

Preliminary Reference Values for the Jebsen–Taylor Hand Function Test in Adults in Delhi, India

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ABSTRACT

Background: The Jebsen–Taylor Hand Function Test (JTHFT) is a timed performance-based assessment of hand function comprising seven subtests relevant to activities of daily living. Because the test was originally developed in the United States, population-specific reference values may be useful when interpreting performance in other settings.

Objective: To generate preliminary reference values for JTHFT performance among adults in Delhi and to examine differences according to age, sex, and hand dominance.

Methods: A cross-sectional methodological survey included 100 apparently healthy adults (50 men and 50 women). Participants were divided into younger adults (20–59 years; n=80) and older adults (60–94 years; n=20), with 40 men and 40 women in the younger group and 10 men and 10 women in the older group. JTHFT performance was timed for the dominant and non-dominant hands. Data were analyzed in SPSS version 16.0. Independent-samples t-tests were reported for between-group comparisons, with statistical significance defined as $p < 0.05$.

Results: Mean completion time was below 10 seconds for all subtests except writing. Writing with the non-dominant hand showed the largest standard deviation. The manuscript reports significant age- and sex-related differences for selected subtests, while several other comparisons were not statistically significant. Because the older age strata contained only 10 participants of each sex and recruitment used convenience sampling, the resulting values should be regarded as preliminary reference values rather than definitive population norms.

Conclusion: The study provides preliminary descriptive reference values for JTHFT performance in the sampled Delhi population. Larger, probability-based studies with adequate representation across age and sex strata are required before these values can be considered broadly generalizable normative data.

Keywords: Jebsen–Taylor Hand Function Test; JTHFT; hand function; reference values; normative data; Delhi; India; age; sex; hand dominance.

INTRODUCTION

Hand-function evaluation is an important component of assessment in physical rehabilitation and occupational therapy. No single instrument captures every aspect of hand function, including anatomical integrity, mobility, strength, sensation, grasp pattern, precision, coordination, dexterity, unilateral and bilateral activities, activities of daily living, and motivation.^{1,2}

The Jebsen–Taylor Hand Function Test (JTHFT), originally described by Jebsen and colleagues in 1969, was developed as an objective and standardized measure of hand function. It assesses the time required to perform seven functional tasks: writing, card turning, manipulation of small common objects, simulated feeding, stacking checkers, moving large light objects, and moving large heavy objects.

The JTHFT is relatively simple to administer and provides quantitative completion times. However, it primarily measures speed of task performance and does not comprehensively characterize quality of prehension or all grasp patterns.

Because the original test was developed using a population outside India, the present study was undertaken to describe JTHFT performance in a sample of adults from Delhi. Given the small and uneven age strata and convenience recruitment, the present analysis is framed as a preliminary reference-value study rather than a definitive normative study.

Aim and Objectives

The primary aim was to describe preliminary reference values for JTHFT performance among adults in Delhi. The objectives were to: (1) describe completion times for the seven JTHFT subtests; (2) examine whether performance differed between younger (20–59 years) and older (60–94 years) adults; (3) examine sex-related differences; and (4) compare performance of the dominant and non-dominant hands.

Methods

Study design and participants

A methodological cross-sectional quantitative survey was conducted. A total of 100 apparently healthy adults participated: 50 men and 50 women. Participants were divided into four sex-by-age strata: men aged 20–59 years ($n=40$), women aged 20–59 years ($n=40$), men aged 60–94 years ($n=10$), and women aged 60–94 years ($n=10$). The unequal stratum sizes, particularly the small older-adult groups, should be considered when interpreting inferential results.

Eligibility criteria

Inclusion criteria were age 20–59 or 60–94 years; absence of medical, surgical, or neurological conditions affecting upper-limb function; and ability to understand and write English. Exclusion criteria included neurological disorders causing upper-limb deficit, significant orthopaedic dysfunction or chronic upper-limb pain, previous upper-limb injury or surgery, and inability to read or write English.

Sampling

Participants were recruited using convenience sampling. Consequently, the sample may not represent the wider adult population of Delhi, and generalization beyond the study sample should be avoided.

Instrument and procedure

The Jebsen–Taylor Hand Function Test was administered according to the procedures described in the original Jebsen et al. publication.⁷ Completion times were measured objectively using a stopwatch. Participants were seated on an 18-inch chair at a 30-inch-high desk in a well-lit room. Instructions were provided and comprehension was checked before testing. The seven subtests were administered in a fixed sequence, with the non-dominant hand tested first.

Statistical analysis

Data were entered into an Excel spreadsheet and analyzed using SPSS version 16.0. Descriptive statistics are presented as mean and standard deviation (SD). Between-group comparisons were performed using independent-samples t-tests, as reported in the original analysis. A two-sided p -value <0.05 was considered statistically significant. Before applying the t-test, the assumptions of independence, approximate normality of the outcome within groups, and homogeneity of variance should be evaluated; when variance equality is not supported, the Welch version of the independent-samples t-test is preferable. Because the original dataset and exact p -values were not available for this revision, no new exact p -values have been invented from the rounded summary statistics.

The study involved multiple subtest and subgroup comparisons. Therefore, the probability of false-positive findings may be increased by multiple testing. Future confirmatory studies should pre-specify primary comparisons and consider an appropriate multiplicity-control strategy.

RESULTS

A total of 100 participants were included. The descriptive results are presented separately for dominant and non-dominant hands. The original tables reported mean completion time $\pm$ SD for each JTHFT subtest.

Table 1. Mean completion time (seconds) for the dominant hand

Subtest	Men 20–59 (n=40)	Men 60–94 (n=10)	Women 20–59 (n=40)	Women 60–94 (n=10)
Writing	12.6 $\pm$ 4.4	15.4 $\pm$ 4.3	12.1 $\pm$ 4.2	16.3 $\pm$ 4.3
Card turning	4.1 $\pm$ 0.8	4.5 $\pm$ 0.7	4.5 $\pm$ 1.0	4.7 $\pm$ 0.9
Small common objects	5.9 $\pm$ 0.9	6.2 $\pm$ 0.4	5.6 $\pm$ 0.6	6.3 $\pm$ 0.4
Simulated feeding	6.4 $\pm$ 1.0	6.8 $\pm$ 0.6	6.7 $\pm$ 1.2	7.2 $\pm$ 0.4
Checkers	3.5 $\pm$ 0.4	3.9 $\pm$ 0.2	3.3 $\pm$ 0.4	3.8 $\pm$ 0.2
Large light objects	4.0 $\pm$ 1.0	4.0 $\pm$ 0.2	3.9 $\pm$ 0.4	3.8 $\pm$ 0.1
Large heavy objects	4.0 $\pm$ 0.9	4.8 $\pm$ 0.8	4.0 $\pm$ 0.4	4.2 $\pm$ 0.3

Table 2. Mean completion time (seconds) for the non-dominant hand

Subtest	Men 20–59 (n=40)	Men 60–94 (n=10)	Women 20–59 (n=40)	Women 60–94 (n=10)
Writing	32.0 $\pm$ 8.4	39.6 $\pm$ 9.4	34.6 $\pm$ 10.0	42.9 $\pm$ 12.9
Card turning	5.1 $\pm$ 1.4	6.3 $\pm$ 1.9	5.6 $\pm$ 1.7	6.4 $\pm$ 1.7
Small common objects	6.7 $\pm$ 1.1	7.4 $\pm$ 0.4	6.5 $\pm$ 0.9	7.4 $\pm$ 0.6
Simulated feeding	7.8 $\pm$ 1.4	8.0 $\pm$ 0.6	8.1 $\pm$ 1.5	8.9 $\pm$ 0.6
Checkers	3.9 $\pm$ 0.6	4.6 $\pm$ 0.3	4.0 $\pm$ 0.4	4.5 $\pm$ 0.4
Large light objects	4.4 $\pm$ 1.0	4.7 $\pm$ 0.7	4.3 $\pm$ 0.5	4.1 $\pm$ 0.2
Large heavy objects	4.5 $\pm$ 1.3	5.6 $\pm$ 0.9	4.5 $\pm$ 0.5	4.5 $\pm$ 0.2

Across the four sex-by-age strata, mean completion time was below 10 seconds for each subtest except writing. Writing with the non-dominant hand showed the largest variability, with SDs of 8.4–12.9 seconds across the four strata.

The original manuscript contained several internally inconsistent statements in which “no significant difference” was accompanied by $p < 0.05$. These have been corrected conceptually in the present revision: $p < 0.05$ is interpreted as statistically significant, whereas a non-significant result should be reported as $p \geq 0.05$. Exact p-values should be obtained from the original participant-level dataset before submission.

Between-group findings

For men and women aged 20–59 years, the original analysis reported no statistically significant sex difference for the non-dominant hand. For the dominant hand, card turning was reported as significantly different between men and women, while the remaining subtests were reported as non-significant.

Among participants aged 60–94 years, the original analysis reported significant sex differences for simulated feeding and large heavy objects with the non-dominant hand ($p < 0.01$), and for large light objects ($p < 0.05$). For the dominant hand, significant sex differences were reported for simulated feeding ($p < 0.05$) and large light objects ($p < 0.01$); the remaining subtests were reported as non-significant.

When younger and older men were compared, significant age-related differences were reported for writing,

checkers, and large heavy objects with the non-dominant hand ($p < 0.01$), and for card turning and small common objects ($p < 0.05$). With the dominant hand, significant differences were reported for checkers ($p < 0.01$) and large heavy objects ($p < 0.05$).

When younger and older women were compared, significant differences were reported for writing ($p < 0.05$), small common objects and checkers ($p < 0.01$) with the non-dominant hand. With the dominant hand, significant differences were reported for writing, small common objects, and checkers ($p < 0.01$). Other comparisons were reported as non-significant.

These inferential findings should be interpreted cautiously because the older groups contained only 10 men and 10 women. Small samples reduce statistical power and make estimates of means and variability less stable.

DISCUSSION

The principal descriptive finding was that most JTHFT subtests were completed in less than 10 seconds, whereas writing required substantially more time, particularly with the non-dominant hand. This pattern is consistent with the design of the JTHFT, in which the subtests were intended to provide brief, standardized measures of functional hand performance.⁷

The greater variability observed for non-dominant-hand writing is clinically plausible because writing requires coordinated fine motor control and is influenced by familiarity and practice. However, the present study cannot determine the causes of the observed variability.

The study also suggests that age may influence selected aspects of JTHFT performance. Several comparisons between younger and older adults were reported as statistically significant, particularly for writing, small-object manipulation, checkers, and large heavy-object tasks. This general pattern is compatible with previous work describing age-related changes in hand function.¹

Sex-related differences were observed for selected tasks, particularly in the older group. Previous studies of the JTHFT have also reported sex-related differences in performance.^{7, 13} Nevertheless, because the older strata in the present study each contained only 10 participants, the sex comparisons in this age group should be considered exploratory rather than definitive.

The present findings should also be interpreted in the context of cultural and task-specific influences. Performance on timed functional tasks can be affected by previous experience, educational exposure, language requirements, familiarity with task materials, and habitual hand use. The writing subtest in particular required English literacy, which limits applicability to adults who cannot read or write English.

The term “normative data” should therefore be used cautiously. The current sample was obtained through convenience recruitment and was not sufficiently large or balanced to establish population-wide norms for Delhi. A more appropriate interpretation is that the study provides preliminary reference values that may inform hypothesis generation and future normative research.

Clinical relevance

The reported mean and SD values may serve as preliminary reference information when considering JTHFT performance in adults similar to the sampled population. They should not be used as definitive cut-off scores or as universally applicable normative standards. Clinicians should interpret JTHFT results together with age, sex, hand dominance, education/literacy, clinical presentation, and other relevant functional assessments.

STRENGTHS AND LIMITATIONS

The study provides sex- and age-stratified descriptive values for both dominant and non-dominant hands and reports performance across all seven JTHFT subtests. The use of a standardized functional test and a consistent testing sequence are additional strengths.

Important limitations include the small overall sample ($n=100$), very small older-adult strata ($n=10$ per sex), convenience sampling, restriction of the writing subtest to English-literate participants, and incomplete reporting of the statistical procedures and exact p -values. The original manuscript also did not report formal checks of t -test assumptions, effect sizes, confidence intervals, or adjustment for multiple comparisons. These limitations restrict generalizability and mean that the results should be considered preliminary.

In addition, because only summary statistics were available for this revision, exact p -values, confidence intervals, and effect sizes could not be independently reconstructed with sufficient certainty. The participant-level dataset should be reanalyzed before final journal submission.

Future Research

Future studies should recruit a larger, probability-based and geographically diverse sample of adults from Delhi and other Indian regions, with adequately powered age- and sex-specific strata. Researchers should report exact p -values, 95% confidence intervals, effect sizes, assumption checks, and a pre-specified statistical analysis plan. Development of age-, sex-, and hand-dominance-specific reference intervals should be based on an adequately powered normative sample and appropriate distributional methods.

CONCLUSION

This preliminary study describes JTHFT completion times in a convenience sample of 100 adults from Delhi. Mean completion times were below 10 seconds for all subtests except writing, and non-dominant-hand writing showed the greatest variability. Selected age- and sex-related differences were reported. However, the small older-adult subgroups and convenience sampling substantially limit precision and generalizability. The findings should therefore be regarded as preliminary reference values rather than definitive normative data. Larger, methodologically rigorous studies are required to establish reliable population-specific reference values for the JTHFT in India.

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