Journal section: Community and Preventive Dentistry
Publication Types: Research
doi:10.4317/medoral.15.e538

Oral health survey of the adult population of the Valencia region (Spain)

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Eustaquio MV, Montiel JM, Almerich JM. Oral health survey of the adult population of the Valencia region (Spain). Med Oral Patol Oral Cir Bucal. 2010 May 1;15 (3):e538-44.
http://www.medicinaoral.com/medoralfree01/v15i3/medoralv15i3p538.pdf

Received: 17/06/2009
Accepted: 28/11/2009

Article Number: 2978 http://www.medicinaoral.com/

eMail: medicina@medicinaoral.com
Indexed in:
-SCI EXPANDED
-JOURNAL CITATION REPORTS
-Index Medicus / MEDLINE / PubMed
-EMBASE, Excerpta Medica
-SCOPUS
-Indice Médico Español

Abstract

Objectives: Ascertain the oral health status of the adult population in the Valencia region of Spain.

Study design: A cross sectional prevalence study was conducted on a sample of 1264 adults, comprising 733 individuals aged 35-44 years and 531 individuals aged 65-74 years. Data collection was carried out in 2006. In both age groups (younger adults and older adults), the clinical examinations were carried out by calibrated dentists (Kappa >0.76).

Results: The caries prevalence in the group of 35-44 year-old subjects was 92.2% (DMFT=7.64). In the group of 65-74 year-old subjects, it was 98.3% (DMFT=16.38). The F/DMFT percentage of the younger adults was 66% and that of the older adults was 16.3%. The edentate percentage was 0.1% in the group of 35-44 year-old subjects and 20.7% in the group of 65-74 year-old subjects. Calculus prevalence was almost 60% among the younger adults. Nearly 22% of the younger adults and 26% older adults presented periodontal pockets, although only a minority (4.6% and 4.3%) were CPI score 4. Significant differences in the various indices were found in relation to institutionalization and socio-economic status.

Conclusions: The caries prevalence (DMFT>0) found in the two age groups studied remains very high: over 90%. The worst health status is found in certain groups, such as the institutionalized elderly and adults with a low socio-economic status.

Key words: *Epidemiological studies, caries prevalence, edentulism, periodontal disease prevalence, adults, the elderly.*

Introduction

The Valencia region of Spain has experienced approximately 20% population growth in the past 10 years. By age groups, 16.3% of the population of the Valencia region is over 65 years old. Ageing and immigration are two of the demographic issues that are currently receiving most attention. The repercussions of both these demographic phenomena have wide-ranging implications for all areas of public administration and particularly for health planning.

In Spain, studies of oral health in representative samples of adults have not been numerous. This situation has changed in the past 15 years, when the four latest epidemiological studies conducted nationally have described the oral health of younger adults (aged 35-44 years) and three of them have included that of older adults (65-74 years), with totally identical design and sample size criteria, facilitating comparisons of the findings.

Recent data are available on the dental health status of schoolchildren in the Valencia region, from an epidemiological study of 1388 pupils carried out in 2004 (1). However, no regional epidemiological study of buccodental health in adults has been conducted.

The lack of such a study in the Valencia region, together with the demographic changes that have taken place (lower mortality rates, higher life expectancy, heavy immigration flows) and improved social and technological conditions, fully justified this project, which was undertaken with the aim of estimating the oral health status of the adult and elderly population of the Valencia region of Spain.

Materials and Methods

Type of study

A representative cross sectional study of the 35-44 and 65-74 year-old population of the Valencia region was designed.

Sample size and selection

In both age cohorts the examinations were conducted at Health Centres that were attended by persons for reasons other than buccodental pathology, with the exception of 12% of the sample of older adults, who were examined at an old people's home.

The systematic sampling process covered health centres with patient lists which comprised 60% of the total population, leaving out small health centres because of the data collection difficulties they presented. Those definitively included in the sampling process guaranteed representation of the urban, peri-urban and rural populations.

The individuals finally examined numbered 1264; of these, 733 belonged to the 35-44 year-old age group and 531 to the 65-74 year-old age group. With an α error of 0.05 ($Z=1.96$) and $p=0.5$, the precision level was 3.6% for the set of individuals aged 35-44 years and 4.2% for the set aged 65-74 years.

Human resources. Calibration

Six Dentistry graduates were selected to conduct the field work after calibrating them against a standard examiner, following the World Health Organization guidelines. The six dentists were divided into three examination teams, assigning them the function of examiner or recorder depending on the calibration result.

The calibration was carried out on a sample of 20 individuals, there being evaluated the condition of healthy tooth versus decayed tooth. 3 selected examiners obtained a kappa interexaminer with regard to the standard gold of 0.85, 0.83 and 0.76.

Data collection

Data collection was carried out in November and December 2006 under standardized conditions for the three examiners and the three recorders as regards light source, equipment, instruments and position of the individual being examined.

Survey model

The form employed to record the information from the survey and oral examination of each individual taking part in the study was custom designed on the model of the assessment form recommended by the World Health Organization adapted to the variables analyzed.

Study variables

Dental caries (permanent teeth)

The criteria of the WHO (4th edition) were employed for diagnosis and coding. The crown and root were examined. The indices calculated were DMFT, % F/DMFT and caries prevalence.

Periodontal status

The index calculated was the community periodontal index, which notes the presence of bleeding, calculus and periodontal pockets.

Sex (Men/Women)

Social class

Social class was recorded according to the classification proposed by Domingo and Marcos (an adaptation of the British classification), which is based on the habitual occupation of the individual examined (2-4). A two-part division was adopted for this study: middle/high and low social class. Owing to the high percentage of retired persons, this status was only determined for the younger of the two adult groups.

Immigration

The rise in immigrant numbers in the active population of the Valencia region led to the inclusion of this variable in the 35-44 year-old group. Adults of non-Spanish nationality were considered foreign (immigrants).

Residence

Urban residents (those living in settlements with more than 50,000 inhabitants) were distinguished from peri-urban and rural residents (those living in settlements with fewer than 50,000 inhabitants).

Living arrangements

In the older adult age group, the survey distinguished whether the individual was institutionalized in an old people's home, lived alone or lived with other people.

Schooling

Schooling was classified into 5 categories: illiterate, basic (to age 13), secondary (baccalaureate), vocational training (technical college qualification) and university studies (3-year diploma or 5-year graduate degree). Given the profile of the study population, which comprised two different age groups, this variable was reorganized into three categories for ease of application of the statistical procedures. In the 35-44 year-old group, these were 'little or none' (illiterate or basic), 'secondary' (high school or vocational training) and 'higher' (university). For the same reason, the maximum level of education reached in the older adult group was reclassified into 'none' (illiterate), 'primary' (basic schooling) and 'above primary' for those with vocational training qualifications, the baccalaureate or a university diploma or degree.

Statistical procedures

The data were analyzed separately for the two age groups using SPSS 13.0® (SPSS Inc., Chicago, IL), performing a univariant analysis of the different variables. The means and confidence interval of the quantitative variables were determined and a one-way ANOVA or a Student's t-test was used to ascertain whether there were any significant differences. A chi square test was used to determine significant differences between the categorical variables. A significance level of 95% was employed.

Table 1. Caries prevalence, total and by sex, social class, living arrangements, residence, nationality and schooling, in the two age groups.

			n		% DMFT > 0		% DT > 0	
35-44 years	**TOTAL**		**733**		**92.6**		**30.6**	
	SEX	Male	220		91.4		31.8	
		Female	513		93.2		30.0	
	SOCIAL CLASS	Middle/High	370		91.6		28.4	
		Low	251		94.4		36.3*	
	RESIDENCE	Urban	502		92.0		30.3	
		Peri-Urban/Rural	231		93.9		31.2	
	NATIONALITY	Spanish	626		91.9		28.6	
		Foreign	107		97.2		42.1*	
	SCHOOLING	Illiterate	12	177	100	92.1	50.0	41.8*
		Basic	165		91.5		41.2	
		Secondary	164	343	92.7	93.0	24.4	28.0
		Vocational T.	179		93.3		31.3	
		University	213	213	92.5	92.5	25.4	25.4
65-74 years	**TOTAL**		531		98.3		26.5	
	SEX	Male	235		97.9		26.4	
		Female	296		98.6		26.7	
	LIVING ARR.	Institutionalized	63		100		23.8	
		Living alone	111		98.2		29.7	
		Living with others	357		98.0		26.1	
	RESIDENCE	Urban	387		98.2		26.9	
		Peri-Urban/Rural	144		98.6		25.7	
	SCHOOLING	Illiterate	90		98.9		26.7	
		Basic	332		98.5		26.8	
		Secondary	58	109	98.3	97.3	32.8	25.7
		Vocational T.	23		95.7		26.1	
		University	28		96.4		10.7	
*significance level <0.05								

*significance level <0.05.

Table 2. Caries indices (mean) by sex, social class, living arrangements, residence, nationality and schooling, in the two age groups.

			DMFT		DT		MT		FT	
35-44 años	**TOTAL**		**7.64**		**0.65**		**1.95**		**5.04**	
	SEX	Male	7.04		0.67		1.96		4.41	
		Female	**7.89***		0.64		1.95		5.31	
	SOCIAL CLASS	Middle/High	7.68		0.57		1.46		**5.65***	
		Low	7.24		0.68		**2.30***		4.26	
	RESIDENCE	Urban	**7.89***		*0.70*		2.03		5.16	
		Peri-Urban/Rural	7.10		0.55		1.77		4.78	
	NATIONALITY	Spanish	7.48		0.60		1.82		**5.06***	
		Foreign	**8.62***		*0.96*		**2.72***		*4.94*	
	SCHOOLING	Illiterate	9.58	7.40	0.67	**1.0***	5.83	**2.6***	3.08	3.7
		Basic	7.26		1.04		2.44		3.78	
		Secondary	8.06	7.90	0.66	0.60	2.04	1.90	5.36	5.40
		Vocational T.	7.82		0.54		1.82		5.46	
		University	7.35	7.35	0.43	0.43	1.39	1.39	5.53	**5.53***
65-74 years	**TOTAL**		**16.38**		**0.63**		**13.07**		**2.68**	
	SEX	Male	**17.51***		0.75		**14.61***		2.15*	
		Female	15.49		0.54		11.85		**3.10***	
	LIVING ARR.	Institutionalized	**22.38***		0.73		**20.3***		1.35	
		Living alone	16.36		0.57		13.04		2.76	
		L.with others	15.33		0.63		11.81		**2.89***	
	RESIDENCE	Urban	15.45		0.67		11.94		2.84	
		Peri-Urban/Rural	**18.88***		0.52		**16.13***		2.24	
	SCHOOLING	Illiterate	17.95		0.69		**15.33***		1.93	
		Basic	16.29		0.63		13.17		2.49	
		Secondary	16.47		0.93		12.36		3.17	
		Vocational T.	11.91	15.4	0.3	0.6	7.09	10.9	4.52	**3.8***
		University	16.0		0.11		11.07		4.82	
**significance level<0.05*										

*significance level<0.05.

Results

The caries prevalence (% DMFT >0) and active caries prevalence (% DT >0) in the younger and older adult populations are shown in Table 1, which also shows the caries prevalence according to the different variables studied. In the 35-44 year-old group, the prevalence of active caries (% DT >0) presented statistically significant differences ($p<0.05$) for social class (28% prevalence in the middle/high group and 36% in the low social class group) and nationality (28% for Spaniards, 42% for immigrants). In the 65-74 year-old group the differences by variable were not significant.

A significant decreasing linear association shows that the prevalence of active caries fell as the level of schooling rose in the younger adult population.

For DMFT, the values obtained were 7.64 ± 5.11 in the 35-44 year-old group and 16.38 ± 8.92 for the 65-74 year-olds (Table 2). The urban-dwelling younger adult population of foreign citizenship presented a significantly higher DMFT index ($p<0.05$).

Older adults living in old people's homes had significantly higher DMFT indices than those who were not institutionalized ($p<0.05$). The caries index among the older adults was significantly higher for those who lived in peri-urban/rural locations.

On analyzing the values for the different components of DMFT in relation to schooling (3 categories) in the 35-44 year-old group, significant differences were encountered: the caries and missing components fell and the filled component rose as the schooling level of the sample population increased. The 65-74 year-old group presented significantly fewer teeth missing through de-

cay and a greater number of filled teeth in the higher education category.

In the 35-44 year-old group, D/DMFT was 8.5%, M/DMFT 25.5% and F/DMFT 66.0%. Among the 65-74 year-olds, D/DMFT was 3.9%, M/DMFT 79.8% and F/DMFT 16.3%.

The mean teeth present were 26.05 and 14.92 for the 35-44 and 65-74 year-old groups respectively. The percentage of 35-44 year-old patients with 20 or more teeth was 95.8% (N=702). The percentage of 65-74 year-old patients with functional occlusion (20 or more teeth) was 44.1% (N=234).

The edentate percentage was only 0.1% in the 35-44 year-old group, whereas it totalled 20.7% in the 65-74 year-old group.

The percentage of individuals who presented at least one active carious lesion in the root was 6.5% among the 35-44 year-olds and 18.1% in the group aged 65-74. 19% of the 65-74 year-old group presented at least one root caries lesion and 95% of these were not filled. The mean number of teeth with decay or fillings in the root was 0.18 and 0.48 for the two age groups respectively.

The percentage of individuals with a community periodontal index score of 0 in all four quadrants was 13% for the younger adults and 5,5% for the older group, as shown in Table 3. In relation to the community periodontal index (CPI) and the sex variable, periodontal health was better among the females in both age groups but the only statistically significant differences ($p<0.05$) were found for score 3 (4-5 mm pocket) in the younger adult group. Females presented a lower prevalence of 4-5 mm periodontal pockets than males. In the younger adult group, a significantly higher percentage of individuals with periodontal disease (one or more sites with

Table 3. Maximum Community Periodontal Index, total and by sex, social class, residence, nationality, living arrangements and schooling for the two age groups.

			MAXIMUM CPI (%)					
			No Disease	**Bleeding**	**Calculus**	**Pocket 4-5 mm**	**Pocket >5 mm**	**Excluded**
35-44 years	**TOTAL**		**13%**	**5.5%**	**59.3%**	**15.8%**	**4.6%**	**1.8%**
	SEX	Male	5.9%	5.9%	58.2%	**20.9%***	6.8%	2.3%
		Female	16.0%	5.3%	59.8%	*13.6%*	3.7%	1.6%
	SOCIAL CLASS	Middle/High	**17.6%***	**6.8%***	59.7%	*12.2%*	2.2%	1.6%
		Low	8.0%	3.6%	59.4%	**21.5%***	**6.0%***	1.6%
	NATIONALITY	Spanish	12.1%	5.9%	60.1%	15.2%	4.8%	1.9%
		Foreign	17.8%	2.8%	55.1%	19.6%	3.7%	1.0%
	SCHOOLING	Illiterate	8.3%	0%	41.7%	**25.0***	**16.7*%**	8.3%
		Basic	10.9%	5.5%	52.1%	23.0%	7.3%	1.2%
		Secondary	15.9%	9.1%	61.0%	8.5%	2.4%	3.0%
		Vocational	12.3%	3.4%	64.2%	15.1%	4.5%	0.6%
		University	13.1%	4.7%	60.6%	16.0%	3.8%	1.9%
65-74 years	**TOTAL**		**5.5%**	**2.1%**	**43.5%**	**21.7%**	**4.3%**	**23%**
	SEX	Male	3.4%	1.3%	40.0%	23.4%	5.1%	26.8%
		Female	7.1%	2.7%	46.3%	20.3%	3.7%	19.9%
	LIVING ARR.	Institutional.	11.1%	1.6%	22.2%	9.5%	1.6%	54.0%
		L. alone	3.6%	1.8%	44.1%	23.4%	1.8%	25.2%
		L. w. others	5.0%	2.2%	47.1%	23.2%	5.6%	16.8%
	SCHOOLING	Illiterate	2.2%	3.3%	31.1%	24.4%	4.4%	34.4%
		Basic	5.4%	1.2%	47.3%	19.3%	4.5%	22.3%
		Secondary	8.6%	0%	48.3%	25.9%	1.7%	15.5%
		Vocational	8.7%	8.7%	21.7%	43.5%	8.7%	8.7%
		University	7.1%	7.1%	46.4%	14.3%	3.6%	21.4%
*significance level <0.05								

*significance level <0.05.

pocket depth of 4 or more millimetres) was observed in those of low social class. No significant differences in periodontal disease prevalence were found for place of residence or years of schooling in the older adult group (Table 3).

Discussion

The caries prevalence (DMFT>0) of the two age cohorts studied remains very high even today, at over 90%, as in the last national survey of 2005, which very probably shows that the two cohorts studied do not correspond to current child cohorts but to those of over 20 years ago.

The active caries prevalence (% DT>0) was lower than in the last national survey both in the 35-44 year-old group (30.6% compared to 50.6%) and in the older adult age group (26.5% vs. 47.2%).

The caries index (DMFT) for both age groups in the Valencia region was lower than that of the last national survey, and more markedly so among the 35-44 year olds (7.64 vs. 9.61) than in the 65-74 year-old cohort (16.38 vs. 16.79).

In the younger adult group, the FT component (teeth filled as a result of decay) of the DMFT index was greater than the other two (MT and DT); in the 65-74 year-old group MT (teeth missing as a result of decay) was clearly predominant, as it has been in the other Spanish and international epidemiological surveys of caries prevalence conducted in recent years (5,6).

With sex as the variable, for the 35-44 year age bracket the DMFT index was significantly higher in women than in men (7.89 for females and 7.04 for males), agreeing with Alvarez et al. study of an adult population in Oviedo (7).

Turning to %F/DMFT, generally speaking the values observed were higher in the Valencia region than in other parts of Spain. However, certain European countries such as Denmark, Austria or France have higher proportions of fillings than those found here (8-10).

The edentate prevalence obtained in this study lies within the range found in the last two Spanish oral health surveys (23.4%-16.8%) and is considerably lower than that of over a decade ago, confirming the current trend towards lower percentages of edentulism in both Spain and other European and North American countries (5,11,12).

In relation to nationality, the prevalence of active caries was significantly greater among foreign nationals, as in the last Spanish survey, in which the % F/DMFT was greater among Spanish nationals (55.3% vs. 42.1%), coinciding with the results of the present study (67.6% vs. 57.3%).

From the data obtained in this study, it may be deduced that the dental status of the institutionalized geriatric population is significantly worse than that of older adults living at home.

On examining the prevalence of periodontal pockets (whether moderate or severe) in the 35-44 years age group in the present study, the figures were similar to those found in the last national survey in 2005 (20.8% vs. 25.4%). In the 65-74 year-old group, the figures for periodontal pocket prevalence were also very similar in the two surveys (33.8% vs. 38%). In terms of public health, the data obtained have considerable implications as, on the one hand, the decay process is very prevalent (in the initial stages, which it is essential to intercept in time) and on the other hand, it is a process that responds to basic, simple, low-cost treatments, with obvious repercussions in terms of human resources and health planning. Efforts to prevent and treat these diseases should continue to target raising public awareness of the need for oral hygiene and early diagnosis, and training the professionals (dentists and dental hygienists) to treat moderate forms of periodontitis. Only a minimal proportion of the population develops more severe forms of periodontal processes: their prevalence may be 4.7-5.6% for the two age cohorts in the Valencia region of Spain.

There is an association between periodontal status and social class in that the more disadvantaged classes presented worse periodontal health status, coinciding with other Spanish and international studies. In 1995, a study of 603 non-institutionalized 65-74 year-olds carried out in France revealed that the total periodontal disease prevalence (scores 3 and 4) was 31.5%, with higher levels being found among adults of low socio-economic status (11).

Worldwide, the prevalence of dental caries among adults is high as the disease affects nearly 100% of the population in the majority of countries (13).

The diagnostic criteria used for our survey were the contents in 4 ª edition (1997) of the document "Surveys of oral health" of the World Health Organization, for what the results can be infra-estimated due to the change of criterion.

With regard to the degree of fulfillment of the recommendations of the World Health Organization (WHO) for the year 2000, in both groups of age the aims are achieved since the percentage of 35-44-year-old patients with 20 or more teeth is 95.8 %, and, the edentulous percentage is 20,7 % in the older adult age group (14).

Oral health professionals will have to do an effort in improving the oral health of the adult Valencian population to be able to reach the aims fixed by SESPO Expert Panel for the adult Spanish population on 2020 (15). This experts' committee fix that the percentage of individuals with periodontal health (CPI=0) should be equal or high of 25% (for 35-44 age group) and edentulous population low than 15% (for 65-74 age group), being a few results still not reached by us.

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Acknowledgement:
This study was funded by Dirección General Salud Pública, Conselleria Sanitat, Generalitat Valenciana, Spain. First investigator, José Manuel Almerich Silla.