

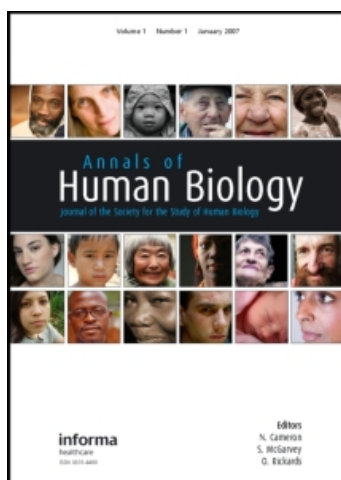
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### The third permanent molar eruption in Kenyan Africans and Asians

J. Hassanali <sup>a</sup>

<sup>a</sup> Department of Human Anatomy, University of Nairobi,

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## The third permanent molar eruption in Kenyan Africans and Asians

J. HASSANALI

Department of Human Anatomy, University of Nairobi

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**Summary.** Data on third permanent molar eruption was obtained from a cross-sectional study of 1343 African and 1092 Asian students aged 13-23 years attending various schools in Nairobi and the University of Nairobi, Kenya. Africans are significantly ahead of the Asians in third molar emergence. As seen from the median age of eruption, in Africans mandibular molars emerge at 17.6-18.3 years followed by the maxillary at 18.5-18.9 years, while in the Asians mandibular molars emerge at 19.9-20.3 years and maxillary at 20.7-21.0 years. African females appear to be earlier than the males in median age of eruption by 0.3-0.4 years, while the Asian females tend to be later than the males by about 0.3 years, but these differences are not significant. Third molar emergence starts earlier in Africans at 13 years of age, and by 18.5 years 50% of Africans have all four molars present. In the Asians, third molar emergence begins at about 15 years and by 21.5 years 50% have all four molars present.

### 1. Introduction

Suk (1919) compared the third molar eruption in Zulus and Europeans and found that, in general, third molars begin to erupt much earlier in Zulus (13 years) than in Europeans (17 years). Carother's study (1947) of third molar eruption in 150 Kenyan Bantu schoolboys showed that the molar teeth erupt between the 15th and 21st year, though the results are not conclusive as the sample was small. Chagula (1960) has studied both eruption and congenital absence of third molars in male East Africans. Fanning (1962) compared her findings of third molar emergence in Bostonians with those of Chagula's in male East Africans, and also showed that emergence of third molars was influenced by extraction of other permanent teeth. Rantanen (1967) extensively reviewed the literature concerning third molar development and eruption for his study of third molar eruption in Finnish children and students. Levesque, Demirjian and Tanguay (1981) have studied sexual dimorphism in development, emergence and agenesis of the mandibular third molar.

The aim of the present study is to provide data for third molar emergence in Africans, both female and male, and to compare the third molar emergence in Africans with Asians. This study follows an earlier one on permanent teeth emergence in Kenyans (Hassanali and Odhiambo 1981).

### 2. Materials and methods

The data consists of records of dental examinations carried out in 1981-1982 of 1343 African and 1092 Asian students aged 13-23 years. The students aged 13-18 years were attending secondary schools situated in middle-income residential areas in the city of Nairobi, Kenya, and those aged 19-23 years were students from all provinces of Kenya, at the University of Nairobi and Secretarial and Accounts Colleges in Nairobi. The African sample consisted of 80% Bantu and 20% Nilotes, and about 90% Asians were born in and are residents of Kenya. The dental examinations were carried out by the author in good daylight. The third molar was considered as having erupted if part of the crown was visible through the gingiva. Birth records of the students were obtained

from the school register or from individuals having confirmed that a birth certificate was available, although birth certificates were not actually examined.

The eruption data were used to calculate the median eruption ages, using Karber's method as described by Cornfield and Mantel (1950). The sample of Africans and Asians, spread over half-year intervals, is shown in table 1. Student's *t* test was done to compare the two groups. The proportion of individuals with one or more third molars at a given age was calculated from the data collected.

Table 1. The African and Asian sample spread over half-year intervals.

Age (year)	African		Asian	
	Male	Female	Male	Female
13+	23	18	18	36
13½+	26	37	41	54
14+	30	43	39	38
14½+	41	39	26	58
15+	58	57	33	43
15½+	53	69	34	42
16+	68	77	23	37
16½+	56	63	26	34
17+	52	73	28	29
17½+	40	50	26	16
18+	32	39	22	17
18½+	20	17	17	20
19+	15	17	15	25
19½+	20	20	18	28
20+	15	15	12	26
20½+	27	9	16	31
21+	27	9	15	24
21½+	15	7	14	27
22+	31	7	20	19
22½+	12	7	20	25
23+	9	—	—	—
Total	670	673	463	629

Table 2. Median eruption age for a given third molar in Africans and Asians.

Third molar	Median ( $\pm$ s.d.) eruption age (yr)			
	Africans		Asians	
M <sub>3R</sub>				
Male	17.95	(2.53)	19.97	(2.53)
Female	17.63	(2.81)	20.19	(2.61)
M <sub>3L</sub>				
Male	18.24	(2.64)	19.89	(2.53)
Female	17.84	(2.73)	20.28	(2.66)
M <sup>3R</sup>				
Male	18.76	(2.45)	20.65	(2.38)
Female	18.47	(2.38)	20.82	(2.62)
M <sup>3L</sup>				
Male	18.89	(2.45)	20.65	(2.37)
Female	18.50	(2.37)	21.01	(2.64)

3. Results

Table 2 shows the median age of eruption of the given third molar for Africans and Asians. Africans are significantly (99% confidence level) ahead of the Asians in third molar emergence, the difference in the median age of eruption in the two ethnic groups being about two–three years. In the Africans, mandibular molars emerge at 17.6–18.3 years followed by the maxillary molars at 18.5–18.9 years. In Asians, mandibular molars emerge at 19.9–20.3 years and maxillary molars at 20.7–21.0 years. African females are earlier than males in the median age of eruption by 0.3–0.4 years, while the Asian females tend to be later than the males by about 0.3 years, and these differences are not significant.

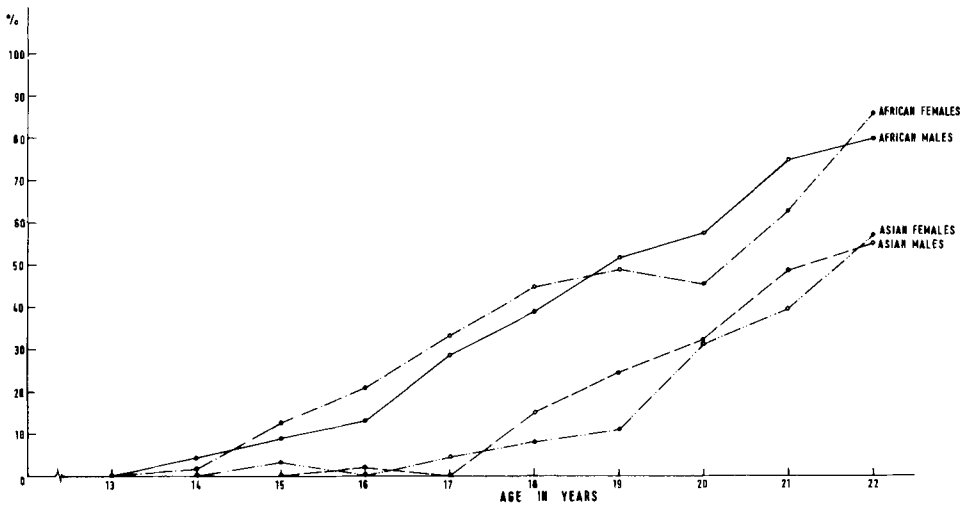


Figure 1. The percentage of Africans and Asians with all four third permanent molars erupted at a given age.

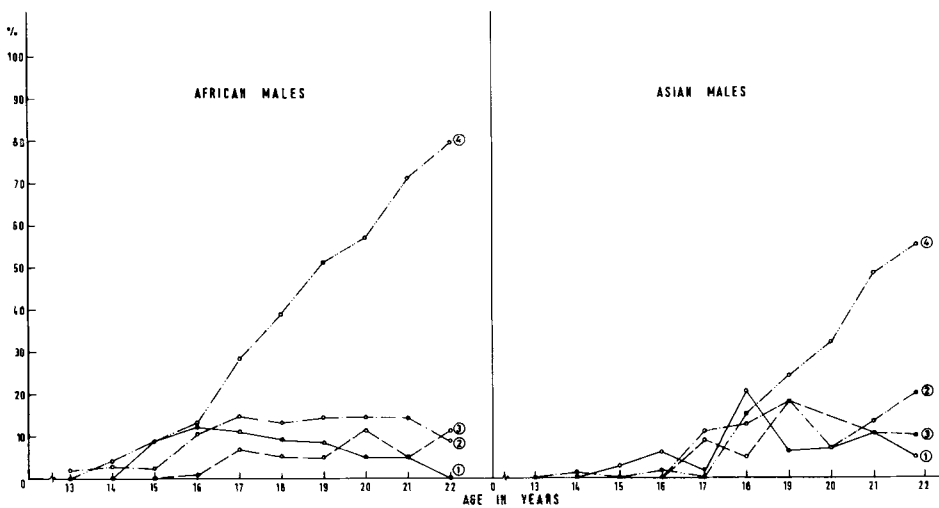


Figure 2. The percentage of African and Asian males with one, two, three or four third molars at a given age.

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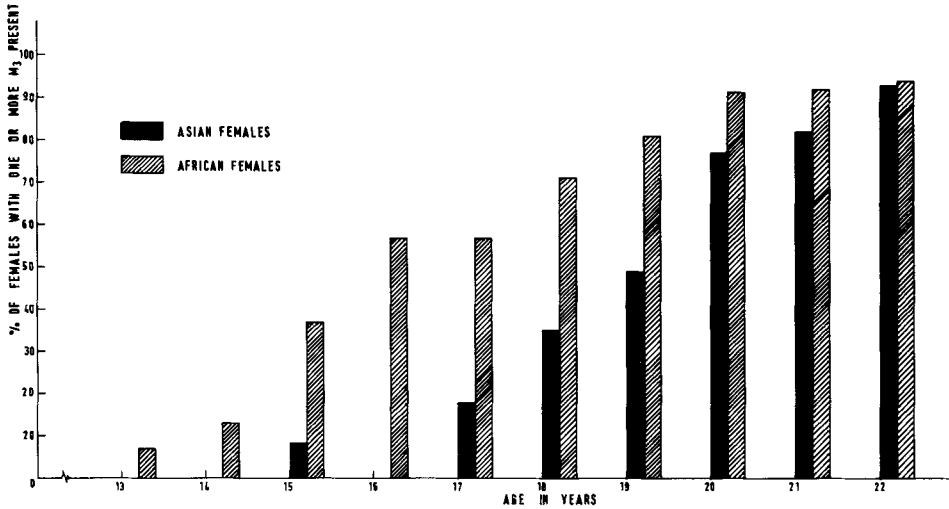


Figure 3. The percentage of African and Asian females with one or more third molars erupted at a given age.

Figure 1 shows the percentage of Africans and Asians with all four third molars erupted at a given age. About 50% of Africans (males and females,  $N=72$ ) have all four molars at 19 years of age compared to about 50% of Asians ( $N=86$ ) having all four molars present at 21.5 years. The emergence of third molars in females appears to be earlier than in males from about 14–17 years, but it tends to be later than the males after 18 years of age. Figure 2 shows the percentage of African and Asian males with one, two, three or four molars at a given age, while figure 3 shows the percentage of African and Asian females with one or more third molars erupted at a given age. Third molar eruption begins early in the Africans at 13 years, while in the Asians it begins at about 14–15 years. At any given age above 13 years, Africans have more third molars erupted than Asians of the same age.

#### 4. Discussion

Compared with the Africans, the emergence of third permanent molars is delayed in Asians, which has also been found for other permanent teeth (Hassanali and Odhiambo 1981). There appears to be no marked sex difference in the Africans and Asians. In the Africans, from the age of 13 to 17 years, third molar emergence is earlier in females than in males, but after the age of 18 years in females emergence of third molars tended to be later than in males. A similar trend is shown by the Asian females who, however, were found to be later than the males in median age of eruption. Suk's (1919) findings also suggest that although more females have third molars erupted than males in age groups 15–17 years, this number reduces after 17 years. Rantanen (1967) found that in 18–23 years' age group, considering the median age of emergence, third molars emerge about one and a half years earlier in males than in females. Levesque *et al.* (1981) found that the girls are ahead of the boys in third molar crown formation but the root development is faster in males than in females. In eruption of all other permanent teeth, females are ahead of the males (Hassanali and Odhiambo 1981, Jaswal 1983), and it appears that after 17 years of age other factors influence the emergence of teeth in the two sexes. Present findings for African males compare well with those of Chagula (1960), who found that in East African males third molars start

Table 3. Percentage of Africans, Asians and Boston males with one or more third molars erupted.

Age (yr)	African male		Boston male		Asian male			
	(Chagula 1960)	(Present study)	(Fanning 1962)	(Present study)	(Present study)	(Present study)		
13	12.0	(51)	2.0	(49)	0	(40)	0	(59)
14	36.0	(88)	7.0	(71)	3	(407)	1.5	(65)
15	64.0	(104)	20.1	(111)	8	(501)	3.0	(67)
16	75.0	(62)	36.3	(124)	22	(589)	8.2	(49)
17	76.0	(47)	62	(92)	36	(437)	22.2	(54)
18	81.0	(60)	67.3	(52)	50	(193)	53.9	(39)
19	88.0	(63)	80	(35)	74	(42)	66.7	(33)
20	96.0	(109)	88.1	(42)	86	(61)	60.7	(28)
21	96.0	(88)	95.2	(42)	—	—	82.7	(29)
22+	97.0	(59)+	98.0	(61)	—	—	85	(40)

Figures in parentheses show number in sample.

to erupt from 13 years, and by 20 years the majority of the boys had all their third molars present. However, as seen in table 3, the percentage of African males with one–four molars in the 13–16 years' age groups is lower than Chagula's findings. The difference may be due to the doubt of the accuracy of age of Chagula's sample. He states that one source of inaccuracy is that after the age of 13, the keen competition for entry into secondary schools tempts the boys to claim a lower age before admission. Thus, some of the boys in the 13–16 years' age group are likely to be older. The ages of schoolchildren may be more accurate in the present study, as the children were born around 1960–1968 when there was more likelihood of registering birth, especially in the middle-income group. The results for the 17–22 years' age group are more comparable as the majority of the boys have third molars erupted by then. Fanning (1962) found that the difference in third molar emergence in East African males and Bostonians in the 13–16 years' age group was 2.5 years, while in the 17–20+ years' age group it was 1.25 years. The difference in the third molar emergence in African males in the present study and Boston males is about 1.5 years in the 13–20 years' age group. The Asian males appear to be very slightly later, about 0.25 years, than the Boston males in third molar emergence. At any given age above 13 years, Africans have more third molars erupted than Asians at the same age, and the percentage of Asians with all four third molars erupted is much less than in the Africans. The percentage of Bostonians (Fanning 1962) with all four molars erupted is less than that found for the Africans in the present study as well as that of Chagula (1960). Fanning (1962) suggested that the difference in the fewer number of erupted third molars in Bostonians may be partly explained by a higher percentage of agenesis of third molars (9%) compared to that in Africans (1.6%) found by Chagula (1960). Generally, agenesis of third molars is more prevalent in Caucasian and Asians than the Africans (Hellman 1936, Nanda 1954, Rantanen 1967). Agenesis of third molars may partly account for the fewer number of third molars erupting in the Asians. However, there are other factors that may influence emergence of permanent teeth, such as ethnic difference based on a genetic time-code for eruption, crowding or availability of space and local factors such as extraction of other molars (Fanning 1962, Brown 1978, Anderson and Popovich 1981).

The use of tooth eruption data of permanent teeth in Kenya for estimation of calendar age has been reported (Hassanali and Odhiambo 1982). Data for third molars has to be used with caution as the age range of eruption is fairly large and, as pointed out by Chagula (1960), the tentative generalization made by Carother (1947) does not hold true.

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Address correspondence to: Dr J. Hassanali, Department of Human Anatomy, University of Nairobi, P.O. Box 30197, Nairobi.

**Zusammenfassung.** Daten über den Durchbruch des dritten Dauermolaren wurden erhoben in einer Querschnittsuntersuchung mit 1343 afrikanischen und 1092 asiatischen Schülern und Studenten des Alters 13-23 Jahre, die verschiedene Schulen in Nairobi und die Universität von Nairobi, Kenia besuchten. Afrikaner waren den Asiaten im Erscheinen des dritten Molaren signifikant voraus. Nach dem medianen Eruptionsalter brechen die mandibularen Molaren bei Afrikanern im Alter von 17,6-18,3 Jahre durch, gefolgt von den maxillaren bei 18,5-18,9 Jahren, während bei den Asiaten die mandibularen Molaren bei 19,9-20,3 Jahren durchbrechen und die maxillaren bei 20,7-21,0 Jahren. Afrikanische Frauen scheinen den Männern im Medianalter des Durchbruchs um 0,3-0,4 Jahren voraus zu sein, während asiatische Frauen gegenüber den Männern um 0,3 Jahre zurückliegen, jedoch sind diese Unterschiede nicht signifikant. Der Durchbruch des dritten Molaren beginnt bei Afrikanern früher, im Alter von 13 Jahren, und bei 18,5 Jahren haben 50% der Afrikaner alle vier Molaren. Bei den Asiaten beginnt der Durchbruch des dritten Molaren bei etwa 15 Jahren und bei 21,5 Jahren haben 50% alle vier Molaren.

**Résumé.** Des données sur l'éruption de la troisième molaire permanente ont été obtenues d'une transversale de 1343 étudiants africains et 1092 étudiants asiatiques âgés de 13 à 23 ans fréquentant diverses écoles à Nairobi et l'Université de Nairobi, au Kenya. Les Africains sont significativement en avance sur les Asiatiques pour l'éruption de la troisième molaire. En âge médian d'éruption, chez les Africains, les molaires mandibulaires sortent à 17·6-18·3 ans suivies des maxillaires à 18·5-18·9 ans alors que chez les

Asiatiques, les molaires mandibulaires sortent à 19·9–20·3 ans et les maxillaires à 20·7–21·0 ans. Les femmes africaines se montrent plus précoces que les hommes en âge médian d'éruption de 0·3–0·4 ans, alors que les femmes asiatiques tendent à être plus tardives que les hommes d'environ 0·3 ans, mais ces différences ne sont pas significatives. L'éruption de la troisième molaire commence plus tôt chez les Africains à l'âge de 13 ans et à 18·5 ans, 50% des Africains ont toutes leurs 4 molaires présentes. Chez l'Asiatique, l'éruption de la troisième molaire commence à environ 15 ans et à 21·5 ans, 50% ont leurs 4 molaires présentes.