

## Original Research Article

An evaluation of visual perception visual memory cognitive functions and emotional status among genders in elderly subjects

Running title: Changes in visual perception, visual memory, cognitive functions and emotional status in elderly subjects.

Type of article : Original research article

### ABSTRACT:

Background: Gender differences in visual memory and perception and cognitive test performance have been significantly influenced by factors like sex

Objective : The current study aimed to evaluate the gender differences in patterns of cognitive test performance and visual perception in healthy elderly individuals.

Methods : Cognitive functions and visual perception was analyzed using clock drawing test and picture identification test in 20 elderly men and women (10 each) and their emotional status was assessed using depression scale

Results : The results revealed that females had a better visual memory and depth perception compared to men and the value was statistically significant at  $p < 0.05$ . Females performed better than men on tests of Picture identification and were better in phonemic verbal skills compared to male men and the value was statistically significant at  $p < 0.05$

Conclusion : The present study concluded an innovative finding that women were better in their performance related to visual depth perception and cognitive functions.

Key words : gender, cognitive task, visual depth perception, emotions, innovation

Introduction:[i-[1]

Cognitive abilities are mental abilities like sustained attention, responses inhibition, speed of information processing, working memory, and pattern recognition that help a person use in his everyday life.[1]. The most basic of these abilities are memory, executive function, processing speed and perception. Depth perception is the ability to see things in three dimensions (including length, width and depth), and to judge how far away an object is. For accurate depth perception, a person requires to have a binocular (two-eyed) vision. People who rely on vision primarily in one eye (called monocular vision) may struggle with depth perception skills[2]. Previous reports revealed that there exists minimal changes among genders in cognitive skills and depth perception especially in younger age groups[3]. But there are scanty reports on the evaluation of visual perception and cognitive functions among genders in elderly subjects[4].

Numerous behavioral studies have been conducted to assess the cognitive correlates of mathematical performance and have shown the important role of visuospatial processes in mathematical processing[5],[6],[6]. The sensory-motor dimensions involved during the experience of stimuli would be automatically activated during a memory task[7],[6]. Memory and perception are two cognitive functions that may share cerebral space, resources, and common processes[8,9]. The reactivated sensory-motor dimensions may influence a perceptual task, and the activation of the sensory-motor dimension during memory processing may influence the performance on a perceptual task in the same sensory-motor dimension[10],[6],[6]. Our team has extensive knowledge and research experience that has translated into high quality publications[11-15][16-20].

These studies have indicated that sensory-motor areas of the brain are not involved in the perceptual processing of a stimulus and they are activated when participants perform a memory task. In line with the imaging studies, behavioral studies have demonstrated the modality-specific character of memory[9],[6]. So, the present study planned to study the evaluation of cognitive screening test among genders in elderly subjects.

#### SUBJECTS AND METHODS:

Study population: 20 healthy subjects of both genders (each 10) in the age group 55-70 years were chosen for the study. The inclusion criteria involve healthy elderly population and exclusion criteria involves elderly subjects without any history of depressive or psychosomatic illness, Alzheimer's disease and dementia. Exclusion criteria involves subjects suffering from cognitive dysfunction disorders.

Test visual perception - clock drawing test were performed by asking the participant to draw it in paper. Visual memory recall was performed by showing a scenery picture for 2 minutes and the ask them to identify number of items re-collected as a memory test. Verbal phonemic fluency was performed using a pen and paper for rapid generation of words begins with a specific letter. Levels of emotional disturbance were evaluated using geriatric depression questionnaire scale circulated in google form results and tabulated.

**STATISTICAL ANALYSIS:** frequency analysis and chi square test was used to analyze the level of emotional disturbance and independent sample t test was needed to analythe visual perception memory, phonemic fluency.

The clock-drawing test is a simple test to screen people for signs of neurological problems, such as Alzheimer's disease and other dementias. The subject is given a piece of paper with a pre-drawn circle on it and asks him to draw the numbers on the clock. Then a specific time is mentioned for example 10 minutes after 11. This simplest scoring method consists of giving one point if the task was completed correctly and 0.5 for half completed and zero points if the clock was not completed correctly

The visual depth perception is performed by allowing them to catch a ball after throwing it above. The SPMT is done using a line drawing scenery picture of a living room in a house where 23 objects commonly observed in daily life and are drawn on an A4 piece of paper: a telephone, a table, a bookshelf, books,, two cups with saucers, chairs, a flower vase, a scenery frame clock, a ceiling lamp, a couch, a cushion, a cat, a low table, a hat on the table, a briefcase, a television, a desk for the television, a calendar on the wall, a flower pot with a cactus, a flower pot with a foliage plant, a table lamp and a window. We collected scores after allowing the examinee to study the picture for 1 min and were instructed to remember the items. After this encoding period, we distracted participants by asking them to conduct a brief digits forward test (four digit strings consisting of 4, 5, 6 and 7 digits, respectively). Participants were then asked to recall the objects in the picture without time limitation. This recall time usually takes less than 1 min. The number of items recalled is the score for Pict 1 with no credit for duplicates

Verbal fluency tests have been validated as brief cognitive assessments for the detection of cognitive impairment and dementia in non-specialist clinical settings. Phonemic fluency was assessed by rapid generation of words beginning with a specific letter A of F.

**RESULT:**

Tests on visual depth perception revealed that females scored better than males and the value was statistically significant. ( $p < 0.05$ ) Tests on visual memory revealed that females were able to identify more pictures in the SMTP test and the value was statistically significant. ( $p < 0.05$ ). Tests on visual depth were better in females, but the value was not statistically significant. ( $p < 0.05$ ) (Figure 1- 3 )

The association between genders and the emptiness of life was assessed. Levels of emotional disturbance with a feeling of emptiness was more evident in females compared to male and the association was found to be statistically significant (Figure 4). The association between gender and level of stress experienced was assessed. It was evident that females were more stressed compared to males and the association was found to be statistically significant (Figure 5)

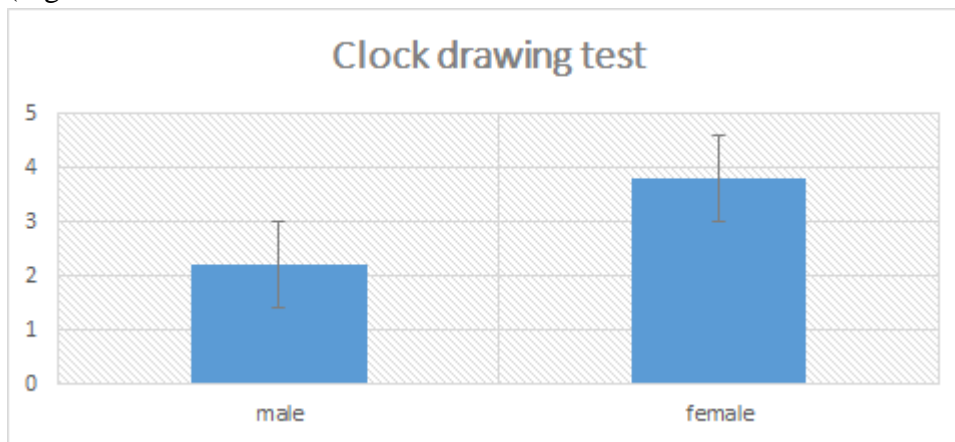


Figure 1. Bar graph showing the scores obtained for genders about clock drawing tests. It is observed that females had increased scores in clock drawing tests compared to male and the value was found to be statistically significant ( $p < 0.05$ ) as in independent sample t test

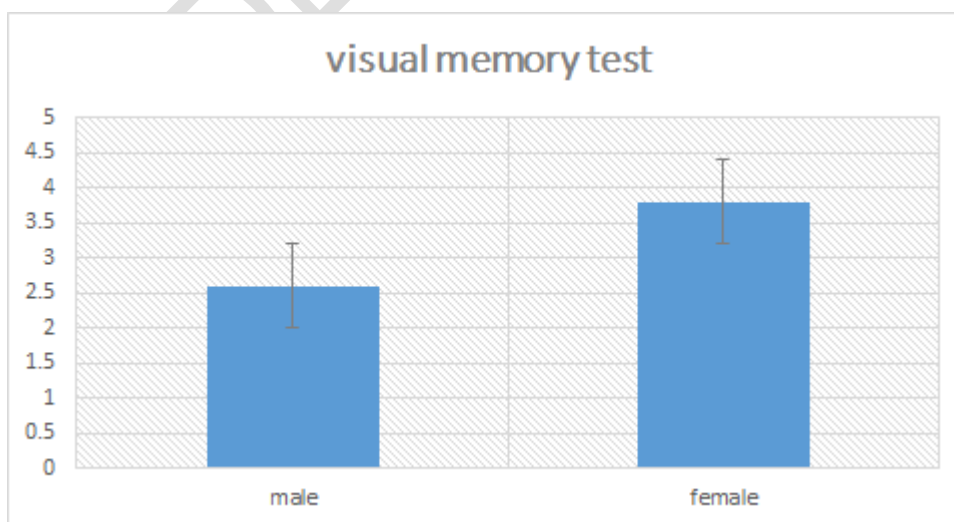


Figure 2. Bar graph showing the scores obtained for genders about visual memory tests. It is observed that females had more scores in visual memory test compared to males and the value was found to be statistically significant ( $p < 0.05$ ) in independent sample t test

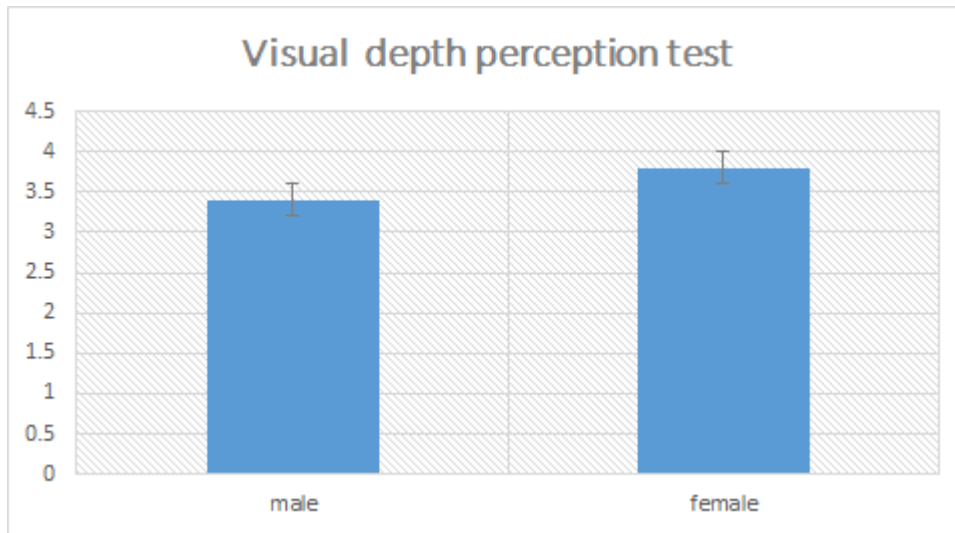


Figure 3. Bar graph showing the scores obtained for genders about visual depth perception test. It is observed that females had more scores in visual depth perception tests compared to males and the value was found to be statistically significant ( $p < 0.05$ ) as in independent sample t test

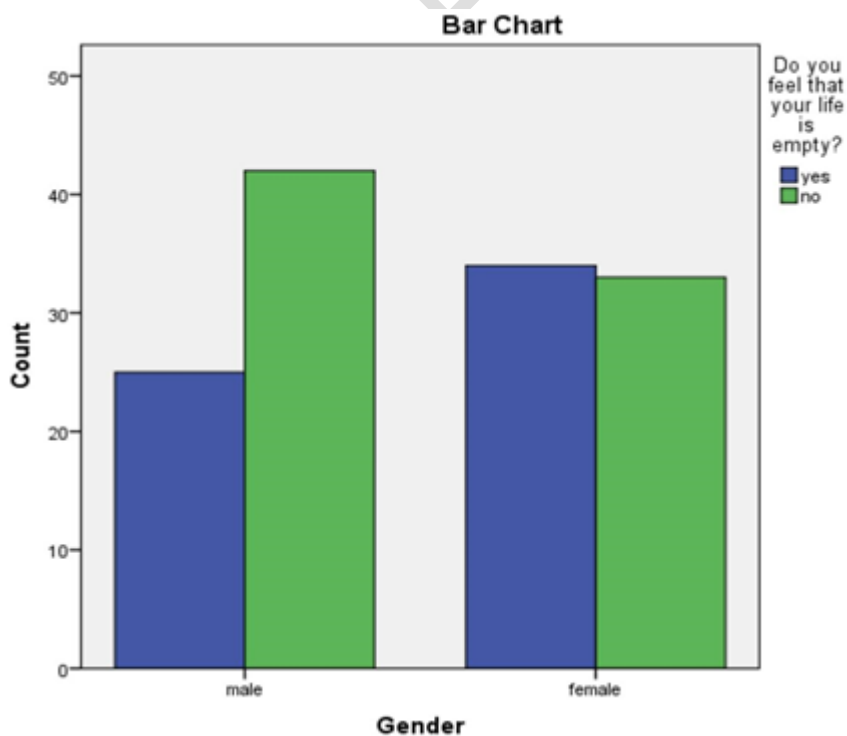


Figure 4. Bar graph depicts the association between the gender of the students and the level of stress they experience. X-axis represents gender of the students and y-axis represents the number of students. Blue colour depicts Yes, green colour denotes No. However females were commonly stressed. The difference was statistically significant (chi-square test; p-value = 0.017- significant)

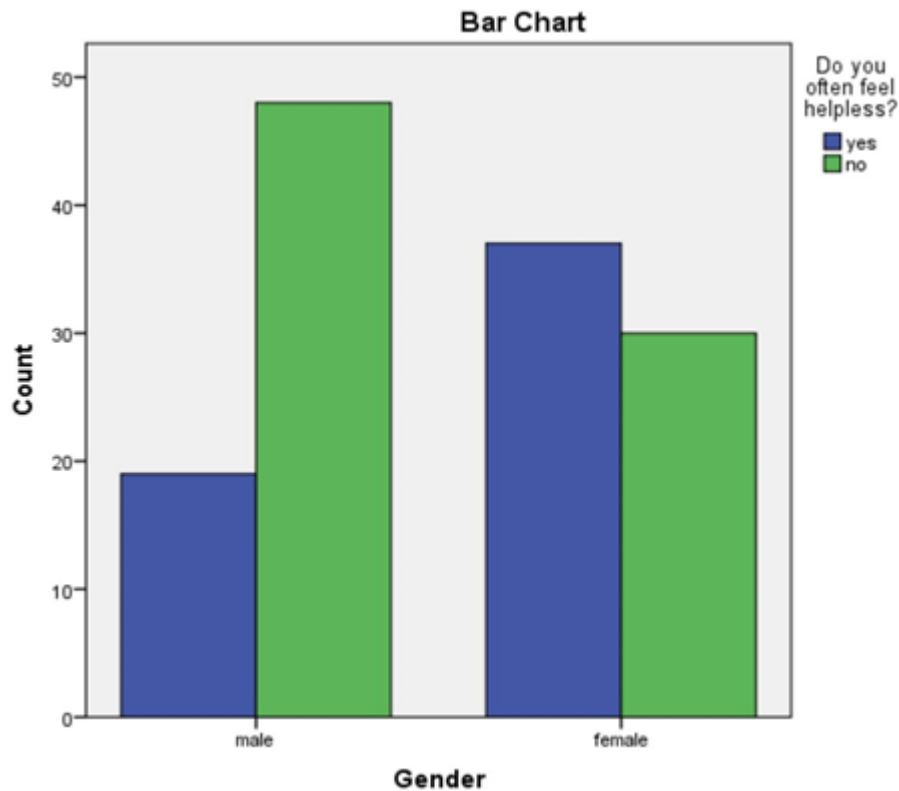


Figure 5. Bar graph depicts association between the gender of the students and the level of stress they experience. X-axis represents gender of the students and Y-axis represents the number of students. Blue depicts Yes, green denotes No. However females were commonly stressed. The difference was statistically significant. (chi-square test; p-value = 0.017 - significant)

#### DISCUSSION:

Sex differences in cognitive functions have been widely studied in the current scientific literature[21]. The present study revealed that there were significant differences in visual depth perception and cognitive functions among genders. Previous reports supported our finding that women are better at recognizing facial effects and expression processing, stronger on emotions in general and Men were only better at recognizing specific behavior which includes aggression, anger and threatening cues[22],[23],[6]

Biological and genetic differences in combination with environmental influences and cultural differences have resulted in the significant cognitive differences among men and women[22]. Reports reveal that among many differences of diverse mental and cognitive abilities, the higher differences prevail in verbal skills, spatial abilities and social cognition[24],[6].

Gender differences in cognitive test performance have been significantly influenced by factors like sex hormones or sexual dimorphisms in brain structure, that change with normal aging. They also reported sexual dimorphisms in brain structure that seem to change with normal aging processes.[25],[6]. Also that sex differentiation of the brain is often influenced by morphological and neurochemical effects of gonadal hormones that affect brain during its aging process.[26],[6]. Our findings relate to previous studies by Cynthia et al those women outperform men on tests of psychomotor speed and verbal learning and memory skills. Also another study revealed that that men performed better than women on visual construction tasks and had better visual perception[27][28][6]. Thus, it is suggested that females had better cognition and visual perception and were able to handle emotions and had more ability than males to recognize paired emotions.

#### CONCLUSION:

Thus, the study concluded that males had lower visual depth perception and cognitive abilities and are more prone to age related changes. Further neurological assessments and studies can provide strong evidence to confirm this association.

#### LIMITATIONS OF THE STUDY

The limitations of study include 20 elderly subjects 55-70 years in the study and this population does not represent the total population. A higher sample size will add accurate results with more statistical significance.

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