Makara Journal of Health Research

Volume 24
Issue 1 *April*

Article 4

4-1-2020

Oral health related quality of life in stroke survivors at community-based rehabilitation centre: A pilot study

In Meei Tew
Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia

Chui Ling Goo
Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia

Shahida Mohd Said
Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia, shahidams@ukm.edu.my

Hafizul Izwan Zahari
Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia

Noor Amalina Ali
Lundang Paku Dental Clinic, Koto Bharu 16450, Malaysia

See next page for additional authors

Recommended Citation

Tew IM, Goo CL, Said SM, Zahari HI, Ali NA, Masawi FA, et al. Oral health related quality of life in stroke survivors at community-based rehabilitation centre: A pilot study. Makara J Health Res.2020;24:21–26.

Oral health related quality of life in stroke survivors at community-based rehabilitation centre: A pilot study

Authors

In Meei Tew, Chui Ling Goo, Shahida Mohd Said, Hafizul Izwan Zahari, Noor Amalina Ali, Fatin Athirah Masawi, Aznida Firzah Abdul Aziz, and Tuti Ningseh Mohd Dom

Makara J Health Res. 2020;24(1):21–26
doi: 10.7454/msk.v24i1.1181

Oral health related quality of life in stroke survivors at community-based rehabilitation centre: A pilot study

In Meei Tew[1], Chui Ling Goo[1], Shahida Mohd Said[1*], Hafizul Izwan Zahari[1], Noor Amalina Ali[2], Fatin Athirah Masawi[3], Aznida Firzah Abdul Aziz[4], Tuti Ningseh Mohd Dom[5]

1. Department of Restorative Dentistry, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia
2. Lundang Paku Dental Clinic, Koto Bharu 16450, Malaysia
3. Sungai Pinang Dental Clinic, Tumpat 16200, Malaysia
4. Department of Family Medicine, Preclinical Block, UKM Medical Centre, Bandar Tun Razak, Cheras 56000, Malaysia
5. Department of Family Oral Health, Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur 50300, Malaysia

E-mail: shahidams@ukm.edu.my

Abstract

Background: Despite being a common problem, long-term disability following stroke often improves after survivors receive regular rehabilitative therapy. This study aimed to assess the oral health-related quality of life (OHRQoL) of stroke survivors who had access to a community-based rehabilitation centre after hospital discharge. **Methods**: Dentate post-stroke patients receiving regular rehabilitative care with slight to moderate dependency (Barthel Index >70) and without severe cognitive impairment were involved in this study. The OHRQoL parameters were measured using the Oral Health Impact Profile-14 (OHIP-14) and EuroQol five dimensions (EQ-5D-5L) questionnaires. **Results**: Thirty one patients were recruited in this study. Majority of the patients hardly ever or never had problems in all functional, physical, psychological and social domains, including eating discomfort and having to avoid eating, difficulty in chewing food and presumably having bad breath (58.1%, 61.3% and 71.0% respectively). Other than gender, age, ethnicity, co-morbidities and oral hygiene practices, education level was the only variable found to significantly affect patients' OHRQoL (p = 0.028). Most of the patients had no or slight problem(s) in self-care (87.1%) and carrying out usual activities (57.1%), pain/discomfort (3.2%) and anxiety/depression (6.5%). **Conclusion**: Stroke survivors under regular rehabilitative care perceived have good oral health-related quality of life.

Keywords: post-stroke, general health, oral health, quality of life, rehabilitation centre

Introduction

Stroke remains a common global health-care problem with long-term implications for disability. According to the Malaysian Stroke Registry, stroke is among the top five leading causes of death,[1] with a total of 11,284 stroke cases and an increased mortality rate reported between 2009 and 2016. The main contributory death factors of stroke include massive bleeding (34%), massive cerebral infarct (25%), and aspiration pneumonia (22%). Nearly two-thirds of those who manage to survive a stroke will suffer long-term disability alongside physical, psychological, and/or social impairments after discharge from the hospital.[2] To ensure a better life quality and care following an acute stroke and hospital discharge, it is crucial to provide long-term post-stroke rehabilitative care to patients during their recovery period;[3] it is also vital to establish community-based rehabilitative centers throughout Malaysia.[4] This is especially important in areas where access to stroke care services is limited or lacking.[5]

Oral health-related quality of life (OHR-QoL) refers to the extent to which oral disorders affect a person's functions and psychosocial well-being.[6] Stroke can have negative impacts on vital oral functions, such as eating, swallowing, and communication, while medications-associated dry mouth has been shown to cause oral health deterioration in post-stroke patients.[7] In addition, the disability to eat well can considerably impact nutrition, quality of life, general health, and subsequent recovery.[8] Home-residing stroke survivors following discharge from the hospital have been shown to have poor OHR-QoL due to physical disability and poor oral

hygiene.[9] Long-term adverse effects of OHR-QoL have been well documented for six months[10] and even one year after discharge from the hospital.[11]

Stroke survivors who receive outpatient rehabilitation immediately after they are medically stable have exhibited favorable stroke recovery.[12] The multi-disciplinary approach in community-based rehabilitation centers can help stroke survivors control their blood pressure and improve their functional level.[13] Furthermore, the introduction of advanced oral health-care programs in outpatient rehabilitation centers has been proven to improve oral hygiene and OHR-QoL of stroke survivors.[14] A study on post-discharge stroke survivors in one of the primary care units in Malaysia showed the positive impacts of OHR-QoL, especially in the domains of functional limitations, physical disability, and handicap.[15]

With the growing number of post-stroke survivors in Malaysia, the quality of life of this population deserves more attention. Although many studies to date have been conducted on OHR-QoL in post-stroke patients, their focus has mainly been on hospitalized stroke patients, overlooking the majority of post-stroke patients who have been transferred to primary care centers after discharge from the hospital. Hence, this study aims to draw on the European Quality of Life Five Dimensions Five Level Scale questionnaire (EQ-5D-5L) and the oral health impact profile-14 (OHIP-14) to assess OHR-QoL in post-stroke patients who are receiving long-term rehabilitative care.

Methods

This cross-sectional study involved stroke survivors who received rehabilitative care in a government primary care clinic in Kuala Lumpur from June 2017 to December 2017. Inclusion criteria required patients to: (a) have been in a stabilized condition since discharge from an acute care hospital and able to perform their daily activities with slight or moderate dependency (Barthel Index > 70);[16] (b) be 18 years old and above, and; (c) have reported stable cases when transferred to a rehabilitation clinic from an acute care hospital. Patients were excluded if they had a severe cognitive impairment (Mini-Mental State Examination score ≤ 9), had naso-gastric tube insertion/placement, or were edentulous.[17] Written informed consent was obtained from all patients at recruitment. Patient information, such as, age, gender, ethnicity and level of education was recorded. This study was approved by the Institutional Review Board of the National University of Malaysia (Ethics No.: UKM PPI/111/8/JEP-2016-525).

Questionnaires. The quality-of-life parameters were measured using the following translated and validated questionnaires EQ-5D-5L[18] and OHIP-14.[19] All patients were able to read and understand Malay and/or English; they completed the above two questionnaires themselves in the presence of an interviewer.

Measurement of generic health status. EQ-5D-5L is an instrument that measures the general health status along five dimensions, namely mobility, self-care, routine activities, pain/discomfort, and anxiety/depression. The respondents self-rated their level of severity for each dimension using a five-level scale: "having no problems;" "having minor problems;" "having moderate problems;" "having severe problems;" and "having extreme problems."

Measurement of oral specific quality of life. OHIP-14 is a 14-item instrument that captures the seven dimensions of oral health components, namely handicap, social disability, psychological disability, physical disability, psychological discomfort, physical pain, and functional limitation. Responses are coded using a 5-point Likert scale: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = fairly often; and 4 = very often. A high score indicates poor OHR-QoL, while the total number of patients choosing "never" and "hardly ever" represents the percentage of patients with satisfactory OHR-QoL.

Statistical analyses. All the collected data were analyzed using SPSS software version 22 (SPSS Inc.). Frequencies and percentages were used to describe the distribution of responses for each question in EQ-5D-5L and OHIP-14 questionnaires. Because the sample size was small and the data were not normally distributed, the Mann–Whitney and Kruskal–Wallis tests were used to assess the median OHIP-14 scores based on sociodemographic characteristics, general health factors, and oral hygiene practices. The level of significance was set at 0.05 for all tests.

Results

The sociodemographic characteristics of stroke survivors and their association with the median OHIP scores are shown in Table 1. Our study involved 22 male (71%) and nine female patients, representing 36.9% of the total clinic enrolment with a mean age of 62 years (SD = 10.01). No significant differences were found between gender, age, ethnicity, and the median OHIP scores. However, patients with higher levels of education showed significantly poor OHR-QoL ($p = 0.028$).

Tables 2 and 3 demonstrate the median OHIP scores based on general health and oral hygiene practices. The majority of patients in this study were diagnosed with hypertension, hypercholesterolemia, and/or diabetes; however, the presence of these comorbidities did not significantly affect OHR-QoL. Most of the patients visited dental clinics when needed (67.7%), brushed their

Table 1. OHIP-14 scores according to the sociodemography characteristics of stroke survivors

Variables	N (%)	Median OHIP scores	95% CI	*p**
Gender				
Male	22 (71.0)	22.5	18.0–29.0	0.250
Female	9 (29.0)	19.0	16.0–28.0	
Age (years)				
30–49	3 (9.6)	20.0	14.0–33.0	
50–69	22 (71.0)	23.0	19.0–29.0	0.471
70–89	6 (19.4)	18.0	15.5–25.0	
Ethnicity				
Malay	18 (58.1)	24.0	19.0–32.0	
Chinese	11 (35.5)	20.0	17.0–23.5	0.257
Indian	1 (3.2)	14.0	14.0–14.0	
Others	1 (3.2)	22.0	22.0–22.0	
Educational level				
Primary school	5 (16.1)	18.0	17.0–25.0	
Secondary school	22 (71.0)	22.0	18.0–24.0	0.028*
University	4 (12.9)	32.0	19.0–67.0	

*$p < 0.05$
Mann–Whitney test for gender.
Kruskal–Wallis test for age, ethnicity, and education level.

Table 2. OHIP-14 scores based on types of medical conditions

Comorbidities	N (%)	Median OHIP scores	95% CI	*p*
Hypertension				
Yes	28 (90.3)	22.0	18.0–24.5	0.234
No	3 (9.7)	41.0	17.0–67.0	
Hypercholesterol				
Yes	17 (54.8)	23.0	18.0–29.0	0.528
No	14 (45.2)	22.0	17.0–33.0	
Diabetes				
Yes	16 (51.6)	21.0	18.0–25.0	0.785
No	15 (48.4)	24.0	17.0–31.5	

*$p < 0.05$
Mann–Whitney test for hypertension, hypercholesterol, and diabetes.

Table 3. OHIP-14 scores according to oral hygiene practices

Variables	N (%)	Median OHIP scores	95% CI	*p*
Frequency of dental visit				
<Once a year	7 (22.6)	23.0	17.5–33.0	0.935
>Once a year	3 (9.7)	19.0	18.0–44.0	
When needed	21 (67.7)	22.0	18.0–28.0	
Frequency of tooth brushing				
Once a day	16 (51.6)	18.0	17.0–25.0	0.644
Twice a day	11 (35.5)	25.5	22.0–32.0	
>Twice a day	4 (12.9)	18.5	16.0–41.0	
Frequency of mouth rinsing				
Never	28 (90.4)	22.0	18.0–25.0	0.664
Seldom	1 (3.2)	35.0	35.0–35.0	
Once a day	1 (3.2)	32.0	32.0–32.0	
More than twice a day	1 (3.2)	18.0	18.0–18.0	
Frequency of flossing				
Never	30 (96.8)	22.0	18.0–25.0	0.078
Seldom	1 (3.2)	44.0	44.0–44.0	

*$p < 0.05$

Table 4. Percentage distribution of patients according to their responses to individual OHIP-14 questions

Items	Very often/quite often N (%)	Sometimes N (%)	Seldom/never N (%)
Functional limitations			
Chewing difficulty	5 (16.1)	7 (22.6)	19 (61.3)
Bad breath	4 (12.9)	5 (16.1)	22 (71.0)
Physical pain			
Eating discomfort	4 (12.9)	9 (29.0)	18 (58.1)
Oral ulcer	2 (6.5)	3 (9.7)	26 (83.9)
Psychological discomfort			
Food lodged	10 (32.3)	9 (29.0)	12 (38.7)
Shy	1 (3.2)	7 (22.6)	23 (74.2)
Physical disability			
Avoid eating	6 (19.4)	7 (22.6)	18 (58.1)
Avoid smiling	0 (0.0)	5 (16.1)	26 (83.9)
Psychological disability			
Sleep disturbance	3 (9.7)	1 (3.2)	27 (87.1)
Concentration disturbance	1 (3.2)	2 (6.5)	28 (90.3)
Social disability			
Avoiding socializing	2 (6.5)	0 (0.0)	29 (93.5)
Daily activities disrupted	1 (3.2)	2 (6.5)	28 (90.3)
Handicap			
Spending money	5 (16.1)	4 (12.9)	22 (71.0)
Low confidence	2 (6.5)	2 (9.7)	26 (83.9)

Table 5. Percentage distribution of patients according to their responses to individual EuroQol questions

Items	No or minor problems N (%)	Moderate problems N (%)	Severe problems N (%)
Mobility	12 (38.7)	13 (41.9)	6 (19.4)
Self-care	27 (87.1)	1 (3.2)	3 (9.7)
Routine activities	18 (58.1)	5 (16.1)	8 (25.8)
Pain or discomfort	21 (67.7)	9 (29.0)	1 (3.2)
Anxiety or depression	22 (71.0)	7 (22.6)	2 (6.5)

teeth once a day (51.6%), and never used mouth rinse (90.3%) or flossing (96.8%). None of the oral hygiene practices had a significant impact on OHR-QoL.

The majority of patients seldom or never had problems in any of the domains, notably the "psychological disability" and "social disability" domains (Table 4). More than 75% of the patients felt confident in their life after the stroke. However, fewer than 50% of the patients refrained from eating certain foods because of chewing and eating difficulties. Food impaction (61.3%) was the only individual item response that considerably affected their OHR-QoL.

According to Table 5, 41.9% of the post-stroke patients in our study had moderate problems in mobility. However, this problem barely caused further functional limitations in the majority of patients in terms of self-care (87.1%) and carrying out daily activities (58.1%). More than 50% of the patients had slight or no stroke-related pain and discomfort and had better mental health.

Discussion

Oral health is an integral part of general health and is part of the multidimensional domains that affect the quality of life.[20] Thus, not only did the use of both generic measures (EQ-5D-5L) and oral specific measures (OHIP-14) in this study help attain a comprehensive assessment of OHR-QoL among stroke survivors but the simplicity of both questionnaires also helped reduce the burden and time required to administer the outcome measures to all the respondents.[21]

Our study showed that up to 60% of the patients suffered from moderate-to-severe mobility problems. Similar findings were reported by another study involving 203 stroke survivors in Malaysia, two or more years post-stroke. In this study, up to 30% of the survivors could not perform outdoor walking without aid.[22] However, it is likely that the patients in our study were not affected much by functional limitations in their daily activities despite mobility restrictions. Most of these patients were able to carry out simple

tasks, such as self-cleaning, dressing, and even participating in leisure and family activities. Hence, our results support the benefits of outpatient rehabilitation programs for the improvement of vital functions following a stroke.[23]

Depression and anxiety are strongly associated with quality-of-life impairment in stroke survivors one year after discharge from the hospital.[24] However, this study's findings showed that the majority of patients suffered from fewer mental health issues reported in the psychological domain assessments of EuroQoL and OHIP-14. This is in line with another study that demonstrated an improvement in depression symptoms among 293 stroke survivors who were receiving outpatient rehabilitation treatment in Belgium.[25] This might be explained by the fact that patients with access to post-stroke rehabilitation programs enjoy better coping strategies, which are vital to the post-stroke enhancement process and the minimization of depression symptoms.[26]

This study investigated the OHR-QoL of stroke survivors in relation to their sociodemographic features, presence of comorbidities, and oral hygiene practices. Only the level of education was found to considerably affect OHR-QoL. In contrast to previous studies,[27,28] those with higher education levels in this study usually reported a lower level of OHR-QoL. This trend could emanate from the individuals' expectations when evaluating their OHR-QoL.[29] In comparison with those with lower education levels, highly educated patients were found to be more concerned about their stroke-related oral health and less satisfied with their post-stroke lives,[30] while patients with lower education levels were more willing to accept post-stroke changes in their lives; these tendencies were illustrated by a low score in OHIP-14, indicating a better OHR-QoL.

In this study, the majority of patients reported fewer problems in their individual item responses to OHIP-14. This could be attributed to the fact that stroke survivors who had undergone rehabilitation treatment and had higher functional levels enjoyed a better oral health status and OHR-QoL.[31] Most patients reported high confidence despite restrictions on their participation in social activities. However, only a minority of them complained about eating difficulties, most probably arising from oro-facial muscle weaknesses.[32]

The main limitation of our study was its small sample size. Our cohort of post-stroke patients had a better functional status, given that most incapacitated patients tend to complain about their difficulties attending clinic sessions. The results of our study, therefore, may not be fully representative of the general stroke population in Malaysia. To enable comparison between subgroups and minimize bias in interpretations of outcomes, future studies are advised to include more patients from other post-stroke rehabilitation centers throughout Malaysia alongside those who are residing at care homes.

Conclusion

The majority of our respondents faced no problems in their daily health care in terms of general and oral health. Both questionnaires recorded low scores for the majority of respondents, implying a low stroke impact in terms of general and oral health. Despite the limitations mentioned above, findings from our study support the provision of community rehabilitation services for stroke survivors in primary care centers in Malaysia.[33] Further studies are required to investigate the effectiveness of oral health-care interventions for the continuation of OHR-QoL after a stroke.[34]

Acknowledgments

We wish to convey our utmost appreciation and gratitude to all the clinic staffs and patients at the Primary Clinic, Medical Center of The National University of Malaysia for their contribution and support throughout this research study.

Funding

This study was funded by a Young Researcher Initiative Research Grant (GGPM-2016-056) from The National University of Malaysia.

Conflict of Interest Statement

The authors declare no conflict of interest.

Received: October 16th, 2019 Accepted: January 29th, 2019

References

1. Loo KW, Gan SH. Burden of stroke in Malaysia. *Int J Stroke Off J Int Stroke Soc.* 2012;7:165–7.
2. Farzadfard MT, Sheikh Andalibi MS, Thrift AG, Morovatdar N, Stranges S, Amiri A, *et al*. Long-term disability after stroke in Iran: evidence from the Mashhad Stroke Incidence Study. *Int J Stroke Off J Int Stroke Soc.* 2019;14:44–7.
3. Aziz ZA, Lee YY, Ngah BA, Sidek NN, Looi I, Hanip MR, *et al*. Acute stroke registry Malaysia, 2010-2014: Results from the National Neurology Registry. *J Stroke Cerebrovasc Dis Off J Natl Stroke Assoc.* 2015;24:2701–9.
4. Mohd Nordin NA, Aziz NA, Abdul Aziz AF, Ajit Singh DK, Omar Othman NA, Sulong S, *et al*. Exploring views on long term rehabilitation for people with stroke in a developing country: findings from focus group discussions. *BMC Health Serv Res.* 2014;14:118.
5. Abdul Aziz AF, Mohd Nordin NA, Ali MF, Abd Aziz

NA, Sulong S, Aljunid SM. The integrated care pathway for post stroke patients (iCaPPS): a shared care approach between stakeholders in areas with limited access to specialist stroke care services. *BMC Health Serv Res.* 2017;17:35.
6. Locker D, Clarke M, Payne B. Self-perceived oral health status, psychological well-being, and life satisfaction in an older adult population. *J Dent Res.* 2000;79:970–5.
7. Kwok C, McIntyre A, Janzen S, Mays R, Teasell R. Oral care post stroke: a scoping review. *J Oral Rehabil.* 2015;42:65–74.
8. 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. *J Oral Rehabil.* 2005;32:495–503.
9. Jang EJ, Kim EK, Lee KS, Lee HK, Choi YH, Hwang TY, *et al*. Oral health related quality of life and it's related factors of stroke patients at home in Korea. *Arch Gerontol Geriatr.* 2015;61:523–8.
10. Zhu HW, McGrath C, McMillan AS, Li LS. Can caregivers be used in assessing oral health-related quality of life among patients hospitalized for acute medical conditions? *Commun Dent Oral Epidemiol.* 2008;36:27–33.
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. Gerodontology*. 2006;23:140–8.
12. Cameron JI, O'Connell C, Foley N, Salter K, Booth R, Boyle R, *et al*. Canadian stroke best practice recommendations: managing transitions of care following stroke, Guidelines Update 2016. *Int J Stroke Off J Int Stroke Soc.* 2016;11:807–22.
13. Aziz AF, Aziz NA, Nordin NA, Ali MF, Sulong S, Aljunid SM. What is next after transfer of care from hospital to home for stroke patients? Evaluation of a community stroke care service based in a primary care clinic. *J Neurosci Rural Pract.* 2013;4:413–20.
14. Dai R, Lam OLT, Lo ECM, Li LSW, McGrath C. Oral health-related quality of life in patients with stroke: a randomized clinical trial of oral hygiene care during outpatient rehabilitation. *Sci Rep.* 2017;7:7632.
15. Abdullah NS, Radzali NFM, Saub R, Vaithilingam RD. Oral health related quality of life and periodontal status of a selected Malaysian adult population: A pilot study. *Ann Dent.* 2013:16–23.
16. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. *Md State Med J.* 1965;14:61–5.
17. Lam OL, McMillan AS, Li LS, McGrath C. Predictors of oral health-related quality of life in patients following stroke. *J Rehabil Med.* 2014;46:520–6.
18. Herdman M, Gudex C, Lloyd A, Janssen M, Kind P, Parkin D, *et al*. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Qual Life Res Int J Qual Life Aspects Treat Care Rehabil.* 2011;20:1727–36.
19. Saub R, Locker D, Allison P. Derivation and validation of the short version of the Malaysian Oral Health Impact Profile. *Commun Dent Oral Epidemiol.* 2005;33:378–83.
20. Baiju RM, Peter E, Varghese NO, Sivaram R. Oral health and quality of life: current concepts. *J Clin Diagn Res.* 2017;11:ZE21–6.
21. Richardson M, Campbell N, Allen L, Meyer M, Teasell R. The stroke impact scale: performance as a quality of life measure in a community-based stroke rehabilitation setting. *Disabil Rehabil.* 2016;38:1425–30.
22. Nor Azlin MN, Aziz NA, Saperi BS, Aljunid SM. Functional limitation and health-related quality of life, and associated factors among long term stroke survivors in a Malaysian community. *Med J Malaysia.* 2016;71:313–21.
23. Chien SH, Sung PY, Liao WL, Tsai SW. A functional recovery profile for patients with stroke following post-acute rehabilitation care in Taiwan. *J Formos Med Assoc.* 2020;119:254–9.
24. Lam KH, Blom E, Kwa VIH. Predictors of quality of life 1 year after minor stroke or TIA: a prospective single-centre cohort study. *BMJ Open.* 2019;9:e029697.
25. Visser MM, Heijenbrok-Kal MH, Spijker AV, Oostra KM, Busschbach JJ, Ribbers GM. Coping, problem solving, depression, and health-related quality of life in patients receiving outpatient stroke rehabilitation. *Arch Phys Med Rehabil.* 2015;96:1492–8.
26. Visser MM, Aben L, Heijenbrok-Kal MH, Busschbach JJ, Ribbers GM. The relative effect of coping strategy and depression on health-related quality of life in patients in the chronic phase after stroke. *J Rehabil Med.* 2014;46:514–9.
27. Chen Q, Cao C, Gong L, Zhang Y. Health related quality of life in stroke patients and risk factors associated with patients for return to work. *Medicine.* 2019;98:e15130.
28. Ramos-Lima MJM, Brasileiro IC, Lima TL, Braga-Neto P. Quality of life after stroke: impact of clinical and sociodemographic factors. *Clinics.* 2018;73:e418.
29. Yen YY, Lee HE, Wu YM, Lan SJ, Wang WC, Du JK, *et al*. Impact of removable dentures on oral health-related quality of life among elderly adults in Taiwan. *BMC Oral Health.* 2015;15:1.
30. Ayala-Luis J, Johansson V, Sampogna F, Axtelius B, Söderfeldt B. A multivariable analysis of patient dental satisfaction and oral health-related quality-of-life. A cross-sectional study based on DVSS and OHIP-14. *Acta Odontol Scand.* 2014;72:187–93.
31. 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;45:476–84.
32. Schimmel M, Ono T, Lam OL, Müller F. Oro-facial impairment in stroke patients. *J Oral Rehabil.* 2017;44:313–26.
33. Abdul Aziz AF, Mohd Nordin NA, Abd Aziz N, Abdullah S, Sulong S, Aljunid SM. Care for post-stroke patients at Malaysian public health centres: self-reported practices of family medicine specialists. *BMC Fam Pract.* 2014;15:40.
34. Ab Malik N, Abdul Razak F, Mohamad Yatim S, Lam OLT, Jin L, Li LSW, *et al*. Oral health interventions using Chlorhexidine-Effects on the prevalence of oral opportunistic pathogens in stroke survivors: a randomized clinical trial. *J Evid Based Dent Pract.* 2018;18:99–109.