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# Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults

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## ABSTRACT

To assess the prevalence of tooth wear on buccal/facial and lingual/palatal tooth surfaces and identify related risk factors in a sample of young European adults, aged 18–35 years. Calibrated and trained examiners measured tooth wear, using the basic erosive wear examination (BEWE) on in 3187 patients in seven European countries and assessed the impact of risk factors with a previously validated questionnaire. Each individual was characterized by the highest BEWE score recorded for any scoreable surface. Bivariate analyses examined the proportion of participants who scored 2 or 3 in relation to a range of demographic, dietary and oral care variables. The highest tooth wear BEWE score was 0 for 1368 patients (42.9%), 1 for 883 (27.7%), 2 for 831 (26.1%) and 3 for 105 (3.3%). There were large differences between different countries with the highest levels of tooth wear observed in the UK. Important risk factors for tooth wear included heartburn or acid reflux, repeated vomiting, residence in rural areas, electric tooth brushing and snoring. We found no evidence that waiting after breakfast before tooth brushing has any effect on the degree of tooth wear ( $p = 0.088$ ). Fresh fruit and juice intake was positively associated with tooth wear. In this adult sample 29% had signs of tooth wear making it a common presenting feature in European adults.

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## 1. Introduction

Recent systematic reviews<sup>1,2</sup> have established that tooth wear is common and increases with age in both the primary and

permanent dentitions. However, neither review provides sufficient data to give a clear appraisal of which factors increase the risk of tooth wear. Hitherto, prevalence studies have reported data from individual countries without any attempt to investigate multiple countries or establish an

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estimate for a region.<sup>3–7</sup> Bartlett et al.<sup>6</sup> and Lussi et al.<sup>7</sup> identified acidic foods, particularly those with high titratable acidity and reflux of gastric contents as risk factors but in national studies.

The severity and distribution of tooth wear is normally measured using indices, which record the change in shape on teeth which is irrespective of the aetiology. The Basic Erosive Wear Examination (BEWE)<sup>8</sup> was developed primarily as practice-based assessment for general practitioners, but also as a suitable index for epidemiological studies. Escarcel is a Pan European study designed to estimate the levels of sensitivity, periodontal disease and tooth wear in young adults and the results from the latter are presented here.

The observational, cross-sectional study across seven European countries reported here was designed to determine prevalence of tooth wear on the oral and facial surfaces in 18–35 year olds in the general dental practice setting, across socioeconomic and demographic groups and identify potential risk factors. The study hypothesis was that erosive dietary challenge is a major risk factor for tooth wear.

### 1.1. Study population

We used a multistage, stratified sampling method to obtain a representative sample of the adult population, attending general practices, between the ages of 18–35, on the basis of gender, geographic location (self disclosed), education and occupation, in seven European countries, Estonia, Finland, Latvia, France, Italy, Spain and UK. Because only 122 participants were recruited in Estonia, its data were merged with those of neighbouring Latvia.

The sample size of 300 used in Finland, Latvia and Spain estimates a prevalence of tooth wear of the order of 30% to within 5.2% (with dentine exposure) with 95% confidence.<sup>1,2</sup> For France, Italy and UK each with ~700 participants, the prevalence is estimated to within 3.4% with 95% confidence. With a sample size of approximately 3000, the study is sensitive to detect quite modest associations between the endpoint of erosive tooth wear and antecedent factors. For example, suppose that the prevalence of tooth wear was 30% overall, but was 33.3% in a subgroup exposed to a risk factor comprising one-third (1000) of the participants and 28.3% in the remaining two-thirds (2000) who were not exposed, corresponding to an odds ratio of 1.26. A difference of this size is detectable with power 80% using a test at the conventional two-sided 5%  $\alpha$  level.

Ethical approval was granted from Research Ethics Committees from each country and all subjects gave oral and written consent to participate in their national language. The present data are part of a larger study called the European Study in Non Carious Cervical Lesions (Escarcel). Details of the survey project can be consulted on the site <http://odontologie.univ-lyon1.fr/recherche/Briefly>, participants of either gender attending for routine dental examinations in general dental practice during the study period were asked to participate.

Following screening, consenting patients who were in good health, between 18 and 35 years of age, able to understand and read the questionnaire, had a minimum of 6 eligible teeth (without restorations), though the number of teeth scored per

patient was usually far higher than this [mean 27.3, range 9–28]. Subjects were excluded if they were currently wearing orthodontic appliances, had cervical restorations on any of the 6 minimum score-able teeth, were taking analgesics or who had undergone oral local anaesthesia in the last 24 h. Subjects on anticoagulants or who suffered bleeding disorders were excluded, as were those who required antibiotics for dental treatment and employees of the study site.

### 1.2. Methods

Standardized clinical examinations, by the trained examiners, were included as part of the routine check-up of participating adults. Ten examiners were involved in Estonia, Finland and Latvia, 15 in France, 17 in Italy, 20 in Spain and 2 in the UK. All examiners were trained and calibrated by a senior epidemiologist using study casts and examination of patients. The intra- and inter-examiner reliability were evaluated according to the World Health Organization (WHO) recommendation giving a Kappa agreement at the end of the training phase of 0.75.

A self-administered questionnaire was developed, in English, then translated into the languages of the participating countries; all translated questionnaires were validated in pilot studies. The questionnaire was based on those used in previous studies identifying risk factors for tooth wear and dentine hypersensitivity<sup>6,9</sup> and included data on lifestyle, dietary and oral health behaviour including tobacco, medication and erosive dietary factors, and health-associated preventive behaviours, characterised by weight relative to height.

Each subject completed the questionnaire, after which the teeth were dried and cleaned if needed to score the wear, using compressed air and examined without magnification under normal dental surgery conditions with good lighting. The cervical, facial and oral (palatal/lingual) tooth surfaces were scored on all teeth (second molar to second molar) using the BEWE<sup>8</sup> on a 0–3 ordinal scale (0 = no wear, 1 = early surface loss, 2 = surface loss < 50%, 3 = surface loss > 50%). Missing teeth, restored surfaces (greater than 50% of the surface), traumatised or carious teeth and third molars were not scored.

Data were analysed at patient level: each individual was characterized by the highest BEWE score recorded for any scoreable surface. Accordingly, bivariate analyses examined the proportion of participants who scored 2 or 3 for at least one tooth in relation to a range of demographic, dietary and oral care variables.

## 2. Results

Overall, 3187 adults were recruited from 7 countries (Estonia 122; Finland 344; France 700; Italy 675; Latvia 342; Spain 304; United Kingdom 700). The highest tooth wear BEWE score was 0 for 1368 patients (42.9%), 1 for 883 (27.7%), 2 for 831 (26.1%) and 3 for 105 (3.3%).

Table 1 shows the proportion of participants with erosive tooth wear defined as a BEWE score of 2 or 3 in relation to a range of antecedent factors including demographic, oral hygiene (Table 2) and dietary factors (Table 3). There were large differences between BEWE scores in different countries

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