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Examining related influential factors for dental calculus scaling utilization among people with disabilities in Taiwan, a nationwide population-based study

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ABSTRACT

Limited studies with large samples have been conducted on the utilization of dental calculus scaling among people with physical or mental disabilities. This study aimed to investigate the utilization of dental calculus scaling among the national disabled population. This study analyzed the utilization of dental calculus scaling among the disabled people, using the nationwide data between 2006 and 2008. Descriptive analysis and logistic regression were performed to analyze related influential factors for dental calculus scaling utilization.

The dental calculus scaling utilization rate among people with physical or mental disabilities was 16.39%, and the annual utilization frequency was 0.2 times. Utilization rate was higher among the female and non-aboriginal samples. Utilization rate decreased with increased age and disability severity while utilization rate increased with income, education level, urbanization of residential area and number of chronic illnesses. Related influential factors for dental calculus scaling utilization rate were gender, age, ethnicity (aboriginal or non-aboriginal), education level, urbanization of residence area, income, catastrophic illnesses, chronic illnesses, disability types, and disability severity significantly influenced the dental calculus scaling utilization rate.

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1. Introduction

Taiwan began implementing the Physically and Mentally Disabled Citizens Protection Act in 1990. The considerable improvement in welfare for the physically or mentally disabled has led to rapid increases in the number of registered citizens with physical or mental disabilities. By the end of 2012, the number of disabled citizen exceeded 1.1 million, showing an increase of 350 thousand in 10 years. People with disabilities accounted for 4.7% of the total population (Ministry of the Interior, 2012).

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People with disabilities are restricted by difficulties in expression and mobility, and therefore have poorer oral health compared to that of the general public (Wright, 1991). A study from Hong Kong on people with mental or physical disabilities found that no calculus was observed in 4 year-olds; however, 20.2% of 14 year-olds had calculus, as well as 56.3% of the 25–35-year-olds (Donnell, Sheiham, & Wai, 2002). Another study on people with intellectual disabilities showed that tooth loss increased rapidly with advancing age. Among these individuals, 90% required conservative treatment, 49% required dental scaling, and 34% required complex periodontal treatment (Pieper, Dirks, & Kessler, 1986).

Dental calculus causes damage to the gums, and leads to periodontal diseases and tooth loss if left untreated. Regular dental calculus scaling is important for preventing periodontal diseases, just as blood glucose management is important for diabetics. Therefore, the National Health Insurance (NHI) offers free dental calculus scaling once every 6 months for all insured people. The NHI covers 99.38% of Taiwan population. The dental calculus scaling might be less important than critical medical conditions such as internal medicine and surgery for the people with disabilities; however, it is a crucial indicator of oral health among these persons. Therefore, this study would like to investigate the utilization of dental calculus scaling among the national population with disabilities.

2. Method

2.1. Data source and processing

This study analyzed the utilization of dental calculus scaling among those with physical or mental disabilities, using the information of disabled individuals registered in the 2008 Ministry of the Interior database and the NHI database between 2006 and 2008 published by National Health Research Institutes. Taiwan with about 23 million of population includes 25cities or counties. This study did not cover three cities (Kaohsiung City, Kaohsiung County and Taoyuan County) since the data were not accessible. The sample size is nonetheless highly representative, and minimal variations in the data structure were observed.

The Statistics Center of Ministry of Welfare and Health, Taiwan, helped us combine all data sets and then provided us the data including the necessary information for this study. All personal identification information has been deleted, and personal privacy was under protection from using these data. This study has been approved by the research ethics committee in China Medical University and Hospital (IRB No. CMU-REC-101-012).

2.2. Relevant variables explanation

The Andersen model was used to analyze the utilization of dental calculus scaling. The independent variables included the following: (1) Predisposing components, which included demographic characteristics (gender, age, marital status, and ethnicity [aboriginal or non aboriginal]) and social structure (education level). (2) Enabling components, which included personal or family resources (income-monthly salary), community resources (urbanization of residential area); additionally, urbanization was categorized into 7 levels by referencing Liu et al. (2006), which stratified the 359 townships in Taiwan into 7 levels, with Level 1 being the most urbanized and Level 7 as the least urbanized. (3) Need components, which involve disease clinical evaluation; this variable included catastrophic illnesses, number of chronic illnesses (between 0 and $\geq$7 types), and three disability types (physical, mental, and both types). Based on the Physically and Mentally Disabled Citizens Protection Act in Taiwan (Ministry of the Interior, 2012), the disabled people were classified into 17-disability categories. In this study, mental disabilities included intellectual impairment, dementia, autism, chromosomal abnormalities, psychiatric disorders, and metabolic abnormalities, congenital defects. Physical disabilities encompassed visual impairment, hearing impairment, speech impediment, physical impediment, multiple impediments, severe organ dysfunction, facial injury, balance impediment, intractable epilepsy, and rare diseases. Severity is classified into 4 groups, profoundly, severe, moderate, and mild. Every level of disability severity had a detailed definition. For instance, intellectual impairment was classified into mild, moderate, severe, and profound. In Taiwan, mild intellectual impairment was defined as having an intelligence quotient of at 55–69; moderate (40–54); severe (25–39); profound ($<$24). The dependent variable was utilization of dental calculus scaling.

2.3. Statistical analysis

The SAS 9.1 software was used to perform the data analyses. Univariate analysis involved the descriptive analysis of the various variables to determine the sample number and percentages. The frequency and percentage of dental calculus scaling utilization were then analyzed (Table 1). Regarding bivariate analysis, the *t*-test, one-way ANOVA, and the Chi square test were performed to determine statistical significance. The Chi square test was performed to compare the utilization of dental calculus scaling among people with disabilities. The variables with $p < 0.05$ from the Chi square test were further examined using multiple logistic regression analysis. Multiple logistic regression was employed to analyze related influential factors for dental calculus scaling utilization in people with physical or mental disabilities, and the significance level was $p < 0.05$. Table 2 presents the independent effect (i.e. adjusted odds ratio, OR) of the relevant variables when all other variables are controlled in all disabled people, the physical disability, mental disability, and both disabilities groups, respectively.

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