Orthodontic Treatment, Dental Health, and Oral Health Behavior in Young Norwegian Adults

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Information about previous orthodontic treatment and oral health is evaluated for 525 17yr-olds and 175 21yr-olds. Of these, 24.6% of the 17yr-olds and 14.3% of the 21yr-olds had received orthodontic treatment. Orthodontic treatment did not appear to have had any adverse effect on the level of periodontal disease, and caries prevalence in the orthodontically treated 17yr-olds was less than in the untreated subjects.

KEY WORDS: · CARIES · DENTAL HYGIENE · ORTHODONTIC TREATMENT · · PERIODONTICS ·

Although it has been reported that a large proportion of children need orthodontic treatment (HELM 1968, INGERVALL ET AL. 1972, HEIKINHEIMO 1978, FORÖY 1979), less is known about the actual frequency of orthodontic treatment in different birth cohorts. There are no generally accepted objective criteria for assessing the need for orthodontic treatment (HELM 1980), so it is defined differently by different investigators. The patient's perceived need is usually a significant factor in the treatment decision. Reports of such positive side effects as better dental health due to behavioral changes brought about by regular hygiene instruction and motivation during the treatment period are also found in the literature (ZACHRISSON 1976, WIST AND NORD 1977, FELIU 1982). It has been argued by some that the psychological effect of a malocclusion is often not fully felt until adult age (FORÖY 1982), while orthodontic treatment should preferably be undertaken earlier in life.

The purpose of the present study is to determine the proportion of individuals with a history of orthodontic treatment among young Norwegian adults, and the perceived treatment need among untreated subjects. In addition, dental health and some characteristics of oral health behavior of orthodontically treated and untreated groups are compared.

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— Materials and Methods —

Two groups were examined. The first consisted of 89 females and 86 males from two neighboring Norwegian towns, Skien (pop. 47,000) and Porsgrunn (pop. 31,000). The subjects were respondents of a stratified random sample of 125 individuals born in 1959 (mean age 21.4±0.3 years) from each of the two towns. The stratification criteria were sex and town.

The second group consisted of subjects born in 1965 who attended the Public Dental Services in Skien in 1982. Complete records were available for 525 subjects, 81% of that age group in the town.

Twenty-one-year-old subjects

The subjects were examined clinically and radiographically for caries and periodontal disease in a modern clinic. Gingival Bleeding Index (GBI) was registered on the buccal and lingual surface of teeth numbers 16, 21, 24, 36, 41, and 44 (International tooth numbering) with a periodontal probe as described by AINAMO AND BAY (1975). Pocket depths were measured on the mesiobuccal side of the same teeth. Decayed, missing or filled tooth surfaces were recorded according to the criteria of the WORLD HEALTH ORGANIZATION (1979), using plane mouth mirrors and probes. Third molars were excluded.

Two posterior bitewing radiographs were taken of each subject, and the proximal surfaces examined for caries (HAUGEJORDEN 1974). Clinical and radiographic scores were combined. The criteria for the clinical and radiographic DMF scores were practiced before the study and the difference between duplicate examinations was found to be not significant ($p > 0.10$).

Occlusal anomalies like maxillary overjet more than 10mm, deep incisor bite characterized by the incisal edge of lower incisor(s) in contact with palatal soft tissue, open bite characterized by less than four teeth in occlusal contact, and space anomalies of incisors exceeding 2mm crowding or spacing were recorded. In addition, crossbite was registered in anterior and posterior segments when at least one upper tooth occluded lingual to the lower.

The subjects were asked about dental visiting habits, regularity of use of toothbrush and toothpick/dental floss, use of cariogenic snacks, whether they had received orthodontic treatment, and whether they were satisfied with the arrangement of their teeth. They were also asked about parents' occupation and grouped according to social class as: 1 — persons with higher education or in top administrative positions; 2 — white collar workers, foremen and farmers; and 3 — blue collar workers, fishermen, etc.

Seventeen-year-old subjects

Reports of missing permanent teeth, cavities or fillings in incisors and cuspids, decayed/filled proximal surfaces, and history of orthodontic treatment were obtained for this group from their dental records, supplemented as required by the district dental officers.

Most of the 21yr-olds had been under regular care in the Public Dental Services from age 7 to 14, while 17yr-olds had received incremental care from the age of 6.

Statistical analysis

Student's t-test was used to test the differences between groups in mean scores, and chi-square to test the significance of differences in distribution of subjects of various groups according to categorical variables.

— Results —

A similar number of 21yr-olds had received orthodontic treatment in the two towns. In all cases except one, this treatment was recommended by school dental officers. While more males than females had received orthodontic treatment, which had also been more frequently recommended to subjects of social classes 1 and 2 (Table 1), none of these differences was statistically significant ($p > 0.10$).

Twenty-two (12.6%) of the subjects born in 1959 had malocclusion exceeding the criteria used in this study. Nine had crowding > 2mm, six had spacing > 2mm, four had a crossbite, two deep incisor bites, and one an overjet exceeding 10mm.

Significantly more ($p < 0.005$) of the subjects born in 1965 had received orthodontic treatment (129, 24.6% of 525 vs. 25, 14.3% of 175). The prevalence of cavities or restorations in cuspids and incisors was similar in orthodontically treated and untreated groups.

Significantly fewer proximal surfaces were decayed or filled in the orthodontically treated 17yr-olds than in the untreated subjects (15.2% vs. 20.4%, $p < 0.005$). The difference was not significant among the 21yr-olds (30.5% vs. 32.0% in the untreated). Previous caries experience was similar in the different social classes.

Missing teeth were significantly more common among orthodontically treated than untreated subjects ($p < 0.005$) and among untreated 21yr-olds compared to untreated 17yr-olds ($p < 0.01$). Approximately 4% of the 17yr-olds had permanent teeth missing because of caries, and altogether 39 permanent molars had been extracted for this reason. The corresponding percentage was 12.5% for the 21yr-olds.

The GBI-score for the orthodontically treated 21yr-olds was 31.3 ± 18.1, while the score for the total group was 30.8 ± 17.6. Three individuals had mean pocket depths larger than 3mm, not significantly different from the rest of the group ($p > 0.10$).

A comparison of dental health related behavior between orthodontically treated and untreated groups and among those who said they would have liked to have orthodontic treatment undertaken while of school age is shown in Table 2. Although the orthodontically treated subjects had more regular dental visiting habits and used dental floss / tooth picks more regularly than the others, the differences were not significant ($p > 0.10$). All 21yr-olds brushed their teeth daily and approximately 90% used fluoride toothpaste.

— Discussion —

The rate of previous orthodontic treatment among the 21yr-olds in the present sample compares well with the approximately 14% of a child population found in urgent need of treatment according to professional judgment (Helm 1977). Approximately 16% of Swedish men reported a history of orthodontic treatment (Ingervall 1974), while the corresponding figure among Finnish undergraduate students was 10% (Laine and Hausen 1982). The proportion of subjects in the present study who had received orthodontic treatment was, however, far below the 58–80% prevalence of malocclusion registered in Norwegian children (Telle 1951, Jonsgar 1965, Foröy 1979).

Approximately 10% of the 21yr-olds said they wished that they had received orthodontic treatment while at school. That figure is not an estimate of the potential demand of treatment, since the

subjects were not given any information about costs. The school dental officers had recommended orthodontic treatment to half of these subjects.

It has been found that the dentist is the most influential person in the decision about whether to undertake orthodontic treatment or not, and the dentist took part in the decision in the majority of cases (KENRAD AND BUCH 1978, SHAW ET AL. 1979). Among the 21yr-olds in the present sample, the school dental officers recommended the orthodontic treatment in all but one case. The criteria for the decision are not known, but the number of 21yr-old subjects who had orthodontic treatment recommended by the school dental officer, and 17yr-olds who received treatment, represent percentages close to that suggested as needing treatment in Norway (HILLESUND ET AL. 1978), as well as the perceived need among 30yr-old Danes in a 15-year followup study (HELM ET AL. 1983).

Table 1

The numbers (% of total) of 21-year-olds with a history of orthodontic treatment, those who wished they had received treatment while at school, and treatment recommendations by the school dental officer. N=175

	Orthodontic Treatment	Wanted Treatment	Orthodontics recommended
Females	10 (11.2%)	9 (10.1%)	21 (23.6%)
Males	15 (17.4%)	11 (12.8%)	23 (26.7%)
Total	25 (14.3%)	20 (11.4%)	44 (25.1%)
		Social Class	
1 and 2	12 (19.0%)	4 (6.3%)	17 (27.0%)
3	13 (11.6%)	16 (14.3%)	27 (24.1%)

Table 2

Interdental cleaning, use of cariogenic snacks, and dental visiting habits among orthodontically treated and untreated 21-year-old Norwegians

	All Subjects	Orthodontically Treated	Wanted Treatment
Interdental cleaning:			
every day	28 (16.0%)	6 (24.0%)	4 (20.0%)
irregularly	49 (28.0%)	10 (40.0%)	5 (25.0%)
seldom/not at all	98 (56.0%)	9 (36.0%)	11 (55.0%)
Cariogenic snacks:			
every day	41 (23.4%)	5 (20.0%)	5 (25.0%)
less often	134 (76.6%)	20 (80.0%)	15 (75.0%)
Dental visits:			
regularly/each year	129 (73.7%)	22 (88.0%)	10 (50.0%)
irregularly	44 (25.1%)	3 (12.0%)	10 (50.0%)
not at all	2 (1.1%)	—	—

Classification systems for malocclusion are available, but the association between malocclusion and other oral disorders has not been clearly demonstrated (SHAW ET AL. 1980). The social and psychological effect of malocclusion should be emphasized when considering a recommendation for treatment; however, the perception of malocclusion varies, and unfortunately too little is yet known about the importance of dental aesthetics.

The dentist's clinical judgment may not be adequate to decide to whom treatment should be recommended (JENNY ET AL. 1983), but only 5% of the 21yr-olds in the present study who said they wished they had received orthodontic treatment while at school had not had a previous recommendation for orthodontic treatment from the school dental officer.

The increased prevalence of orthodontic treatment undertaken in the younger age group is probably due to some extent to the increased availability of such treatment. Practically all orthodontic treatment in the area is undertaken by specialists and partially paid for by the patient, a share which has increased in recent years. The frequency of orthodontic treatment undertaken in the 17yr-olds indicates that so far this increased cost had not reduced the demand for treatment to any noticeable extent.

The orthodontically treated 17yr-olds had significantly fewer decayed or filled proximal surfaces, indicating that the orthodontic treatment might have had a positive effect on caries prevalence. This is in agreement with earlier findings (INGERVALL 1962, ZACHRISSON 1971), but it is not known whether the two groups of 17yr-old were comparable in social class. However, this factor did not appear to affect the dental health of 21yr-old subjects significantly.

Missing permanent teeth were found significantly more often among orthodontically treated subjects due to missing bicuspids. Thus approximately 60% of the orthodontically treated 17yr-olds had missing permanent teeth. It may be argued that those extractions have contributed to the lower caries prevalence in the remaining teeth.

There was no significant difference in the dental health related behavior of treated and untreated groups, and the small observed difference is more likely associated with the somewhat higher social class of treated subjects. Both groups had dental health habits similar to what has been found earlier in Norwegian populations (HELÖE ET AL. 1982).

The present study indicates a perceived need for orthodontic treatment among adults. The criteria for significant malocclusion were rather extreme to avoid borderline cases and thus minimize examiner variability. Even so, approximately 12% were found to have such a severe malocclusion. Malocclusion traits like crowding and maxillary spacing were most frequently registered.

The prevalence of orthodontic treatment among subjects born in 1965 suggests that the need for treatment as defined by these criteria is now approximately covered among 17yr-olds who have received dental care in the local Public Dental Service.

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References

Ainamo, J., Bay, I. 1975. Problems and proposals for recording gingivitis and plaque. Int. Dent. J. 25:229-35.

Feliu, J. L. 1982. Long-term benefits of orthodontic treatment on oral hygiene. *Am. J. Orthod.* 82:473-77.

Foröy, A. O. 1979. Malokklusjonsfrekvens og kjeveortopedisk behandlingsbehov hos 6-°aringer i Nittedal. *Norsk Tannelaegeforen Tid.* 89:538-40.

Haugejorden, O. 1974. A study of the methods of radiographic diagnosis of dental caries in epidemiological investigations. *Acta. Odont. Scand. suppl.* 65:64-76.

Heikinheimo, K. 1978. Need of orthodontic treatment in 7-year-old Finnish children. *Community Dent. Oral Epidem.* 6:129-34.

Helm, S. 1968. Malocclusion in Danish children with adolescent dentition: an epidemiologic study. *Am. J. Orthod.* 54:352-66.

Helm, S. 1977. Epidemiology and public health aspect of malocclusion. *J. Dent. Res.* Spec. Issue C27-31.

Helm, S. 1980. Indikation og behov for ortodontisk behandling. En kritisk litteraturoversigt. 1. *Tandlaegebladet.* 84:175-85.

Helm, S., Kreiborg, S., Solow, B. 1983. A 15-year follow-up study of 30-year-old Danes with regard to orthodontic treatment experience and perceived need for treatment in a region without organized orthodontic care. *Community Dent. Oral Epidem.* 11:199-204.

Heloe, L. A., Aaro, L. E., Sogaard, A. J. 1982. Dental health practices in Norwegian adults. *Community Dent. Oral Epidem.* 10:308-12.

Hillesund E., Lotsberg, O. B., Tande, H. 1978. *Offentlig tannhelsetjenestes forhold til kjeveortopedisk service.* Universitetet i Oslo.

Ingervall, B. 1962. The influence of orthodontic appliances on caries frequency. *Odont. Revy.* 175-90.

Ingervall, B., Hedegard, B. 1974. Awareness of malocclusion and desire of orthodontic treatment in 18-year-old Swedish men. *Acta. Odont. Scand.* 32:93-101.

Ingervall, B., Seeman, L., Thilander, B. 1972. Frequency of malocclusion and need of orthodontic treatment in 10-year-old children in Gothenburg. *Svensk Tankläk Tid.* 65:7-21.

Jenny, J., Cons, N. C., Kohout, F. J. 1983. Comparison of SASOC, a measure of dental aesthetics, with three orthodontic indices and orthodontist judgment. *Community Dent. Oral Epidem.* 11:236-41.

Jonsgar, H. 1965. *En epidemiologisk undersökelse av tannstillingsfeil hos skolebarn i Bergen.* Thesis. Universitetet i Bergen.

Kenrad, L., Buch, H. 1978. Undersökelse af en gruppe unges holdning til tandreguleringsbehandling. Specialtandlaegeafhandling. Köbenhavn.

Laine, T., Hausen, H. 1982. Cross-sectional study of orthodontic treatment and missing of permanent teeth in two birth cohorts of Finnish students according to sex. *Community Dent. Oral Epidem.* 10:209-13.

Shaw, W. C., Addy, M., Ray C. 1980. Dental and social effects of malocclusion and effectiveness of orthodontic treatment: a review. *Community Dent. Oral Epidem.* 8:36-45.

Shaw, W. C., Lewis, H. G. Robertson, N. R. E. 1975. Perception of malocclusion. *Brit. Dent. J.* 138:211-16.

Shaw, W. C., Gabe, M. J., Jones, B. M. 1979. The expectations of orthodontic patients in South Wales and St. Louis, Missouri. *Br. J. Orthod.* 6:203-5.

Telle, E. S. 1951. A study of the frequency of malocclusion in the county of Hedemark, Norway. *Trans. Europ. Orthod. Soc.* 192-8.

Wist, P. J., Nord, A. 1977. Caries experience in orthodontically treated individuals. *Angle Orthod.* 47:59-64.

World Health Organization. 1979. *A guide to oral health epidemiological investigations.* Oral Health Unit, WHO, Geneva.

Zachrisson, B. U. 1976. Cause and prevention of injuries to teeth and supporting structures during orthodontic treatment. *Am. J. Orthod.* 69:285-300.

Zachrisson, B. U., Zachrisson, S. 1971. Caries incidence and orthodontic treatment with fixed appliances. *Scand. J. Dent. Res.* 79:183-92.