

Exploring the Influence of Factors on Cognitive Decline in Elderly Punjabi Community: A Cross-Sectional Analysis

Tanvi Chaudhary¹, Pooja Pal²

¹Research Scholar, Audiology and SLP (Dept. of ENT), SGRD Institute of Medical Sciences and Research

²Professor, Dept. of ENT, SGRD Institute of Medical Sciences and Research

Corresponding Author : **Tanvi Chaudhary**

Abstract

Introduction: Cognitive impairment is a prevalent issue among older adults and carries significant importance for both health and society. There are several factors that might play a role in its development, with hearing loss being one of them. Surprisingly, hearing loss is frequently disregarded in the care plans for elderly individuals facing cognitive challenges. This study seeks to explore how factors such as hearing loss, age, gender, and living location influence the cognitive abilities of older people and how they relate to specific characteristics of hearing loss. **Method:** This cross-sectional study conducted an assessment of cognitive performance in a group of 211 elderly individuals aged between 60 and 80 years, all of whom had cognitive impairments. Additionally, their hearing abilities were evaluated, and demographic information was collected. The study aimed to uncover any connections between risk factors and cognitive functioning in this elderly population. **Results:** The data examination allowed us to confirm that cognitive performance scores in this particular group of people were not influenced by gender or place of residence. Instead, age, as well as the presence, severity, and duration of hearing impairment, were the notable factors impacting test performance. **Conclusion:** In assessing the elderly, it is crucial to consider factors associated with cognition, such as age and the status of hearing loss, including its severity and duration. This consideration is essential for developing suitable care plans for geriatric individuals.

Keywords- Elderly, Risk Factors, Cognitive Function, Cross-Sectional, Older Adults, Hearing Loss

Introduction: Due to the continuous advancements in medical technology, the population of older individuals is steadily increasing (Eshkoo et al., 2015). Consequently, concerns about the rise in health challenges leading to disabilities are

also on the rise. Studies conducted on the general elderly population indicate that cognitive issues are prevalent among those living in communities (Overton et al., 2019; Pettigrew & Soldan, 2019). Additionally, presbycusis, a condition characterized by progressive hearing loss, is widespread and often associated with negative cognitive outcomes (Lin et al., 2011). With our population aging, the importance of enhancing the quality of life for the elderly becomes increasingly critical. It is now well-established that cognitive impairment and hearing loss are significant factors adversely affecting the quality of life for older individuals (Wlodarczyk et al., 2004; Mick et al., 2014). Cognitive problems can have a profound negative impact on an individual's emotional and social well-being (Zuidema et al., 2007). As the proportion of elderly individuals is rapidly increasing in developing countries, it is essential to evaluate cognitive function in the elderly and investigate the potential influence of various factors, such as hearing loss, age, gender, and residential area, on cognitive differences since these factors can have varying effects on cognition within the older adult population. If so, this information could contribute to our understanding of aging successfully and in a healthy manner (Rowe & Kahn, 1987).

Method

The study commenced after obtaining authorization from the author to utilize the cognitive assessment tool, MoCA, following training and certification for its use. Additionally, it received approval from the institutional ethics committee and obtained informed consent from all participating patients.

Data for the study was collected from both a Charitable Society and our institute's memory clinic. The assessment involved evaluating geriatric individuals for cognitive deficits using the MoCA tool (Nasreddine et al., 2005), which had been adapted into Punjabi. This tool consists of 30 questions, with higher scores indicating better cognitive abilities, while scores below 26 indicate cognitive impairment. The MoCA assessment was consistently administered by the same evaluator, and the analysis of results followed MoCA evaluation protocols. The test included questions and tasks that participants had to complete.

The study included participants who were fluent Punjabi speakers, aged between 60 and 80 years, and had a cognitive score of less than 26 on the MoCA tool. Those who were excluded from the study were individuals who couldn't complete the cognitive assessment due to visual impairment, the inability to follow test instructions because of severe hearing loss, the incapacity to read and write Punjabi alphabets and numbers, or the inability to participate in the task due to dexterity issues. Additionally, individuals with behavioral complaints or severe cognitive problems, in whom hearing loss couldn't be reliably evaluated, were also excluded from the study.

Individuals with cognitive deficits underwent an audiological examination. They had their bilateral air conduction thresholds measured at octave frequencies ranging from

250Hz to 8000Hz, and their bilateral bone conduction thresholds measured at octave frequencies ranging from 250Hz to 4000Hz. To summarize their hearing status, we computed four frequency averages at 500Hz, 1000Hz, 2000Hz, and 4000Hz. Hearing loss severity was categorized according to WHO standards, with mild defined as 26-40 dBHL, moderate as 41-60 dBHL, severe as 61-80 dBHL, and profound as greater than 80 dBHL.

The collected data was then statistically analyzed to investigate the impact of various factors, including hearing loss, age, gender, and residential area, on cognition in the elderly population. The analysis was performed using SPSS version 28, with descriptive statistics presented in terms of mean, median, standard deviation, frequency, and percentage. Analytical statistics involved the use of the Kruskal-Wallis test to compare cognitive scores across three or more sample characteristics and the Mann-Whitney U test to compare two independent sample characteristics. A p-value less than 0.05 was considered statistically significant.

Result

A total of 211 individuals with cognitive impairments participated in the study. Out of these, 129 (61.1%) were male, and 82 (38.9%) were female. The age of the participants ranged from 60 to 80 years, with 129 (53.1%) falling between the ages of 60 and 70, and 82 (46.9%) between 71 and 80 years old. Table 1 contains the analysis of data obtained from the results of the MOCA concerning the characteristics of these individuals.

Table 1 reveals that 117 respondents were living in urban areas, making up 55.6% of the total, while 94 residents were from rural areas, constituting 44.5% of the total. Among the 211 patients recruited, 75 (35.6%) had normal auditory thresholds, while 136 (64.4%) individuals experienced some degree of hearing loss, categorized as mild (71 individuals), moderate (54 individuals), and severe (11 individuals). Most of the cases investigated exhibited either normal hearing thresholds or mild to moderate hearing loss. The details of hearing loss characteristics are summarized in Table 2.

Table 1- Cognitive scores concerning subject characteristics

		Frequency		cognitive scores			p value
		n=211	percentage	Mean	SD	Median	
Age	60-70 Years	112	53.1	22	3	23	0.01
	71-80 Years	99	46.9	20	3	19	
Gender	Male	129	61.1	21	3	22	0.57
	Female	82	38.9	20	4	19	
Residential	Urban	117	55.5	21	3	22	0.20

area	Rural	94	44.5	20	4	19	
Hearing loss	Present	136	64.4	20	3	20	0.03
	Absent	75	35.6	23	3	24	

Table 2- Cognitive scores concerning characteristics of hearing loss

		Frequency		cognitive scores			p value
		n=136	percentage	Mean	SD	Median	
Hearing loss severity	Mild	71	52.2	22	3	22	0.001
	Moderate/severe	65	47.8	19	3	18	
Duration of hearing loss	<5years	82	60.3	22	3	22	0.02
	5.1-10YEARS	40	29.4	18	2	18	
	>10 years	14	10.3	16	3	17	

The findings validated that increasing age and the presence of hearing loss pose an increased risk for cognitive impairment in older adults. Additionally, greater severity and longer duration of hearing loss are associated with a higher risk in the elderly population with cognitive impairments. Furthermore, the data analysis affirmed that factors such as residential area and gender did not have an impact on the cognition scores obtained.

Discussion

The elderly population experiencing cognitive impairment is on the rise. Several factors could contribute to the development of cognitive dysfunction, and cognitive function may decline over time due to the interplay of these risk factors. Additionally, these risk factors could serve as a basis for early screening and intervention for cognitive issues in the elderly. The primary aim of this study was to identify potential risk factors for cognitive dysfunction and establish their connection with hearing loss characteristics in the elderly.

Age stands out as a crucial risk factor for cognitive impairment. As we grow older, there is a natural decline in brain structure. From a broader perspective, age-related brain atrophy is an expected outcome of the aging process (Liu-Ambrose et al., 2019). Our study aligns with previous research in confirming the relationship between age and cognitive functions. For instance, Van Hooren et al. (2007) found that age significantly impacted all cognitive measurements. Similar findings were reported by Dore et al. (2007), who conducted 22 different cognitive function tests on 945 individuals aged 20 to 79 years.

Gender represents another potential factor influencing cognition. While some previous studies have suggested that females tend to exhibit better cognitive functioning compared to males (Yao et al., 2009; Cobb et al., 1995; Chen et al., 2010), others have found contrasting results (Bozikas et al., 2008). However, our study's findings confirmed that gender did not have an impact on the results of the MOCA test, which is consistent with results obtained by other researchers (Dore et al., 2007; Almeida, 1998; Kucukdeeci et al., 2005). The superior cognitive performance of females in certain tasks may be linked to their higher verbal abilities, as many tasks rely on verbal function (Herlitz et al., 1997). Biological mechanisms, such as atherosclerosis, could also account for these differences (Van excel et al., 2001), given that men are more prone to develop atherosclerosis. On the other hand, males might experience a relatively slower onset of cognitive deficits due to their longer educational periods compared to females (Peterson et al., 2010). Additionally, the choice of the cognitive assessment battery used may also contribute to variations in results.

The place of residence also plays a significant role in cognitive functioning. Residing in a densely populated city has been associated with better cognitive function in previous studies (Besser et al., 2017; Wu et al., 2017; Xiang et al., 2018). Cities with higher population density often have well-developed infrastructure and convenient transportation options for older individuals, along with more opportunities for social engagement and activities. This urban environment is conducive to cognitive function. An environment with a larger population typically signifies an urban and well-established setting.

However, research has also shown that, despite living in cities, those who live alone tend to have relatively lower cognitive function compared to those who live with family members. This phenomenon has been explained by the idea that elderly individuals living alone may experience a lack of emotional and cognitive stimulation due to their isolated living conditions and limited social connections (Fratiglioni et al., 2004; Park et al., 2014; Engberg et al., 2008; Bannister et al., 1998). Interestingly, these findings align with the results of our study, which did not find any significant difference in terms of the area of residence. This can be attributed to the fact that our primary data was obtained from cases residing in the Pingalwara charitable society, where elderly individuals had relocated to live there, away from their own homes.

Hearing loss can hinder effective communication between caregivers and individuals with cognitive impairment. As people age, both the prevalence of hearing loss and dementia increase, affecting more than 10% of individuals aged 65 and older. Clearly, the epidemiological data regarding those with hearing impairment and individuals with cognitive dysfunction are a cause for global concern, both in terms of health and economics (Prince et al., 2013).

When we examined the relationship between cognitive performance and hearing loss using the MOCA tool, we discovered that older individuals with hearing loss scored lower than those without hearing loss, aligning with previous research (Tay et al., 2006; Raiha et al., 2001). Furthermore, scores decreased with increasing duration and severity of hearing loss, consistent with findings from earlier studies (Lin et al., 2011; Harrison et al., 2015; Wallhagen et al., 2008; Deal et al., 2017). Severe hearing loss prevents individuals from fully perceiving environmental sounds, leading to increasing difficulty in verbal communication and subsequent social isolation, which can affect cognition (Mick et al., 2014). Recognizing this early stage of cognitive decline and intervening to address modifiable risk factors such as hearing loss can help reverse the disease process or at least delay the onset of dementia, a condition for which there is no cure (Allen et al., 2003). In contrast, Gussekloo et al. (2005) and Hong et al. (2016) reported weaker associations between age-related hearing loss (ARHL) and cognition, possibly due to variations in the prevalence of ARHL or cognitive decline and dementia in different countries.

The current study aimed to identify potential factors influencing cognitive performance in the elderly Punjabi-speaking population. However, it is important to note that the study has some limitations, as it did not include certain crucial risk factors known to affect cognitive function, such as education and income status. Additionally, the study did not investigate the relationship between these risk factors and specific domains of cognitive functioning.

Conclusion

In conclusion, the present study identified certain risk factors as significant predictors of cognitive impairment. Age and hearing loss status were found to have an impact on the cognitive performance of the elderly. Therefore, healthcare providers should carefully assess older individuals in the community, taking into account the aforementioned risk factors, in order to plan and provide the most appropriate care for the elderly population.

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