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Correlation of Prosthetic Status with the Gohai and Tmd Indices

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Abstract - *this study sought to find a correlation between the prosthetic status and TMD and between the prosthetic status and self-perception of oral health in a Brazilian elderly population (n=400). Prosthetic status was recorded in clinical examinations, and TMD was determined by applying the Helkimo index. Self-perception of oral health was evaluated based on the Geriatric Oral Health Assessment Index (GOHAI). The most prevalent prosthetic status was edentulous using complete dentures (47.5%). Absence of subjective TMD symptoms was found in 69.5%, and of clinical TMD signs in 38.3% of the population. The average GOHAI score was 33.02 ± 2.85. A correlation was found between prosthetic status and TMD subjective symptoms (P=0.017), but prosthetic status and TMD objective signs were uncorrelated (P=0.061). Prosthetic status and self-perception of oral health were positively correlated (P=0.001).*

KEY WORDS**:** Temporomandibular dysfunction, Geriatric Oral Health Assessment Index, institutionalized elderly, community-dwelling elderly, prosthetic status.

INTRODUCTION

The aetiology of temporomandibular dysfunction (TMD) is still unclear[1, 2]. Several changes that attend ageing, such as pathological changes in teeth and periodontal tissues, with consequent loss of occlusal contacts and diminished oral motor function[3, 4], could lead to the conclusion that TMD is more prevalent among elderly populations. Furthermore, changes in occlusal relationships due to the use of removable dentures[5], prolonged use of dentures[6], and excessive wear of artificial teeth are expected to further aggravate TMD symptoms among the elderly.

However, recent research has revealed that TMD symptoms in elderly populations are not as prevalent as previously thought[1, 2, 7, 8] and the belief that occlusion plays a main role in TMD etiology has been weakened, while psychological and general health have received greater emphasis as important factors in declared TMD symptoms[9, 10].

Recent researches [1, 11] found that TMD symptoms are more closely related to general health and psychosomatic complaints than to prosthetic or dental status, particularly in elderly populations. Analyzing the relationship between TMD symptoms and dental status, general health and background factors among two cohorts of 70-year-old Swedish subjects, the authors found that there was no significant correlation between the number of teeth and single TMD symptoms or the TMD index. In contrast, the number of TMD symptoms and psychosomatic complaints presented a stronger correlation[1]. These findings were corroborated in other studies[8, 11], indicating that subjective symptoms associated with a multi-symptomatic situation probably exert a stronger impact on the oral health self-perception of the elderly than objective clinical signs.

Nevertheless, earlier studies reported that oral function[12, 13] and quality of life[14] are negatively affected in TMD patients; and that health-related quality of life was also negatively influenced by patients' prosthetic status[15, 16]. Other studies have shown the benefits of prostheses in the recovery of oral function, improving the patient's nutritional status and general health[17, 18].

Considering the need for a more comprehensive understanding about how prosthetic status, TMD and self-perception of oral health among the elderly are correlated, the present paper investigated the prevalence of TMD, prosthetic status and GOHAI in an elderly population in São José dos Campos, SP, Brazil. Based on previous research[1, 8], which stated that dental status is not correlated with the TMD index, we hypothesize that TMD is not correlated with prosthetic status. However, there should be a correlation between GOHAI and prosthetic status, since prosthetic status seems to affect health-related quality of life negatively [14, 15].

MATERIAL AND METHODS

Subjects

The target population of this study is the entire elderly population (23,669, 60 years or older) of São José dos Campos, Brazil, according to the latest census (2000)[19]. The single inclusion criterion was age, i.e., 60 years and older. To achieve a representative sample of the target population, including community dwellers and institutionalized elderly, individuals living in institutions for the elderly and community-dwelling elderly had to be actively enrolled in the project.

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All the institutions for the elderly (n=18) in the city, involving all levels of care, were invited to participate in the study, but 27.7% of them (n=5) declined. All the residents of the participating institutions who were able to answer the questions were enrolled in this study. The most convenient way to include community-dwelling elderly in the present survey was to look for them in the city's social groups for independent elderly. The most representative groups (n=11) participated and all the participants in these groups were enrolled in the study.

Applying this sampling methodology, four hundred individuals 60 and older were enrolled in this study. Of these, 185 were residents of institutions for the elderly and 215 were community dwellers. This sample represents 1.69% of the entire elderly population of the city. Using the Minitab power and sample size tool (Minitab Inc., State College, PA, USA), the sample's power was given a score of 0.9793, indicating that it was fairly representative of this city.

The study was previously approved by the institutional review board (protocol number L092/2004/CEP) and all the subjects gave their informed consent. All the interviews and clinical examinations were conducted by a single examiner.

TMD evaluation

The prevalence of TMD was evaluated based on the Helkimo Index[20], which was also used to evaluate patients' complaints (Helkimo Anamnestic Dysfunction Index – Ai) and clinical symptoms (Helkimo Clinical Dysfunction Index – Di) of TMD. The indices were applied by a single previously calibrated examiner.

The Helkimo Anamnestic Dysfunction Index (Ai) evaluates a patient's subjective complaints of TMD and ranges from Ai 0 (absence of subjective symptoms of TMD) to Ai II (severe TMD symptoms). The Helkimo Clinical Dysfunction Index (Di), which evaluates clinical (objective) symptoms of dysfunction on the basis of oriented clinical examinations, ranges from Di 0 (absence of clinical symptoms of TMD) to Di III (more than one severe symptom combined with any of the mild symptoms)

Oral health self-perception

The oral health self-perception was based on the Geriatric Oral Health Assessment Index (GOHAI). This index contains 12 questions about oral health, which are scored from 1 to 3, giving a total sum ranging from 12 to 36. The lower the final score the poorer is the self-rated oral health.

The questions referred to three dimensions: the physical dimension (the individual's chewing, swallowing and vocal abilities), the social dimension (satisfaction with the appearance of teeth; concern about teeth, gums or dentures; social limitations caused by oral health, embarrassment about eating in public); and the concern dimension (ability to eat without discomfort, use of medication to relieve oral discomfort, sensitivity to cold, hot or sweet foods).

The version used in this study was the Brazilian validated GOHAI version, which presented 0.65 Cronbach's alpha[21].

Prosthetic status

The prosthetic status of the patients was evaluated through clinical examinations performed by a single previously calibrated examiner and classified in the groups listed in Table 1.

Statistics

The collected data were tabulated in Excel (Microsoft Inc) software and a descriptive statistics was performed. The Mann-Whitney test was used to check for a possible correlation between gender and GOHAI. The possible correlation between Helkimo indices and prosthetic status was tested by the chi-square test, and the Kruskal-Wallis test was used to check for a possible correlation between prosthetic status and GOHAI.

RESULTS

The sample contained a higher percentage of women (75.3%). The mean age was 72.3 (SD=8.1). Of the total sample of 400 patients, 215 were community dwellers and 185 were institutionalized.

Table 1 shows the prosthetic status of the patients. Fully dentate patients were the smallest slice of the sample (1.3%), followed by fixed bridge users (1.8%) and users of removable partial denture (3.5%). Edentulous patients using complete dentures were the most prevalent group (47.5%), followed by edentulous without dentures (23.3%) and partially dentate with complete dentures (9.5%).

With regard to the presence of subjective TMD symptoms, which was observed based on the Helkimo Anamnestic Dysfunction Index (Ai), 69.5% of the sample showed an absence of subjective TMD symptoms (Ai0), 18.5% displayed mild symptoms (AiI), and 12% showed severe symptoms (AiII) (Table 2).

As for the presence of objective TMD signs, based on the Helkimo Clinical Dysfunction Index (Di), 38.3% of the sample showed an absence of clinical TMD signs (Di0), 56% displayed mild signs (DiI), 4% showed at least one severe sign (DiII), and 1.3% had severe signs (DiIII) (Table 2).

The GOHAI average of the sample was 33.02 ± 2.85, ranging from 21 to 36. The average GOHAI score was 32.92 ± 2.83 among women and 33.32 ± 2.9 among men, but this difference was not statistically significant (P=0.105).

Tables 3 and 4 compare prosthetic statuses with Helkimo indices. The Helkimo Anamnestic Dysfunction Index presented a statistically significant correlation with prosthetic status (P=0.017), but no correlation was found between the Helkimo Clinical Dysfunction Index and prosthetic status (P=0.061).

Table 5 compares the results of GOHAI with various prosthetic statuses. A statistically significant correlation (P=0.001) was found between prosthetic statuses and GOHAI indices. The highest GOHAI averages were found for individuals wearing fixed bridges, followed by fully dentate patients, users of fixed bridges conjugated with removable dentures and wearers of removable partial dentures.

Table 1. *Prosthetic status distribution.*

Prosthetic Status		*n*	*%*
A	Fully dentate	5	1.3%
B	Users of complete dentures	190	47.5%
C	Edentulous without complete dentures	93	23.3%
D	Partially dentate without dentures	37	9.3%
E	Partially dentate with complete dentures	38	9.5%
F	Users of fixed bridge	7	1.8%
G	Users of removable partial dentures	14	3.5%
H	Users of fixed bridge conju-gated w/ removable dentures	16	4.0%

Table 2. *Helkimo index classification of the sample.*

	Classification	*n*	*%*
Helkimo Anamnestic Dysfunction Index (Ai)	Ai 0	278	69.5%
	Ai I	74	18.5%
	Ai II	48	12.0%
Helkimo Clinical Dysfunction Index (Di)	Di 0	155	38.8%
	Di I	224	56.0%
	Di II	16	4.0%
	Di III	5	1.3%

Table 3. *Helkimo Anamnestic Dysfunction Index (Ai) distribution for each prosthetic status. The x^2 test was used to test for possible correlations. The asterisk (*) indicates a statistically significant correlation*

Prosthetic status	*Helkimo Anamnestic Dysfunction Index (Ai)*						*Total*	
	Ai0		*AiI*		*AiII*			
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Fully dentate	2	0.7%	3	4.1%	0	0.0%	5	1.3%
Users of complete dentures	137	49.3%	29	39.2%	24	50.0%	190	47.5%
Edentulous without complete dentures	63	22.7%	21	28.4%	9	18.8%	93	23.3%
Partially dentate without dentures	26	9.4%	8	10.8%	3	6.3%	37	9.3%
Partially dentate with complete dentures	22	7.9%	11	14.9%	5	10.4%	38	9.5%
Users of fixed bridge	7	2.5%	0	0.0%	0	0.0%	7	1.8%
Users of removable partial dentures	12	4.3%	1	1.4%	1	2.1%	14	3.5%
Users of fixed bridge conju-gated w/ removable dentures	9	3.2%	1	1.4%	6	12.5%	16	4.0%
Total	278	69.5%	74	18.5%	48	12.0%	400	100%

P = 0.017*

DISCUSSION

Our first hypothesis was that TMD is uncorrelated with prosthetic status. However, our results revealed a correlation between prosthetic status and subjective TMD symptoms, though not with objective TMD signs. These findings do not agree with previous studies which found no correlation between dental status and TMD[7, 22, 23]. Another study[1] found a weak correlation only in women, who showed more symptoms correlated with more teeth. Psychological and general health factors are believed to play a major role in TMD[9, 10], particularly in elderly populations[1, 2, 8].

It is also important to highlight that a possible source of bias in this study relies on the fact that 70% of this study sample were fully edentate with a further 9% of individuals that are edentulous in one arch. Such preponderance of a given prosthetic status may impair the robustness of the statistical analysis.

Our second hypothesis, that there should be a correlation between GOHAI and prosthetic status, was confirmed by the results of this study. The influence of prosthetic status on oral health self-perception was previously suggested by some authors[15, 16], who found a relationship between oral impacts and occluding pairs of natural teeth. These authors also found that participants with fewer than nine occluding pairs of natural teeth were 2.6 times more likely to report oral impacts than those with nine or more pairs[15]. Furthermore, patients with full prostheses were more likely to complain of limited oral function, report poor health status, and take prescription medication[16].

Inasmuch, the correlation between GOHAI and prosthetic status should help explain the aforementioned correlation of prosthetic status and subjective TMD symptoms, since prosthetic status should negatively affect oral health self-perception, which is correlated with subjective TMD symptoms, as stated earlier[8].

However, it is important to point out that, although statistical significance was found, it should be noted that this statistical finding may not represent a real clinical significance, as the vast majority of the sample presented a positive perception of oral health, above 33 points.

Another result that should be highlighted is that patients presenting more extensive prosthetic treatment (fixed bridges, conjugated RPD and fixed bridge conjugated with removable dentures) reported a higher perception of their oral health, similar to that reported by fully dentate patients. A possible explanation for this finding is that patients' efforts to undergo such extensive dental treatments and their subsequent satisfaction with the results[24, 25] are important variables to be considered in oral health self-perception.

However, it is important to point out that all the findings of the present research (and the majority of cited papers) come from a correlational study design. Due to the com-

Table 4. *Helkimo Clinical Dysfunction Index (Di) distribution for each prosthetic status. The x^2 test was used to test for possible correlations.*

Prosthetic status	*Helkimo Clinical Dysfunction Index (Di)*								*Total*	
	Di0		*DiI*		*DiII*		*DiIII*			
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Fully dentate	0	0.0%	5	2.2%	0	0.0%	0	0.0%	5	1.3%
Users of complete dentures	77	49.7%	106	47.3%	6	37.5%	1	20.0%	190	47.5%
Edentulous without complete dentures	32	20.6%	52	23.2%	6	37.5%	3	60.0%	93	23.3%
Partially dentate without dentures	15	9.7%	19	8.5%	3	18.8%	0	0.0%	37	9.3%
Partially dentate with complete dentures	12	7.7%	24	10.7%	1	6.3%	1	20.0%	38	9.5%
Users of fixed bridge	4	2.6%	3	1.3%	0	0.0%	0	0.0%	7	1.8%
Users of removable partial dentures	10	6.5%	4	1.8%	0	0.0%	0	0.0%	14	3.5%
Users of fixed bridge conju-gated w/ removable denture	5	3.2%	11	4.9%	0	0.0%	0	0.0%	16	4.0%
Total	155	38.8%	224	56.0%	16	4.0%	5	1.3%	400	100%

P= 0.061

Table 5. *Average distribution of GOHAI scores for each prosthetic status.*

GOHAI	*Average*	*Median*	*SD*	*Q1*	*Q3*	*n*	*CI*	*P*
Fully dentate	34.40	36	3.05	35	36	5	2.67	0.001*
Users of complete dentures	33.23	34	2.74	32	35	190	0.39	
Edentulous without complete dentures	32.08	33	3.09	31	34	93	0.63	
Partially dentate without dentures	33.30	34	1.97	32	35	37	0.63	
Partially dentate with complete dentures	32.63	33.5	3.53	31	35	38	1.12	
Users of fixed bridge	35.00	36	2.24	35.5	36	7	1.66	
Users of removable partial dentures	34.07	35	1.86	33.25	35	14	0.97	
Users of fixed bridge conju-gated w/ removable denture	34.19	35	1.97	33	36	16	0.97	

Kruskal-Wallis test was used to test for possible correlations.
The asterisk (*) indicates a statistically significant correlation.

plexity of TMD etiology and the absence of a reliable animal model for TMD, it is very difficult to design a study to identify possible cause and effect relationships among the numerous variables involved.

In view of the above, further studies would be useful to determine if this correlation between prosthetic status and TMD subjective symptoms is also present in different populations and try to gain a deeper understanding of how prosthetic status influences TMD subjective symptoms and oral health self-perception.

CONCLUSION

In a sample of elderly Brazilians, the most prevalent prosthetic status was edentulous using complete dentures, the majority presented absence of subjective TMD symptoms and a positive perception of oral health. A statistical correlation was found between prosthetic status and TMD subjective symptoms, although prosthetic status and TMD objective signs were uncorrelated. Prosthetic status and self-perception of oral health were positively correlated.

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