ORIGINAL ARTICLE

Enhancing Knowledge, Attitude, and Behavior of Merauke's Dentist to Diagnose OPMD: Assessing the effectiveness of "GIDI-OM" an Educational Mini Game

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ABSTRACT

Introduction: Oral cancer is a significant health issue in Indonesia, ranking 13th globally in 2020. Dentists can prevent its progression from Oral Potentially Malignant Disorders (OPMD), especially in high-risk areas like Merauke, South Papua. **Material and Methods:** This research used an online questionnaire administered before and after the intervention to assess the differences in dentists' knowledge, attitudes and behaviors. The questionnaire was developed by researchers referring to an OPMD literature review specifically for this research and then divided into pre- and post-test control group design with a quasi-experimental approach. Data analysis used the Independent Test (2-tailed). **Results:** The results were significant at $p < 0{,}001$ ($p < 0.005$) with an average increase in the knowledge, attitude and behaviour of the intervention group compared to the control group of around 15% to 3% respectively. **Conclusion:** The Merauke dentist who utilized GIDI-OM showed an increase in knowledge, attitudes and behavior compared to the control group.
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Keywords: OPMD, knowledge-attitudes-behaviour, diagnose, game, dentist

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INTRODUCTION

Oral cancer is a serious problem and is on the rise in many parts of the world. Oral Potentially Malignant Disorders (OPMD) is a lesions condition that has the potential to transform into malignancy. Asia has the highest prevalence of OPMD cases, with a percentage of 10.54%. Diseases classified under OPMD include leukoplakia, erythroplakia, oral submucous fibrosis, oral lichen planus and some hereditary diseases like dyskeratosis congenita and epidermolysis bullosa, although their occurrence is very rare (1-4).

The etiology of OPMD includes smoking, tobacco chewing, betel nut chewing and alcohol consumption. According to the World Health Organization (WHO) in 2011, Indonesia was one of the countries with the highest smoking prevalence globally, namely around 46.8% in men and 3.1% in women. Merauke is a city in Indonesia located in South Papua. Based on the 2018 Riskesdas (Riset Kesehatan Dasar) data, 25.39% of the population in Merauke smoked, consisting of 63.08% kretek, 49.55% white cigarettes and 31.23% handrolled cigarette. Additionally, approximately 9.55% of the population has the habit of chewing tobacco. Alcohol consumption is also common among the people of Merauke, with approximately 22.3% of the population consuming alcohol (5,6).

The high prevalence of smoking and betel nut chewing habits in Merauke City indicates the possibility of high cases of OPMD, although these cases are not well-documented. This situation shows a gap in the knowledge of dentists in Merauke in early diagnosis of OPMD, given the prevalence of smokers and betel nut chewers in the city resulting in a lack of reporting OPMD cases in Indonesia. Dentists' understanding of OPMD is primarily obtained from formal education during dental school, participation in seminars, workshops regarding OPMD and practical experience in the field. However, these methods may not sufficiently motivate dentists to learn more about OPMD (7). Therefore, a more engaging and interactive OPMD learning method is needed, and one such approach is the use of educational mini-games

(8-10).

Based on this background, this research aims to provide an engaging method for dentists in Merauke to improve their ability to early detect OPMD using the GIDI-OM educational mini-game.

MATERIALS AND METHOD

Population and Sample:

The population of this research consisted of 8 dentists who are members of PDGI (Persatuan Dokter Gigi Indonesia) Merauke. The sample selection technique used purposive sampling, which involved inclusion and exclusion criteria as respondent filters. The sample size was calculated using the Lameshow formula which was applied to the population. The calculation results take into account potential dropouts by adding 20% to the obtained sample size. As a result, a total of 32 respondents were involved in this study. As much as 32 respondents were taken using a random sampling system for each group in the control and intervention groups.

The number of respondents in each control and intervention group was 16 dentists. Inclusion criteria for this research were general dentists registered as Merauke branch of PDGI members and general dentist who has a practice license in Merauke City. Whereas the exclusion criteria, were specialist dentists who are registered as Merauke branch of PDGI members (11). Each group (control and intervention) was divided equally based on experience of treating patients with suspected OPMD lesions, experienced of attending CPD on OPMD during their dental career and year of graduation. Approval and ethical permission obtained from Universitas Airlangga Faculty of Dental Medicine Health Research Ethical Clearance Commission [Reference No: 743/HRECC_FODM/IX/2022].

Design:

This research was quantitative with a quasi-experimental approach. The experiment in this study was measured before and after the intervention. The research sample was divided evenly into control and intervention groups. The intervention group was provided with GIDI-OM, while the control group was given standard media in the form of a booklet containing information about OPMD (12,13).

Variables:

In this research, the independent variables used were the GIDI-OM Mini Educational Game and standard OPMD educational media in the form of a booklet containing OPMD materials.

a. GIDI-OM stands for Game for Early Detection of Oral Malignancies, which is a mini-serious game in the form of a web-based application designed to enhance general dentists' knowledge in early detection of OPMD lesions. GIDI-OM is a game consisting of a set of questions about OPMD equipped with detailed OPMD materials explanations, allowing dentists to test their knowledge about OPMD and review OPMD materials.

b. The standard educational media is in a form of booklet containing materials about Oral Potentially Malignant Disorders (OPMD).

The dependent variables in this research are the level of knowledge, attitude and behavior of dentists practicing in Merauke City regarding Oral Potentially Malignant Disorders (OPMD).

a. Knowledge is the result of "knowing" and occurs after someone senses an object. Sensing will produce knowledge which can be influenced by the intensity of attention and perception of an object. Knowledge variable was the research subjects' response to the statements posed by the researcher through a questionnaire containing 19 questions about OPMD, which was converted into a Guttman scale with a value of 0 or 1. The total score categorized into three categories: low (1-7), moderate (8-15), high (16-19).

b. Attitude is an individual's tendency to act, in the form of a closed response to certain stimuli or objects. Attitude variable was the research subject's response to statements posed by the researcher through a questionnaire containing 10 questions related to attitudes, concerning treatment, legal and psychological aspects related to patient care. Answers were assessed using a Likert scale (agree, neutral and disagree), each of which was given a score of 2 for a professional/agreeing attitude, a score of 1 for a neutral attitude and a score of 0 for a negative/disagreeing attitude. The highest score was 20 (10x2), indicating the attitudes that a professional should have in their routine clinical practice. A low score indicates intolerance and lack of theoretical/practical preparation for patient care. The total score categorized into three categories: low (1-7), moderate (8-15), high (16-20).

Instrument:

The instrument used in this research was an online questionnaire administered before and after the intervention to assess differences in dentists' knowledge, attitudes and behavior. The knowledge questionnaire consists of 19 questions, while the attitude and behavior questionnaire consists of 10 questions. This questionnaire was developed by the authors and oral medicine specialist consultant referring to the OPMD literature review specifically for this research. This questionnaire has been tested for validity and reliability on 40 randomly selected general dentists who are not part of PDGI Merauke. The validity test was carried out using Pearson's Correlation Analysis Coefficient or Bivariate Pearson (Pearson Moment Product) ($\alpha < 0.05$) with the SPSS application. Meanwhile, the reliability test was carried out using Cronbach's Alpha analysis ($\alpha > 0.06$). The validity test results of the knowledge questionnaire showed $p = 0.033$ and the reliability test showed $p = 0.586$. Meanwhile, the validity test results of the attitude and behavior questionnaire showed $p = 0.033$ and the reliability test showed $p = 0.751$ (7,9,14).

Intervention:
GIDI-OM is an educational mini-game, which is a web-based application specifically designed for games with quizzes related to OPMD lesions. This game falls under the category of "Serious Games," which means it is not solely for entertainment but aims to improve skills, strategic thinking, knowledge, multi-tasking, decision-making and psychomotor skills in the fields of health or education (15). The game is called GIDI-OM (Game for Mini Detection of Oral Malignancies). Apart from presenting quizzes, it also provides explanations regarding OPMD materials with the aim of improving the knowledge, attitudes and behaviors of dentists. (Figure. 1)

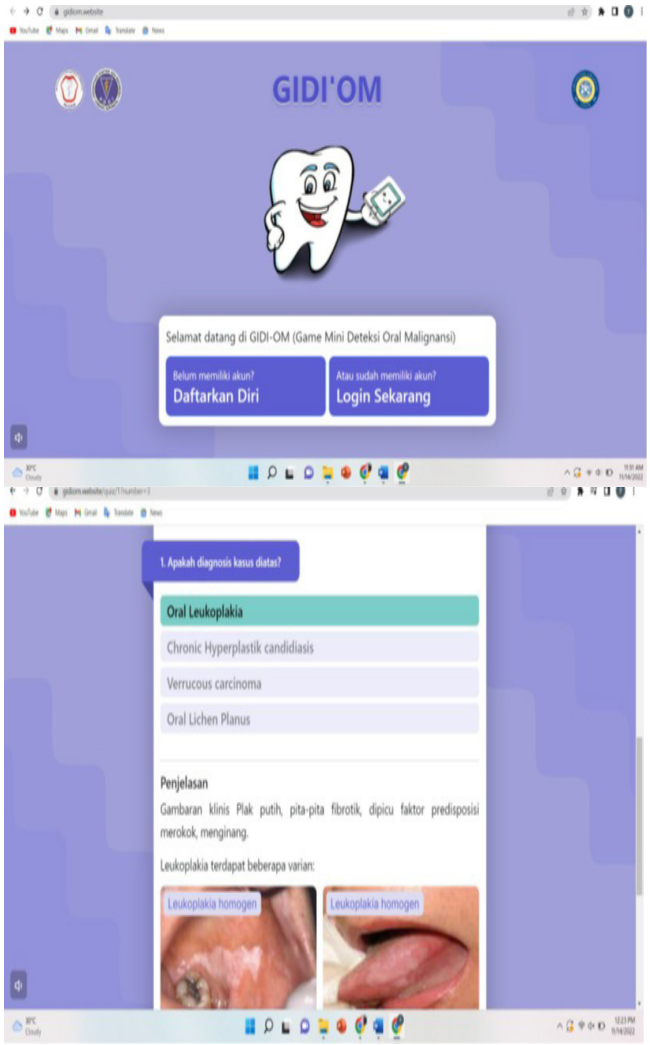

Fig. 1: Educational Mini Game "GIDI-OM" Display

The control group respondents (dentists) were given a booklet about OPMD, while the intervention group respondents (dentists) were instructed to play GIDI-OM educational mini-game and were given a time limit (20 minutes) for playing the GIDI-OM educational mini-game.

Statistical Analysis
Data analysis was conducted using observational analysis that displayed the differences in knowledge, attitudes and behaviors of dentists in Merauke regarding OPMD between the control group using standard media such as booklets and the intervention group using the GIDI-OM educational mini-game. These differences between each group (pre-post control group and pre-post intervention group) were assessed using an Independent Test (2-tailed).

RESULT

In this study, there were 32 respondents characterized based on age, gender, year of graduation, length of practice after graduation, experience in treating patients with suspected OPMD lesions and participation in Continuing Professional Development (CPD) on OPMD during their career in dentistry. (Table I)

Table I: Analysis of Demographic Data

Demographic Data		Analysis post-pre %	
		Control Group	Intervention Group
Gender	Male	30.75%	69.25%
	Female	47.5%	52.5%
Experience in treating patient with suspected OPMD lesions	Yes	46.2%	53.8%
	No	32.75%	68.25%
Experience in participating in CPD on OPMD during their dental career	Yes	41.25%	58.75%
	No	25.75%	74.25%

Demographic data in this study was analysed, based on gender, and it was found that men in the intervention group had a higher post-pre score, namely around 69.25% compared to men in the control group which was only around 30.75%. For women in the intervention group, the post-pre score were 5% higher than those in the control group. The experience of treating patients with suspected OPMD in the intervention group was higher, namely around 53.8% compared to the control group, around 46.2%. Meanwhile, the experience of participating in CPD regarding OPMD while being a dentist was higher in the intervention group, around 74.25%, compared to the control group, around 25.75%. Based on the data collected, before the data analysis, a normality test was carried out first with Shapiro Wilk and the results obtained were $p > 0.05$ (Table II).

The results of Delta statistical analysis (post-test score - pretest score) between the control and intervention groups yielded significant results, with $p = 0.000$ ($\alpha < 0.005$). The results of comparative analysis and frequency of control group knowledge variable (Table III) showed that there is a difference in the pretest frequency compared to the post-test in the moderate category, with 5 respondents (31.25%) reduced to 3 respondents (18.75%) and the high category of 11 respondents (68.75%) increased to 13 respondents (81.25%). The statistical results (Table II) of knowledge regarding OPMD lesions in control group were found to be significant at $p = 0.000$ (< 0.05) (Table III). Meanwhile, the results of the comparative analysis and frequency of the intervention group knowledge

variable (Table IV) showed that the difference in pretest frequency compared to post-test was in the moderate category with 7 respondents (43.75%) reduced to 0 respondents (0%) and the high category of 9 respondents (55.25%) increased to 16 respondents (100%). The results of statistical analysis (Table IV) showed that knowledge regarding OPMD in the intervention group was found to be significant at p = 0.000 (α < 0.05).

From the results of Delta statistical analysis (post-test score - pretest score) between the attitudes and behavior of the control and intervention groups, significant results were obtained with p = 0.000 (α <0.005). The results of comparative analysis and frequency of attitudes and behavior variable of the control group in (Table V) showed that the difference in pretest frequency compared to post-test was in the moderate category with15 respondents (93.7%) reduced to 14 (87.5%) respondents and the high category of 1 respondent (6.3%) increased to 2 respondents (12.5%). The results of statistical analysis in (Table V) generally showed that attitudes and behavior of research control respondents were different between pretest and post-test with a value of p = 0.004 (α < 0.05). Meanwhile, the results of comparative analysis and frequency of attitudes and behavior variable intervention group in (Table VI) found that there was a difference in the frequency of pretest compared to posttest with a moderate category of 15 respondents (93.75%) reduced to 10 respondents (62.5%) and high category of 1 respondent (6.25%) increased to 6 respondents (37.5%) . The results of statistical analysis of the attitudes and behavior of intervention group showed that there was a significant difference between the pretest and post-test with a value of p = 0.000 (α < 0.05).

Table II: Analysis of Normality Test Shapiro-Wilk

Descriptive	Analysis post-pre	
	Control Group	Intervention Group
N	16	16
Missing	0	0
Mean	19.0	19.0
Median	19	18
Standar deviation	1.27	1.27
Minimum	16	16
Maximum	21	22
Shapiro-Wilk p	0.111*	0.490*

(* significant p > 0.05)

Table III: Comparative analysis and frequency of control group knowledge variables

Variable	Category	Frequency	Significancy (p)
Pretest	Low	0	0.000*
	Moderate	5	
	High	11	
Post test	Low	0	
	Moderate	3	
	High	13	

(* significant p < 0.05)

DISCUSSION

This research discusses the differences in the improvement of knowledge, attitudes and behavior of dentists in Merauke in early detection of OPMD lesions before and after intervention. The study includes a control group that provided with standard media such as booklets and an intervention group that was given the GIDI-OM educational mini-game.

In this study, the knowledge outcomes of majority respondents in both the control and intervention groups were classified as high. This is consistent with research conducted by Saputri and Hartanto in 2022, which stated that the knowledge of dentists in Indonesia falls into the high category (14). However, based on the statistical analysis results from the delta comparison test between the control and intervention groups, significant differences were found. The group given GIDI-OM

Table IV: Comparative analysis and frequency of intervention group knowledge variables

Variable	Category	Frequency	Significancy (p)
Pretest	Low	0	0.000*
	Moderate	7	
	High	9	
Post test	Low	0	
	Moderate	0	
	High	16	

(* significant p < 0.05)

Table V: Comparative analysis and frequency of attitude and behavior variables from the control group

Variable	Category	Frequency	Significancy (p)
Pretest	Low	0	0.004*
	Moderate	15	
	High	1	
Post test	Low	0	
	Moderate	14	
	High	2	

(* significant p < 0.05)

Table VI: Comparative analysis and frequency of attitude and behavior variables from the intervention group

Variable	Category	Frequency	Significancy (p)
Pretest	Low	0	0.000*
	Moderate	15	
	High	1	
Post test	Low	0	
	Moderate	10	
	High	6	

(* significant p < 0.05)

treatment showed a better improvement in knowledge compared to the control group. This analysis aligns with research conducted by Zaror et al., in 2021, suggested that "Serious Games" have been proven to enhance the knowledge of medical students and healthcare professionals by fostering motivation for proactive learning and interactive gaming. It was also mentioned that healthcare workers prefer simulations and quizzes that focus on developing knowledge and skills through enjoyable games over conventional methods such as books. Zaror et al., stated that "Serious Games" have been effective in the prevention or treatment of various areas such as diabetes, asthma, cancer and mental health (12).

In the attitudes and behavior category, the majority of respondents in both the control and intervention groups showed attitudes and behavior regarding OPMD lesions in the moderate category. This is in line with research conducted by Jamali in 2012, which examined the attitudes and behavior of 100 dentists, where approximately 61.2% fell into the moderate category, only 16.3% were in the high category and the rest were in the low category (22.5%). The dentists' attitudes and behavior significantly influence decision-making when diagnosing OPMD cases. In a systematic review, Coppola et al. (2021) concluded that dentists often feel that their knowledge is inadequate for screening precancerous lesions, but they are aware of the importance of dentists' role in cancer prevention. This fear of making decisions and providing treatment to patients suspected of having OPMD stems from these factors (9).

Statistical analysis results from the Delta test for attitudes and behavior between the control and intervention groups showed significant differences in dentists' attitudes and behavior towards OPMD. The intervention group that received GIDI-OM showed improvement in attitudes and behavior towards OPMD compared to the control group. This demonstrates that engaging learning methods using Serious Games can enhance healthcare professionals' interest in acquiring skills and knowledge. This result is supported by a study conducted by Wu et al., in 2021, which found that preclinical dental students who played a serious game showed improved skills in treating caries/pulpitis or endodontic procedures, as well as better clinical skills after playing the game (16). Similar to a study conducted by Hannig et al., in 2013, where preclinical dental students demonstrated improved skills in mixing alginate after using the O-Mat serious game (17), it aligns with the findings of this study, where the attitudes and behavior of the intervention group that received GIDI-OM showed better results than the control group.

In conclusion, the GIDI-OM educational mini-games are more effective in improving the knowledge, attitudes and behavior of dentists in early diagnosis of OPMD compared to those who only received standard media like booklets. These results are consistent with previous research indicating that learning through game methods is more effective in enhancing knowledge and skills compared to static and less engaging traditional methods (10, 17, 18).

However, this study has limitations, such as the limited sample size, which only includes dentists in Merauke. The research location was carried out in Merauke because this area has a high risk of OPMD disease. The high risk occurs because the community has a culture of smoking, drinking and consuming alcohol (5), where these two things are predisposing factors for OPMD disease. Therefore, future research can be conducted with a larger sample size and in different locations to obtain more representative results. Additionally, we suggest a further research involving more variables to explore factors that might influence the improvement of dentists' knowledge, attitudes and behavior in early detection of OPMD.

CONCLUSION

Based on the results, this research concludes that the group treated with GIDI-OM (Game for Mini Detection of Oral Malignancies) demonstrated an improvement in knowledge, attitudes and behavior compared to the control group, which was only provided with standard media such as booklets. GIDI-OM provides benefits as an engaging method for dentists to enhance their ability to detect early signs of patients with suspected OPMD lesions. In the future, it is recommended that GIDI-OM be further developed into an Android-based application to help improve the knowledge, attitudes and behavior of dentists throughout the world in diagnosing OPMD lesions early.

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