53	47	98	11.480	$p < 0.01$
Group 2: Eyes open, nondominant hand	53	47	98	4.188	$p < 0.05$
Group 3: Eyes closed, dominant hand	53	47	98	8.225	$p < 0.01$
Group 4: Eyes closed, nondominant hand	53	47	98	4.566	$p < 0.05$

TABLE 6. **Normal Values for Mean (SD) for the Moberg Pickup Test**

	Male Subjects	*Female Subjects*
Group 1: Eyes open, dominant hand	11.5 (1.3)	10.6 (1.4)
Group 2: Eyes open, nondominant hand	11.9 (1.4)	11.3 (1.7)
Group 3: Eyes closed, dominant hand	22.1 (3.2)	20.3 (3.0)
Group 4: Eyes closed, nondominant hand	22.9 (3.4)	21.4 (3.6)

TABLE 7. **Inter-rater Reliability for 14 Subjects**

	No. of Subjects	**df**	*Pearson's Correlation Coefficient*	*Significance**
Group 1: Eyes open	14	12	0.671	$p < 0.01$
Group 2: Eyes closed	14	12	0.801	$p < 0.01$

*One-tailed test.

Limitations of the Study

The methodology of this study did not address intrarater reliability. In the clinic, it is likely that the same therapist will retest the same patient on subsequent visits.

The sample size of 14 subjects and 2 testers was too small for the inter-rater reliability test. An expanded subject base and more testers may have yielded reliability coefficients greater than 0.6.

Although the test scores appeared to increase as subject age increased, no conclusion can be drawn, since the majority of the subjects were in the age groups of 20 to 29 years and 30 to 39 years.

It would be helpful to compare our data with those obtained by other methods and from other research designs, to make the test results of this pickup test more relevant clinically.

CONCLUSION

This study draws attention to the significance of gender difference and hand dominance in performance of the pickup test. As a preliminary study, it suggests that administering the test with a standard protocol may be clinically sound. However, the results of this study should not be generalized because of the small number of subjects and other limitations.

REFERENCES

1. Moberg E. The unsolved problem: how to test the functional value of hand sensibility. J Hand Ther. 1991;4:105–10.
2. Moberg E. Objective methods for determining the functional value of sensibility in the hand. J Bone Joint Surg. (Br.) 1958; 40B:454–76.
3. Omer GE. Sensory evaluation by the pick-up test. In: Jervett DL, McCarroll HR (eds). Nerve Repair and Regeneration: Its Clinical and Experimental Basis. St Louis, Mo: CV Mosby, 1980:250–1.
4. Dellon AL. Evaluation of Sensibility and Re-education of Sensation in the Hand. Baltimore, Md: Williams & Wilkins, 1981:102–6.
5. Callahan AD. Sensibility testing: clinical methods. In: Hunter JM, Schneider LH, Mackin EJ, Callahan AD (eds). Rehabilitation of the Hand. 2nd Ed. St Louis, Mo: CV Mosby, 1984: 407–31.
6. Tubiana R, Thomine JM, Mackin EJ. Sensibility Evaluation in the Examination of the Hand and Upper Limb. Philadelphia, Pa: WB Saunders, 1984:176–94.
7. Marsh D, Smith B. Timed functional tests to evaluate sensory recovery in sutured nerves. Br J Occup Ther. 1986;3:79–82.
8. Westling G, Johansson RS. Factors influencing force control during precision grip. Exp Brain Res. 1984;53:277–84.