Assessment of Visual Acuity Changes in Response to Haemodialysis

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Introduction

Haemodialysis (HD) patients report visual disturbances associated with dialysis sessions although causes for these symptoms are poorly documented and understood. We performed an observational study to describe and assess the change in visual acuity (VA) in response to haemodialysis therapy.

Methods

All patients receiving chronic haemodialysis at our centre between 1st March 2015 and 31st May 2015 were invited to participate. Participants who were registered blind were excluded, as were those who on initial testing were unable to read the largest letters on the Snellen chart.

The visual acuity of each eye was assessed using a Snellen eye chart (figure. 1) at 3 meters before and after a single mid-week dialysis session.

In order to allow comparative analysis, the Snellen result was then converted to both a Logarithm for Minimal Angle of Resolution (LogMAR) score and a decimal for categorization according to the World Health Organisation(WHO) classification (figure 1) of visual loss into normal, mild, moderate and severe (table 1). Patients' subjective perceptions of visual disturbances in relation to dialysis were recorded, as were their pre- and post-dialysis bloods, pre- and post-dialysis blood pressure, and blood glucose. Information about the particulars of their dialysis regimen (how many times per week the patient attended dialysis, duration of dialysis session) were also recorded.

Fig. 1: Example Snellen chart(1)

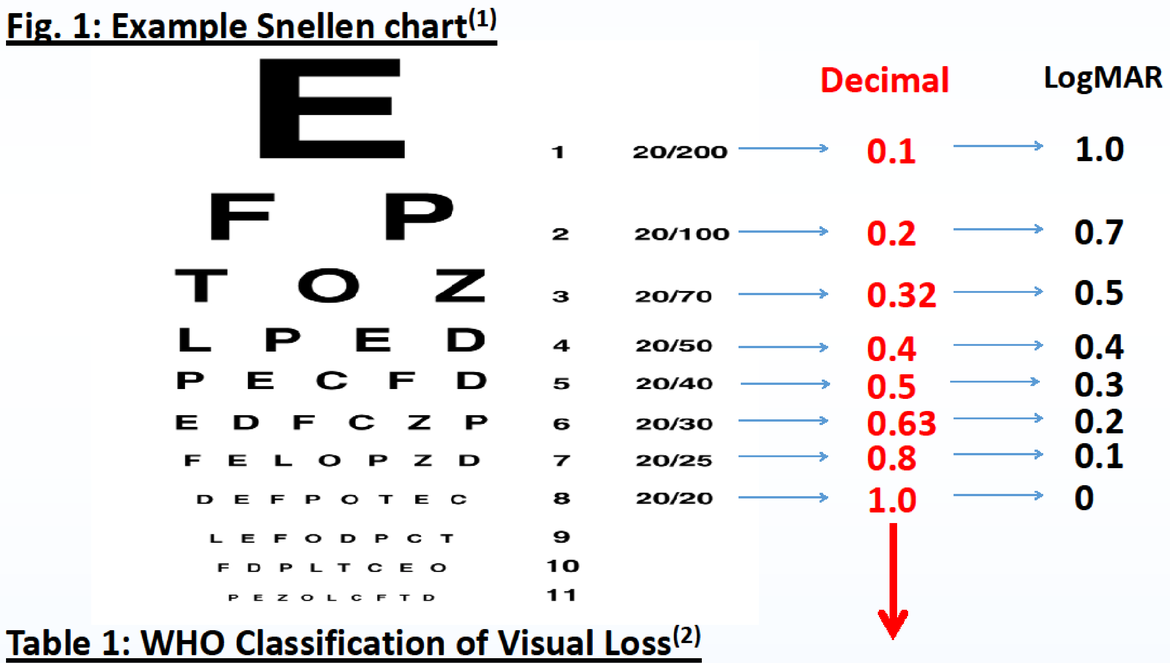


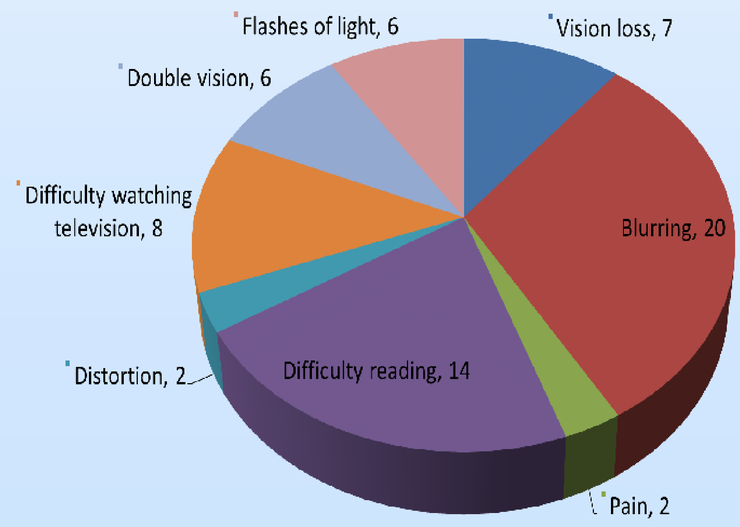
Table 1: WHO Classification of Visual Loss(2)

Category	Worse than	=/>
Mild or no visual impairment		0.3
Moderate	0.3	0.1
Severe	0.1	0.05
Blind	<0.05	

Results

148 patients (281 eyes) were suitable for inclusion, 95 patients were male, and 42 patients were diabetic. The median age of participants was 68 years (range 25-90 years). The median dialysis vintage was 50 +/- 44 months. 45 patients admitted to wearing corrective visual aids.

Figure 2: Symptoms Reported by 16% of Participants During and After Dialysis



WHO Classification Results

Best eye pre-dialysis assessment revealed 50 (34%) patients had normal vision, 40% (n=59) mild, 21% (n=31) moderate and 5% (n=8) had severe visual impairment. As a reference, the prevalence of moderate or severe visual impairment in the UK general population is less, at 14%(3).

LogMAR Results

44% of patients experienced a deterioration in visual acuity in one or both eyes by the end of dialysis (table 2), defined as a reduction in LogMAR score of ≥0.1 (equivalent to at least one row on Snellen chart). Looking at each eye separately, there was a significant deterioration in mean LogMAR score comparing pre-dialysis and post-dialysis measurements: mean pre-dialysis score 0.4±0.2 deteriorating to 0.44±0.2 post-dialysis, p=0.01 (figure 3). No correlation was found between the presence of ophthalmic medical conditions (n=60) and a deterioration in VA.

Deterioration in Vision	Improvement in Vision	No Change
44%	36%	20%

Table 2:Change in Visual Acuity Across a Dialysis Session (LogMAR)

Patients with a decline in visual acuity category following dialysis were older (median age 74 years (IQR 16) vs 69 years (IQR 21, p=0.05) and more likely to require corrective visual aids. We did not observe a relationship between visual acuity decline and change in blood pressure or blood sugars. 24 (16%) patients reported visual disturbances during dialysis (figure 2), most commonly blurring of vision or difficulty reading/watching TV. Of these 29% dropped a visual category across the dialysis session.

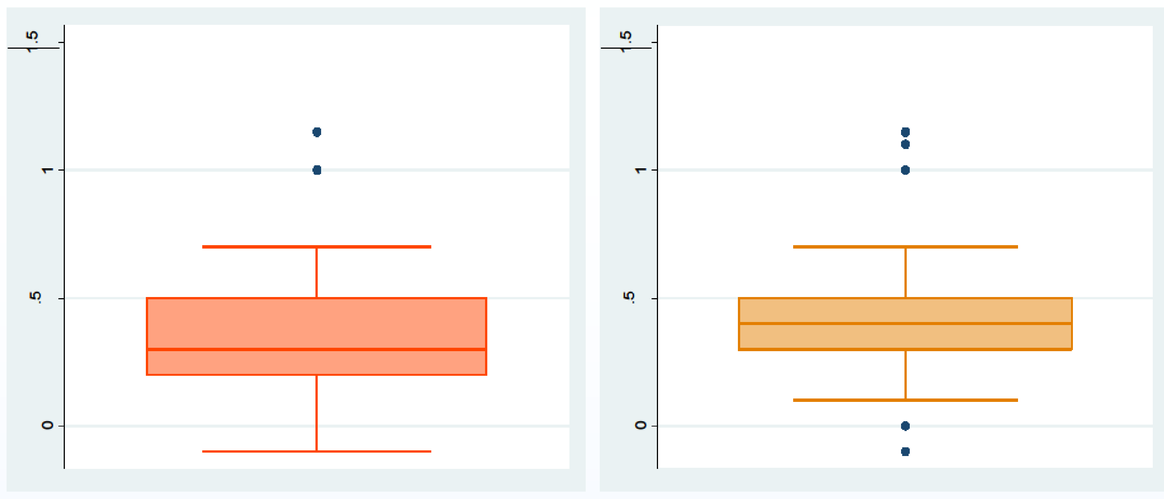


Figure 3: Pre and Post Visual Acuity LogMAR Scores

Near Vision Results

Near vision was assessed using a reduced Snellen chart at 30cm. The decimal scores were converted to LogMAR scores; no significant deterioration was found in response to dialysis (mean pre-dialysis 0.54±0.26 c.f. 0.55±0.26 post-dialysis, p=0.19).

Conclusion

This study is the largest of its kind and illustrates that visual impairment in HD patients is common, occurring at a higher prevalence than is seen in the general population.

A proportion of patients experience significant decline in VA in response to dialysis treatment that was not obviously associated with co-existing ophthalmic or medical conditions. The decline in VA may pose a significant risk in this vulnerable population who often experience high levels of comorbidity and physiological frailty. Further work is required to understand the mechanisms, associated factors and impact of this problem, particularly the role of factors directly related to the dialysis procedure.

References

1) https://upload.wikimedia.org/wikipedia/commons/7/77/1606_Snellen_Chart-02.jpg
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Dialysis. Epidemiology, outcome research, health services research.

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