Epidemiology of Vertigo on Hospital Emergency

Epidemiologia da Vertigem na Urgência Hospitalar

Luís Roque REIS✉[1,2], Rita LAMEIRAS[1], Pedro CAVILHAS[1], Pedro ESCADA[1,2]
Acta Med Port 2016 May;29(5):326-331 ▪ http://dx.doi.org/10.20344/amp.6571

ABSTRACT

Introduction: Vertigo is one of the most frequent motives in seeking specialized medical care in an emergency. The aim of this study was to evaluate the relevance of balance disorders in the Otorhinolaryngology urgency, the epidemiological characteristics and the possible seasonality. It was used a sample of patients who were assisted in a health care emergency department of this specialty, of a universitary hospital and during a period of four years.

Material and Methods: The project was conceived as a descriptive epidemiological study of population type, retrospective, during the period from 2010 to 2013. A total population of 40,173 attendances of patients during this period used the emergency eepartment of Otolaryngology. The parameters studied included age, gender, annual number of cases (total and percentage), date of crisis of vertigo, seasonal distribution by seasons and annual proportion of hospitalized cases.

Results: A total of 4,347 patients (10.8%) sought medical attention due to dizziness/balance disorders over the four years of the study. There has been an annual increase in the number of cases between 7.6% (in 2010) and 17% (in 2013). Women were more often affected (68.3%) and crises occurred more often in individuals between 60 and 79 years of age (40%). The cases were distributed heterogeneous between the seasons, having more episodes of dizziness in summer and autumn and with an increasing trend between 2010 and 2013. The number of hospitalizations has increased annually over this period.

Discussion: The epidemiology of vertigo and vestibular disorders is still a specific field to study, because it may be useful for clinical decision-making and health care planning.

Conclusion: The study revealed that cases of vertigo in urgency increased annually and are more frequent in women, in elderly population and in Summer and Autumn.

Keywords: Emergency Service, Hospital; Portugal; Vertigo/epidemiology.

RESUMO

Introdução: A vertigem é um dos motivos mais frequentes na procura de atendimento médico especializado na urgência. O objetivo deste estudo foi avaliar o peso real que as alterações do equilíbrio têm na urgência de Otorrinolaringologia, as suas características epidemiológicas e uma eventual sazonalidade por estações do ano. Usou-se uma amostra de doentes que utilizou o serviço de urgência desta especialidade de um hospital central universitário de Lisboa durante um período de quatro anos.

Material e Métodos: O projeto foi concebido como um estudo epidemiológico descritivo de tipo populacional, retrospectivo, no período de 2010 a 2013. Incluiu uma população total de 40 173 atendimentos de doentes que nesse período utilizou o serviço de urgência de Otorrinolaringologia. As variáveis estudadas incluíram a idade, género, número anual de casos (total e percentual), data da crise de vertigem, distribuição sazonal por estações do ano e proporção anual de casos internados.

Resultados: Um total de 4 347 doentes (10,8%) procurou atendimento médico devido a vertigem ou alterações do equilíbrio ao longo dos quatro anos do estudo. Verificou-se um aumento anual do número de casos entre 7,6% (em 2010) a 17% (em 2013). As mulheres foram mais frequentemente afetadas (68,3%) e as crises ocorreram mais frequentemente em indivíduos entre os 60 e 79 anos de idade (40%). Os casos distribuíram-se de forma heterogénea entre as estações do ano, havendo mais episódios de vertigem no verão e no outono e com uma tendência crescente entre 2010 e 2013. O número de internamentos aumentou anualmente nesse período.

Discussão: A epidemiologia da vertigem e dos distúrbios vestibulares específicos é ainda um campo a estudar, pois pode ter utilidade para a tomada de decisões clínicas e para o planeamento dos cuidados de saúde.

Conclusão: O estudo revelou que os casos de vertigem na urgência aumentaram anualmente e são mais frequentes no sexo feminino, na população idosa e no verão e outono.

Palavras-chave: Portugal; Serviço de Urgência Hospitalar; Vertigem/epidemiologia.

INTRODUCTION

Vertigo is a subjective symptom and hard to define, with different causes and ranging from mild to severe. Even though physicians and patients use 'vertigo' and 'dizziness/light-headedness' indiscriminately, differential diagnosis of both situations is crucial and vertigo, with a vestibular (peripheral or central) origin, should be distinguished from dizziness, with a non-vestibular origin. Vertigo has been defined by the Committee on Hearing and Equilibrium of the American Academy of Otolaryngology, Head and Neck as "a feeling of movement when nothing is happening as regards earth's gravity".[1]

Epidemiological data on vertigo and vestibular disorders clearly improve physician's evidence based decision-making. However, despite both (vertigo and dizziness) having been described as one of the ten major causes for referral to emergencies[2] and a frequent reason to attend ENT (Ear, Nose & Throat) Emergency Department, epidemiology of vertigo in general population is variable:

1. Serviço de Otorrinolaringologia. Hospital Egas Moniz. Centro Hospitalar de Lisboa Ocidental. Lisboa. Portugal.
2. Departamento de Otorrinolaringologia. Faculdade de Ciências Médicas. Lisboa. Portugal.
✉ Autor correspondente: Luís Reis. roque-reis@sapo.pt
Recebido: 03 de maio de 2015 - Aceite: 16 de dezembro de 2015 | Copyright © Ordem dos Médicos 2016

the two major studies on this subject, by Mendel *et al.*[3] and by Neuhauser *et al.*[4] found 4.8 and 10.5% prevalence rates of vertigo of vestibular origin, respectively. In addition, Hain[5] estimated that 15% of the population presented with balance disorder from any origin (vestibular and non-vestibular), suggesting that one to two thirds of all patients presenting with balance disorders is affected by a disorder of the inner ear. It has also been estimated that, in countries where healthcare services are less focused in Emergency care than in Portugal, patients attending healthcare services with vertigo attended emergency 0.4 ± 0.9 times for medical examination and were admitted for 2 ± 5.4 days over the previous three months due to vertigo.[6]

Our study mainly aimed to identify the role of balance disorders in the ENT Emergency Department. This is probably the first study on this subject ever published in Portugal and is a retrospective study describing the epidemiological aspects of vertigo in patients attending ENT Emergencies at *Hospital de Egas Moniz*. The study also aimed to determine whether vertigo had any seasonality, which was another original issue. The following variables were analysed: annual patient distribution adjusted to patient's age and gender, seasonal distribution, annual number of patients with vertigo (total and in percentage) and annual number of admitted patients. In addition, any statistically significant difference in annual distribution, in seasonal distribution as well as in the annual number of admissions was analysed.

MATERIAL AND METHODS

The clinical database of the ENT Emergency Department, available at the *Serviço de Sistemas e Tecnologias de Informação (SSTI)* of the *Centro Hospitalar de Lisboa Ocidental (CHLO), EPE* was analysed. Variability in diagnostic criteria was expected, as more than twenty physicians examined the patients and assigned encoded diagnoses. For this reason, all codes associated to a diagnosis of vertigo were selected (Table 1); the study aimed to assess the distribution of balance disorders and vertigo and not specifically of any certain pathology. "Vertigo" and "dizziness" symptoms were combined into the "dizziness and vertigo" variable, according to code 780.4.

Table 1 - Diagnosis and ICD codes assigned to patients selected for the study

Diagnosis	ICD code*
Vertigo of central origin	386.2
Epidemic vertigo	078.01
Peripheral vertigo NOS	386.10
Benign paroxysmal vertigo	386.11
Peripheral vertigo NEC	386.19
Vertigo	438.85
Dizziness and giddiness	780.4

* International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM)
NOS: not otherwise specified; NEC: not elsewhere classified.

All the patients who attended ENT Emergency Department at the CHLO from 1 January 2010 to 31 December 2013 (four years) were considered for the study. This open-access go-through Emergency Department provides healthcare services to a population of 439,944 (2011 Census) living in five parishes from the municipality of Lisbon (São Francisco Xavier, Santa Maria de Belém, Alcântara, Santo Condestável and Ajuda) and in the municipalities of Oeiras and Cascais. This is a western Portuguese coastal region with a predominantly Caucasian population and with universal-access to healthcare, although involving out-of-pocket costs.

A long timeframe was considered in order to improve statistical accuracy and allowing for epidemiological analysis over time. Patient distribution and total number of emergency attendances over that time period (Table 2) were analysed.

The following SSTI data were also collected: patient's name, gender, age, date of attendance in ENT Emergency Department (which was considered as the date of vertigo crisis) and number of patients admitted with this pathology. Data were organized and stratified into ten-year age groups, by gender and comparing summer-autumn *vs.* winter-spring.

Data were entered into an Excel® spreadsheet and Statistical Package for the Social Sciences® (SPSS) version 21.0 for Windows® was used for statistical analysis. Initially, assumptions for parametric statistical tests were analysed in order to guide the selection of the most adequate tests. The analyses and tests that were used in the study are shown in Table 3.

Our study was carried out according to DGS regulation 015/2013 (03/10/2013) regarding informed consent and specifically according to paragraph G) and R).

RESULTS

An increasing number of patients presenting with vertigo was found between 2010 and 2013, while at the same time a mild reduction was found in the overall number of emergency attendances. Therefore, the ratio between the annual number of patients with vertigo and annual emergency attendances reflected the increased percentage of patients in that period of time, from 7.6 to 17% (Table 4).

The distribution of the episodes of vertigo adjusted to patient's gender, age group and group of seasons of the year (winter and spring *versus* summer and autumn) is shown in Table 5. Statistically significant differences were found regarding vertigo episodes adjusted to gender (χ^2 [1] = 579.381; $p < 0.001$), age group (χ^2 [9] = 2,033.370; $p < 0.001$), season of the year (χ^2 [3] = 14.197; $p = 0.003$), group of seasons of the year (winter/spring and summer/autumn) (χ^2 [1] = 7.536; $p = 0.006$) and to the year of the study (χ^2 [3] = 180.235; $p < 0.001$). The results found showed that mostly women attend Emergency (68.3%), mostly patients aged 70 to 79 (20.8%) and specifically within the 60-79 age range (40%), patients presented with vertigo mainly in summer

Table 2 - Study's timeframe

Timeframe
Total time of the study (1 January 2010 to 31 December 2013 – 4 years)
Annual analysis (2010, 2011, 2012 and 2013)
Seasonal (season of the year, in each year 2010 to 2013)
summer: 21 June to 22 September
autumn: 23 September to 20 December
winter: 21 December to 20 March
spring: 21 March to 20 June

Table 3 - Statistical analysis and tests used

Analysis	Variable	Test
Homogeneity of distribution	Patient's gender, age group, season of the year, year	Adjustment chi-square
Association with the season of the year	Year	Association chi-square
Association with the year	No. admissions, % patients in total Emergency attendances, Total Emergency attendances, percentage of admissions in total number of patients	Pearson's correlation coefficient

Table 4 - Distribution of patients with vertigo (Nvert) and total number of Emergency attendances per year (Ntotal)

2010			2011			2012			2013		
Ntotal	Nvert	%	Ntotal	Nvert	%	Ntotal	Nvert	%	Ntotal	Nvert	%
11,256	860	7.6	11,285	974	8.6	9,127	1,064	11.7	8,505	1,449	17.0

and in autumn (52.1%) and an increasing trend has been found from 2010 (7.6%) to 2013 (17%).

The results of the association between seasonality and the year of the study are shown in Table 6. This association (χ^2 [9] = 19.780; p = 0.019) showed that, in 2010, patients with vertigo attended Emergency mainly in summer or in autumn, in 2013, patients attended mainly in summer (27.1% and 28%, respectively), while in 2011 and 2012 attended mainly in winter (26.1%) and in autumn (31%), respectively.

The results of the association between the year and total number of admissions, the percentage of patients in total number of emergency attendances, total number of emergency attendances and percentage of admissions in total number of patients are shown in Table 7. A statistically significant positive correlation was found between the year of the study and total number of admissions (r = 0.98; p = 0.019) or the percentage of patients in total number of emergency attendances (r = 0.95; p = 0.046). The results have shown a statistically significant increase in total number of admitted patients (37 patients) as well as in the percentage of patients in total number of emergency attendances between 2010 (seven patients) and 2013 (12 patients), even though no significant increase in the percentage of admissions was found when compared to the total number of patients.

DISCUSSION

Our study aimed to clarify vertigo epidemiology as a reason for attending ENT Emergency Department in Portugal. In total, 4,347 patients (10.8%) attended with vertigo/balance disorders over a 4-year time period. An annual increase in total number of patients attending ENT Emergency Department has been found (7.6 (2010) to 17% (in 2013). Female patients and patients aged 60 to 79 were predominantly found. Patients with vertigo mainly attended in summer and in autumn, with an increasing trend found between 2010 and 2013. An annual increase in the number of admitted patients has been found, even though this was not found when adjusted to the annual number of patients.

The results of the study do not allow for the identification of the incidence or prevalence of the disease in general population, only allowing for the identification of the percentage of patients with vertigo in total number of ENT Emergency attendances. However, a high and increasing number of patients is worth mentioning, corresponding to almost one fifth of the reasons for attending this emergency department. We may infer from the analysis of these results that vertigo has a high prevalence in Portuguese population, ageing population has a contribution to this conclusion and patients cannot get an adequate treatment with current liaison between primary healthcare and ENT Outpatient Clinic (the reason why patients directly attend Emergency).

Table 5 – Gender, age group, seasonal, group of seasons of the year (winter/spring; summer/autumn) and annual distribution

	N	%	χ^2	*p*
Gender			579.381	*< 0.001*
Male	1,380	31.7		
Female	2,967	68.3		
Age group			2,033.370	< 0.001
0 - 9	24	0.6		
10 - 19	130	3.0		
20 - 29	236	5.4		
30 - 39	431	9.9		
40 - 49	526	12.1		
50 - 59	610	14.0		
60 - 69	835	19.2		
70 - 79	905	20.8		
80 - 89	588	13.5		
90 or over	62	1.4		
Season of the year			14.197	0.003
spring	1,011	23.3		
summer	1,149	26.4		
autumn	1,147	26.4		
winter	1,040	23.9		
Group of seasons of the year			7.536	0.006
winter-spring	2,083	47.9		
summer-autumn	2,264	52.1		
Year			180.235	< 0.001
2010	860	19.8		
2011	974	22.4		
2012	1,064	24.5		
2013	1,449	33.3		

Table 6 - Annual and seasonal distribution

	2010		2011		2012		2013			
	N	%	N	%	N	%	N	%	χ^2	*p*
Season of the year									19.780	0.019
spring	199	23.1	237	24.3	230	21.6	345	23.8		
summer	233	27.1	247	25.4	264	24.8	405	28.0		
autumn	225	26.2	236	24.2	330	31.0	356	24.6		
winter	203	23.6	254	26.1	240	22.6	343	23.7		

According to Burt and Schappert[7] balance disorders have greatly increased over time among most frequent reasons for attending Emergencies, having an increasingly relevant impact in Emergencies in the USA,[8] even though reasons for this remain unclear: according to Kerber *et al.*[8] this may be due to ageing population but also to the fact that physicians in Primary healthcare increasingly refer patients with balance disorders to Emergency.

Table 7 - Association between the year and total number of admitted patients, percentage of patients in total emergency attendances, total emergency attendances and percentage of admitted patients in total number of patients presenting with vertigo

	Year
Admissions	0.98*
Percentage of patients in total emergency attendances	0.95*
Total emergency attendances	-0.93
Percentage of admitted patients in total number of patients presenting with vertigo	0.47

Results expressed in Pearson's correlation coefficient; * $p \leq 0.05$

Our study is in line with literature describing around twice the prevalence of vertigo in female *vs.* male patients.[8-10] The higher prevalence of vertigo in elderly patients found in our study is also in line with literature, showing the vascular and degenerative disruption of vestibular system, which is more likely in elderly people.[9]

Studies on disease seasonality and particularly regarding vertigo are quite rare: Mariani *et al.*[11] found an increased number of patients with crisis of benign positional paroxysmal vertigo in winter, particularly in January, as well as a progressive reduction in spring and in summer (lowest in August).

Physicians should be warned against the frequent underestimation of balance disorders as clinical manifestations of non-vestibular diseases such as stroke and epilepsy.[12,13] Some studies suggest that stroke may be responsible by 25% of sudden onset balance disorders with no other neurological signs or symptoms[14]. Other studies have described stroke as a less frequent cause – only in 3.2% of the patients.[15] ENT physicians working in Emergency are clearly on the front line of healthcare to patients with balance disorders and should be able to select patients with an indication for imaging in order to look for a central origin or patients with an indication for immediate referral to a neurologist.

Our study aimed to obtain epidemiological data on vertigo and balance disorders in patients attending ENT Emergency Department, without seeking for the identification of any specific cause. Further studies regarding the incidence and prevalence of specific vestibular disorders in emergency are needed, in order to reach a more rational approach to clinical decision and improve patient healthcare.

CONCLUSION

Vertigo showed specific epidemiological characteristics in the emergency setting. This was the first study on the analysis of vertigo characteristics in the Portuguese population and particularly regarding its seasonal distribution. From total number of ENT emergency attendances, 11% were due to vertigo or balance disorders, particularly in women, in elderly patients and showing a seasonal distribution with higher expression in summer and in autumn.

HUMAN AND ANIMAL PROTECTION

This study was analysed and approved by the Ethics and Healthcare Committee at the *Centro Hospitalar de Lisboa Ocidental* (CHLO). The authors declare that the followed procedures were according to the Helsinki Declaration of the World Medical Association.

DATA CONFIDENTIALITY

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

FINANCIAL SUPPORT

The authors declare that there was no financial support in writing this manuscript.

REFERENCES

1. Committee on Hearing and Equilibrium guidelines for the diagnosis and evaluation of therapy in Meniere's disease. American Academy of Otolaryngology-Head and Neck Foundation, Inc. Otolaryngol Head Neck Surg. 1995;113:181-5.
2. Moulin T, Sablot D, Vidry E, Belahsen F, Berger E, Lemounaud P, et al. Impact of emergency room neurologists on patient management and outcome. Eur Neurol. 2003;50:207-14.
3. Mendel B, Bergenius J, Langius-Eklof A. Dizziness: A common, troublesome symptom but often treatable. J Vestib Res. 2010;20:391-8.
4. Neuhauser HK, Radtke A, von Brevern M, Lezius F, Feldmann M, Lempert T. Burden of dizziness and vertigo in the community. Arch Intern Med. 2008;168:2118-24.
5. Hain TC. Dizziness-and-balance.com: Epidemiology of dizziness. [consultado 2015 jan 31]; Available from: http://dizziness-and-balance.com/disorders/dizzy_epi.html.
6. Benecke H, Agus S, Kuessner D, Goodall G, Strupp M. The Burden and Impact of Vertigo: Findings from the REVERT Patient Registry. Front Neurol. 2013;4:136.
7. Burt CW, Schappert SM. Ambulatory care visits to physician offices, hospital outpatient departments, and emergency departments: United States, 1999--2000. Vital Health Stat. 2004;157:1-70.
8. Kerber KA, Meurer WJ, West BT, Fendrick AM. Dizziness presentations in U.S. emergency departments, 1995-2004. Acad Emerg Med. 2008;15:744-50.
9. Garrigues HP, Andres C, Arbaizar A, Cerdan C, Meneu V, Oltra JA, Santonja J, Perez A. Epidemiological aspects of vertigo in the general population of the Autonomic Region of Valencia, Spain. Acta Otolaryngol. 2008;128:43-7.
10. Lai YT, Wang TC, Chuang LJ, Chen MH, Wang PC. Epidemiology of vertigo: a National Survey. Otolaryngol Head Neck Surg. 2011;145:110-6.
11. Mariani P, Pelagatti M, Hahn A, Alpini D. Epidemiology of paroxysmal positioning vertigo: correlation with seasons, climate, and pollution. Int Tinnitus J. 2008;14:168-74.
12. Ferro JM, Pinto AN, Falcao I, Rodrigues G, Ferreira J, Falcao F, Azevedo E, Canhao P, Melo TP, Rosas MJ, Oliveira V, Salgado AV. Diagnosis of stroke by the nonneurologist. A validation study. Stroke. 1998;29:1106-9.
13. Hopkins A, Menken M, DeFriese G. A record of patient encounters in neurological practice in the United Kingdom. J Neurol Neurosurg Psychiatry. 1989;52:436-8.

14. Norrving B, Magnusson M, Holtas S. Isolated acute vertigo in the elderly; vestibular or vascular disease? Acta Neurol Scand. 1995;91:43-8.
15. Kerber KA, Brown DL, Lisabeth LD, Smith MA, Morgenstern LB. Stroke among patients with dizziness, vertigo, and imbalance in the emergency department: a population-based study. Stroke. 2006;37:2484-7.
16. Neuhauser HK, von Brevern M, Radtke A, Lezius F, Feldmann M, Ziese T, et al. Epidemiology of vestibular vertigo: a neurotologic survey of the general population. Neurology. 2005;65:898-904.