Original Article

Ocular manifestations in sensorineural hearing loss: A cross sectional study

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Abstract

Hearing and vision are responsible for 95% of environmental cognition. The loss of both sight and hearing leaves a devastating impact on individual's communication abilities and self esteem. Currently, hearing and vision are assessed and treated in isolation using sense-specific measures. There is no unified classification system for dual sensory impairment. With this background, we conducted a study with objective to determine various ocular manifestations in subjects with sensorineural hearing loss (SNHL) and to correlate with the severity of the disease. A cross sectional study was designed with same objective. A battery of audiological tests were carried out followed by examination of ophthalmological defects in form of visual acuity, slit lamp and fundus examination. On the basis of the severity of the SNHL, subjects were categorized into three subgroups as Grade I –mild SNHL (n=7); Grade II- moderate and moderately severe SNHL (n=20) and Grade III - severe and profoundly SNHL (n=27). We observed that ocular manifestation was prevalent in 59% of total study population. Cataract was found to be the most common ocular manifestation (18/54) followed majorly by refractive error, age related macular degeneration and pseudoexfoliation (PEX). A significant association between ocular manifestation and degree of SNHL was observed in Grade II subjects (20/27) patients. In addition, when subjects were categorized on the age basis, we observed maximum ocular manifestations among subjects above 50 years which included cataract, age related macular degeneration and pseudoexfoliation. **Conclusion:** Visual and hearing assessment should be conducted in unified manner, however future studies in a large study cohort are the need of hour.

Keywords: Sensorineural hearing loss; ocular manifestations; cataract.

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INTRODUCTION

Sensorineural hearing loss (SNHL) accounts for about 90% of all hearing loss. It is a condition with profound implications for patients, families, and society.[1] Hearing loss has many different presentations, ranging in severity from mild to profound, including low and high pitch patterns; and can affect people of any age. Most common form of SNHL worldwide is presbycusis which is an age related progressive hearing loss affecting 30-45% of people above 50 years of age.[2] Among children, SNHL can be congenital or acquired perinatally. SNHL is the most common congenital disease, with an incidence of 1–3 cases/1000 live births.[3] Early detection of hearing loss coupled with appropriate early intervention is critical for speech, language, and cognitive development. These competencies serve as the foundation for later academic skills. Vision, another sensory function of body, together with hearing is responsible for 95% of environmental cognition. Therefore, it is important to ensure that visual function in subjects with SNHL should be optimized or taken care of. This becomes more important in children with hearing loss, as key developmental milestones are achieved during first few years of their life, Also, it has been demonstrated that adults older than 70 years have

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some degree of dual sensory impairment (DSI).[4] The age related increase in sensory impairment particularly in context of change in life expectancy has highlighted concerns about the cumulative effect of sensory impairments on disability and health related quality of life in growing number of older adults. Considering the importance of hearing and vision in one's life, it is pertinent to advocate ophthalmologic evaluation in people with SNHL. With this brief background and as a team of ENT surgeons, we thought it is worth to evaluate types of ocular manifestations in sensorineural hearing loss(SNHL) and to assess their relation to degree of sensorineural hearing loss. The results of our study pave new insight in this particular field and have profound implications for patients, families, and society.

MATERIALS AND METHODS

A total of 54 subjects with SNHL on PTA were recruited in the present cross sectional study over a period of one year from August 2013 to July 2014. Subjects with SNHL attributed to noise or ototoxic drug exposure, congenital ear anomalies and prior history of meningitis or viral infections like measles, mumps and herpes zoster were excluded from study. The Institutional Ethics Committee approved the study. Before participation in the study, an informed written consent was obtained from each subject after explaining the protocol. Severity of deafness was graded as mild (26-40dB), moderate (41-55 dB) to moderately severe (56-70 dB) and severe (71-90 dB) to profound (>90 dB) as per WHO (1980) classification. Advanced audiometric evaluation in the form of Tone decay test, Short increment sensitivity index and Brain stem evoked response audiometry was done to differentiate between cochlear and retrocochlear type of pathology. Ophthalmological examinations included visual acuity, slit lamp examination and dilated fundoscopy.

RESULTS

Among 54 subjects 31 were males and 23 were females. The age range of the subjects was 9 to 75 years. On the basis of the severity of the SNHL, subjects were categorized into three subgroups as Grade I –mild type of SNHL (n=7); Grade II- moderate and moderately severe degree of SNHL (n=20) and Grade.III - severe and profoundly severe hearing loss (n=27). We observed that cataract (figure 1) was the most common ocular manifestation and was; found among 18 subjects out of 54 (33%) total subjects. Other ocular manifestaions include refractive error (7%), ARMD (5%) and pseudoexfoliation syndrome (5%). Five subjects had miscellaneous ocular manifestation which included viterous degeneration, tilted optic disc, coloboma with viterous degeneration, viteroretinal traction, amblyopia. There was one patient of waardenburg syndrome and one patient was found to have usher's syndrome. Rest of 23 (41%) patients had no ocular manifestation.

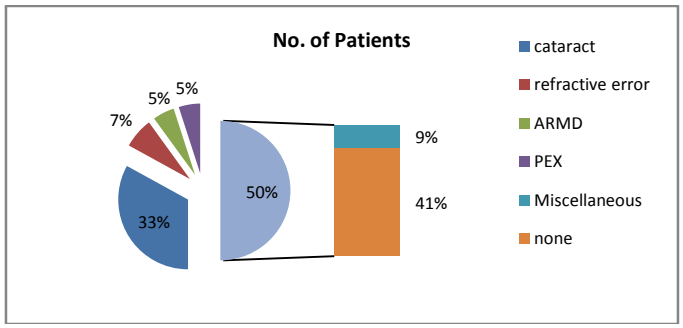

Figure 1: Distribution of ocular manifestations among study population

Association between ocular manifestation and degree of SNHL was assessed. Maximum cases of ocular manifestations were found among subjects having moderate to moderately severe degree of SNHL, that is 20 out 27(74%) patients had some ocular manifestation. To determine any association of age and ocular manifestaion, we divided total subjects in three groups as age (i) <25 years; (ii) 25-50 years (iii) >50 years (Table 1).

Table 1: Ocular manifestations in relation to age group of SNHL patients

Age group (Years)	Total	Occular Manifestations					
		Catract	Refreactive Error	ARMD	PEX	NO	OTHER
UPTO 25	19	0	1	0	0	14	4
25 - 50	11	1	1	1	0	5	3
>50	24	17*	2	2	3	5	0

*1 pt. had both pex and cataract while had ARMD

The ocular manifestations are depicted in table 1 when grouped according to age. We observed maximum ocular manifestations among individuals above 50 years which included cataract, age related macular degeneration and pseudoexfoliation. Patient up to 25 years had no specific ocular manifestation except for 4 patients one of whom had waadenburg syndrome and other 3 had miscellaneous ocular findings in form of squint, tilted optic disc and amblyopia (Table 1).

DISCUSSION

Ophthalmologic consultation in patients with SNHL serves two goals. The first goal is to determine visual acuity and identify visual deficits requiring intervention. Normalization of visual acuity is critical in these patients who already have auditory sensory deficit and therefore have greater dependence on visual input. The second goal is to aid in the identification of hereditary hearing loss syndromes that are associated with ocular findings. Early identification of syndromes give patients and their families the comfort of a diagnosis, may allow identification of other syndrome associated abnormalities, and will have implications for genetic counselling. In our study overall prevalence of ocular manifestation was 59 %. Most common manifestations included cataract, refractive error, age related macular degeneration and pseudoexfoliation syndrome. Maximum cases of ocular manifestations were found among subjects having moderate to moderately severe degree of SNHL, that is 20 out 27(74%) patients had some ocular manifestation, most common of which was cataract. Our findings are consistent with findings from the EHLS.[5,6] In both studies, statistically significant associations were found between hearing loss and both age-related cataract (nuclear or cortical cataract, or previous cataract surgery) and ARM. In our study also significant association was seen between hearing loss and age related cataract. Our findings suggest that they are both likely markers of aging. Biologically plausible mechanisms for the association of these two sensory impairments include sharing of common risk factors in addition to age. Each condition has been postulated to result from somewhat similar genetic, environmental, and lifestyle factors.[7-9] Exposure to oxidative stress, cigarette smoking, and atherosclerosis and its risk factors have been linked respectively to ARM,[10-13] cataract,[8,14-15] and hearing loss.[7,16-18]. Previous reports have shown that persons with both impairments have poorer physical[19-20] and social functioning and higher rates of depressive symptoms[21] than do persons with a single impairment. A possible reason for this cumulative effect is that vision and hearing impairments affect different aspects of functioning. Vision mainly affects the physical and spatial environment, while hearing affects social functioning in day- to-day interactions.[22] In older population (>50 years), visual impairment was significantly associated with hearing impairment. This association was explained, in part, by the associations between hearing impairment and cataract, the major cause of visual impairment. This association suggests that both of these sensory impairments may be markers of biologic aging. They may also share common risk factors in addition to age. Irrespective of the underlying cause, combined sensory impairment had a cumulative detrimental effect on functional status, independence, and well- being, affecting both mental and physical domains. In current clinical practice, hearing and vision are assessed and treated in isolation using sense-specific measures to document either hearing impairment or vision impairment. There is no unified classification system for dual sensory impairment. However, results obtained in our study indicate that visual and hearing assessment should be conducted in unified manner. These two impairments might share common underlying pathophysiology, possibly genetic, environmental, and lifestyle risk factors, that contribute to biologic aging. However further studies are needed to understand the relationship between visual and hearing impairments in persons with SNHL and to determine whether intervention to improve these impairments could delay biologic aging.

LIMITATIONS

No study is without limitations, so is ours, which included a single center based study, and small study cohort and therefore, caution must be exercised in extrapolating data. We want to emphasize that our finding of an association may be viewed as a hypothesis generating observation rather than being taken as a definitive conclusion in it.

CONCLUSION

In current clinical practice, hearing and vision are assessed and treated in isolation using sense-specific measures to document either hearing impairment or vision impairment. There is no unified classification system for dual sensory impairment. However results obtained in our study indicate that visual and hearing assessment should be conducted in unified manner. These two impairments might share common underlying pathophysiology, possibly genetic, environmental, and lifestyle risk factors, that contribute to biologic aging. However further studies are needed to understand the relationship between visual and hearing impairments in persons with SNHL and to determine whether intervention to improve these impairments could delay biologic aging.

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