Table 1. Demographics of Participants ( 4-6 Years Old; N=62)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Experimental group | | | | | Control group | | | | |
| n=31 | | | | |  | n=31 | | | |
| Age (SD) | | 5.12 (1.05) | | | | |  | 5.27(1.02) | | | |
| Gender | |  | |  |  |  |  |  | |  |  |
| Boys | | 21(67%) | | | | |  | 22(71%) | | | |
| Girls | | 10(33%) | | | | |  | | 9(29%) | | | |
| DD subtype  Developmental delay  Cerebral palsy  Intellectual disabilities  Chromosome abnormalities  Classification using MAND a  NDI score <55  NDI range 55-69  NDI range 70-85 |  | | 13(42%)  9(29%)  7(22%)  2(7%)  5(16%)  14(45%)  12(39%) | | | |  | | 11(36%)  10(32%)  9(29%)  1(3%)    4(13%)  14(45%)  13(42%) | | | |

NOTE.

SD, standard deviation; MAND, McCarron Assessment of Neuromuscular Development

NDI, Neuromuscular Developmental Index

a Classification of children using the McCarron Assessment of Neuromuscular Development: NDI score<55 represents severe motor delay; 55-69 represents moderate motor delay; 70-85 represents mild motor delay; >85 represents typically developing children.

Table 2. Test scores and ANOVA results for each group (N=62)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Experimental group (n = 31) | | | | | | |  | |  | | Control group (n = 31) | | | | | | | |
|  | Pre-test | | | | | Post-test | | ANOVA | | |  | Pre-test | | | | Post-test | | | ANOVA | | |
| **Hand kinematics** | (SD) | | | (SD) | | | | *F* | | *P* |  | (SD) | | | (SD) | | | *F* | | *P* |
| Wrist ROM (degree)b | -26.5 (19.8) | | | 2.4 (28.1) | | | | 17.70*\** | | .000 |  | -27.1 (25.7) | | | -15.3 (25.2) | | | 3.44 | | .073 |
| MP ROM (degree)c  PIP ROM (degree)d  DIP ROM (degree)e | 34.7 (15.3)  32.1(14.4)  19.4(12.6) | | | 41.5 (5.3)  20.7(5.5)  13.8(6.7) | | | | 4.94*\**  18.23*\**  8.95*\** | | .034  .000  .005 |  | 33.5 (13.6)  33.6(14.4)  16.5(10.6) | | | 34.8 (13.8)  29.4(12.7)  14.4(8.3) | | | .38  3.68  2.11 | | .540  .065  .157 |
| Press force (Ib) | 1.9 (0.8) | | | 2.0 (0.6) | | | | .65 | | .801 |  | 1.8 (0.7) | | | 9.5 (2.9) | | | .195 | | .662 |
| **PPS performancea** |  | |  | |  | |  |  | |  |  |  | |  |  | |  |  | |  |
| Space management | 13.7 (4.8) | | | 16.6 (3.2) | | | | 11.39*\** | | .002 |  | 13.3 (4.3) | | | 14.3 (3.5) | | | 2.80 | | .105 |
| Material management | 22.8 (8.7) | | | 28.8 (5.5) | | | | 14.62*\** | | .001 |  | 24.2 (7.4) | | | 25.3 (6.0) | | | 1.90 | | .177 |
| Pretense-symbolic | 25.1 (8.0) | | | 29.5 (4.2) | | | | 11.75*\** | | .002 |  | 25.2 (7.5) | | | 26.6 (5.7) | | | 3.73 | | .063 |
| Participation | 24.0 (4.9) | | | 31.8 (7.0) | | | | 19.23*\** | | .000 |  | 23.2 (5.0) | | | 24.1(4.8) | | | .712 | | .406 |

Note. ANOVA, analysis of variance

*\*P* < .05 (within-group comparison)

a PPS, Revised Knox Preschool Play Scale

b Max angle of wrist flexion (negative number: wrist palmar flexion; positive number: wrist dorsiflexion)

c Max angle of metacarpophalangeal joint (MP) flexion

d Max angle of proximal interphalangeal joint (PIP) flexion

e Max angle of distal interphalangeal joint (DIP) flexion

Table 3. ANOVA of the pre-test data and ANCOVA of the post-test data between the experimental and control groups (N=62)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Pre-test  Univariate (ANOVA) | | | | |  | Post-test  Univariate (ANCOVA) | | | |
|  | *F* | | *P* | η2a | POWERb |  | *F* | *P* | η2a | POWERb |
| **Hand kinematics** | |  |  |  |  |  |  |  |  |  |
| Wrist ROM | | .010 | .921 | .000 | .051 |  | 6.91\*\* | .011 | .105 | .735 |
| MP ROM  PIP ROM  DIP ROM | | .104  .156  .977 | .784  .694  .327 | .002  .003  .016 | .062  .068  .163 |  | 6.66\*\*  13.16\*\*  1.22 | .012  .001  .273 | .101  .182  .020 | .719  .946  .193 |
| Press force | | .380 | .540 | .006 | .093 |  | .093 | .762 | .002 | .060 |
| **PPS performance** | |  |  |  |  |  |  |  |  |  |
| Space management | | .105 | .747 | .002 | .062 |  | 8.98\*\* | .004 | .132 | .839 |
| Material management | | .439 | .510 | .007 | .100 |  | 10.04\*\* | .002 | .145 | .876 |
| Pretense -symbolic | | .003 | .953 | .000 | .050 |  | 9.39\*\* | .003 | .137 | .854 |
| Participation | | .407 | .526 | .007 | .096 |  | 25.17\*\* | .000 | .299 | .999 |

Note. ANOVA, analysis of variance; ANCOVA, analysis of covariance

\*\**P* < .05 (between-group comparison)

a. Effect size (η2): small η2 < .01–.05; moderate η2 = .06–.13; large η2 ≥ .14

b. Adequate study power, .8. The small study sample size may be the reason for the under-powered status of the study.