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UNIVERSITÀ DEGLI STUDI DI TORINO

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Orthostatic hypotension and psychiatric comorbidities in patients with dizziness

Matteo Pezzoli, MDa, Massimiliano Garzaro, MDa, Giancarlo Pecorari, MDa, Andrea Canale, MDb, Diego Meister, MDc, Maria Lucia Mangiardi, MDd, Carlo Giordano, MDa, Roberto Albera, MDb

a First ENT Division, Department of Head and Neck, University of Turin, Via Genova 3, Torino, Italy

b Second ENT Division, Department of Head and Neck, University of Turin, Via Genova 3, Torino, Italy

c Department of Clinical Physiopathology, University of Turin, Via Genova 3, Torino, Italy

d Cardiology Division, Department of Internal Medicine, University of Turin, Corso Dogliotti 14, Torino, Italy

Corresponding author: Matteo Pezzoli Viale del Castello 42, Moncalieri, Torino.
Tel.: +39 011 6336649; fax: +39 011 6336650.

E-mail address: mapezzoli@libero.it

Abstract

Purpose

The present study was undertaken to investigate orthostatic hypotension and psychiatric comorbidity with anxiety and depression in dizzy patients.

Materials and methods

Sixty-three patients with nonspecific dizziness and 27 volunteer subjects were evaluated with the head-up tilt test (HUTT) and the Standardized Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, Axis I.

Results

Orthostatic hypotension was induced by HUTT in 44% of patients and in 15% of volunteers ($P = .0082$); we found that the incidence of anxiety and depression was significantly higher ($P < .05$) in patients with nonspecific dizziness than in controls. Orthostatic hypotension was related to age but not to antihypertensive therapy and sex. Dizziness during the HUTT was reported by 49% of patients and 33% of volunteers ($P = .2469$). Among patients, dizziness was found to be related to sex (female) and anxiety. A correlation between dizziness and anxiety was also present in volunteers. Head-up tilt test induced vasovagal reactions in 2 volunteers.

Conclusions

Orthostatic hypotension is present in a high percentage of patients with orthostatic dizziness, and anxiety and depression are an important factor in the onset of dizziness. A high percentage of abnormal responses in volunteer subjects seems to indicate that the HUTT is not indicated for routine use.

Introduction

Dizziness is a common problem, particularly in the elderly, and the dizzy patient represents a major diagnostic challenge. Drachmann and Hart [1] reported 4 types of dizziness: vertigo, lightheadedness, disequilibrium, and those types that do not fit into any of the previous 3 categories. Vertigo indicates probable vestibular pathology, whereas lightheadedness suggests a cardiovascular disorder; disequilibrium describes imbalance or unsteadiness and may indicate a central neurologic disorder. The fourth category of “others” is a repository for poorly defined dizziness with a multifactorial etiology.

Orthostatic hypotension (OH) is one of the miscellaneous causes of nonspecific recurrent dizziness and can cause symptoms such as presyncope, especially while standing. The possibility that psychological or psychiatric symptoms may be consequences of vestibular dysfunction has been proposed [2]. Anxiety and panic are often associated with nonspecific recurrent dizziness, and it is difficult to establish if they are the cause or a consequence [2]. The aim of this study is to define to what extent OH is present in dizzy patients and determine whether anxiety and depression are a factor in causing dizziness.

Materials and methods

The study included 63 consecutive subjects affected by nonspecific recurrent dizziness while standing up or in the orthostatic position (group A) and 27 asymptomatic volunteers recruited from the hospital staff and their relatives (group B). All the enrolled subjects gave their informed consent before their inclusion in the study.

Exclusion criteria for group A were the presence of rotatory vertigo and of other neurologic symptoms or signs. Moreover, subjects affected by diabetes, heart disease other than systemic hypertension, and neurologic diseases were not included in the study group.

All patients underwent otoscopy, pure tone audiometry, and vestibular tests based on bedside examination (the Dix-Hallpike and Pagnini McClure maneuver, the head impulse test, head-shaking test, and mastoid-vibration test) and a bithermal energy test. The vestibular tests were carried out under video-oculography recording. All subjects admitted to the study group presented a normal outcome at the vestibular examination. In older subjects, hearing loss caused by age was occasionally found.

Group A (patients) was composed of 24 men (38%) and 39 women (62%); mean age was 59 years (SD, 18 years; range, 16-91 years). Of these patients, 25 (40%) had history of systemic hypertension and were receiving medical therapy. Group B (controls) was composed of 15 men (55%) and 12 women (45%); mean age was 51 years (SD, 14 years; range, 21-77 years); 9 of them (33%) had a history of systemic hypertension.

In all cases (groups A and B), systolic (SBP) and diastolic (DBP) pressure, heart rate, and oxygen saturation were measured. The clinical characteristics of patients and volunteers admitted to the study are summarized in Table 1. Differences in sex and age between the 2 groups (Table 1) were not significant on the χ^2 test or Student *t* test ($P > .05$).

Table 1.

Clinical parameters evaluated in subjects admitted to the 2 groups considered in the study

No.	Patients (group A) Controls (group B)	
	63	27
Age (y), mean (SD)	59 (18)	51 (14)
Females, n (%)	39 (62)	12 (45)
Antihypertensive therapy, n (%)	25 (40)	9 (33)
Supine hypertension	17 (27)	4 (15)
Supine SBP (mm Hg), mean (SD)	131 (20)	125 (16)
Supine DBP (mm Hg), mean (SD)	82 (16)	82 (9)

Differences are not significant for any of the parameters evaluated ($P > .05$).

All patients included in groups A and B were evaluated for anxiety and depression by the same physician who had been trained for the use of the Italian version of the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* Axis I Disorders (SCID-I) [3]. The SCID-I is a well-known standardized tool for making the major *DSM-IV* Axis I diagnoses that allow the interviewer to phrase questions in a manner appropriate to the patient's cognitive abilities to detect current episodes or lifetime occurrences of mental disorders [4]. For the aim of our study, only current episodes of anxiety or depression were considered in the results section.

To determine the presence of OH, they were then submitted to the head-up tilt test (HUTT). The HUTT protocol was the same one used in a previous study we did [5]: we carried out the HUTT in a quiet, dark environment, with room temperatures between 20°C and 24°C, at least 2 hours after a light meal. Intake of current therapy was not interrupted. We recorded a continuous electrocardiogram and pulseoxymetry. Manual blood pressure reading was obtained from the right arm with a mercury column sphygmomanometer, whereas heart rate was recorded on an electrocardiographic monitor. Patients had previously been examined by a cardiologist. We measured blood pressure during the first, fifth, and tenth minute, while the patient was in the supine position with safety belts fastened. The tilt table was then gently tilted head up until an angle of 70° was reached. With the patient in the orthostatic position, we measured blood pressure every minute during the first 5 minutes of tilt, then at the 8th, 10th, 12th, 15th, and 20th minute. The duration of the tilt was 20 minutes to detect cases of delayed OH [6]. We considered reactions to tilt as hypotensive when, at any time during the HUTT, the SBP decreased by 20 mm Hg or greater or the DBP decreased by 10 mm Hg or greater relative to the last supine measurement. We defined supine hypertension as SBP of 140 mm Hg or more and/or DBP of 90 mm Hg or more during the 10-minute supine phase before the test [7]. During the HUTT, all patients and control subjects had sinus rhythm, and only minor ST-tract alterations were observed.

Results

In 2 cases in group B, HUTT was interrupted because of a mixed vagal reaction. Both subjects were males, were under antihypertensive therapy with angiotensin-converting enzyme inhibitors, and were 60 and 48 years old, respectively.

We found a significantly higher ($P < .01$) incidence of OH, anxiety, and depression in patients affected by nonspecific dizziness (group A) with respect to controls (group B). In particular, a hypotensive reaction during the HUTT was recorded in 28 patients affected by dizziness (44%) and in 4 healthy subjects (Table 2). Head-up tilt test induced dizziness in 31 patients (group A) and in 9 controls (group B) ($P > .05$). Among these 31 dizzy patients, 18 (58%) had effectively concomitant OH, whereas 13 (42%) did not (Table 3). In the study group, dizziness induced by HUTT was not related to the presence of a concomitant OH ($P = .0591$) (Table 3). Of 9 patients with complaints of dizziness in group B, 4 demonstrated OH on HUTT (Table 3). In the control group, dizziness induced by HUTT was significantly related to a concomitant OH ($P = .0072$) (Table 3).

Table 2.

Incidence of hypotensive reactions, dizziness during tilt test, anxiety and depression in subjects affected by nonspecific dizziness (group A) and in controls (group B)

No.	Patients (group A) Controls (group B)		<i>P</i>
	63	27	
OH during tilt test	28 (44%)	4 (15%)	.0082*
Dizziness during tilt test	31 (49%)	9 (33%)	.2469
Anxiety	27 (43%)	4 (15%)	.0146*
Depression	15 (24%)	1 (4%)	.0186*

* $P < .05$.

Table 3.

Incidence of outcomes for group A (patients) and for group B (subjects) in relationship to dizziness during the HUTT

	Group A		<i>P</i>	Group B		<i>P</i>
	Dizziness during tilt test	Asymptomatic during tilt test		Dizziness during tilt test	Asymptomatic during tilt test	
No.	31	32		9	18	
OH	18 (58%)	10 (31%)	.0591	4 (44%)	0 (0%)	.0072*
Non-OH	13 (43%)	22 (69%)	.0591	5 (56%)	18 (100%)	.0072*
Tilt SBP (mm Hg)	113.5 (24.0) [†]	120.8 (18.0) [†]	.1761	116.1 (25.3) [†]	116.9 (13.6) [†]	.9150
Tilt DBP (mm Hg)	78.5 (18.2) [†]	87.3 (10.5) [†]	.0215*	86.9 (10.0) [†]	85.6 (5.7) [†]	.6688
Tilt HR (bpm)	87.3 (15.3) [†]	85.8 (14.3) [†]	.6890	77.6 (20.8) [†]	85.1 (2.8) [†]	.1380
Anxiety	18 (58%)	9 (28%)	.0319*	4 (44%)	0	.0072*
Depression	9 (29%)	6 (19%)	.5079	1 (10%)	0	.3333
Females	24	15	.0192*	4 (44%)	8 (44%)	1.0000

* $P < .05$.

† Number in parentheses represents standard deviation. HR, heart rate; bpm, beats per minute

Using the standardized SCID interview, we found that the incidence of anxiety and depression was significantly higher ($P < .05$) in patients with nonspecific dizziness (group A) than in controls (group B) (Table 2).

Dizziness during the tilt test was significantly associated with anxiety in both patients (group A) and controls (group B), whereas OH associated with dizziness was found only in controls (Table 3). Females experienced dizziness during the HUTT more frequently than males only in group A ($P = .0192$) (Table 3).

Of the subjects in group A, a history of hypertension, anxiety, depression, and sex were not related to HUTT outcome (Table 4).

Subjects who presented OH during the HUTT were significantly older ($P < .05$ on the Student t test) than subjects without OH.

Table 4.

Outcomes in patients in group A in relation to OH

No.	OH 28	No OH 35	P
Dizziness during the tilt test	18 (64%)	13 (36%)	.0591
Anxiety	13 (46%)	14 (40%)	.7978
Depression	8 (29%)	7 (20%)	.6198
History of hypertension	11 (39%)	14 (40%)	1.0000
Age (y)	64 (15) [†]	54 (18) [†]	.0217*

* $P < .05$.

† Number in parentheses represents standard deviation

Discussion

We detected OH in a significantly higher percentage of patients with orthostatic dizziness (44%) than in controls (15%), whereas we did not find that patients complained of dizziness during the HUTT more than controls did. We also found a higher prevalence of anxiety and depression in patients with orthostatic dizziness and that OH was related to age but not to antihypertensive therapy. Dizziness during the HUTT was related to anxiety in both controls and patients. Those patients who reported dizziness during the HUTT were also more likely to be females or depressed.

These results provide some interesting indications for defining to what extent OH, anxiety, and depression contribute to chronic dizziness.

Using the HUTT, we found a prevalence of OH in controls that is similar to that in the general population. The Cardiovascular Heart Study reported a prevalence of OH of 16.2%, increased to 18.2% when subjects with orthostatic dizziness were included, in a general population of adults older than 65 years [8]. Similar findings were reported in a recent study, where the prevalence of OH in the general population was 15.9% (25.8% in patients older than 60 years) when blood pressure was measured at the third minute of active orthostatic stress [9]. Prevalence of OH is known to increase with age and with hypertension and diabetes.

When we consider selected populations of patients, the prevalence of OH varies in relation of the selection criteria used. In a clinical study by Faraji et al [10], conducted in patients complaining of dizziness, where patients were submitted to the HUTT based on their history and the results of other clinical orthostatic screening, OH was found in 61% of patients. In a recent epidemiological study in a large population of patients with vertigo, OH was present in only 3.7%, but patients with different pathologies, including peripheral, vestibular, and central nervous system disorders, had been included [11]. Our findings are closer to that of Faraji et al because vestibular and central nervous pathologies were excluded and admission to the study was based on suspicion of clinical OH (symptoms evoked or present in the orthostatic position).

Dizziness was elicited during tilt test in 46% of patients in group A and in 33% of subjects in group B, but the difference was not statistically significant. A high percentage (64%) of patients in group A had dizziness and concomitant OH, even if dizziness cannot be considered significantly correlated with OH. Although the HUTT did not make it possible for us to establish a relationship between dizziness and OH, we still consider the HUTT useful: beyond statistical analysis, in a clinical setting, the detection of dizziness and simultaneous OH is useful because it makes it possible for physicians to modify antihypertensive therapy or to advise patients to use caution when standing up. Moreover, the HUTT, in respect to simple blood pressure measurements in the supine and orthostatic position, permits continuous monitoring of electrocardiogram and heart rate.

In patients who had dizziness without OH (36% in group A and 22% in group B), the cause of symptoms remains uncertain, but it can be assumed that anxiety plays an important role. Hyperventilation, which is secondarily related to anxiety, is a well-known occurrence during the HUTT. Naschitz et al [12] documented hypocapnia during the HUTT in 17% of subjects with a history of dizziness. The initial design of our study did not include the evaluation of hypocapnia, so we cannot rule out hyperventilation, which should be taken into consideration because it is related to psychologic factors. Because the HUTT also induced dizziness without OH in 5 volunteer subjects who did not report a history of recurrent dizziness, it cannot be considered a good maneuver to reproduce symptoms because the test is not physiologic and tends to induce discomfort in both patients and volunteer subjects.

A mixed neurocardiogenic vasovagal reaction was induced in 2 volunteer subjects. Both were males in antihypertensive therapy with angiotensin-converting enzyme inhibitor agents. Neither reported previous episodes of syncope. This finding is not surprising because the specificity of HUTT was reported to be 92% [13] and reproduces vasovagal reaction in a variable percentage of healthy subjects [14]. None of the patients in group A had a vagal reaction because patients referred to the Ear, Nose and Throat (ENT) clinic do not normally have a history of fainting or presyncope.

Patients with nonspecific dizziness (group A) had significantly higher scores of anxiety or depression as compared with subjects in the control group. Previous studies have demonstrated that

patients with dizziness who are referred to dizziness clinics have a high prevalence of psychiatric disorders [15] and [16]. High psychiatric comorbidity with anxiety and depression has been described especially in patients with Menière disease and vestibular neuronitis; in such cases, the origin of the anxiety is likely to be a reaction to recurrent or chronic vertigo [15]. On the other hand, nonspecific dizziness may be seen as a psychosomatic symptom caused by anxiety. In subjects with OH dizziness, it is also related to neurotic disorders. Nozawa et al [17] showed that the onset of dizziness and vertigo in patients with orthostatic dysregulation may be affected by emotional or psychological instability. His study included patients with orthostatic dysregulation diagnosed based on a questionnaire. In our patients, organic vestibular diseases were excluded, and hypotensive reaction was detected in 44% of the group. In the 13 patients without hypotension who experienced symptoms during HUTT, 9 had anxiety or depression or both. However, SCID scores were also high in patients with OH. Based on our results, it seems likely that psychiatric comorbidity with anxiety and depression are an important factor in patients who experience dizziness and in those seeking medical advice regardless OH.

In conclusion, in an ENT clinical setting, patients referred for dizziness, when vestibular causes are excluded, should be evaluated to exclude OH. The HUTT can be a useful diagnostic test but has limitations. It does not reproduce a normal everyday situation, may enhance a decrease in blood pressure as compared with active standing, and can induce discomfort and dizziness, especially in subjects with anxiety. Moreover, the high percentage of abnormal responses in volunteer subjects (2 vasovagal, 4 OH with dizziness, and 5 dizziness of 27 subjects) indicates that the HUTT should not be routinely administered. When OH and dizziness are concomitantly detected, the HUTT yields useful information. However, simple blood pressure measurement in the supine position and after standing up, as reported in the literature, may be sufficient. The HUTT should be reserved for selected cases with a high suspicion of OH, when this is not detectable with simple standing up. We found psychological disorders in a high percentage of patients with recurrent nonspecific dizziness, with and without inducible OH. The SCID test, which is simple and quick, should also be performed in ENT clinics to select patients who warrant more complex psychiatric evaluation and can benefit from antidepressant or anxiolytic therapy.

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