Research Article

Perceived Hearing Impairment and Cognitive Function in Elderly Outpatient Attendees of the South West Region of Cameroon

Surdité de Perception et Fonctions Cognitives chez les Sujets Âgés de la Région du Sud-Ouest du Cameroun

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ABSTRACT

Introduction. Background: Hearing impairment (HI) and cognitive impairment (CI) are common health problems in elderly patients, with far-reaching and diverse consequences. We sought to describe the hearing profile, cognitive profile, and associated factors in elderly patients received at a tertiary level hospital in Cameroon, and determine the relationship between HI and CI. **Methodology**. We conducted a hospital-based cross-sectional study, at the outpatient department of a tertiary level and referral hospital in Cameroon. We included all consenting elderly patients aged 55years and above from February to April 2024. Critically ill patients and those with known neurological conditions were excluded. **Results.** A total of 107 patients were included. The average age was 69.1±8.7years. Using the HHIE-S tool, 26 individuals had HI (24.3%). Participants with primary level of education had a significantly higher risk of having HI compared to patients with higher levels (aOR=4.1, 95% CI=1.2-13.8, p=0.02). CI was found in 38 (35.5%) individuals. Twenty-one (19.63%) participants had both HI and CI. Factors associated with CI on multivariate analysis were age ≥60years (aOR=15.1, 95% CI=1.9-117.7, p=0.01), lower level of education (aOR=5.5, 95% CI=1.8-16.9, p=0.003), and HI (aOR=13.3, 95% CI=4-44.8, p<0.001). Married participants had less odds of developing CI (aOR=0.3, 95% CI=0.1-0.9, p=0.03). **Conclusion.** The significant association between HI and CI justifies intentional screening, holistic assessment, and integrated management.

RÉSUMÉ

Introduction. Les déficiences auditives et les déficiences cognitives sont des problèmes de santé courants chez les personnes âgées, dont les conséquences sont vastes et diverses. Nous avons cherché à décrire le profil auditif, le profil cognitif et les facteurs associés chez les patients âgés accueillis dans un hôpital de niveau tertiaire au Cameroun, et à déterminer la relation entre les déficiences auditives et les déficiences cognitives. **Méthodologie.** Nous avons mené une étude transversale en milieu hospitalier, au service des consultations externes d'un hôpital de niveau tertiaire et de référence au Cameroun. Nous avons inclus tous les patients âgés de 55 ans et plus, consentants, de février à avril 2024. Les patients gravement malades et ceux présentant des troubles neurologiques connus ont été exclus. **Résultats**. Au total, 107 patients ont été inclus. L'âge moyen était de 69,1±8,7 ans. En utilisant l'outil HHIE-S, 26 personnes étaient atteintes de HI (24,3 %). Les participants ayant un niveau d'éducation primaire avaient un risque significativement plus élevé d'avoir un IH que les patients ayant un niveau d'éducation plus élevé (aOR=4,1, 95% CI=1,2-13,8, p=0,02). L'IC a été trouvé chez 38 personnes (35,5 %). Vingt-et-un (19,63 %) participants présentaient à la fois un HI et un CI. Les facteurs associés à l'IC dans l'analyse multivariée étaient l'âge ≥60 ans (aOR=15,1, 95% CI=1,9-117,7, p=0,01), un niveau d'éducation inférieur (aOR=5,5, 95% CI=1,8-16,9, p=0,003), et le HI (aOR=13,3, 95% CI=4-44,8, p<0,001). Les participants mariés avaient moins de chances de développer une IC (aOR=0,3, 95% CI=0,1-0,9, p=0,03). **Conclusion**. L'association significative entre l'IH et l'IC justifie un dépistage intentionnel, une évaluation holistique et une prise en charge intégrée.

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HIGHLIGHTS

What is known of the subject
Hearing impairment (HI) and cognitive impairment (CI) are common health problems in elderly patients, with far-reaching and diverse consequences.

The aim of our study
Hearing profile, cognitive profile, and associated factors in elderly patients received at a tertiary level hospital in Cameroon.

Key Results
1. A total of 107 patients were included. The average age was 69.1±8.7years. Using the HHIE-S tool, 26 individuals had HI (24.3%).
2. Participants with primary level of education had a significantly higher risk of having HI compared to patients with higher levels (aOR=4.1, 95% CI=1.2-13.8, p=0.02).
3. CI was found in 38 (35.5%) individuals. Twenty-one (19.63%) participants had both HI and CI. Factors associated with CI on multivariate analysis were age ≥60years (aOR=15.1, 95% CI=1.9-117.7, p=0.01), lower level of education (aOR=5.5, 95% CI=1.8-16.9, p=0.003), and HI (aOR=13.3, 95% CI=4-44.8, p<0.001).
4. Married participants had less odds of developing CI (aOR=0.3, 95% CI=0.1-0.9, p=0.03).

Implications for future practices and policies
Raising awareness regarding HI and its impact on cognitive function would be beneficial for early recognition and intervention. The significant association between HI and CI justifies intentional screening, holistic assessment, and integrated management.

INTRODUCTION

Hearing impairment (HI) is a common problem associated with aging. The impact of hearing loss in elderly patients may be profound, with consequences on the social, functional, and psychological well-being of the person concerned[1]. Presbycusis refers to hearing loss that is associated with the cochlear degenerative process of aging[2]. It is the most common cause of adult hearing deficiency, and considered the most prevalent form of sensory impairment in the elderly. Presbycusis is an increasingly important public health problem that can lead to reduced quality of life, isolation, dependence, and frustration[1]. In addition to the psychosocial impact, some studies have reported an association between HI and cognitive decline. Cognitive impairment (CI) or deficit is an inclusive term used to describe the impairment of different domains of cognition, causing diverse physiologic and social disturbances. A systematic review with meta-analysis published in 2023 showed a significant association between hearing loss and cognitive decline, regardless of race/color, and a non-significant association among blacks[3]. Studies included in the meta-analysis were however limited to North America and Asia.

As population demographics are slowly changing in low-middle income countries (LMICs), hearing loss linked to aging, and potentially cognitive disorders, are likely to become more serious problems. In Cameroon, life expectancy at birth has increased from 54 years in 1990 to 60 years in 2024[4]. This shows that more patients will be exposed to these problems and will need proper management. While there have been studies done on both HI and its relationship with cognitive function in this vulnerable population in high income countries, there is little comprehensive data on this in our setting. Providing data on the frequency of these conditions in our setting and understanding the extent and nature of a potential relationship between them is crucial for effective intervention, management, and improvement of the quality of life for elderly individuals. The objective of this study was to describe the hearing profile, cognitive profile, and associated factors in elderly patients received at a tertiary level hospital in Cameroon, and determine the relationship between HI and CI.

PATIENTS AND METHODS

Study design and procedure
This study was a hospital-based cross-sectional study, conducted at the outpatient department of Buea Regional Hospital, a tertiary level and referral hospital for the South West Region of Cameroon. This department that constitutes the doorway into the health facility receives all patients attending the hospital. We consecutively included all consenting elderly patients aged 55years and above for a period of three months, from February to April 2024. The elderly population in Cameroon involves adults aged ≥60years, based on the life expectancy[4]. However due to limitations related to illiteracy that could hinder the execution of the study, we decided to consider patients 55years and above. We excluded critically ill elderly patients and those with known neurological conditions that affect cognitive function such as Alzheimer's disease and traumatic brain injury. The Hearing Handicap Inventory for the Elderly Screening Version (HHIE-S) is a subjective standardized 10-item questionnaire that assesses perceived HI and how an individual senses the social and emotional effects of hearing loss[5]. Scores obtained range from 0-40. We used this tool that enabled us to categorize results as follows; no handicap: 0-8, mild to moderate handicap: 10-24, severe handicap: 26-40. We used the Mini Mental State Examination (MMSE) to assess cognitive function. It is an 11-question tool that tests five areas of cognitive function: orientation, registration, attention and calculation, recall, and language[6]. It provides scores ranging from 0-30, and categorized as follows; no CI: 25-30, mild CI: 19-24, moderate CI: 10-18, severe CI: 0-9. Potential participants were approached at the waiting lobby of the outpatient department. After consenting participants were consulted for the reason why they came, they were taken into a private consultation booth. Patients who could read and write were given the questionnaires to fill with guidance and explanations. For older participants, who had some difficulties reading, the questions were read and explained to them. Their responses were noted and entered accordingly.

Statistics

Data collected included categorical variables; sex, age groups, marital status, level of education, MMSE categories, HHIE-S categories, and relevant medical history, summarized as frequencies and percentages. Continuous variables included age, MMSE and HHIE-S scores, summarized as means and standard deviations. The Chi square test was used to test for significant associations between categorical variables. Logistic regression analysis was used to assess associations between variables of different types. Statistical significance was set at a p-value <0.05.

Ethical considerations

Ethical approval was obtained from the Institutional Review Board of the Faculty of Health Sciences University of Buea, followed by administrative authorization from the Regional Delegation of Public Health for the South West Region, and the Director of the Buea Regional Hospital. Only patients with non-urgent medical conditions were included. Confidentiality and privacy of participants was strictly ensured during data collection, after informed consent from study participants.

RESULTS

Socio-demographic and clinical characteristics of participants

A total of 137 potentially eligible participants were approached. Among these, 110 patients agreed to participate. We included 107 patients, after three were excluded due to communication difficulties. The average age of participants was 69.1 years ±8.7, ranging from 55 to 90 years. A proportion of 52.3% (56) were males, and

47.7% (51) were females. Table 1 shows socio-demographic characteristics of the study population. The most common comorbidities were hypertension (76; 71%), diabetes (32; 29.9%), obesity (30; 28%), and osteoarthritis (16; 15%).

Table 1.Socio-demographic characteristics of study population

Category	N=107	%
Age Group		
55-65	44	41.1
66-75	37	34.6
76-85	20	18.7
>85	6	5.6
Gender		
Male	56	52.3
Female	51	47.7
Marital Status		
Single	1	0.9
Married	49	45.8
Divorced	2	1.9
Widow/Widower	55	51.4
Occupation		
Unemployed	6	5.6
Employed	41	38.3
Retired	60	56.1
Level Of Education		
None	2	1.9
Primary	44	41.1
Secondary	31	29
University	30	28

Thirty-five participants declared being aware of an existing hearing problem (32.7%). Alcohol consumption was noted in 43 (40.2%) participants, and two (1.9%) participants were smokers.

Table 2. Factors associated with hearing impairment

Category	Without Hearing Impairment	With Hearing Impairment	Total n=107	Adjusted OR (95% CI)	P–Value
Age Group					
<60 years	19	2	21	5.2 (3.1-6.7)	0.24
≥60 years	62	24	86		
Gender					
Male	45	11	56	1.5 (0.5-12.5)	0.239
Female	36	15	51		
Occupation					
Unemployed	0	6	6	0.7 (0.2-14.7)	0.51
Employed	31	10	41		
Retired	50	10	60		
Level Of Education					
None	1	1	2	4.1 (1.2-13.8)	0.02
Primary	27	17	44		
Secondary	27	4	31		
University	26	4	30		

Hearing impairment and cognitive dysfunction

Using the HHIE-S tool, 26 individuals had HI (24.3%). Scores noted ranged from 0 to 24. Figure 1 shows the categories of HI identified. Using multivariate analysis (see Table 2), participants with primary level of education had a significantly higher risk of having HI compared to the other levels (aOR=4.1, 95% CI=1.2-

13.8, p=0.02). The MMSE showed that 38 (35.5%) individuals had CI. Twenty-one (19.63%) individuals had both HI and CI. Figure 2 shows the proportions of the categories of cognitive function assessment. Factors associated with CI are represented on Table 3. Statistically significant predictors of CI on multivariate analysis were age ≥60years (aOR=15.1, 95% CI=1.9-

117.7, p=0.01), lower level of education (aOR=5.5, 95% CI=1.8-16.9, p=0.003), and HI (aOR=13.3, 95% CI=4-44.8, p<0.001).
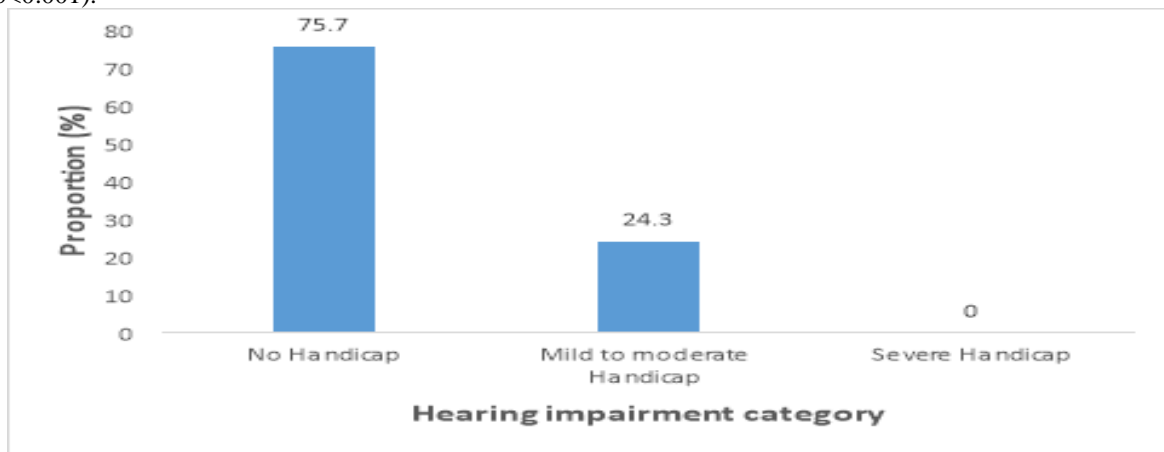

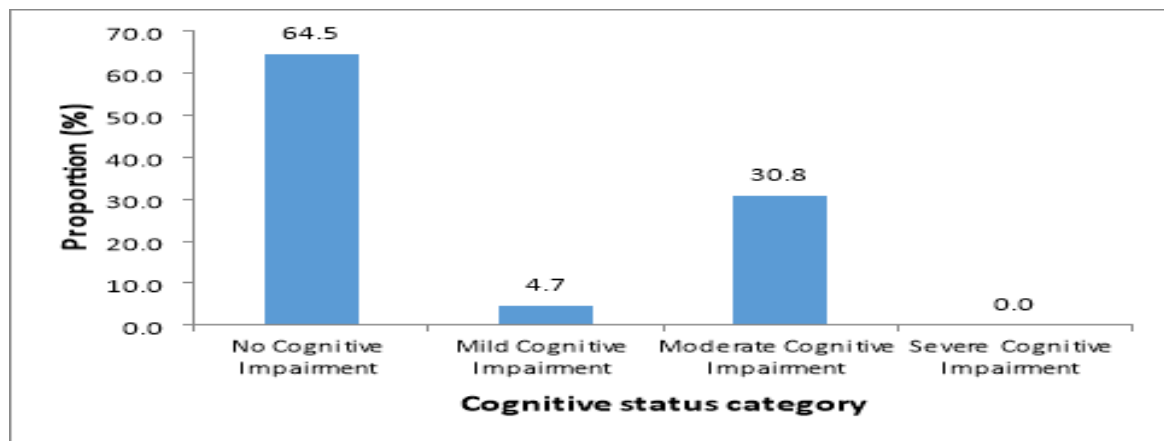Figure 1. Proportions of hearing impairment categories

Figure 2. Proportions of cognitive function categories

Table 3. Factors associated with cognitive impairment

Category	Without Cognitive Impairment	With Cognitive Impairment	Total (N=107)	Adjusted OR (95% CI)	P–Value
Age Group					
<60 years	20	1	21	15.1 (1.9-117.7)	0.01
≥60 years	49	37	86		
Gender					
Male	38	18	56	5.6 (1.2-25.6)	0.45
Female	31	20	51		
Marital Status					
Single	29	29	58	0.3 (0.1-0.9)	0.03
Married	40	9	49		
Occupation					
Unemployed	6	0	6	1.7 (0.02-19.7)	0.08
Employed	27	14	41		
Retired	36	24	60		
Level Of Education					
None	0	2	2	5.5 (1.8-16.9)	0.003
Primary	21	23	44		
Secondary	23	8	31		
University	25	5	30		
Hearing impairment					
No	64	17	81	13.3 (4-44.8)	<0.001
Yes	5	21	26		

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Married participants had less odds of developing CI (aOR=0.3, 95% CI=0.1-0.9, p=0.03).

DISCUSSION

Cameroon is a tropical sub-Saharan African country with a surface area of 475,000km², a population of approximately 27 million and an estimated overall physician-patient ratio of 0.1 per 1000 people[7]. It is a low-middle income country with a GDP of 47.95 billion US dollars[7]. The country is partitioned into 10 administrative regions, each comprising of at least one tertiary level hospital located in the regional capital with specialists, serving populations varying from about 1 million to over 4 million. Buea is a semi-urban city, and also the regional capital of the South-West region. Our study showed that the prevalence of HI in elderly patients in our setting is high. As expected, this problem is commonly associated with CI. We found that the association between these two conditions was strongly statistically significant. A study carried out in Cameroon in 2017[8] reported a slightly lower prevalence of HI than ours (14.8%), in patients aged 50years and above. This was a community-based study with a larger sample. The burden of this condition is aggravated in Cameroon by associated stigma, discrimination, and difficult access to proper management faced by these patients[9]. HI in the elderly in the form of presbycusis is common and caused primarily by cochlear degeneration and the cumulative effect of noise over time. In addition, genetic susceptibility, otological disorders, and exposure to ototoxic agents also contribute[2]. Interestingly, our study showed that participants with a lower level of education were significantly more likely to have HI. Participants with lower levels of education generally have precarious jobs, hence limited access to proper healthcare, increased exposure to noise and other risky environmental factors. Regarding CI, participants aged 60 years and older unsurprisingly had significantly higher odds of developing cognitive decline. This is consistent with the well-established association between aging and cognitive dysfunction due to neurodegenerative changes and other age-related factors[10–13]. In the same manner, participants with lower levels of education had a significantly higher risk of CI compared to those with higher educational levels. The number of years of formal education completed by individuals is positively correlated with their cognitive function throughout adulthood and predicts lower risk of dementia late in life[14]. Education is an early surrogate marker of cognitive reserve and is a predictor of better cognitive performance both in early and middle ages, and higher educational attainment is a protective factor against cognitive decline and dementia[15]. Another potential protective factor identified was living with a partner or significant other. Married individuals had a significantly lower risk of CI. Social support and engagement through marriage may contribute to cognitive well-being and reduce the risk of CI. As older adults age, their social contact becomes narrower, and interpersonal communication among family members becomes the main form of social interaction[16]. Older people without spouses who may lack emotional and instrumental support from their spouses and other family members in their lives are more likely to experience feelings of loneliness[17], leading to depression and subsequent cognitive decline. HI appeared to have the most significant association with CI. Participants with HI were 13 times more likely to present CI, with a strong statistical significance. Many similar studies have demonstrated this interrelation[10–12]. There are a number of explanations to this association. Firstly, considering that both HI and CI are more prevalent in elderly patients, with more risk factors and related co-morbidities, it is expected that these two conditions would be associated. However, this reason alone cannot explain the relationship. Evidence has portrayed that patients with HI are more susceptible to isolate themselves within their homes[18]. Mick *et al.* found that greater hearing loss was associated with increased odds of social isolation in women aged 60 to 69 years[19]. Long-term loneliness may lead to depression, manifesting in the symptoms of a decline in performing activities of daily living and social contact. This will eventually hinder their ability to recognize and address personal health issues promptly, and increase their vulnerability to CI[20]. In our setting where solutions to HI are very scarce and unevenly distributed[21], the impact of this relationship could result in an increase in the burden of CI, and worsening of an already difficult and serious health problem. Our findings are relevant to clinicians who interact with elderly patients on a daily basis. Cognitive function evaluation should be a routine step in the assessment of elderly patients with hearing difficulties. The involvement of audiologists and mental health professionals should be integrated in the management of elderly patients for holistic care. It is imperative for policy makers to allocate resources for screening of the elderly population in order to improve the quality of life of this vulnerable population. Public awareness campaigns should be organized in order to reduce stigma related to hearing and cognitive decline, provide important data for informed decisions[22], and encourage the elderly to seek for care. The use of a subjective tool to screen for HI constitutes a limitation of this study. However, this tool has the advantage of assessing the social and emotional impact of HI, which is not possible using quantitative tests such as pure tone audiometry or auditory-evoked brainstem response. Moreover, the low literacy level of patients obliged us to reduce the lower limit of study participants. Finally, this study was a hospital-based study and is therefore not generalizable.

CONCLUSION

HI and CI are common in the elderly population of Buea, and they commonly co-exist in these patients. Raising awareness regarding HI and its impact on cognitive function would be beneficial for early recognition and intervention. The significant association between these two conditions justifies intentional screening, holistic assessment, and integrated management.

Conflict of interest

The authors are grateful to all the patients who voluntarily participated in this study.

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Author contributions

CN conceived the study. EC-N and CN designed the study. EC-N, CN, and AE conducted data collection. EC-N performed data analysis. CN, AE, and VV interpreted the results and provided critical insights. EC-N drafted the manuscript. All authors reviewed and agreed to the final manuscript.

Conflict of interest

None.

REFERENCES

1. Ciorba A, Bianchini C, Pelucchi S, Pastore A. The impact of hearing loss on the quality of life of elderly adults. Clin Interv Aging. 2012;7:159–63.
2. Gates GA, Mills JH. Presbycusis. Lancet. 2005;366(9491):1111–20.
3. Conceição Santos de Oliveira D, Gomes-Filho IS, Araújo EM, Xavier Ramos M de S, Freitas Coelho JM, Marques AA, et al. Association between hearing loss and cognitive decline in the elderly: A systematic review with meta-analysis study. PLoS One. 2023;18(11):e0288099.
4. Cameroon: Life expectancy at birth/en - NHO Cameroon [Internet]. [cited 2024 Aug 26]. Available from: http://onsp.minsante.cm/profiles_information/index.php/Camer oon:Life_expectancy_at_birth/en
5. Hearing Screening in Older Adults | HIGN [Internet]. [cited 2024 Aug 26]. Available from: https://hign.org/consultgeri/try-this-series/hearing-screening-older-adults
6. Folstein MF, Folstein SE, McHugh PR. 'Mini-mental state'. A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189–98.
7. World Bank Open Data [Internet]. World Bank Open Data. [cited 2024 Sep 11]. Available from: https://data.worldbank.org
8. Ferrite S, Mactaggart I, Kuper H, Oye J, Polack S. Prevalence and causes of hearing impairment in Fundong Health District, North-West Cameroon. Trop Med Int Health. 2017;22(4):485–92.
9. Wonkam-Tingang E, Kengne Kamga K, Adadey SM, Nguefack S, De Kock C, Munung NS, et al. Knowledge and Challenges Associated With Hearing Impairment in Affected Individuals From Cameroon (Sub-Saharan Africa). Front Rehabil Sci. 2021;2:726761.
10. Does Hearing Loss in the Elderly Individuals Conform to Impairment of Specific Cognitive Domains? - Valeria Guglielmi, Camillo Marra, Pasqualina M. Picciotti, Giovanna Masone Iacobucci, Silvia Giovannini, Davide Quaranta, Roberta Anzivino, Gaetano Paludetti, Guido Conti, 2020 [Internet]. [cited 2024 Sep 8]. Available from: https://journals.sagepub.com/doi/abs/10.1177/08919887198741 17
11. Lin FR, Yaffe K, Xia J, Xue QL, Harris TB, Purchase-Helzner E, et al. Hearing loss and cognitive decline in older adults. JAMA Intern Med. 2013;173(4):293–9.
12. Dawes P, Emsley R, Cruickshanks KJ, Moore DR, Fortnum H, Edmondson-Jones M, et al. Hearing Loss and Cognition: The Role of Hearing Aids, Social Isolation and Depression. PLoS One. 2015;10(3):e0119616.
13. Livingston G, Huntley J, Sommerlad A, Ames D, Ballard C, Banerjee S, et al. Dementia prevention, intervention, and care: 2020 report of the Lancet Commission. The Lancet. 2020;396(10248):413–46.
14. Lövdén M, Fratiglioni L, Glymour MM, Lindenberger U, Tucker-Drob EM. Education and Cognitive Functioning Across the Life Span. Psychol Sci Public Interest. 2020;21(1):6–41.
15. Gonçalves NG, Avila JC, Bertola L, Obregón AM, Ferri CP, Wong R, et al. Education and cognitive function among older adults in Brazil and Mexico. Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring. 2023;15(3):e12470.
16. Evans IEM, Martyr A, Collins R, Brayne C, Clare L. Social Isolation and Cognitive Function in Later Life: A Systematic Review and Meta-Analysis. Journal of Alzheimer's Disease. 2019;70(s1):S119–44.
17. Isik K, Başoğul C, Yildirim H. The relationship between perceived loneliness and depression in the elderly and influencing factors. Perspect Psychiatr Care. 2021 Jan;57(1):351–7.
18. Bott A, Saunders G. A scoping review of studies investigating hearing loss, social isolation and/or loneliness in adults. International Journal of Audiology. 2021;60(sup2):30–46.
19. Mick P, Kawachi I, Lin FR. The association between hearing loss and social isolation in older adults. Otolaryngol Head Neck Surg. 2014;150(3):378–84.
20. Zhang D, Zheng W, Li K. The relationship between marital status and cognitive impairment in Chinese older adults: the multiple mediating effects of social support and depression. BMC Geriatrics. 2024;24(1):367.
21. Choffor-Nchinda E, Fokouo Fogha JV, Ngo Nyeki AR, Dalil AB, Meva'a Biouélé RC, Me-Meke GP. Approach and solutions to congenital hearing impairment in Cameroon: perspective of hearing professionals. Trop Med Health. 2022;50(1):36.
22. Andjock Nkouo Y, Bola Siafa A, Asmaou Bouba D, Mbwentchou W, Meva'a Biouele R, Ngono Ateba G, Mindja Eko D, Njock R, Ndjolo A, Djomou F. Campagne de Dépistage de la Surdité: Expérience de la Journée de l'Audition à l'Hôpital Général de Yaoundé. Health Sciences and Disease. 2022;23(4). https://doi.org/10.5281/hsd.v23i4.3551.

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