Oral Hygiene Practices and Status of Stroke Patients Attending an Outpatient Clinic in a Nigerian Tertiary Hospital

*Moshood Folorunsho **ADEYEMI**,** Abiodun **BELLO**,***Moninuola Adebusola **ERNEST**, ***Ehigie **IGBEN**,** Kolawole **WAHAB**
*[*Department of Surgery, University of Ilorin, Ilorin, **Department of Medicine, University of Ilorin Teaching Hospital, Ilorin, ***Department of Surgery, University of Ilorin Teaching Hospital, Ilorin]*

Correspondence
Dr. Moshood F Adeyemi

Department of Surgery, University of Ilorin, Ilorin
Email: adeyemimoshood@yahoo.com

ABSTRACT

Background: There may be an impairment of oral self-care post-stroke which may compromise oral hygiene and health. However, there is paucity of information on oral hygiene and oral health status of stroke patients in Nigeria.

Objective: To assess the oral hygiene and health status of stroke outpatients.

Method: A cross-sectional study of stroke patients attending the neurology outpatient clinic of a tertiary hospital in North Central Nigeria was conducted. Data on sociodemographic variables and oral health behaviour was obtained. Each patient was examined to determine the oral hygiene status using the Simplified Oral Hygiene index, DMFT index for the status of caries, Modified gingival index for the presence or absence of gingival disease and Modified Rankin score for functional impairment

Results: There were 120 participants with a mean age of 60.30±13.21 years. Poor oral hygiene status was found in 29.7% while 28.8% had good oral hygiene status. The mean DMFT was 1.37±2.672. Dental caries was seen in 48/120 (40%) while 28 (23.3%) had gingival diseases. A modified Rankin score of 3-5 was independently associated with poor oral hygiene status (OR 1.367; 95% CI 1.020-1.832; p=0.036).
Conclusion: Poor oral hygiene status is common in patients with stroke and the risk of this is higher in those with poor functional status. Oral health status should be considered in the holistic rehabilitation of stroke patients.

Keywords: Oral health status; Oral hygiene index; Stroke; Functional status

Moshood F. Adeyemi
https://orcid.org/0000-0001-6175-8163
Abiodun Bello
https://orcid.org/0000-0002-2078-6739
Moninuola A. Ernest
https://orcid.org/0000-0001-5518-2911
Ehigie Igben
https://orcid.org/
Kolawole Wahab
https://orcid.org/0000-0002-2914-1953
Received: 25-Aug, 2023
Revision: 27 Jan, 2024
Accepted: 30 Jan, 2024

Citation: Adeyemi MF, Bello A, Ernest MA, Igben E, Wahab K. Oral hygiene practices and status of stroke patients attending an outpatient clinic in a Nigerian tertiary hospital. Nig J Dent Res 2024; 9(1):40-47. https://dx.doi.org/10.4314/njdr.v9i1.6

INTRODUCTION

Stroke is defined according to WHO as "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin[1] It is a leading cause of morbidity and mortality worldwide with increasing incidence and prevalence in developing countries.[2] There is a rising burden of stroke in Nigeria and other sub-Saharan African countries with an annual incidence rate of 316 per 100, 000, a prevalence rate of up to 1.4 per 1,000, and a 3-year fatality rate of up to 84%.[3,4] compared to what obtains in the developed countries.[5,6] Oral functional impairments are prevalent after stroke and include swallowing and eating difficulties, both of which may affect up to 80% of patients.[7,8] Facial paresis is an orofacial manifestation of stroke that affects the face and tongue, and may secondarily affect the soft palate[7] Similarly, physical deficits like hand-eye coordination problems, hand or arm deficit may compromise personal oral hygiene efforts.[9]

Poor oral health is by itself a risk factor for cardiovascular disease (CVD), including stroke. A recent analysis of 2013 to 2014 data from the US National Health and Nutrition Examination Survey (NHANES) shows that individuals with fair/poor gum health are more likely to have CVD compared to those who report excellent/very good gum health.[10] Even in acute stroke settings, poor oral health is associated with aspiration pneumonia which is one of the predictors of poor outcome.

In the multidisciplinary care of stroke patients, the role of the dentist is important in management and rehabilitation. Such a role involves advising and assisting in acute care service and maintaining proper oral health care during the early stage, following stroke.[7] In subsequent periods of rehabilitation, the services may include the provision of preventive and restorative care.[11] However, despite the obvious need for dental care, dentists are hardly involved in the routine management of patients with stroke in both inpatient and outpatient settings.

The association between periodontal diseases and stroke was proposed by Millard and Marcken,[12] and the suggested mechanism involves the initiation of an inflammatory process caused by microbacteria in the subgingival and supragingival plaque in the crevicular fluid. The proposed mechanism involves the inflammatory process leading to the aggregation of platelets, formation of thrombosis, and subsequent embolism. This, in turn, is suggested as a fundamental mechanism in the formation of stroke. In summary, the study suggests that periodontal diseases may contribute to stroke by triggering inflammation and thrombosis through the presence of microbacteria in oral plaque.

It is important to note that while there is some evidence suggesting a link between oral health and cardiovascular diseases, including stroke, further research is needed to establish a clear cause-and-effect relationship and to understand the underlying mechanisms in more detail. Maintaining good oral hygiene and regular dental check-ups are generally recommended for overall health and well-being.

Despite the high and escalating burden of stroke in Nigeria and other sub-Saharan African countries which may adversely affect oral health, there is paucity of information on oral hygiene and oral health status of stroke survivors. This study aimed to assess the oral hygiene and oral health status of patients with stroke who were attending the neurology outpatient clinic of a tertiary hospital in Nigeria.

MATERIALS AND METHODS

This descriptive, cross-sectional study was conducted from 2016 to 2020 at the Neurology Clinic of the University of Ilorin Teaching Hospital in North Central Nigeria. The clinic is run by 3 neurologists, supported by postgraduate resident doctors. The hospital has a stroke unit that provides in-patient care for about 150 stroke patients per year and about 8-10 patients attend the clinic for follow-up per week. After obtaining informed consent to participate, all eligible patients were consecutively recruited. Eligibility criteria included being an adult (at least 18 years of age), with a neuroimaging confirmation with either computed tomography or magnetic resonance imaging and at the time of recruitment in the clinic, the participant must be at least 30 days post-stroke. The study was approved by the Institutional Review Board of the hospital with approval number ERCPAN/2015/03/1517.

A pre-tested semi-structured questionnaire was used to obtain the necessary information from the attending neurologists and trained research assistants who were resident doctors rotating through the neurology unit. Information obtained were the sociodemographic characteristics, stroke-related symptoms, duration of a stroke, history of

presence or absence of hypertension, presence or absence of aphasia, facial nerve palsy, and muscle power in the limbs (graded from 0-5) using the medical research council grading system,[13] and functional status using the modified Rankin Scale (mRS). The mRS is a disability assessment scale used as an outcome measure in stroke patients. Six distinct disability ratings are defined by the mRS: grade 0 denotes "no symptoms at all," grade 5 denotes "severe disability or bedridden, incontinent, and requiring constant nursing care and attention," and grade 6 denotes death. A modified Rankin scale (mRS) score ≤2 was graded as good functional status while 3-5 was graded as poor.[14] Oral hygiene practices were assessed by asking questions on frequency of daily tooth brushing, and prior utilization of dental services. A highly experienced dentist conducted a detailed oral examination on each patient and assessed the oral hygiene status using the Simplified Oral Hygiene Index which is composed of a combination of the Debris Index (DI) and the Calculus Index (CI). Each of these indices is based on numerical determinations representing the amount of debris or calculus found on the buccal and lingual surfaces of the preselected teeth.

The maxillary and mandibular arches were examined in four quadrants, each being examined for debris and/or calculus. Six surfaces were selected from the four posterior and two anterior teeth for examination for OHI-S. In the posterior portion of the dentition, usually the first molar but sometimes the second or third molar was examined.

The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars were inspected. In the anterior portion of the mouth, the labial surfaces of the upper right and the lower left central incisors were scored. For each individual, the debris scores were summed and divided by the number of surfaces scored. At least two of the six possible surfaces had to be scored and examined before the final scores were calculated. The same methods were used to obtain the calculus score.

The DI and the CI were combined to obtain the OHI-S. The CI and DI values range from 0 to 3; the OHI-S values from 0 to 6, with lower scores indicating better oral hygiene. The OHI-S is the gold standard for the assessment of oral hygiene.[6] Simplified Oral Hygiene Index was rated according to the guidelines published by Greene and Vermillion [15]; a score of 0-1.2 was rated as good, 1.3-3.0 as fair and 3.1-6.0 as poor. The caries status was determined using the DMFT index,[16] that is the number of decayed, missing, and filled teeth individually with the use of a standard dental mirror and probe, and was expressed as the DMFT means while modified gingival index (MGI) [17]was used to identify the presence or absence of gingival diseases. Dental examination was carried out by using sterile dental instruments (mouth mirrors and explorers) under natural light.

Data analysis

Data was analyzed using the Statistical Product and Service Solutions (SPSS) version 20.0 (SPSS Inc, Chicago, Il.)[18] Relevant sociodemographic and clinical characteristics were presented as frequency (percentages), while continuous variables were presented as means and standard deviation. The conditional logistic regression method was used to determine the factors associated with oral hygiene status which was dichotomized into two categories ("good/fair" and "poor"). Variables that were entered into the logistic regression model included age, sex, muscle power, aphasia, facial nerve palsy and modified Rankin score. The independent predictors of poor oral hygiene status were determined using the backward elimination logistic regression method. Results of the multivariate logistic regression analysis were presented as odd ratios with 95% confidence intervals and level of significance (p) set at <0.05.

RESULTS

A total of 120 patients (male 62.5%) with a mean age of 60.30±13.21 (range 21-91) years participated in the study. Only 49 (40.8%) of the patients had at least 12 years of formal education (minimum of senior secondary level of education)(≥ primary). Eighty per cent had hypertension as the dominant modifiable risk factor for stroke. Modified Rankin Scale (mRS) score was good (≤ 2) in 73.3% of the study participants. These are shown in Table 1.

Oral Hygiene Practices among Participants

In this study, 33.3% of the respondents had utilized dental services previously. The common reason for dental service utilization was dental extraction due to toothache (8.3%), while other reasons were scaling and polishing (1%) and dental checkup (1%).

Seventy (70%) of the patients brushed their teeth once a day. There was no significant association between the frequency of tooth brushing and their modified Rankin score (p=0.937).

Oral Health Status

Only 35 (29.2%) of the patients brushed their teeth at least twice daily, while only 40 (33.3%) reported having ever visited a dentist. The median (IQR) number of decayed-missing-filled teeth (DMFT)

index was 2 (0-2), and the mean DMFT was 1.37±2.672. Dental caries was seen in 48/120 (40%) while 28 (23.3%) had gingival diseases [Table 1]. The presence of dental caries was higher, 88 (73.3%) in participants with good mRS score compared to 32 (26.7%) in those with poor mRS; however, there was no statistically significant difference between the DMFT and the modified modified Rankin score (p=0.085).

Oral Hygiene index and its predictors

As shown in Figure 1, only 28.8% had good oral hygiene status while 29.7% had poor oral hygiene. Conditional logistic regression analysis showed that a modified Rankin score of 3-5 predicted poor oral hygiene status (OR 1.367; 95% CI 1.020-1.832; p=0.036). (Table 2)

Table 1: Sociodemographic and clinical characteristics of study participants

Gender	**N (%)**
Male	75 (62.5)
Female	45(37.5)
Educational Status	
No primary School Education	11(9.17)
Primary School Education	31(25.83)
Secondary School Education	24(20.00
Tertiary School Education	46(38.33)
Postgraduate School Education	8(6.67)
Duration of stroke, n (%)	
1-6 months	55 (45.8)
7-12 months	20 (16.7)
>12 months	45 (37.5)
Functional status using Modified Rankin Score (mRS), n (%)	
Good (mRS ≤2)	88 (73.3)
Poor (mRS 3-5)	32 (26.7)
Frequency of tooth brushing per day	
Once	85 (70.8)
Twice	30 (25.0)
Thrice	5 (4.2)
Utilization of dental services	
Yes	40(33.3)
No	80(66.7)
Gingival status	
Presence of gingival disease	28(23.3)
Absence of gingival disease	92(76.7)
Aphasia	
Presence of Aphasia	30(25)
Absence of Aphasia	90(75)
Facial Palsy	
Presence of Facial Palsy	36(30)
Absence of Facial Palsy	84(70)
Muscle Power	
Right Upper Limb	3.60±1.92
Right Lower limb	3.53±1.88
Left upper limb	3.76±1.85
Left lower Limb	3.74±1.88

Table 2: Predictors of Poor Oral Hygiene Status on Conditional Logistic Regression

	Predictor Variable	Odd ratio (95% CI)	P value
Step 1[a]	Age	1.036 (0.998-1.076)	.064

	Aphasia	2.063 (0.695-6.122)	.192
	Poor muscle power	1.067 (0.324-3.514)	.915
	Facial nerve palsy	.803 (0.356-1.812)	.597
	Modified Rankin score	1.357 (0.925-1.991)	.118
	Constant	.025	.046
Step 2[a]	Age	1.036 (0.998-1.076)	.064
	Aphasia	2.054 (0.695-6.070)	.193
	Facial nerve palsy	.798 (0.357-1.782)	.582
	Modified Rankin score	1.340 (0.990-1.814)	.058
	Constant	.028	.010
Step 3[a]	Age	1.034 (0.997-1.073)	.072
	Aphasia	2.315 (0.851-6.297)	.100
	Modified Rankin score	1.363 (1.013-1.835)	.041*
	Constant	.020	.001
Step 4[a]	Age	1.030 (0.994-1.068)	.105
	Modified Rankin score	1.367 (1.020-1.832)	.036*

*Significant p value.

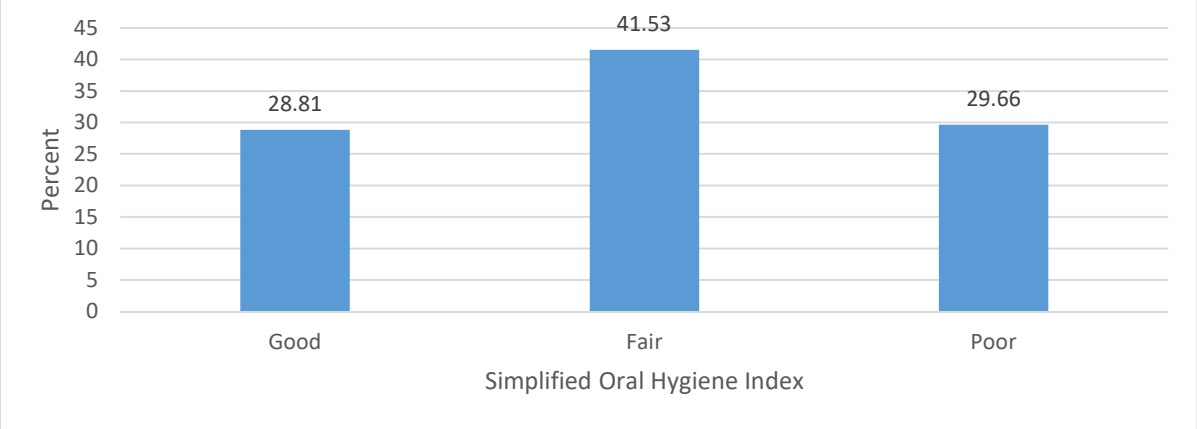

Figure 1: Oral Hygiene Status of study participants

DISCUSSION

This study analyzed and evaluated the oral hygiene index and its predictors in stroke survivors.

The results show that about one-third of the participants, had poor oral hygiene status and a modified Rankin score of 3-5 was an independent risk factor for this observation. This is not entirely surprising since 32 (26.7%) of our stroke patients had a high degree of disability and required assistance with self-care and activities of daily living, putting them at risk of having poor oral hygiene. Our findings are comparable to previous reports from similar previous studies among stroke patients.[9,15,19-23] It has been demonstrated that factors like advanced age, lower Barthel index score (a measure of the degree of dependence) and higher modified Rankin score among others are associated with poor oral hygiene status in stroke patients[9]. Despite a high proportion of our study participants having good functional status as assessed by the modified Rankin score, this measure of functional status emerged as the independent predictor of oral hygiene status. Patients with a mRS score of 3-5 (poor functional outcome) are about 37% at higher risk of poor oral hygiene status compared to those with lower mRS scores. This is not surprising because these are patients with moderate to severe disability which would impair adequate self-care. It is thus imperative that those with poor modified Rankin scores should have assistance with oral care during their rehabilitation as their frequency and intensity of tooth brushing may be comparatively lower compared to that of apparently healthy individuals and stroke patients with good functional status. The fact that about 70% of our patients brushed once daily shows that probable ineffective brushing

because of disability could have contributed negatively to their oral health status.

This study reported a dental service utilization rate of 33.3%, which is higher than the 23.9% reported by Osadolor et al[24] but lower than the 50% reported by Kim et al.[25] Symptomatic reasons emerged as the predominant motivation for seeking dental services, a trend consistent with earlier studies[26,27,28]. Ajayi et al,[29] further underscored fear-related conditions as a primary obstacle to oral healthcare uptake within the studied demography. Among these, apprehension towards dental injections ranked highest. The phenomenon of dental anxiety and pain-related fears in dentistry was noted to have persisted notwithstanding advancements in dental technology, procedures, and preventative measures.[29]

It is imperative to acknowledge that disparities in utilization rates across studies may be attributed to other multiple contributory factors. Notably, the constrained availability of dental services in the present study locale, coupled with potential impediments posed by high treatment costs and a shortage of adequately trained dental professionals, may serve as plausible explanations for the observed lower utilization rate. This observation corroborates the findings of Ajayi et al. [29] These considerations are of paramount significance in formulating strategies aimed at enhancing oral health care accessibility and utilization within the study community. Moreso, participants in this study may have prioritized other healthcare needs over dental care due to a lack of awareness about the importance of oral health. On the other hand, the higher utilization rate reported by Kim *et al.*[25] could be attributed to differences in the study population or methodology.

The mean DMF among stroke patients ranged from 8.57±7.10 to21.6±9.7 as reported in previous studies.[30,31] It is however lower in the present study. This could be because most of our participants received care in the tertiary institution and also have tertiary education. Almost half of the participants (40%) experienced dental caries, the probable explanation for this could be due to oral sensorimotor impairment leading to the accumulation of plaque and food debris on the tooth causing dental caries.

Our study indicates that 23.3% of participants exhibited signs of gingival diseases (periodontal diseases), a prevalence notably lower than reported rates in analogous investigations. For example, Yunus[27] reported a substantially higher prevalence of 99.4% in their study population, highlighting substantial variability. This variance in prevalence rates can be ascribed to diverse factors, including sample size, demographic heterogeneity, and cultural distinctions among nations.

CONCLUSION

Poor oral hygiene status was common among the participants, with those who have poor functional status being at higher risk. It is thus imperative that oral health is considered in the holistic rehabilitation of every stroke patient. Those with poor functional status will need assistance with oral care because of the limitation of their ability to brush properly which will negatively affect their oral health. To reduce the accumulation of food particles in the oral cavity, a comprehensive oral hygiene instruction that may include instruction on the use of an electric toothbrush, large hand-held toothbrush, and water irrigation instrument coupled with plaque-revealing tablets and running a washcloth chlorhexidine through the vestibule may be needed in stroke patients, especially those with poor functional status.

LIMITATION

Our study was limited to only stroke patients who were on follow-up at the outpatient clinic, hence our findings need to be interpreted within this context. However, if inpatients were included, the overall oral health status reported could have been worse than what we found because of the higher degree of disability at that stage.

RECOMMENDATION

The assessment of patients in the acute phase of a stroke and documenting their oral health status is highly recommended. This will improve outcomes through the early institution of prevention and avoidable complication like aspiration pneumonia to which a patient with poor oral health status could be highly susceptible.

Source of support

Nil

Conflict of Interest

None declared

REFERENCES

1. Aho K, Harmsen P, Hatano S, Marquardsen J, Smirnov VE, Strasser T. Cerebrovascular disease in the community: results of a WHO collaborative study.Bull World Health Organ. 1980; 58:113–130.
2. Thayabaranathan T, Kim J, Cadilhac DA, Thrift AG, Donnan GA, Howard G, Howard VJ, Rothwell PM, Feigin V, Norrving B, Owolabi M.

Global stroke statistics 2022. Int J Stroke. 2022;17:946-56.
3. Owolabi M. Taming the burgeoning stroke epidemic in Africa: stroke quadrangle to the rescue. West Indian Med J. 2011; 60:412–421.
4. Krishnamurthi RV, Feigin VL, Forouzanfar MH, Mensah GA, Connor M, Bennett DA, Moran AE, Sacco RL, Anderson LM, Truelsen T, O'Donnell M. Global and regional burden of first-ever ischaemic and haemorrhagic stroke during 1990–2010: findings from the Global Burden of Disease Study 2010. The Lancet Global Health. 2013 Nov 1;1(5):e259-81.
5. Owolabi MO, Sarfo F, Akinyemi R, Gebregziabher M, Akpa O, Akpalu A, et al: Dominant modifiable risk factors for stroke in Ghana and Nigeria (SIREN): a case-control study. Lancet Glob. Health 2018, 6(4):e436-e446.
6. Sarfo FS, Ovbiagele B, Gebregziabher M, Wahab K, Akinyemi R, Akpalu A, et al: Stroke Among Young West Africans: Evidence From the SIREN (Stroke Investigative Research and Educational Network) Large Multisite Case-Control Study. Stroke 2018, 49(5):1116-1122.
7. Tran P, Mannen J. Improving oral healthcare: improving the quality of life for patients after a stroke. Spec. Care Dent. 2009;29:218-21.
8. Zeng LN, Rao WW, Luo SH, Zhang QE, Hall BJ, Ungvari GS, et al: Oral health in patients with stroke: a meta-analysis of comparative studies. Top Stroke Rehabil2020, 27(1):75-80
9. Lawal IU, Ibrahim R, Ramphoma KJ: Oral hygiene in stroke survivors undergoing rehabilitation: does upper extremity motor function matters? Top Stroke Rehabil2021, 28(7):531-536.
10. Sumayin Ngamdu K, Mallawaarachchi I, Dunipace EA, Chuang LH, Jafri SH, Shah NR, et al: Association Between Periodontal Disease and Cardiovascular Disease. Am J Cardiol2022, 178:163-168
11. .Hunter RV, Clarkson JE, Fraser HW, MacWalter RS: A preliminary investigation into tooth care, dental attendance and oral health related quality of life in adult stroke survivors in Tayside, Scotland. Gerodontology2006, 23(3):140-148.
12. Hashemipour MA, Afshar AJ, Borna R, Seddighi B, Motamedi A. Gingivitis and periodontitis as a risk factor for stroke: A case-control study in the Iranian population. Dental Research Journal. 2013;10(5):613
13. Medical Research Council. Aids to the investigation of the peripheral nervous system. London: Her Majesty's Stationary Office; 1943. Medical Research Council.
14. Uyttenboogaart M, Stewart RE, Vroomen PC, De KJ, Luijckx GJ. Optimizing cutoff scores for the Barthel index and the modified Rankin scale for defining outcome in acute stroke trials. Stroke. 2005; 36: 1984–1987
15. Greene JC, Vermillion JR: The Simplified Oral Hygiene Index. J Am Dent Assoc1964, 68:7-13.
16. Anaise JZ. Measurement of dental caries experience--modification of the DMFT index. Community Dent Oral Epidemiol. 1984; 12:43-6. doi: 10.1111/j.1600-0528.1984.tb01408.x. PMID: 6583041.
17. Lobene,RR. A Modified gingival index for use in clinical trials .Clin.Prevent.Dent.1986;8:3-6
18. Mahmoud N, Kowash M, Hussein I, Hassan A, Al Halabi M. Oral health knowledge, attitude, and practices of Sharjah mothers of preschool children, United Arab Emirates. Journal of International Society of Preventive & Community Dentistry. 2017 Nov;7(6):308.
19. Ghizoni JS, Taveira LA, Garlet GP, Ghizoni MF, Pereira JR, Dionísio TJ, Brozoski DT, Santos CF, Sant'Ana AC. Increased levels of Porphyromonasgingivalis are associated with ischemic and hemorrhagic cerebrovascular disease in humans: an in vivo study. J. Appl. Oral Sci. 2012; 20:104-12.
20. Károlyházy K, Arányi Z, Hermann P, Vastagh I, Márton K: Oral Health Status of Stroke Patients Related to Residual Symptoms: A Case-Control Epidemiological Study in Hungary. Oral Health Prev Dent 2018, 16(3):233-239.
21. Chiu SY, Chang CH, Fu CH, Chen MY. Factors Associated With Oral Health Status and Oral Hygiene Behavior in Patients With Stroke. Hu Li ZaZhi. 2020 Oct 1;67(5):44-55.
22. Moldvai J, Orsós M, Herczeg E, Uhrin E, Kivovics M, Németh O: Oral health status and its associated factors among post-stroke inpatients: a cross-sectional study in Hungary. BMC Oral Health 2022, 22(1):234.
23. Wagner C, Marchina S, Deveau JA, Frayne C, Sulmonte K, Kumar S. Risk of stroke-associated pneumonia and oral hygiene. Cerebrovascular diseases. 2016 Feb 1;41(1-2):35-9.
24. Osadolor OO, Akaji EA, Otakhoigbogie U, Amuta HC, Obi DI, Osadolor AJ. Dental Service

Utilization of a Rural Population in Nigeria. Int J Dent Res. 2019;4(2):62-5..
25. Kim HT, Park JB, Lee WC, Kim YJ, Lee Y. Differences in the oral health status and oral hygiene practices according to the extent of post-stroke sequelae. J Oral Rehabil. 2018;45(6):476-84.
26. Kaira LS, Srivastava V, Giri P, Chopra D. Oral health-related knowledge, attitude and practice among nursing students of Rohilkhand medical college and hospital: A questionnaire study. J orofac Res 2012; 2:20-3.
27. Ekanayake L, Ando Y, Miyazaki H. Patterns and factors affecting dental utilisation among adolescents in Sri Lanka. Int Dent J 2001; 51:353-8.
28. Tubaishat RS, Darby ML, Bauman DB, Box CE. Use of miswak versus toothbrushes: Oral health beliefs and behaviours among a sample of Jordanian adults. Int J Dent Hyg. 2005; 3:126-36
29. Ajayi DM, Arigbede AO. Barriers to oral health care utilization in Ibadan, South West Nigeria. African health sciences. 2012; 12:507-13.
30. Yunus GY, Itagi AB. Oral health status in cerebrovascular accident survivors (cva)-a descriptive cross sectional study. Ind. J. Sci. Res. and Tech. 2014 2(1):61-68/
31. McMillan AS, Leung KC, Pow EH, Wong MC, Li LS, Allen PF. Oral health-related quality of life of stroke survivors on discharge from hospital after rehabilitation. Journal of oral rehabilitation. 2005 Jul;32(7):495-503