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Socialization of Snake Fruit Peel Utilization for Periodontal Health among Agricultural Students

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Abstract

Periodontal disease is one of the most common oral health problems and may reduce quality of life if not properly prevented. At the same time, agricultural waste such as snake fruit peel (Salacca zalacca) has potential value because it contains bioactive compounds that may support further health-related research. This community service program aimed to improve students' knowledge and awareness of periodontal disease prevention and the potential utilization of snake fruit peel as an agricultural-based natural material. The activity was conducted through an interactive lecture involving 40 students from the Agribusiness and agrotechnology Study Programs at Universitas Tunas Pembangunan Surakarta. The program consisted of preparation, implementation, and evaluation stages. Evaluation was carried out using pre-test and post-test questionnaires based on six indicators. The results showed an increase in all indicators after the socialization. The highest improvement was found in knowledge of bioactive compounds in snake fruit peel, which increased by 55 points, followed by understanding of the potential of snake fruit peel with an increase of 46 points. Understanding of periodontal disease and its prevention also increased by 45 points. These findings indicate that interactive socialization was effective in improving students' knowledge, awareness, and interest in connecting agricultural waste utilization with oral health promotion and natural product innovation.

Keywords*: periodontal disease; snake fruit peel; agricultural waste; bioactive compounds; community service*

1. INTRODUCTION

Periodontal disease is a common oral health problem. This condition is characterized by inflammation of the supporting tissues of the teeth, which can interfere with chewing function, comfort, aesthetics, and quality of life. One common form of periodontal disease is periodontitis, an inflammation of the periodontal tissue caused by microbial colonization. If left untreated, periodontitis can progress to damage the alveolar bone and periodontal ligament, leading to periodontal pockets, gingival recession, tooth mobility, and even tooth loss (Maksum et al., 2020). The prevalence of periodontitis in Indonesia is reported to remain high, reaching 74.1%, necessitating broader promotional and preventive efforts within the community (Badan Kebijakan Pembangunan Kesehatan Kementrian Kesehatan, 2023).

Periodontitis is generally closely related to plaque accumulation and suboptimal oral hygiene. Clinically, this disease can be characterized by swelling of the gingival margin, reddish gingival discoloration, bleeding on probing, pocket depths greater than 4 mm, gingival recession, and tooth mobility (Khoirowati et al., 2023). Several parameters that can be used to assess periodontal status include Probing Depth (PD), Clinical Attachment Level (CAL), and Bleeding on Probing (BOP) (Kinane et al., 2017). Understanding the early signs of periodontal disease is important for the public, including students, so they can take early preventive measures through good oral hygiene.

Agricultural students play a strategic role in identifying, developing, and utilizing the potential of natural materials. Their knowledge is not limited to plant cultivation but can also be directed toward utilizing agricultural products and waste that have added value for health. One natural material with potential for development is the peel of the snake fruit (Salacca zalacca). Snake fruit peel is often considered waste, yet it is known to contain bioactive compounds such as flavonoids, alkaloids, tannins, phenols, and saponins. These compounds

have potential antimicrobial and anti-inflammatory properties that can be further studied in the health sector, including periodontal health (Girsang et al., 2025).

The use of natural ingredients as alternative health supplements is gaining increasing attention due to their perceived lower potential for side effects and relatively affordable cost. However, proper understanding of herbal ingredients is still necessary to prevent the public from viewing them as a substitute for primary medical therapy. In cases of periodontitis, primary treatment remains professional procedures such as scaling and root planing, accompanied by the use of medications when necessary according to clinical indications (Anwaristi, 2025). Therefore, education about natural ingredients should be directed towards increasing knowledge, prevention, and research development, rather than advocating for self-use without the supervision of a healthcare professional.

This community service activity was carried out in the form of outreach to agricultural students regarding periodontal disease, its causative factors, preventive measures, and the potential use of snake fruit peel as a natural ingredient with health benefits. This outreach is important because agriculture students have a close scientific relationship with biological resources and agricultural processing. Through this activity, students are expected to understand that agricultural waste, such as snake fruit peel, has the potential to be developed into valuable materials through appropriate research, including preclinical trials to assess its safety and effectiveness before widespread use in the community.

The outreach is expected to increase students' knowledge about periodontal health and the use of agricultural-based natural materials. Furthermore, this activity is expected to raise students' awareness of maintaining dental and oral health and encourage innovative thinking in developing the potential of agricultural waste as a source of bioactive materials. This community service activity serves as a form of integration between dental health science and agricultural science to support health education and the sustainable use of natural resources.

2. METHOD

This community service program was conducted using an interactive lecture method aimed at increasing students' knowledge and awareness regarding periodontal health and the potential utilization of agricultural waste, particularly snake fruit peel (*Salacca zalacca*), as a natural bioactive material. The interactive lecture approach was selected because it allows structured delivery of scientific information while providing opportunities for discussion, questions, and knowledge exchange between the speaker and participants (Anwaristi, 2024). This method was considered appropriate for introducing the relationship between oral health, periodontal disease prevention, and the potential development of agricultural-based natural products.

The program was carried out in person and involved 40 students from the Agribusiness and Agrotechnology at Universitas Tunas Pembangunan (UTP) Surakarta. The activity was held at Campus I, UTP Surakarta, on 10 May 2026. The participants were selected because agriculture students have a strategic role in understanding the potential of plant-based materials and agricultural waste that may be developed into value-added products, including materials with possible health-related benefits.

The implementation of the program consisted of three stages: preparation, implementation, and evaluation. The preparation stage included identifying participant needs, preparing educational materials, developing presentation modules, and coordinating the technical implementation of the activity. The educational materials were designed to cover basic concepts of periodontal disease, clinical signs of periodontitis, risk factors, prevention strategies, and the potential of snake fruit peel as a source of bioactive compounds such as flavonoids, tannins, alkaloids, phenols, and saponins.

The implementation stage was conducted through an interactive lecture and discussion session. The main topics delivered included the definition and impact of periodontal disease, the importance of maintaining oral hygiene, early signs of periodontitis, preventive measures, and the role of natural materials in supporting health-related innovation. Special emphasis was placed on snake fruit peel as an agricultural by-product that is often regarded as waste but has potential value due to its bioactive compound content. Participants were also introduced to the importance of scientific testing, including preclinical studies, to evaluate the safety and effectiveness of natural materials before they can be recommended for broader use.

The evaluation stage was designed to measure the achievement of the program objectives. Evaluation was carried out using structured pre-test and post-test questionnaires with a 5-point Likert scale. The assessment focused on five main indicators: (1) understanding of periodontal disease and its clinical signs, (2) knowledge of periodontal disease prevention, (3) understanding of snake fruit peel as a potential agricultural waste material, (4) knowledge of bioactive compounds contained in snake fruit peel, and (5) awareness of the importance of scientific testing before the utilization of herbal or natural materials for health purposes.

In addition to quantitative evaluation, a descriptive qualitative evaluation was also conducted through direct observation and dialogue during the activity. This evaluation aimed to identify changes in participants' perceptions, attitudes, and interest regarding the utilization of agricultural waste as a value-added natural material. Participant engagement was observed through their activeness in asking questions, responding to the discussion, and expressing ideas related to the development of plant-based materials for health innovation.

The success of the program was determined based on several criteria: (1) an increase in post-test scores compared with pre-test scores, (2) improved awareness of periodontal health and disease prevention, (3) increased understanding of the potential value of snake fruit peel as an agricultural by-product, and (4) high levels of enthusiasm and active participation throughout the program. The results of this evaluation were expected to reflect the effectiveness of the socialization program in improving students' knowledge and encouraging interdisciplinary awareness between agriculture and oral health.

Figure 1. Poster as socialization edia

3. RESULT AND DISCUSION

This community service project was conducted as a socialization program on periodontal health and the potential utilization of snake fruit peel (*Salacca zalacca*) as an

agricultural by-product with possible health-related benefits. The activity used an interactive lecture method and involved 40 students from the Agribusiness and Agrotechnology Study Programs. The objective of this program was to improve students' knowledge, awareness, and interest regarding periodontal disease prevention, as well as the potential development of agricultural waste into value-added natural materials.

The activity began with a presentation on periodontal disease, including its definition, causes, clinical signs, and impact on oral health. The participants were introduced to common signs of periodontitis, such as gingival inflammation, bleeding gums, gingival recession, periodontal pocket formation, and tooth mobility. The session also emphasized the importance of maintaining oral hygiene, controlling dental plaque, and undergoing regular dental check-ups as preventive measures against periodontal disease.

The second part of **the activity focused on the potential of snake fruit peel as an agricultural waste material that contains bioactive compounds, including flavonoids, tannins, alkaloids, phenols, and saponins**. These compounds were explained as having potential antimicrobial and anti-inflammatory properties that may support further research in the field of oral health. However, the participants were also informed that natural materials require proper scientific testing, including preclinical and clinical studies, before they can be recommended for health-related use.

Participants showed enthusiasm during the activity, as reflected by their active participation in the question-and-answer and discussion sessions. Several students expressed interest in the possibility of developing agricultural waste, particularly snake fruit peel, into value-added products. This activity facilitated interdisciplinary knowledge transfer by connecting agricultural science with oral health promotion and natural product development.

Figure 1. Socialization activity on periodontal health and the potential utilization of snake fruit peel as an agricultural by-product

Evaluation was conducted using pre-test and post-test questionnaires to measure changes in participants' knowledge and awareness. The evaluation focused on several indicators, including understanding of periodontal disease, knowledge of periodontal disease prevention, awareness of snake fruit peel as a potential agricultural by-product, knowledge of bioactive compounds in snake fruit peel, and understanding of the importance of scientific testing for natural materials. The measurement results derived from the questionnaire data are presented in Table 1.

Table 1. Change in student knowledge level on snake fruit peel potency

No	Indicator	Pre-test value	Post-test value	Increase value
1	Understanding of periodontal disease and its prevention	20	65	45

2	Understanding of the potential of snake fruit peel	30	76	46
3	Knowledge of the bioactive compounds in snake fruit peel	22	77	55
4	Awareness of the importance of scientific testing	45	70	25
5	Interest in developing agricultural-based natural materials	45	70	25
6	Active participation during activities	60	80	20

The evaluation results showed an increase in all measured indicators after the socialization program. This finding indicates that the activity successfully improved students' knowledge, awareness, and interest regarding periodontal health and the potential utilization of snake fruit peel (*Salacca zalacca*) as an agricultural-based natural material. The pre-test and post-test results demonstrated that the interactive lecture method was effective in delivering information and encouraging participants to understand the relationship between agricultural waste and oral health innovation.

The highest improvement was found in the indicator of knowledge of the bioactive compounds in snake fruit peel, with an increase of 55 points, from 22 in the pre-test to 77 in the post-test. This result suggests that most participants initially had limited knowledge about the chemical compounds contained in snake fruit peel. After the socialization, **students were able to better understand that snake fruit peel contains bioactive compounds such as flavonoids, tannins, alkaloids, phenols, and saponins, which may have potential antimicrobial and anti-inflammatory properties. This improvement shows that the material delivered during the program was relevant to the participants' background as agriculture students**.

A substantial increase was also observed in the understanding of the potential of snake fruit peel, which increased by 46 points, from 30 to 76. This result indicates that the socialization successfully changed participants' perception of snake fruit peel from agricultural waste into a material with potential added value. The discussion on the utilization of agricultural by-products helped students recognize the importance of developing plant-based materials through scientific approaches. This finding supports the objective of the program, which was to **introduce the potential of agricultural waste as a source of natural materials that may be further explored in health-related research**.

The indicator of understanding of periodontal disease and its prevention increased by 45 points, from 20 in the pre-test to 65 in the post-test. This improvement shows that participants gained better knowledge about periodontal disease, including its causes, clinical signs, and preventive measures. Before the activity, the students had relatively low understanding of periodontal health because the topic was outside their main field of study. After the educational session, participants became more aware of the importance of oral hygiene, plaque control, and regular dental check-ups in preventing periodontal disease.

Awareness of the importance of scientific testing increased by 25 points, from 45 to 70. This result indicates that participants developed a better understanding that natural materials cannot be directly used as health products without proper scientific validation. The socialization emphasized that herbal or plant-based materials require safety and effectiveness testing, including preclinical and clinical studies, before being recommended for public use. This aspect is important to prevent misunderstanding regarding the use of natural materials and to encourage evidence-based development of agricultural products.

The interest in developing agricultural-based natural materials also increased by 25 points, from 45 to 70. This finding suggests that the program was able to encourage students' interest in exploring the potential of agricultural resources beyond their conventional use. Although the increase was not as high as the knowledge-related indicators, the result still

reflects a positive change in participants' motivation to develop value-added natural materials. This interest is important because agriculture students have a strategic role in identifying, processing, and innovating plant-based resources for broader community benefits.

Active participation during the activity increased by 20 points, from 60 to 80. This indicator had the highest pre-test value compared with the other indicators, suggesting that the participants already had good baseline enthusiasm and willingness to engage in learning activities. The increase after the program indicates that the interactive lecture and discussion sessions were able to maintain and improve participant involvement. Active participation was also reflected in the question-and-answer session, where students showed interest in the relationship between agricultural waste, bioactive compounds, and health innovation.

Overall, the results demonstrate that the community service program was effective in improving students' knowledge and awareness regarding periodontal disease prevention and the potential use of snake fruit peel as an agricultural-based natural material. The largest improvements were observed in knowledge-related indicators, particularly regarding bioactive compounds and the potential of snake fruit peel. **These findings indicate that the socialization provided new and relevant information for agriculture students**. Therefore, this activity can be considered beneficial as an interdisciplinary educational program that connects oral health promotion with agricultural resource utilization.

4. CONCLUSION

This community service program successfully improved students' knowledge, awareness, and interest regarding periodontal health and the potential utilization of snake fruit peel (Salacca zalacca) as an agricultural-based natural material. The socialization activity showed positive results, as indicated by increased post-test scores in all measured indicators. The highest improvement was found in students' knowledge of bioactive compounds contained in snake fruit peel, followed by their understanding of its potential as an agricultural by-product. The program also enhanced students' understanding of periodontal disease prevention and the importance of scientific testing before natural materials can be developed for health-related purposes. Active participation during discussions reflected students' enthusiasm and interest in interdisciplinary learning. Overall, this activity demonstrated that interactive socialization is an effective approach to connect agricultural science with oral health promotion and natural product innovation. This program may serve as a foundation for future community service activities and research-based product development. Future programs may involve hands-on sessions, such as simple demonstrations of agricultural waste processing, extraction concepts, or product development ideas, so that participants can connect theoretical knowledge with practical applications. The duration of the activity should be extended to allow deeper discussion, group activities, and participant presentations related to innovation ideas. Collaboration between dental health experts, agricultural lecturers, and natural product researchers should be strengthened to provide broader interdisciplinary perspectives.

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