

## Comparison of Visual Oral Health Literacy Level Pre and Post Oral Health Education among Adolescents

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### Abstract

The objective of this study was to compare the visual oral health literacy (VOHL) level before and after oral health education among 217 adolescent subjects who were recruited from two secondary schools in Kuala Lumpur.

For the VOHL, the students were asked to draw their upper and lower anterior teeth as seen in the hand-held mirror, twice. The VOHL test was conducted once at the start of the session and repeated after oral health education (OHE) was given. Tooth and gingival scores were calculated, and changes in the scores before and after OHE were determined. Statistical analysis was performed using SPSS version 22 with a value of significance set at  $p < 0.05$ .

For VOHL, at baseline, the students had a low score for both gingival, and tooth scores with the gingival score being significantly lower. Upper tooth and gingival scores were higher than lower tooth and gingival scores. Comparison of scores before and after OHE showed that both tooth and gingival scores improved significantly after OHE. VOHL allows evaluation of students' oral health literacy both visually and quantitatively.

It should be considered for future use in any multilingual nation to increase oral health literacy among adolescents in the country.

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### Introduction

Oral health literacy is defined as the extent to which individuals can gain, process and understand basic oral health information and services needed to make appropriate oral health decisions.<sup>1</sup> There is a well-recognised association between health literacy and health outcomes.<sup>2,3</sup> Individuals with low health literacy skills often have poorer health knowledge and health status, unhealthy behaviors, less utilisation of preventive services, a higher rate of hospitalisation, increased health care costs and ultimately poorer health outcomes than those with higher literacy levels.<sup>4</sup> Oral health literacy is regarded as the interplay between culture and society, the health system, education system,

and therefore its level varies especially in a country as diverse as Malaysia.

Various tools are available for assessment of oral health literacy. Examples include Rapid Estimate of Adult Literacy in Dentistry-30 (REALD-30) 2007, Test of Functional Health Literacy in Dentistry (ToFHLiD) 2007 and Oral Health Literacy Instrument (OHLI) 2009, all of which are usually delivered in questionnaire form and require a certain level of reading comprehension from the subjects.<sup>5</sup> It appears to be reflective of an individual's ability to recognise words, rather than an actual representation of his or her knowledge about oral health.<sup>5,6</sup>

Many studies have been performed measuring oral health literacy in adults and even in children. However, very little attention is given to adolescents.<sup>5</sup> The World Health Organization (WHO) recognises those ages 10-19 as adolescents. Adolescence is a period of tremendous growth and development, acquisition of skills, also a time of considerable risks where health education will exert powerful influences (WHO, 2016).

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Most school students in Malaysia receive annual oral health education (OHE) and examination via the incremental dental care program conducted by the Ministry of Health dental clinics. The OHE sessions are customarily delivered classroom style using PowerPoint presentation. Albeit small, systematic review reported that OHE brings positive impact on one's knowledge and oral health status.<sup>7</sup>

In school, OHE is usually offered only once. Thus it would be desirable to implement the oral health literacy evaluation and OHE simultaneously so that the subjects' literacy level can be directly determined, and suitable education can be given. Therefore, an instrument with on-site evaluation capability is preferable.<sup>8</sup> To date, there is no oral health literacy tool for adolescents available in Malaysia.

This justifies the selection of a visual oral health literacy (VOHL) tool, where it was first used on secondary school students to evaluate their oral health literacy.<sup>8</sup> The visual assessment tool is interactive and more enjoyable for the students, compared to questionnaires that may make them feel like they are taking an examination.<sup>8</sup>

The objective of this study is to evaluate oral health literacy level among adolescents, prior to and after OHE program using VOHL tool. This knowledge may aid in the better planning of effective oral health intervention program within this group, to increase awareness of oral health as part of a healthy lifestyle, and thereafter increasing the likelihood of maintenance of healthy dentition throughout life. Worldwide evidence also showed that a school-based oral healthcare initiative is an economical approach to promote good oral health that can last a lifetime, and that early exposure and education can allow them to decide when treatment is needed and how to get this treatment.<sup>9</sup>

## Methods

A cross sectional study was conducted to assess the oral health literacy among school children of two secondary schools in Kuala Lumpur that were involved with "Teach For Malaysia program." Subjects of this study were first and second-year students with age range of 13 to 14 years old. The details of the study were explained before consent of participation were given by subject's parents or guardians. Ethical

approval was obtained from the research ethics committee, The National University of Malaysia.

A self-administered questionnaire was distributed to gain subject's demographic information that includes gender and race. Next, a VOHL assessment was conducted, followed by an OHE session. The OHE included a detailed explanation of features of healthy teeth and gingiva, how to recognize dental plaque, dental caries, and gingivitis including symptoms, detection, treatment and prevention of dental diseases. Another VOHL assessment was conducted after the OHE was given.

Scores	Evaluation criteria
Tooth score	
0	Teeth are not drawn
1	Teeth are drawn, but not clear
2	Either tooth shape or tooth alignment is properly drawn
3	Both tooth shape and tooth alignment are properly drawn
Gingiva score	
0	Gingiva is not drawn
1	Gingiva is drawn, but not clear
2	Either interdental papilla or marginal gingiva is properly drawn
3	Both the interdental papilla and marginal gingiva are properly drawn

**Table 1.** Score and criteria of mouth drawing (VOHL).<sup>8</sup>

### *Visual Oral Health Literacy (VOHL) tool*

The VOHL tool is a simple mouth drawing exercise where the students were instructed to observe using a handheld mirror and draw the upper and lower anterior teeth area (12,11,21,22,32,31,41,42) as they see inside their mouth.<sup>8</sup> The drawings were scored based on the criteria in Table 1. Separate scores were calculated for the upper and lower arches, as well as for the teeth and gingiva. The total range of whole mouth scores was from 0 to 6 while the total scores for each arch range from 0 to 3. The scoring was conducted by three examiners, and the average scores were computed. The intra-class correlations for three judges for all tooth scores and gingival scores were higher than 0.787 ( $p < 0.001$ ).

### Sample size calculation:

Sample size calculation followed the Australian Government National Statistical Service where a total of 218 patients were required to have a 95% chance of detecting, as significant at the 5% level.<sup>10</sup>

### Data Analysis

Data collected was analysed using SPSS version 22. A t-test was conducted to determine differences between mean scores with a value of significance set at  $p < 0.05$ .

### Results

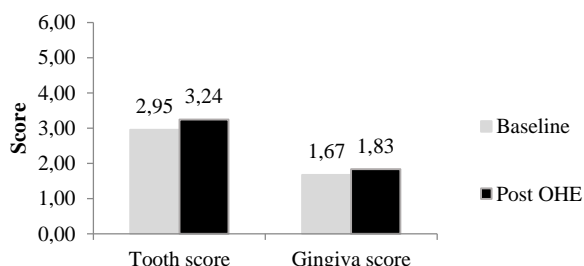
#### Demographics

There were 247 students who participated but only 217 students completed the study. The number of males were 104 (48%) and females were 113 (52%). Students of the Chinese ethnicity formed the majority (48.4%) followed by Malays (39.6%), Indians (7.4%) and others (4.1%).

#### VOHL

#### Total tooth score and total gingival score pre and post-OHE

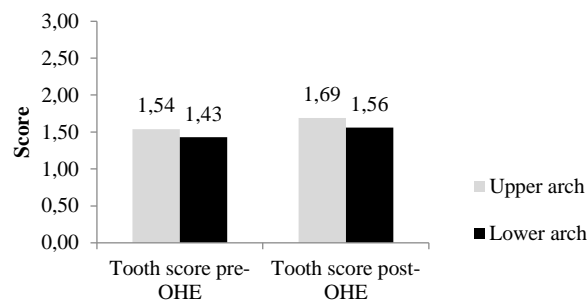
Figure 1 shows the results of the total tooth and gingival scores at baseline and after oral health education was given. The improvement was noted for both tooth, and gingival scores after OHE was given ( $p < 0.01$ ). Statistical analysis between genders and races did not yield any significant difference.



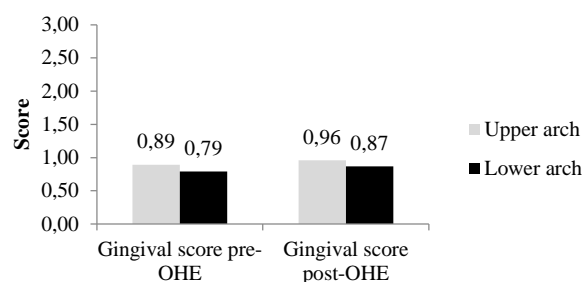
**Figure 1.** Total tooth score and gingival score,  $p < 0.01$ .

#### Comparison of scores between upper arch and lower arch

The tooth score was higher in the upper dental arch compared to the lower dental arch, before and after the OHE was given (Figure 2), Similar results are seen for the gingival score where the score for upper dental arch was significantly higher than lower dental arch (Figure 3). Improvements were noted for all scores, after OHE was given ( $p < 0.01$ ).



**Figure 2.** Comparison of tooth scores between arches, pre and post-OHE,  $p < 0.01$ .



**Figure 3.** Comparison of gingival scores between arches, pre and post-OHE,  $p < 0.01$ .

### Discussion

At baseline, comparison of drawing scores of the teeth and gingiva revealed that tooth scores were higher than gingiva scores. This is in agreement with the study on which this research is based.<sup>8</sup> This shows that adolescents pay more attention to their teeth when observing their mouth, whereas gingiva is mostly ignored. The results of the latest school oral health survey in the country show the periodontal related disease is increasing while DMFT is decreasing among adolescents where only about 20% of 12 year-olds have healthy gingiva, and this figure reduced to only 11% in 16 year-olds.<sup>11</sup> Hence, gingival health should be given more emphasis when giving oral health education for school students to increase their awareness of its health and diseases.

It is interesting to note that tooth and gingiva scores were higher in the upper arches than the lower arches. The aesthetics of the anterior teeth play an important role in the young adults' quality of life.<sup>12</sup> However, the results of the current study suggest that more attention is given to the upper dental arch compared to the lower arch. This may be probably due to the fact that it can be seen more easily, possesses a more prominent impact on overall aesthetics and plays a role in day-to-day social interactions when compared to lower teeth and gingiva. However, the lack of evidence in comparison of caries occurrence between upper and lower dentition made it hard to conclude if that is due to lack of awareness of the lower dentition or due to other factors.

Health education is proven to have some impact on one's knowledge and oral health status.<sup>7</sup> In the current study, comparison of drawing scores before and after oral health education showed that both tooth and gingiva scores improved significantly after education was given, proving that health education also plays a role in increasing the students' oral health literacy.

Oral health literacy levels usually are assessed using written questionnaires, which may be a reflection on how well the individual recognized certain words rather than true oral health literacy.<sup>5</sup> The benefit of VOHL instrument is that it allows evaluation visually and quantitatively and allows an assessment of students' health literacy levels on site by looking at their drawings. The students are placed in a situation where they are required to specifically observe their mouths, thus making them notice their oral condition objectively. As examiners, we are able to directly detect areas that students are unaware of and provide oral health education tailored for the students.

Another advantage is that this exercise is more engaging and interactive, which is appropriate as this activity was conducted as part of the school's post-exam curricular program. A questionnaire would make the student's feel like they are taking an exam, which could deter their interest.

Limited health literacy due to language barriers is one of many limitations faced by members of multicultural populations.<sup>13</sup> The same can be said regarding Malaysia's multicultural and multilingual population. The participants' first languages in this study were a

mix between Malay, Chinese and a few other languages. Therefore, VOHL was a preferred tool compared to a questionnaire that needs a certain degree of reading literacy.

Further, the VOHL together with a customized OHE aims to not only increase the subjects' knowledge but also to empower them to recognise teeth and gingiva problems at an early stage. This may increase their motivation to seek necessary treatments and more importantly, work to prevent these conditions.

One of the limitations to this study was the lack of existing literacy tool for adolescents to compare the results of the VOHL with.

## Conclusions

The VOHL allows evaluation of students' oral health literacy both visually and quantitatively. It should be considered for future use in any multilingual nation to increase oral health literacy among adolescents in the country.

## Declaration of Interest

None declared.

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