

PREVALENCE AND ASSOCIATION OF BENIGN PAROXYSMAL POSITIONAL VERTIGO IN THE ELDERLY

Prevalência e associações da vertigem posicional paroxística benigna em idosos

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ABSTRACT

Purpose: to determine the prevalence of benign paroxysmal positional vertigo and identify their associations in an elderly population. **Methods:** a cross-sectional study in elderly patients evaluated by audiological evaluation, comorbidity questionnaire and Dix-Hallpike maneuver. Were applied nonparametric tests: Chi-square and multivariate regression with a confidence interval of 95%. **Results:** the final sample consisted of 494 individuals, with a median age of 69 (64.75 to 74.00) years. Observed prevalence of 23.9% of benign paroxysmal positional vertigo and 51.6% of neck pain and headache 37.9%. There was a statistically significant association between benign paroxysmal positional vertigo and neck pain, headache and gender in this population. **Conclusion:** it is concluded that this elderly population the prevalence of benign paroxysmal positional vertigo was 23.9% and the neck pain was 51.6% and there was a significant association between benign paroxysmal positional vertigo with neck pain and female gender.

KEYWORDS: Vertigo; Dizziness; Neck Pain; Range of Motion, Articular

■ INTRODUCTION

Dizziness is one of the most common complaints among elderly people and it constitutes a difficulty of great relevance, since it is related to the risk of falls, an important factor of morbidity and mortality among seniors. It is estimated that dizziness occurs frequently in the population above 65 years of age at a rate of 85%, and it is associated with many different causes. It may manifest as unbalance, vertigo and/or other types of dizziness¹.

The Benign Paroxysmal Positional Vertigo – BPPV is the most common cause of vertigo among adults, being reported in a rate of 20 to 30% in specialized health clinics. It affects mostly women, especially after the 60 years of age, when the occurrences get up to seven times greater, and with its peak level at 70 to 78 years. It's considered to be the most common cause of vertigo among the elderly, since 30% of the people reported to have suffered from it at least once in their lifetime²⁻⁴.

BPPV is clinically characterized by recurrent episodes of vertigo, which are usually intense, spinning, lasting for some seconds and typically brought about by specific cephalic movements⁵.

The diagnosis of BPPV includes careful attention to the history of vertigo associated to changes in the position of the head, confirmed by the Dix-Hallpike maneuver (DH)³.

Even though it's idiopathic in most cases, BPPV may occasionally be caused by traumatic brain injury, vertebrobasilar insufficiency, otologic postoperative period, endolymphatic drops, vestibular neuritis or middle ear disease⁵. Apparently, many factors make

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Conflict of interest: non-existent

the person susceptible to BPPV, including advanced age, cervical and head trauma, physical inactivity, cervical pain and other ear diseases or surgeries⁶.

One of the most common musculoskeletal dysfunction among the population is the cervical spine disorder, and cervicgia is one of the three most frequently reported complaints among adult population⁷. Estimates show that 26 to 71% of people may suffer cervical pain sometime in their lifetime⁸.

A limited range of motion (ROM), the sensation of increase in muscular tension, cephalalgia, cervico-brachial pain, vertigo and other signs and symptoms are common manifestations, and may be worsened by movements or by the persistence of the cervical spine posture⁹.

Functional and structural disorders of the cervical spine are frequent causes of consistent vertigo in patients with degenerative diseases in the cervical spine. The changes in the cervical proprioception may cause nystagmus accompanied by vertigo, cervicgia, otalgia, that worsen with the movements, muscular tension, that may and may not be accompanied by acute tinnitus and variances of hearing range¹⁰.

In addition to being considered as a primary cause of vertigo, cervical changes may also be secondary, when it's caused by another vestibular pathology. In this case, the patient tries to steady the head by the contraction of the cervical muscles, avoiding labyrinthine stimuli that provoke dizziness, which maintains the complaint of dizziness, this time by proprioceptive stimulus, even after the original vestibular disease had been solved.

The present study had as its purpose to verify the prevalence of BPPV, and to identify the most likely associations between BPPV with gender, age, hearing loss, cephalalgia, cervical pain and limited range of movements among the elderly.

■ METHODS

This cross-sectional study has been approved by the research ethics committee (0063/09), with elderly people of 60 years of age and older, of both genders, with independent life, that were classified in the levels 3 and 4 of the Functional Status proposed by Spirduso¹², that accepted voluntarily to take part in the study.

The sample was estimated to be of 385 participants, defined in a randomized and stratified manner, taking into account the five areas of a county, considering a sample error of 5%, and a statistical power of 80%.

The research was carried on by the use of the audiological anamnesis, based on KATZ protocol

for anamnesis¹³ and the pure tone audiometry, considered to be the golden standard to evaluate auditory threshold in adults, performed individually in a soundproof booth equipped with an Interacoustics audiometer, AD-28 model. Furthermore, a questionnaire was filled out containing self-reported answers, including questions about age, gender, vertigo complaints and the medical history with data about cervical pain complaints.

The classification that was used to determine the hearing loss was according to the degree, being considered without loss those with tone average up to 25 dB and with loss those with tone average above 26 dB¹⁴.

The diagnosis of BPPV of the posterior semicircular canal includes careful attention to the history of vertigo associated with changes in the position of the head, confirmed by the Dix-Halpike maneuver³. The operational procedure was carried out with anamnesis by trained evaluators, followed by the Dix-Halpike maneuver, being considered a case of BPPV every patient that presented one or two-sided nystagmus.

The cervical pain complaints were verified by means of a standardized questionnaire¹⁵, and the active movements of flexion, extension side flexion from neuter to the right and to the left, rotation in neuter to the right and to the left of the cervical spine were measured with a universal goniometer (Carci, Industry and Trade of Surgical and Orthopedic Equipment Ltd., Brazil), scaled on a two-by-two degrees measurement.

In order to measure the cervical ROM by means of goniometry the measuring system developed by KAPANDJI¹⁶ and MARQUES¹⁷ was taken into account. The acquired data was categorized in patients that presented restriction of cervical ROM and those that presented normal cervical ROM, according to age and gender, following the classification used by Youdas et al¹⁸.

The ages were categorized in four ranges: from 60 to 69, from 70 to 79, from 80 to 89 and above 90 years old.

The data were analyzed in descriptive and analytical forms. The numerical variants were observed as to the distribution of normality by means of the Shapiro-Wilk test. In the cases that the presupposed were met, these were presented in terms of average and standard deviation; otherwise, in terms of the median and its quartiles (1st-3rd). The categorical variants were presented in terms of absolute and relative frequency.

The prevalence was calculated through the number of individuals with BPPV divided by the total number of individuals in the sample, with its respective sample errors. The correlation between

the dependent variant (BPPV) with the independent variants (age, gender, hearing loss, dizziness, cervical pain, cephalalgia, and ROM of cervical flexion, extension, rotation to the right, rotation to the left, side flexion to the right, side flexion to the left) was made by the chi-square test (X^2) for tables of contingency 2X2 or rXc, according to the need.

For multivariate analysis, Poisson Regression was used, with robust adjustment of variance to identify the factors associated with the cases of BPPV, represented by figures of prevalence ratio (PR) and reliability (interval) of 95%. Only the variants with statistical significance (identified in the univariate analysis) were used in this model. The statistical significance was adopted in 5% ($P < 0,05$). The statistical programs utilized were the Statistical Package for the Social Sciences (SPSS 15.0) and the Stata SE 8.

■ RESULTS

The number of participants was of 494 individuals, 332 (67,2%) of them being female with an average

of 69 years of age (64,75 – 74,00). After dividing the samples by decades, it was observed that 53,2% (263) were between 60 and 69 years old, 38,7% (191) between 70 and 79 years old, 7,7% between 80 and 89 years old and 0,4% (2) above 90 years old. All the participants underwent audiometric examination, with prevalence of 42,1+-2,2% (208) of hearing loss.

Of all the evaluated patients, 52+-2,2% (257) patients presented dizziness complaints; of these, 76% (197) were female. The prevalence of BPPV was of 23,9% +-1,9% (118 individuals), of which 76,2% (90) were women. Furthermore, 34,7% (41) presented BPPV to the right, 36,4% (43), BPPV to the left and 28,9% (34) BPPV to both sides.

The prevalence of cephalalgia complaints in this population was of 37,9 +-2,2% (188). Furthermore, 51,6% +-2,2% (255 individuals) presented cervical pain complaints, of which 78,1% were female. The result of the cervical mobility of these elderly people is shown on Table 1 and Table 2.

Table 1 - Median and its 1st and 3rd quartiles of the result in degrees of goniometry in ADM's cervical sample

Age Group	Flex.	Ext.	Flex.Lat.L	Flex.Lat.R	Rot. L	Rot. R
60-69						
Man (73)	55(40-60)	47(40-50)	25(20-35)	25 (20-30)	50(47,5-55)	50(45-55)
Woman (184)	55(50-60)	50 (40-50)	30 (25-35)	30(20-33)	50(47,5-55)	50(41,5-55,)
70-79						
Man (70)	50(40-60)	50(42,25-50)	25(20-30)	25(20-30)	46.5(40-55)	50(40-50)
Woman(121)	55(45-60)	50(40-50)	30(20-30)	30(20-31)	50(40-55)	50(40-55)
80-89						
Man (17)	50(40-53,5)	45(37,5-50)	25(20-30)	20(12,5-20)	43(37,5-51)	50(40-50)
Woman(21)	55(41,5-60)	47(42,5-50)	29(20-32,5)	22(17,5-30)	50(32,5-55)	52.6(10.5)
90-97						
Man (1)	48	50	30	30	50	50
Woman (1)	30	30	20	20	35	35

Flex.: Flexion of cervical ; Ext.: Extension of cervical; Flex.Lat.L.: Lateral flexion to the left cervical; Flex.Lat.R: Lateral flexion to the right cervical; Rot.L.: Cervical rotation to the left; Rot.R.: Cervical rotation to the right.

Table 2 - Restriction of elderly ROM plans Frontal, Sagittal and Horizontal

Age Group	Rest. ROM Flex.	Rest. ROM Ext.	Rest. ROM Flex.Lat.L	Rest. ROM Flex.Lat.R	Rest. ROM Rot.L	Rest. ROM Rot.R
60-69						
Man (73)	8 (11%)	39 (53,4%)	32 (43,8%)	32 (43,8%)	20 (27,4%)	21 (28,8%)
Woman (184)	17 (9,2%)	166 (90,2%)	42 (22,8%)	59 (32,1%)	63 (34,2%)	115 (62,5%)
70-79						
Man (68)	6 (8,7%)	8 (11,6%)	11 (15,9%)	15 (21,7%)	9 (12,9%)	13 (18,8%)
Woman (118)	10 (8,3%)	33 (27,3%)	11 (9,1%)	19 (16,1%)	18 (15,7%)	36 (29,8%)
80-89						
Man (17)	1 (5,9%)	4 (23,5%)	6 (35,3%)	3 (17,6%)	4 (23,5%)	7 (41,2%)
Woman (21)	2 (9,5%)	4 (19%)	3 (14,3%)	5 (23,8%)	5 (23,8%)	7 (33,3%)
90-97						
Man (1)	0	0	0	0	0	0
Woman (1)	1	1	0	0	1	1
Total (483)	45 (9,3%)	255 (52,8%)	105 (21,7%)	133 (27,5%)	120 (24,8%)	200 (41,4%)

Rest. ROM Flex.: Restriction of cervical range of motion in flexion; Rest. ROM Ext: Restriction of cervical range of motion in extension; Rest. ROM Flex.Lat.L.: Restriction of cervical range of motion in lateral flexion to the left; Rest. ROM Flex.Lat. R: Restriction of cervical range of motion of flexion to the right; Rest. ROM Rot.L.: Restricted range of cervical range of motion of rotation to the left; Rest. ROM Rot.R.: Restriction of cervical range of motion in rotation to right.

In the univariate analysis, there were found associations between BPPV and the independent variants: cervical pain ($P=0,033$), gender ($P=0,016$) and dizziness complaints ($P<0,001$). For all other analyzed independent variants no associations were found (Table 3).

The independent variants that presented significant association with the dependent variant BPPV were included in the multivariate model (Table 4).

In the evaluation of the associations between variants, by means of the rate of prevalence, the dizziness complaint is significantly associated with the presence of BPPV, at a prevalence rate of 1,7 (1,196 – 2,416).

Table 3 – Associations between BPPV and the independent variables

Variáveis	χ^2	Valor de P
BPPV X Cervical pain	4,53	,033
BPPV X Gender	5,78	0.016
BPPV X dizziness	0,97	<0.001
BPPV X Hearing loss	13,83	0,32
BPPV X Age	2,79	0,34
BPPV X Headache	2,76	0,96
BPPV X Restriction of ROM		
Flexion	0,17	0,93
Extension	0,35	0,85
Rot. R	2,30	0,15
Rot. L	0,68	0,40
Flex. Lat. R	2,30	0,12
Flex. Lat. L.	0,14	0,70

Flexion: Flexion of cervical; Extension: Extension of cervical; Flex.Lat.R.: cervical lateral flexion to the left; Flex.Lat.R: lateral flexion to the right; Rot.L.: cervical rotation to the left, Rot.R.: cervical rotation to the right.

Chi-square test (χ^2).

Teste do quiquadrado (χ^2)

Table 4 - Results of Poisson regression showing the ratio of Prevalence Rates, with confidence intervals (CI) and P value for the main independent variables tested in the model for the geriatric population, in relation to the presence of BPPV

Characteristics	N	Prevalence of VPPB	RPaj	IC 95%	P
Gender					
Male	162	17,30 %	1,339	(0,907 – 1,978)	0,141
Female	332	27,10 %			
Cervical Pain					
YES	255	27,85%	1,168	(0,835 – 1,634)	0,363
NO	239	19,66%			
Dizziness					
YES	257	30,73%	1,7	(1,196 – 2,416)	0,003*
NO	237	16,45%			

N = number of subjects; aPR: adjusted prevalence ratio, CI = confidence interval, P = statistical significance,

■ DISCUSSION

In this study, the prevalence of dizziness was of 52%. These symptoms have high prevalence in the world population, being estimated at approximately 2% among young adults, 30% among the people at 65 years of age, and up to 50% among the elderly above 85 years old¹⁹. Dizziness becomes more prevalent in older people, either because the changes related to aging make this group more susceptible to these diseases, or because the cumulative probability of exposure to these diseases increases with time. An example of such pathology is the Benign Paroxysmal Positional Vertigo – BPPV, which may occur at any age, but is much more common among the elderly, as a result of the continuous deterioration of the maculae acusticae²⁰.

The prevalence of BPPV in this study was of 23,9%. BPPV is one of the most common causes of dizziness and its main symptom is the feeling of spinning dizziness caused by the change in the position of the head²¹. In the United States, between 17 and 42% of the patients with vertigo are diagnosed with BPPV and, although this disorder affects people throughout their lifetime, it has the tendency to affect people between 50 and 70 years old, having, therefore, attention called to it in terms of social security and health assistance^{2, 3}.

The actual incidence and prevalence of BPPV is difficult to estimate precisely. For example, a study in Japan estimated the incidence to be of 0,01%, while a study carried out in Minnesota estimated it to be of 0,06%, with an increase of 38% every decade of life. Nevertheless, it's likely that these initial epidemiological studies underestimate the actual situation, since they included only the patients that reported to their doctors their acute vestibular

problem, and excluded those that never reported it to their doctors².

A recent study in Germany registered the estimated prevalence and incidence of BPPV in the adult population as a whole. The researchers used a transversal research, representative of the adult population of Germany in general, done through phone interviewing, and found a prevalence of 2,4% of the total, with a prevalence of 3,2% in women and 1,6% in men. Among individuals 18 through 39 years old, the estimated prevalence was of 0,5%. From 40 to 59 years old the prevalence was of 1,7%, and for people above 60 years old the estimated prevalence was almost seven times greater when compared to the age group of 18 through 39⁴.

But the German study has its limitations, because any data gathering based on interviews may end in an incorrect classification, and that because BPPV diagnosis can be ultimately confirmed only when typical nystagmus is observed during positioning exams.

The prevalence and incidence of BPPV varies according to the population under study, and still many cases are underreported, since many cases go unnoticed and there still are professionals that don't feel capable enough to evaluate such pathological condition nor even treat it²².

Besides this, there was significant association between BPPV complaint and the female population. This finding is in agreement with the researched literature, which affirms that BPPV is one of the most frequent diseases of the vestibular system and prevalent among women, and with other studies that point out women as more susceptible than men to neurotological changes. This "sensibility" may be considered in part as a consequence of the natural hormonal variance common to women^{2-4, 23}.

In the present study, there was no significant association between the incidence of BPPV and the increase of age (in decades), which may be explained by the high prevalence of people from 60 to 69 years of age (53,2%).

In this study, it has been observed that the presence of BPPV cases may be predicted by the oscillating dizziness complaint. The occurrence of BPPV cases was greater 1,7 (1,196 – 2,416) among individuals that presented dizziness complaint.

There was no association between BPPV and hearing loss in this study, which is corroborated by the study of Moreno and Rego AAP²⁴, which demonstrates that posterior canal BPPV has no influence on the characteristics of hearing loss among elderly people.

Cephalalgia is one of the most common symptoms in the clinical practice. It causes considerable financial impact and overloads the emergency units. The year prevalence in the population is of 70 to 90%²⁵. In this study, the prevalence was of 37,9%. Migraine is the most common type of cephalalgia, and many times may be associated with vestibular symptoms. But, in this study there was no association between cephalalgia and BPPV²⁶.

The prevalence of cervical pain was of 51,6%. One of the most common musculoskeletal dysfunctions in the population is the cervical spine disorder; cervicalgia is one of the three most frequently reported complaints in the adult population²⁷. Estimates show that 26 to 71% of individuals may suffer cervical pain during their lifetime⁸.

In this study, cervical changes – pain and limitation of movements – were prevalent in the elderly population, patient with cervical pain complaints. Besides this, there was significant association between BPPV and cervical pain complaints.

Cervical pain, head instability and vestibular disorders may result in dysfunction of the strategies of head and neck control that, with time, may place excessive pressure on cervical muscles²⁸. The combined effect of cervical pain and dysfunction of the control strategies may sustain balance difficulties and, in part, explain the association between cervical pain and balance. Besides this, in one study cervical pain was one of the main predictors of dizziness related to anxiety and to the sensation of lack of body control²⁹.

There was no association between BPPV and the decrease in the range of cervical movement in all planes (frontal/sagittal/horizontal).

The cervical spine ROM decreases with age in a consistent way in practically all studies, and apparently there is no intrinsic influence capable of slowing down this progression^{8, 17, 30, 31}. The decrease of cervical ROM is multifactorial. It must

be taken into account the degenerative processes, being it either in the disks, the bones, and/or the ligaments, plus muscle shortening and lack of use. As one grows old, the structure of intervertebral disks degenerates, and so do the average content of fluid and the average height of the disk²⁹.

Some studies that evaluated cervical mobility demonstrated a greater decrease with age in the movements of flexion and extension, but the studies showed a greater decrease of movement in the horizontal plane (cervical rotation movement)³⁰. In the present study, the evaluated elderly people presented decrease in the range of movement in all planes of cervical spine movement, especially in extension and cervical rotation to the right.

The main scientific relevance of the present study is in estimates of prevalence of BPPV in a population of elderly people that are not in specialized clinics or in specific hospitals, by means of a golden-standard diagnosis criterion, which is the Dix-Hallpike Maneuver. The sample was representative, with appropriate study delimitation and qualified statistical analysis. Besides these, there is scant literature about the associations and risk factors for BPPV, like cervical pain.

It's considered that BPPV is a multifactorial disease, not being possible to determine in most cases a single cause, having intrinsic and/or extrinsic factors contributing to its pathogenesis. The results of this study present implications for clinical practices, since it's essential to have an adequate evaluation, both in the data gathering referring to the history of the patient, and in the physical examination, seeking to recognize the symptoms related to BPPV. Furthermore, they may contribute to a more efficient therapeutic approach in the treatment of these patients by means of programs that emphasize the improvement of cervical mobility (stretching and relaxation) and diminish the use of medications, reducing pain and restoring functional independence and balance.

This study also emphasizes the need to carry on studies that identify the risk factors for BPPV that may be modified by means of specific interventions, and other works, such as randomized clinical trials, that may evaluate the most efficient therapeutic approach for BPPV patients.

One of the limitations of this study refers to the means of measuring the prevalence of cervical pain complaints, done through a self-reported questionnaire, there being no type of clinical evaluation on the part of the evaluators.

■ CONCLUSION

It is concluded that, in this population of elderly people, the prevalence of BPPV was of 23,9% and of cervical pain was of 51,6%.

There was significant association between BPPV and cervical pain in this population and between BPPV and females. Besides this, dizziness complaint was shown to be a predictive factor for BPPV. Furthermore, there was no association between BPPV and age, nor between hearing loss and BPPV.

RESUMO

Objetivo: verificar a prevalência da vertigem posicional paroxística benigna e identificar suas prováveis associações em uma população de idosos. **Métodos:** estudo transversal realizado em idosos, submetidos à avaliação audiológica, questionário e à Manobra de Dix-Hallpike. Aplicaram-se os testes não paramétricos: Qui-quadrado e regressão multivariada com intervalo de confiança de 95%. **Resultados:** a amostra final foi de 494 indivíduos, com mediana de idade de 69(64,75- 74,00) anos. Observou-se a prevalência de 23,9% de vertigem posicional paroxística benigna e 51,6% de dor cervical e 37,9% de cefaléia. Houve associação estatisticamente significativa entre a vertigem posicional paroxística benigna e dor cervical, gênero e cefaléia nesta população. **Conclusão:** conclui-se que nesta população de idosos a prevalência da vertigem posicional paroxística benigna foi de 23,9% e da dor cervical foi de 51,6% e houve associação significativa entre a vertigem posicional paroxística benigna com a dor cervical e com o gênero feminino.

DESCRIPTORIOS:Vertigem; Tontura; Cervicalgia; Amplitude de Movimento Articular

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Received on: June 01, 2013

Accepted on: August 25, 2013

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