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RESEARCH ARTICLE

A STUDY FOR ASSESSING AUDITORY INTERFERENCE ON SIMPLE REACTION TIME IN YOUTH OF A.P

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Abstract

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INTRODUCTION: -

Reaction time (RT) is defined as the interval of time between the presentation of the stimulus and appearance of appropriate voluntary response in the subject.⁽¹⁾ Reaction time is an important method used to assess a person's central information processing speed and their ability to produce fast, coordinated peripheral movement responses.⁽²⁾

According to the number of stimuli in a task: Simple reaction time- if the number of stimuli is equal to one and Choice reaction time- if higher than one stimulus.^(3,4) Auditory disturbance like traffic noise, music while working, household noise during study and use of mobile phone use is one of the most serious driving distractions, and its negative influence on driving performance has been supported by a large body of recent research.^(5,6)

AIM: -

- 1) To estimate the effects of low volume auditory interference on visual reaction time (VRT) and auditory reaction time (ART).
- 2) To estimate the effects of phone conversation on visual reaction time (VRT) and auditory reaction time (ART).

METHODOLOGY: -

- STUDY SETTING: Medical Teaching Hospital
- STUDY DESIGN: Cross sectional study
- STUDY PERIOD: March – July 2023
- STUDY POPULATION: 200 (100 males and 100 females)
- Equipment used: Psychotronics 501-004TR Digital Reaction Time Apparatus, Phone model: OnePlus – 9R, Speaker with volume modification. Informed Written Consent Was Taken from All Participants.

Inclusion criteria:

- Subjects having normal auditory abilities (tested with tuning fork tests- Rinne and Weber's test).
- Subjects having normal visual abilities (tested with Snellen, Jaeger's, and Ishihara's charts) adequate cognitive functioning and language skills to understand and complete the tasks in the study.

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Exclusion criteria:

- Subjects having impaired vision, colour blindness, deafness will be excluded from the study. Also, subjects with severe cognitive impairment will be excluded from the current study.

Procedure: Participants were given a comprehensive introduction to the study's process, ensuring they were comfortable with each step. Before the main test, each student completed a practice round. The study focused on measuring reaction times in response to specific stimuli: an auditory beep for auditory reaction time (ART) and a visual red circle for visual reaction time (VRT). These reaction times were recorded using equipment, with participants pressing a button as soon as they perceived the stimulus. Each student's reaction was measured across five trials, and only the quickest reaction time was retained for analysis.

In the next stage subjects participated in performing task while listening to music in low volume. After that they were told to perform the task with a phone conversation as a form of auditory distraction. Each participant spoke with the same person, discussing personal interests to keep them engaged. To maintain consistency, the readings took place between 10 a.m. and noon in a quiet, isolated room. The data collected were then organized into an Excel spreadsheet and analysed using SPSS version 17.0.

RESULTS:

The mean age of the participants was 20.2 ± 2.34 years, with an equal gender distribution of 50% females and 50% males.

Table 1:- Reaction Time Among Study Participants.

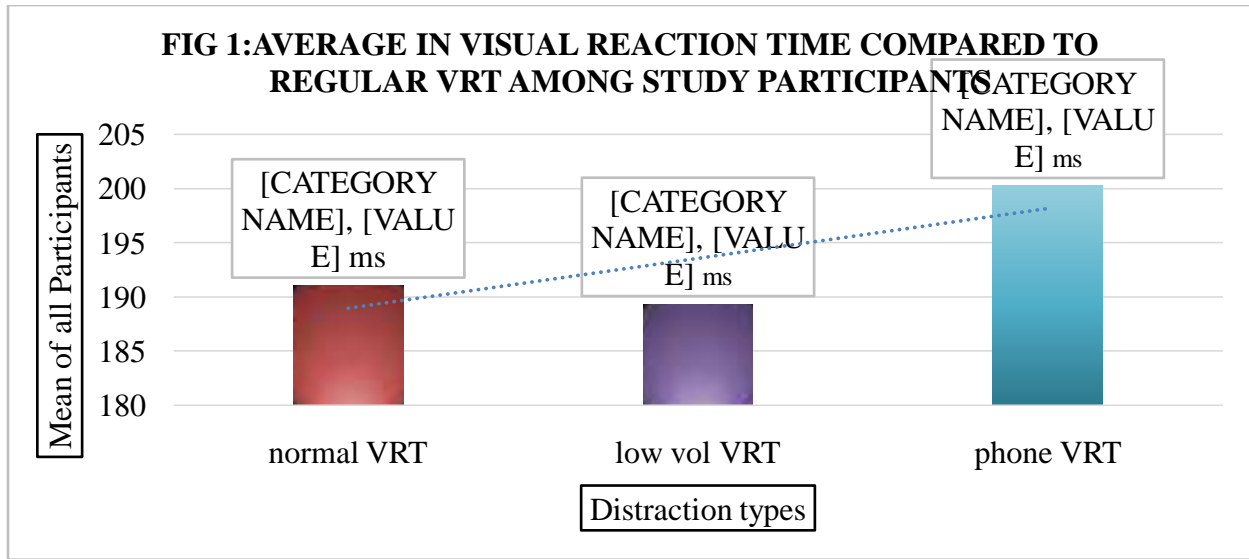
	Stimulus	Reaction	Mean (In ms)	Std.Deviation	Std.Error	P Value
Pair 1	normal	-VRT	191.05	13.09	0.93	NS
	low vol	-VRT	189.35	13.35	0.95	
Pair 2	normal	-ART	166.45	8.84	0.63	NS
	low vol	-ART	179.01	10.7	0.76	
Pair 3	normal	-VRT	191.05	13.09	0.93	<0.05
	phone	-VRT	200.24	15.1	1.061	
Pair 4	normal	-ART	166.45	8.84	0.63	<0.01
	phone	-ART	202.99	11.72	0.83	

This table 1: presents the reaction times among study participants across different stimulus environments and reaction types. Each pair compares the reaction time under a "normal" condition with a different stimulus, either low-volume or phone settings, for both visual reaction time (VRT) and auditory reaction time (ART). Comparisons reveal that introducing low-volume stimuli does not significantly impact reaction times for both VRT and ART. Yet, reaction times increase notably in the presence of a phone stimulus for both VRT (Pair 3, $p < 0.05$) and ART (Pair 4, $p < 0.01$), indicating that phone usage likely distracts fellows more than low-volume settings, especially in terms of auditory responses.

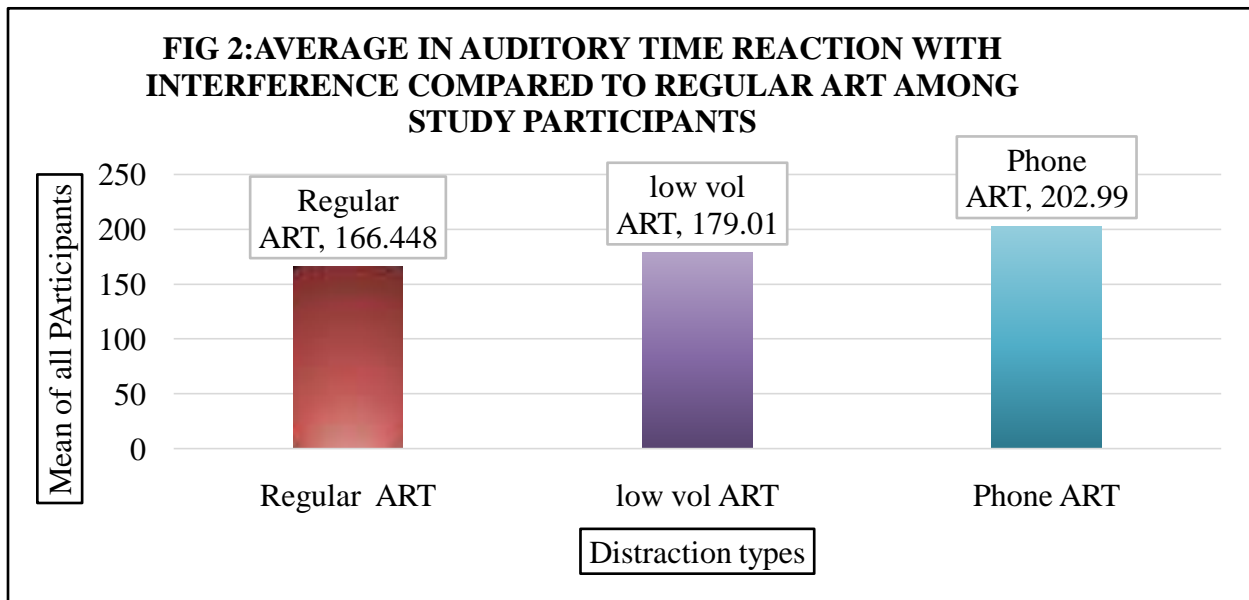
Table 2:- Reaction Time For Visual And Auditory Stimulus In Different Sex Group.

	STIMULUS - REACTION	REACTION TIME IN FEMALES	REACTION TIME IN MALES
Pair 1	Normal- VRT	187.21 + 12.3	190.88+- 13.9
	low vol -VRT	186.48 +_ 12.5	189.21+_ 14.4
Pair 2	normal -ART	167.32 +_ 8.2	165.575 +_ 9.5
	low vol -ART	179.85+_ 10.5	178.17+_ 10.9
Pair 3	normal -VRT	187.21 + 12.3	190.88+- 13.9
	phone -VRT	201.24+_ 13.8	199.24+_ 16.1
Pair 4	normal -ART	167.32 +_ 8.2	165.575 +_ 9.5
	phone --ART	203.23+_ 11.3	202.75+_ 12.2

In Table 2: Reaction times for visual (VRT) and auditory (ART) stimuli are presented for females and males. Both sexes show increased reaction times when exposed to phone distractions for both VRT and ART, indicating that phone usage significantly impacts response time for both sexes, especially in auditory tasks.



In Fig 1: Average decrease in visual reaction time as compared to control values under the interference of low volume auditory stimulus. And an average increase can be seen in visual reaction time as equated to control under the interference of Phone conversation.



In Fig 2: Average increase in auditory reaction time as compared to control under the interference of low volume auditory stimulus. And increase is also seen under the influence of Phone conversation.

DISCUSSION:-

In this study, listening to music has had stimulating influence on visual reaction time due to certain factors like arousal and concentration as stated in the previous studies.^(2,5) However, there are other researchs which consider music as distracter in performing cognitive tasks requiring attention and concentration which has a negative effect and deteriorate cognitive performancelike seen in the present study ART increases.⁽³⁾ Also, in the present study, there is more interference with auditory reaction time compared to visual reaction time.

Overall, the collective results of this studies suggest that answering calls if persistent in the context of mobile phone use while driving cause interference with reaction time, like study done by Ronggeng Zho et al.,2016.⁽⁶⁾ Like Karia RM et al., 2012 in present study Females had faster VRT compared to males.⁽⁴⁾

CONCLUSION:-

1. This study shows that low volume music has a positive effect on the on visual reaction time (VRT) and negative effect on auditory reaction time (ART) of the subjects.
2. This study determined that both the reaction time are prolonged with mobile use.

RECOMMENDATIONS:

Misuse of cell phones is an emergent. The results of the study that has shown significant implications for use of cellular phones while driving. All users of cellular phones should be advised not to engage in intense phone conversations while driving, where split-second decisions can make a life-saving difference. If unavoidable, people should use self-regulatory actions to keep their driving within an adequate safety margin.

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