



## COMPARATIVE STUDY OF REACTION TIMING USING RULER DROP TEST IN SCHOOL GOING CHILDREN OF RURAL AND URBAN AREAS: - A CROSS SECTIONAL STUDY

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**ABSTRACT** **CONTEXT:** -Reaction time (RT) task assess several brain function and a slow RT can be due to various brain disease, and acquired condition.<sup>1</sup>

Reaction time is one of the important method to study a person's central information processing speed and coordination peripheral movement response.<sup>2</sup>

Simple reaction time (SRT), the minimal time needed to respond to a stimulus, is a basic measure of processing speed.<sup>3</sup>

Reaction time (RT) is the time interval between stimulus and response. RT can be measured by ruler drop method (RDM).<sup>4</sup>

**AIM:** -The aim of this study is to compare the reaction timing using ruler drop test in school going children of rural and urban areas.

**SETTING AND DESIGN:** -The interventional study was carried out in rural and urban area school of Abu Road.

**METHOD AND MATERIAL:** -600 Subjects were included in basis of inclusion and exclusion criteria and divided into 2 groups with 300 participants in each group. In both groups performing ruler drop test.

**RESULT:** -Statistically is significant ( $p \leq 0.001$ ) the result showed high significant difference between two groups There was good reaction time of school going children of urban area compare to school going children of rural area

**CONCLUSION:** -The above study concluding that the values for the school going children of urban area has higher significance value for the reaction timing and it is easy to perform for the participants.

**KEYWORDS :** Ruler drop test, Reaction time, School going children, Response time, Rural and urban area.

### INTRODUCTION

Reaction time is purposeful voluntary response to an external stimulus. There is a certain time period between application of external stimulus and appropriate motor response to the stimulus called the reaction time.<sup>2</sup>

Reaction time is defined as an interval of time between presentation of stimulus and appearance of appropriate voluntary response in a person. It varies with number of possible valid stimulus type, order and intensity of stimulus, arousal, age, gender physical fitness hand-dominance practice and error, fatigue, fasting, distraction, alcohol, finger tremor, stress, drug, intelligences, learning disorder, brain injury, illness, personality type, accuracy in hearing and visio.<sup>4</sup>

Reaction time (RT) is the delay between presence of stimulus and beginning of response. It is a measure how quickly an organism can respond to a particular stimulus.<sup>5</sup>

Reaction time (RT) is measure of the quickness with which an organism responds to some sort of stimulus. RT is defined as the interval of the time between the presentation of the stimulus and appearances of appropriate voluntary response in the subject. Human RT work by having a nervous system recognize the stimulus. The neuron they relay the message to the brain. The message then travels from the brain to the spinal cord which then reaches person's hand and fingers. The motor neurons then tell the hand and finger how to react.<sup>6</sup>

Age-related differences in processing speed have been observed on a variety of task, including verbal memory span, visual search, latter discrimination, memory search retrieval fluency, mental rotation, and response selection.<sup>7</sup>

Reaction time in psychology- also called latent time- is the interval between the stimulus and the response of the organism to its presentation or the time required to start a pre-programmed response to a specific stimulus. Reaction time indicates the speed of decision making and performance. furthermore, the definition of RT can be representative of individual's cognitive processing speed.

Types of reaction time: - Generally, there are two type of RT: simple and complex reaction time.<sup>8</sup>

Reaction time is one of the important method to study a person's central information processing speed and coordination peripheral movement response.<sup>9</sup>

Cognitive process are typically inferred from behavior data such as accuracy and reaction time.<sup>10</sup>

There are various method to measure reaction time but most of these method require expensive machines or computer software. Other common method to measure reaction time is the meter stick test and ruler drop test.<sup>12</sup>

### RULER DROPTEST

The person to be tested stands or sits near the edge of the table and chair, resting their elbow on the table and chair so that their wrist extended over the side. The assessor holds the ruler vertically in the air between the subject's thumb and index finger, but not touching. Align the zero mark with the subject fingers. The subject should indicate when they are ready. Without warning, release the ruler and let it drop- the subject must catch it as quickly as possible as soon as they see it fall. Record in centimeter the distance the ruler fell. Repeat several time (e.g. 3 times) and take the average score.

### NEED OF STUDY

Reaction time is measure of the quickness with which an organism responds to some sort of stimulus. RT play a very important role in our lives as its practical implication may be of great consequences.<sup>4</sup> Good reaction time allow us to be agile and efficient when it comes to responding to stimuli and situation like driving, having a conversation, playing sports, etc.

Therefore, this study will add to growing body of knowledge that if these two groups of reaction time of rural and urban area comparable outcome and if one group is superior to the other, which should be well-appreciated group.

### AIM OF THE STUDY

- The aim of this study is to compare the reaction timing using ruler drop test in school going children of rural and urban areas.

### OBJECTIVE OF THE STUDY

- To comparison of reaction time between the rural and urban school going children by using ruler drop test.

### HYPOTHESIS

#### • NULL HYPOTHESIS

- There is no significant difference between the reaction timing using ruler drop test in school going children of urban and rural area schools.

#### ALTERNATE HYPOTHESIS

- There is significant differences between the reaction timing using ruler drop test in school going children of rural and urban areas.

1. The reaction time of rural school going children is good then urban school going children by using ruler drop test.
2. The reaction time of urban school going children is good then rural school going children by using ruler drop test.

**MATERIAL AND METHODOLOGY**

- **Study Setting:** - Shri U.S.B. College of Physiotherapy, Abu Road
- **Source of data:** - Various school at Abu Road

**Method of collection of data**

- **Study population:** - Students of the school
- **Sample size:** - 600 Students
- **Sampling method:** - Convenient Sampling
- **Study design:** - An Observational Study

**Material to be used**

- ✓ Consent Form
- ✓ Pen
- ✓ Notepad
- ✓ Weight machine
- ✓ Stature meter
- ✓ Ruler
- ✓ Chair and Table
- ✓ Other necessary stationary

**Criteria for selection**

- **Inclusion criteria**
  - Age between 5-19 years.
  - Girls and boys
  - Free from physical disability
  - Able to understand simple command
- **Exclusion criteria**
  - Mental Retarded child
  - Physical disability
  - Uncooperative children
  - Open Wound, recent fracture, contracture, or any nerve injury in the upper limb
  - Any other condition that prevent the children from performing the test.

**MEASUREMENT PROCEDURE**

A total of 600 children participated in this study (300 Urban, 300Rural). They were selected from 7 school in Abu Road. This was a convenience sample selected from a larger geographic area (Both urban and rural) of Rajasthan (INDIA)

Principal of all school's child participation voluntarily signed an informed consent from prior to their child's participation in this study.

A sample of 600 children of rural and urban area (300 rural, 300 urban) will be participating in this study with the prior permission from the principal of participating school and also parents / legal guardians. The assent from their principal will be obtained prior to the study.

All anthropometric measurement will be taken before the initiation of the study.

Examiner used the following standardized testing procedure for RDT the child was invited to sit on a chair with their dominant and non-dominant hand kept in the mid-prone position, elbow flexed to 90°, and forearm supported on at, with the open hand at the edge of the surface.

The ruler was suspended vertically by the examiner, such that the 0-cm mark on the ruler coincided with the borders of the fingers.

The ruler was then dropped between two fingers without prior intimation, and the subject were asked to grasp it as quickly as possible.

The order of testing of each was randomized. Examiner conducted a demonstration.

The children also performed some familiarization trials for the RDT. The children were encouraged to reach the best score possible.

Record in centimeter the distance the ruler fell. Repeat Several time (e.g 3 times) and take the average score.

The test Score was the distance reached with a lower distance indicating better performance. Regarding length, the length or centimeter of scale that have more will be and who holds the scale late will be that the poorer performance

**RESULTS**

**TABLES AND GRAPHS**

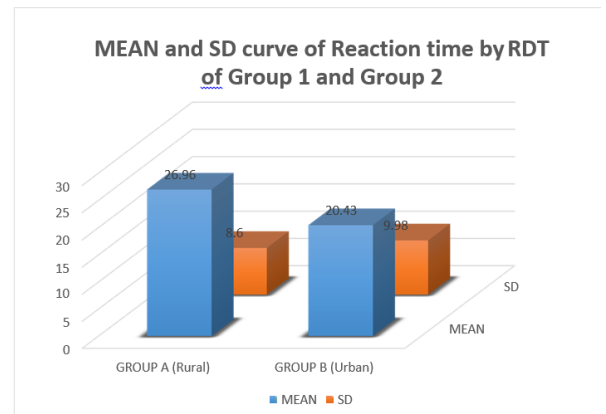
- Six hundred subject were divided into two groups.
- Group A student of rural area an Observational group.
- Group B student of urban area an observational group.
- Group A (m=300) and Group B (m=300)

**Table 3.1 Mean, SD and Kolmogorov-Smirnov test of Group 1 and Group 2.**

GROUP	N	MEAN	SD	Kolmogorov-Smirnov test	Sig.
GROUP A	300	26.96	±8.60	.523	.947
GROUP B	300	20.43	±9.98	1.067	.205

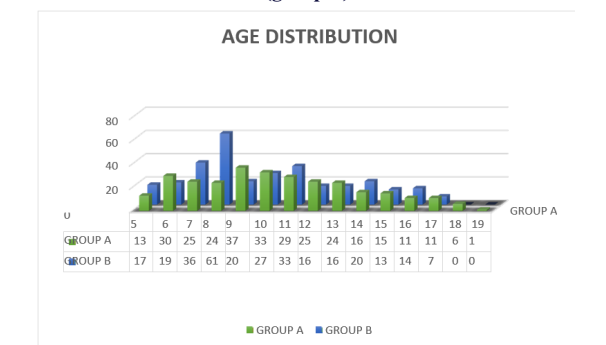
- The Kolmogorov -Smirnov test will be used for check the normality. Test distribution is Normal. Calculated from data.

Data was collected, compiled and analyzed by using statistical package of social science (SPSS) software version 20. The result was obtained as mean ± SD. Students t test was used for group comparison. P value of ≤0.001 was considered to be statistically significant.



**FIG.3.2: -Anthropometric Characteristics and RDT performance.**

**Graph 3.4: - Age Distribution Of Student Of Rural Area (group A) And Student Of Urban Area (group B)**



**INTERPRETATION:** - The Above Table 3.3 Graph 3.4 Show The Age Distribution In Age (year) In Group A And Group B

- **Independent T test:** -
  - It was used for between Group comparison of Group A and Group B
- **Kolmogorov- Smirnov Test:** -
  - As our Sample size is greater than 50 so this test will be used to check the normality.

**Table 2. 4 Inter group comparison of rural and urban area reaction times on the both the group.**

INTERGROUP (Group A-B)	Independent t test	Sig.	P - value
	8.586	.000	$P \leq 0.001$

**INTERPRETATION:** - The Above Table 2.4 shows the result of Independent t test. Which show there was highly significant differences between both the group ( $P \leq 0.001$ )

#### DISCUSSION:-

The study was compare to the reaction timing using ruler drop test of school going children of rural and urban areas.

In present study, when the values of reaction time of rural area and reaction time of urban area analyzed, it was statistically proven that school going children of urban area has well appreciated data then school going children of rural area.

Estimating RT by RDT might be an interesting task to school going children because in RDT a moving ruler will be held between their fingers. The task might create motivational among all the children.

**Otaki M et al (2019)** ► Conducted Study On “The Effect of Different Visual Stimuli On Reaction Times: a performance comparison of young and middle-age people”. No significant Intergroup differences in the reaction time were found the simple reaction time task.<sup>11</sup>

**Shilpa Jain and Sapna Dhiman et al January (2019)** ► Conducted Study On “Analysis of Reliability of Audio-Visual Reaction Time Machine and Ruler Drop Test for Assessing Reaction Time”. This result show that both these test are highly reliable for measuring reaction time and ruler drop test can also be used in cases where audio and visual Reaction time machine is not present.<sup>12</sup>

This study was done to compare the reaction timing using ruler drop test in school going children of rural and urban areas. there are few Literature which do the reaction time study on different subjects. Means Reaction time is very important for our everyday lives and needs intact sensory system, cognitive processing, and motor performance. Reaction time is good indicator of sensorimotor coordination and performance of an individual.

The present study shows that there is highly significant good reaction time using ruler drop test of school going children of Urban area then Rural area.

#### LIMITATION

- Long term follows up was not taken
- Duration of the study is only 2 week
- Result could be generalized to all age groups
- Only 5-19 years of age or more participants to be taken

#### RECOMMENDATION FOR FURTHER STUDIES

- Further study can be done using other test for measure for reaction timing.
- Duration of study can be more than 2 weeks.
- I study can be done on other age groups.
- Further studies can be done with different subjects.

#### CONCLUSION

In present study, when the values of reaction time of rural area and reaction time of urban area analyzed, it was statistically proven that school going children of urban area has well- appreciated data then school going children of rural area.

Reaction time of urban area is well appreciated because of sports activity, computer knowledge, higher- quality education etc.

Reaction time of rural area is fewer than urban area because of lack of quality teacher training, Non- permanence of teacher demotivating, less, sports activity, etc.

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