

A comparative study of hand reaction time to visual stimuli in students of 1st MBBS of a Rural Medical College

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Abstract:

Visual reaction time (VRT) is a simple non invasive technique used to study correlations between sensory and motor activity of the central nervous system (CNS). Reaction time is necessary in many important activities such as driving a vehicle, athletics and other such functions where an individual has to respond immediately in a specific situation. In the present study VRT of both hands of students of I MBBS was determined by using simple electric circuitry. VRT of both left and right hands was determined and results analyzed by applying Z Test. In males VRT of right hand and left hands were 145.05 ± 4.06 and 167.03 ± 4.50 milliseconds (ms) respectively, and in females it was 165.39 ± 8.56 ms and 171.54 ± 8.96 ms respectively. Significant differences in VRT of left and right hands were noticed in both sexes. VRT of both hands in females showed significantly higher values than their male counterparts.

Key words : Hand reaction time, Visual stimuli

Introduction

Auditory reaction time (ART) and visual reaction time (VRT) are non invasive techniques used to assess relationships between sensory and motor activities of the CNS. It also provides information about integrative capability of CNS for sensory and motor signals.^[1] Delay in reaction time indicates brain damage, mental disorder or other psychopathologies.^[2,3,4] Combined studies of ART and VRT have been carried out in diabetics, schizophrenics, workers exposed to noise etc.^[4,5,6,7,8]

Literature related to study of ART and VRT are few. Present study makes an attempt to record VRT of left and right hands of students studying in the first year of MBBS, Rural Medical College, Loni, Maharashtra.

Material and methods

Visual reaction time was studied in 117 students (91 males and 26 females), in the age group 17-20 years, studying in 1st MBBS. Preliminary medical examination of these students was carried out. All the selected students were physi-

cally healthy, had normal vision, and did not suffer from any illness, especially neurological disorders. VRT was determined by method used by Madan Mohan, and Jain^[6,8]. The subjects were briefed about the procedure to be followed. A glow of light was used as a visual signal. The subject was to press a response key with the index fingers of the left and right hands alternatively. The visual stimulus was applied from the front to avoid effect of lateralized stimulus on reaction time.

Individual perception of visual signal and its reaction time varied greatly, hence a total number of five responses were recorded on a moving drum (speed: 25 mm / sec), and the lowest value was considered as VRT for purposes of this study.

The results were analyzed statistically by applied Z -Test.

Results

Table I shows VRT of both hands in both sexes. In males VRT of right hand and left hands were 145.05 ± 4.06 milliseconds (ms) and 167.03 ± 4.50 ms respectively, and in females it was 165.39 ± 8.56 ms and 171 ± 8.96

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ms respectively. Significant differences in VRT of left and right hands were noticed in both sexes. The difference in reaction time between right and left hands in males was 21.98 ± 4.55 ms and in females it was 5.95 ± 8.76 ms. The VRT ratio of right to left hand showed a lower value in males as compared to females. VRT of both hands in females showed significantly higher values than their male counterparts.

Table II shows statistical analysis of VRT of right and left hand in both the sexes. It was observed that VRT of right hand is of shorter duration than that of the left hand in both the sexes ($P < 0.01$). However the value of reaction time in both hands in males was shorter as compared to females.

Table III shows a comparison of VRT of right and left hands in males and females. It is observed that VRT is of shorter duration in right hands of males ($P < 0.01$).

Table I :

Mean and standard values in milliseconds of VRT in males and females.

Parameter		VRT (ms)	Difference (ms)
Male(n=91)	Female (n = 26)		
Right hand	145.05 ± 4.60	165.39 ± 8.56	20.34 ± 4.16
Left hand	167.03 ± 4.50	171.54 ± 8.96	4.51 ± 4.46
Difference	21.98 ± 4.55	5.95 ± 8.76	-
Ratio of VRT (Right/Left + Hand)	0.87	0.96	-

Table II :

Statistical analysis of VRT (ms) of right+2 left hand in males and females

Subject	Right hand	Left hand	Std Error	Z-Value	P-Value	Result
Boys (n=91)	145.05 ± 4.60	167.03 ± 4.50	0.67	32.80	<0.01	Highly significant
Girls (n=26)	165.39 ± 8.56	171.54 ± 8.96	2.43	2.53	<0.01	Highly significant

Table III :

Statistical analysis showing comparison of VRT between males & Females

Parameter	Boys(n=91)	Girls(n=26)	Std Error	Z Value	P Value	Result
Right Hand	145.05 ± 4.60	165.39 ± 8.56	1.75	11.62	< 0.001	Highly significant
Left Hand	167.03 ± 4.50	171.54 ± 8.96	1.82	2.48	<0.01	Highly significant

Discussion

Right hand VRT recorded shorter duration than left hand in both sexes, which is similar to findings in earlier studies. The right hand being the dominant hand exhibited enhanced motor activity; hence VRT recorded in right hand was of shorter duration.

Motor conduction velocity being faster in the domi-

nant upper limb (right hand), impulses to the hand travel a shorter route and have faster motor conduction velocity compared to the leg. VRT in all females was of more prolonged duration in both hands as compared to males because of increased muscle mass in males.

In the present study, VRT was recorded in the upper limbs only, which record shorter durations as impulses to

the hand travel a shorter route and have faster motor conduction velocity compared to the leg.

It was noted that the time taken by CNS to process the signal (sensory and motor) is dependent on human behaviour.

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