



Comparative study of Auditory Reaction Time and Visual Reaction Time in 18 to 20 years age group

KEYWORDS

reaction time, auditory reaction time, visual reaction time.

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ABSTRACT Reaction time (RT) evaluates speed of Central nervous system and the coordination between the sensory and motor system. Present study was carried out in 60 healthy subjects (30 males and 30 females) in the department of physiology. Auditory reaction time (ART) and visual reaction time (VRT) was recorded in each subject after detailed clinical examination. Data was analyzed using t test. We found that ART is faster than VRT and reaction time is faster in males as compared to females.

INTRODUCTION

Reaction time is the time between presentation of stimulus and appearance of response in the subject.¹ It measures the processing speed of Central nervous system and the coordination between the sensory and motor system. It depends upon various factors like age, sex, left or right handedness, central versus peripheral vision, practice, fatigue, distraction, drugs, personality type and intelligence of the subject⁽²⁾. Reaction time is a simple and non - invasive test for peripheral as well as central neural structures.

Abu Rayhan al-Biruni was the first to describe the concept of RT.³ Lesser reaction time is important in certain occupations like drivers, sportsmen, pilots, soldiers, doctors as it determines alertness of a person. Human RT works by having a nervous system recognize the stimulus. The neurons then relay the message to the brain. The message then travels from the brain to the spinal cord, which then reaches person's hands and fingers. The motor neurons then tell the hands and fingers how to react. The accepted figures for mean simple RTs for college-age individuals have been about 190 ms for light stimuli and about 160 ms for sound stimuli Welford AT.⁴

The purpose of this study was to find out whether ART is faster than VRT and to compare duration of ART and VRT between males and females.

MATERIALS AND METHOD

The present study was carried out in the Department of Physiology, Grant Govt. Medical College, Mumbai. A total of 60 (30 males & 30 females) subjects were taken. Detail clinical examinations of subjects were carried out.

Inclusion criteria

18-20 year healthy subjects.

Exclusion criteria

Hearing defect

Visual disorder

Any drug addiction, smoking, alcohol.

Ethical clearance for the study was obtained from Institutional Ethical Committee and informed written consent was taken from every participant.

The apparatus used in this study was 'Research reaction Time apparatus' manufactured by Anand Agencies, Pune-2. It is a portable device with inbuilt digital display of time with least count of 1/1000 sec i.e. 1 millisecond. For recording ART sound stimuli of a continuous beep was selected. For recording VRT a Red light incorporated on the instrument was used. Before measuring ART and VRT, each subject was made familiar with the apparatus. While performing the test, the subject was made to sit comfortably on a chair and was motivated for better results as much as possible. As soon as the stimulus was perceived by the subject, subject was asked to respond by pressing the

response switch by index finger of dominant hand. Each subject was given three trial practices. Three readings of reaction time were noted from the digital display in milliseconds (msecs). Lowest reading was taken as the value for the reaction time task.

A comparison was made between a. VRT and ART in all 60 subjects inclusive of both males and females b. VRT and ART between males and females. The statistical analysis was carried out using paired and unpaired t test. $P < 0.05$ was considered to be statistically significant.

RESULTS

Table no.1 Comparison of ART and VRT.

Reaction time	N	Mean \pm S.D.	P value
ART (msec)	60	157.54 \pm 9.00	<0.05
VRT(msec)	60	178.96 \pm 10.46	

< 0.05 = significant

There is significant difference between the two and the ART is faster than the VRT in healthy subjects.

Table no.2 Comparison of ART and VRT in males and females.

Reaction time	Males (n=30)	Females(n=30)	P value
ART (msec)	151.23 \pm 7.82	163.86 \pm 4.60	<0.05
VRT (msec)	164.97 \pm 5.61	181.78 \pm 5.93	<0.05

There is significant difference as reaction time in males is faster than females for ART and VRT.

Diagram no.1 showing comparison of ART and VRT.

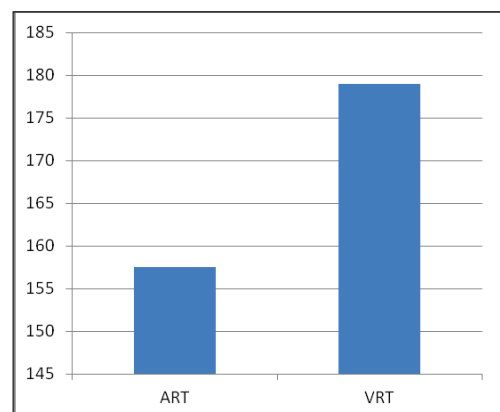
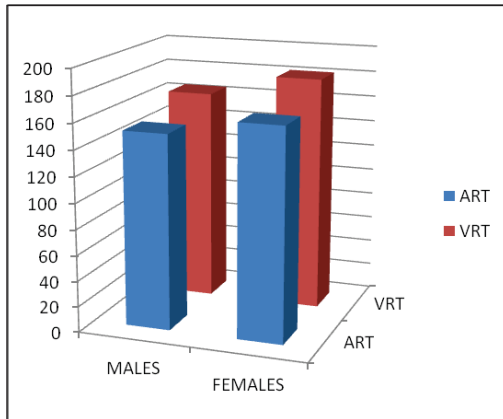


Diagram no.2 showing comparison of reaction time between males and females.



Discussion

Table no. 1 and diagram no. 1 shows that ART is faster than VRT. Reaction time has mainly two components: (1) Mental processing time: It is the time required for responder to perceive stimulus, identifying and analyzing of stimulus, and decide the proper motor response. (2) Movement time: It is time required to perform movement after selection of response. This implies that the faster the stimulus reaches the motor cortex, faster will be the reaction time to the stimulus.^{5,6}

Reaction time is dependent on several factors like arrival of the stimulus at the sensory organ, conversion of the stimulus by the sensory organ to a neural signal, neural transmissions and processing, muscular activation, soft tissue compliance, and the selection of an external measurement parameter⁽⁷⁾. An auditory stimulus takes only 8-10 milliseconds to reach the brain, while visual stimulus takes 20-40 milliseconds⁽⁸⁾ which states that the faster the stimulus reaches the motor cortex, faster will be the reaction time to the stimulus. Therefore the auditory reaction time is faster than the visual reaction time.

Findings of our study are similar with Pain & Hibbs and Thompson which also shows that auditory reaction time is faster than visual reaction time.^{7,9}

Table no.2 and diagram no.2 shows that reaction time is more in females as compared to males.

Bruce and Russel (1962) explained it on the basis of varying level of sex steroids during different phases of menstrual cycle which have sodium and water retaining effect. This retention of salt and water could modify the axonal conduction. It is also suggested to alter the availability of the neurotransmitter at the synaptic level. This modulation of neurotransmitter coupled with altered rate of impulse transmission due to fluctuation in the levels of hormones affect the sensory motor association with the processing speed at the Central Nervous System^{10,11}

Motor response is faster in males as compared to females because they are comparatively stronger than females.¹² Findings of our study are in accordance with Bruce, Silverman..

Conclusion

Thus we can conclude that ART is faster than VRT and reaction time in males is less as compared to females.

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