



ISSN: 2456-0057

IJPNPE 2018; 3(2): 294-295

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www.journalofsports.com

Received: 18-05-2018

Accepted: 19-06-2018

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## Bimanual coordination efficiency with reference to anthropometric and gender profiling in a group of administrative staff

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### Abstract

**Introduction:** Bimanual hand coordination is very important in carrying out day to day activities. It depends on various factors like age, gender, education, intactness of central and peripheral nervous system, occupation, lifestyle. The aim of the study was to compare the efficiency of bimanual hand coordination between right handed male and female subjects and to correlate efficiency index with age of those subjects.

**Material and Methods:** The study group included 30 right handed healthy male and 30 right handed healthy female subjects of age group between 21-60 years. Institutional ethical clearance and Informed consent from subjects was taken. The efficiency of bimanual hand coordination was assessed by the use of bimanual hand coordination test apparatus with electrical chronoscope. The time (T) taken for completion of the task and the error (E) committed was recorded by the chronoscope and efficiency index (E.I) was calculated as  $E.I = (T-E)/T * 100$ .

**Results:** The mean age of males was  $32.1 \pm 11$  years and females were  $32.1 \pm 13$  years. The efficiency index of males ( $96.08 \pm 5.25$ ) was significantly higher than females ( $93.16 \pm 6.67$ ) with p value  $< 0.005$ . Negative correlation of efficiency index with age was observed ( $r = -0.343$ ,  $p = 0.0001$ ).

**Conclusion:** It was concluded that bimanual hand coordination was better in males as compared to females and the efficiency index decreases with age in these subjects.

**Keywords:** Age, gender, bimanual hand coordination

### Introduction

Bimanual hand coordination is very important in performing daily activities like eating, dressing yourself, driving etc. Coordination of the hands and fingers is likely to rely on communication through the corpus callosum to an even greater extent than proximal limb movements. This is because the hands and fingers are controlled mainly by the contralateral hemisphere, whereas the arms can also be controlled to a significant degree by the ipsilateral hemisphere<sup>[1, 2, 3]</sup>. Producing coordinated two-handed movements requires precise timing between the limbs which is influenced by various factors like age, handedness and gender<sup>[4, 5, 6]</sup>. The present study was undertaken with the aim of analyzing the possible influence of age and gender on efficiency of bimanual hand coordination.

### Materials and methods

The present study was conducted at department of physiology Sri Devaraj Urs Medical College, Kolar after taking institutional ethics clearance. The study group included randomly selected 30 right handed healthy male and 30 right handed healthy female subjects of age group between 21-60 years. Subjects with known history of motor, behavioural, orthopaedic, reported history of learning difficulties or neurologic deficits and participants with primary uncorrected visual deficit or medical condition that might interfere with their ability to carry out motor task were excluded from the study. Informed consent was taken. Those who provided consent for the study were subjected to clinical examination of sensory and motor system. Efficiency of bimanual coordination was assessed by the use of bimanual hand coordination test apparatus with electrical chronoscope. The subjects were to trace the Table on the apparatus with the help of the pointer from start to end using two handles with both the

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hands simultaneously. If the pointer touches the walls of table on the apparatus it was noted as error (e) committed and was digitally recorded by chronoscope in seconds. They were given trial twice before the actual task was to be performed. Time required for completion of the test (T) and error (e) committed during completion of task was noted in seconds.

Efficiency index, E.I. =  $(T-e)^* 100/T$  was calculated accordingly.

### Results

The mean age of males was 32.1+ 11 years and females were 32.1+ 13 years and are age matched with p value >0.005.

**Table 1:** Comparison of efficiency index of males (n=30) and females (n=30).

	Males	Females	P-Value
Efficiency Index (Mean+SD)	(96.08+ 5.25)	(93.16+ 6.67)	<0.005

### Statistical Analysis

Two tailed independent student t-test was used to find the significance in efficiency index between male and female subject groups. Significance was also assessed at 5% level of significance. The correlation between age and efficiency of bimanual hand coordination was done using Pearson correlation co-efficient and significance was assessed at 1% level of significance.

### Discussion

Bimanual coordination is important for our day to day activities to be carried out smoothly. The efficiency of this bimanual coordination is dependent on the integrity of corpus callosum which helps in communication between two hemispheres of the brain. Corpus callosum plays a major role in coordinating motor activity from opposite sides of the body; deficits in bimanual coordination have been documented in individuals with agenesis of or damage to the corpus callosum [7, 8].

Various studies have demonstrated that bimanual coordination was significantly predicted by age & gender [4, 5]. Present study shows significant difference in efficiency of bimanual coordination between males and females. Variations in gonadal steroid levels may contribute substantially to the sex differences reported in human cognitive and motor skills [9]. Researchers have also documented sex differences in corpus callosum morphology in both area and regional subdivisions in humans [10]. Animal based study done on capuchin monkeys shows adult females have larger corpus callosum, brain volume ratio, rostral body than their male counter parts [11].

Present study also shows age related decline in efficiency of bimanual coordination. Age related decrease in coordination has also been documented [4, 5, 12]. Aging is linked to decrease in size of the corpus callosum and also effects the integrity of the of corpus callosum [13].

In our study the sample size is very small and to project these results to general population larger samples have to be studied and also the various phases of menstrual cycle and their possible effect on the performance in females needs to be studied.

In conclusion, the present study showed that males have better bimanual coordination compared to their female counterparts and aging causes decline in efficiency of bimanual coordination. Further work is required to know the possible effect of different phases of menstrual cycle on bimanual coordination in females.

### References

1. Gazzaniga MS. Visuomotor integration in split-brain monkeys with other cerebral lesions. *Exp Neurol.* 1966; 16:289-98.
2. Brinkman J, Kuypers HG. Splitbrain monkeys: cerebral control of ipsilateral and contralateral arm, hand, and

finger movements. *Science.* 1972; 176:536-9.

3. Brinkman J, Kuypers HG. Cerebral control of contralateral and ipsilateral arm, hand and finger movements in the split-brain rhesus monkey. *Brain.* 1973; 96:653-74.
4. Bangert AS, Lorenz PA, Walsh, Schachter CM, Seidler. Bimanual coordination and aging: Neurobehavioral implications. *Neuropsychologia.* 2010; 48:1165-1170.
5. Bellis TJ, Wilber LA. Effects of Aging and Gender on Interhemispheric Function. *Journal of speech learning and hearing research.* 2001; 44:246-263.
6. Muetzel RL, Collins PF, Mueller AB, Schissel AM *et al.* The development of corpus callosum microstructure and associations with bimanual task performance in healthy adolescents. *NeuroImage.* 2008; 39(4):1918-25.
7. Eliassen JC, Baynes K, Gazzaniga MS. Anterior and posterior callosal contributions to simultaneous bimanual movements of the hands and fingers. *Brain.* 2000; 123(12):2501-2511.
8. Mueller, Oakes KL, Marion, Brown, Warren S *et al.* Bimanual motor coordination in agenesis of the corpus callosum. *Behavioral Neuroscience.* 2009; 123(5):1000-1011.
9. Hampson, Elizabeth, Kimura, Doreen. Reciprocal effects of hormonal fluctuations on human motor and perceptual-spatial skills. *Behavioral Neuroscience.* 1988; 102(3):456-459.
10. Utamsing C, Holloway RL, Sexual dimorphism in human corpus callosum. *Science.* 1982; 216:1431-1432.
11. Phillips KA, Sherwood CC, Lilak AL. Corpus Callosum Morphology in Capuchin Monkeys Is Influenced by Sex and Handedness. *Plos one.* 2007; 2(8):792.
12. Moes, Paul, Jeeves, Malcolm A, Cook, Katherine V. Bimanual coordination with aging: Implications for interhemispheric transfer. *Developmental Neuropsychology.* 1995; 11(1):23-40.
13. Fling BW, Christine M, Walsh, Banger AS, Lorenz PA, Welsh RC *et al.* Differential Callosal Contributions to Bimanual Control in Young and Older Adults. *Journal of Cognitive Neuroscience.* 2011; 23(9):2171-2185.