신경재활치료과학 제 7 권 제 2 호
Therapeutic Science for Neurorehabilitation
Vol. 7. No. 2. 2018.
https://doi.org/10.22683/tsnr.2018.7.2.029

Normative Data of Upper Extremity Performance Test for Elderly (TEMPA) for Korean Adult Population and Characteristics of Hand Function and Strength

Lee, Chang Dae*, M.S., O.T., Jung, Min-Ye**, Ph.D., O.T.,
Park, Ji-Hyuk**, Ph.D., O.T., Kim, Jongbae**, Ph.D.

*Dept. of Occupational Therapy, Steinhardt School of Culture,
Education and Human Development, New York University, New York, NY, USA

**Dept. of Occupational Therapy, College of Health Science, Yonsei University, Wonju, South Korea

Abstract

Objective : The purpose of this study was establishing clinical norms of TEMPA Korean version for Korean adult population in addition to identifying characteristics of hand function by age and gender based on the collected data.

Methods : A total of 138 healthy adults between ages 20 and 59 were recruited by continuous sampling. All subjects had been employed TEMPA Korean version and Jarmar dynamometer and pinch gauge to evaluate hand function and strength.

Results : The results showed that there were no statistically significant difference in overall hand function among the age groups and between genders. Also, while there were no significant differences in overall speed and qualitative movement, age groups of 40s and 50s showed a declining tendency in speed in some of the tasks. Also, hand strength increases up to 40s and start declining from the 50s, but most results did not show significant differences among the age groups.

Conclusion : Normative data of TEMPA Korean version for Korean adult population was established, therefore, it can be used in clinical setting and research as evidence based. Furthermore, occupational therapists need to consider about the signs of decline in hand function and strength in middle-aged adults and to provide education programs to maintain their hand function.

Key Words : Hand function, Hand strength, Normative data, TEMPA

교신저자 : 정민예(minye@yonsei.ac.kr)
|| 접수일: 2018.04.22. || 심사일: 2018.05.02.
|| 게재승인일: 2018.05.16.

I. Introduction

Hand function is one of the most crucial factor for humans. Impaired hand function affects everyday activities (Regardt, 2014). It increases a person's dependency while performing tasks, consequently the impairment leads to decreased quality of life (Incel, Sezgin, As, Cimen, & Sahin, 2009; Regardt, 2014). As hand function affects humans' overall lives, a measurement tool that can assess precise hand function and the normative data of the tool are necessary. It is essential for occupational therapy practitioners to evaluate patient's hand function with such tool and its normative data. With them, occupational therapy practitioners can understand ascertain level of the impairment of the patient and the level of recovery after a treatment by comparing with the average hand function level of a healthy population who have the same demographic characteristics with the patient.

Upper Extremity Performance Test for Elderly (Test Évaluant les Membres supérieurs des Personnes Âgées; TEMPA) is a measurement tool that can accurately assess hand function impairments of patients. It was originally developed to measure the older adults' hand function, however, it is significant for its capability to also assess impaired hand functions raised from various disorders such as amputation, paresis, arthritis, and etc. TEMPA consists of 9 tasks, selected through a task analysis among daily living activities, that measures a person's hand function quantitatively (speed of execution) and qualitatively (functional rating and task analysis)(Desrosiers, Hébert, Dutil, & Bravo, 1993). In view of the described strengths (daily activities based tasks, measures quantitatively and qualitatively), TEMPA is a comprehensive measurement tool that can measure hand functions simultaneously (Jebsen, Taylor, Trieschmann, Trotter, & Howard, 1969; Lemmens, Timmermans, Janssen-Potten, Smeets, & Seelen, 2012).

TEMPA Korean version was recently introduced in Korea, but normative data of TEMPA for Korean population by age groups and gender has not been established. Thus, if this valid and reliable measurement has more normative data for various population, it would be a considerable value to occupational therapy practitioners. Therefore, the purposes of this study were establishing the normative data of TEMPA Korean version for adult population, as well as identifying the characteristics of the hand function and strength in adult population through TEMPA Korean version and hand pinch strength tests.

II. Method

1. Participants

A total of 138 adults, from 20 years old to 59 years old participated in the study. The participants who meet inclusion criteria of the study were recruited by continuous sampling (Table 1). Inclusion criteria were (1) not have any neurological, musculoskeletal diseases which can affect the hand function, (2) not have a visual problem, (3) not show cognitive impairment

(MMSE>24), (4) able to follow instructions, and (5) able to understand the purpose of the study and agree to participate. This study was approved by institutional review boards at Yonsei University and written informed consent was obtained from all participants. Also, the purpose and process of the assessment were explained to all participants.

Table 1. General information of participants (*N*=138)

Variables		N (%)
Gender	Male	64(46.4)
	Female	74(53.6)
Aged	20 to 29	37(26.8)
	30 to 39	33(23.9)
	40 to 49	32(23.2)
	50 to 59	36(26.1)
Dominant hand	Right	131(94.9)
Education	No formal education	0(0)
	Elementary school	0(0)
	Middle school	1(0.7)
	High school	34(24.6)
	College degree	103(74.6)

2. Measurements

1) Upper extremity performance test for elderly (Test Évaluant les Membres supérieurs des Personnes Âgées; TEMPA).

TEMPA was developed by Desrosiers and her colleagues (1993) to assess hand functions of older adults. The tool consists of 9 tasks (4 unilateral, 5 bilateral tasks) which were selected among daily living activities through a task analysis. Three sub-scores are used to evaluate each of the tasks: speed of execution, functional rating, and task analysis. Speed of execution measures the length of time to complete the tasks. A maximum of 120 seconds is provided to complete each task. Functional rating measures the independence during the performance of tasks. Task analysis measures the difficulty that the subject feels during the performance of the tasks. The task analysis consists of five subcategories, which are: range of movement, strength, control of gross movement, prehensions patterns, and fine movement. Both functional rating and task analysis use a four-point scale (0 to -3 point). Korean version TEMPA's test-retest reliability was .71-1.0, and intraclass correlation coefficients (ICC) was .79~1.0 (Lee, 2015).

2) Jamar dynamometer and pinch gauge.

To measure palmar grasp strength, the adjustable-handle Jamar dynamometer, which is well known as the most accurate instrument to measure grip strength, was employed (Bellace, Healy, Besser, Byron, & Hohman, 2000). For standardization, it was set at the second handle position for all participants. Pinch gauge, which measures finger strength, was employed for lateral pinch, tripod pinch and tip pinch. For the lateral pinch the gauge was held between the thumb pad and middle phalanx of the index finger. The position of the tripod pinch was making the index and middle fingers in opposition to the thumb. Also the tip pinch position was making the index finger and thumb in contact with one another. Participants were as-

sessed in a seated position, shoulder adducted and neutrally rotated, elbow flexed at 90°, forearm positioned neutrally resting on a support, wrist extension at 0–30°, and ulnar deviation at 0–15°.

3. Procedures

All participants were administered TEMPA Korean version tasks, followed by the hand and finger strength tests. All measurements were performed with the same examiner. During hand and finger strength measurements, participants were measured three times for each measurement (palmar grasp, lateral pinch, tripod pinch, and tip pinch), and a 60-second pause was provided as recovery between the three measurements. The outcome was presented with the mean of the measurements. Participants were allocated in four groups (20s, 30s, 40s, and 50s) to compare the outcomes by age and also by gender. Normative data for the speed of execution for each age groups and for each gender was established.

4. Analysis

To analyze participants' general information, descriptive statistical analysis was used. Comparisons of speed of execution between and among age group and gender were analyzed by the independent *t* test and one-way ANOVA, and Scheffe test was used for post-hoc. The result of the functional rating and task analysis were compared by the chi-square test. To analyze the outcomes, SPSS (win 21.0) was used.

III. Result

1. Normative date of speed of execution

The speed of execution normative data of Korean TEMPA for the adult population is presented in appendix A.

2. Characteristic of hand function among the adult groups

The result of the overall speed of execution did not show a statistically significant difference among groups. However, four tasks showed a significant difference among the groups. 50s group's speed of execution was slower than that of the 30s group in 'open a lock and take the top off a pillbox' and 'write and affix a postage stamp' tasks ($p<.05$). They were also slower than the 20s group's speed of execution in 'use coins - left' task ($p<.05$). Moreover, the 40s and 50s groups' speed of execution were slower than the 20s group in 'pick up and move small objects' task ($p<.001$). On the other hand, there were no statistically significant difference among the groups in functional rating and task analysis (Table 2).

3. Characteristic of hand function between genders

There was no difference in overall speed of execution between genders, however the result of each tasks showed that the speed of execution of females was faster than males. Females were faster in three tasks which were: 'pour water

from a pitcher into a glass – left' (p<.05), 'use coins – left' (p<.05), and 'pick up and move small objects' (p<.01 in right, p<.05 in left). However, there was no statistically significant difference between genders in both functional rating and task analysis (Table 3).

Table 2. Comparison of TEMPA results among age groups (N=138)

Tasks		Speed of execution						Functional rating					
		Aged 20 to 29 (n=37)	Aged 30 to 39 (n=33)	Aged 40 to 49 (n=33)	Aged 50 to 59 (n=36)	p	Post -hoc	Aged 20 to 29 (n=37)	Aged 30 to 39 (n=33)	Aged 40 to 49 (n=33)	Aged 50 to 59 (n=36)	p
		M(SD)	*M(SD)*	*M(SD)*	*M(SD)*			*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	
Pick-up and move a jar	Right	1.01 (0.31)	0.92 (0.22)	0.87 (0.21)	0.91 (0.16)	.10		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
	Left	1.04 (0.33)	0.96 (0.21)	0.94 (0.21)	0.97 (0.20)	.29		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Open a jar and take a spoonful of coffee		7.79 (1.55)	7.50 (1.51)	7.44 (1.49)	7.10 (1.42)	.27		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Pour water from a pitcher in-to a glass	Right	8.40 (1.46)	8.65 (1.32)	8.63 (1.52)	8.68 (1.58)	.85		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
	Left	8.24 (1.43)	8.22 (1.73)	8.48 (1.87)	8.37 (1.27)	.89		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Open a lock and take the top off a pillbox		10.74 (1.67)	10.17 (2.27)	10.82 (2.56)	11.79 (2.07)	.02*	d>b	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Write and affix a postage stamp		10.11 (1.86)	9.77 (2.45)	10.66 (2.48)	11.87 (3.61)	.01**	d>b	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Put a scarf around one's neck		6.90 (1.45)	6.25 (1.66)	6.31 (1.59)	6.48 (1.77)	.32		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Shuffle and deal cards		13.49 (2.27)	13.39 (2.75)	13.23 (2.22)	14.62 (3.12)	.11		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Use coins	Right	6.73 (1.08)	6.62 (0.99)	6.59 (0.86)	7.14 (1.33)	.13		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
	Left	6.66 (0.81)	6.91 (1.07)	6.93 (0.91)	7.47 (1.36)	.01*	d>a	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.03 (0.17)	.73
Pick up and move small objects	Right	6.06 (0.76)	6.23 (1.08)	6.82 (1.20)	6.84 (1.49)	.01**	c>a, d>a	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
	Left	5.89 (0.93)	6.78 (1.51)	7.28 (1.65)	7.34 (1.84)	.00***	c>a, d>a	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.0
Overall		93.07 (9.45)	92.37 (14.05)	95.00 (12.47)	99.57 (14.19)	.08		0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	-0.03 (0.17)	.73

Items	Task analysis				p
	Aged 20 to 29 (*n*=37)	Aged 30 to 39 (*n*=33)	Aged 40 to 49 (*n*=33)	Aged 50 to 59 (*n*=36)	
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	
Range of movement	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	1.0
Strength	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	1.0
Control of gross movement	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	1.0
Prehensions patterns	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	1.0
Fine movement	-0.03(0.16)	0.00(0.00)	0.00(0.00)	-0.03(0.37)	.96
Overall	-0.03(0.16)	0.00(0.00)	0.00(0.00)	-0.03(0.37)	.96

*p<.05, **p<.01, ***p<.001, a: aged 20 to 29, b: aged 30 to 39, c: aged 40 to 49, d: aged 50 to 59

Table 3. Comparison of TEMPA results between genders (*N*=138)

Tasks		Speed of execution			Functional rating		
		Male (*n*=64)	Female (*n*=74)	*p*	Male (*n*=64)	Female (*n*=74)	*p*
		M(SD)	*M(SD)*		*M(SD)*	*M(SD)*	
Pick-up and move a jar	Right	0.90(0.25)	0.96(0.22)	.18	0.00(0.00)	0.00(0.00)	1.0
	Left	0.94(0.24)	1.01(0.25)	.08	0.00(0.00)	0.00(0.00)	1.0
Open a jar and take a spoonful of coffee		7.67(1.39)	7.27(1.57)	.12	0.00(0.00)	0.00(0.00)	1.0
Pour water from a pitcher into a glass	Right	8.78(1.58)	8.41(1.34)	.14	0.00(0.00)	0.00(0.00)	1.0
	Left	8.67(1.66)	8.03(1.42)	.02*	0.00(0.00)	0.00(0.00)	1.0
Open a lock and take the top off a pillbox		10.87(2.10)	10.92(2.31)	.88	0.00(0.00)	0.00(0.00)	1.0
Write and affix a postage stamp		11.00(3.16)	10.28(2.36)	.13	0.00(0.00)	0.00(0.00)	1.0
Put a scarf around one's neck		6.68(1.76)	6.34(1.49)	.22	0.00(0.00)	0.00(0.00)	1.0
Shuffle and deal cards		6.68(2.70)	6.34(2.56)	.06	0.00(0.00)	0.00(0.00)	1.0
Use coins	Right	6.96(1.11)	6.62(1.07)	.07	0.00(0.00)	0.00(0.00)	1.0
	Left	7.20(1.20)	6.82(0.97)	.04*	0.00(0.00)	-0.01(0.12)	1.0
Pick up and move small objects	Right	6.84(1.26)	6.17(1.05)	.00**	0.00(0.00)	0.00(0.00)	1.0
	Left	7.18(1.65)	6.47(1.51)	.01*	0.00(0.00)	0.00(0.00)	1.0
Overall		96.93(13.84)	93.42(11.72)	.11	0.00(0.00)	-0.01(0.12)	1.0

Task analysis			
Items	Male (*n*=64)	Female (*n*=74)	*p*
	M(SD)	*M(SD)*	
Range of movement	0.00(0.00)	0.00(0.00)	1.0
Strength	0.00(0.00)	0.00(0.00)	1.0
Control of gross movement	0.00(0.00)	0.00(0.00)	1.0
Prehesions patterns	0.00(0.00)	0.00(0.00)	1.0
Fine movement	-0.03(0.25)	-0.03(0.16)	.70
Overall	-0.03(0.25)	-0.03(0.16)	.70

*p<.05, **p<.01

Table 4. Comparison of hand strength among age groups and between genders (*N*=138)

Tasks		Male					Female					
		Aged 20 to 29 (*n*=15)	Aged 30 to 39 (*n*=17)	Aged 40 to 49 (*n*=16)	Aged 50 to59 (*n*=16)	*p*	Aged 20 to 29 (*n*=22)	Aged 30 to 39 (*n*=16)	Aged 40 to 49 (*n*=16)	Aged 50 to 59 (*n*=20)	*p*	Post-hoc
		KG (*SD*)	KG (*SD*)	KG (*SD*)	KG (*SD*)		KG (*SD*)	KG (*SD*)	KG (*SD*)	KG (*SD*)		
Palmar grasp	Right	42.44 (9.20)	43.84 (8.81)	46.15 (7.07)	44.65 (10.21)	.59	22.90 (5.29)	26.21 (7.04)	27.58 (5.87)	24.2 (4.93)	.11	
	Left	40.78 (10.05)	42.14 (8.34)	44.15 (5.40)	42.50 (9.51)	.72	22.73 (5.30)	24.75 (6.33)	26.25 (6.83)	22.73 (4.89)	.38	
Lateral pinch	Right	22.73 (3.17)	22.61 (3.54)	23.42 (3.31)	21.83 (2.31)	.43	14.44 (2.26)	15.27 (2.67)	16.33 (2.31)	14.67 (2.37)	.03*	c>a
	Left	21.47 (3.76)	22.51 (2.92)	23.15 (3.45)	21.85 (2.32)	.57	14.08 (1.95)	14.23 (2.72)	14.50 (2.25)	13.33 (2.45)	.27	
Tripod pinch	Right	17.96 (4.12)	18.61 (4.48)	20.79 (4.41)	16.82 (3.30)	.20	12.58 (2.90)	14.00 (3.87)	14.46 (2.73)	12.97 (2.54)	.18	
	Left	16.96 (4.24)	18.55 (4.17)	19.94 (3.57)	19.06 (3.25)	.36	12.55 (2.72)	13.42 (3.50)	13.46 (2.51)	12.57 (3.01)	.65	
Tip pinch	Right	12.58 (3.45)	13.73 (3.05)	14.71 (3.27)	12.34 (4.27)	.15	9.41 (2.26)	10.38 (3.86)	10.67 (2.26)	10.32 (2.59)	.43	
	Left	13.11 (3.80)	13.76 (2.26)	15.52 (3.07)	14.96 (3.22)	.10	9.33 (2.39)	10.19 (3.49)	10.48 (2.49)	10.20 (2.56)	.43	

*p<.05, a: aged 20 to 29, b: aged 30 to 39, c: aged 40 to 49, d: aged 50 to 59

4. Hand and pinch strength

Both male and female groups did not show differences in hand and pinch strength among age groups except for lateral pinch-right item between 20s and 40s female groups (Table 4).

IV. Discussion

The purpose of this study was establishing normative data of Korean TEMPA as well as identifying the characteristics of hand function and strength by age and gender based on the collected data from the adult population. The result that there was no difference in overall speed and qualitative movement among adult groups coheres with the former studies (Chae & Lee, 1997). However, during a few specific tasks, the 40s and 50s groups showed a declined speed of execution than the 20s and 30s groups. This closely observed result may indicate that the decline in hand function starts from the 40s or 50s although the overall speed of execution seems to maintain throughout the 40s and 50s group.

As the sign of decline in hand function seems apparent from the 40s group, occupational therapy practitioners can provide education such as joint protection techniques to middle-aged adult population. Through the joint protection techniques the adults will learn to use bigger joints and muscles instead of small joint and muscles. This type of education program will decrease the risk of or delay development of degenerative disorders or conditions (e.g. osteoarthritis or rheumatoid arthritis), which affect hand function, and keep maintaining their maximum hand function as long as possible (Stamm et al., 2002).

Between genders, there was no significant difference in the overall speed of execution, functional rating, and task analysis scores, although some of the tasks' results presented that females' speed of execution was faster than males'. This result was similar with the previous study, which reported that there was statistically a significant difference between genders, but the result cannot draw a general conclusion. (Jebsen et al., 1969).

Nonetheless, contrary to the speed and qualitative movement results, hand and pinch strength, except right lateral pinch strength in the 40s, is well maintained until the 50s. While the results of change in hand and pinch strength by age were not statistically significant, the hand and pinch strength tended to increase until the 40s and slightly decrease after the 50s. The result has discrepancy with the previous studies which reported that, generally, hand strength peaks in 30s and started decreasing after 40s (Kim, Jeon, Kim, Jeong, & Koo, 2018; Massy-Westropp, Gill, Taylor, Bohannon, & Hill, 2011). However, there is also another study, which fairly coheres with our findings, reporting that hand strength peaks at age 35 to 45 (Werle et al, 2009). In addition, when we compared the results with the normative data of hand strength for Korean population, the magnitude of difference (0.2% to 8.6%) were acceptable in size (Kim et al., 2018). Therefore, the results of this study is still acceptable and meaningful.

The limitation of this study was that we used continuous sampling for recruiting participants. Due to the non-probability sampling we could not control factors such as the education level, the occupation, or body mass index (BMI) of the test subjects, which can affect a person's hand functions(LaCroix, Guralnik, Berkman, Wallace, & Satterfield, 1993; Russo et al., 2006; Werle et al., 2009).

V. Conclusion

This study has significance in establishing norms of TEMPA Korean version for the adult population. With this data we hope more Korean researchers and occupational therapy practitioners use TEMPA in research and during intervention. Furthermore, through the research we found the characteristics of hand function and strength among adults. According to these findings, occupational therapy practitioners need to consider and provide education programs to middle-aged adults with slight signs of declined hand function to prevent degenerative disorders and conditions which can affect their hand functions.

References

Bellace, J. V., Healy, D., Besser, M. P., Byron, T., & Hohman, L. (2000). Validity of the Dexter Evaluation System's Jamar dynamometer attachment for assessment of hand grip strength in a normal population. *Journal of Hand Therapy*, *13*(1), 46-51. Doi: 10.1016/S0894-1130(00)80052-6

Chae, K., & Lee, H. S. (1997). Assessment of Upper Extremity Function in Normal Korean Adults by Manual Function Test. *Journal of Korean Society of Occupational Therapy, 5*(1), 52-57.

Desrosiers, J., Hébert, R., Dutil, E., & Bravo, G. (1993). Development and reliability of an upper extremity function test for the elderly: The TEMPA. *Canadian Journal of Occupational Therapy, 60*(1), 9-16.

Incel, N. A., Sezgin, M., As, I., Cimen, O. B., & Sahin, G. (2009). The geriatric hand: correlation of hand-muscle function and activity restriction in elderly. *International Journal of Rehabilitation Research*, *32*(3), 213-218.doi: 10.1097/MRR.0b013e3283298226

Jebsen, R. H., Taylor, N., Trieschmann, R., Trotter, M., & Howard, L. (1969). An objective and standardized test of hand function. *Archives of Physical Medicine and Rehabilitation, 50*(6), 311.

Kim, C. R., Jeon, Y. J., Kim, M. C., Jeong, T., & Koo, W. R. (2018). Reference values for hand grip strength in the South Korean population. *PloS one*, *13*(4), e0195485. Doi: 10.1371/journal.pone.0195485

LaCroix, A. Z., Guralnik, J. M., Berkman, L. F., Wallace, R. B., & Satterfield, S. (1993). Maintaining mobility in late life. II. Smoking, alcohol consumption, physical activity, and body mass index. *American Journal of Epidemiology, 137*(8), 858-869. Doi: 10.1093/oxfordjournals.aje.a116747

Lee, C. D. (2015). *A Study on Validity and Reliability of Upper extremity performance test for elderly (TEMPA).* (Master thesis), Yonsei University, Seoul. Retrieved from http://www.riss.kr/link?id=T13873411

Lemmens, R. J., Timmermans, A. A., Janssen-Potten, Y. J., Smeets, R. J., & Seelen, H. A. (2012). Valid and reliable instruments for arm-hand assessment at ICF activity level in persons with hemiplegia: A systematic review. *BioMed Central Neurology, 12*(1), 21. Doi: 10.1186/1471-2377-12-21

Massy-Westropp, N. M., Gill, T. K., Taylor, A. W., Bohannon, R. W., & Hill, C. L. (2011). Hand grip strength: Age and gender stratified normative data in a population-based study. *BMC research notes*, *4*(1), 127. Doi: 10.1186/1756-0500-4-127

Regardt, M. (2014). *Hand function, activity limitation and health-related quality of life in patients with polymyositis and dermatomyositis.* Inst för neurobiologi, vårdvetenskap och samhälle/Dept of Neurobiology, Care Sciences and Society.

Russo, A., Onder, G., Cesari, M., Zamboni, V., Barillaro, C., Capoluongo, E., ... & Landi, F. (2006). Lifetime occupation and physical function: A prospective cohort study on persons aged 80 years and older living in a community. *Occupational and Environmental Medicine, 63*(7), 438-442. Doi: 10.1136/oem.2006.027623

Stamm, T. A., Machold, K. P., Smolen, J. S., Fischer, S., Redlich, K., Graninger, W., ... & Erlacher, L. (2002). Joint protection and home hand exercises improve hand function in patients with hand osteoarthritis: A randomized controlled trial. *Arthritis Care & Research*, *47*(1), 44-49. Doi: 10.1002/art1.10246

Werle, S., Goldhahn, J., Drerup, S., Simmen, B. R., Sprott, H., & Herren, D. B. (2009). Age-and gender-specific normative data of grip and pinch strength in a healthy adult Swiss population. *Journal of Hand Surgery (European Volume)*, *34*(1), 76-84. Doi: 10.1177/1753193408096763

국문초록

한국 성인의 TEMPA 표준치, 손기능과 근력에 관한 연구

이창대*, 정민예, 박지혁**, 김종배****

*New York University

**연세대학교 보건과학대학 작업치료학과

목적 : 본 연구의 목적은 한국 성인의Upper extremity performance test for elderly (TEMPA) 표준치를 제시하고, 수집된 자료를 바탕으로 성인의 손 기능의 특성과 근력의 차이를 연령별, 성별로 알아보는 것이다.

연구방법 : 연구에 참여한 대상자는 20세에서 59세 사이의 손 기능에 장애가 없는 성인 138명이었다. 손 기능의 특성과 근력을 평가하기 위하여 모든 대상자에게 TEMPA, Jarmar dynamometer, pinch gauge를 시행하였다.

결과 : 성인의 손 기능에는 연령별, 성별 차이가 통계적으로 유의미한 차이를 보이지는 않았지만, 40대와 50대에서 수행 속도가 감소하는 경향을 보였다. 성인의 근력은 40대에서 가장 높은 수준의 근력을 보였으며 50대에서 감소하는 경향을 보였지만 대부분의 결과에서 유의미한 차이는 없었다.

결론 : 작업치료사는 중년 성인의 손기능과 근력에서 나타나는 감소의 전조 증상에 대한 관심과 그 기능 수준을 유지하기 위한 교육 프로그램을 제공하는 것이 필요할 것이다. 본 연구를 통해 한국 성인의 TEMPA 표준치가 확립되었다. 이 표준치가 임상적 평가 및 근거 기반연구에 있어 유용한 자료가 되기를 기대한다.

주제어 : 성인, 손 근력, 손 기능, 표준치, TEMPA

Appendix A

Normative Data of Speed of execution for Korean adult population

Tasks		Male				Female			
		Aged 20 to 29 (*n*=15)	Aged 30 to 39 (*n*=17)	Aged 40 to 49 (*n*=16)	Aged 50 to 59 (*n*=16)	Aged 20 to 29 (*n*=22)	Aged 30 to 39 (*n*=16)	Aged 40 to 49 (*n*=16)	Aged 50 to 59 (*n*=20)
		M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*
Pick-up and move a jar	Right	1.01 (0.37)	0.87 (0.17)	0.83 (0.25)	0.90 (0.13)	1.01 (0.27)	0.97 (0.26)	0.92 (0.16)	0.92 (0.19)
	Left	1.01 (0.31)	0.93 (0.19)	0.90 (0.27)	0.92 (0.17)	1.07 (0.34)	0.99 (0.22)	0.98 (0.12)	1.00 (0.22)
Open a jar and take a spoonful of coffee		8.13 (1.43)	7.56 (1.35)	7.54 (1.61)	7.48 (1.19)	7.56 (1.62)	7.43 (1.71)	7.33 (1.41)	6.79 (1.55)
Pour water from a pitcher into a glass	Right	8.50 (1.80)	8.90 (1.47)	8.75 (1.74)	8.96 (1.40)	8.33 (1.21)	8.39 (1.12)	8.50 (1.31)	8.45 (1.70)
	Left	8.17 (1.39)	8.49 (1.73)	8.91 (2.07)	9.09 (1.33)	8.28 (1.49)	7.94 (1.73)	8.06 (1.59)	7.80 (0.88)
Open a lock and take the top off a pillbox		10.81 (1.43)	9.87 (1.95)	10.67 (2.29)	12.17 (2.10)	10.69 (1.85)	10.48 (2.60)	10.96 (2.88)	11.49 (2.05)
Write and affix a postage stamp		10.04 (1.74)	10.16 (2.11)	11.29 (2.97)	12.50 (4.63)	10.17 (1.98)	9.36 (2.77)	10.03 (1.74)	11.37 (2.55)
Put a scarf around one's neck		7.04 (1.48)	6.58 (1.81)	6.59 (1.67)	6.54 (2.12)	6.81 (1.45)	5.90 (1.45)	6.03 (1.51)	6.43 (1.49)
Shuffle and deal cards		13.30 (1.98)	13.04 (1.76)	12.76 (2.61)	13.88 (4.03)	13.62 (2.49)	13.77 (3.54)	13.70 (1.70)	15.22 (2.08)
Use coins	Right	7.15 (0.93)	6.84 (1.06)	6.63 (0.91)	7.25 (1.44)	6.45 (1.10)	6.39 (0.88)	6.54 (0.83)	7.05 (1.27)
	Left	6.97 (0.80)	7.11 (1.15)	7.00 (1.00)	7.70 (1.62)	6.44 (0.76)	6.70 (0.97)	6.87 (0.84)	7.28 (1.12)
Pick up and move small objects	Right	6.17 (0.89)	6.63 (1.10)	7.05 (1.24)	7.49 (1.46)	5.99 (0.66)	5.80 (0.90)	6.60 (1.15)	6.31 (1.32)
	Left	6.30 (0.94)	7.21 (1.66)	7.16 (1.56)	8.01 (1.93)	5.60 (0.83)	6.32 (1.21)	7.41 (1.78)	6.80 (1.62)
Overall		94.60 (9.10)	94.19 (12.80)	96.08 (14.20)	102.88 (17.28)	92.02 (9.75)	90.45 (15.45)	93.92 (10.82)	96.92 (10.89)