British Journal of Medicine & Medical Research
11(1): 1-8, 2016, Article no.BJMMR.21494
ISSN: 2231-0614

SCIENCEDOMAIN *international*
www.sciencedomain.org

Prevalence and Trend of Geriatric Otorhinolaryngologic Diseases at University College Hospital, Ibadan, Nigeria

Ayotunde James Fasunla[1*], Ukamaka Nwankwo[2], and Onyekwere George Nwaorgu[1]

[1]Department of Otorhinolaryngology, College of Medicine, University of Ibadan and University College Hospital, Ibadan, Nigeria.
[2]Department of Otorhinolaryngology, University College Hospital, Ibadan, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author AJF was involved in the study concept and design, data collection, analysis and interpretation, writing of manuscript and final draft approval. Author UN was involved in the study design, manuscript writing and final draft approval. Author OGN was involved in the study concept and design, manuscript drafting and review for contribution to knowledge and correction as well as the final draft approval.

Article Information

DOI: 10.9734/BJMMR/2016/21494
Editor(s):
(1) Patorn Piromchai, Department of Otorhinolaryngology, Khon Kaen University, Thailand.
Reviewers:
(1) John Bizakis, University Hospital of Larissa, Greece.
(2) Anonymous, Nigeria.
(3) Nicolas Padilla-Raygoza, Universidad de Guanajuato, Mexico.
Complete Peer review History: http://sciencedomain.org/review-history/11465

Original Research Article

Received 19th August 2015
Accepted 31st August 2015
Published 19th September 2015

ABSTRACT

Aims: To determine the prevalence of otorhinolaryngologic diseases and the trend in the elderly people at the University College Hospital, Ibadan, Nigeria.
Study Design: Retrospective study.
Place and Duration of Study: Department of Otorhinolaryngology, University College Hospital, Ibadan, Oyo State, Nigeria, between July 2001 and June 2015.
Methodology: The clinical records of 421 elderly patients [202 (48%) males; 219 (52%) females; age range 65 – 103 years] with ear, nose, throat, head and neck symptoms were reviewed for all essential data which included demographics (age and sex) and clinical diagnoses. These were

**Corresponding author: Email: ayofasunla@gmail.com;*

categorised into otologic, rhinologic, pharyngolaryngeal and face & neck cases. The results were presented in tabular forms and descriptive analysis performed.

Results: The geriatrics otorhinolaryngologic cases constituted 4.1% of all the total new cases of otorhinolaryngologic diseases managed during the study period. Otorhinolaryngologic diagnoses made included otologic, rhinologic, pharyngolaryngeal and face & neck cases in 282 (67.0%), 64 (15.2%), 62 (14.7%), and 13 (3.1%) respectively.

Conclusion: The prevalence and trend of geriatric otorhinolaryngologic diseases in Nigeria have not really changed despite the increase in life expectancy. Policy makers on health should be aware of this information and use it in planning health care programme for the elderly persons in Nigeria.

Keywords: Cerumen auris; chronic rhinosinusitis; geriatric otorhinolaryngology; Nigeria; pharyngitis; presbycusis.

1. INTRODUCTION

Ageing is a normal biological process in human body which may result from interaction of genetics with environmental factors. There are many biological theories of ageing which are grouped either into programmed theory namely evolutionary, telomere, reproductive and ageing clock or error theory namely DNA damage, autoimmune, accumulative waste, wear and tear, and free radical theories of ageing. The effect of ageing is more pronounced among the elderly and this makes them more vulnerable to medical and surgical diseases. Ageing is a risk factor for a lot of diseases [1] and many people die daily from age related problems worldwide [2,3]. The elderly may be faced with challenges such as bizarre presentation of illnesses, multiple diseases, practice of poly-pharmacy and its associated adverse effects as well as difficulty in differentiating between treatable diseases and ageing process. The recurrence or persistence of medical problems may make them develop depression, diminished independence and poor social interaction. Some of them underreport their health problems because of the fear of being labeled 'disturbing elements' thereby making statistics on geriatric diseases incomplete. The metabolism of drug by the liver is slower in the elderly than in young age [4].

The report given by United Nation in the document on World Population Ageing 2013 indicated that the geriatric population increased from 9.2% in 1990 to 11.7% in 2013 and, this is being estimated to increase to 21.1% in 2050 [5]. In sub-Sahara Africa, the geriatric population is being projected to grow slightly from 4.7% in 2005 to 5.5% in 2030 [6]. The average life expectancy in Nigeria rose from 36 years in 1960 to 51.63 years for men and 53.68 for women in 2014 [7]. Evidently, more people now attain older age in Nigeria due to improvement in health care delivery and socioeconomic development. However, it has not been documented whether or not this also translates to change in the trend of geriatric otorhinolaryngologic diseases in Nigeria. The elderly or geriatrics population constitutes about 5% of the entire people in Nigeria [8]. There is therefore a need to examine the otorhinolaryngologic health challenges of this group of people. The information obtained would assist the health policy makers to have a better health care program for the elderly that will make their last days satisfying. There are few studies on geriatrics otorhinolaryngology in Nigeria [9-14] but the last of them was six years ago. This study therefore was designed to determine the prevalence of otorhinolaryngologic diseases and the trend in the elderly people at the University College Hospital, Ibadan, Nigeria.

2. METHODOLOGY

This was a 15 year retrospective study of all elderly (≥ 65 years) patients managed for otorhinolaryngologic disease at the Department of Otorhinolaryngology, University College Hospital, Ibadan, Oyo State Nigeria. The clinical record was reviewed for all the new otorhinolaryngologic cases managed during the study period with emphasis on the elderly persons. The diagnosis was based on clinical history, examination findings and investigations. Essential data collected from the patients' medical records included age, sex, marital status, religion, occupation, residential area, and clinical diagnosis. The clinical diagnoses were categorised based on the affected head and neck region into otologic, rhinologic, pharyngolaryngeal and face & neck. The results were presented in tabular forms and descriptive analysis performed.

3. RESULTS

A total of 10,268 new otorhinolaryngologic cases were managed during the study period but only 421 were geriatric otorhinolaryngologic cases comprising 202 (48%) males and 219 (52%) females with a sex ratio of 1:1.1 (M: F). The age ranged from 65 – 103 years with mean age of 76.7 years. The geriatric patients constituted 4.1% of the total new cases of otorhinolaryngologic diseases managed during the study period. Two hundred and sixty eight (63.7%) were Muslims, 271 (64.4%) were retirees or pensioners, and 407 (96.7%) reside in urban area (Table 1).

Table 1. Demographic characteristics of the patients

Variable	Frequency (n)	Percentage (%)
Gender		
Male	202	48
Female	219	52
Marital status		
Married	197	46.8
Widow/widower	224	53.2
Religion		
Islam	268	63.7
Christianity	153	36.3
Occupation		
Retirees/pensioner	271	64.4
Petty trading/business	61	14.4
Artisans	56	13.3
House wife	21	5.0
Farmers	12	2.9
Residential area		
Urban dwellers	407	96.7
Rural dwellers	14	3.3

Otorhinolaryngologic diagnoses made included otologic cases in 282 (67.0%), rhinologic cases in 64 (15.2%), pharyngolaryngeal cases in 62 (14.7 %), and face & neck cases in 13 (3.1%) cases. The distribution of the specific clinical diagnosis is shown in Table 2.

4. DISCUSSION

This present study showed that the elderly people have otorhinolaryngologic diseases and the trend still remains the same despite the reported increase in life expectancy in Nigeria [7]. The elderly constitutes 4.1% of patients managed for otorhinolaryngologic diseases in the study area. Previous similar studies in Nigeria have reported the prevalence of geriatric otorhinolaryngology to range from 3.64% to 6.2% [10,13,14]. The prevalence rate in this present study may be a reflection of geriatric population in Nigeria which was reported to be 5% of the Nigerian population [8]. However, the slight female preponderance seen in this study agrees with other similar studies [14] but in discordance to other similar studies [9,10,13]. This may be because women live longer or that they give more attention to their health than their male counterparts [15].

Otologic cases are the commonest in this study and seen in 66.8% of the study population. This is in agreement with other similar studies in Nigeria where the prevalence of otologic cases ranged from 52.2 – 72.5% [10,13,14]. Cerumen auris and presbycusis were the commonest diagnoses in this present study accounting for 61% of otologic cases. Cerumen auris was the commonest otologic case in this present study. This is similar to the report by Afolabi et al. [9] and Kayode et al. [11]. It is a treatable cause of conductive hearing loss in the geriatric population [16]. It may be caused by a combination of many factors which include a reduced number of apocrine glands due to ageing, anatomical nature of ear canal, ear canal hair, repeated self-ear cleaning and the use of hearing aids [17]. Removal of impacted cerumen improves hearing ability by about 5dB [18].

Presbycusis is the second most common otologic diagnosis in this study. Other similar studies have reported it to be the commonest otologic geriatric case [10,14,19]. About 60% of the geriatric populations in United States have at least 25dB compromise in hearing [16]. Presbycusis is an age related sensorineural hearing loss which results from degeneration of auditory hair cells, auditory neurons, and stria vascularis with associated cochlear conductive loss [20,21]. The complex interaction of cellular ageing with multiple factors like noise exposure, ototoxicity, cardiovascular disease, metabolic and genetic factors also contributes to this. The hearing loss is bilateral and symmetrical with the greatest loss in the high frequency. It has a down sloping pattern on audiogram. A number of studies have shown that hearing loss has a significant impact on perceived emotional, social, and communication function of elderly persons [22-24]. It incapacitates the affected geriatric patients by preventing them from understanding and participating in smooth communication. The burden of presbycusis is worsened by age related visual problem in them. Patients with mild to moderate sensorineural hearing loss are treated with hearing aids while those with severe and profound hearing loss are treated with cochlear implantation.

Table 2. Distribution of the specific geriatric otorhinolaryngologic cases

Anatomic region	Specific clinical diagnosis	Frequency (n)	Percentage (%)
Otologic cases	Cerumen auris,	89	31.6
	Presbyacusis	83	29.4
	Foreign body	32	11.4
	Otomycosis	17	6.0
	Tinnitus	13	4.6
	Cervical vertigo	9	3.2
	Chronic suppurative otitis media	8	2.8
	Malignant otitis externa	7	2.5
	Meniere's disease	7	2.5
	Benign Paroxysmal positional vertigo	7	2.5
	Ototoxicity	5	1.8
	Ear tumours	3	1.1
	Acoustic neuroma	2	0.7
		282	**100.0**
Rhinologic cases	Chronic rhinosinusitis	44	68.7
	Spontaneous epistaxis	15	23.4
	Hyposmia/anosmia	4	6.3
	Sinonasal tumour	1	1.6
		64	**100.0**
Pharyngolaryngological cases	Pharyngitis	29	46.8
	Laryngitis	9	14.5
	Snoring	7	11.3
	Globus pharyngeus	6	9.7
	Foreign body aspiration/ingestion	5	8.1
	Fish bone impaction in the tonsil	2	3.2
	Laryngeal tumour	2	3.2
	Oropharyngeal tumour	1	1.6
	Nasopharyngeal tumour	1	1.6
		62	**100**
Face and neck	Metastatic neck node	5	38.4
	Facial paresis	2	15.4
	Deep neck space infection	2	15.4
	Parotid tumour	1	7.7
	Goiter	1	7.7
	Carotid body tumor	1	7.7
	Pharyngeal pouch	1	7.7
		13	**100.0**

Foreign body in the ear was the third commonest otologic case seen in this study. People use cotton bud to clean the ear or scratch it whenever they experience itching sensation. This may inadvertently get dislodged into the ear canal and become a foreign body as seen in these elderly persons. Itching in the ear is a symptom of otomycosis which constituted 6% of the otologic cases in this study. Otomycosis is a fungal infection of the ear which may become florid in people with depressed immunologic system such as diabetes mellitus, HIV, malnutrition, etc [25].

Tinnitus, although reported as a clinical diagnosis in 4.6% elderly persons in this study, could be a manifestation of ear, metabolic, cardiovascular diseases and ototoxicity. Geriatric patients are usually on medications for multiple disorders. This may result in ototoxicity, an adverse reaction of multiple drugs taken by this population for various comorbid diseases, seen in 1.8% of the otologic cases. Some adverse drug reactions like insomnia, dizziness, depression, and loss of balance may mimic effect of ageing.

Ear infections such as chronic suppurative otitis media and malignant otitis externa (MOE) were found in 2.8% and 2.5% elderly patients respectively. The risk of MOE is increased in those with depressed body immunity like poorly controlled diabetes, HIV infection, malnutrition, etc. It is usually caused by *Pseudomonas aeruginosa* and rapid spread to involve both soft and bony tissues in the petro-temporal region [26]. MOE used to be very fatal but due to improvement in health services and therapy, the incidence of death from it has considerably reduced.

Balance disorders constituted 9.6% of the otologic cases seen in the elderly and they are cervical vertigo, Meniere's disease, and benign paroxysmal positional vertigo. The balance disorders make the elderly persons more prone to falls with attendant body injuries [27,28].

About 30 – 50% of geriatric patients in a year fall at least once. This number increases to 80% after age 80 [29]. Balance disorder may be due to age related decline in both vestibular sensory and ganglion cells. There is loss of hair cells in the ampulla, reduced number of vestibular nerve axons and loss of neurons in the vestibular nuclei [30-35]. It may also be due to the following factors like Parkinson's disease, brain tumours, visual impairment, multiple medications, metabolic and cardiovascular disease which are associated with ageing.

Rhinologic cases are the second commonest in this study and seen in 15.2% of the elderly population. Previous similar studies in Nigeria had reported the prevalence of rhinologic cases in elderly persons to be between 16.6 and 18.5% [10,13,14]. The effects of ageing in the nose include structural, hormonal, mucosal, olfactory and neural changes [36]. A decline of cell and humoral mediated immunity has been noted with ageing (immunosenescence) [34]. There is degeneration of mucus secreting cells and reduction in the effectiveness of the mucociliary system in the elderly [35]. This results in symptoms of postnasal drip, nasal discharge, sneezing and gustatory rhinitis [36]. Rhinosinusitis constituted 68.7% of rhinologic cases and the third otorhinolaryngologic disease in this present study. Previous similar studies had reported it to be the sixth most common chronic condition of the elderly [37]. Underlying chronic disease and poor nutrition increase the risk of rhinosinusitis in this group. Epistaxis is relatively common in the geriatric patient and atherosclerotic changes commonly seen in them contribute to its severity [35]. The use of anticoagulants, NSAIDs, co-morbid disease and sinonasal malignancies are risk factors for epistaxis. One of the elderly persons in this study was managed for sinonasal tumour.

Histologic analysis of the olfactory area revealed an increase in the number of patches of respiratory epithelium in the geriatric population. This may represent a loss of primary olfactory receptor neurons [38]. Age is one of the most important determinants of olfactory function and olfaction sensitivity has been shown to decrease with age [39]. Only 4 (6.3%) elderly persons with rhinologic cases had hyposmia / anosmia in this study. More than 50% of geriatrics with ages above 80 years has olfactory dysfunction [40]. It is difficult to make a distinction between olfactory changes that result from ageing process and that from rhinologic disease that occurs in them [33].

Pharyngolaryngeal cases constitute 14.7% of the geriatric otorhinolaryngologic cases. The inflammation of the pharynx and larynx mucosa accounted for 61.3% cases. Pharyngitis, laryngitis and globus pharyngeus could be manifestations of gastroesophageal reflux disease [41]. Globus pharyngeus seen in 9.7% pharyngolaryngeal cases has also been associated with cervical osteophyte, an age related degenerative neck bone condition. Correct identification of the cause of the laryngitis and pharyngitis with appropriate treatment will bring about cure. The geriatric population is more likely to develop dysphagia from diseases than from the ageing process alone [42]. Pharyngitis, globus pharyngeus, esophageal foreign bodies as well as cancer of the oropharynx and nasopharynx may cause pathologic dysphagia. Treatment of these diseases would improve swallowing. Snoring constituted 11.3% of pharyngolaryngeal cases seen in this study. The decrease in pharyngeal muscular strength and tone with age predispose the elderly persons to snoring [43]. Snoring can affect sleep. A change in sleep duration occurs as part of the ageing process [44]. The duration and need for sleep reduces with age. There is increased difficulty in falling asleep (sleep latency) and greater difficulty in staying asleep (sleep efficiency) resulting in multiple short naps. The proportion of co-morbid medical conditions affecting sleep also increases with age. They include depression, arthritis, gastroesophageal reflux, prostate hypertrophy in men, as well as renal and pulmonary disorders [45]. With age, there is an increase in pharyngeal swallow delay, a decrease in the duration of swallow, decreased cricopharyngeal swallowing, and decreased peristaltic amplitude and velocity [46]. This would result in dysphagia. The reduced facial muscle strength due to ageing in the elderly persons may cause poor cup drinking, decrease masticatory strength and lingual pressure which drive pharyngeal swallowing. The speed of swallowing gradually slows down after age 45 with a significant difference between individuals below 45 versus 70 years of age [47]. Many of these changes are subtle and slowly progressive, allowing the geriatric population to adapt to

compensatory mechanisms. Cerebrovascular accident (CVA) and Parkinson's disease, commonly seen in the elderly persons are neurologic causes of dysphagia [44].

Laryngitis and laryngeal tumour may manifest as voice disorders. The voice loses its range, power and strength with an increasing age [48]. It then becomes difficult to distinguish the male and female voice. With ageing, the frequency of the male voice tends to increase and that of the female tends to decrease. Pathologically, the change in voice in the elderly may be caused by any or combination of laryngopharyngeal reflux, thoracic and pulmonary disorders, drops in thyroid hormone, menopause and andropause.

In this present study, 14 (3.3%) elderly persons had cancers of the head and neck region. It has been reported that more than half of all cancer patients are of ages 65 years and above at the time of diagnosis [49]. The risk for developing head and neck malignancy is increased in the elderly by factors like long duration of smoking, alcohol intake and exposure to carcinogens. However, they are known to tolerate the management of cancer in the early stage more than in the advanced disease stage.

There were only two elderly persons in the study that had facial paresis secondary to previous parotid surgeries. The change in facial appearance in the elderly may also result from ageing. There is loss of skin elasticity and volume due to atrophy of the dermis. The loss of adipose tissue in the face leads to gaunt appearance, thinning of the lips, hollowing of cheeks and orbits with creping of the eyelid skin. Over the years, repetitive crinkling of expression or laugh lines causes permanent creases on the face. Gravity's downward pull of the soft tissues of the face causes wrinkling. Over exposure to ultraviolet light from the sun is the cause of the majority of the damage associated with the ageing face [50].

5. CONCLUSION

The prevalence and trend of geriatric otorhinolaryngologic diseases in Nigeria have not really changed despite the increase in life expectancy. Policy makers on health should be aware of this information and use it to provide quality health care program for the elderly persons in Nigeria.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Dullin A, Gottschling DE, Nystrom T. The good and the bad of being connected: The integrons of ageing. Curr Opin Cell Biol. 2014;26:107-112.
2. De Grey ADNJ. A strategy for postponing ageing indefinitely. Stud Health Technol Inform. 2005;118:209-219.
3. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet. 2006;367(9524):1747–1757.
4. Reidenberg MM. Drugs in the elderly. Bull N Y Acad Med. 1980;56(8):703-714.
5. United Nations. Department of Economic and social affairs, population division. World Population Ageing; 2013 ST/ESA/ SER.A/348. Available:www.un.org/en/development/desa (Assessed on 22 June, 2015).
6. Velkoff VA, Kowal PR. Ageing in Sub-Sahara Africa: The changing demography of the region. In: National Research Council (US) Committee on population; Cohen B, Menken J, editors. Ageing in sub-Saharan Africa: Recommendation for furthering research. Washington (DC): National Academies Press (US); 2006;2.
7. Baiyewu O, Bella AF, Adeyemi JD, Bamigboye EA, Jegede RO. Health problems and sociodemographic findings in elderly Nigerians. Afr J Med Med Sci. 1997;26:13-17.
8. Olayinka A. Country report: Ageing in Nigeria – Current state, social and economic implications. Available:www.rc11-sociology-of-aging.org/system/files/Nigeria%202007_0.pdf (Assessed on 24 June, 2015).

9. Afolabi OA, Ijaduola GTA. Pattern of ear diseases among older people. East and Central African Journal of Surgery. 2008;13(2):96-100.
10. Ogunleye AOA, Ibekwe TS, Ijaduola GTA. Otorhinolaryngology and geriatrics in Ibadan, Nigeria. Nigerian Journal of Otorhinolaryngology. 2005;2(1):7-12.
11. Kayode AS, Alabi BS, Segun S, Ogah S. Audit of otological diseases amongst elderly in Nigeria. Intl Arch Otorhinolaryngol. 2010;14:212-216.
12. Ibekwe TS, Nwaorgu OG, Onakoya PA, Ibekwe PU. Spectrum of otorhinolaryngo-logical emergencies in the elderly in Ibadan, Nigeria. Niger J Med. 2005;14(4): 411-4.
13. Okoye BC, Onotai LO. Pattern of geriatric otorhinolaryngological diseases in Port Harcourt. Niger J Med. 2007;16(3): 239-241.
14. Okhakhu AL, Okolugbo NE, Onyeagwara NC. Pattern of otorhinolaryngological disorders amongst geriatric population in Benin City, Nigeria. Int J Mod Alt Med Res. 2013;1:14-19.
15. Cummings SR, Melton LJ. Epidemiology and outcomes of osteoporotic fractures. Lancet 2002;359:1761-1767.
16. Siegel GJ. Geriatric polypharmacy in otorhinolaryngology. In: Geriatric care otorhinolaryngology. American Academy of Otorhinolaryngology – Head and Neck Surgery Foundation. 2006;8:149.
17. Sharp JF, Wilson JA, Ross L, Barr-Halmiton RM. Ear wax removal: A survey of current practice. Br Med J. 1990;301: 1251–3.
18. Liu XZ, Yan D. Ageing and hearing loss. The Journal of Pathology 2007;211(2): 188–197.
19. Gates GA, Cooper JC. Incidence of hearing decline in the elderly. Acta Otolaryngol. 1991;111:240–248.
20. Schuknecht HF, Gacek MR. Cochlear pathology in Presbycusis. Ann Otol Rhinol Laryngol. 1993;102:1-16.
21. Fischel-Ghodsian N, Bykhovskaya Y, Taylor K, Kahen T, Cantor R, Ehrenman K, et al. Temporal bone analysis of patients with Presbycusis reveals high frequency of mitochondrial mutations. Hear Res. 1997; 110:147-154.
22. Stumer J, Hickson L, Worrall L. Hearing impairment, disability and handicap in elderly people living in residential care and in the community. Disabil Rehabil. 1996; 18:76-82.
23. Lutman ME. Hearing disability in the elderly. Acta Otolaryngol Suppl. 1990;476: 239-248.
24. Ciurlia-Guy E, Cashman M, Lewsen B. Identifying hearing loss and hearing handicap among chronic care elderly people. Gerontologist. 1993;33:644-649.
25. Fasunla J, Ibekwe T, Onakoya P. Otomycosis in western Nigeria. Mycoses. 2008;51:67-70.
26. Carfrae MJ, Kesser BW. Malignant otitis externa. Otolaryngol Clin N Am. 2008;41: 537-549
27. Davis LE. Dizziness in the elderly men. J Am Geriatr Soc. 1994;42:1184.
28. Minor LB, Schessel DA, Carey JP. Meniere's disease. Curr Opin Neurol. 2004;17:9-126.
29. Dominguez RO, Bronstein AM. Assessment of unexplained falls and gait unsteadiness: The impact of age. Otolaryngologic Clinics of North America. 2003;33(3):637-651.
30. Merchant SN, Velázquez-Villaseñor L, Tsuji K, Glynn RJ, Wall C 3rd, Rauch SD. Temporal bone studies of the human peripheral vestibular system: normative vestibular hair cell data. Ann Otol Rhinol Laryngol Suppl. 2000;181:3-13.
31. Velázquez-Villaseñor L, Merchant SN, Tsuji K, Glynn RJ, Wall C 3rd, Rauch SD. Temporal bone studies of the human peripheral vestibular system: Normative Scarpa's ganglion cell data. Ann Otol Rhinol Laryngol Suppl. 2000;181:14-19.
32. Alvarez JC, Diaz C, Suarez C, Fernandez JA, Gonzalez del Rey C, Navarro A, et al. Ageing and the human vestibular nuclei: morphometric analysis. Mech Ageing Dev. 2000;114:149-172.
33. Yilmaz AAS, Corey JP. Current Allergy and Asthma Reports. 2006;6(2):125-131.
34. Ramos-Casals N, Garcia-Carrasco M, Brito M, Lopez-Soto A, Font J. Autoimmunity and geriatrics: Clinical significance of autoimmune manifestations in the elderly. Lupus. 2003;12:341-355.
35. Janzen VD. Rhinological disorders in the elderly. The Journal of Otolaryngology. 1986;15(4):228-230
36. Eldestein DR. Ageing of the normal nose in adults. Laryngoscope. 1996;106:1-25.
37. Coclasure JC, Gross CW, Kountakis SE. Endoscopic sinus surgery in patients older

than sixty. Otolaryngol Head Neck Surg. 2004;131(6):946-949.
38. Paik SI, Lehman MN, Seidan AM, Duncan HJ, Smith DV. Human olfactory biopsy: the influence of age and receptor distribution. Arch Otolaryngol Head Neck Surg. 1992; 118:731-738.
39. Landis BN, Konnerth CG, Hummel T. A study on the frequency of olfactory dysfunction. Laryngoscope. 2004;114: 1764-1769.
40. Murphy C, Schubert CR, Cruickshanks KJ, Klein BE, Klein R, Nondhal DM. Prevalence of olfactory impairment in older adults. JAMA. 2002;288:2307-2312.
41. Koufman JA. The otolaryngologic manifestations of gastroesophageal reflux disease (GERD): A clinical investigation of 225 patients using ambulatory 24-hour pH monitoringand an experimental investigation of the role of acid and pepsin in the development of laryngeal injury. Laryngoscope. 1991;101(Suppl 53):1-78.
42. Lundy DS. Swallowing. In: Geriatric care otorhinolaryngology. American Academy of Otorhinolaryngology – Head and Neck Surgery Foundation. 2006;4:86-94.
43. Marklund M, Franklin KA. Treatment of elderly patients with snoring and obstructive sleep apnea using a mandibular advancement device. Sleep Breath. 2015;19:403-405.
44. Piani A, Brotini S, Dolso P, Budai R, Gigli G. Sleep disturbances in elderly: A subjective evaluation over 65. Archives of Gerontology and Geriatrics; 2004;38: 325-331.
45. Foley D, Ancoli-Israel S, Britz P, Walsh J. Sleep disturbances and chronic disease in older adults: Results of the 2003 National Sleep Foundation Sleep in America Survey. Journal of Psychosomatic Research. 2004;56(5):497-502.
46. Tracy JF, Logemann JA, Kahrilas PJ, Jacob P, Kobara M, Krugler C. Preliminary observations on the effects of age on oropharyngeal deglutition. Dysphagia 1989;4:90-94.
47. Robbins J, Hamilton J, Lof G, Kempster G. Oropharyngeal swallowing in normal adults of different ages. Gastroenterology. 1992; 103:823-829.
48. Kolanowski AM, Barksdale DJ. Keeping the older adult's voice central in research and practice. J Gerontol Nurs. 2014;40: 3-4.
49. Wolf GT. Ageing, the immune system, and head and neck cancer. Geriatric Otorhinolaryngology. 1989;158-165.
50. McGraw-Wall B. Facial plastic surgery. In: Geriatric care otorhinolaryngology. American Academy of Otorhinolaryngology – Head and Neck Surgery Foundation. 2006;5:103-105.

© 2016 Fasunla et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/11465