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HEALTHCARE COMMUNICATION OF 3D VISUAL TEETH OF PLAWANGAN SITE'S EARLY HUMAN SKULL

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ABSTRACT
Communication is part of the development of information technology about cultural until health. The development of communication such as visual communication with digitization has rapidly discover health issue from the history of human kind. Digitizing archaeological remains in 3 dimensions is a new technology, one of which is the model of an early human skull at Plawangan Site. The 3 dimensional shape of the early human skull model at Plawangan site shows pathological articulations in the form of minor shapes, especially on the teeth which can explain health status information. This study aims to explain the communication that can be conveyed through visual communication of the dental health status of early humans at Plawangan Site. The research method used was descriptive qualitative with a constructivist paradigm and a 3 dimensional observational data collection technique using early human teeth at Plawangan Site. The data analysis technique used is qualitative analysis and macroscopic analysis. From the teeth of early humans from Plawangan Site, it can be shown that communication phenomena about maritime and agricultural activities have an impact on dental health and are indications of dental disease. The need for survival, processed food, and limited assistive devices caused tooth decay and the use of mollusks and rice also indicated dietary patterns that affected the dental health of early humans at Plawangan Site during their lifetime.

Keywords: *Early human teeth, Pathology, Plawangan Site, 3D visual communication, dental health*

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INTRODUCTION

Health communication could be found not just from current situations. But from remaining skull from a prehistoric site could also be discovered diseases in the said era, based on the teeth. A three (3) dimension visualization would help to communicate on how the remaining skull lived in her time, what did she eat, what did she did by using her teeth, and what diseases she has. The skull as the archaelogical remain found in Plawangan site in Rembang Regency, Central Java Province.

Plawangan site is a prehistoric site from the Palaeometallic Age or Bronze Age with the main findings in the form of early human skeletons. This site is located in Plawangan Village, Kragan District, Rembang Regency, Central Java Province. It is the east of Lasem District City, which is on the north and south side of the northern causeway that connects Semarang-Surabaya, Pantura (North Coast of Java). Research in the Plawangan area began in 1977 based on reports from residents when making the foundation of the village hall building and then finding early human skeletons (Lukman et al., 2021).

The discovery was then followed up by the Research Team from the National Archaeological Research Center who later found several findings in the form of a number of primary and secondary grave data along with the findings of several grave supplies. Since then, the research has continued until 1978 and then continued in 1980 to 1993 and in 2017. The findings from the excavations and surveys were in the form of pottery fragments (edges, spout, lips, neck, handle, base, and body) and fragments of Chinese ceramics (Yuan, Song, Ming, Swatow, and Qing), Annam, Sawankalok, Sukhothai, European, and Japanese, plain earthenware of edging, lip, neck, base and body types; ornamental pottery on the lips and body, sea shells (mollusks), land snails, millstone made of andesite, iron slag, Chinese coin and early human skeletons (Lukman et al., 2021).

Archaeological evidence in the form of sea shells to pottery shows the role of Austronesian speakers in the culture adopted by early humans at the Plawangan Site. The National Archaeological Research Center conducted excavation research in the same year and found a number of primary and secondary grave data along with their grave supplies. Excavations proved that there was a grave with a container in the form of a bronze nekara belonging to the Heger I type. Inside the nekara were found jars of graves, animal bones, pottery, metal fragments, beads, rocks, animal bones, and shells (Soejono, 2010). Austronesian speakers have agricultural cultural characteristics, also in social aspects such as worship of ancestors or gods/goddesses, tattoo, betel chewing traditions, and maritime culture (Kusuma & Damai, 2019). Based on this statement, it can be estimated that humans in the site Plawangan are part of the Austronesian speakers in Indonesia. Early humans at the Plawangan site depended most of their lives on maritime culture such as foodstuffs sourced from the sea. The findings of shellfish can provide information regarding indications of early human diet patterns. This can have an impact on the dental health of early humans at the Plawangan Site.

The health status of early humans at the Plawangan site can be identified through the discipline of osteoarchaeology. The use of osteoarchaeology can provide information about the osteobiography of early human individuals at the Plawangan Site in the form of age, gender, and diseases suffered, especially in the teeth. Teeth are one of the remains of bones that are difficult to decompose in early human teeth. Dental disease in early humans can provide information about the activities carried out by early humans in the past. This can provide detailed information about the life of the early human skeleton at Plawangan Site and reconstruct the culture of the past, how humans have habits in their lives, to the ideology adopted in past cultures (Nystrom & Tilley, 2019).

The use of teeth in early humans had an important role in everyday life during early human life. In addition to chewing teeth, it had another function in Prehistoric times, such as as a tool for daily activities or the so-called "third hand" (Prayudi & Suriyanto, 2018). The activity of using teeth as a "third hand" can explain the health status of early humans at the Plawangan Site. In early humans, dental health problems have been found, such as in the form of attrition, trauma, caries, discoloration, enamel hypoplasia, and abnormalities in tooth development. The indications of

early human diet patterns from the remains of shellfish findings are thought to have an impact on the dental health of early humans at the Plawangan Site. The problems studied are what kind of palaeopathologies of early human teeth at the Plawangan Site. The aspects studied in this study were the maxilla and mandible teeth on an adult human skeleton at the Plawangan site.

This study aims to provide detailed information about the life of the culture of the past in early humans Plawangan site. This correlates with the identification of habits carried out by early humans in Plawangan site in the past by examining and describing abnormalities and diseases of the teeth. The results of this study will show how the influence of activities carried out by early humans at the Plawangan Site complements the identification results that have been carried out and can find out the activities that existed in the past. The benefits of this research are expected to be able to complement the previous data and add to the treasures of knowledge, especially in the field of archaeology, especially for the early human skeleton of the Plawangan Site as an archaeological object.

This research contains several literatures as a reference for research theory. (Wulandari, 2013) in Penggunaan Media Komunikasi Visual sebagai Strategi Komunikasi dalam Sosialisasi Kesehatan Reproduksi Remaja explains the use of effective visual communication media in the socialization of adolescent reproductive health increases understanding of important issues. The media used can be through games, brochures, illustrations, cliche displays, through educational videos, and guidebooks. Visuals can educate adolescents about contraception, disease transmission, and safe reproductive health practices. With this approach, reproductive health messages can be more easily accessed and understood by the youth target audience. This research helps in explaining the effectiveness of using media in communication as a health education strategy.

Prayudi & Suriyanto (2018) in the article GLM LVI: An Ostearchaeological Review of a Skeleton from Gilimanuk describe the tooth-using activities of the GLM LVI early human skeleton. There are several types of diseases such as calculus, caries, periodontal, and abscesses as well as dental diseases due to cultural influences in the form of betel nut consumption, and tooth modification. This article helps in explaining cultural activities and influences on early humans at Plawangan Site.

METHODOLOGY

This research uses qualitative descriptive methods, such as defining research gaps and problems on existing literature studies and research, so this research can carry problems according to those existing problems (Bungin, 2007). The aspect studied in the observation was the teeth of early humans at Plawangan Site. This data uses qualitative data based on literature study and macroscopic dental data from researcher observation. Macroscopic analysis is an analysis method using bare eye without the aid of tools such as microscope. This analysis examines in detail the surface of the tooth that is visible to the eye without the aid of an instrument. Macroscopic analysis can predict dental diseases and activities that affected the dental health of early humans at the Plawangan site. Data analysis technique uses qualitative analysis, such as systematically

presenting data, interpreting data, and drawing conclusions about early human's disease, age estimation by evaluating dental attrition using the Brothwell method and the Lovejoy method.

RESULTS AND DISCUSSION

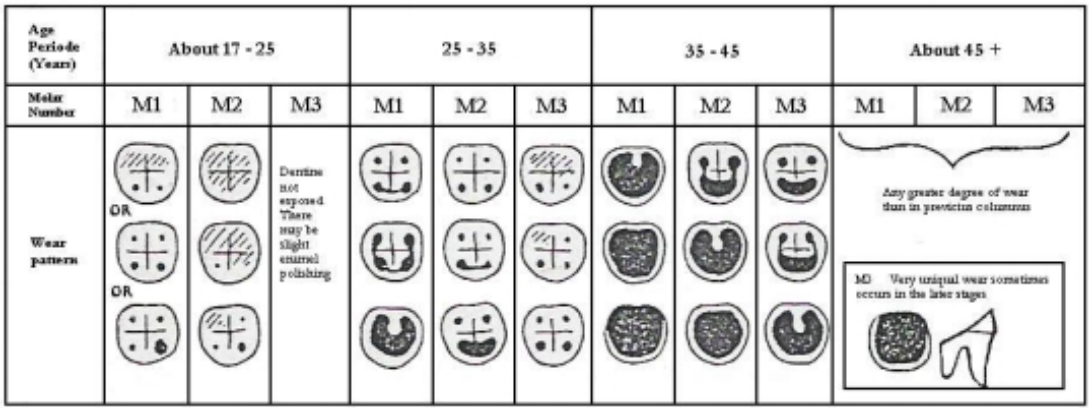
Boedhisampurno (1990) examined 184 teeth from the Plawangan Site. The results showed that even 184 permanent teeth showed different types with morphological characteristics. On the incisors, there are quite a lot of shovel shapes, besides that there is crowding/pushing on the lower teeth, as well as winging and rotation. Agenesis of the third molar was present both above and below. First and second-degree tooth wear. Mutilation in the form of grinding/sharpening on the occlusal surfaces of the front teeth and the large difference in the mesiodistal direction of the first and second maxilla incisors were quite prominent.

The sex of early humans at Plawangan Site can be identified according to Image 1. The eye sockets tend to be round and the temples are thin, indicating that the cranium is female. On the side there is a temporal bone with a mastoid process that appears to be thinly articulated to indicate gender. Soft emphasis on several parts of the cranium, especially the frontal protrusion, indicates female gender. Besides being able to show gender, the cranium can also explain diseases in the past, one of which is dental disease.

Source: Damai, 2021

Image 1 Skull of Early Human Plawangan Site

In prehistoric times the common dental diseases suffered were dental caries, dental calculus, trauma to the teeth, periodontitis and attrition (Prayudi & Suriyanto, 2017). Dental caries is an infectious disease caused by microbes on the tooth surface and damages the structure, crown, and root of the tooth. This disease arose as a result of the lifestyle of early humans at the Plawangan Site who consumed too much sugar (sucrose) which is from rice (agriculture) that related with Austronesian culture. Caries appears on tooth enamel as opaque spots that are white or brown in color. The point will continue to grow and cause damage to the enamel and in some cases enamel hypoplasia. This damage results in dentin the teeth becoming caries. There are several things that can affect the emergence of dental caries disease in early humans, for example, such as diet and patterns of maintaining dental and oral hygiene (Arizona, 2016).



Source: Damai, 2021

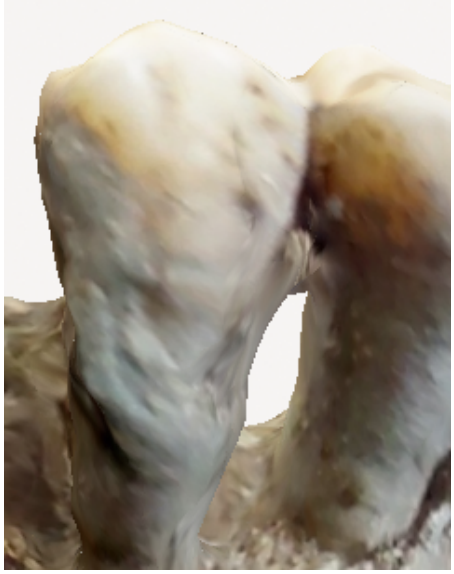
Image 2 Molar tooth wear pattern using the Brothwell method

Attrition is a natural result that occurs in the occlusal, incisal, or proximal parts of the tooth due to the masticatory process. Attrition can be correlated with human age, it can estimate age of the individual at the time of death by the degree of wear has been used. Based on age estimation by evaluating dental attrition using the Brothwell method (Image 2), attrition experienced by early humans showed that individuals were around 35-45 years old (Oliveira et al., 2006).

Source: Damai, 2022

Image 3 Plawangan Site early human's right mandible posterior teeth shows attrition

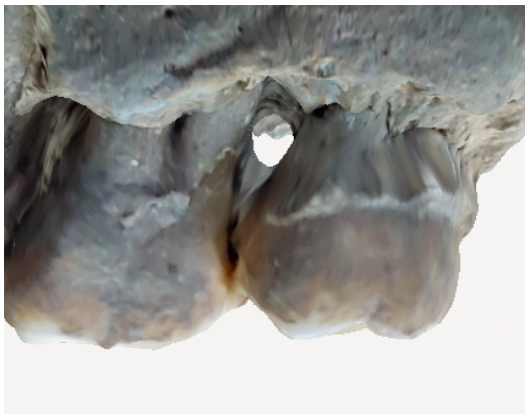
Based on Lovejoy's tooth attrition method on the maxilla and mandible, early humans at Plawangan site showed that they were in phase H with an estimated age of 40-50 years. In the premolars there is a large exposure of both cusp crests. In molar 1 large exposure of all cusp, but largest protocone. In the molar 2, great exposure to all cusp. In molar 3, large exposure on the protocone with small exposure on the other (Lovejoy, 1985). Attrition occurs because when a person gets older, the level of tooth wear in the mastication process that occurs will result in a greater attrition level. Mastication process affects the abrasion process of the teeth. Teeth can show traces of use for daily life other than masticatory tools. Teeth are often used as a "third hand" to help hold objects more stable. The use of molars as a tool, usually the attrition of the occlusal molars will be at a more advanced level (Prayudi & Suriyanto, 2018).



Source: Damai, 2022

Image 4 Caries on P-2 left mandible

Dental calculus is a mineralized pile of dental plaque containing microorganisms in the mouth. Dental trauma that occurs due to the fracture of the maxilla first molar (fracture) is most likely unintentional because it is located in a part that is difficult to reach, such as the lingual part and occurs antemortem (Prayudi & Suriyanto, 2018). Calculus on the teeth of early humans Plawangan site can be found in the maxilla and mandible, especially in the molars.



Source: Damai, 2022

Image 5 Calculus on right third molar maxilla

Periodontitis is a condition when the alveolar bone in the jaw and the periodontal ligament are lost, weakening the supporting structures of the teeth and causing tooth loss (Image 5). This disease occurs between the teeth, gums, and jawbone. Periodontitis starts from dental plaque that collects at the border of the teeth and gums, causing swelling of the gums (Prayudi & Suriyanto, 2018). In early human teeth Plawangan site there is wear and tear which is characterized by the loss of the hard tissue surface of the teeth due to factors other than trauma, dental caries, and developmental disorders. Tooth wear can be classified into four types, such as abrasion, erosion, abfraction, and attrition. Attrition is wear and tear that occurs with loss of tooth surface structure due to contact between teeth against the opposing teeth. This begins with the loss of the tooth enamel structure process in the incisal or occlusal part which progressively affects the underlying dentin structure. Attrition affected surfaces usually look smooth and shiny (Ortner, 2003).

Source: Damai, 2021

Image 6 Impaction on right third molar maxilla

Tooth anomaly occurs due to two things, occurs during life (acquired

conditions) and congenital (congenital conditions). Anomaly that occurs in early human teeth Plawangan site is a congenital pathology from birth, that is impaction. In early human teeth Plawangan site there is pathology in the form of impaction on the mandibular left third molar (M-3 left) (Figure 6). Impacted teeth are teeth that fail to erupt completely into the oral cavity into the occlusal plane due to obstruction by adjacent teeth, surrounding bone, or pathological tissue. Based on the impaction class by Greg Winter, the impaction experienced by early human teeth Plawangan site had a mesio-angular impaction class. Mesio-angular impaction is impaction of the third molar that is tilted mesially so that the crown of the third molar is tilted mesially towards the mesial second molar (Hupp et al., 2019).

A 3D model of the early human skull from the Plawangan site can be used as a medium to create communication programs related to dental health education. Visual communication design can provide health information that is accepted by society, making it more engaging (Wulandari, 2013).

CONCLUSION

Early human from the Plawangan site is a woman, aged between 35-45 years old, who lived in the Paleometallic Age, around 4000 years ago. Based on the results of the osteoarchaeological analysis, the human at this site has palaeopathology of the teeth in the form of caries, attrition, calculus, tooth loss, periodontitis, and dental anomaly such as impaction. It communicates that attrition shows that the woman consumed too much sugar (sucrose) from rice (agriculture) and carbohydrates from mollusks (maritime culture). It also indicates the use of teeth as a third hand in everyday life. Calculus is seen in all posterior teeth due to anterior teeth have tooth loss. Calculus continues into periodontitis and continues into tooth loss due to erosion of the alveolar bone. There is an anomaly in the teeth that is impaction on the left third molar (left M-3) mandible which is impacted to form mesioangular. Based on the indications of maritime and agriculture, it communicates the development of Austronesian characteristics.

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