Oral health in Tunisia

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Current WHO methods were employed to estimate the prevalence of toothbrush possession, tea drinking, tobacco habits, fluorosis, dentofacial anomalies, periodontal diseases, dental caries as well as treatment needs in schoolchildren in Tunisia, the smallest country in North Africa. Fluorosis was endemic in some regions. Dentofacial anomalies were more frequent than in the other countries of the Eastern Mediterranean Region (EMR). The prevalence of periodontal disease was high despite the high percentage of toothbrush possession. Altogether 60% of 12-year-olds and 70% of 15-year-olds required oral hygiene instruction, 44% and 15% respectively required scaling. Dental caries was also relatively frequent, but indices were low and the dental therapeutic index was very low. Of the 6–12- and 15-year-olds, 52%, 44% and 52%, respectively needed restorative care. Moreover, 19% of 6-year-olds, 20% of 12-year-olds and 5% of 15-year-olds required extractions. None of 6-year-olds, 3% of 12-year-olds and 5% of 15-year-olds required other dental treatment such as pulpal treatment and prosthetics. A comparison with a survey carried out 13 years ago indicated that dental caries seemed to be decreasing. The DMF at age 12 was lower than WHO goals for the Year 2000 and of the Eastern Mediterranean Region countries. The findings showed an unequal distribution of oral health personnel, with the southern part of the country being particularly underserved.

Key words: Dental caries, dental fluorosis, dentofacial anomalies, periodontal disease, Tunisia, WHO, survey

With a population of 9.7 million inhabitants and an area of 165,000 km², Tunisia is the smallest country in North Africa. Both its history and the nature of the country place it at the crossroads of Europe and Africa, of the Christian Western World and the Arab-Muslim Eastern World. The Tunisian population is almost entirely Arab and white, apart from a few Berber residents in the southern mountains and a small number of black people in the southern oases. One third of the inhabitants (39%) live in rural or suburban areas. For the past few years, Tunisian demography has been in a transition phase, which has resulted in a decreasing number of infants, 47% of the population being under twenty and 37% under fifteen years. The school age population is nearly a quarter of the total population.

Organisation of dental care and training

For a long period, oral health was not considered as important in Tunisia. The situation began to change in the 1980s with economic development. There was a coincident increase in the number of dentists at this time, as the first group of students had been admitted to the Tunisian Faculty of Dentistry in Monastir in 1975, and at the same time the demand for oral health care was increasing. Dental personnel in Tunisia comprise dentists and dental technicians.
Dentists

Dentists graduate from the university after six years of studying, preceded by 13 years schooling. There is only one faculty that provides such training of dentists comprising three years of theoretical and experimental courses on medicine and dentistry, two years of theoretical and clinical courses on dentistry and one year of practice in public dental clinics. Both structures and means are insufficient to secure a good training in this faculty and its adjacent training centre (with eight departments). The existing equipment at the faculty can barely satisfy the training needs of the 4th and 5th level students. They do not enable the faculty to train all postgraduates. After graduation, dentists work in public or in private dental clinics. Some will pursue their postgraduate studies inside or outside Tunisia. The Tunisian faculty provides postgraduate training of four years duration, after succeeding in an examination for an appointment as a house officer and comprising eight specialties: paedodontics, orthodontics, oral surgery, periodontics, conservative dentistry, crown and bridge, partial, and complete prosthodontics. Only orthodontics is recognised as a dental speciality in private practice.

Dental technicians

Dental technicians graduate from the only health training school in the country after three years of training preceded by 13 years schooling. After graduation, technicians can work in dental units of the public hospitals or in private dental units on their own. They prepare crowns, dentures and bridges, but they are not allowed by law to provide care in oral cavities. There are neither specialised dental nurses nor dental assistant personnel and those working in dental clinics or hospital dental units are general nurses and have had their training in medical nursing schools.

Almost all the hospital dental units belong to and receive support from the government. They are supervised by the Ministry of Public Health however, there are some dental units supervised by the Ministry of Social Affairs, which provide their affiliated members with dental care.

In 1993, there were 400 dental technicians and 1,200 dentists (for 8.9 million inhabitants) in the various sectors. The dentists were distributed as follows: 76% in the private, 21% public and 3% university sectors. The average national ratio was one dentist to 7,872 inhabitants and one dental clinic to 8,217 inhabitants but with great regional disparities. In Tunis, the Tunisian capital, there was one dentist to 2,215 inhabitants and one dental clinic to 2,416 inhabitants whereas in the south of Tunisia the ratios were respectively 1:120,000 and 1:41,6662. However, part of the population was unable to get oral health care because of the imbalance in the distribution of health care centres, their modest socio-economic level and the insufficient refunding of oral health care services. Only 25% of the population received oral health care in the private sector. In the public sector, the geographical distributions of the dental clinics and the dentists were quite uneven.

At present, there are 600 dental technicians and 1,756 dentists. Dentists are distributed thus: 71% in the private, 21% public and 3% university sectors, with nearly 5% unemployed. The average national cover ratio is one dentist to 5,770 inhabitants. The average national ratio is one dental clinic to 6,091 inhabitants with certain regional disparities4.

The public health facilities include 321 dental clinics and 368 dentists. However, the distribution of dentists does not exactly coincide with the distribution of dental clinics. This is due to resignation and transfers of dentists to the private sector. Some areas are not covered by oral health departments25.

Medical insurance usually covers basic dental health care intervention such as fillings and tooth extractions, but does not cover orthodontics and prostheses. Government employees and people who work in private institutions or companies, can usually get partial or total refund of the expenditure on basic health care, orthodontics and prostheses in private dental clinics. The proportion of the refund varies from one insurance company to another.

Elementary schoolchildren represent the largest proportion of the school age population (66%). Since 1992 the National Preventive Oral Health Program was established by the School Health Department of the Ministry of Health (SHD) where screening of dental caries was carried out by the school doctors within systematic medical examination as well as epidemiological supervision. Based on the screening, cases are referred to the hospital dental clinics for treatment, which is free for all students at all levels: elementary, secondary as well as high levels3.

Oral health data for schoolchildren in Tunisia is available only from the three national surveys. The first was carried out by Abid6 in 1981, the second by the Tunisian Society of Pedodontics and Preventive Dentistry7 in 1988, the last by the School Health Department8 of the Ministry of Health in 1994. The 1994 study aimed to determine the prevalence of different oral diseases in schoolchildren and to compare them with the results of other studies and finally to update and to revise the objectives of the oral health programme strategy.

Oral health of schoolchildren

Subjects and methods

In the 1994 survey9, a total of 1,802 schoolchildren (865 males and 937 females) were chosen by stratified
random sampling with adjustment for age. The target ages were 6 years (corresponding to the first grade of the elementary school), 12 years (corresponding to the seventh grade of the elementary school) and 15 years (corresponding to the first grade of the secondary school). The training of 46 public dentists as examiners, calibration and standardisation of examining techniques were arranged according to WHO criteria\(^7\). Clinical examinations were carried out in the classroom under natural light. The simplified WHO form was used to record information. Tea drinking, tobacco habits and toothbrush possession were also recorded under the section ‘other conditions’\(^8\). Dental caries lesions, periodontal diseases, dentofacial anomalies and dental fluorosis were recorded according to the WHO criteria. WHO had approved the survey protocol and analysed the data (TUN/ORH/001). Periodontal treatment needs were detected only in the permanent dentition (12- and 15-year-old children). The usual indices of dental caries (DMFT) and periodontal diseases, Community Periodontal Index for Treatment Needs (CPITN) were calculated. The chi-squared test was used to compare the proportions with 5% level of significance.

### Results

The composition of the sample according to age, sex and residence is shown in Table 1. Periodontal diseases (bleeding and calculus) were high. Indeed, their prevalence was 60% and 70% respectively in 12- and 15-year-olds. The number of sextants reached by every child in relation to age showed a lesser degree of severity of periodontal damage; nearly one third of the teeth were affected by bleeding and/or calculus at this age (Table 2).

There was a high prevalence of dental caries both in the primary teeth (57%) and in permanent teeth (58%) in 15-year-olds and they had a higher prevalence in the permanent teeth (48%) than the 12-year-olds (Table 3). There was no significant difference in the prevalence among 12-year-olds according to sex. The comparison with the 1981 survey, which was carried out with the same WHO criteria, showed that the prevalence of the 1994 survey was much lower than that of the 1981 survey and it decreased with age (\(p<0.001\)). There was no significant difference (\(p>0.08\)) between the prevalence of dental caries in males and females\(^5\). The mean DMFT index was 2.1 at the age of 6 and 2.0 at the age of 15 (Table 2). The DMFT at the age of 12 was lower than that of the 1981 study (DMFT = 2.8) and also lower than WHO goals for the Year 2000 (DMFT = 3) and for the African and the EMR countries (DMFT = 1.5\(^{\text{11,12}}\) (Table 5).

The improvement of dental caries status should not hide the very low dental therapeutic indices. The D component was also high (1.2 out of 1.3 at the age of 12; 1.7 out of 2.0 at the age of 15), while the F component, a conservative care indicator, was very low; 0.05 out of 1.3 at the age of 12; 0.1 out of 2.0 at the age of 15; i.e. only one tooth was filled for 26 decayed permanent teeth at the age of 12 (Table 4). More than 52.5% of the children aged 6 needed conserva-

### Table 1  Distribution of the schoolchildren according to age, sex and residence

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No</th>
<th>Males %</th>
<th>Females %</th>
<th>Urban %</th>
<th>Rural %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>600</td>
<td>51.5</td>
<td>48.5</td>
<td>63.4</td>
<td>36.6</td>
</tr>
<tr>
<td>12</td>
<td>602</td>
<td>45.6</td>
<td>54.4</td>
<td>96.0</td>
<td>4.0</td>
</tr>
<tr>
<td>15</td>
<td>600</td>
<td>46.9</td>
<td>53.1</td>
<td>95.7</td>
<td>4.3</td>
</tr>
<tr>
<td>Total</td>
<td>1802</td>
<td>48.0</td>
<td>52.0</td>
<td>85.1</td>
<td>14.9</td>
</tr>
</tbody>
</table>

### Table 2  Periodontal status in Tunisian children compared with EMR Countries (15–19 years)\(^{11}\)

<table>
<thead>
<tr>
<th>Country</th>
<th>Bleeding (%)</th>
<th>Calculus (%)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunisia</td>
<td>[16.2 (2.2)(^*)]</td>
<td>[43.8 (1.1)](^{\text{P}})</td>
<td>1994</td>
</tr>
<tr>
<td>Bahrain</td>
<td>10.7 (2.2)(^{\text{P}})</td>
<td>59.32 (1.4)(^{\text{P}})</td>
<td>1994</td>
</tr>
<tr>
<td>Cyprus</td>
<td>8</td>
<td>71</td>
<td>1986</td>
</tr>
<tr>
<td>Jordan</td>
<td>55</td>
<td>28</td>
<td>1990</td>
</tr>
<tr>
<td>Lebanon</td>
<td>3</td>
<td>85</td>
<td>1982</td>
</tr>
<tr>
<td>Oman</td>
<td>5</td>
<td>69</td>
<td>1991</td>
</tr>
<tr>
<td>Pakistan</td>
<td>20</td>
<td>52</td>
<td>1991</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>12</td>
<td>37</td>
<td>1987</td>
</tr>
<tr>
<td>Somalis</td>
<td>43</td>
<td>14</td>
<td>1985</td>
</tr>
<tr>
<td>Sudan</td>
<td>23</td>
<td>33</td>
<td>1991</td>
</tr>
<tr>
<td>Syria</td>
<td>26</td>
<td>53</td>
<td>1989</td>
</tr>
<tr>
<td>Yemen</td>
<td>30</td>
<td>64</td>
<td>1990</td>
</tr>
</tbody>
</table>

\(^{*}\)Number of sextants

\(^{\text{P}}\)Prevalence of bleeding and of calculus in 12-year-olds

### Table 3  Prevalence of dental caries according to age and sex compared with the first national survey\(^5\)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>1994</th>
<th>1981</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>63.5</td>
<td>52.8</td>
<td>56.7</td>
<td>60.2</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>51.0</td>
<td>46.3</td>
<td>48.3</td>
<td>68.3</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>53.2</td>
<td>62.6</td>
<td>58.2</td>
<td>76.0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>55.9</td>
<td>53.9</td>
<td>54.4*</td>
<td>68.2*</td>
<td></td>
</tr>
</tbody>
</table>

\(^{*}\)p<0.001

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of 12 years, 44.7% and at 15 years, 52.3% required such treatment (with 1.1 and 1.6 teeth indicated to be filled respectively).

Concerning dentofacial anomalies, 38% of 12-year-olds (26% had mild malocclusion, 18% had moderate to severe malocclusion) and 36% of 15-year-olds (23% and 13% respectively) were affected. These were the highest percentages reported in the EMR countries.

Prevalence of dental fluorosis was 18% among 6-year-olds, 28% in 12-year-olds and 31% in 15-year-olds. These findings may also explain the low rate of caries in spite of a lack of an oral health prevention programme.

Toothbrush possession, increased with age from 46% among 6-year-olds to 86% in 12-year-olds and 92% in 15-year-olds. The prevalence of children who smoked tobacco was very low.

The prevalence of tea drinking increased with age from 7.9% in 6-year-olds to 22% in 12-year-olds and 33% in 15-year-olds.

### Discussion

Oral health of Tunisians has undergone severe repercussions due to certain changes in the dietary habits during the last twenty years as it is very rich in carbohydrates. The problem became more acute when the calorific origin of the ratio was studied as cereals are the principal source of calories, while those from an animal origin are very low: 17% (12.5g of a total of 72g/day), the optimum being 35–50%. The diet of Tunisians remained deficient in animal proteins and generally unbalanced in favour of cereals but was then transformed into soft, sticky and carbohydrate components. This situation was, in part, due to the ignorance of the basic nutrition requirements. The increased consumption of sugar and a high frequency of consumption has changed the pattern of the diet.

The prevalence of malocclusions was high. There were more dentofacial abnormalities related to heredity or to the function in relation to certain unfavourable habits, like tongue-thrust or thumb-sucking. In addition, premature extractions of decayed teeth were not followed by the use of space maintainers. This situation has required training of specialists in orthodontics, since in 1994, there were only 30 orthodontists, health authorities had to develop continuing education for graduate dentists to practice interceptive orthodontics in the Faculty of Dentistry. The dentists had to also promote prevention and conservative care to reduce the need for tooth extractions.

Dental fluorosis is endemic in some regions of Tunisia, mainly in the South-West, where the phosphate mines are located, as in the other North African countries, and this may decrease dental caries. The prevalence of periodontal diseases was high despite the use of traditional oral hygiene methods. This may be due to the use of poor tooth brushing methods because of insufficient time devoted by dentists to inform, motivate and teach appropriate brushing methods as well as the observed changes in the dietary behaviour. However, dental care, particularly in the public sector, was still devoted to extractions of carious teeth. This was due to the imbalance in the distribution of dental clinics and the dentists according to the regions. Moreover, in some dental clinics there were no scaling instruments and the dentists were not concerned about prophylaxis. In the private sector, an important part of the population did not benefit from periodontal care due to their modest socio-economic level and to the insufficiency in refunding dental fees. Because of the increasing number of dentists and dental units in the public sector during the few last years, a great change in oral health care has taken place.

Dental caries was relatively common and the Tunisian public health sector and the private dentists could not cope with this situation. Public health authorities...
had to focus more care on the preventive oral health programme. Parents and children had to be better informed and more motivated to take care of their teeth, mainly the first permanent molars.

In 1994, the total number of dentists was 1,150, there having been only 256 in 1981. At present, the number has increased to 1,756. The only training establishment, the Faculty of Dental Medicine graduates 150 new dentists annually, in addition to those who have graduated from foreign countries.

The Tunisian government’s expenditure on oral health has increased significantly. This is shown by the acquisition of approximately 196 dental units before 1994 compared with 321 to date. In the private sector, the number of dental clinics has increased from 210 in 1981 to 850 in 1994, currently reaching 1,243, although they are unequally scattered throughout the country. The traditional oral hygiene methods have been abandoned in favour of the toothbrush. Fluoridated toothpastes are increasingly available in the market, although fluorosis has been getting more severe in certain regions. As elsewhere, the wide use of antibiotics during the last decades has led to the change in oral flora ecology and to the virulence of bacterial plaque. A national oral health day campaign was started in 1985, aimed at both oral health professionals and the public to promote prevention of dental caries and periodontal diseases.

Contrary to the decrease of dental caries indices in Tunisia, most of the developing countries have shown increasing indices, e.g. the 12-year-old DMF (1.3) was much lower than that of Morocco (2.3), a country comparable to Tunisia in culture, lifestyle and health care. They are, however, comparable to those observed in the developed countries in Europe and USA, although the resources available to reach these results are not similar.

**Conclusion**

In Tunisia, dental caries was relatively frequent in schoolchildren reflecting the great insufficiency in treatment of caries both in the primary and in the permanent teeth. Children and parents should be encouraged to visit dentists more often. Furthermore, dentist-patient and dental unit-patient ratios must be improved. Periodontal problems (especially calculus) appear already among the 12- and 15-year-old schoolchildren in Tunisia. Authorities must take this into account in the National Preventive Oral Health Program. Malocclusion is also more frequent in Tunisia than in the other countries of the EMR. There is an unequal distribution of oral health personnel, with the southern part of the country particularly under-served. The Ministry of Public Health has carried out a new survey approved by WHO (TUN/HPR/000/RB/02) in May 2003, to update the available data, to discover whether the WHO recommendations are being followed, and to adjust and revise the objectives of the oral health programme strategies. However, the results are not yet available. This survey was conducted not only on schoolchildren but also, for the first time, on adults.

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**References**


