Evaluation of DMFT in paediatric patients with social vulnerability conditions

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Abstract

Aim The aim of this study was to analyse the dmft/DMFT index in paediatric patients belonging to families with low income, in conditions of social vulnerability and absolute poverty and to compare it with a control group with a good socioeconomic status.

Materials and methods The study analysed a total sample of 160 patients with average age of 8.6±2.5. The sample was divided into two groups based on the Equivalent Economic Situation Indicator (ISEE). Group 1 consists of 80 patients with an ISEE value less than €6.000 and was examined at the "Solidarietà Vincenziana" Dental Centre – Rome (Italy), which is a centre dedicated to people with minimum income, destitute, elderly without resources, immigrant children; Group 2 consists of 80 patients with an ISEE value of more than €20.000 and was examined at the Pediatric Dentistry Unit, University of Rome Tor Vergata.Statistics: Statistical analysis was performed using SPSS for Windows version 21 (IBM SPSS Inc., Chicago, IL, USA). The statistical analysis included a descriptive evaluation of the results in a bivariate analysis. The association between the presence of caries and the background variables was evaluated with the chi-squared association or Fisher test. The minimum level of significance was fixed at P-value≤0.05.

Results Analysing the number of caries-free subjects and subjects with caries in reference to the age group between 5 and 12 years and the ISEE value, without distinction of sex, there is a statistically significant difference between Group 1 and Group 2, both in relation to the dmft (p=0.038, Chi-squared Test=4.28) and to the DMFT (p=0.001, Chi-squared Test=19.23). Subjects aged between 5 and 12 years had an average DMFT of 1.88 ± 0.83 (Group 1) and 0.95 ±0.54 (Group 2).

Conclusions The study highlights a positive relationship between ISEE value, of poor socio-economic situations (condition of absolute poverty, low economic income) and increase in the DMFT index. The oral health status is an indicator of poverty. For this reason it would be advisable to plan early preventive interventions, providing the possibility of appropriate and effective access for children in economic and social needs, whose quality of life can be further negatively affected by oral diseases.

KEYWORDS Absolute poverty, DMFT, Social vulnerability.

Introduction

In Italy, over one 1,260,000 children and adolescents (12.6% of the total), live in conditions of absolute poverty [Istat, 2019], that is, belonging to families with an overall expenditure for consumption equal to or lower than the poverty threshold. The poverty threshold is calculated on the basis of the minimum monthly expenditure necessary to acquire a basket of goods and services which, in an Italian context and for a family with certain characteristics, is considered essential for a minimally acceptable standard of living.

The incidence of children in absolute poverty varies from a minimum of 10.1% in Central Italy to a maximum of 15.7% in Southern Italy and is 9.7% in families where there is at least one minor child present, remaining very widespread among those with three or more minor children (19.7%) and those made up of foreign parents with minors (31%) [Istat, 2019].

In this context of social, cultural and economic poverty, and consequently also of health, oral health is an important public health problem due to the high prevalence, severity and complications of diseases that can occur in children and that can compromise the physiological growth of the child and the functions performed by the stomatognathic apparatus. Oral health status is therefore an indicator of poverty.

Dental care has suffered a decline due to the economic crisis, and social inequalities in oral health and prevention are noted, as well as access to treatment, disadvantaging people who are poorly educated or have scarce economic resources [Istat, 2015].

In 2013, the number of people who went to the dentist/orthodontist (37.9%) decreased, dental visits were delayed over a longer period of time (29.2%), the proportion of those who gave up treatment for economic reasons increased (12%), the quota covered by the public sector (5%) remained very limited, the ratio of foreign children who had never had a dental visit increased (46.3%), the ratio of children, in particular from families with low education, who had never had a dental visit increased (41.5%) [Istat, 2015].

The National Health System in Italy, to date, foresees programmes to protect dental health during developmental age (0–14 years), with special attention to subjects with health and social vulnerability conditions. The latter can be defined as a condition of social and economic disadvantage, usually related to conditions of marginalisation and/or social exclusion,

which prevents access to dental care alongside a lack of sensitivity to problems of prevention and treatment, and above all due to the high costs of private dental care.

The choice of instruments used to evaluate the socio-economic condition and the criteria for selecting the population groups in conditions of social vulnerability to be identified as recipients of the specific dental services is entrusted to the Regions and the Autonomous Provinces according to the Equivalent Economic Situation Indicator (ISEE). In Italy, patients contribute to the expenses for access to specialised healthcare services, such as the case of dentistry, according to a list provided by the Ministry of Health (the so-called Italian Nomenclatore tariffario) [DPCM 12/1/17].

Among the conditions of social vulnerability we can identify three distinct situations:

- situations of social exclusion, i.e. ISEE income not exceeding € 8,000 a year (access to care is provided for free by the regional health fund);
- poverty situations, i.e. ISEE income higher than € 8,000 and up to € 13,000 a year (access to care is provided by the regional health fund with a small contribution to expenses by the patient);
- middle/low income situations, i.e. ISEE income between € 13,000 and € 20,000 a year (care is provided with a 20% reduction on the rates of healthcare services).

The aim of this study was to analyse the DMFT index in paediatric patients belonging to families with low income, in conditions of social vulnerability and absolute poverty and to compare it with a control group with an ISEE higher than € 20,000.

Materials and methods

The study analysed a total sample of 160 patients divided into: 16 children under 5 years old, and 144 children between the ages of 5 and 12.

The sample was divided into two groups based on the ISEE value.

- Group 1: consists of 80 patients with an ISEE value less than € 6,000, examined at the "Solidarietà Vincenziana" Dental Centre in Rome (Italy). The "Solidarietà Vincenziana" Dental Centre is a non-profit, voluntary ONLUS association that operates within the Vincenziano AIC Italy and is dedicated to destitute, elderly people with minimum income, without resources, immigrant children or people without health care. For this study the parameter ISEE < € 6,000 was chosen because it was the maximum parameter to access this Dental Centre.
- Group 2: consists of 80 patients with an ISEE value of more than € 20,000 and was examined at the Pediatric Dentistry Unit, University of Rome Tor Vergata.

Each patient underwent a dental evaluation carried out by a trained dentist. During the dental visit, information regarding the age, sex, place of birth and nationality of the parents was recorded in the patient's medical record through a verbal interview, and the written consent of the parents or guardians was obtained.

The extraoral and intraoral clinical examination were performed. The dental assessment included teeth count (deciduous and permanent teeth), teeth extracted for caries and other reasons, caries, dental sealants, dental trauma, permanent or temporary restoration, enamel hypoplasia.

Dental caries were assessed using a visual-tactile method and X-rays (bite-wing and panoramic radiography). The criteria for manifest caries were: a visually detectable cavity on smooth surfaces, a catch of the blunt probe under slight pressure for fissures, an approximal translucency into the dentin on the X-rays.

For each participant the dmft/DMFT index was calculated according to the number of decayed (D), missing (M), filled (F) deciduous-permanent teeth [WHO, 2013].

The exclusion criteria were asthma, allergies, diabetes, coeliac disease, body growth delay, gastrointestinal diseases. The clinical examination of the dental arches was carried out in full compliance with the rules of oral hygiene, using disposable gloves and masks and tools such as probes and mirrors.

Since some patients between the ages of 5 and 12 were in the mixed dentition phase, it was decided to separately evaluate the dmft value for deciduous teeth and DMFT for permanent teeth.

Statistical analysis

Statistical analysis was performed using SPSS for Windows version 21 (IBM SPSS Inc., Chicago, IL, USA), and included a descriptive evaluation of the results in a bivariate analysis. The association between the presence of caires and the background variables was evaluated with the chi-squared association or Fisher test. The minimal level of significance was fixed at P-value≤0.05.

Results

The average age of the subjects examined is 8.6±2.5. By analysing the different groups we can highlight:

- Group 1 (ISEE <€ 6,000): 6% (n. 6) of the subjects are under 5 years old (50% female, 50% male), 94% (n. 74) of the subjects are aged between 5–12 (53% female, 47% male);
- Group 2 (ISEE <€ 20,000): 12% (n. 10) of the subjects are younger than 5 years old (50% female, 50% male), 88% (n. 70) of the subjects are aged between 5–12 (59% female, 41% male).

Groups 1 and 2 were homogeneous, equally distributed for age.

Analysing the number of caries-free subjects and subjects with caries in reference to the age group between 5 and 12 years old and the ISEE value, without distinction of sex, there is a statistically significant difference between Group 1 and Group 2, both in relation to the dmft (p = 0.038, Chi-squared Test = 4.28) and to the DMFT (p = 0.001, Chi-squared Test = 19.23) (Fig. 1, 2).

On the other side, there are no statistically significant differences, in Groups 1 and 2, between the number of caries-free subjects and subjects with caries in reference to the age group of children under 5 years of age (p = 0.69, Chi-squared Test= 0.15).

Subjects aged between 5 and 12 years old have an average DMFT of 1.88 ± 0.83 (Group 1) and 0.95 ±0.54 (Group 2).

Discussion and conclusion

The study showed that the DMFT index is higher in patients in absolute poverty, under 12 years of age, with an ISEE lower than € 6,000, compared to Group 2 with medium-high ISEE of over € 20,000. Thus, this study highlights how the oral

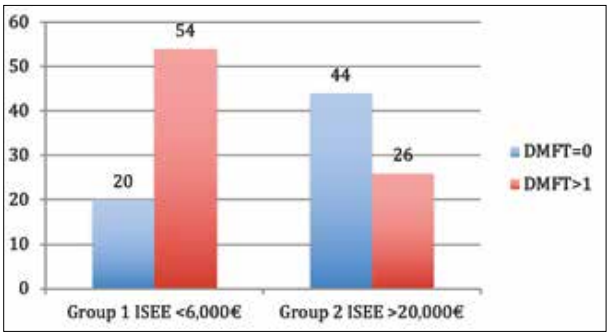

FIG. 1 DMFT (subjects 5-12 years old) in Groups 1, and 2 (p=0.001, Chi-squared Test =19.23).

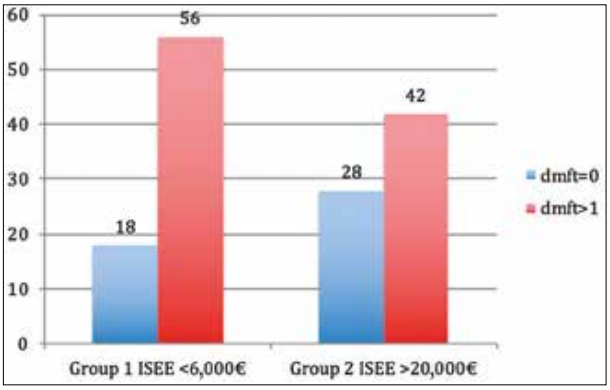

FIG. 2 dmft (subjects 5-12 years old) in Groups 1, and 2 (p=0.038, Chi-squared Test =4.28).

health status can be an indicator of poverty.

The results relative to the relationship between the ISEE and subjects under the age of 5 will not be considered in the discussion as they are not statistically significant, and the numerosity of the examined sample is small.

Several studies in the literature aimed to identify the prevalence of caries in relation to the socioeconomic situation. Congiu et al. [2014] showed, based on the evaluation of a sample of preschool children in the North of Sardinia, that there is a relationship between the parents' employment status and the child's oral health.

The results obtained in the present work led to similar results in studies carried out by Carta et al. [2014], Campus et al. [2007] and Matranga et al. [2014], finding a significant impact of socioeconomic determinants on the prevalence of caries.

By performing a combined analysis between Groups 1 and 2 (Fig. 1) it is evident that the dmft index in deciduous teeth of children in mixed dentition is represented more in Group 1 with ISEE <€ 6,000 than in Group 2 with ISEE >€ 20,000 (75% and 60% respectively). In Group 1, there is a frequency of dmft >1, which is much higher than the frequency of children with dmft = 0. The data is statistically significant, being p=0.038, Chi-squared test=4.28. Therefore, the results obtained are not attributable to the case but to an actual relationship between the ISEE value and caries.

Figure 2 shows that the frequency of DMFT in permanent teeth in children in mixed dentition is greater in Group 1 with ISEE <€6.000. In contrast, in Group 2 with ISEE >€ 20,000, the ratio is reversed and there are more children with a DMFT=0. This data was statistically significant for p=0.001, Chi-squared test=19.23.

Comparing the data of the present study with the results of an aepidemiological study carried out in Italy in 2007 [Campus et al., 2007], 73.1% of the sample of children between the ages of 5 and 12 with an ISEE <€6.000 have a dental caries experience, compared with the national average of 43.1%; while, considering the Group with an ISEE> €20.000, there is a 37.1% prevalence of caries, with a value lower than the aforementioned national average.

Furthermore, analysing the average DMFT index of Group 1 with an ISEE <€6.000, it can be seen that it is higher than the national average of 1.09 [Campus et al., 2007] and the average DMFT of Group 2 with ISEE> €20.000 of 0.95. Therefore, being the bacterial aetiological agent common to both groups examined, the differences found are necessarily due to different environmental factors, i.e. factors external to the host that modify and condition habits and lifestyle. It is therefore evident that in social environments where there is a difficult socioeconomic situation, a greater predisposition to caries is conceivable [Costacurta et al., 2014; Cianetti et al., 2017; Ferrazzano et al., 2019].

Poverty is a determinant of illness and at the same time the compromised heath status can lead to the impoverishment of individuals and communities [Monasta, 1998]. Furthermore, caries can be considered an indicator of social exclusion.

The Italian economic crisis of recent years has certainly played a decisive role in the protection of health in general terms. But it is important to consider that oral health is strongly correlated with general health [Costacurta et al., 2011] and subject to the same determining factors, and is essential for the attainment of a good quality of life [WHO, 2010a].

Oral diseases alter the quality of life [Martins et al., 2018] and disproportionately affect the disadvantaged segments of society, placing an additional burden of disease on these groups [Watt, 2012]. The analysis of aepidemiological data has shown that social determinants influence oral health, and that oral diseases have a direct correlation with the socioeconomic position status [da Fonseca and Avenetti, 2017].

The recognition and identification of social determinants and their influence on inequalities in the dental field has profound implications in guiding health services and developing appropriate strategies in terms of prevention and therapy [Petersen and Kwan, 2011].

According to the eco-social theory and the conceptual scheme of social determinants, the concept of "embodiment" is elaborated, that is to say, the process people go through to translate their own personal experiences into biological terms [Krieger, 2005]. Based on this definition, health and disease can be defined as the biological expression of interactions that take place on a political, economic, and social level. No biological aspect of health can be understood if decontextualised from a historical, social, economic and political point of view.

According to the conceptual framework of the Commission on Social Determinants of Health (CSDH), two types of determinants can be highlighted: structural and intermediate [Navarro and Shi, 2001; WHO, 2010b]. Among the structural determinants there is the socioeconomic/political context and the social position. With the term socioeconomic and political context, reference is made to all those factors such as governance, macroeconomic policies (market rules, financial and economic trends, organization of the labour market), social policies (welfare, labor policies, building and housing rights), public policies (education, healthcare, environmental hygiene),

culture, values and traditions, aepidemiological conditions. In social aepidemiology [Krieger et al., 1997], the main indicators used to correlate health to social position are: income, education, employment, gender, ethnicity. Among the intermediate determinants are: material conditions (possibility of accessing those material goods necessary to satisfy the basic needs in order to live a dignified life), psychosocial conditions (negative life experiences, work stress, high economic debts), biological characteristics (sex, age and genetic characteristics), behavioural and material conditions (smoking habits, physical exercise or inactivity, alcohol intake and/or substances abuse) [Graham, 2004]. But in addition to serious material deprivation, educational poverty closely associated with economic poverty, has a decisive meaning. In fact, a study conducted in the Campania region of Italy on a sample of paediatric subjects shows a significant relationships between dmft/DMFT (caries experience), family income level ($p<0.001$) and mother's educational level ($p<0.001$) [Ferrazzano et al., 2016].

Children whose mothers have a low education, show a higher incidence of dental caries [Cianetti et al., 2017] and early childhood caries [Hallett and O'Rourke, 2003; Martens et al., 2006]; while children whose parents have a high education, on average show lower rates of caries [Ismail and Sohn, 2001]. In fact, the spread of poverty decreases as the level of education and educational qualifications increase [Istat, 2019].

Furthermore, oral diseases have a greater impact in terms of pain, discomfort, functional limitations and social and economic effects among the most socially disadvantaged groups [Watt, 2012]. Although healthcare services are provided, the lack of recourse to treatment is very often delayed/prevented, particularly among immigrants, due to a lack of cultural and family motivation, information, health education and poor knowledge of healthcare system [Cote et al., 2004; Guay, 2004; Amin, 2011; Cote et al., 2004; Li et al., 2017].

The limitations of this study are the lack of further assessments on the ethnic group, on the analysis of any migratory backgrounds and on the age range of the examined sample being limited to subjects no older than 12 years old.

In conclusion, this study highlights a positive relationship between poor socioeconomic status (condition of absolute poverty, low economic income) and increase in the DMFT index. For this reason it would be advisable to plan early prevention interventions, providing the possibility of appropriate and effective privileged access to oral care for children in economic and social need, whose quality of life could be further negatively affected by oral diseases. There is also the need for continuous monitoring of health inequalities through adequate surveillance systems to support activities aimed to overcome the economic, cultural and educational poverty that affect large sections of the population today.

Action must be taken to ensure the availability of accessible, appropriate and effective dental treatment for marginalised groups in society whose quality of life is likely to be more negatively affected by oral diseases.

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