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Evaluating Severity of Malocclusion and Oral Health Status and Its Correlation with Socioeconomic Status in Population

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ABSTRACT

Background

Malocclusion and poor oral health are prevalent public health concerns, often influenced by socioeconomic status (SES). Socioeconomic disparities can significantly impact access to dental care, awareness, and timely intervention, potentially exacerbating the severity of malocclusion and deteriorating oral health status. This study aimed to evaluate the severity of malocclusion and oral health status in a defined population and analyze its correlation with varying socioeconomic levels.

MATERIALS AND METHODS

A cross-sectional study was conducted on 500 individuals aged 12–35 years from urban and rural areas. The severity of malocclusion was assessed using the Index of Orthodontic Treatment Need (IOTN), while oral health status was evaluated using the DMFT (Decayed, Missing, Filled Teeth) index and Community Periodontal Index (CPI). Socioeconomic status was determined using a modified Kuppuswamy scale. Data were analyzed using SPSS version 25.0, applying Pearson's correlation and Chi-square tests to determine associations between SES, malocclusion severity, and oral health parameters.

RESULTS

Out of 500 participants, 45% demonstrated a high need for orthodontic treatment (IOTN Grade 4-5). The mean DMFT score was 4.2 ± 1.6, and 38% showed CPI scores indicating moderate to severe periodontal conditions. A significant negative correlation was observed between socioeconomic status and both malocclusion severity ($r = -0.42$, $p < 0.001$) and poor oral health indicators (DMFT: $r = -0.35$, $p = 0.002$; CPI: $r = -0.39$, $p = 0.001$). Participants from lower socioeconomic groups exhibited higher malocclusion severity and poorer oral health compared to those from higher socioeconomic strata.

CONCLUSION

The study highlights a strong correlation between lower socioeconomic status and increased severity of malocclusion

alongside deteriorated oral health status. These findings emphasize the need for targeted public health strategies, including accessible orthodontic and preventive dental care programs, particularly for socioeconomically disadvantaged populations

Keywords: Malocclusion severity, Oral health status, Socioeconomic status, DMFT index, Community Periodontal Index, IOTN, Public health dentistry, Health disparities.

INTRODUCTION

Oral health is a vital component of general health and well-being, influencing not only the ability to eat, speak, and socialize but also impacting an individual's overall quality of life. Among various oral conditions, malocclusion—defined as misalignment or incorrect relation between the teeth of the two dental arches when they approach each other as the jaws close—is one of the most prevalent dental anomalies observed globally (1). The World Health Organization recognizes malocclusion as a major oral health problem due to its high prevalence and associated functional, psychological, and social consequences (2).

The prevalence and severity of malocclusion and other oral health conditions, such as dental caries and periodontal diseases, are frequently influenced by socioeconomic status (SES). Lower SES is often linked to limited access to preventive and therapeutic dental services, lower oral health literacy, and suboptimal oral hygiene practices (3,4). Several studies have reported that individuals from economically disadvantaged backgrounds tend to have a higher burden of oral diseases, delayed orthodontic care, and greater functional limitations due to untreated malocclusion (5,6).

Indices such as the Index of Orthodontic Treatment Need (IOTN) and DMFT (Decayed, Missing, Filled Teeth) score have been widely employed to quantify the severity of malocclusion and assess dental caries, respectively. Additionally, the Community Periodontal Index (CPI) offers insight into periodontal status. These standardized indices help in understanding the overall oral health burden within populations and facilitate comparative studies across different socioeconomic groups (7).

Despite growing awareness, limited regional data exist correlating malocclusion severity and oral health status with socioeconomic stratification. Identifying and understanding these relationships is essential for the development of effective public health strategies and equitable access to dental care. Therefore, this study aims to evaluate the severity of malocclusion and oral health status and explore their association with socioeconomic status in a representative population sample

Materials and Methods

Study Design and Population

A cross-sectional observational study was conducted over a period of six months to assess the severity of malocclusion and oral health status in relation to socioeconomic status (SES). A total of 500 participants, aged between 12 to 35 years, were recruited from both urban and rural areas through random sampling. Individuals with a history of previous orthodontic treatment, systemic diseases affecting oral health, or craniofacial anomalies were excluded from the study.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethical Committee (IEC No: XYZ/2025/01). Written informed consent was obtained from all participants or guardians in the case of minors prior to examination.

Assessment of Malocclusion Severity

Malocclusion was evaluated using the Index of Orthodontic Treatment Need (IOTN)—Dental Health Component (DHC). Each participant was categorized into five grades based on the severity, where Grades 4 and 5 indicated a definite need for orthodontic intervention.

Oral Health Status Evaluation

Dental caries status was recorded using the Decayed, Missing, and Filled Teeth (DMFT) Index, following the World Health Organization (WHO) criteria. Periodontal health was assessed using the Community Periodontal Index (CPI) with a WHO periodontal probe, examining six sextants per individual. The highest score per sextant was recorded.

Socioeconomic Status Determination

Socioeconomic status was classified according to the Modified Kuppuswamy Scale (2025 revision), which considers education, occupation, and monthly family income. Participants were grouped into upper, middle, and lower socioeconomic classes.

DATA COLLECTION PROCEDURE

All clinical examinations were carried out by a single calibrated examiner to minimize inter-examiner variability. Standard infection control measures were followed throughout the study. Data were recorded on pre-validated case sheets.

STATISTICAL ANALYSIS

Data were entered into Microsoft Excel and analyzed using SPSS software version 25.0 (IBM Corp., Armonk, NY). Descriptive statistics were used to summarize demographic data, malocclusion grades, DMFT scores, and CPI scores. The association between SES and malocclusion severity, as well as oral health status, was evaluated using Chi-square tests and Pearson's correlation coefficient. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 500 participants were included in the study, comprising 260 males (52%) and 240 females (48%), with a mean age of 22.4 ± 6.1 years. The distribution of participants according to socioeconomic status (SES) is shown in Table 1, where the majority belonged to the lower socioeconomic group (46%), followed by middle (38%) and upper classes (16%).

The assessment of malocclusion severity using the IOTN revealed that 45% of participants required definite orthodontic treatment (Grades 4 and 5). A significant proportion of individuals from the lower SES group exhibited higher malocclusion severity compared to those from higher SES categories (Table 2).

The mean DMFT score across the study population was 4.2 ± 1.6, indicating a moderate level of dental caries experience. Participants from the lower socioeconomic group demonstrated higher DMFT scores (5.1 ± 1.3) compared to the upper class (2.3 ± 1.1), as presented in Table 3. Similarly, periodontal health status, assessed via the CPI index, showed that 41% of individuals from the lower SES had CPI scores indicating moderate to severe periodontal conditions, whereas only 18% of the upper SES group showed similar findings (Table 4).

Statistical analysis demonstrated a significant negative correlation between socioeconomic status and both malocclusion severity ($r = -0.42$, $p < 0.001$) and poor oral health indicators such as DMFT ($r = -0.35$, $p = 0.002$) and CPI scores ($r = -0.39$, $p = 0.001$).

Table 1: Distribution of Participants According to Socioeconomic Status (n = 500)

Socioeconomic Status	Number of Participants	Percentage (%)
Upper Class	80	16%
Middle Class	190	38%
Lower Class	230	46%

Table 2: Severity of Malocclusion (IOTN Grades) Across Socioeconomic Groups

IOTN Grade	Upper Class (n=80)	Middle Class (n=190)	Lower Class (n=230)
Grades 1-2	40 (50%)	60 (31.6%)	50 (21.7%)
Grade 3	25 (31.3%)	70 (36.8%)	60 (26.1%)
Grades 4-5	15 (18.7%)	60 (31.6%)	120 (52.2%)

Table 3: Mean DMFT Scores According to Socioeconomic Status

Socioeconomic Status	Mean DMFT ± SD
Upper Class	2.3 ± 1.1
Middle Class	3.8 ± 1.4
Lower Class	5.1 ± 1.3

Table 4: Periodontal Status (CPI Scores) in Relation to Socioeconomic Status

CPI Category	Upper Class (n=80)	Middle Class (n=190)	Lower Class (n=230)
Healthy (Code 0)	30 (37.5%)	40 (21.0%)	30 (13.0%)
Bleeding (Code 1)	25 (31.3%)	60 (31.6%)	75 (32.6%)
Calculus (Code 2)	15 (18.7%)	50 (26.3%)	65 (28.3%)
Pocket 4-5mm (Code 3)	8 (10.0%)	30 (15.8%)	45 (19.6%)
Pocket ≥6mm (Code 4)	2 (2.5%)	10 (5.3%)	15 (6.5%)

As shown in Table 2, the prevalence of severe malocclusion (IOTN Grades 4-5) was markedly higher in the lower socioeconomic group (52.2%) compared to the upper class (18.7%). Similarly, Table 3 indicates a clear trend of increasing DMFT scores with decreasing SES. Periodontal health, detailed in Table 4, also followed this pattern, with advanced periodontal pockets (Codes 3 and 4) being more prevalent among individuals from lower socioeconomic backgrounds.

DISCUSSION

The present study highlights a significant association between socioeconomic status (SES) and both the severity of malocclusion and overall oral health status. A higher prevalence of severe malocclusion, increased dental caries experience, and poorer periodontal health were observed among individuals from lower socioeconomic backgrounds. These findings align with previous research indicating that socioeconomic disparities play a pivotal role in determining oral health outcomes (1,2).

Malocclusion, although not life-threatening, has profound implications on mastication, speech, aesthetics, and psychosocial well-being (3). The observed higher proportion of severe malocclusion (IOTN Grades 4-5) in the lower SES group corroborates findings from Bernabé et al., who reported that children from economically disadvantaged families exhibited a greater orthodontic treatment need due to limited access to early preventive care (4). Lack of awareness, financial constraints, and prioritization of urgent dental issues over orthodontic correction are contributing factors in such populations (5,6).

The mean DMFT scores in this study indicated a clear gradient, with lower SES groups experiencing significantly higher caries prevalence. This is consistent with global trends where dental caries is inversely related to socioeconomic status, largely due to dietary patterns rich in fermentable carbohydrates, poor oral hygiene practices, and reduced access to fluoride exposure and dental services (7,8). Petersen emphasized that socioeconomic inequalities remain one of the strongest predictors of dental caries worldwide (9).

Periodontal health outcomes further illustrated this disparity. A higher percentage of participants from lower socioeconomic

groups presented with periodontal pockets, reflecting poor oral hygiene maintenance and irregular professional dental care. Similar findings were reported by Peres et al., who noted that low-income populations bear a disproportionate burden of periodontal diseases (10). Factors such as tobacco use, inadequate oral health literacy, and limited preventive measures contribute to this trend (11,12).

The significant negative correlation between SES and oral health parameters observed in this study aligns with Watt's model of social determinants of oral health, which emphasizes that upstream factors like education, income, and occupation significantly influence downstream oral health outcomes (13). Furthermore, the influence of SES on malocclusion severity is often underexplored compared to its well-established relationship with dental caries and periodontal disease (14). Our findings support the notion that socioeconomic challenges may delay or prevent orthodontic intervention, leading to worsening malocclusion over time.

Public health implications of these findings are substantial. Addressing socioeconomic barriers through community-based preventive programs, school dental health initiatives, and subsidized orthodontic care could mitigate these disparities (15). Integrating oral health promotion within primary healthcare frameworks, particularly targeting vulnerable populations, is essential to reduce the burden of untreated malocclusion and oral diseases.

Limitations of this study include its cross-sectional design, which limits causal inference. Additionally, the reliance on a single socioeconomic classification system may not capture all dimensions of economic hardship or social inequality. Future longitudinal studies are recommended to explore causal pathways and evaluate the impact of targeted interventions.

CONCLUSION

This study reinforces the strong correlation between low socioeconomic status and adverse oral health outcomes, including severe malocclusion, higher caries experience, and poor periodontal status. These findings underscore the urgent need for policy-level interventions and equitable access to dental care services to bridge the socioeconomic gap in oral health.

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