

# Why Do Subjective Vertigo and Dizziness Persist over One Year after a Vestibular Vertigo Syndrome?

Christoph Best,<sup>a</sup> Annegret Eckhardt-Henn,<sup>b</sup> Regine Tschan,<sup>c</sup>  
and Marianne Dieterich<sup>a,d</sup>

<sup>a</sup>*Department of Neurology, Johannes Gutenberg-University, Mainz, Germany*

<sup>b</sup>*Department of Psychosomatic Medicine, Bürgerhospital Stuttgart, Germany*

<sup>c</sup>*Department of Psychosomatic Medicine and Psychotherapy, Johannes  
Gutenberg-University, Mainz, Germany*

<sup>d</sup>*Department of Neurology, Ludwig-Maximilians-University, Munich, Germany*

The overlap and interlinkage of dizzy symptoms in patients with psychiatric and vestibular vertigo/dizziness disorders is the subject of an ongoing debate. In a one-year follow up in 68 patients with vestibular vertigo syndromes, the persistency of vertigo and dizziness symptoms was examined and correlated with vestibular parameters and results from a psychiatric evaluation. Patients with vestibular migraine showed poorest improvement of vertigo and dizziness symptoms over time. In addition, patients who developed anxiety or depressive disorder after the onset of the vestibular disorder showed poor improvement and high persistency of symptoms.

**Key words:** vertigo; vestibular disorder; subjective symptoms; anxiety; depression

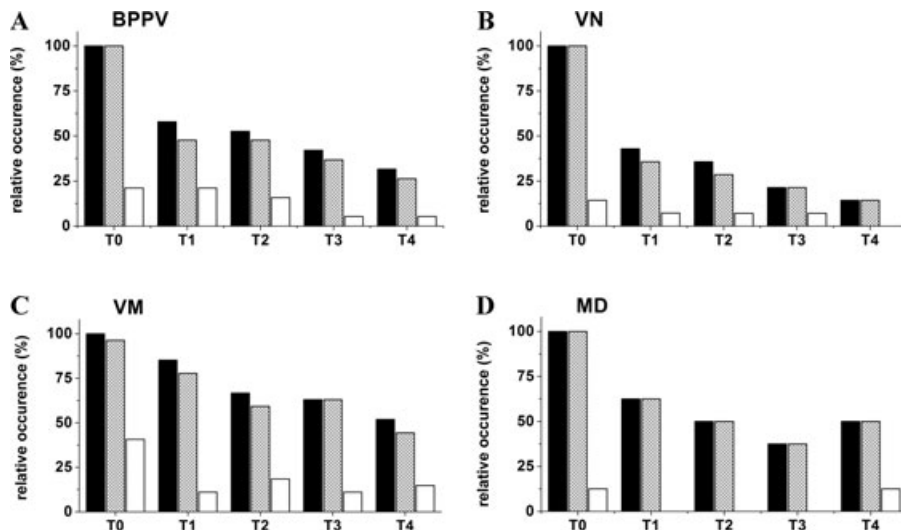
## Introduction

High rates of coexistence of psychiatric disorders and vestibular disorders have been described in the past.<sup>1-4</sup> Different models for a possible interlinkage between the vestibular system and emotion-processing systems have been discussed.<sup>5-7</sup> Still, the high rates of handicap, anxiety, and depression in vertigo patients represent the lack of understanding of the mechanisms that lead to symptom persistency and chronicity in vestibular vertigo patients. The aim of this prospective study was to shed some light on these mechanisms.

## Patients and Methods

In this interdisciplinary longitudinal prospective study, 68 patients with vestibular vertigo syndromes (benign paroxysmal positioning vertigo [BPPV,  $n = 19$ ], vestibular neuritis [VN,  $n = 14$ ], vestibular migraine [VM,  $n = 27$ ], and Menière's disease [MD,  $n = 8$ ]) were examined. Neurological and neuro-otological examinations comprised a detailed clinical examination and a vestibular test battery including measurements of subjective visual vertical, ocular torsion as well as an electro-oculography with caloric and rotatory testing. For psychiatric examination all patients underwent two structured interviews (SCID [Structured clinical interview for DSM disorders]-Interview) and a psychometric examination battery including vertigo-specific instruments measuring vertigo-induced psychological distress (Vertigo Handicap Questionnaire [VHQ] and

Address for correspondence: Christoph Best, M.D., Department of Neurology, Johannes Gutenberg-University, Mainz, Langenbeckstraße 1 55101 Mainz Germany. Voice: +49-6131-17-7155; fax: +49-6131-17-5697. bestc@uni-mainz.de



**Figure 1.** Subjective perceived vertigo and dizziness symptoms differentiated into the vestibular vertigo syndromes (**A**: BPPV, **B**: VN, **C**: VM, **D**: MD) over the 1-year follow up (T0–T4). Black columns show the relative occurrence of any vertigo and/or dizziness symptoms, hashed columns the relative occurrence of remittent vertigo and/or dizziness attacks, and white columns the relative occurrence of permanent vertigo and/or dizziness symptoms.

Vertigo Symptom Scale [VSS]) and non-vertigo-specific instruments measuring general psychological strain (Hospital Anxiety and Depression Scale, [HADS] and Symptom Checklist-90R [SCL-90R]). Patients were examined within the follow-up design at baseline (T0), after 6 weeks (T1), 3 months (T2), 6 months (T3), and 12 months (T4). At all follow-up appointments, patients were asked if they experienced any vertigo/dizziness symptoms, vertigo/dizziness attacks, or permanent vertigo/dizziness. The study was performed in accordance with the Helsinki Declaration and approved by the local ethics committee; patients were included after they gave their informed, written consent.

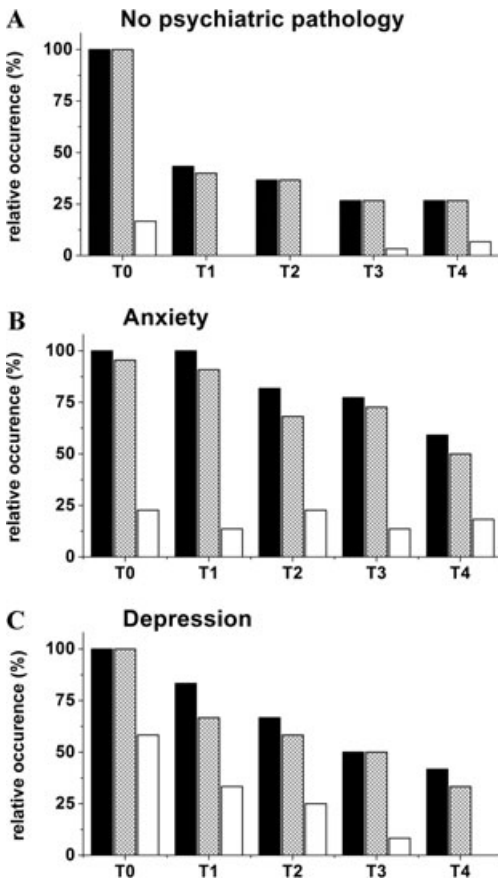
## Results

Repeated measures ANOVA analyses showed a significant improvement of subjective perceived overall vertigo/dizziness symptoms over the follow-up period of 1 year ( $F = 16.408$ ,  $dF = 4$ ,  $P < 0.001$ ). Subjective perceived vertigo/dizziness attacks also improved

( $F = 15.668$ ,  $dF = 4$ ,  $P < 0.001$ ), while subjective permanent vertigo/dizziness symptoms did not reveal any significant improvement ( $F = 1.630$ ,  $dF = 4$ ,  $P = 0.177$ ).

## Diagnostic Subgroups

Repeated measures ANOVA analyses in the diagnostic subgroups (BPPV, VN, VM, and MD; Fig. 1A–D) showed a significant decrease in the occurrence of vertigo/dizziness symptoms in patients with BPPV (31.6% of the patients perceived vertigo/dizziness symptoms at T4), VN (14.3% with vertigo/dizziness symptoms), and MD (50% with vertigo/dizziness symptoms) (BPPV:  $F = 3.562$ ,  $dF = 4$ ,  $P = 0.014$ ; VN:  $F = 11.854$ ,  $dF = 4$ ,  $P < 0.001$ ; MD:  $F = 3.767$ ,  $dF = 4$ ,  $P = 0.016$ ). In VM patients a decrease in the occurrence of vertigo/dizziness symptoms was present (51.9% of patients perceived vertigo/dizziness symptoms at T4), but the improvement over the 1-year follow up was not significant in the repeated measures ANOVA design ( $F = 1.325$ ,  $dF = 4$ ,  $P = 0.270$ ).



**Figure 2.** Subjective perceived vertigo and dizziness symptoms differentiated into the type of psychiatric reaction after the onset of the vestibular vertigo syndromes (**A**: no psychiatric disorder following the onset of the vestibular disorder; **B**: patients with reactive anxiety disorders; **C**: patients with reactive depressive disorders) over the 1-year follow up (T0–T4). Black columns show the relative occurrence of any vertigo and/or dizziness symptoms, hashed columns the relative occurrence of remittent vertigo and/or dizziness attacks, and white columns the relative occurrence of permanent vertigo and/or dizziness symptoms.

### Reactive Psychiatric Disorders

In a second step, the occurrence and persistence of vertigo/dizziness symptoms in the patients with vestibular vertigo syndromes was compared between patients who did not develop any psychiatric disorder (Fig. 2A) after the onset of the vestibular disorder and patients who developed an anxiety or depressive disorder

(Fig. 2B, 2C). Patients without a reactive psychiatric disorder had significantly greatest symptom improvement (Fig. 2A;  $F = 16.476$ ,  $dF = 4$ ,  $P < 0.001$ ). Patients with a reactive anxiety disorder also showed a significant improvement of symptoms (Fig. 2B;  $F = 3.40$ ,  $dF = 4$ ,  $P = 0.014$ ) but relatively higher rates of persisting vertigo/dizziness symptoms. Patients with a reactive depressive disorder revealed a tendency of symptom improvement, however, the repeated measures ANOVA analysis was not significant (Fig. 2C;  $F = 0.294$ ,  $dF = 4$ ,  $P = 0.878$ ).

### Correlation Analyses

Multiple correlation analyses showed no significant connection between vestibular test parameters and subjective perceived vertigo/dizziness symptoms. In contrast, the restrictions and handicaps in daily life induced by vertigo and dizziness correlated positively with subjective perceived symptoms over the whole period of time (T1:  $r = 0.739$ ,  $P < 0.001$ ; T2:  $r = 0.756$ ,  $P < 0.001$ ; T3:  $r = 0.826$ ,  $P < 0.001$ ; T4:  $r = 0.816$ ,  $P < 0.001$ ). In addition, the subjective perceived vertigo/dizziness symptoms correlated positively with acute depressive and anxiety distress as measured by the SCL-90R (depressive distress: T1:  $r = 0.410$ ,  $P = 0.001$ ; T2:  $r = 0.342$ ,  $P = 0.007$ ; T3:  $r = 0.411$ ,  $P = 0.002$ ; T4:  $r = 0.290$ ,  $P = 0.053$ ; anxiety distress: T1:  $r = 0.468$ ,  $P < 0.001$ ; T2:  $r = 0.353$ ,  $P = 0.006$ ; T3:  $r = 0.418$ ,  $P = 0.002$ ; T4:  $r = 0.348$ ,  $P = 0.019$ ).

### Conclusion

Patients with a vestibular migraine showed poorest improvement of symptoms in comparison to the other vestibular vertigo subgroups. In addition, patients who developed reactive anxiety and depressive disorders exhibited limited decrease in the occurrence of vertigo/dizziness symptoms. Finally, the vestibular outcome did not correlate with symptom persistency, while

the development of anxious and depressive distress correlated positively with the occurrence and persistence of vertigo/dizziness symptoms. The persistency of subjective vertigo/dizziness symptoms is not caused by vestibular deficit and dysfunction, but instead it is likely that the individual pattern of psychological reaction after the onset of the vestibular disorder leads to symptom persistency and chronicity. The fact, that patients with MD also showed high rates of subjective symptom persistency may reflect an additional factor, contributing to chronicity of dizziness symptoms. So, a remitting course of the disease might occur as an additional risk factor. Therefore, patients with vestibular migraine or Menière's disease and patients with signs of an anxious and depressive reaction should receive early interdisciplinary treatment and psychological de-escalating intervention.

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### Conflicts of Interest

The authors declare no conflicts of interest.

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