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Understanding the Experience of Age-Related Vestibular Loss in Older Individuals: A Qualitative Study

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Abstract

Background—Inner ear balance (or vestibular) function declines with age and is associated with decreased mobility and an increased risk of falls in older individuals. We sought to understand the lived experience of older adults with vestibular loss in order to improve care in this population.

Methods—Qualitative data were derived from semi-structured interviews of individuals aged 65 years or older presenting to the Balance and Falls Prevention Clinic from February 1, 2014 to March 30, 2015 for evaluation of age-related vestibular loss. Transcripts were analyzed using interpretive phenomenological analysis. We created a taxonomy of overarching superordinate themes based on the World Health Organization's International Classification of Functioning, Disability, and Health (ICF) Framework, and classified key dimensions within each of these themes.

Results—Sixteen interviews were conducted with individuals (mean age 76.0 years, 75 % female) with age-related vestibular loss. The three superordinate themes and associated key dimensions were (1) body impairment (including depression, fatigue, fear/anxiety, and problems with concentrating and memory); (2) activity limitation and participation restriction (isolation, needing to stop in the middle of activities, reduced participation relative to expectations, reduced ability to drive or travel, and problems with bending/looking up, standing, and walking); and (3) environmental influences (needing help with daily activities). All participants reported difficulty walking.

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Aisha Harun, Carol Li, John F. P. Bridges, and Yuri Agrawal have no conflicts of interest to report.

Compliance with Ethical Standards The hospital institutional review board approved this study (Baltimore, MD: study number CR00007456) and the study was performed in accordance with the ethical standards of the Declaration of Helsinki. Informed consent was obtained from all individuals who participated in the study.

Conclusions—Older adults report that vestibular loss impacts their body functioning and restricts their participation in activities. The specific key dimensions uncovered by this qualitative study can be used to evaluate care from the patient's perspective.

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1 Introduction

Numerous lines of evidence demonstrate that loss of inner ear balance (i.e., vestibular) function occurs with healthy aging [1–4]. Vestibular loss in healthy aging has been associated with adverse consequences in older individuals, including reduced gait speed [5–7], increased risk of falls [1, 5, 8, 9], and decreased overall quality of life [10]. Although half of older adults experience some degree of vestibular loss [11], how vestibular loss in healthy aging affects the lived experience of older individuals is not well understood.

Older adults may experience vestibular disease differently from younger individuals. For example, older patients with the common vestibular disorder of benign paroxysmal positional vertigo do not experience the classic symptoms of brief spells of rotatory vertigo, but instead typically report chronic disequilibrium [12]. Moreover, older individuals are less active than younger adults and are more likely retired from employment [13]. The more limited range of activity among older adults may contribute to a different experience of vestibular impairment.

In this study, we sought to gain a deeper understanding of the lived experience of vestibular loss in healthy aging as reported by older individuals presenting with dizziness to a Balance and Falls Prevention Clinic. We aim to provide insight into the salient features of the lived experience of older adults with vestibular loss.

2 Methods

We conducted a qualitative semi-structured interview study of older individuals presenting to the Balance and Falls Prevention Clinic (Baltimore, MD, USA) from February 1, 2014 to March 30, 2015 for evaluation of dizziness. The hospital institutional review board approved this study (Baltimore, MD: Study number CR00007456). The RATS qualitative research guidelines (Relevance of the study, Appropriateness of qualitative methods, Transparency of procedures, Soundness of interpretive approach) were used to guide the structure and analysis of this study [14].

2.1 Study Participants and Recruitment

Purposeful sampling was performed in order to elicit diverse responses from individuals. Individuals were eligible if they (1) were aged 65 or older, (2) presented for evaluation of dizziness or imbalance, (3) had evidence of vestibular dysfunction on laboratory testing, (4) did not have a specific vestibular diagnosis (e.g., Meniere's disease, benign paroxysmal positional vertigo, or intracranial tumor) given that this was a study of vestibular loss in healthy aging, and (5) were fluent in English. Eligible individuals were contacted in person immediately after their clinic visit or by phone to arrange for a follow-up meeting by the primary investigator or a member of the research team. All participants who were asked to

join the study agreed to participate. Informed consent was obtained from all patients prior to interviews.

2.2 Vestibular Testing

Vestibular testing consisted of standard laboratory procedures available in a balance clinic center. The vestibular system consists of semicircular canals that detect head rotation and otolith organs that detect linear head movements and the orientation of the head with respect to gravity. Semicircular canal function testing included caloric testing and horizontal head impulse testing. Caloric testing involved the delivery of cold and warm water or air to each ear and the measurement of the eye movement response for each ear [15]. The direction and velocity of the eye movements were recorded for each ear and compared. Per our laboratory standards, an abnormal caloric response was defined as a 20 % asymmetry in eye movement velocity between each ear [15]. Assessment of semicircular canal function was also performed with video or clinical head impulse testing [15]. The patient was asked to fix their gaze on a target (typically the examiner's nose), and the examiner delivered brief, horizontal head impulses. The test was considered abnormal if the patient made corrective rapid eye movements ('refixation saccades') to maintain gaze stabilization. Otolith function was measured with the sound-evoked cervical vestibular evoked myogenic potential (cVEMP) [16, 17], whereby a sweep of auditory tone bursts was delivered and inhibitory potentials were recorded from the ipsilateral sternocleidomastoid muscle. Absent cVEMP responses in either ear were considered abnormal.

2.3 Interviews

Semi-structured face-to-face interviews lasting 15–25 min were conducted by a trained member of the research team. An interview guide was used consisting of four questions.

1. Can you describe your experiences with dizziness and/or balance problems?
2. Can you describe your feelings of dizziness and associated symptoms?
3. Do you have any physical limitations?
4. Do you have any practical or lifestyle restrictions?

In order to increase the reliability of the participant reports, we sought to confirm the reports with family or friends who may have sat in on the interviews. The interviews were audio tape-recorded and de-identified in order to preserve anonymity and ensure patient confidentiality. The audiotapes were then transcribed by an online transcription service. Interviews were conducted until data saturation was reached, which was defined as the point at which no new themes emerged after three consecutive interviews [18]. Data saturation was reached after 16 interviews.

2.4 Data Analysis

Data analysis was carried out using ATLAS.ti 7.5 qualitative data analysis software (Berlin, Germany) per published guidelines [19]. Key ideas were identified and coded using interpretative phenomenological analysis (IPA), a well established qualitative research methodology used to create a thematic narrative from a series of interviews [20– 22]. Two

individuals independently analyzed the interview transcripts (AH, YA). After the first nine interviews, the researchers met to discuss the interview codes. A consensus was reached on the coding scheme, and a codebook was created. Subsequent interviews were conducted, and the codebook was then used to analyze each subsequent interview until data saturation was reached. The codes derived from IPA were then further classified using three superordinate themes based on the International Classification of Functioning, Disability, and Health (ICF) Framework. The ICF is an internationally recognized framework that has standardized the measurement of the impact of a health condition on specific domains of functioning and disability [23]. Specific ICF categories from the Vertigo Comprehensive Core Set were selected to classify the codes derived from IPA, as these categories were carefully selected to describe disability and functioning for individuals with dizziness or balance impairment [24]. The three superordinate themes were body function impairment, activity limitation and participation restriction, and environmental influences. For each of the superordinate themes, key dimensions were identified that represented the major elements of the themes, as described by the study participants. Key dimensions were drawn from among the most frequently reported codes, and some similarly themed codes were collapsed into a single key dimension. A full list of codes and their frequencies are provided in Appendix 1 (see electronic supplementary material). Representative quotes were extracted to illustrate each theme and dimension [20–22].

3 Results

3.1 Population Characteristics

A total of 16 participants were included in this interview study. The characteristics of the study population are shown in Table 1. The mean age was 76.0 years (SD 8.5, range 65–94). Twelve out of 16 participants (75.0 %) were female. Eleven participants (68.8 %) had both semicircular canal and otolith dysfunction. Two participants (12.5 %) had otolith dysfunction only, and three individuals (18.8 %) had semicircular canal dysfunction only.

We created our taxonomy starting with the three superordinate themes from the ICF Framework [23]: body function impairment, activity limitation and participation restriction, and environmental influences. Key dimensions were then defined for each of these themes. The themes and dimensions are presented in Fig. 1. The participants reported interaction of these themes (e.g., body function impairment restricted their activities and participation), as depicted in Fig. 1. Representative quotations for each dimension are presented in Table 2.

3.2 Body Function

Participants reported impairment of their body function (Table 2). The physical manifestations of vestibular impairment included depression, fatigue, fear and anxiety, and problems with concentration and memory. Fatigue was prominent among the participants, as they reported that their disease “drains [them] of energy” and made them “feel tired.” Fear was often associated with the unpredictability of their symptoms. Participant 9 stated, “It is frightening in a way, because sometimes you don't know when it is going to happen.” Participant 10 reported, “I just want to feel safe. Right now, I do not feel safe.” Fear and anxiety of being embarrassed was also expressed in the interviews. Respondents stated that

they feel “embarrassed about stumbling a little or being slow” or “embarrassed if [they] cannot walk.” Many respondents voiced concerns about falls. Participant 6 reported that he was “afraid that [he] would stumble and fall.” Participant 3 reported depression because of the impact of their disease: “It has changed my life and it is making me very depressed because I cannot do anything.” Vestibular impairment also had an effect on concentration and memory in a majority of participants. Interviewees stated that they needed to “concentrate more” when doing tasks or that they were “not really able to concentrate as much.” Participant 5 stated, “Only when I’m dizzy, I can’t remember anything.”

3.3 Activity Limitation and Participation Restriction

Participants reported that their vestibular impairment restricted their daily activities and participation (Table 2). For several individuals, their disease was so debilitating that they needed to stop in the middle of their activities. Others reported problems walking, bending/looking up, and standing. All 16 respondents felt that their disease restricted their ability to walk. Common statements were that they “can’t really walk.” Similarly, the capacity to bend over or to look up was affected in a majority of participants. Participant 7 reported that she gets “too dizzy while bending down,” while Participant 1 stated that he can “no longer look up during baseball.”

The interviewees felt that their vestibular impairment restricted their participation in social activities (Table 2). For half the interviewees, this restriction resulted in feelings of social isolation. Participant 9 stated, “I feel like I am a hermit now. I stay in the house, which I never did before.” Others reported not being able to see family or friends as much as they would like, often having to turn down invitations to social gatherings because of their dizziness. A majority of respondents expressed that their social participation was reduced relative to their expectations for themselves, stating “this is not really normal for even my age” or that “there is a lot of things that I love to do, and I cannot do.” Almost all interviewees reported that participation restriction stemmed from a reduced ability to drive or travel. Referring to relatives living in a neighboring state, Participant 13 said, “I’ve got relatives that I cannot go and see, because I cannot drive.”

3.4 Environmental Influences

Participants reported environmental influences that have changed their day-to-day lives. Many participants stated that they needed help with daily activities, resulting in a loss of independence. Participant 9 stated “I used to shop and do everything for myself ... Now [my daughter] does everything for me.”

4 Discussion

In our interview study of older individuals with vestibular loss, we gained an in-depth understanding of the patient-reported experience of this condition. Several large population-based studies have previously observed an association between vestibular loss and poorer health-related quality of life using standardized quality-of-life questionnaires [25, 26]. A few prior studies have taken a qualitative approach, specifically in patients with traumatic brain injury with resulting vestibular loss, a group of patients undergoing vestibular rehabilitation,

and in individuals with Meniere's disease [27–29]. In addition, Yardley has well documented the lived experience of a wide range of individuals suffering from dizziness and vertigo [30]. Our study adds to this literature by taking a qualitative approach focused on an older population with vestibular loss associated with healthy aging, in whom the quality of life impacts of disease processes are known to differ from younger individuals. The specific issues raised by the participants in this study will help direct and determine the efficacy of care in this population.

We note several salient insights that emerged from this study. First, we found that difficulty walking was universally reported by the older participants in the study. The current literature on vestibular function and walking is relatively sparse, with small studies showing an association between vestibular loss and slower gait speeds and between vestibular loss and shorter step lengths [5, 6]. A more comprehensive understanding of the link between vestibular impairment and gait speed and variability in older individuals is warranted, given the universality of this symptom. Moreover, intervention studies for older adults with vestibular loss will need to consider the impact of the treatment on the ability to walk, given that this is a critical characteristic of vestibular impairment as reported by older patients.

Second, participants in the study conveyed the strong emotional burden that comes with living with vestibular loss. The majority of our interviewees reported living with constant fear and anxiety. They reported feeling unsafe and fearful of falling, which resulted in decreased participation in activities and travel and increased social isolation. The limitation of activities to the point of social withdrawal has not been typically reported in younger cohorts with vestibular disease, possibly due to more severe losses in older individuals or a reduced ability to compensate. Activity restriction has been previously documented in older adults with Meniere's disease [28]. Third, this study is among the first to find that older individuals with vestibular loss self-report difficulties with concentration and memory. A small but emerging literature is indeed suggesting a link between vestibular dysfunction and cognitive impairment [31–33], and this qualitative study corroborates such an association.

We note several limitations of this study. This was a cross-sectional investigation and as such cannot be used to make inferences about the causal association between vestibular loss and body structure and function, activity and participation restriction, and environmental influences. In addition, our sample was drawn from patients with vestibular loss seen at an academic referral center, and may not be representative of the population of older individuals with vestibular loss. Lastly, the information reported by the participants may have been limited by the reliability of the participant. However, whenever possible we sought to confirm the reports with family or friends who may have sat in on the interviews. The interviews may have also been biased towards the questions that the interviewer asked. We attempted to minimize this bias by utilizing an interview guide. Despite these limitations, this study endeavors to provide the perspective of the older patient with vestibular loss. These issues raised by patients will be metrics by which to evaluate the efficacy of interventions at improving the lived experience of this condition. These issues should be considered when evaluating clinical improvement of vestibular disease in individuals, in addition to simply assessing improvement or resolution of vestibular-related symptoms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Key Points for Decision Makers

The key impacts of vestibular dysfunction on day-to-day life include body impairment, activity limitation, and participation restriction.

This paper demonstrates the value of qualitative research in understanding the patient-reported experience of vestibular loss, which can be used to evaluate care from the patient's perspective.

Fig. 1. The three superordinate themes and associated key dimensions

Table 1**Study sample characteristics and vestibular testing results**

ID	Age	Gender	Vestibular testing results			Head impulse testing
			cVEMP	Caloric testing		
1	65	M	Absent on right	Right-sided hypofunction	NP	
2	78	F	Absent on left	Normal		Bilateral hypofunction (vHIT)
3	87	F	Absent bilaterally	Normal		Left-sided hypofunction (cHIT)
4	71	F	Absent on left	Left-sided hypofunction		Left-sided hypofunction (vHIT)
5	78	F	Absent bilaterally	Left-sided hypofunction		Right-sided hypofunction (vHIT)
6	70	M	Absent bilaterally	Left-sided hypofunction		Normal (cHIT)
7	71	F	Normal	Left-sided hypofunction		Normal (vHIT)
8	75	F	Absent bilaterally	Left-sided hypofunction		Right-sided hypofunction (vHIT)
9	87	F	NP	NP		Bilateral hypofunction (cHIT)
10	66	F	Absent on right	Normal		Normal (vHIT)
11	94	F	Absent bilaterally	Normal		Bilateral hypofunction (cHIT)
12	72	F	Absent on right	NP		Left-sided hypofunction (cHIT)
13	72	M	Absent bilaterally	Normal		Left-sided hypofunction (cHIT)
14	85	M	Absent on right	Normal		Bilateral hypofunction (cHIT)
15	67	F	Normal	Left-sided hypofunction		Normal (vHIT)
16	78	F	Absent bilaterally	Normal		Normal

cHIT clinical head impulse test, *cVEMP* cervical vestibular evoked myogenic potential, *F* female, *ID* Participant *ID*, *M* male, *NP* not performed, *vHIT* video head impulse test

Table 2
Representative quotations

Theme	Dimension	ICF category	Sample quotations
Body function	Depression	b152	<i>It's changed my life. It's making me very depressed because I can't do anything.</i> -Participant 3
	Fatigue	b455	<i>It drains me of energy I think because my body's trying to do something to get it back.</i> -Participant 15
	Fear and anxiety	b152	<i>I love to go out and preach, because I'm an evangelist. I can't do it, because I'm embarrassed and scared.</i> -Participant 5
	Problems with concentration	b140	<i>I can't concentrate at all, because I get a headache plus dizzy.</i> -Participant 16
	Problems with memory	b144	<i>When I'm dizzy, I can't remember anything. I'm trying to make a sentence and I forget.</i> -Participant 5
Activity limitation and participation restriction	Isolation	d740, d750, d760	<i>I don't go out as much as far as to social events, or anything like that. I do not do that anymore.</i> -Participant 10
	Need to stop in the middle of activities	d230	<i>Most of time, I just stop and find a place to either sit and lay back or lay down and wait.</i> -Participant 8
	Problems bending/looking up	d410	<i>If I bend down and pick something up and jerk myself up, it just starts it. It ignites it.</i> -Participant 15
	Problems standing	d410	<i>When I first stand up, I have to hold onto something. It's embarrassing.</i> -Participant 6
	Problems walking	d450	<i>One time when I had a really bad time, I wasn't comfortable going for a walk, which I tend to do.</i> -Participant 2
	Reduced participation relative to expectations	d920	<i>This is not really normal for even my age. My sister was 99 years old, and she was active. She went out; come back, she cooked, did everything. I'm just 78.</i> -Participant 5
Environmental influences	Reduced ability to drive or travel	d475, d920	<i>It makes it hard because I've got relatives down in Virginia that I can't go see, because I can't drive.</i> -Participant 13
	Need help with daily activities	e310, e315, e320, e340	<i>In many ways you lose your independence, because you have to rely on your caregiver to be my side all the time.</i> -Participant 11

ICF International Classification of Functioning, Disability, and Health Framework