

Workers oral health: a cross-sectional study

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Abstract

Adults and elderly usually present an expressive tooth loss in household epidemiologic studies. Few studies were found to report oral health conditions in economically active adults. **Aim:** To describe the oral health status of adult workers in an extended range age (20-64 years old) of a supermarket chain. **Methods:** This cross-sectional survey was conducted in a company in the state of São Paulo. A total of 386 workers aged 20 to 64 years old were examined following the guidelines recommended by the World Health Organization (1997) with respect to caries, treatment needs for caries, and need and use of dental prostheses. Age was stratified into groups for analysis. A descriptive analysis was performed and tooth loss rate was calculated. Kruskal Wallis and Tukey's tests were used for the evaluation of differences in DMFT and chi-square test was used for treatment needs. **Results:** The mean DMFT was 14.6 ($\pm$ 8.3), and differences were found among the 3 groups, mainly due to missing teeth. DMFT was 10.8 ($\pm$ 6.95) in the 20-34-year-old group, 19.6 ($\pm$ 6.13) in the 35-44-year-old group and 22.1($\pm$ 7.32) in the 45-64-year-old group. Significant differences in tooth loss rate were observed between the age groups (tooth loss rate ranged from 18% to 81%). Among the adults, 53.5% had treatment needs for caries. **Conclusions:** The younger adult workers in this study showed better oral conditions and an increase in tooth loss was observed in the older individuals. Considering common risk approach, dentistry should work together with health promotion for the studied population of workers in order to meet the oral treatment needs and prevent new tooth losses.

Keywords: adults, occupational health, epidemiology, oral health.

Introduction

The impact of oral health on daily activities and quality of life is known, as well as the number of working hours lost due to oral diseases¹ like untreated caries, severe periodontitis and severe tooth loss, which have been listed among the 100 Global Burden Disease in 2010². Although the prevalence of caries has been decreasing in the last decades, this health improvement presents significant differences regarding the occurrences of oral diseases among countries, regions, cities and population groups, like adults¹. While studies have demonstrated that reduction of oral disease prevalence in household adult population is still a challenge, workers need to be better investigated.

Epidemiological studies among adults focusing on dental caries experience, tooth loss and prosthesis need are useful planning tools for public health. Brazilian nationwide oral health surveys conducted in 1986³, 2003⁴ and 2010⁵ indicate variations of the caries experience index between adolescents, adults and elderly, chiefly as regards the missing teeth component³. While adolescents showed less than one tooth loss, adults from 35 to 44 years of age presented a high number of

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missing teeth in the national epidemiology survey³⁻⁵. This finding may be explained by oral health actions for adults with priority on immediate dental care and restorative dental procedures⁶. The result of those actions was the predominance of lost teeth (with a 50 % to 90 % variation), as shown by oral health surveys of adults and elderly population in a household sample³.

The proportion of economically active adults (older than 20 years) to those who were not working was 2:1, in the São Paulo state⁷. Workers are involved with the local productivity and the economically active population, so it is important to know their oral health status focusing dental care and oral health promotion in the working environment. This study is relevant and presents two differentials from the national epidemiological studies carried out at household level: a sample of workers and an extended age range from 20-64 years old. Thus, the objective of the present study was to investigate the oral health status among workers aged 20 to 64 years in a discount supermarket chain.

Material and methods

Settings and study design

This cross-sectional study was carried out in São Paulo Metropolitan Region, which consists of 39 municipalities and has 19,889,559 inhabitants⁷. Data were gathered between June 2008 and August 2009 among employees of a discount supermarket chain.

Sample

The age range of the sample was 20-64 years old, in order to extend the WHO age range⁸.

Sample size was determined based on the caries experience variable (DMFT) using data of the Oral Health Epidemiological Survey of the State of São Paulo⁹. In order to calculate the sample size of adults aged 20-29, it was used the DMFT of 19 years old (8.9 ± 5.1); for adults aged 30-64 year-old group, it was used the DMFT of 35 to 44 years old (20.3 ± 7.61)⁹. A 95% confidence interval was adopted with precision of 20% and design effect of 2. It was added 20% more adults to the sample, in order to compensate losses and refusals, resulting in a sample size of 376 individuals, being 224 for adults in the 20-30 years range and 152 for adults in the 31-64 years range. The company management was previously informed about the research objective and methods. Twenty-five visits were stipulated to the place and random selection of 16 workers among those present at the day of visit, totalizing 400 examined workers to be enrolled. If the adult was absent the day of the visit, a replace was provided. The universe comprised 2000 employees in 2009.

Variables

Oral examinations were performed at the company site using artificial light, CPI probes and plane dental mirror⁹. The only examiner obtained a 90% concordant diagnosis compared to the reference regarding the clinical conditions

adopted¹⁰. The intra-examiner agreement was 98.5%¹¹.

DMFT index, treatment needs for caries, need and use of prosthesis were measured following WHO guidelines.

Each volunteer filled in a self-applied questionnaire (61 questions) for verification purposes, like demographic factors and socio-economic factors. The inclusion criteria for the survey were: to belong to one of the established age group categories, to show cognitive abilities to answer a written questionnaire and to agree participating in this research.

Statistical analysis

Data were tabulated using the Statistical Package for the Social Sciences (SPSS) 17.0 and the Excel. Age was stratified into 3 sub-groups: 20-34, 35-44 and 45-64.

Descriptive analysis was performed. The differences between DMFT and between genders were verified by the Mann Whitney test, those between DMFT (and its components: decayed, missing and filled teeth) and the age groups by the Kruskal Wallis test followed by Tukey's test (post-hoc one-way ANOVA). Statistical differences among treatment needs, age groups and gender were analyzed by the chi-square test. When the p value was less than 0.05, it was considered significant.

Because of the great difference in the number of missing teeth, the sample was stratified by age into 9 groups (with 5-year intervals) in order to calculate tooth loss rate for each age class, as proposed by Dunning and Klein¹², using the expression $M/DMFT$, where the missing teeth component (M) is the dividend and DMFT index the divisor. In order to soften the cumulative effect of dental loss in time, the number of missing teeth in the older age group was removed from the younger subsequent, so that it would be observed which age range presents addition or reduction of tooth losses. Kruskal Wallis test, followed by Tukey's test (post-hoc one-way ANOVA) was applied to compare tooth loss rate among age groups.

Ethical issues

Considering that human participants were involved in this research, ethical approval was obtained from the Research Ethics Committee of Piracicaba Dental School - State University of Campinas (n°. 122/2005).

Results

Out of the 400 randomly selected workers, 14 refused to participate. Thus, 386 employees between the ages of 20-64 were examined. The mean age was 32.65 years. After stratifying the age groups into 3 sub-groups, there was a predominance of 62.4% (n=241) of younger adults with ages ranging from 20-34 years, followed by adults from 35 to 44 years old with 24.4% (n=94) and the oldest (13.2%, n=51).

Regarding the evaluated demographic factors, 211 (54.7%) were women and the majority (61.1%) was born in the city of São Paulo. Workers' mean family income was US\$715.00. Considering the education level, 18.9% (n=73) completed the elementary school, 71% (n=274) started or

Table 1. Mean values of decayed, missing and filled teeth components, DMFT and sound teeth in workers according to age groups in São Paulo, 2009.

Age group(years)	n (%)	Decayed	Missing	Filled	DMFT	Sound teeth
20-34	241 (62.4)	1.32 ^a (±2.08)	2.35 ^a (±2.79)	6.84 ^a (±5.51)	10.79 ^a (±6.95)	21.21
35-44	94 (24.4)	1.32 ^a (±1.91)	9.36 ^b (±7.18)	8.46 ^a (±6.36)	19.58 ^b (±6.13)	12.42
45-64	51 (13.2)	0.61 ^a (±0.96)	13.45 ^c (±10.12)*	8.38 ^a (±6.40)	22.10 ^b (±7.32)**	9.9
Total	386 (100)	1.23(±1.94)	5.38 (±6.88)	7.44 (±5.88)	14.56(±8.31)	17.44

Note: The Tukey test was used considering $p < 0.05$ for statistical differences. * $p < 0.05$ ** $p < 0.01$

completed the second grade.

The DMFT mean of the general sample was 14.6. By evaluating each component, decayed teeth were 9.5% of the index, missing teeth were 38% and filled teeth 52.5%. No difference was found with respect to the components among the sub-groups, with exception for the M component ($p < 0.05$). Regarding the DMFT index, a difference was observed in the youngest age group (Table 1). The mean of present teeth was 26.6.

A variation in the mean values of missing teeth among the nine age groups was observed (Table 2). The dental loss rate was higher in the last examined group (81%, between 60-64 years). An increase in tooth loss rate was perceived till the 45 year-old group, and moreover till those aged 55-60 years. The biggest difference in missing teeth could be seen between the 30-35-year-old and the 35-39-year-old groups (4.6) (Table 2).

Although the mean values of decayed teeth (1.23 ± 1.94) were found not so high in comparison to the other components of the DMFT index, 44.4% of the studied population presented active caries. Among the examined individuals 53.5% had some treatment needs (Table 3). Extraction was the only treatment need that showed significant difference in the statistical tests among the 3 sub-groups ($p < 0.01$).

Regarding the use of prosthesis, it was found a greater use of maxillary rather than mandibular prostheses. Divergent values were found comparing the gathered data related to the use of prosthesis among the different age groups (Table 4).

In the evaluation of prosthesis need it was verified that the most prevalent necessity was for fixed prostheses for the

substitution of one tooth (11.1%). The need for mandibular prostheses was greater compared with maxillary prostheses, and 47.4% did not need mandibular prostheses (Table 5).

Discussion

This paper highlights the economically active adult population's oral health data, aged from 20 to 64, which is an extended age range in relation to the WHO recommendations⁸, and requires wider investigation. There are few studies about oral health in the working population and the impact of oral disease is well established on the quality of life and daily activities, like work and study.

The DMFT index varied from 10.80 among the workers aged 20-34 to 19.58 among those aged 35-44 years, in other words an almost 100 % increase. Between the adults in the last group and those in the 45-64-age-group (DMFT=22.0) there was no significant difference. However, analyzing only the missing teeth component, differences were observed among the three age groups, with variations from 2.3 to 9.4 and 13.5. In British adults as also in the present study, the youngest presented more sound teeth and less restored teeth, representing healthier teeth than the oldest¹³. Therefore, it is important to investigate the DMFT index and its components in different age groups, in order to allow interpretation of the real meaning of this index, which evaluates the caries experience.

In the latest Brazilian nationwide oral health survey (2011⁵), the adult population (35-44 years) showed DMFT of 16.3. That means a better result compared with 2003 data,

Table 2. Mean values of missing teeth, tooth loss rate, difference in the mean values of missing teeth among age groups (5-year intervals) in São Paulo, 2009.

Age (years)	n%	Mean (SD)	Tooth loss rate M/DMFT	Differences in tooth loss among the age groups
60 to 64	4 (1.0)	24.75 (13.84) ^c	0.81	11.04
55 to 59	8 (2.1)	13.71 (11.15) ^b	0.65	2.93
50 to 54	9 (2.3)	10.78 (9.10) ^b	0.49	-1.81
45 to 49	30 (7.8)	12.59 (9.07) ^b	0.51	1.79
40 to 44	45 (11.7)	10.98 (8.44) ^b	0.54	3.09
35 to 39	49 (12.7)	7.89 (5.51) ^b	0.41	4.6
30 to 34	58 (15.0)	3.29 (2.90) ^a	0.22	0.53
25 to 29	94 (24.4)	2.76 (3.19) ^a	0.24	1.46
20 to 24	89 (23.1)	1.30 (1.80) ^a	0.18	

Note: Different letters indicate significant differences between the groups according to the Tukey's test (post hoc one-way ANOVA) $p < 0.01$

Table 3. Absolute and percentage distribution of treatment needs among the examined subgroups in São Paulo, 2009.

		20 to 34 years n (%)	35 to 44 years n (%)	45 to 64 years n (%)	Total n (%)
Treatment needs for caries	No	112 (46.5)	43 (45.7)	25 (49)	180 (46.6)
	Yes	129 (53.5) ^a	51 (54.3) ^a	26 (51) ^a	206 (53.4)
Type of needs	Restoration of 1 face	60 (24.9) ^a	25 (26.9) ^a	12 (23.5) ^a	97 (25.1)
	Restoration of 2 face	59 (24.5) ^a	26 (27.7) ^a	15 (29.4) ^a	100 (25.9)
	Pulp treatment	44 (18.3) ^a	16 (17.0) ^a	8 (15.7) ^a	68 (17.6)
	Exodontia	14 (5.8) ^a	13 (13.8) ^b	3 (5.9) ^c	30 (7.8)

Note: Chi-square test; $p < 0.05$ was applied for rejection of null hypothesis, ^a $p < 0.01$

Table 4. Use of maxillary and mandibular prostheses among adult workers, São Paulo, 2009.

Use of prosthesis	Maxillary			Mandibular		
	20- 34	35-44	45-64	20- 34	35-44	45-64
		n (%)			n (%)	
No use	229 (95)	68 (72.3)	29 (56.9)	238 (98.8)	87 (92.6)	41 (80.4)
1 fixed prosthesis	4 (1.7)	3 (3.2)	1 (2.0)	1 (0.4)	1 (1.1)	1 (2.0)
1 removable prosthesis	8 (3.3)	10 (19.7)	2 (0.8)	4 (4.3)	4 (7.8)	
Combination of prostheses	0	0	1 (2.0)	0	0	1 (2.0)
Total prostheses	0	7 (7.4)	10 (19.6)	0	2 (2.1)	4 (7.8)

Table 5. Maxillary and mandibular prosthesis needs among adult workers, São Paulo, 2009.

Prosthesis needs	Maxillary			Mandibular		
	20-34	35-44	45-64	20-34	35-44	45-64
		n (%)			n (%)	
No need	187 (77.6)	51 (54.3)	30 (58.8)	143 (59.3)	23 (24.5)	17 (33.3)
Prosthesis for 1 tooth	28 (11.6)	10 (10.6)	5 (9.8)	38 (15.8)	8 (8.5)	3 (5.9)
Prosthesis for more than 1 tooth	4 (1.7)	4 (4.3)	4 (7.8)	5 (2.1)	9 (9.6)	3 (5.9)
Combination of prostheses	22 (9.1)	28 (29.8)	11 (21.6)	55 (22.8)	53 (56.4)	26 (51)
Total prostheses	0	1 (1.1)	1 (2.0)	0	1 (1.1)	2 (3.9)

which was 20.1⁴. An improvement on adult oral health across years was found in other countries like United States, Canada¹⁴ and also among the British adults¹³. Although the percentage of the missing teeth component was reduced from 50%⁴ to 44.8 %⁵, it was still the most predominant component of the index. Considering the same age range, and the workers of the current study, a higher value of DMFT than in the latest national survey was observed, but lower mean values of decayed teeth. The samples of the national surveys of 2003 and 2010 were drawn from individuals at their homes, whilst the present study examined company workers. Studies have confirmed the impact of work on the health of an individual. Not only is the access of the low-income population restricted and the conventional dental treatment onerous, but dental care is also influenced by individual living conditions^{1,15}. Most of the time, the income is the determinant factor in the choice of the individual for a specific kind of treatment and acquisition of an oral health product.

Extending the view to age groups of adolescents, adults and elderly people, it can be observed in the latest Brazilian

surveys that there is a considerable difference in the missing teeth component among these groups⁴. Thus, the present study addresses the importance of examining an extended age group that fits in these age intervals. The adolescents examined in the state of São Paulo, presented 0.42 missing teeth, adults showed 11.25 and elderly people 26.21⁴. It was observed a greater difference in the mean values of missing teeth between the 60-64 years old and the age ranges of 30-34 and 35-39. These data draw the attention to the need of performing more comprehensive epidemiological studies in younger adults in order to make a deeper evaluation of the moment when the teeth losses seem to occur more often.

The increase of tooth loss in the older age groups has been reported in several studies¹⁶. However, there are no scientific signs that establish a link between the age process and the tooth losses⁶. In the present study, the rate of missing teeth values showed increasing tendency, which varied from 18 % to 81%, showing differences in the mean values of the nine studied age groups. In Brazil, tooth loss is the result of absence of policies that promote the oral health in adults in

the past⁵ and could be explained in this study by cohort effect¹⁷. Recently, new policies have been implemented in order to extend the dental services access to other age groups, beyond the students¹⁸.

Lacerda et al.¹⁹ examined adult workers in the South of Brazil and the missing teeth presented the biggest percentage of DMFT (54%). Nevertheless, in the present examination filled teeth were the highest DMFT component in the total sample. Filled teeth could be associated with dental care, but the restorative treatment should take into account the risks and diagnosis methods, to avoid that the patient be driven to a repetitive restoration cycle²⁰.

In Lebanon, 401 adults in the age group 35 to 44 years had 27% of the DMFT (16.3) referred to the decayed teeth component²¹, higher than in the present study. The importance of interpreting the DMFT index is a means of avoiding false conclusions regarding the dental health. The component decayed teeth, depending on the observed need of treatment might be filled or pulled.

The verification of the treatment needs is relevant to plan dental services. The SB Brasil 2003⁴ demonstrated that the more prevalent necessities were low complexity needs like the one- or two-face restorations observed in the present work. It is important to point out that the non-attendance of these needs can drive the evolution of the disease to the tooth loss, which showed in the present study a significant difference among the age groups, being higher among the younger adults, and implying an increase of tooth losses in the future. Untreated caries in permanent dentition affects 35% of the population, being the most prevalent condition at all ages in the Global Burden Disease, which means loss in years of life due to this oral condition².

The effect of tooth loss can be observed by the needs and use of prosthesis. In the present research, 95% of the subjects aged 20 to 34 years did not use prosthesis. The use of prosthesis itself is a factor that leads the adult to be classified as a patient with a potential caries risk²². WHO and other studies emphasized the importance of controlling caries and periodontal disease, based on risk criteria²². It is recommended to them get involved in a prevention program in order to guarantee prosthesis maintenance and adaptation, and to avoid the occurrence of oral diseases²².

This original study focused on the adult population that is the labor force of society, and an extended age group in relation to WHO criteria, unlike other studies. Some difficulties, like sampling limitation, occurred because it was difficult to enroll workers older than 45 years – which is an important factor in reaching the target sample size – as the majority of volunteers were between 20 and 30 years old. This study is not representative of all the working population. However, it presents important data of a sample usually not studied such as workers as age range, which brings new knowledge for public health dentistry.

World Health Organization established as goal for the global oral health the minimization of the impact of oral diseases on health and psychosocial development by the year 2020, in order to reduce the absenteeism from school

and work. Oral health promotion by early diagnosis and control of diseases is one of the tools to reach this target, which will reflect in the reduction of tooth losses²³. This knowledge may help understanding the importance of dentistry and medicine working together with a common risk approach to reduce oral disease and promote a healthy environment.

The present study observed that among the examined workers, the youngest presented the best oral health conditions, and showed smaller percentages of need and use of prostheses. The majority of the volunteers needed treatment for caries and the most prevalent necessities were for those of low complexity. The implementation of an efficient program for oral health promotion is needed in order to avoid tooth losses among workers of a supermarket chain.

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