

4. Results

The 108 patients who fulfilled the inclusion and exclusion criteria were analyzed.

Baseline demographic and epidemiological characteristics of the patients are given in Table 1.

Table 1: Baseline characteristics of 108 isolated vertigo patients

Clinical or laboratory variable	n (%)
Female	67 (62%)
Mean age (\pm STD)	60.89 \pm 14.61
Elevated glucose level on admission	17 (15.8%)
Normal blood glucose level	88 (81.5%)
Blood fat test including cholesterol, triglycerids, HDL, LDL	106 (98.2%)
Abnormality in blood fat test	65 (60.2%)
Normal in blood fat test	41 (38.0%)
Hypertension	46 (42.6%)
No cerebrovascular risk factors such as hypercholesterolemia, hyper-coagulable state, art. hypertension, hyperglycemia, hyperlipidemia, smoking	22 (20.4%)
Migraine history	4 (3.7%)
Some form of psychiatric complaint or known psychiatric disease	21 (19.4%)

Clinical description of vertigo and concurrent symptoms of the 108 patients are given in Table 2.

Table 2: Characterization of vertigo in 108 isolated vertigo patients

Symptom/sign	n (%)
Duration of vertigo (<1 minute)	10 (9.3%)
Duration of vertigo (1 minute-1 hour)	16 (14.8%)
Duration of vertigo (1 hour – 1 day)	25 (23.2%)
Duration of vertigo (>1 day)	16 (14.8%)
Duration of vertigo (not mentioned)	41 (38.0%)
Linear vertigo	51 (47.2%)
Rotatory vertigo	36 (33.3%)
Linear and rotatory vertigo	3 (2.8%)
Unspecific vertigo	2 (1.9%)
Type of vertigo not mentioned	16 (14.8%)
Postural influence on vertigo	40 (37.0%)
Concurrent eye symptoms such as diplopia, visual blur, flash	13 (12.0%)
Concurrent ear symptoms such as tinnitus, hypoakusis, ear fullness.	15 (13.9%)
Nausea or vomiting	49 (45.4%)
Unspecific neurological symptoms by history (slight paraesthesias, clumsiness, speech disturbance)	22 (20.4%)
Headache during vertiginous attack	20 (18.5%)
Postural imbalance during vertiginous attack	42 (38.9%)
Ataxia in clinical physical examination	32 (29.6%)

Additional paraclinical findings are provided in Table 3.

Table 3: Paraclinical information on 108 isolated vertigo patients

Investigation type	n (%)
ENT consultation	36 (33.0%)
EKG or Holter EKG	95 (88.0%)
Abnormality in EKG or Holter EKG (atrial fibrillation, tachycardia, brady-cardia, AV block, extrasystole, Q-T elongation, etc.)	24 (22.2%)
Normal EKG or Holter EKG	71 (65.7%)
Extra- and transcranial duplex	75 (69.4%)
Abnormality in extra- or transcranial duplex (blood velocity change, arterioscleotic changes, etc.)	20 (18.5%)
Normal extra- and transcranial duplex	55 (50.9%)
EEG	12 (11.1%)
Normal EEG	12 (11.1%)

Brain imaging results are shown in Table 4.

Table 4: Results of brain imaging in 108 isolated vertigo patients

Imaging	n (%)
Abnormality in cranial CT unrelated to acute vertigo (atrophy, leukoencepha-lopathy, old infarct, etc.)	47 (43.5%)
Normal cranial CT	34 (31.5%)
Cranial MR angiography (MRA)	33 (30.6%)
Normal MRA	20 (18.5%)
Abnormality in MRA (artery stenosis, hypoplasia, kinking, elongation, etc.)	13 (12.0%)
Cranial MRI	108 (100.0%)
Cause of vertigo identified in MRI	13 (12.0%)
Cause of vertigo not identified in MRI	95 (88.0%)

After MRI examination, the patients were divided into 2 groups:

Group 1: the causes of vertigo identified on MRI (central origin); 13 patients (12%).

Group 2: the causes of vertigo remained unknown after MRI; 95 patients (88%).

MRI revealed fresh infarcts in Group 1. The lesion areas were pons, cerebellum, medulla oblongata, temporo-occipital lobe, parietal lobe, thalamus, corpus callosum, both periventricular areas, and frontal lobe.

There was no peripheral origin of vertigo detected by MRI in this cohort (such as extra-axial lesions in the ponto-cerebellar angle, vestibular nerve tumors, etc.)

4.1 Patients in group 1

Clinical characteristics and MR imaging results in group 1 are presented in Table 5.

Table 5: Clinical characteristics and MR results in patients with fresh lesions on MR imaging

Patient	Age/gender	Clinical symptoms and signs	Cranial MRI results
1	57/w	Vertigo, vomiting	Fresh pons infarct, atrophy
2	62/w	Vertigo, visual blurring, headache	Fresh pons infarct, atrophy, leukoencephalopathy
3	76/w	Vertigo, headache, paraesthesia	Fresh infarct left temporo-occipital lobe, atrophy
4	83/w	Vertigo, visual blurring, ataxia, vomiting	Fresh infarct left parietal lobe, old cerebellar infarct, atrophy, leukoencephalopathy
5	61/w	Vertigo, ataxia, provoked nystagmus, paraesthesia	Fresh infarct splenium corpus callosi, atrophy
6	84/w	Vertigo; ataxia, nausea, vomiting	Fresh infarct left frontal lobe, atrophy, leukoencephalopathy
7	51/m	Vertigo, visual blurring,	Fresh infarcts both periventricular regions, atrophy, leukoencephalopathy, multiple old lacunar infarcts
8	67/w	Vertigo, paraesthesia	Fresh right thalamus infarct, old left capsula interna infarct
9	91/m	Vertigo, ataxia, vomiting, headache	Fresh infarct right cerebellum, old infarct, atrophy
10	80/w	Vertigo, vomiting, nausea, provoked nystagmus	Fresh infarct left pons, old infarct left cerebellum, atrophy, leukoencephalopathy
11	52/m	Vertigo, nausea, paraesthesia	Fresh infarct right medulla, old infarct
12	71/m	Vertigo, paraesthesia	Fresh infarct right pons, leukoencephalopathy, atrophy
13	45/w	Vertigo, headache	Fresh infarct right cerebellum

4.2 Comparison of clinical and laboratory characteristics between group 1 and group 2

The comparison of baseline characteristics of group 1 and group 2 is shown in Table 6.

Table 6: Comparison of baseline characteristics between the patients with explanatory MRI results (group 1) and those patients without conclusive MRI results (group 2)

Variable	Group 1 (n=13)	Group 2 (n=95)	p
Female	6 (46%)	61 (64%)	0.170(&)
Age	67.69±14.45	59.95±14.46	0.073(#)
Elevated glucose level on admission	0 (0%)	17 (18%)	0.093(&)
Abnormality in blood fat test (including cholesterol, triglycids, HDL, LDL)	11 (85%)	54 (57%)	0.055(*)
Hypertension	6 (46%)	40 (42%)	0.782 (*)
Nocerebrovascular risk factors	1 (8%)	21 (22%)	0.206(&)
Migraine history	0 (0%)	4 (4%)	0.594(&)
Psychiatric complaint or known psychiatric disease	1 (8%)	20 (21%)	0.231(&)

: independent sample test

* Pearson Chi-square test,

& Fisher's Exact Test

The baseline characteristics did not differ significantly between group 1 and group 2

The comparison of the clinical description of vertigo and concurrent symptoms of group 1 and group 2 are shown in Table 7.

Table 7: Comparison of the clinical description of vertigo and concurrent symptoms between the patients with explanatory MRI results (group 1) and those patients without conclusive MRI results (group 2)

Variable	Group 1 (n=13)	Group 2 (n=95)	p
Duration of vertigo (<1 minute)	0 (0%)	10 (11%)	0.261(&)
Duration of vertigo (1 minute - 1 hour)	1 (8%)	15 (16%)	0.390(&)
Duration of vertigo (1 hour - 1 day)	4 (31%)	21 (22%)	0.350(&)
Duration of vertigo (>1 day)	1 (8%)	15 (16%)	0.390(&)
Linear vertigo	8 (62%)	43 (45%)	0.270(*)
Rotatory vertigo	3 (23%)	33 (35%)	0.309(&)
Linear and rotatory vertigo	0 (0%)	3 (3%)	0.678(&)
Unspecific vertigo	0 (0%)	2 (2%)	0.773(&)
Postural influence on vertigo	2 (15%)	38 (40%)	0.074(&)
Concurrent ocular symptoms	3 (23%)	10 (11%)	0.190(&)
Concurrent ear symptoms	0 (0%)	15 (16%)	0.126(&)
Nausea or vomiting	5 (38%)	44 (46%)	0.594(*)
Unspecific neurological symptoms by history (slight paraesthesia, clumsiness, speech disturbance)	5 (38%)	13 (14%)	0.040(&)
Headache during vertiginous attack	4 (31%)	16 (17%)	0.197(&)
Postural imbalance during vertiginous attack	3 (23%)	39 (41%)	0.212(*)
Ataxia in clinical examination	5 (38%)	27 (28%)	0.328(&)
Unspecific provoked nystagmus	2 (15%)	16 (17%)	0.628(*)

: independent sample test

* Chi-square test

& Fisher's Exact Test

The comparison of paraclinical information of group 1 and group 2 is shown in Table 8.

Table 8: Comparison of paraclinical information between the patients with explanatory MRI results (group 1) and those patients without conclusive MRI results (group 2)

Variable	Group 1 (n=13)	Group 2 (n=95)	p
EKG or Holter EKG	12 (92%)	83 (87%)	
Abnormality in EKG or Holter EKG	3 (25%)	21 (25%)	0.645(&)
Extra- and transcranial duplex performed	7 (54%)	68 (72%)	
Abnormality in extra- or transcranial duplex	3 (43%)	17 (25%)	0.273(&)

: independent sample test

* Chi-square test

& Fisher's Exact Test

The comparison of brain imaging results of group 1 and group 2 is shown in Table 9.

Table 9: Comparison of brain imaging results between the patients with explanatory MRI results (group 1) and those patients without conclusive MRI results (group 2)

Variable	Group 1 (n=13)	Group 2 (n=95)	p
Abnormality in cranial CT unrelated to acute vertigo	10 (77%)	37 (39%)	0.01(*)
Abnormality in MR angiography	2 (15%)	11 (12%)	0.485(&)

: independent sample test

* Chi-square test

& Fisher's Exact Test

4.3 Type of vertigo in group 1 and group 2.

In G1 (n=13), 8 patients (62%) suffered from linear vertigo, 3 patients (23%) suffered from rotatory vertigo, and in 2 patients (15%) vertigo type was not mentioned in the medical record. In G2, 43 patients (45%) suffered from linear vertigo, 33 patients (35%) suffered from rotary vertigo, 3 patients (3%) suffered from linear and rotary vertigo, 2 patients (2%) suffered from unspecific vertigo, and in 14 patients (15%) vertigo type was not mentioned in the medical record.

Figure 1. The type of vertigo in G1 and G2

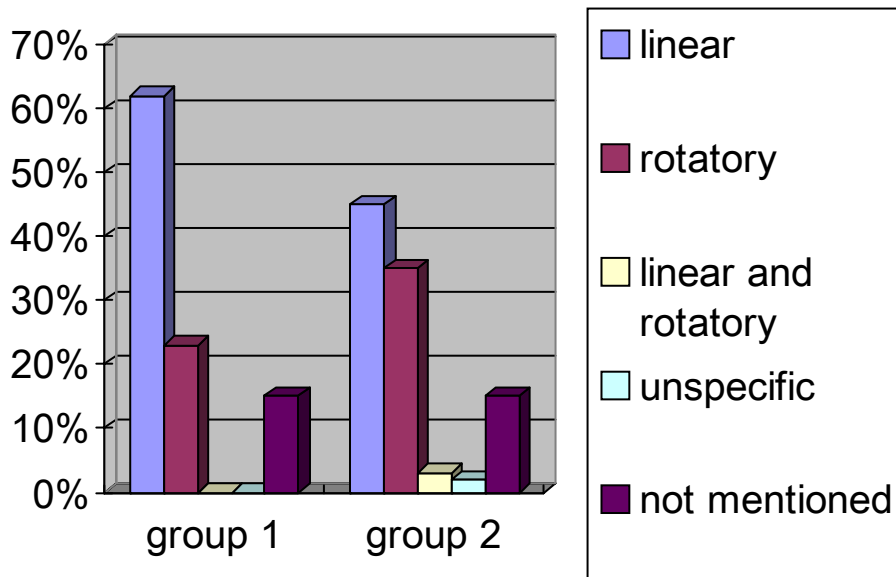
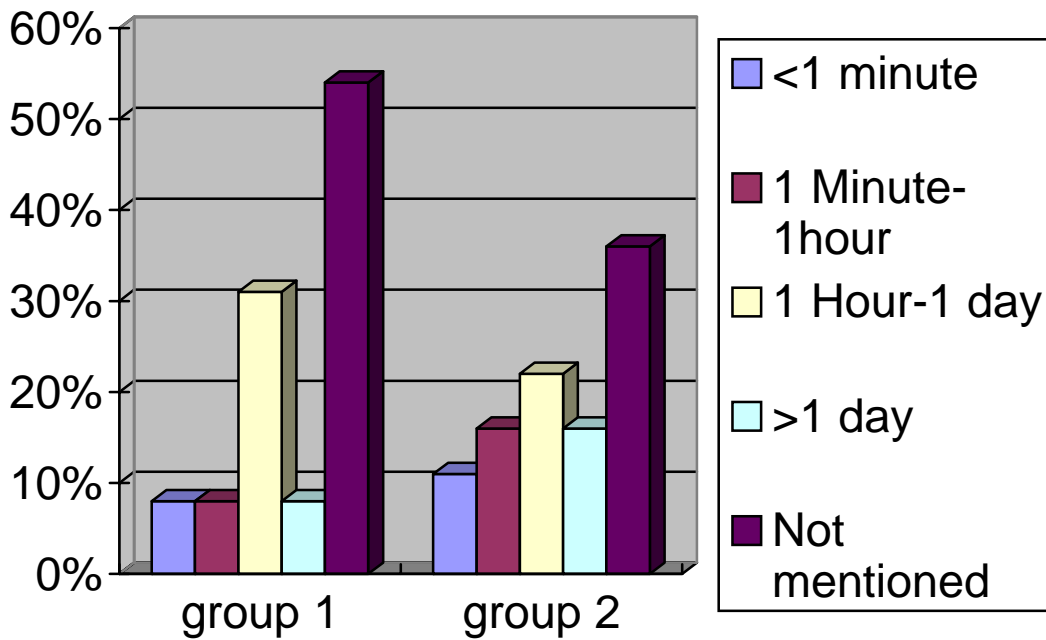


Figure 2. The duration of vertigo attacks in patients of G1 and G2



In G1, 2 patients (15%) had intense vertigo; in the others the intensity of vertigo was not recorded. In G2, of the 34 patients (36%) whose intensity of vertigo was recorded, only 2 (2%) had slight vertigo, the other 32 patients (34%) suffered from intense vertigo subjectively.

In G1, 2 patients (15%) complained the intensity of vertigo changed with the movement of head or body, in 11 patients (85%) this was not mentioned in the medical record. In G2, 38 patients (40%) complained about the intensity of vertigo changing with movements of head or body, 6 patients (6%) registered no change, and in 51 patients (54%) it was not mentioned in the medical record.

4.4 More details about selected variables in group 1 and group 2

4.4.1 ENT consultation

In G1, none of the patients had ENT consultation. In G2, a total of 36 patients (38%) underwent an ENT consultation. Of these, 15 patients (16%) had ear symptoms, and 11 of those (12%) had an ENT consultation. None of them could be diagnosed as peripheral vertigo in caloric testing, nor was an ear problem identified in any of the patients.

4.4.2 Eye and ear symptoms

In G1, 3 patients (23%) experienced unspecific visual blurring. In G2, 10 patients (11%) had similar visual symptoms, 2 (2%) reported flashing, 4 (4%) had visual blurring, and 4 (4%) had diplopia. In G1, none had ear symptoms. In G2, 15 patients (16%) had ear symptoms: 5 (5%) had tinnitus, 6 (6%) had hypoakusis, 2 (2%) had tinnitus and hypoakusis, 2 (2%) had ear fullness.

4.4.3. Psychiatric symptoms and others symptoms

In G1, only 1 patient (8%) had phobic disease. In G2, 20 patients (21%) suffered some form of psychopathological complaint or had psychological disease. 7 patients (7%) had depression, 8 patients (8%) complained of panic

during vertiginous attacks or had phobic disease, 1 (1%) had depression and phobic disease, and 4 patients (4%) complained of other psychiatric problems (stress, psychiatric heart problem, schizoaffective psychosis). In G2, other unspecific symptoms included sweating, compressed feeling in the head, pain in the neck, lumbar pain, thoracic pain, and light dyspnea.

4.4.4 Headache and migraine

In G1, 4 patients (31%) had headache during vertiginous attacks, none had a migraine history in the medical record. In G2, a total of 19 patients (20%) had headache during vertiginous attacks or a migraine history: Of these, 15 patients (16%) had headache only during the vertiginous attack, 1 patient (1%) had headache during vertiginous attack and a migraine history, and further 3 patients (3%) had no headache during vertiginous attack but a migraine history.

4.4.5 Cerebrovascular risk factors

In G1, only 1 patient (8%) had no cerebrovascular risk factors such as hypercholesterolemia, hypertension, hyperglycemia, hyperlipidemia, hypercoagulable state, or smoking. In G2, 21 patients (22%) had no cerebrovascular risk factors.

4.4.6 Cranial MRA

In G1, only 3 patients (23%) had MRA examination. 2 of them (15%) with abnormal results: one had a missing right ACA, and one had plaques in both ICAs. In G2, 30 patients (32%) had MRA examination. Of them, 11 patients (12%) had abnormal results such as artery stenosis, hypoplasia, kinking, or elongation. A total of 3 patients (3%) had abnormalities in vertebrobasilar system: 1 of them had vertebral artery stenosis, another one had vertebral artery elongation, and one had hypoplasia of a vertebral artery.