Dizziness Ameliorated With Prism Treatment of Vertical Heterophoria

Objective: The visual system is an integral part of the balance system. However a specific visual disorder causing dizziness and headache has not been described in the otolaryngology literature. Vertical Heterophoria (VH) is a binocular vision disorder with symptoms of headache, dizziness, anxiety, neck pain and reading difficulties, treatable with prismatic lenses. The study's objective was to quantify dizziness and associated symptom reduction after prismatic lens treatment in patients with a chief complaint of dizziness concomitantly diagnosed with VH.

Methods: Retrospective analysis of 40 patients presenting to an optometric binocular vision subspecialist with a chief complaint of dizziness and who were simultaneously diagnosed with VH between August 2009 and May 2011. Pre / post-treatment data was collected from validated survey instruments (Headache Disability Index (HDI), Dizziness Handicap Inventory (DHI), Zung Self-Rating Anxiety Scale (SAS); from the Vertical Heterophoria Symptom Questionnaire (VHSQ) (a validated self-administered VH symptom assessment instrument developed by the authors to determine VH symptom burden); from a subjective rating (0-10 scale) of headache, dizziness and anxiety severity; and from a sub-analysis of VHSQ questions that pertain specifically to headache, dizziness and anxiety. Upon conclusion of treatment, subjective assessment of overall improvement of VH symptoms was obtained utilizing a 10 cm visual analog scale (VAS).

Results: Treatment effects were analyzed using paired t-tests. Following prismatic lens treatment, there was a 50 % decrease in DHI score ($p<0.0001$); 46.9% reduction in HDI score ($p<0.0001$); 19.9% reduction in Zung score ($p=0.0036$); 49.4% reduction in VHSQ score ($p<0.0001$); and a 70.2% reduction in overall symptoms as measured by the 10 cm visual analog scale ($p<0.0001$). There was also a reduction in the 0-10 scores for headache (60.4%; $p<0.0001$), dizziness (64.1%; $p<0.0001$), and anxiety (57.8%; $p<0.0001$); the two VHSQ headache questions (44.1%; $p=0.0269$), six VHSQ dizziness questions (54.5%; $p<0.0001$), and three VHSQ anxiety questions (50.2%; $p=0.0036$) (see Figure 1).

History: Patients present with a combination of non-vertiginous dizziness, facial pain around the eyes, headache, neck pain, and anxiety. Reading difficulties are common, but often not the chief complaint (see Figure 2 for full symptom set and prevalence). Given the diverse symptom set, they have seen many different specialists prior to being diagnosed with VH.

Physical examination: Patients have skew deviation (vertical eye misalignment), head tilt to the side, and slight disconjugate gaze. Symptoms are often duplicated by having the patient move their eyes into convergence.

Prism Challenge: The current tests used to identify VH perform inconsistently.[1,2,3] To improve diagnosis, the authors developed the Prism Challenge, a dynamic process between the optometrist and the patient to determine the optimal prismatic lens prescription.[4] One quarter units of prism are incrementally added to a trial frame (see Figure 3) in the vertical and horizontal direction until the patient's symptoms are minimized.

Pathophysiology: Vertical heterophoria seems to be caused by a combination of skew deviation of the eyes, a roll head tilt, and otolith dysfunction (likely the utricle). This is combined with a visual preference for balance (see Figure 4). This has been described in visual vertigo patient.[5]

Thirty percent of the population has one eye higher than the other, yet only 4% of the population becomes symptomatic. Patients with a head tilt or isolated utricle dysfunction often do not have symptoms. Utricle dysfunction causes skew, head tilt and ocular torsion. In these patients a head roll tilt is likely present to stabilize the retinal image and reduce diplopia. A head roll tilt is the second most destabilizing posture after the head tilted backwards. This head tilt causes the balance organs and eyes to be misaligned with gravity.

Motion sickness is common in these patients. It is likely caused by asymmetric vertical optokinetic stimulation/ nystagmus, which is asymmetric in both time and angle. Vertical optokinetic nystagmus has been shown to be one of the most potent stimuli for motion sickness.

Conclusion: Treatment of dizziness with prismatic lenses resulted in a marked score reduction of the validated and other metrics for dizziness, headache and anxiety, which correlated with a marked reduction of overall VH symptom level. These patients have had many other diagnoses prior to being diagnosed with VH including: failure to compensate, psychogenic dizziness, vestibular migraine, visual vertigo, and motion sickness. Close collaboration between vision providers and otolaryngologists will be needed to serve this population. Prospective studies are needed to further validate this intervention to assess for placebo effect, and determine prevalence of VH in dizziness patients.

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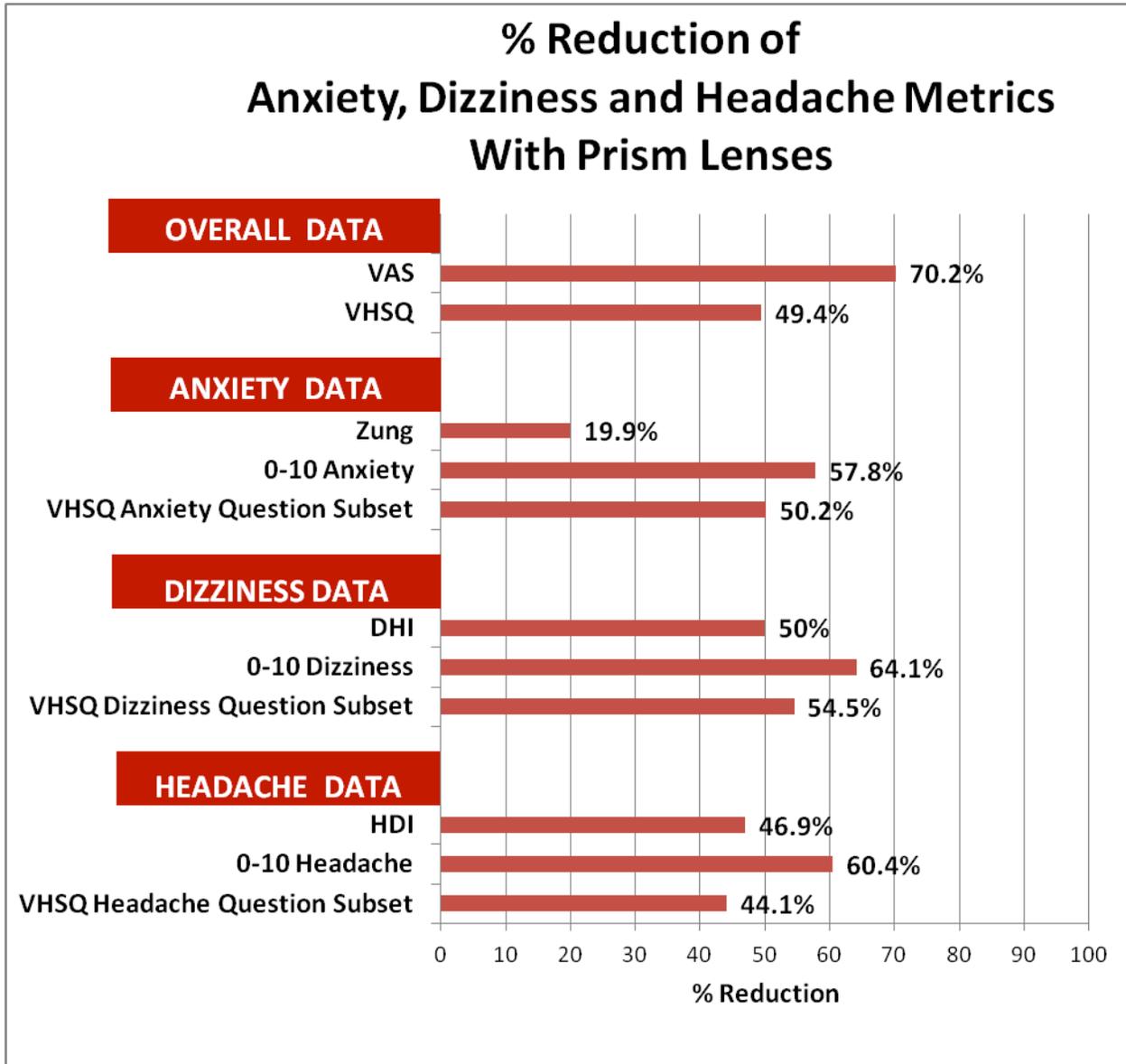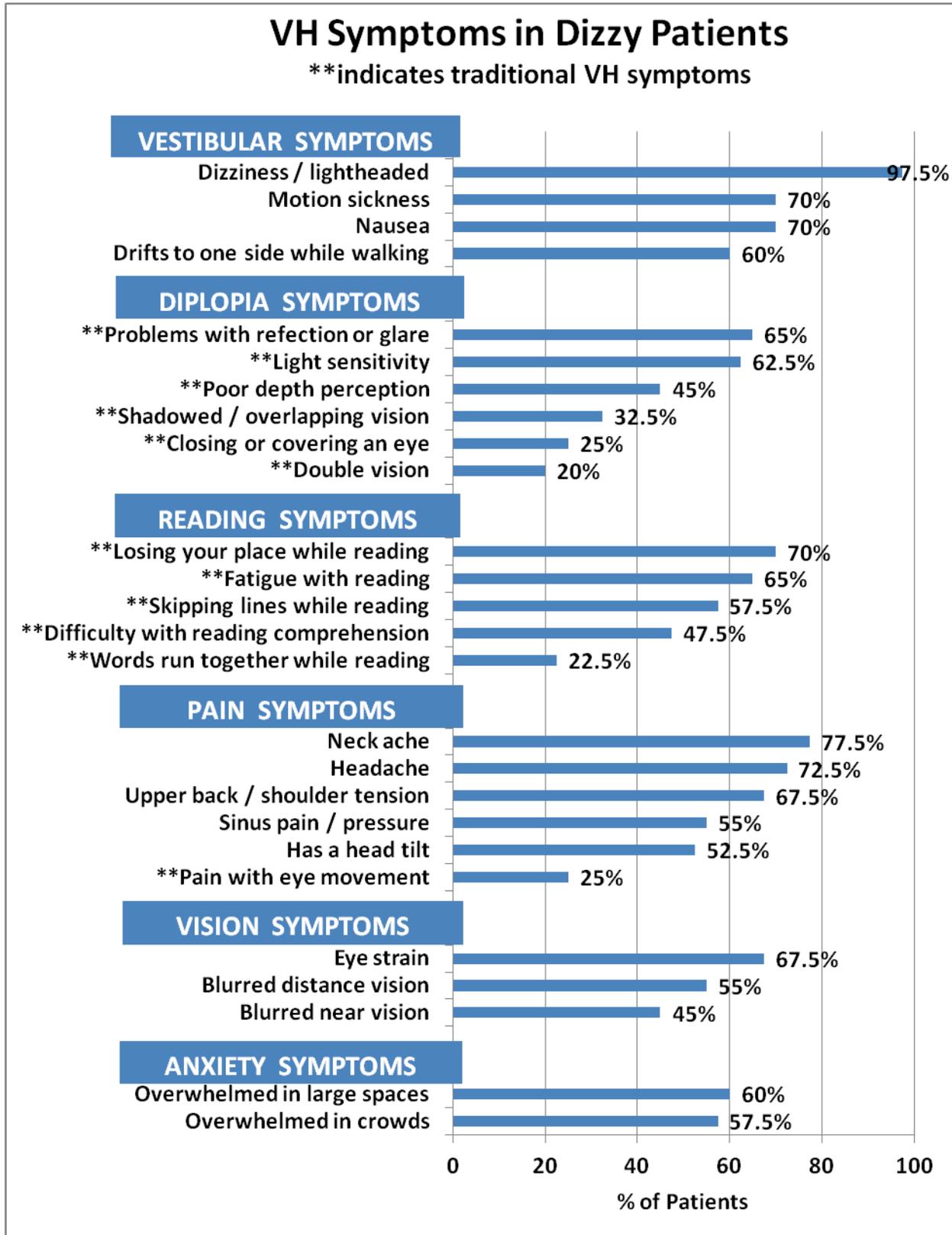
Figure 1

% Reduction of
Anxiety, Dizziness and Headache Metrics
With Prism Lenses

Figure 2

VH Symptoms in Dizzy Patients
**indicates traditional VH symptoms

VESTIBULAR SYMPTOMS
Dizziness / lightheaded — 97.5%
Motion sickness — 70%
Nausea — 70%
Drifts to one side while walking — 60%

DIPLOPIA SYMPTOMS
**Problems with refection or glare — 65%
**Light sensitivity — 62.5%
**Poor depth perception — 45%
**Shadowed / overlapping vision — 32.5%
**Closing or covering an eye — 25%
**Double vision — 20%

READING SYMPTOMS
**Losing your place while reading — 70%
**Fatigue with reading — 65%
**Skipping lines while reading — 57.5%
**Difficulty with reading comprehension — 47.5%
**Words run together while reading — 22.5%

PAIN SYMPTOMS
Neck ache — 77.5%
Headache — 72.5%
Upper back / shoulder tension — 67.5%
Sinus pain / pressure — 55%
Has a head tilt — 52.5%
**Pain with eye movement — 25%

VISION SYMPTOMS
Eye strain — 67.5%
Blurred distance vision — 55%
Blurred near vision — 45%

ANXIETY SYMPTOMS
Overwhelmed in large spaces — 60%
Overwhelmed in crowds — 57.5%

0   20   40   60   80   100
% of Patients

Figure 3

Figure 4