

Vision-Related Activities among Glaucoma Patients in Onitsha Nigeria

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Abstract

Objective: To evaluate performances of different task by Primary open angle glaucoma (POAG) patients at Guinness Eye Centre Onitsha Nigeria.

Materials and methods: POAG patients underwent a modified culturally relevant five items of the Activities of Disability Related to Vision (ADREV) tasks. These tasks were recognizing facial expression, detecting motion, locating objects, placing pegs into different sized holes and matching socks. The score ranged from 0 to 7(0=inability to carry out any task, 7=task carried out effortlessly with grades in between scores based on ease of carrying out task). Glaucoma severity was also assessed.

Results: Two hundred and four patients with mean age of 61.0 years; 46.1% males and 53.9% females participated in this study. The total mean score of the 5 tasks carried out was 26.6 ± 9.9 SD; range of 0-35. The ratings for the individual tasks were: motion detection 6.21 ± 1.8 ; placing pegs 5.77 ± 2.1 ; object location 5.39 ± 2.2 ; facial expression 4.73 ± 2.1 and matching socks 4.49 ± 2.5 . Patients aged ≥ 60 years had more advanced glaucomatous damage and greater difficulty performing the task ($p=0.01$)

Conclusion: Older age and more glaucomatous damages were associated with poor ADREV performance. Matching of socks and identification of facial expressions were the most tasks. Older glaucoma patients and those with advanced disease require support for vision-related activities of daily living.

Keywords: Vision; Activity; Glaucoma; ADREV tasks

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Introduction

Vision is needed for daily functioning of all human beings; and good eyesight is essential in carrying out activities of daily living. Glaucoma can impair patients' abilities to perform common daily activities and cause significant physical challenges from vision loss [1]. Performance-based instruments investigate the ability of an individual to undertake activities of daily living which are important to them [2]. Researches have shown that performance-based tasks in the clinics correlate highly with similar task performed at home [3]. Performance-based measures are Activities of Function Related to Vision (AFREV) [4], Activities of Disability Related to Vision (ADREV) [2], Assessment of Ability Related to Vision (AARV) [5], Driving Stimulator [6], Facial Recognition [7], and Eye-Hand Coordination [8]. Visual acuity

and visual fields are important visual function tests; however they offer less insight into the perceived or actual impact of the disease on the individual as they go about everyday tasks [9].

ADREV provides valid estimates of how visual loss due to glaucoma affects the ability to perform activities of daily living [2]. Its performance is influenced by physical limitations either musculoskeletal or neurological co-morbidities of the participant [10] and also by literacy level of the participants. Glaucoma may indeed affect performance of different tasks and a loss of confidence in performing basic daily tasks tends to precede self-reported specific visual problems [11,12]. This vital information is lacking in our clinical practice, and this present study bridges the gap in knowledge with regards to the aforementioned handicaps among POAG patients in our environment.

Materials and Method

This study was conducted at the Guinness Eye Centre, Onitsha. Onitsha is in Anambra State which is in South East of Nigeria. Onitsha is one of the biggest commercial cities in Nigeria. Approval for the study was obtained from the Ethics and Medical Research Committee of the hospital and. Written consent was obtained from each patient after proper explanation of the nature and study objectives. A third generation performance-based Activities of Disability Related to vision (ADREV) [13] tool was used in this study. The performance of activities of daily living were assessed using five of the ADREV instrument namely; recognizing facial expression, detecting motion, locating objects, placing a peg into different sized holes and matching socks. Patients who had significant lens opacity stage 2 or above of LOCS III classification (LOCSIII) [14] were excluded. Patients with impaired musculoskeletal functions, neurological co-morbidities and orthopaedic physical limitations were also excluded.

Glaucoma was grouped into 5 stages using Aulhorn and Karmeyer visual field staging [15], using the Optopol PTS 910 perimeter into;

Stage 1: Relative scotoma according to the affected axons

Stage 2: Small absolute scotoma in Bjerrum region without connection to the blind spot.

Stage 3: Absolute scotoma in the Bjerrum region with connection to the blind spot, eventually including a nasal step according to Ronne.

Stage 4: Further extension of scotoma into the visual field.

Stage 5: Collapsing of the complete visual field. A small temporal island of vision may remain.

The patients performed the ADREV tasks with both eyes open and using their present optical aid if worn. Each test performance was graded from 0-7. The scores were assigned based on the ease of performance of these tasks; the score 0 was the least score and was assigned if the patient could not perform the test, while 7 was the highest score obtainable if task was performed easily. The tests were conducted under ambient light of 40 Foot Candle except recognition of facial expressions and detecting motion which were done in reduced illumination. The illumination used in this present study was converted to watts to enable calibration of the light source/point.

The Test Details Were

Facial recognition

Seven full-face colour photographs of two angry, two sad, two happy faces and one surprised face of the same model were used. For each paired picture one was large sized and the other small sized. The seventh unpaired picture was of large size. The large sized pictures measured 23cm by 17cm while the small sized picture measured 10cm by 7cm. The seven full-face photographs were presented on a 15.6 inches computer screen at ½ meter. The order of display of the facial expression photographs was angry, happy, sad, and surprised.

Motion detection

A large black cross against a white background on a computer screen provides a point of fixation. While fixing on the cross, fourteen balls with five red, five blue and four yellow balls moved diagonally across the 15.6 inches computer screen within thirty eight seconds.

Locating objects

Fourteen boxes with seven red and seven pale brown coloured boxes were used. Sample boxes were shown before start of the test. The measurements of the paired red and pale brown boxes are shown in **Table 1**.

This test was done in 6x3m space. The boxes were arranged in increasing sizes 50 cm apart. The boxes were arranged in two rolls diagonally with the last two boxes 4 and 6meters in front of the patient. This order was taken to prevent any box obstructing the view of the one behind it.

Placing pegs

Holes measuring 5, 7, 9, 11, 13, 15 and 17cm were carved on seven different boards. The boards each measured 22.9 x 5.1 x 5.1 cm. The stick used measured 50.8 cm in height and a diameter of 2.5 cm. A wooden stand was created with five slots to hold the boards one at a time at different angles. The boards were placed one at a time in ascending order of hole size starting with the 5cm hole sized board. The boards with the hole size 7, 11 and 15 cm were displayed diagonally, while the other holed boards were kept horizontally.

Matching socks

Seven differently patterned male socks were attached to a grey cloth. The patient sat in front of a table 1 metre wide and matched these seven hung socks from a group of 10 socks, 7 of which are mates for the hanging socks.

Patients were divided into two groups based on gender and age. Comparisons were made between male and female genders. The average age of retirement in Nigeria is 60 years [16]; hence comparisons were also made among those less than 60 years and those 60 years and above. The data generated were entered into the Statistical Package for Social Science (SPSS) version 16 software and analyzed.

Results

Two hundred and four patients participated in the study. The age of patients ranged from 40 to 92 years with a mean age of 61.0

Table 1 Length, width and height of boxes.

Box	Length (cm)	Width (cm)	Height (cm)
1	27	18	14
2	24	16	12
3	21	14	10
4	19	8	8
5	16	7	7
6	13	6	6
7	11	3	3

years. There were 94 males (46.1%) and 110 females (53.9%). The male to female ratio was 1:1.2. Ninety nine (48.5%) were <60 years and 105 (51.5%) were ≥ 60 years of age; with 31% of these patients having non-formal education. There was no statistical difference between the age groups and gender of patients in this study.

The presenting visual acuity in the better eyes of the patients with available corrections is:

6/6-6/18 → 96 (47.1%); 6/24-3/60 → 79 (38.7%) and <3/60-Light perception → 29 (14.2%)

The glaucoma stages for these patients were stratified according to age (<60 years and ≥ 60 years) are shown in **Table 2**. There was no difference between the different stages of glaucoma and gender ($p=0.6$). However older patients ≥ 60 years had more advanced visual field loss ($p=0.001$). The older patients had more scotomas in their visual fields and complete collapse of their visual fields.

The performance of five tasks of ADREV

The total mean score of the five tasks was 26.6 ± 9.9 , range 0-35. The scores for the different tasks are: motion detection 6.21 ± 1.8 ; object location 5.39 ± 2.2 , placing pegs 5.77 ± 2.1 facial expression 4.73 ± 2.1 and matching socks 4.49 ± 2.5 .

The mean score for all tasks performed by males was 24.9 ± 10.6 and the females 28.0 ± 9.0 . The difference in the mean scores of both sexes for all tasks was statistically significant ($p=0.03$). **Table 3** shows the mean scores of the different tasks.

Table 2 Glaucoma stages stratified by age.

Stages	Ages (years)	
	<60 No (%)	≥ 60 No (%)
Stage 1	36 (17.6)	6 (2.9)
Stage 2	15 (7.4)	(5.9)
Stages 3	17 (8.3)	20 (9.8)
Stages 4	12 (5.9)	33 (16.2)
Stages 5	19 (9.3)	34 (16.7)
Total	99 (48.5)	105 (51.5)

Table 3 Mean scores in ADREV tasks for the males and females.

Task	Mean score		t-test	p value
	Males	Female		
Facial recognition	4.3 ± 2.3	5.0 ± 1.9	2.3	0.03
Motion detection	6.1 ± 2.0	6.4 ± 1.6	1	0.3
Locating objects	5.0 ± 2.4	5.7 ± 2.0	2.3	0.04
Placing pegs	5.4 ± 2.4	6.1 ± 1.9	2.3	0.04
Matching socks	4.1 ± 2.7	4.8 ± 2.4	1.8	0.06

Table 4 Comparison of mean score of ADREV tasks among <60 years and ≥ 60 years participants.

Tasks	<60 years	≥ 60 years	t-test	p value
Facial recognition	5.2 ± 2.0	4.2 ± 2.1	3.3	0.002
Motion detection	6.3 ± 1.8	6.2 ± 1.8	0.3	0.5
Locating objects	5.8 ± 2.1	5.0 ± 2.2	2.7	0.007
Placing pegs	6.0 ± 2.1	5.6 ± 2.2	1.3	0.1
Matching socks	5.1 ± 2.5	3.9 ± 2.5	3.4	0.001

The mean score of tasks carried out by the age group <60 years was 28.4 ± 9.9 and age group ≥ 60 years was 24.9 ± 9.5 . The mean difference in scores of the tasks was statistically significant ($p=0.01$). The **Table 4** show the mean scores of tasks carried out by the two age groups.

Discussion & Conclusion

The perception of peoples' positions in life is determined by how they fit into their society. To fit into the society, one is expected to carry out activities that are culturally relevant. Good vision is essential in carrying out all activities of daily living. The visual disability caused by glaucoma affects functional disabilities irrespective of age [17]. Population and hospital based studies have shown that glaucoma patients in our environment present with poor vision, advanced disease and extensive visual field losses [18-23]. Patients with advanced glaucoma have a marked difficulty in daily activities, with a correlation between the severity of the visual field defects and a higher limitation in the activities [24,25]. However, patients can also have visual disability in early stages of glaucoma [26].

Patients in this present study had greatest difficulty with matching socks; this was worse in those ≥ 60 years of age. Kotecha A et al. [8] provide evidence that patients with glaucoma exhibit deficits in eye-hand coordination compared with the age-matched normally sighted control. The most difficult facial expression for the patients was for angry and sad facial expressions. The difficulty with facial recognition was also observed by Fiona et al [7] in patients with more advanced visual field loss or poor contrast. In future it is necessary to include contrast sensitivity test and investigate its effect on performance of vision related activity.

In this present study, about one third of patients had no formal education. Thus, tasks involving reading was removed. Lack of adequate space and also because of some physical challenges that might not be obvious, tasks that had to do with ambulation was excluded. It is essential to carry out tasks that are culturally and linguistic adaptation to avoid exclusion of large number of people. This justified reduction of some task of ADREV instrument in this present study.

In this present study old age and advanced glaucomatous damage were risk factors associated with difficulty in carrying out vision related activities of daily living. We recommend safe/friendlier home and work environment for glaucoma patients. Also, interventions that reduce late presentation will reduce the burden of glaucoma on vision related activities of daily living.

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