

## Possible Relationships between Dental Occlusion and Living Habits Identified through Joint Study by Lion, Kuroishi City and Hirosaki University

Lion Corporation has partnered with Kuroishi City in Aomori Prefecture and Hirosaki University to carry out a joint observational study of children at Kuroishi City elementary schools investigating the relationship between dental occlusion and living habits. This study, conducted over three years from 2019 to 2021, is part of Lion's oral care activities aimed at improving health. The study identified possible relationships between dental crowding (in which teeth are crooked and overlap) and breathing, and between dental crowding and stooped posture. As a multi-year study involving all the elementary schools in a city, this project is highly distinctive.

### ■Background of the Study

Driven by its purpose, "Make a difference in everyday lives by redesigning habits: ReDesign," Lion is implementing initiatives aimed at contributing to healthy life expectancy in the oral health field.

An individual's improper bite (malocclusion) can not only affect chewing, but also lead to elevated risk of cavities and other oral health issues due to difficulty in cleaning areas where teeth overlap. Links connecting living habits with malocclusion during children's growth have been suggested, but so far, scientific evidence for such links is lacking.

Lion investigated the relationships of occlusion with posture and living habits, focusing on the period of children's development in which permanent teeth come in, which greatly affects occlusion. The study was conducted jointly with Kuroishi City, which issued a healthy city declaration in 2015 and is proactively implementing health education in schools, and Hirosaki University, which is pursuing research aimed at promoting longer healthy life expectancies throughout society.

### ■About the Study

The study targeted children in third through sixth grades in all Kuroishi City elementary schools over the three years from 2019 to 2021.\*<sup>1</sup> Each year, photos of the children's tooth alignment were taken. These photos were analyzed for correlation with measurement data on the children's standing posture, survey data about their living habits and school dental checkup data. Malocclusion was assessed using standards based on relevant scientific literature. Posture was assessed using a standing posture assessment system to determine if children displayed stooping or lordosis. Living habit surveys were filled out by the children's parents and mainly consisted of questions about the children's oral condition, oral care habits and eating habits.

The parents of the children who were in the study for more than one year were also asked to fill out a survey about changes in their oral care awareness and practices.

\*<sup>1</sup> Study participants: Children in third to sixth grade (fourth to sixth grade only in fiscal 2019) in Kuroishi City schools who, along with their parents, consented to participate

## ■ Study Results

The study's analysis focused on children in the fifth and sixth grades, as the replacement of primary teeth with permanent teeth is usually advanced among children of this age group, and their tooth alignment is relatively stable. More than half of the children included in this analysis were found to have malocclusion, with the most common type being crowded teeth, in which the teeth overlap partially due to a mismatch between jaw and tooth size (Figure 1).

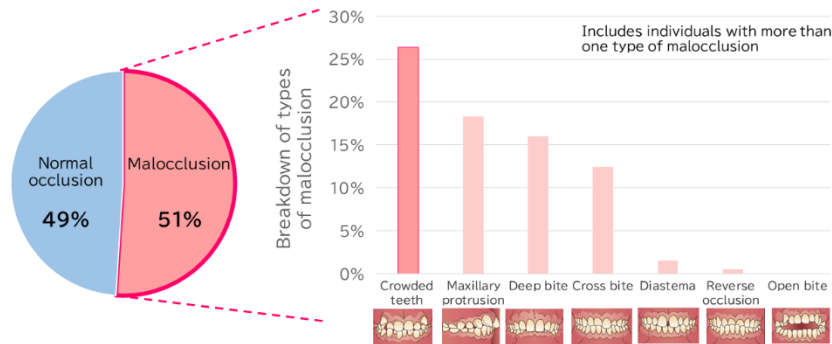


Figure 1. Ratio of Malocclusion.

(Children in fifth and sixth grade, excluding those with a history of orthodontic treatment, n=193.)

The analysis also found that children classified as having a stooped posture had an elevated rate of crowded teeth (Figure 2). Furthermore, children indicated as often or sometimes sleeping with their mouths open in the living habit survey were found to have a statistically significantly elevated rate of dental crowding (Figure 3).

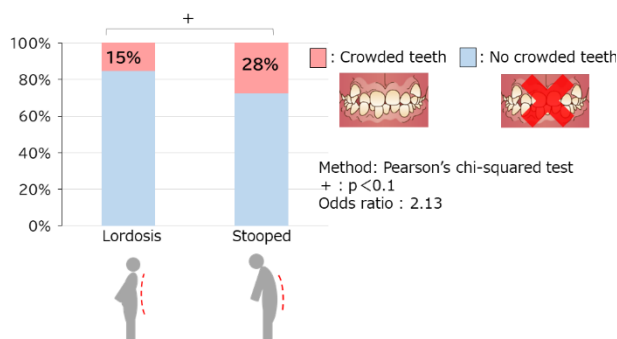


Figure 2. Correlation between Crowded Teeth and Posture. (Standing posture measurement data, n=144.)

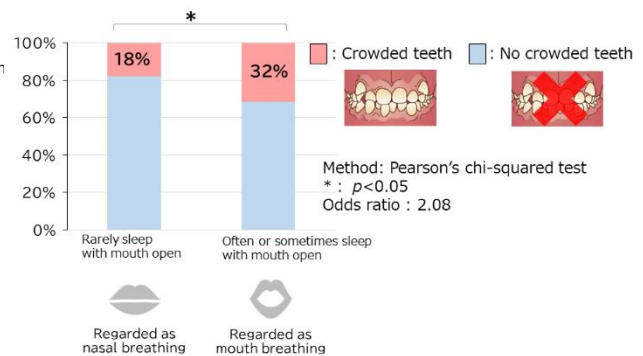


Figure 3. Correlation between Crowded Teeth and Mouth Breathing during Sleep. (Living habit survey results, n=179.)

In addition, the parents of participating children commented in the living habit survey that the study led to changes in their oral care awareness and practices (Figure 4).

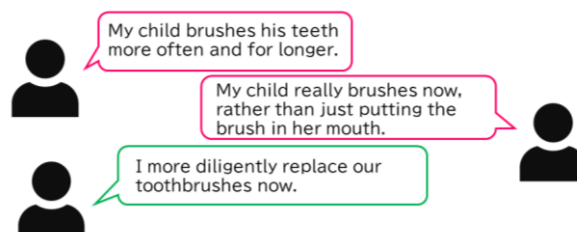


Figure 4. Selected Responses from the Open Comment Section of the Living Habit Survey.

The results of this study will be used in oral health instruction at the participating schools and provided as feedback to the children's families in order to assist in promoting health from a young age. This initiative will continue for another two years with the aim of further elucidating the possible relationships between dental occlusion and living habits identified through the study.

Lion is implementing the Lion Oral Health Initiative,<sup>\*2</sup> which encompasses all aspects of its corporate activities in the oral health field. As part of the Lion Oral Health Initiative, this research initiative aims to help extend healthy life expectancy from the mouth outward.

<sup>\*2</sup> An umbrella term for Lion's activities in the oral health field aimed at the achievement of the Vision2030 long-term strategic vision. An overview of the initiative was published August 8, 2022 (see Related Information, below).

#### Related Information

- Lion Establishes the Lion Oral Health Initiative for 2030

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