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Original articles

Relationship between physical activity, feelings of disability and quality of life in patients with peripheral vestibular dysfunction

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ABSTRACT

Purpose: to verify the association of self-reported feelings of disability and physical activity with the impact of vestibular symptoms on the quality of life of patients with vestibular dysfunction.

Methods: a retrospective, cross-sectional, analytical, documentary study approved by the Research Ethics Committee (evaluation report no. 4.462.519), with 50 selected medical records of patients diagnosed with peripheral vestibular dysfunction, including a survey of their medical history and results of the Dizziness Handicap Inventory (DHI).

Results: the sample's mean age was 55.38 years, and the majority were females (70%). The DHI revealed a moderate impact of dizziness. Physically active patients perceived less impact of the disease (p-value = 0.0167), while patients with feelings of disability, due to vestibular symptoms, had a greater damage of their quality of life (p-value = 0.0468).

Conclusion: physical activity was associated with less damage of dizziness to the quality of life; also, a greater impact on the quality of life was associated with feelings of disability related to vestibular complaints.

Keywords: Vestibular Diseases; Quality of Life; Dizziness; Vertigo; Postural Balance

INTRODUCTION

Imbalance, dizziness, and vertigo are symptoms that widely affect the world population. Complaints of dizziness correspond to 5% of the reasons that take people to see a doctor[1]. Vestibular impairments are more common in females and mostly affect the senile population[2].

Vestibulopathies can be classified as peripheral ones, which affect structures below the vestibular nerve (such as the labyrinth)[3] and occur more often in the population in relation to central vestibulopathies[4], which in turn affect the pathways of the central nervous system, above the vestibular nerve[3].

Vestibular symptoms can cause much damage to individuals, such as inability to work, phobias, social isolation, stress, lack of confidence to perform everyday activities that require balance, and even panic attacks[1].

These consequences of vestibular symptoms may lead the patient to feel negative and incapable, directly affecting their quality of life (QOL)[5]. These feelings can be significant to the point of triggering or aggravating psychiatric conditions that require medical intervention[6].

In contrast to feeling incapable, a study[7] has shown that physically active people tend to have fewer dizziness complaints. Regular physical activity improves the overall metabolism and stimulates proprioception and other systems related to body balance control, which also contribute to a greater sense of well-being.

Patient-reported outcome measures (PROM) are a reliable way to assess the interference of these different symptoms with the person's QOL. The Dizziness Handicap Inventory (DHI), a 25-question tool quite known in clinical practice, is administered in interviews to measure the patient's self-perception of the impact caused by dizziness on their QOL, analyzing physical, emotional, and functional aspects[8].

It is essential to learn the patient's clinical profile by surveying their medical history in detail to find information that will help confirm their clinical diagnosis, establish a prognosis, and refer to and outline early treatment, when necessary, thus preventing falls and other impairments.

Moreover, it is necessary to investigate feelings of disability, lack of confidence, and other negative ones caused by vestibular symptoms, as they may negatively impact these patients' QOL. Contrary to these, regular physical activity is suggested for its positive impact on their lives.

Hence, this study aimed at verifying, mainly, the association of self-reported feelings of disability and physical activity with the impact of vestibular symptoms on the QOL of patients presented with peripheral vestibular dysfunction.

METHODS

This retrospective, cross-sectional, analytical, documentary study was approved by the Research Ethics Committee of the Onofre Lopes University Hospital of the Federal University of Rio Grande do Norte (HUOL/UFRN), Brazil, under evaluation report no. 4.462.519. The sample was recruited by surveying and analyzing 120 medical records of patients attending the Balance Public Outreach Program of the Hearing and Balance Laboratory (LAEq, in Portuguese), at the Speech-Language-Hearing Teaching Clinic of the Federal University of Rio Grande do Norte (UFRN) between April 2017 and October 2019. The documentary analysis of these medical records took place in February and March 2021.

The study inclusion criteria were patients diagnosed with peripheral vestibular dysfunction referred by the originating institution's outpatient center for vestibular rehabilitation. To be selected for the study, the medical records needed to have complete speech-language-hearing history data, a signed personal data consent form, and a properly filled DHI. Medical records of patients medically diagnosed with central vestibular dysfunction were excluded from the analysis.

After selecting them based on these criteria, 50 medical records were included in this study. Medical history data were surveyed regarding age, sex, self-perception of social and/or professional disability, and patient-reported regular physical activity to analyze the relationship between these factors and DHI scores.

The physical, emotional, functional, and total DHI scores were analyzed. Responses were characterized as "yes" (scoring 4 points), "no" (scoring 0 points), or "sometimes" (scoring 2 points). The total DHI score ranges from 0 to 100 points – higher total scores indicate a greater impact on the patient's QOL[9]. DHI scores were classified based on a study that categorized dizziness/vertigo handicap as follows: 0 to 30 – mild impact; 31 to 60 – moderate impact; 61 to 100 points – severe impact[10].

The data were tabulated in Excel and then submitted to descriptive and inferential statistical analyses. Firstly, the descriptive analysis was made, presenting continuous variables in measures of position and dispersion and categorical variables in frequency and percentage.

The inferential analysis was based on exploratory analysis with Pearson's correlation to find the independent variables that most correlated with the dependent variable (DHI). Based on these variables, five possible linear regression models were established, using the Akaike information criterion (AIC) and Bayesian information criterion (BIC). Then ANCOVA was applied to explain the variability found in DHI. Given the high correlation between the total DHI score and age (which is a numerical variable), the independent variable was established as a covariable.

Inferential analysis results were obtained with R software. The significance level for the analyses was set at 5%.

RESULTS

The sample's mean age was 55.38 years, with a minimum of 18 and a maximum of 85 years. Females (70%) were more predominant than males (30%).

Altogether, 30 patients (60%) had self-reported feelings of disability due to vestibular symptoms, while 20 patients (40%) did not have that feeling. Also, 32 (64%) patients reported not being physically active, while 18 (36%) were regularly so.

Chart 1 below describes the measures of position and dispersion of the quantitative variables (age and physical, functional, emotional, and total DHI scores).

Chart 1. Characterization of the measures of position and dispersion (mean, standard deviation [SD], minimum, median, and maximum values) of quantitative variables (age and physical, functional, emotional, and total scores in the Dizziness Handicap Inventory

	Mean	SD	Minimum	Median	Maximum
Age	55.38	14.85	18	56	85
DHI	53.2	20.74	20	50	100
PH	16.24	6.07	6	17	28
FU	20.52	9.02	4	21	36
EM	16.44	10.06	0	12	36

Captions: SD – standard deviation; DHI - total score in the Dizziness Handicap Inventory; FI – physical aspect in the DHI; FU – functional aspect in the DHI; EM – emotional aspect in the DHI.

The inferential data analysis revealed that age (r = 0.38), physical activity (r = 0.29), and feelings of disability (r = 0.33) (independent variables) were more correlated with DHI (dependent variable). When controlled with the effect of age (covariable), both physical activity and feelings of disability explained the variability of mean DHI (R^2adj = 0.23), due to the difference between adjusted and unadjusted standard deviation (SD). Adjusted values have data related to age after the adjustment with the means model, without the influence of this covariable. SD was found to decrease – i.e., when not controlled by the effect of age, DHI had a smaller variation not explained by the two independent variables (physical activity and feeling of disability) (Chart 2).

Comparisons between individuals who answered "yes" or "no" to these variables (physical activity and feeling of disability) revealed a significant difference in mean values, also shown in Chart 2. These results demonstrate that physically active patients had lower mean DHI scores (45.3; ±8.7) than physically inactive ones (56.2; ±6.8), which suggests that physically active individuals had less impact from the disease on their QOL (p-value = 0.0167). Patients who felt incapable because of the disease had higher mean DHI scores (55.4; ±7.2) than those who did not report this feeling (46.1; ±8.3), which indicates that the feeling of disability had a greater impact on these patients' QOL (p-value = 0.0468).

Chart 2. Characterization of adjusted and unadjusted mean values according to the explanation of the independent variable in relation to the dependent one

	Unadjusted			Adjusted				
	N	Mean	SD	Mean	SD	Upper	Lower	p-value
Physically active	18	45.3	18.1	45.3	8.7	36.6	54.1	0.0167
Physically inactive	32	57.6	21.1	56.2	6.8	49.4	63.0	
Feels incapable	30	58.7	18.2	55.4	7.2	48.2	62.5	0.0468
Does not feel incapable	20	45.0	22.1	46.1	8.3	37.8	54.4	

Captions: N – number of patients in the independent variable group; SD – standard deviation of the adjusted or unadjusted mean; Upper – the upper limit of the mean in relation to the standard deviation; Lower – the lower limit of the mean in relation to the standard deviation; p-value – the significance of the statistical explanation, obtained with the ANCOVA test.

DISCUSSION

Peripheral vestibular dysfunction can trigger different symptoms with various degrees of impact on the QOL. Hence, it is essential to investigate the damage caused by such symptoms on the QOL, which can help diagnose and plan vestibular rehabilitation, when indicated.

The patients' mean age in the medical records analyzed in this study was 55.38 years. This value is close to the ones found in other studies[11,12], which show a predominance of adults. This may be explained by this age group's greater search for health services and the spontaneous nature of this demand.

There was a predominance of females, similar to that of other studies[13-18], which refer that hormonal and metabolic changes in this sex may contribute to the greater occurrence of vestibulopathies in them.

The analysis of total DHI score revealed means indicating a moderate impact of vestibular dysfunction on the patients' QOL[10], which was likewise found in other studies[19-21]. Regarding specific scores, the functional aspect was the most affected, followed by the emotional and then physical aspects. Previous studies[11,22] also demonstrated damage to the functional capacity due to chronic vestibular dysfunction. This aspect of DHI assesses damage to the performance of professional, social, leisure, and home activities – i.e., restricting the performance of and participation in everyday activities[10], which are essential to the adult population, predominant in this study.

The present study verified that physically active patients had less disadvantage in DHI than inactive ones, which was corroborated by Kamo et al. (2022)[23]. This finding demonstrates that being physically active influenced less impact of the vestibular dysfunction in these patients' QOL, which can be explained by how physical activity helps maintain functional capacities and improve vestibular symptoms[24-26].

Morimoto et al. (2019)[16] and Ferraz et al. (2019)[7] demonstrated the positive effects of physical activities on how patients with unilateral vestibular dysfunction related to their surroundings, helping compensate for vestibular asymmetry and diminish imbalance and related symptoms. Physical activity also increases caloric expenditure, contributing to weight loss, and decreasing risks related to metabolic diseases - which in turn are directly related to the triggering or worsening of vestibular symptoms.

Furthermore, physical activities delay organic function decrease inherent to aging, whereas sedentarism can make patients twice as likely to manifest vestibular symptoms[23,27].

Research[28] in patients with peripheral vestibulopathies pointed out a relationship between physical activities and improved QOL, measured with Bardin's analysis technique, in patients with vestibular dysfunction. Other benefits of regular physical activity have been observed, such as these patients' improved physical aptitude and organic and cognitive functions, which positively impact their QOL[25].

The correlation between feelings of disability associated with vestibular symptoms and the mean total DHI score may be related to the very symptoms that make them feel insecure, as they get extremely uncomfortable when triggered[29]. Another study[30] identified the negative impacts of feelings of disability on the QOL of patients with vestibular symptoms. It also mentioned emotional and psychic insecurity, with important social impact.

Other pieces of research[12,16,31] demonstrated a relationship between vestibular dysfunction associated with psychological disorders (e.g., anxiety and depression) and the predominance of patients affected

by both diseases. An explanation for such a relationship is the existing connection between vestibular nuclei and the parabrachial nucleus, which respectively control the vestibular function and manifestations of anxiety[16]. Another explanation is that patients restrict their social activities for fear of triggering vestibular symptoms, leading to isolation and depressive symptoms[12].

The results show the importance of asking patients with vestibular dysfunction about their life habits (including physical activities) and feelings of disability related to this complaint.

DHI has been widely used in clinical practice and scientific research as a reliable analysis instrument to assess participation restriction in patients with vestibular dysfunction[19]. However, symptoms of insecurity, anxiety, fear, sadness, and disability in some patients, beyond the relationship with vestibular complaints, may characterize signs of a psychic disease[16]. Considering that some vestibular diseases are directly related to psychiatric conditions[6], speech-language-hearing therapists must know PROM tools that screen patients at a greater risk in order to refer them to specialized professionals and provide them with greater benefits from multidisciplinary care.

The literature describes some tools – e.g., the Vertigo Symptom Scale (VVS)[32], Vertigo Handicap Questionnaire (VHQ)[33], Vestibular Disorders Activities of Daily Living Scale (VDADL)[34], Visual Analog Scale (VAS)[35], and State-Trait Anxiety Inventory (STAI)[36] - as PROM that identify symptoms of disability, insecurity, and anxiety present in these patients, surveying important information on the interference of these symptoms with the QOL. These instruments also enable directed intervention according to the documented complaints and specific referrals for each case[37].

Health professionals who assess and rehabilitate patients with vestibular symptoms must instruct them about physical and psychic health, involving regular physical activity associated with mental and psychic well-being[16].

Participating in physical activity groups can also positively influence the QOL of patients with vestibular dysfunction, as it not only improves sedentarism but also help minimize feelings of loneliness and associated feelings of depression[28].

Vestibular disease relapses are highly likely[38]; hence, patients with vestibular dysfunction must be followed up and monitored. Patients with dizziness should be managed by multiprofessional teams to identify and control possible comorbidities involved in vestibular diseases[1,16].

Future studies should administer questionnaires on QOL associated with clinical and functional body balance tests to investigate the specific benefits of being physically active. Studies should also characterize feelings of disability, insecurity, and anxiety to analyze the relationship between these feelings and vestibular symptoms.

CONCLUSION

This study showed an association between physical activity and self-reported feelings of disability and the impact of vestibular symptoms on the QOL of patients with vestibular hypofunction.

It also verified a greater damage to the QOL of individuals who reported feeling insecure due to vestibular symptoms, while those who were regularly physically active had less impact from these symptoms.

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