Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.intl.elsevierhealth.com/journals/jden

The nocturnal use of complete dentures and sleep stability in edentulous elders

Elham Emami[a,b,*], *M. Hamed Salah*[b], *Pierre Rompré*[a], *Nelly Huynh*[a], *Andrew Beauchamp*[a], *Jocelyne S. Feine*[b,c]

[a] *Faculté de Médecine Dentaire, Université de Montréal, Montreal, QC, Canada*
[b] *Faculty of Dentistry, McGill University, Montreal, QC, Canada*
[c] *Department of Epidemiology and Biostatistics and Occupational Health, Faculty of Medicine, McGill University, Montreal, Canada*

ARTICLE INFO

Article history:
Received 30 October 2012
Received in revised form
20 May 2013
Accepted 30 May 2013

Keywords:
Edentulism
Sleep quality
Dental prosthesis
Obstructive sleep apnea (OSA)

ABSTRACT

Objective: To evaluate the stability of sleep quality and the impact of nocturnal use of complete dentures on sleep quality in an elderly edentulous population over a one-year period.

Materials and methods: Written informed consent was obtained from 172 edentulous elders who agreed to enrol in a longitudinal cohort study. A total of 153 participants completed the follow-up after one year. Perceived quality of sleep and daytime sleepiness were measured using the Pittsburgh Sleep Quality Index (PSQI, score 0–21) and the Epworth Sleepiness Scale (ESS, score 0–24) at baseline (T_0) and at follow-up (T_1). Data on oral health related quality of life, type of mandibular dentures (conventional versus implant-retained mandibular overdenture), nocturnal wear of the dentures and socio-demographic status were obtained by means of the OHIP-20 questionnaire, a clinical examination form and a socio-demographic questionnaire.

Results: No statistically significant differences were detected in the global PSQI mean scores and EES mean scores from baseline (PSQI 4.77 ± 3.32; EES 5.35 ± 3.72) to the follow-up assessment (PSQ1 5.04 ± 3.50; EES 5.53 ± 4.34). Edentate elders wearing prostheses at night had poorer daytime sleepiness scores than those who removed their prostheses at night ($p = 0.003$ unadjusted model; $p = 0.058$ adjusted for age, gender, type of prosthesis and the OHIP-20 total score).

Conclusion: Results of this study suggest that wearing complete dentures while sleeping has little effect on sleep quality or daytime sleepiness.

1. Introduction

A common source of dissatisfaction among older people is disturbed sleep. It is estimated that up to 50% of older adults complain of difficulty sleeping, further exacerbating the risks of morbidity in the ageing population.[1,2] It has been reported that 43% of those over the age of 65 have difficulty in the onset and maintenance of sleep, while 25% report daily drowsiness.[3–5] Drowsiness and symptoms of sleep disturbance have

* *Corresponding author at*: Oral Health and Rehabilitation Research Unit, Faculté de Médecine Dentaire, Université de Montréal, C.P.6128, Succursale Centre-ville, Montreal, QC, H3C-3J7 Canada. Tel.: +1 514 343 6053; fax: +1 514 343 2233.
E-mail address: Elham.emami@umontreal.ca (E. Emami).
0300-5712/$ – see front matter
http://dx.doi.org/10.1016/j.jdent.2013.05.017

been associated with declining cognitive abilities, depression, falls and mortalities.[4] Changes in sleep architecture, such as age-related reductions in slow wave sleep (SWS), reduced sleep continuity, increased percentage of stage-two sleep and sleep latency, have been observed in the healthy ageing process as previously reported.[6,7] In addition to such reductions in sleep quality associated with senescence, other parameters may aggravate the symptoms, thus resulting in sleep disturbances.

Sleep disturbances are multifactorial in nature and could be affected by alterations of the circadian rhythm, neuropsychological impairment, use of medications and medical conditions.[8] Among primary sleep disorders often precipitated by the aforementioned co-morbidities is sleep-disordered breathing (SDB), characterized by an apnoea-hypopnoea index (AHI) of greater than five. SDB ranges from the cessation of respiration lasting for at least 10 s (apneas) and/or partial or reduced respiration (hypopneas) during sleep.[5,9]

SDB is often exacerbated with older age, obesity, neurological impairment, abnormalities of respiratory reflexes, alcohol and smoking,[10,11] resulting in decreased quality of life, cognitive impairment, greater risk of nocturia, hypertension and cardiovascular diseases.[2,12] It is also often accompanied by excessive daytime sleepiness (EDS) caused by sleep fragmentation, which could further impede daily social and occupational activities.[13,14]

Among aggravating factors that were proposed to exacerbate the SDB is edentulism. A decrease in retropharyngeal space and/or the hypotonicity of the pharyngeal musculature in edentulous people have been proposed to increase the collapsibility of airways in OSA.[15,16] Using polysomnographic studies, Bucca et al.,[17] suggested a higher AHI in the absence of dentures. Having assessed the anteroposterior oropharyngeal wall distance with supine lateral cephalometry, they attributed the perpetuation of OSA with a decrease in retropharyngeal space. Furthermore, they reported lower arterial haemoglobin saturation in patients following the removal of dentures. Thus, they collectively attributed edentulism with exacerbation of OSA, in addition to previously recognized risk factors associated with craniomandibular abnormalities.[17]

In spite of suggested anatomical changes, results of our previous longitudinal cohort study indicated that edentulous older adults are good sleepers, regardless of the nocturnal wearing of their dentures. Assessment of the association between oral health-related quality of life (OHRQoL) and quality of sleep in this study confirmed that the former is a major contributor to the quality of sleep in the elderly.[18] Furthermore, perceived general health and OHRQoL predict sleep quality and daytime sleepiness. These results may collectively suggest that, in fact, poor OHRQoL and general health are better predictors of sleep disturbance than anatomical changes associated with not wearing dentures at night. Therefore, the objective of this study was to examine the stability of sleep quality and daytime sleepiness over time and to evaluate the impact of nocturnal denture wearing in a cohort of edentulous elders. We tested the null hypothesis that there is no difference in the subjective sleep quality and daytime sleepiness of edentate elders who do and do not wear their dentures during sleep over a one-year period.

2. Materials and methods

2.1. Study design

This manuscript reports the sleep results of the longitudinal prospective study emerging from an earlier randomized controlled trial (RCT). This previous RCT was designed to assess the impact of mandibular two-implant retained overdentures (IODs) on the nutritional status of edentulous elders. The eligibility criteria and other details have previously been described.[18,19] In brief, a total of 255 edentulous females and males aged 365 years participated in this previous clinical trial. The patients randomly received either mandibular conventional dentures or overdentures retained by ball attachments on two implants and new conventional maxillary dentures during the period of 2006–2008. A sub-sample of these patients was recruited for this present prospective study. Inclusion criteria included only participants who previously participated in the RCT, were willing to wear the study dentures and were able to fully understand and respond to study questionnaires. The study protocol was approved by the Université de Montréal and McGill University Institutional Review Boards, and written informed consent was obtained from the 172 individuals who agreed to enrol in this prospective study. The participants underwent a series of independent assessments regarding their sleep at baseline (T_0, one year after receiving their new prosthesis) and then reviewed one year later (T_1). Participants who did not participate in the T_1 assessment were excluded from the data analysis.

2.2. Outcomes and variables

The primary and secondary outcomes of this study were self-reported sleep quality and the daytime sleepiness. These two parameters were assessed by the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS), respectively. The PSQI is comprised of a self-reported questionnaire with 19 items encompassing seven clinical component scores, each ranging from 0 to 3. These components yield a global score of 0–21. The higher total global score represents a decline in sleep quality. An overall score $\geq$5 suggests the existence of sleep problems.[20] Stability and reliability of this index have been previously evaluated.[20–23] The ESS (scores ranging from 0 to 24) assesses the daytime likelihood of falling sleep with no specific time frame. Values of $\geq$10 often correspond to significant drowsiness. Reliability and validity of these questionnaires have been previously examined.[24]

The independent variables in this study include socioeconomic status, type of mandibular dentures (conventional or implant-retained overdenture), nocturnal wear of maxillary and mandibular dentures and oral health related quality of life, as measured by the OHIP-20 (Oral Health Impact Profile).

The Oral Health Impact Profile-20 (OHIP-20) is a validated denture-specific measure of the oral health-related quality of life (OHRQoL).[25,26] This 20-item questionnaire includes functional limitation, pain, psychological discomfort, physical disability, psychological disability, social disability and handicap. The items were rated on six-point Likert-type scales (never, rarely, occasionally, often, very often or all of the time).