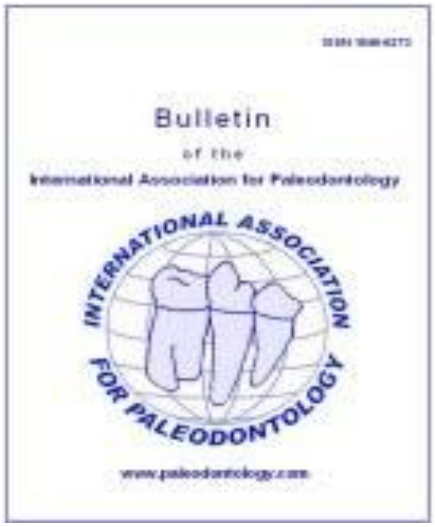

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Aims and scope

Bulletin of the International Association for Paleodontology (www.paleodontology.com) is an interdisciplinary open access online journal inviting and welcoming contributions from anthropology, bioarchaeology, paleodontology and related fields. The journal publishes papers and develops discussions on a wide range of research problems, e.g. methodo-logy and methods of bioarchaeological, and anthropological research, including field and laboratory study techniques; information technologies; bioarchaeological reconstruction; human evolution; etc. The journal also publishes results of field investigations conducted by bioarchaeologists, anthropologists, osteologists, and announcements of symposia and professional meetings. It is the goal of this publication to provide authors with an international forum for the presentation of their materials and ideas. Bulletin of the International Association for Paleodontology features eight types of articles: original scientific papers, reviews, case reports, letters to the editor, book reviews, meetings reports and preliminary communications. Bulletin of the International Association for Paleodontology is primarily a scientific journal, but submissions from scholars and students in this field are also encouraged.

Daftar Isi

Cultural Dental Modification in Prehistoric Population in Indonesia

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Abstract

The purpose of this paper is to describe the variation of dental modification related to the history of human migration in Indonesia. Material used in this study were cranium of ancient populations from Java (Binangun, Leran), Bali (Semawang, Gilimanuk), Sumba (Melolo) and Flores (Liang Bua, Liang Toge, Lewoleba). The pattern of dental modification were observed and categorized. It is assumed that the variation of dental modification was influenced by culture that was brought by migrant population, or it could be, there was a mix-culture between migrant's and indigenous population. Furthermore, the variation of dental modification indicates the in-migration from different time and different group of migrant people. The pattern of dental modification that disappeared earlier is the oldest pattern that has ever been practiced in Indonesia. In the other hand, the youngest patterns or the newest influence is the patterns that existed in longer time. This information is suitable with pattern of migration of Austronesian people into Indonesia.

Keywords: dental modification; Indonesia; ancient population, human migration

Introduction

Dental modification is one of the practices of intentional modification of the human body mostly carried out worldwide. The practice of dental modification has been documented in Africa, America, South America, Europe, Oceania, East Asia and also Southeast Asia (1-10). Scott and Turner (11) stated that mouth, including the teeth, as well as biological organ (chewing apparatus) is a social organ. When one smiles or laughs, their mouth and teeth are visible. Even when one is angry and grins, their mouth and teeth are visible. In other words, mouth and teeth are an attention in an interaction between individuals. Therefore, the mouth, especially the teeth, becomes the main target of modification based on the values of the culture of a community.

The significance of dental modification is related to rites of the passage, marker of a group affiliation, beauty, social status, sign of childbearing, family relationship, mourning etc. In the other hand, cultural dental modification can also provide a clue about the history of human migration. When a population migrates to a new region, it does not mean that only the biological body that migrates to the new region, their culture also migrates to the new region. Various types of dental modification found worldwide are the data that show acculturation of cultures that indicate the route of migration.

The purpose of this study is to describe the variation of dental modification as an effort to increase the literature on the practice of dental modification in Indonesia. In addition, this study is aimed at describing the alternative route of migration of ancient people in Indonesia based on the types of dental modification.

Materials and Methods

In Indonesia, the practice of dental modification has been reported in some ancient population. It has been documented that there are some different types of dental modification found among skeletal remains (12-13). Even the practice of dental modification is still carried out in some areas until today due to various reasons.

Skeletal remains from prehistoric population observed was found in Java (Binangun, Leran), Bali (Semawang, Gilimanuk), Sumba (Melolo) and Flores (Liang Bua, Liang Toge and Lewoleba) dated c.3550-1500 BP or approximately Mesolithic-Iron age (13). Figure 1 shows the locations where the skeletal remains of prehistoric population were found. In this study, not many mandibles were found. Mandibles were only found in the population of Semawang and Gilimanuk, Bali. Therefore, it is unknown whether the front teeth in the mandible of skeletal remains found in other islands were also modified.

Results

In general, the modified teeth are the six front teeth, namely the canines and incisors in the maxilla. Not many mandibles were found in this study, but in the mandibles found, there is a modification of six front teeth, namely the canines and incisors.

According to Scott and Turner (11), when one smiles or speaks, the six front teeth (especially the maxillary front teeth) are visible. Therefore, it is not surprising that the target of a modification is the front teeth. Good looking mouth and teeth are the center of attention, and can be a symbol of status, both social and economic, membership of an ethnic, marital status, and so forth.

Table 1 shows several types of dental modification which were observed in this study. In general, the most common modification is filling in a variety of forms namely labial, lingual and occlusal surface. Another modification found is extraction. Figure 6 shows the variation of filling found in the population. Sharpening, including its variation of modification, was found in Java (Leran and Binangun) and Semawang (Bali). Labial, occlusal and lingual fillings were found in Bali (Semawang, Gilimanuk) and Liang Toge (Flores). Type of modification found in Flores (Liang Bua and Lewoleba) and Sumba (Melolo) is extraction.

Some types of modifications were still found until more recent period. For example, the skeletal remains which are presumed to be from the classical period show filling of sharpening and its variations (see figure 7). As a matter of fact, filling of occlusal surface of six front teeth is still carried out by modern society today, such as in Bali and Timor. In Bali, filing, especially of the maxillary front teeth, is part of a sacred religious practice for the purpose of refraining from evil lust. Therefore, dental modification becomes mandatory for Hindus in Bali. In Timor (or the area of East Nusa Tenggara), filing of occlusal surface is still carried out by both men and women. The reason behind dental modification in Timor is aesthetic. According to interviews with the residents, they feel less comnfortable if they do not have their teeth modified.

Blackening is apparently an ancient tradition that is carried out throughout Southeast Asia (14-15). A common reason for blackening is beauty. There are various ways to blacken teeth, for example by using a kind of timber or chewing betel nut. In Indonesia today, chewing betel nut is still performed although only in rural areas and among the elderly. In Java, chewing betel nut is commonly performed by women. However, in eastern part of Indonesia, such as in East Nusa Tenggara and Papua, chewing betel nut is still a custom performed by the society both children and adults, male and female.

Skeletal remains found in Flores and the surrounding areas show the same indication on the teeth. Staining on the teeth due to chewing betel nut was found. Betel nut contains Piper betel, Areca catechu, Uncaria gambeer and burnt coral/lime, and tobacco is used as a complement. When the first four ingredients are mixed (chewed), the saliva turns red. The final process of chewing betel nut is distributing betel nut evenly to the entire surface of the teeth by using tobacco. As a result,

the whole teeth turn red. If it is performed intensively and for a long period, the whole teeth will be permanently red. Whether this practice is correlated with the red stain on the teeth of skeletal remains found in Flores and the surrounding areas requires further research.

Discussion

Based on the above description and comparison of the types of modification, the practice of dental modification continues to be carried out until now. Type of dental modification which is still carried out until nowadays (in all aspects - religious or aesthetic) is filing of occlusal surface of the six front teeth. This indicates that the filing of occlusal surface is a preference. This type of dental modification was introduced by the people who migrated the latest to Indonesia (especially in Eastern part of Indonesia). The tradition of dental modification is not necessarily physically. However, people can imitate what is considered good or a new thing from people with different cultural backgrounds. Thus, the interaction among cultures takes place without involving physical. Even in certain situations, new dental modification may replace previous dental modification, otherwise acculturation takes place. Tiesler (16) stated that the human body, with its physical and psychological properties, figures both as basis and mediator in all cultural interactions. It is also affected by the social life.

Based on the comparison of the three types of dental modification, the ancient people of Semawang and Gilimanuk (Bali) were the people who performed the practice of modification that have similarities with other communities. The type of modification in Semawang and Gilimanuk is similar to the type of modification performed by the people of Binangun in Java (sharpening). On the other hand, the type of modification in Semawang and Gilimanuk, namely filling of the occlusal surface, is similar to the type of modification in Liang Toge, Flores (see Table 1). This gives the impression that Bali is the stepping stone for migration from and to other islands, given that Bali is located in the middle of islands in Eastern part of Indonesia. Jacob (17) stated that the route of migration in Indonesia started from the Western and Northern part of Indonesia, it is not surprising if Bali is the intersection of the route of migration of ancient people between the mainland of Southeast Asia and the Pacific Islands with different cultural backgrounds (12,17-21). In other words, Bali is the stepping stone for the route of migration both from the East and from the North of Indonesia (12-13).

The cluster of Flores islands (Melolo, Liang Bua and Lewoleba) seems to have similar idea regarding dental modification. The type of modification performed is extraction of the maxillary lateral incisors. So far, this type has not been found in the Western part of Indonesia. In addition, dental extraction is no longer carried out in the Eastern part of Indonesia. Therefore, it can be presumed that this type is the oldest type or a specific type (characteristic) of Flores islands

communities. In other words, from the aspect of migration, Flores islands did not receive a strong influence, either migration from the east and the north, at least until the end of the Neolithic period.

Based on a study of the teeth either metrically or non-metrically, Matsumura (21) stated that the indigenous people of Southeast Asia are Australomelanesian. However, due to climate change that triggered migration to take place and the mixing between indigenous and migrant people. On the other hand, a group of islands in the Eastern part of Indonesia might be an obstacle for migration flow and encouraging isolation. Given that the Flores Islands are located in the most Eastern cluster, the effect of migration becomes weakened.

The practice of filling of occlusal surface which is still practiced by today's society shows that the impact of the culture of the migrants with different dental modification backgrounds remains. The filling of the occlusal surface is still practiced today, especially in Eastern part of Indonesia. On the other side, the direction of migration was to the Eastern part of Indonesia including of Flores Islands (Sumba, Flores and Lewoleba) (17). This confirms the notion that Java, Bali, Sumba and Flores are traversed by the route of migration of ancient Indonesian people.

Conclusion

Various form of cultural dental modification among prehistoric populations in Indonesia indicated that there was multiple migration entered into Indonesia, which is assumed as Austronesian people. Based on the similarity of the pattern of dental modification, indicated that the migrant people came from west and towards eastern part of Indonesia. Since the group of ancient population from Flores shows their own pattern (extracting), it indicated that the more east the more less the influence of migrant's cultures.

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References

1. Haour, P. & Pearson, J.A. An instance of dental modification on a human skeleton from Niger, West Africa, Oxford Journal of Archaeology. 2005; 24:427 – 433.

2. Finucane, B.C., Manning, K.& Toure′, M. Prehistoric dental modification in West Africa–early evidence from Karkarichinkat Nord, Mali. International Journal of Osteoarchaeology. 2008; 18:632-640.

3. Braswell, G.E., & Pitcavage, M.R. The cultural modification of teeth by the ancient Maya: A unique example from Pusilha, Belize. Mexicon. 2009; XXXI.

4. Williams, J. & White, C.D, Dental modification in the postclassic population from Lamanai, Belize. Ancient Mesoamerica. 2006; 17:139-151

5. Pacey, L. Viking teeth offer insight into cultural status. British Dental Journal. 2014; 216:445

6. Takenaka, M., Mine, K., Tsuchimoci, K. & Shimada, K. Tooth removal during ritual tooth ablation in the Jomon period. Indo-Pacific prehistory Association Bulletin. 2001; 21:49-52

7. Domett, K.M., Newton, D.J.W., O'Reilly, Tayles, N., Shewan, L., Beavan, N. Cultural modification of the dentition in prehistoric, Cambodia. International Journal of Osteoarchaeology. 2013; 23:274-286

8. Gonzales, EL., Perez, BP., Sachez, JA., Acinas, MM. Dental aesthetics as an expression of cultural and ritual. Br dent J. 2010; 208(2):77-80

9. Arcini, C. The vikings bare their filed teeth. Am J of Phys Anth; 2005; 28:727- 733

10. Afshin, H., Cagdur, AS., Büyük, Y., Karaday, B. Cosmetic dentistry in ancient times: V-shaped dental mutilation in skeletal remains form Corycus, Turkey. Bull Int Assoc Paleodont. 2013;7(2):148-156

11. Scott, R.G. & Turner II, C.G. The Anthropology of Modern Human Teeth. Cambridge: Cambridge University Press; 1997.

12. Koesbardiati, T., Suriyanto, R.A. Dental Modification in Flores: a biocultural perspective. In: E. Indriati, editor. Proceedings of Recent Advances on Southeast Asian Paleoanthropology and Archaeology Seminar, 2007 p.259-68. Laboratory of Bioanthropology and Paleoanthropology Faculty of Medicine Gadjah Mada University, Yogyakarta.

13. Suriyanto, R.A., Koesbardiati, T., Murti, D.B. Mongoloidization around Neolithic until present Indonesia: a perspective of Dental Modification. Proceedings book of the 2nd International Joint Symposium on Oral and Dental Sciences. FKG Yogyakarta; 2012.

14. Zumbroich, T. J. Teeth as black as a bumblebee's wings: the ethnobotany of teeth blackening in Southeast Asia. Ethnobotany Research & Applications. 2009; 7: 381-98.

15. Rooney, D. F. Betel Chewing in Southeast Asia. Paper prepared for the Centre National de la Recherche Scientifique, (CNRS) in Lyon, France, 1995.August.

16. Tiesler, V. Head Shaping and Dental Decoration Among the Ancient Maya: Archaeological and Cultural Aspect. Paper presented at the 64 Meeting of the Society of American Archaeology, Chicago. 1999

17. Jacob, T. Some Problems Pertaining to the Racial History of the Indonesian Region. Utrecht: Drukkerij Neerlandia; 1967.

18. Kayser, M., Brauer, S., Weiss, G., Schiefenhövel, W., Underhill, P.A. & Stoneking, M. Independent histories of human Y chromosomes from Melanesia and Australia. The American Journal of Human Genetics. 2001; 68:173-190

19. Karafet, T.M., Lansing, J.S., Redd, A.J., Watkins, J.C., Surata, S.P.K., Arthawiguna, W.A., Mayer, L., Bamshad, M.J., Lynn B. & Hammer, M.F. Balinese Y-chromosome perspective on the peopling of Indonesia: genetic contributions from Pre-Neolithic hunter-gatherers, Austronesian farmers, and Indian traders. Human Biology. 2005; 77:93-114.

20. Mona, S., Grunz, K.E., Brauer, S., Pakendorf, B., Loredana Castrí, Sudoyo, H., Marzuki, S., Barnes, R.H., Schmidtke, J., Stoneking, M. & Kayser, M. Genetic admixture history of eastern Indonesia as revealed by Y-chromosome and mitochondrial DNA analysis. Molecular Biology and Evolution. 2009; 26:1865-77.

21. Xu, S., Pugach, I., Stoneking, M., Kayser, M., Jin, Y., the HUGO Pan-Asian SNP Consortium. Genetic dating indicates that the Asian-Papuan admixture through eastern Indonesia corresponds to the Austronesian expansion. Proceedings of the National Academy of Sciences USA. 2012; 109:4574-79

22. Matsumura. The Population History of Southeast Asia Viewed from Morphometric Analysis of Human Skeletal and Dental Remains. In: M. Oxenham; N. Tayles, editors. Bioarchaeology of Southeast Asia. Cambridge: Cambridge University Press; 2006. p. 33-58.

23. Kasnowiharjo, G., Suriyanto, R.A., Koesbardiati, T., Murti, D.B. Modifikasi gigi manusia Binangun dan Leran Temuan baru di Kawasan Pantai Utara Kabupaten Rembang, Jawa Tengah. Berkala Arkeologi. 2013; 33(2):132-254.

Figure 1. Location of the prehistoric population (A. Java; B. Bali; C. Sumba; D. Flores)

Figure 2. Type of dental modification in the population of Leran (left) and Binangun (right) in Java.

Figure 3. Type of dental modification in the population of Semawang in Bali.

Figure 4. Type of dental modification in the population of Melolo in Sumba.

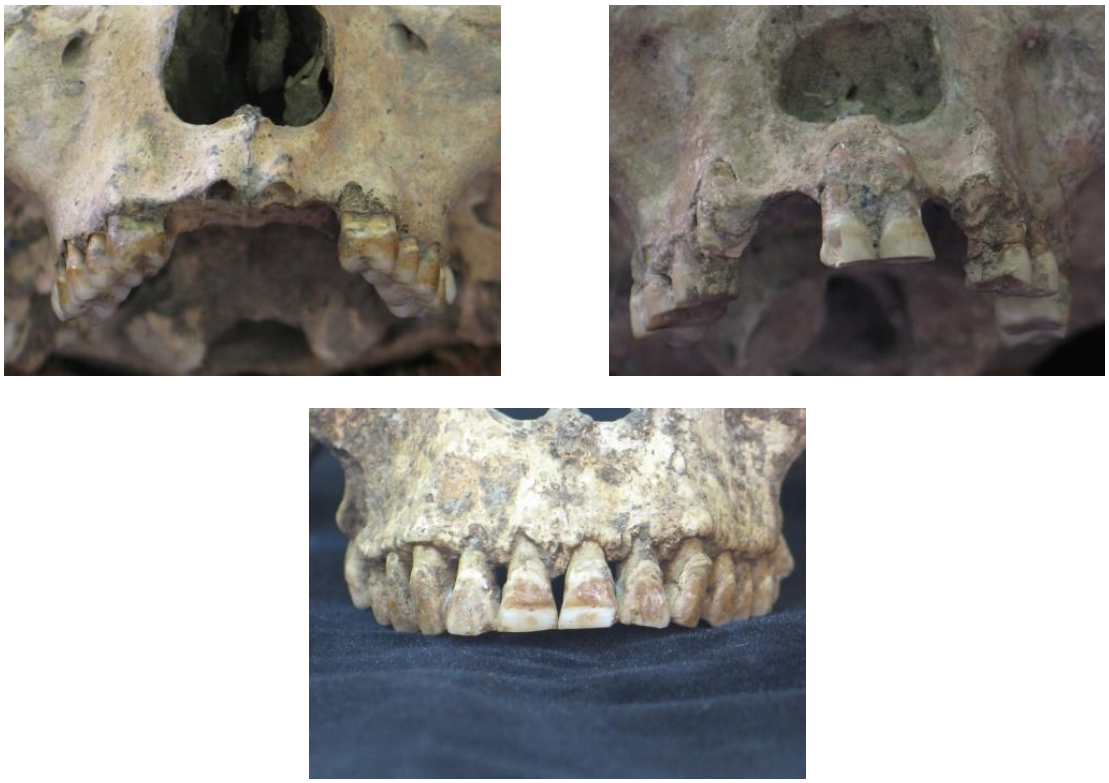

Figure 5. Type of dental modification in the population of Liang Bua (left), Lewoleba (right) and Liang Toge (lower) in Flores.

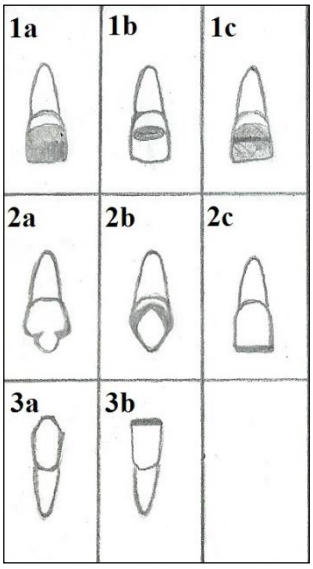

Figure 6. Pattern of dental modification in Indonesian ancient population.

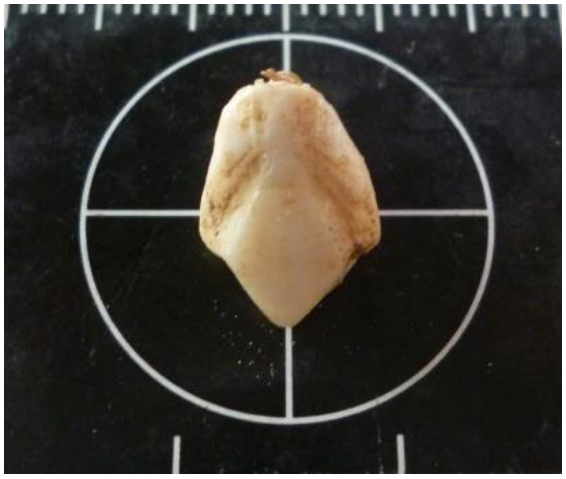

Figure 7. Pattern of dental modification in classic period.

Location	Teeth modified	Type of dental modification
Java		
Leran*	Upper left and right incisors and canine	Filling – dog-teeth-like
Binangun*	Upper left and right incisors and canine	Filling (labial surface), pointed shape
Bali		
Semawang	Upper left and right incisors and c anine Lower left and right incisors and canine	Filling (labial and occlusal surface) Filling (pointed shape)
Gilimanuk	Upper left and right incisors and canine Lower left and right incisors and canine	Filling (labial and occlusal surface) Filling (occlusal surface)
Sumba		
Melolo	Upper left and right lateral incisors	Extraction, blackening (chewing betel-nut?)
Flores		
Liang Bua	Upper left and right lateral incisors	Extraction, blackening (betel-nut chewing?)
Lewoleba	Upper left and right lateral incisors	Extraction, blackening (betel-nut chewing?)
Liang Toge	Upper left and right incisors and canine	Filling (labial, occlusal and lingual surface)

Source: *Kasnowiharjo et al. (2013)

Table 1. Type of dental modification found in Java, Bali, Sumba and Flores.