Caries prevalence of young adults in Oslo, Norway, and Porto, Portugal

A comparative analysis

Manuel Desport Marques, Espen Bjertness and Harald M. Eriksen
Department of Preventive Dentistry, Dental Faculty, University of Porto, Porto, Portugal, and Department of Epidemiology, National Institute of Public Health, and Department of Operative Dentistry, Dental Faculty, University of Oslo, Oslo, Norway

Marques MD, Bjertness E, Eriksen HM. Caries prevalence of young adults in Oslo, Norway, and Porto, Portugal. A comparative analysis. Acta Odontol Scand 1994;52:111–115. Oslo. ISSN 0001–6357.

The purpose of the present study was primarily to establish the oral health status of young adults in the area of Porto, Portugal. The assessment is based on a random sample of 30- to 39-year-olds with criteria identical to those of a Norwegian study of 35-year-olds. This makes it possible also to present a comparative analysis of the caries prevalence in Oslo, Norway, and Porto, Portugal. The results indicate lower DMF scores among the Portuguese (DMFS = 46.2) than the Norwegian (DMFS = 85.0) adults. The difference is primarily due to a greater number of filled surfaces among the Norwegians (FS = 59.7) than the Portuguese (FS = 4.4). However, carious surfaces are more prevalent among Portuguese than Norwegian adults (DS = 9.2 versus DS = 3.3). Both among Portuguese and Norwegian adults, oral hygiene and dental visits seem to play an important role with regard to the prevalence of decayed surfaces. Decayed surfaces were more prevalent among men than women, and a correlation between social status and prevalence of decayed surfaces was present in both societies. □ *Dental caries; epidemiology*

Harald M. Eriksen, Department of Operative Dentistry, Dental Faculty, P.O. Box 1109, 0317 Blindern, Oslo, Norway

Oral health data from a society constitute a basis for proper planning of dental health services and programs. Studies collecting oral health data from similar age cohorts belonging to different societies, such as Porto, Portugal, and Oslo, Norway, will also offer a possibility for comparative analyses relating disease prevalence to oral health determinants. The results may contribute relevant background information for clinical and research interventions related to oral health conditions.

From most countries there is more information available on the dental health of children and adolescents than on that of adults. The caries prevalence of 12-year-old Portuguese is moderate to high, with DMFT between 3.3 and 3.8, as reported from different trailblazing studies (1–3). Studies further indicate an unchanged caries prevalence among children and adolescents in Portugal during the past decade (4), which is in contrast to the general trend of marked improvement in dental health among young Norwegians, with a national average DMFT of 2.3 among 12-year-olds in 1991 (5).

Previous studies on dental health among adult Portuguese have been performed on selected or convenience samples (2–4, 6), and a generalization to the general population is therefore impossible. The DMFT condition among adult Portuguese on the basis of these studies is illustrated in Fig. 1. For comparison, Fig. 2 illustrates the DMFT situation among adults in Norway on the basis of Refs. 7–9.

These data and figures illustrate marked differences in dental health among Portuguese as compared with Norwegian adults, with lower DMFS values, due to very low

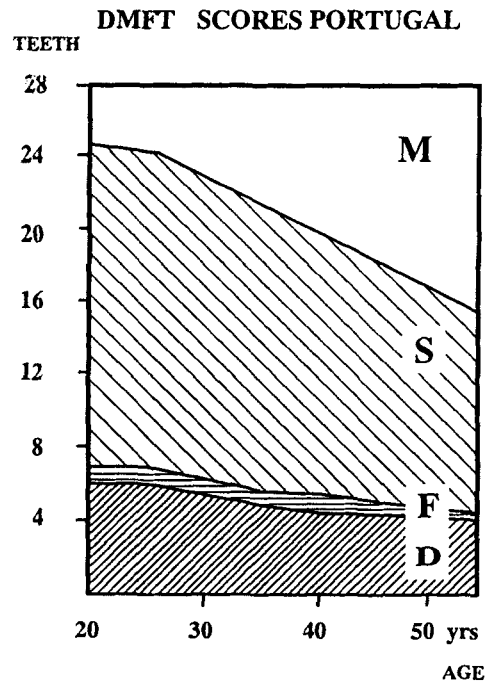

Fig. 1. DMFT scores from caries-epidemiologic studies of adults in Portugal after 1980 (2–4, 6). D = decayed; M = missing; F = filled; S = sound. The registrations are based on 28 teeth.

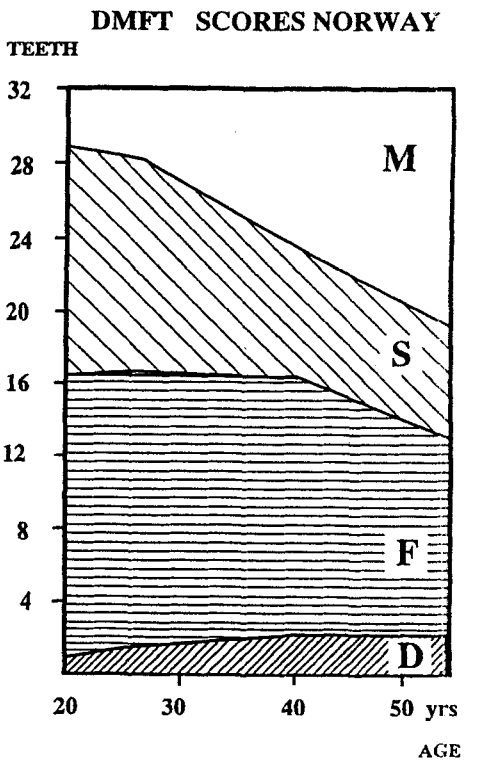

Fig. 2. DMFT scores from caries-epidemiologic studies of adults in Norway after 1980 (7–9). D = decayed; M = missing; F = filled; S = sound. The registrations are based on 32 teeth.

numbers of filled surfaces and higher numbers of missing (M) and decayed (D) surfaces, in Portugal (Figs. 1 and 2). The data also indicate differences in treatment profiles and utilization of dental health services in Portugal and Norway. Finally, they may show differences in oral health determinants in the two societies with relevance for proper oral health interventions.

The present oral health study in Porto, Portugal (10), has a design and methods similar to those of a study on 35-year-olds in Oslo, Norway (8). This makes it possible to perform an analytical comparison in addition to a purely descriptive comparison of the data. The results and conclusions may be representative for urban, adult (30–40 years) populations in the two countries.

Materials and methods

The Norwegian sample of 200 35-year-old citizens of Oslo, born in 1949 and randomly drawn by The National Bureau of Statistics in 1984, was invited to have a free dental examination at the Dental Faculty, University of Oslo. One hundred and fifty-six attended. Among them, 12 non-Caucasian immigrants were excluded from the present part of the analyses because their dental health conditions differed from those of the Norwegian citizens (8).

The original Portuguese sample comprised 322 persons 30 to 39 years of age and living in the Porto area. The sample was randomly drawn from the local electorate lists in 1990, and 197 persons were available for the dental examination. Of the non-attenders 65 invitations were returned with unknown addresses, and 35 refused due to lack of interest.

The clinical examination performed at the dental schools in Oslo and Porto included a caries registration on the basis of the DMF

Table 1. Comparison of DMF values for Portuguese 30- to 39-year-olds and Norwegian 35-year-olds

	Portuguese, $n = 197$		Norwegians, $n = 144$	
	$\bar{x}$	SD	$\bar{x}$	SD
Caries experience (DMFT)	13.8	6.7	25.0	3.8
Caries experience (DMFS)	46.2	27.3	85.0	18.4
Decayed surfaces (DS + D_FS)	9.2	13.1	3.3	4.7
Missing teeth (MT)	6.6	4.9	4.8	2.5
Missing surfaces (MS)	32.7	23.5	23.7	12.4
Filled surfaces (FS)	4.4	6.6	59.7	15.6

index (11). In the Norwegian study (8) decayed surfaces were recorded both clinically and radiographically, whereas only a clinical recording was included in the Portuguese study (10). Periodontal conditions were recorded (10) but will not be presented here. The oral hygiene was scored in accordance with the Simplified Oral Hygiene Index (OHI-S) (12). Stimulated saliva secretion and buffer capacity were also tested.

Both the Norwegian and the Portuguese participants answered a questionnaire accompanied by a structured interview related to oral health habits and conditions.

The Norwegian sample was investigated clinically by E. Bjertness and the Portuguese by M. D. Marques. The two investigators were thoroughly calibrated through joint dental health registrations both in Norway and Portugal, and intraexaminer reliability was recorded until satisfactory agreement was reached. Statistical analyses have been performed with the SPSS program package.

Results

Portuguese adults show lower DMF scores than Norwegians of similar age. This is primarily due to a lower number of filled surfaces among the Portuguese (Table 1). On the other hand, the number of decayed surfaces is substantially higher among Portuguese than Norwegian adults. There is also a higher number of missing teeth/surfaces among the Portuguese. Third molars are included in the registration.

Of the independent variables tested, the level of oral hygiene seems to be correlated with caries prevalence both among the Portuguese and the Norwegian adults (Table 2). The oral hygiene level, as indicated by the mean OHI-S values, was 3.0 for the Norwegians and 3.2 for the Portuguese. There is a greater number of decayed surfaces among men than women in both societies, and the educational level and social status seem to play a role as caries determinants. Dental visiting habit is a determinant of importance for the number of decayed surfaces both among the Norwegian and the Portuguese adults. However, whereas 89% of the Norwegians were registered as regular attenders, only 29% of the Portuguese attended on a regular basis (that is, at least once a year), indicating a difference in the utilization of dental health services in the two societies.

Discussion

The methods used for clinical registrations had been thoroughly practiced through calibration tests both in Oslo and Porto. The questionnaires were also designed in the same manner, with precoded questions, to facilitate identical handling and computerization. The relative impact within each society of the various determinants included should therefore be reliable. The validity of selected psychosocial factors was tested through a structured interview and found satisfactory.

The attendance in the Oslo investigation was 78%, whereas that among the Portuguese was 61%. Unknown address was the single most prevalent reason for not attending both in Oslo and in Porto. There does not appear to be any influential bias connected with non-attendance.

The descriptive analyses show that the caries prevalence measured as DMFT/S is much higher in the Oslo than in the Porto population. The Oslo population is characterized by very high DMF scores (Table 1) where the F-component constitutes the major part of the index value (FS = 59.7 of a total DMFS score of 85.0). The FS value

Table 2. Carious surfaces among Portuguese 30 to 39- and Norwegian 35-year-olds related to some independent variables. DS + D_FS is the dependent variable. Statistical significance is based on analysis of variance

	Portuguese				Norwegians			
Independent variables	*n*	$\bar{x}$	SD		*n*	$\bar{x}$	SD	
Gender								
Male	100	11.4	13.2	**	71	3.6	4.0	*
Female	97	6.9	7.2		73	2.9	5.3	
Education								
<10 years	128	10.5	12.4	*	47	3.9	3.5	*
>10 years	69	6.7	6.4		97	3.1	5.0	
Oral hygiene (OHI-S)								
<2	30	6.1	10.0	**	47	2.8	3.9	**
>2	167	9.8	11.0		97	4.8	4.7	
Dental visiting habits								
Regular >1/year	57	5.3	4.4	**	128	2.9	4.5	**
Irregular <1/year	140	10.8	12.2		16	6.1	5.4	
Use of fluoride								
Yes	152	8.5	10.1	NS	138	3.5	3.1	NS
No	45	11.7	12.8		6	3.3	4.8	
Eating habits between meals								
<1/day	87	8.1	9.3	NS	Not available			
>1/day	110	10.1	11.9					

* $0.01 < p < 0.05$; ** $p < 0.01$; NS = statistically not significant.

is higher and the number of missing teeth lower than what was found in a WHO study on oral health in a Norwegian reference region (7) (Fig. 2), reflecting emphasis on retaining and restoring teeth in a typical urban society compared with a mixed urban/rural society in Trøndelag (7).

The caries prevalence of the Porto population is about half that of the Oslo level measured as DMFT/S (Table 1). Whereas the number of missing teeth was similar in the two populations (Table 1), restored teeth constitute only a minor fraction of the total DMF scores in Porto as compared with Oslo (Table 1). The Porto scores for decayed teeth is higher than reported from other epidemiologic surveys in Portugal (2, 3, 6) (Fig. 1), and both the present and other oral health surveys indicate a substantial need for caries prevention and restorative treatment. According to previous investigations (6) and the present findings (10), the most prevalent reason for seeking dental treatment in Portugal is pain and emergency conditions, and extraction is frequently the treatment of choice.

In Table 2 the prevalence of decayed surfaces is correlated with selected independent variables. There seems to be more decay among men than women, and the present results do not confirm previous observations that female gender represents increased caries risk in Portugal (6) (female DMFS = 51.8 and DS = 6.9; male DMFS = 47.3 and DS = 11.4).

The level of oral hygiene determined by the OHI-S index (11) shows a statistically significant correlation with the number of decayed surfaces, both in the Porto and in the Oslo populations. This indicates that improved dental plaque control should be an important preventive measure in both societies.

The lack of correlation between reported use of fluoride toothpaste and carious surfaces was surprising and unexpected in the Portuguese population, whereas in the Oslo population the number of non-users was too low to expect any statistically significant difference. Further analysis of the habits related to the use of toothpaste, including exposure time per day, should be thoroughly

investigated before specific recommendations for use are emphasized.

In conclusion, Portuguese and Norwegian young adults represent two entirely different populations with regard to the prevalence of dental caries and utilization of dental health services. However, among the variables tested, gender, oral hygiene, and socioeconomic status together with regular dental visits seem to be equally important as determinants for the number of decayed surfaces in the two populations. The data collected from the Portuguese population further confirm the main findings from the WHO trailblazer studies (2, 3) (Fig. 1).

References

1. Pereira A. Estudo da prevalencia da carie dentaria na populacào escolar dos 6 as 15 anos do Concelho de Viana do Castelo resultados preliminares. Rev Port Estomatol Cir Maxilofac 1980;21:19–53.
2. Almeida CM, Emilio MC, Möller I, Marthaler T. Inquérito nacional preliminar de saude oral. Lisbon: Escola Superior de Medicine Dentaria de Lisboa, 1987.
3. Almeida CM, Emilio MC, Möller I, Marthaler T. Inquérito nacional explorador de prevalencia das doencas e necessidades de tratamento na cavidade oral. Rev Port Estomatol Cir Maxilofac 1990;31: 137–49, 215–30, and 1991;32:9–22.
4. Caries status in Europe and predictions of future trends. Caries Res 1990;24:381–96.
5. Tannhelsetjenesten i Norge. Årsmelding 1991. Oslo: Helsedirektoratet, 1991.
6. Meyer K. Oral health of Portuguese adults [thesis]. Bergen: University of Bergen, 1990.
7. Bærum P, Holst D, Rise J. Dental health in Trøndelag 1983. Changes from 1973–1983. Oslo: Directorate of Health, 1985.
8. Bjertness E, Eriksen HM, Hansen BF. Caries prevalence of 35-year-old Oslo citizens in 1973 and 1984. Community Dent Oral Epidemiol 1986;14: 277–82.
9. Lervik T, Haugejorden O, Holmebakken N. Tannhelse hos 40-55-åringer i Skien i 1985. Nor Tannlegeforen Tid 1988;98:462–65.
10. Marques MD. Saude oral de uma populaçao do Porto do grupo etário dos 30–39 anos [thesis]. Porto, Portugal: Universidade do Porto, 1993.
11. Klein H, Palmer LE. Studies in dental caries. 1. Dental status and dental needs of elementary school children. Publ Health Rep 1938;53:751–65.
12. Greene JC, Vermillion JR. The simplified oral hygiene index. J Am Dent Assoc 1964;68:25–31.

Received for publication 16 August 1993
Accepted 25 October 1993