Surveillance Study

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Oral health sentinel-based surveillance: a pilot study on dentinal hypersensitivity pain

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Abstract

Aim of the study is to assess the development of a structured sentinel system for oral health data collection at national level. Furthermore, this pilot study aims to investigate the prevalence data on dentinal sensitivity pain collected through a nationwide network of epidemiological sentinels (dental hygienists). Each sentinel was given a specific number of examinees and periodicity of data collection. Overall, 116 adults were recruited from 19 Regions, 42,24% male and 57,76% female, with a mean age of 26. DH result was consistent with literature data, being 45%. All sentinel completed the standard forms and assured a good compliance. The overall good customer satisfaction assures adhesion of the sentinels to the procedure, and the regular data collection. The pilot study proved the effectiveness of a structured nationwide network of epidemiological sentinels (dental hygienists) for oral health data collection at national level. This methodology can be an essential starting point for periodic comparative studies. ***Clin Ter 2017; 168(5):e333-337. doi: 10.7417/CT.2017.2030***

Key words: *Dentinal Hypersensitivity, pain, sentinel*

Introduction

Tooth enamel is the hardest substance in human body being formed for almost totality of minerals and only for a small percentage of organic matter. Dental erosion consists in a dental wear consequent to a direct contact of non-bacterial acids origin with tooth surface. When dentinal tubules occur dentinal hypersensitivity manifests, which significantly impact on quality of life of patients because the pain is associated with a tangible discomfort (1.2). Dentine hypersensitivity (DH) is an oral common condition, characterized by an intense transient pain resulting from stimulation of the exposed dentin, typically in response to chemical, thermal, tactile or osmotic stimuli (3). At the same time, this pain cannot be explained as arising from any other dental pathology. The diagnosis is difficult, especially when there are neighbouring decay processes, in which the pulp alterations are similar to those highlighted in cases of dental hypersensitivity (4.5). Basic requirements in diagnosis of sensitivity are both depth and location where the external agent is applied; in fact, the deeper is the cavity, the more permeable is the dentin due to greater size and number of tubules, important prerequisite to the hydrodynamic theory of Brännström, which asserts that the sensitive dentin is pervious. Conversely, dentinal sensitivity can be reduced drastically obliterating the orifices of the tubules, resulting in a reduction in conductance. The tubular permeability allows not only chemical, thermal, tactile or osmotic stress stimuli, but also the penetration of bacteria and toxins (6,7,8). Quick and ready reaction of tooth at any noxious stimulus causes dentinal pain. Patients with sensitivity often change their eating habits and behaviour. Epidemiological studies on the prevalence of DH in Europe, have resulted in conflicting data with values ranging from 1,34% to 98%. Italy reported the highest rate with a value of 47% of young adults affected. This heterogeneity can be explained by several factors such as the sample population (ethnic origin, location study, the periodontal status, dental hygiene habits), the different diagnostic criteria used to define DH and if the original data are based on a clinical assessment or filling out a self-administered questionnaire. Italy showed the highest index of DH and Schiff along with the United Kingdom, where Finland, Latvia and Estonia scored the lowest (9). If the prevalence of DH is increasing, especially in Europeans young adults, the need to diagnose this condition and to intercept, or even prevent, it at an early stage becomes essential to preserve tooth structure, reduce pain and improve OHRQoL (10).

Aim of the study is to assess the development of a structured sentinel system for oral health data collection at national level. Furthermore, this pilot study aims to investi-

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gate the prevalence data on dentinal sensitivity pain collected through a nationwide network of epidemiological sentinels (dental hygienists).

Materials and methods

This pilot study is part of a larger project called "SOHIP Project" (Sentinels for Oral Health Project Italian), which was developed as a synergy between University of Rome Sapienza, University of Sassari and a national scientific association of dental hygienists. It is aimed to collect data in the adult population of the Italian on the prevalence non-carious lesions of the enamel and dentin hypersensitivity.

The recruited sentinels in the study are nationwide representative and are distributed through all macro-regions, with a proportional number consistent with the population territorial numeracy.

All the epidemiological sentinels were professional Dental Hygienist, affiliated to a national scientific association of dental hygienists (SISIO).

This survey was designed as an epidemiological observational study, conducted in a young-adult population (18-35 years).

Sample Population

To gain a proper sample consistency and territorial distribution, a stratified sampling method, based on the subject's sex, geographic location, education and employment, was used to obtain a representative sample of the Italian adult population aged 18-35 in good conditions health and able to comply with all study procedures and restrictions. Subjects were excluded if they had 5 teeth or less, wearers of orthodontic appliances, presence of cervical restorations, being treated with analgesics or had undergone oral local anaesthesia in the last 24 h. All patients gave oral and written informed consent.

Each sentinel was given a specific number of examinees and periodicity of data collection. Enrolled subjects' data were anonymously recorded on a standard locked excel spreadsheet, based on the number of the examiner sentinel and a few individual sequence data-base.

Calibration of the sentinels

The calibration of the examiners was organized at the Department of Dental and Maxillofacial Sciences, Policlinic Umberto I, Rome by two high-level epidemiologists, for 2 days, based on the examination and re-examination of 15 subjects. Intra- and inter-examiner reliability was assessed according to WHO recommendations. Intra and inter-examiner agreement expressed as Kappa values was 0.82 and 0.75 respectively. In the two calibration days, theoretical learning forms and practical verification modules were provided to all participants:

1° session: Introduction; Basic Erosive Wear Examination; Dentinal Hypersentivity, Schiff Index; Periodontal Health Assessment.

2° session: Euro Oral Health Erosion Clinical Form; Questionnaire; Practical organizations; Conclusions

To ensure the correctness of data collection by all the sentinels, a testing period has been envisaged during which the examiners have collected data via paper and sent folders to headquarters of Rome, where it was possible to carry out quality control. Upon completion of the data collection, four questions about the degree of satisfaction of sentinels were produced.

Clinical examination

Each participant completed a self-administered questionnaire based on those used in previous studies that identify risk factors for dentine hypersensitivity, including data on lifestyle, eating habits and oral hygiene habits; perception of dentinal hypersensitivity including intensity, duration, origin; risk factors associated with non-carious cervical lesions (tobacco, drugs, dietary factors erosion) (10,11,12,13). After the completion of questionnaire, it was conducted by the sentinels a clinical examination for dentine hypersensitivity. Exclusion criteria for susceptibility testing: teeth with exposed dentin, with deep restorations, defective or vestibular teeth, used as a pillar for fixed or removable dentures, teeth with total crowns, orthodontic bands, extensive caries or enamel fractures, sensitive teeth with positivity for etiological factors which do not include intervening dentine exposed by erosion, abrasion or recessions. All eligible teeth, except second and third molars, were evaluated for the presence or absence of DH. The dentin exposed surface of each eligible tooth was subjected to stimulation with a jet of air at 60 psi (± 5 psi) and the temperature of 19 ° C (± 5 ° C) for 1 second application of using the air syringe / dental water, from a distance of about 1 cm. The fingers of non-dominant hand were used to cover the teeth of other side. The examiner discreetly records the patient's response to the stimulus using the values of the ordinal Schiff scales (0 = entity does not respond to the sensibility, 1 = subject responds to stimuli, but not to require the suspension of the stimulus, 2 = subject responds to stimuli and requires the suspension or moves from stimulus, 3 = subject responds to air stimulus, considers stimulus to be painful, and calls for the withdrawal of the stimulus 4 = cannot answer) (14). The patient was then asked if the stimulus caused DH or not.

For the standard clinical evaluation according to SOHIP project, require an operating light and the following instruments: mirror, air / water syringe, cotton rolls.

Statistical analysis

All data were analysed using the software STATA (Mac version 10.1). Descriptive statistics as cross tabulations and linear trends were calculated.

Result

Overall, 116 adults were recruited by 26 sentinels in 19 Regions, 42,24% male and 57,76% female, with a mean age of 26. Table 1 shows the proportions of patients classed as having DH according to criteria. 12 patients (10%) had a maximum Schiff score of 3, 27 (22%) 2 or 3 and 54 (45%)

Table 1. Patients classed as having DH according to SCHIFF criteria and DH questionnaire.

	PERCENT %
ALL PATIENT	
SCHIFF HIGEST	SCORE
0	42%
1	23%
2	12%
3	10%
4	12%
2-3	22%
1-3	45%
DECLARED	DH
DONT KNOW	18%
YES	21%
NO	61%

scored 1 or higher. For DH question in the questionnaire, 25 (21%) reported DH. This results shows that the three criteria to diagnose DH were interrelated. There was a significant association between the questionnaire declared hypersensitivity and clinically elicited sensitivity; and Schiff score and clinically elicited DH. However, a Schiff score of 0, do not corresponded to no elicited response from the patient in questionnaire (42% vs 61%). No statistically significant associations were detected between gender, occupation and hypersensitivity (Tab 2,3).

Customer Satisfaction Sentinels

Regards the customer satisfaction questionnaire administered to the participating sentinels, the results showed that all the examiners declared a complete/moderate patients' compliance level in the data collection procedure, with no record of low/null collaboration. Patients' awareness about dental hypersensitivity was not satisfactory, since only 13% was fully informed, 47% moderately and 40% did not have

Tabella 2. Associations between gender, occupation and hypersensitivity.

	NUMBER	**ELICITED SENSITIVITY**	**%**
ALL PATIENTs	116		
AGE			
18-25	9		
26-35	107		
GENDER			
MALE	49		
FEMALE	67		
OCCUPATION			
SELF EMPLOYED	33		28.45
MANAGERS/white collar	11		9.48
MANUAL	29		25.00
UNEMPLOYED/housewife	12		10.34
STUDENT	31		26.72

Tabella 3. Associations between gender, occupation and SCHIFF

GENDER			**SCHIFF**			**TOT**
	0	1	2	3	4	
Male	18	9	9	6	7	49 (42%)
Female	29	21	3	6	8	67 (58%)

OCCUPATION						**TOT**
SELF EMPLOYED	10	10	4	5	4	33 (28%)
MANAGERS	2	3	1	3	2	11 (9%)
MANUAL	11	7	4	2	5	29 (25%)
UNEMPLOYED/housewife	6	2	2	1	1	12 (11%)
STUDENT	18	8	1	1	3	31 (27%)
TOT	47	30	12	12	15	116

Pearson chi2(4) = 5.4448 Pr = 0.245

any information about the studied condition. Furthermore, there was an overall good/moderate completion of the data collection forms, but only 27% was fully completed, and lastly, patient mostly needed extra explanation on the queries by the sentinel, being clear for the 20% of the responders.

Because of the quality control process, limitations and strengths of the methodology have been identified.

• *Among limitations*: too narrow data collection time, the lack of a digital support, clinical evaluation of the patient, coupling of the clinical form with the questionnaire, folders' transmission procedure, communicative chain.

• *Among strong points*: the potential of simple immediate and clear data collection system, good territorial representation, quick methods of collection, monitoring tool of problems, pioneering dimension, empowerment and team building.

It was therefore provided to examiners a locked excel spreadsheet, individually marked with the regional code of the Sentinel, which enabled faster communication of data and completeness of the collection, giving each sentinel examiner a self-correction tool for the evaluation of their work.

Thence it has been continued with the new data collection methodology that is reported in the present work, which led to a 100% success in the organizational and optimization in data collection flow.

Discussion and Conclusions

The present pilot study proved the effectiveness of a structured nationwide network of epidemiological sentinels (dental hygienists) for oral health data collection at national level. This methodology can be an essential starting point for periodic comparative studies. The overall good customer satisfaction assures adhesion of the sentinels to the procedure, and the regular data collection. The use of new technologies for data recording and transmission is another strong point of the project: with the standardized locked excel spreadsheets, the examiners were provided with a self-assessing tool, which facilitated the completeness of the data collection. The proposed system is based on recommendations and methodologies for collecting data for which there is an agreement on the validity and significance, and for which most the EU countries has already available data.

Furthermore, data from the pilot study confirm that dentine hypersensitivity pain/discomfort is highly prevalent in young adults across Europe since it affected up to 42% (11). Other studies have reported prevalence figures of 73–98% (15), 60% (16) and 68% (17), using similar techniques. Result of this study show a prevalence of 45%, consistent with the previous studies. Comparing the data obtained on DH prevalence from each of the diagnostic methods used, there was consistency with data reported from response to sensitivity on clinical stimulation, the code resulting from Schiff Air Sensitivity Scale, and the questionnaire declared hypersensitivity. In this study, cold air was used as a physical stimulus, and Schiff score was used to complement the patient's own DH perception. This study demonstrated that all three different measures used to assess DH were strictly correlated and were complementary and supportive of each other.

Severity of pain is proportional to the strength of the stimulus, but also to the subject's psychological state (18,21). In some studies, sensitivity was assessed by questionnaire and clinically investigation and reported that prevalence data obtained from questionnaires was a little higher than that obtained by clinical exam, although the differences were small in most cases (13, 19, 20, 22). Overall the 3 criteria used to assess DH in this study were highly interrelated which is relevant in future study design.

The results of the described methodology and clinical assessment support further usage of such sentinel network to widen sample size and to ensure epidemiological data flow at regular intervals on oral health conditions, thus creating a simple, effective, inexpensive and validated method of population oral health monitoring.

The study conducted up to now has limitations due to the short period of data collection, the lack of digital support that makes the folder transmission process too elaborate and does not facilitate the sentinel in checking the correct compilation of the folder.

We propose to continue to increase the reference sample and resolve the limitations that have arisen.

Disclosure Statement

For this study, there was no conflict of interest in: (1) the study design; (2) the collection, analysis and interpretation of data; (3) the writing of the report; and (4) the decision to submit the paper for publication.

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