

Descriptive study of factors modifying the periodontal status of a population of people with a learning disability in Spain

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Abstract

Objectives: To evaluate, for institutionalised people with a learning disability: their periodontal status, periodontal treatment needs, the influence of social and demographical factors, behaviour, dental maintenance and malocclusions on their periodontal state. **Subjects:** 143 adults (17.5 ± 3.5 years) with a learning disability in residential care. **Design:** Data were recorded relating to age, gender, illness, difficulties in behavioural management, residential status (resident/non-resident), previous contacts with dentists, and oral hygiene. The Community Periodontal Index of Treatment Needs (CPITN), periodontal treatment needs (TN) and malocclusion (WHO: 0, 1 and 2), were registered in accordance with the criteria of the World Health Organisation (WHO). **Results:** 24.3% had a congenital learning disability and 20.8% were diagnosed with Down syndrome. 79.0% of subjects were non-resident; 77.6% had a dental management issue; for 61.1% it was their first dentist contact; 41.9% brushed their own teeth. For malocclusion; 10.5% had none, 15.4% had mild and 74.1% moderate/advanced. For periodontal health; 4.2% had good health, 4.1% had bleeding, 59% calculus, 25.7% moderate pockets and 7% deep pockets. None of the patients was totally edentulous. Periodontal disease increased with age ($p < 0.001$) and women had better periodontal health ($p < 0.01$). Patients who had their teeth brushed by their carers had better periodontal health ($p < 0.05$). 4.2% require no treatment, 95.1% required instruction in oral hygiene, 91% instruction and calculus removal; 6.3% advanced periodontal treatment. Treatment needs increased with age ($p < 0.001$), with difficulty in management ($p < 0.001$), and whether they brushed their own teeth ($p < 0.05$). **Conclusions:** A high level of mild/moderate periodontal disease was observed in the sample. This increased with age, with the presence of malocclusions and with unsupervised brushing.

Key words: CPITN, disabled patients, handicap, periodontal treatment needs, periodontal status

Introduction

The range of syndromes that are included in the term 'disabled' causes an initial difficulty when it comes to evaluating a patient's periodontal condition, since the intellectual, social, medical or economic situation of each group will be very different. In Spain, 15% of the population has some form of intellectual or physical disability, and it is estimated that approximately 4.5% require some kind of help with mobility such as wheelchairs and specialised escorts (Manau and Echeverria, 2004).

Due to the great variety of syndromes grouped together

under the term disabled, each of them has particular sociological and health-related characteristics which make up their classification. Therefore, deciding on how effective periodontal studies may be undertaken becomes a complicated matter. Most published studies refer to physically and mentally disabled people. This group has been studied most frequently because they are wholly or partially recruited from care centres, people with Down syndrome, patients suffering cerebral palsy or autism, those with sensory loss and intellectually disabled patients from other diagnosed causes. Their intellectual ability or their specific condition, may act

as modifying factors with regard to their periodontal condition.

Numerous studies have been conducted on the oral health of patients with disabilities, and although the vast majority of these studies mention their dental condition, there are also some which describe their periodontal status. For example, in a population of disabled Swedish people gingivitis was more prevalent among patients in residential care, and that this increased with the level of disability, particularly among people with Down syndrome (Forsberg *et al.*, 1985). Another study in Sweden among adults with a learning disability showed how the periodontal state of patients in residential care was appreciably worse than that of patients who were not in residential care (Gabr  and Gahnberg, 1994). A high prevalence of periodontal disease was also detected in other populations, together with a great need for basic, and in some more advanced periodontal treatment (Pieper *et al.*, 1986). Higher CPITN values were found, both in children and adults with learning disabilities, when compared with normal populations (Shapira *et al.*, 1991; Stabolz *et al.*, 1991). In Spain, there are no national studies that describe the oral health status of such patients on a national scale, although there are some studies which refer to the situation in certain care centres, or in some autonomous communities. Extrapolation of the data from such studies can lead to errors when taking into account the oral condition of these populations at a national level. The contribution of new data with regard to the condition of such populations is thus considered to be very important.

The aetiology of periodontal disease is thought to be infectious, and therefore the role of bacterial plaque and the level of oral hygiene play a significant part. There are other factors which can alter the clinical signs and the development of the disease. Among these, the most important are host-dependent factors. There are systemic diseases which alter the inflammatory response. Among them are some of the syndromes which cause learning disabilities, so that it appears that this population might present with a greater prevalence of periodontal disease (Porter and Scully, 1994). The explanation of this situation could lie both in the patient's systemic disease and in the factors which favour it. Among the latter are the level of oral hygiene and malocclusion. We have therefore undertaken this study with the following objectives: to evaluate the periodontal state of a population of people with learning disabilities who are in residential care in the province of Seville, Spain; to evaluate the need for periodontal treatment in this population; and to evaluate the influence that variables such as socio-demographic factors (age, gender, residential status), behaviour management, dental maintenance (any previous contacts with the dentist, reported brushing habits) and the presence of malocclusions, can have on their periodontal state and treatment needs.

Material and method

Study population

A convenience sample was selected from people with disabilities who attended a centre for the education of the intellectually, physically and/or sensorily disabled in Seville ("Ciudad de San Juan de Dios"). Patients were permanently resident or attended on a half-board basis. To conduct the study, we first obtained the necessary consent from the parents or carers of the participants, after explaining the purpose and objectives of the study, and all of them gave consent for the study. The carers of the participants completed a questionnaire, and were offered evaluation and treatment of any dental problems identified, at the clinic of the Seville Faculty of Dentistry, in the Integrated Dentistry Department for Patients with Special Needs, or, if necessary, in the operating theatres of the "Hospital de San Juan de Dios" in Seville, Spain.

Prior to periodontal evaluation the age, gender, the medical history, individual difficulties in clinical management (reflecting the behaviour of each patient in the dental setting), the status at the centre (residential/non-residential), regularity of periodontal/dental reviews and oral hygiene habits, were recorded. Clinical histories were taken by the examiner.

Periodontal examination and assessment

All patients were examined by the same, previously trained examiner, in accordance with the criteria of the World Health Organisation (WHO) (Ainamo *et al.*, 1982). The single examiner had received specific training in the use of the Community Periodontal Index of Treatment Needs (CPITN) and had been instructed in the management of people with learning disabilities. Following the criteria for the index, the mouth was divided into sextants (upper right, teeth 17–14; upper middle, teeth 13–23; upper left, teeth 24–27; lower left, teeth 37–34; lower middle, teeth 33–43; lower right, teeth 44–47). Each sextant was examined to see if two or more teeth were present, and if there were any indications that they should be removed. If there was only one tooth in the sextant to be examined, the sextant was excluded but the tooth included in the adjacent sextant. The excluded sextants were considered to have no teeth (sextant "X"). A WHO 621 periodontal probe was used with a force of 25N, in order to identify the depth of the probing in the mesial, vestibular, distal and lingual areas of each functional tooth, excluding the third molars. In addition to the usual instruments (non-magnifying mirrors, lights) we used rubber props especially designed to facilitate examination of this type of patient. A powerful lighting source from the operating theatre of the residential centre was used.

In accordance with the WHO criteria (Ainamo *et al.*, 1982), the periodontal treatment requirement of each sextant was coded according to the periodontal state

Table 1. Assessment of Periodontal Index of Treatment Needs codes (Ainamo et al., 1982)

CPITN	
Code 0	Healthy
Code 1	Bleeding on probing (no pockets or calculus)
Code 2	Calculus or retaining factors subgingivally (no pockets exceeding 3 mm)
Code 3	Sextant with 4-5 mm deep pockets
Code 4	Sextant with pockets 6 mm deep or deeper
X	Sextant excluded

Table 2. Assessment of Treatment Needs codes criteria, based on the most severe code in the dentition (Ainamo et al., 1982)

TN	
TN 0	Gingival health, no treatment needs
TN 1	Need for improved gingival health if Code 1 has been recorded
TN 2	Need for scaling, root planing and improved oral hygiene (Codes 2 + 3)
TN 3	Need for complex periodontal treatment (Code 4)

encountered, depending upon the condition of the worst affected site (*Table 1*). The assessment was made as follows: code 0: Healthy/TN0 (no need for treatment); code 1: bleeding on probing/TN1 (need for instruction to improve oral hygiene); code 2: supra- or sub gingival calculus found/TN2 (need for instruction in oral hygiene and calculus removal); code 3: pocket 4–5mm deep /TN2 (need for instruction in oral hygiene and calculus removal and/or scaling and root planning); code 4: pocket 6mm deep or more /TN3 (need for instruction in oral hygiene, calculus removal and corrective periodontal treatment) (*Table 2*).

Malocclusion

According to the WHO (WHO, 1987), malocclusions are codified as 0 non occlusal abnormalities; 1 mild occlusal abnormalities – overcrowding, alterations in the alignment of the arch, inclined teeth and 2 moderate or severe occlusal abnormalities – cross bite, overcrowding by more than 4mm, Angle classes II and III, overjet of more than 9mm.

Patient management

The individual's behaviour in the dental setting for clinical management was evaluated. A patient was classified as 'easy' when it was possible to explore the mouth without any difficulty. Conversely, a person was classified as 'difficult' when it was necessary to use some form of physical intervention to examine the mouth.

Statistical analysis

The descriptive statistic, mean and standard deviation, for continuous variables (age and the mean of sextants by CPITN codes) were calculated. For descriptive variables the distribution of frequencies was calculated. Pearson's Chi-squared test was used for analysis of the qualitative variables (CPITN and TN). Comparisons of mean values for sextants affected per patient according to clinical and demographic variables was carried out using non parametric Kruskal-Wallis and

Mann-Whitney U tests. The level of statistical significance established was $p < 0.05$.

Results

The demographic characteristics of the study sample are shown in *Tables 4* and *5*. The mean age of the 143 people in the sample was 17.5 ± 3.5 years. It may be seen from the same tables that the majority of the sample were attending the centre, but not resident (79.0%). Their management, in most cases, was considered straightforward (77.6%) and for 88 patients (61.1%) this was their first contact with the dentist. It should also be noted from the data collected that the majority of patients (41.9%) cleaned their own teeth.

All patients had some type of learning difficulty, which in most cases was congenital, although the aetiology was not well understood in 24.3% cases. Of the sample, 20.8% had Down syndrome, 4.9% oligophrenia, 14% delayed psychomotor and/or general development, 25% cerebral palsy and 11% different syndromes such as West syndrome and Rett syndrome. The type of condition was not statistically significantly related to the periodontal condition.

Malocclusions

Of the sample, 10.4% had no malocclusion, 15.3% mild malocclusion and 74.3% moderate/severe malocclusion.

Periodontal status

None of the patients was edentulous. The sextant which appeared to be excluded according to the criteria of one tooth or less present, in most cases was the lower left (3.5%) (*Table 3*). The mean number of teeth present was significantly higher for the 12–13 and 14–17-year-old-groups than in the 18–20 and 21+ years group (*Table 6*). Only 4.2% of the sample had good periodontal health, 4.1% had bleeding on probing, 59% calculus, 25.7% pockets of 4–5mm (moderate periodontitis), and 7% had advanced periodontitis (pockets of 6mm or more). *Table 3* gives the distribution of conditions around the sextants: the healthiest sextant in the sample was the lower left (25.7%); the

Table 3. Distribution of CPITN codes per sextant

CODE	Sextant 17-14 n(%)	CODE	Sextant 13-23 n(%)	CODE	Sextant 24-27 n(%)
0	28(19.4)	0	23(16.0)	0	31(21.5)
1	27(18.8)	1	38(26.4)	1	23(16.0)
2	58(40.3)	2	61(42.4)	2	64(44.4)
3	22(15.3)	3	18(12.5)	3	20(13.9)
4	5(3.5)	4	2(1.4)	4	5(3.5)
X	4(2.8)	X	2(1.4)	X	1(0.7)
CODE	Sextant 44-47 n(%)	CODE	Sextant 33-43 n(%)	CODE	Sextant 37-34 n(%)
0	29(20.1)	0	16(11.1)	0	37(25.7)
1	26(18.1)	1	10(6.9)	1	28(19.4)
2	76(52.8)	2	99(68.8)	2	55(38.2)
3	8(5.6)	3	16(11.1)	3	16(11.1)
4	3(2.1)	4	2(1.4)	4	3(2.1)
X	2(1.4)	X	1(0.7)	X	5(3.5)

Table 4. Distribution of CPITN scores according to age, gender and malocclusions. Difference significant, chi-square $p < 0.001^*$, $p < 0.01^{**}$.

	No. examined (%)	Persons coded 0 n (%)	Persons coded 1 n (%)	Persons coded 2 n (%)	Persons coded 3 n (%)	Persons coded 4 n (%)
Age*						
12-13	16 (11.2)	5 (29.4)	1 (5.8)	8 (47.1)	1 (5.8)	1 (5.8)
14-17	49 (34.3)	1 (2.0)	4 (8.2)	36 (73.5)	8 (16.3)	0
18-20	52 (36.4)	0	1 (1.9)	29 (55.8)	16 (30.8)	6 (11.5)
21+	26 (18.1)	0	0	12 (46.1)	12 (44.4)	2 (7.4)
Gender**						
Men	106 (74.1)	4 (3.8)	1 (0.7)	63 (59.4)	33 (31.3)	5 (4.7)
Women	37 (25.9)	2 (5.4)	5 (13.9)	22 (59.5)	4 (10.8)	4 (10.8)
Presence of malocclusions**						
None	15 (11.8)	4 (26.7)	0	6 (40.0)	3 (20.0)	2 (13.3)
Mild	22 (15.4)	0	1 (4.5)	12 (54.5)	8 (36.4)	1 (4.5)
Mod/Severe	106 (74.1)	2 (1.9)	5 (4.7)	67 (63.2)	26 (24.5)	6 (5.7)
Total	143(100.0)	6 (4.2)	6 (4.2)	85 (59.4)	37 (25.9)	9 (6.3)

Table 5. Distribution of CPITN scores according to type of residential status, management and reported brushing habits. Difference significant, chi-square $p < 0.01^*$, $p < 0.05^{**}$.

	No. examined (%)	Persons coded 0 n (%)	Persons coded 1 n (%)	Persons coded 2 n (%)	Persons coded 3 n (%)	Persons coded 4 n (%)
Residential status*						
Residential	113 (79.0)	5 (4.4)	6 (5.3)	74 (65.5)	23 (20.4)	5 (4.4)
Non-resident	30 (21.0)	1 (3.3)	0	11 (36.7)	14 (46.7)	4 (13.3)
Management*						
Easy	111 (77.6)	1 (0.9)	5 (4.5)	69 (62.2)	29 (26.1)	7 (6.3)
Difficult	32 (22.4)	5 (15.6)	1 (3.1)	16 (50.0)	8 (25.0)	2 (6.3)
Reported brushing habits**						
Him/herself	60 (41.9)	0	1 (1.7)	39 (65.0)	16 (26.7)	4 (6.7)
Parents	24 (16.8)	2 (8.3)	3 (12.5)	13 (54.9)	5 (20.8)	1 (4.2)
Carers	13 (9.1)	2 (15.4)	0	4 (30.8)	4 (30.8)	3 (23.1)
No brush	46 (32.2)	2 (4.3)	2 (4.3)	29 (63.1)	12 (26.1)	1 (2.2)
Total	143(100.0)	6 (4.2)	6 (4.2)	85 (59.4)	37 (25.9)	9 (6.3)

Table 6. Mean number of sextants affected per patient according to age, gender, presence of malocclusion, residential status, management and reported brushing habits. Difference significant, Kruskal-Wallis - Mann-Whitney U $p < 0.05^*$, $p < 0.01^{**}$, $p < 0.001^{***}$.

	No. examined	Mean no. sextants coded 0	Mean no. sextants coded 1	Mean no. sextants coded 2	Mean no. sextants coded 3	Mean no. sextants coded 4	Mean no. sextants coded X
Age							
12–13	16	4.0***	0.2	1.3**	0.1**	0.4	0.0*
14–17	49	1.1***	1.2	3.2**	0.4**	0.0	0.0*
18–20	52	0.6***	1.2	2.9**	0.2**	0.2	0.3*
21+	26	0.5***	0.9	2.9**	1.0**	0.1	0.4*
Gender							
Men	106	0.9*	1.1	3.1*	0.7	0.1	0.1
Women	37	1.8*	1.0	2.2*	0.5	0.2	0.1
Presence of malocclusions							
None	15	2.3	0.3*	2.3	0.7	0.3	0.0
Mild	22	0.7	0.8*	3.5	0.9	0.2	0.0
Mod/Severe	106	1.1	1.2*	2.8	0.6	0.1	0.1
Residential Status							
Residential	113	1.3*	1.1	2.9	0.5***	0.1	0.1
Non-resident	30	0.6*	0.7	2.7	1.3***	0.4	0.3
Management							
Easy	111	1.0	1.2**	2.8	0.7	0.1	0.1
Difficult	32	1.6	0.5**	3.0	0.6	0.2	0.1
Reported brushing habits							
Him/herself	60	0.9	1.2	2.9	0.7	0.1	0.1
Parents	24	1.5	0.9	2.9	0.5	0.2	0.0
Carers	13	1.0	0.5	2.4	1.1	0.8	0.1
Total	143						

Table 7. Distribution of periodontal treatment needs (TN) according to age, management and reported brushing habits. Difference significant, chi-square $p < 0.001^*$, $p < 0.01^{**}$, $p < 0.05^{***}$. Note: Only 97 individuals brushed their teeth***. Construction of TN: TN1 = %codes 1 + 2 + 3 + 4; TN2 = %codes 2 + 3 + 4; TN3 = %codes 4.

	Persons coded TN0 n (%)	Persons coded TN1 n (%)	Persons coded TN2 n (%)	Persons coded TN3 n (%)
Age*				
12–13	5 (33.3)	10 (66.7)	9 (60.0)	1 (6.7)
14–17	1 (2.0)	48 (98.0)	44 (89.8)	0
18–20	0	52 (100.0)	51 (98.1)	6 (11.5)
21+	0	27 (100.0)	27 (100.0)	2 (7.4)
Management**				
Easy	1 (0.9)	110 (99.1)	105 (94.6)	7 (6.3)
Difficult	5 (15.6)	27 (84.4)	26 (81.3)	2 (6.3)
Reported brushing habits***				
Him/herself	0	60 (100.0)	59 (98.3)	4 (6.7)
Parents	2 (8.3)	22 (91.7)	19 (79.2)	1 (4.2)
Carers	2 (15.4)	11 (84.6)	11 (84.6)	3 (23.1)

most bleeding on probing, the upper central (26.4%); the greatest accumulation of calculus, the lower central (68.8%); pockets of 4–5 mm, the upper right (15.3%); those with deep pockets, the two upper posterior sextants (3.5% in each case).

As shown in Table 4 (maximum score for each sextant), periodontal disease increased with age. This difference was

statistically significant (chi-squared, $p < 0.001$). It was observed that 35.3% of patients aged 12–13 were classified as periodontally healthy, and this decreased to 2% among those aged 14–17, while in the 18–20 and 21+ age groups there were no patients with good periodontal health. The most severe periodontal disease was found in the 21+ age group, which had 44.4% with moderate and 7.4% with deep pockets,

although the greatest number of deep pockets was found among the 18–20 age group (11.5%). Women appeared to have more sextants coded 0 (5.4%) than men (3.8%) ($p < 0.01$). However, despite the fact that women had a higher percentage of deep pockets (10.8%), more moderate periodontal disease was found in men, 10.8% and 31.3% coded 3, respectively. The same table shows that patients who did not have a malocclusion had better periodontal health, code 0, (26.7%), while those who had severe malocclusions had higher indices of calculus, code 2, (63.2%) and periodontal pockets, code 3, (24.5%) and code 4 (5.7%) ($p < 0.01$).

Table 5, the maximum scores for each sextant, shows the indicators for periodontal disease which were significantly related to the residential status of the patients. It was noted that non-resident patients had greater accumulations of calculus (65.5%), while the most severe periodontal disease was found in residents (46.7% Code 3 and 13.3% Code 4). The differences were statistically significant ($p < 0.01$). The same table shows that more of the patients who were most difficult to manage had good periodontal health than did those who were easier to manage (chi-square $p < 0.01$); thus those who were 'easy' to manage had more calculus (62.2%) and more moderate periodontal pockets (26.1% coded 3) than those who were more 'difficult' to manage. Table 5 also shows that patients whose teeth were brushed by their carers had the best periodontal health in the sample (Coded 0: 15.4%), the lowest percentages of bleeding (Code 1: 0%) and calculus (Code 2: 30.8%), although they had the highest percentages of advanced periodontal disease (Code 3: 30.8% and Code 4: 23.1%). These differences were statistically significant ($p < 0.05$).

The extent and severity of periodontal disease increased significantly with age, gender, the degree of malocclusion, the residential status, the management and the reported brushing habits, as is seen in Table 6.

Periodontal treatment needs

The periodontal treatment needs of these intellectually disabled patients were considerable. Only 4.2% of the patients did not require periodontal treatment, with most of the study subjects requiring instruction in oral hygiene (95.1%). A further, large percentage required instruction in oral hygiene, scaling, root planing or calculus removal (91%). A small percentage required advanced periodontal treatment (6.3%). Table 7 shows how periodontal treatment needs in terms of instruction in oral hygiene (TN1), oral hygiene and scaling (TN2) and advanced periodontal treatment (TN3) increased with age (chi-square $p < 0.001$), with difficulty in patient management (chi-square $p < 0.001$), and whether or not the patient cleaned his/her own teeth (chi-square $p < 0.05$).

Discussion

The present study has some limitations, principally in relation to the sample such as the numbers available and the gender mix, due to the occupations on offer at the centre at

the time of the study. As well, the bias introduced by the captive nature of this population group, the heterogeneity of the underlying conditions and the socio-economic characteristics of the sample are potentially significant. However, there are numerous studies on the periodontal state of different populations of disabled people in different countries, all of which, similarly, demonstrate a range of data, depending on the clinical and socio-economic characteristics of the group studied. Pregliasco *et al.* (2001), from a sample of 219 patients, observed that none had a healthy periodontal state, compared with 4.2% in our study. In addition, 20.5% in their sample had calculus or moderate pockets, and 27.8% had deep pockets, while advanced periodontal disease in the present study was considerably less (7%). It is likely that the age range in their study (22 to 99 years with a median at 61.5 years) compared with a much lower median age (17.5 years) in our study would explain some of the differences noted (Pregliasco *et al.*, 2001).

Studies such as that of Lindemann *et al.* (2001) demonstrated how poor oral status was directly proportional to first contact with a dentist, whether the patient brushed his/her own teeth without the help of an assistant, and did not attend for regular dental check-ups. Similar results were observed in this study, in that patients whose teeth were brushed by their carers at residential centres had the least severe periodontal disease. Having previously attended the dentist does not appear to be a determinant for periodontal health in this sample, probably because this group did not attend for sequential, planned maintenance visits, but infrequent visits for emergency treatment only.

The paradox that patients who were more difficult to manage, which tended to correspond with more severe learning disability, generally had better periodontal health is corroborated by other studies (Gabre and Gahnberg, 1997). In this latter study, it was shown that patients in residential care, who had a profound learning disability, had better oral health than those who were less disabled and non-resident. This is substantiated in our study by the high number of non-brushers who are also non-resident. Similarly, Shapira *et al.* (1998) studied the dental condition of 387 subjects with a learning disability in a residential centre in Israel; the group which was most severely disabled had the highest level of CPITN, a score of 3, although subjects classified as 'educable' had lost more teeth per sextant. In another study it was confirmed that disabled patients, in general, have poorer oral health than patients who are not disabled; the poorer oral health was found in those who had a higher intelligence quotient and were more independent (Declerck *et al.*, 1995). Similar results were found in the study by Salandová *et al.* (1998), of a population of 87 people with a learning disability, carried out over two years. This study reached the conclusion that those who attended day units had poorer dental health than those who were in residential care, despite the fact that the latter were more severely disabled. This is confirmed in our study, where it was observed

that those who attended the centre as day-patients had more gingivitis and accumulation of calculus, although those resident at the centre suffered more advanced periodontal disease (moderate and deep pockets).

The results from other studies concur with our findings. Karjalainen *et al.* (2002) presented results from a study of 214 people with learning disabilities in residential care, of whom 40% could be classified as having mild or moderate learning difficulties, and 60% severe learning difficulties. Those who were more physically restricted had better dental health, despite having fewer dental check-ups due to the difficulty in their management. Those patients with greatly reduced mobility had greater requirements for advanced periodontal treatment. Lancashire *et al.* (1997), found in a population of physically disabled people that patients who had tetraplegia had a greater accumulation of plaque and a poorer periodontal condition than those with hemiplegia, and concluded that this was due to specific plaque control programmes in these patients. In general terms, in analysing data provided by this and other studies, it may be concluded that, although more severely disabled people usually have a stricter regime as residents, and a more severe general condition, their periodontal condition may be better than that of less severely disabled people who live at home, due to the professional care provided in most centres.

It is important to stress that in this study the periodontal state of the sample was not affected by the age of the patient or the fact that a patient suffered from any one specific syndrome or another. In the present study, the type of attendance at the centre, the motivation of the educators to control plaque, or other local factors such as malocclusions, seem to be of relevance to the periodontal condition of these patients. This has also been observed in other publications (Shapira *et al.*, 1998).

With regard to periodontal treatment needs, this study establishes that the greatest need for periodontal treatment involves what may be defined as 'basic periodontal treatment', grouped under codes TN1 and TN2. This includes instruction in oral hygiene, removal of calculus and scaling and root planing. In this respect, in studies conducted in Spain (Velasco *et al.*, 1995) on 182 subjects with learning disabilities living in three care centres, the periodontal health of the study population, although poor, was particularly related to accumulation of calculus, gingivitis and occasionally shallow pockets. The resident status had a negative influence on the oral health of the population. The authors concluded that the majority of patients required a programme of oral hygiene and basic periodontal treatment. Although in the present study the higher proportion of patients requiring advanced periodontal treatment was among the group whose maintenance care was provided by carers at the centre, it is possible that this was related to the fact that they were the patients most affected by psychological decline. The differences between both

papers could lay in the fact that in Velasco's study the carers played a more positive role in the control of brushing habits than was the case in the present study (Velasco *et al.*, 1995).

Similar results were obtained by Llodra *et al.* (2003), who conducted an analysis of oral and dental health among 684 people with learning disabilities in Extremadura (Spain). Data were collected on these subjects using the Community Periodontal Index (CPI). The authors describe how the periodontal health of the sample deteriorated as age increased. The same proved to be true in our study, in which the poorest periodontal condition was observed among the oldest patients, particularly in the 18–20 and 21 or more years old groups. This may reflect the time period for which the aetiological factors are active in the individuals' mouths. In the study by Llodra *et al.* (2003), the most prevalent pathology encountered was the accumulation of calculus and gingivitis, which also progressively increased directly in relation to age. In our study, however, the highest indices of gingivitis and calculus were detected in the 14–17 age group, which may correspond with the hormonal changes of puberty, or to conditions particular to this sample. In this respect, in both studies, it appears that periodontal treatment needs should be directed primarily towards instruction in oral hygiene and professional removal of calculus. This finding points to the conclusion that it is vital that all dentists know how to manage people with disabilities; it is not necessary for the dentist to be specialised in periodontics in order to treat this group.

When analysing previous studies in comparison to the present, a number of conclusions can be deduced. The scattered nature of the populations studied, the common factor among them being that they are closed communities, with particular standards established in each one, means that data cannot easily be compared or extrapolated. In addition, the methodology used in each of the studies varies considerably. The majority of researchers opt for more or less precise applications of the World Health Organisation's oral health survey criteria and methodology, which is especially designed for large population screening.

There is a series of factors repeated in all these populations: the level of dependency of the patients, lack of motivation for oral hygiene, lack of specific prevention plans, the difficulty of carrying out such plans, the high level of mild and moderate periodontal disease in these populations, the important modifying role played by the patient's psychosocial situation and the characteristics of his/her residential status. Among all these factors, the training of carers in maintenance of oral health, who will adapt to the particular characteristics of each patient also appears to play an important role (Attström and Van der Velden, 1998).

Other factors relating to special features of the syndromes that present in some patients, such as parafunction or malocclusions, may also have implications (Silvestre *et al.*, 2000). In the present study, where the level of severe

malocclusions recorded was higher than in other studies carried out in populations of similar ages (Shyama *et al.*, 2001), but similar to that of other, more extensive studies (Vittek *et al.*, 1994), it was shown that a more severe malocclusion was associated with a poorer periodontal condition. This finding may be explained by the fact that the degree of malocclusion tends to be related to tooth positions, which favour accumulation of bacterial plaque and make its removal difficult. Trauma can also be caused by malocclusion, and this will act as a modifying factor for periodontal disease which, from the results, may play an important role. For this reason, correction of malocclusions, adapted to the psychological and clinical characteristics of each patient (Chaushu and Becker, 2000), and treatment of periodontal disease must both be undertaken in these patients (Gher, 1998).

Conclusions

A high level of mild/moderate periodontal disease was observed in the sample, which increased with age, with the presence of malocclusions and with unsupervised brushing. Carers play a vital role in improving this situation. The treatment of malocclusions is also of great importance. Periodontal treatment needs, although extensive, do not require any special qualifications in this field for their implementation. Rather, skills in managing a person with a disability are paramount in the maintenance of good periodontal, and other dental, health. In view of the limitations of the present study, another multi-centre study of periodontal health of people with disabilities must be developed.

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