

The Prevalence of Endemic Goitre in Kelantan, Malaysia

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Summary

A large-scale study was undertaken in the state of Kelantan, to determine the prevalence of goitre. A total of 2,450 subjects above the age of 15 years were selected from 31 localities in the state and examination for goitre was done using the technique of Perez. The state was divided into 3 areas — coastal area (area 1), inland area (area 2) and the area in between the coast and the inland area (area 3). The overall prevalence of goitre was 36.8% and the prevalence in areas 1, 2 and 3 were 23.0%, 35.9% and 44.9% respectively and ranged from 6.9% in a locality in area 1 to 59.7% in a locality in area 3. In all areas, the prevalence was higher in females than in males. The prevalence of grades I, II and III goitres were 21.5%, 1.0% and 0.5% respectively in area 1, 33.6%, 1.5% and 0.7% respectively in area 2 and 41.7%, 2.2% and 1.0% respectively in area 3. Amongst age groups, goitre prevalence was highest in the 36 to 45 years age group in area 1 (33.9%), in the 15 to 25 years age group in area 2 (39.6%) and in the 26 to 35 years age group in area 3 (54.3%). In all the areas, goitre prevalence was lowest in the above 56 years age group. We concluded that the prevalence of goitre was high in Kelantan and there were regional differences in the prevalence rate within the state.

Key words: Endemic goitre, goitre prevalence.

Introduction

Endemic goitre is a major problem in certain parts of the world, especially in the inland and mountainous areas such as the Himalayas of Asia, the Alps of Europe and the Andes of South America¹. The major cause of this is thought to be lack of iodine in the diet. In Malaysia, in one of the earlier reports, goitre prevalence was high amongst the villages near Kampung Kuala Betis in Kelantan², near Grik, Perak and near Ulu Tembeling, Pahang³. More recently in Sarawak, the prevalence of goitre was reported to be high, especially amongst the indigenous tribes^{4,5,6}. The Ai river region in Sarawak had a prevalence rate of 99.5%, which was claimed to be the highest in the world⁵. In a study of selected villages in Kedah, the overall prevalence was 35.1% with the highest goitre prevalence being found in the inland villages and the lowest in a coastal village⁷. No major study since then has been done to define the extent of this problem in Malaysia and hence this study was undertaken to determine the prevalence of goitre in Kelantan in order to assess the magnitude of the problem.

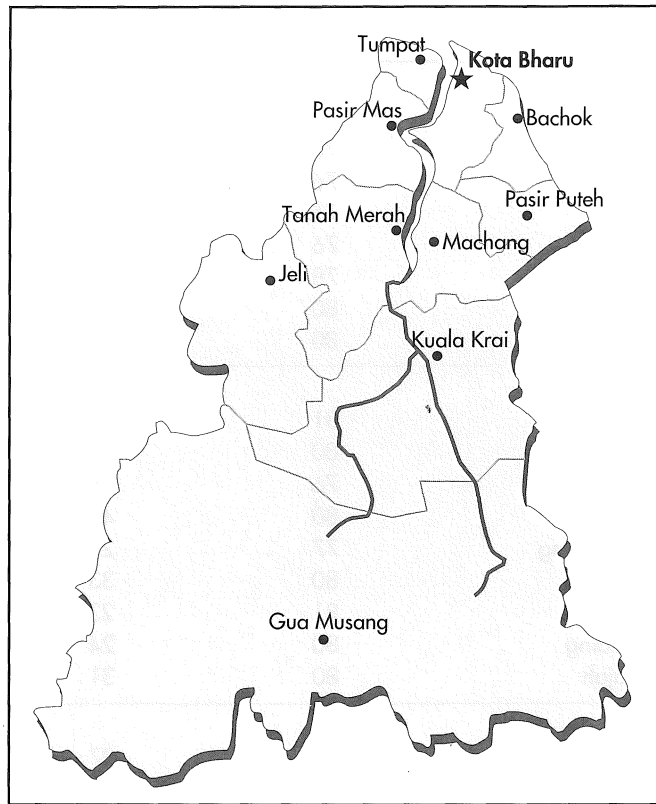


Fig 1: Map of Kelantan showing the 10 districts.

Subjects and Methods

The state of Kelantan has a population of approximately 1.2 million and is divided into 10 districts (Fig 1). The districts were grouped into 3 areas based on the distance from the coast. Area 1 consisted of the districts adjacent to the coast — Tumpat, Kota Bharu, Bachok and Pasir Puteh. Area 2 consisted of the districts in between the coastal districts and the inland districts — Machang, Pasir Mas and Tanah Merah. Area 3 consisted of the inland districts — Gua Musang, Kuala Krai and Jeli. Selection of localities for study was done randomly, based on the method of cluster sampling. The number of clusters in each district of each area was proportional to the population in the district. In area 1, the clusters selected were in Kota Bharu, Penambang, Salor, Kota and Peringat in Kota Bharu district; Kebakat in Tumpat district; Gunung in Bachok district; and Bukit Awang in Pasir Puteh district. In area 2, the clusters were in Bunut Susu, Kangkong and Rantau Panjang in Pasir Mas district; Ulu Sat and Pulau Chondong in Machang district; and Gual Ipoh, Kerilla Estate, Batu Gajah and Bukit Gading in Tanah Merah district. In area 3, the clusters selected were in Ciku 1, Jerek, Jeram Tekuh, Paloh 3 and Gua Musang in Gua Musang district; Dabong Temalir, Sungai Sok, Manik Urai, Pahi and Chenulang in Kuala Krai district; and Jeli, Batu Melintang and Kuala Balah in Jeli district. Examination was done from house-to-house and subjects above the age of 15 years were included. Examination of the neck for goitre was done by 1 person only throughout the study, using the technique of Perez⁴. The goitre size was graded as follows: grade 0 — thyroid gland not palpable; grade 1 — thyroid gland not visible but palpable; grade 2 — thyroid gland visible; and grade 3 — thyroid very enlarged, of at least the size of the subject's clenched fist.

Table I
The locality, no of subjects and goitre prevalence in Kelantan

Locality	No of subjects	Goitre prevalence
Area 1		
Kota Bharu	72	5 (6.9%)
Penambang	73	7 (9.6%)
Badang	76	7 (9.2%)
Kota	75	12 (16.0%)
Peringat	76	27 (35.5%)
Gunung	78	26 (33.3%)
Kebakat	80	23 (28.8%)
Bukit Awang	80	26 (32.5%)
Area 2		
Ulu Sat	81	25 (30.9%)
Pulau Chondong	80	15 (18.8%)
Kangkong	76	33 (43.4%)
Bunut Susu	80	45 (56.3%)
Rantau Panjang	77	27 (35.1%)
Gual Ipoh	80	33 (41.3%)
Kerilla Estate	81	23 (28.4%)
Bukit Gading	80	24 (30.0%)
Batu Gajah	80	31 (38.8%)
Area 3		
Temalir	80	27 (33.8%)
Chenulang	82	39 (47.6%)
Ciku 1	80	35 (43.8%)
Paloh 3	84	47 (56.0%)
Pahi	82	31 (37.8%)
Manik Urai	82	41 (50.0%)
Dabong	80	33 (41.3%)
Sg Sok	79	32 (40.5%)
Jeram Tekoh	77	46 (59.7%)
Kg Jerek	80	35 (43.8%)
Gua Musang	80	40 (50.0%)
Batu Melintang	80	37 (46.5%)
Kg Jeli	79	20 (25.3%)
Kuala Balah	80	42 (52.5%)

Statistical Analysis

The t-test and Chi square test were used in the statistical analysis using Microstat statistical programme on a computer.

Results

A total of 2,450 people from 31 localities were examined. Of these, 610 (24.9%) were from area 1, 715 (29.2%) were from area 2 and 1,125 (45.9%) were from area 3. There was a total of 967 (39.5%) males and 1,483 (60.5%) females (Table II). There was no significant difference between the mean age of subjects in the 3 areas. The overall prevalence of goitre was 36.8% and the prevalence in the 3 areas is shown in Table I. The prevalence was significantly higher in area 3 than in area 1 ($p < 0.001$) and area 2 ($p < 0.001$), and that in area 2 was

Table II
The no of female and male, the mean (\pm SD) age
and the overall goitre prevalence in the 3 areas

	Area 1	Area 2	Area 3
Female (no.)	395 (64.8%)	416 (58.2%)	672 (59.7%)
Male (no.)	215 (35.2%)	299 (41.8%)	453 (40.3%)
Age (years) (Mean \pm SD)	38.2 \pm 17.3	38.4 \pm 16.6	36.7 \pm 14.9
Overall goitre prevalence	23.0%	35.9%	44.9%

Table III
The prevalence of goitre in the 3 areas of Kelantan

Area	Total Population	Goitre Grade			
		0	1	2	3
1	610	470 (77.0%)	131 (21.5%)	6 (1.0%)	3 (0.5%)
2	715	459 (64.2%)	240 (33.6%)	11 (1.5%)	5 (0.7%)
3	1,125	620 (55.1%)	469 (41.7%)	25 (2.2%)	11 (1.0%)

Table IV
The prevalence of goitre amongst females in the 3 areas of Kelantan

Area	Total Population	Goitre Grade			
		0	1	2	3
1	395	285 (72.1%)	101 (25.6%)	6 (1.5%)	3 (0.8%)
2	416	234 (56.3%)	167 (40.1%)	10 (2.4%)	5 (1.2%)
3	672	302 (45.0%)	336 (50.0%)	23 (3.4%)	11 (1.6%)

Table V
The prevalence of goitre amongst males in the 3 areas of Kelantan

Area	Total Population	Goitre Grade			
		0	1	2	3
1	215	185 (86.0%)	30 (14.0%)	0 (0.0%)	0 (0.0%)
2	299	225 (75.3%)	73 (24.4%)	1 (0.3%)	0 (0.0%)
3	453	318 (70.2%)	133 (29.4%)	2 (0.4%)	0 (0.0%)

significantly higher than in area 1 ($p < 0.001$). Amongst males, the prevalence of goitre was significantly higher in area 3 than area 1 ($p < 0.001$), and that in area 2 was also significantly higher than in area 1 ($p < 0.005$). However, there was no significant difference in the prevalence rate between areas 3 and 2. The highest prevalence was found in Jeram Tekoh (59.7%) in the district of Gua Musang and the lowest was in Kota Bharu (6.9%) (Table I). The majority of goitres were of grade 1 in all 3 areas and the prevalence of large and visible goitre (grades 2 and 3) was 1.5%, 2.2% and 3.2% in areas 1, 2 and 3 respectively (Table III). The prevalence of large and visible goitre was also higher in females than males in all the 3 areas. The highest prevalence of goitre in females was in the 36 to 45 years age group in areas 1 and 2 and in the 26 to 35 years age group in area 3 (Fig 2). In males, the highest prevalence in area 1 was in the 46 to 55 years age group; in area 2 was in the 15 to 25 years age group; and in area 3 was in the 36 to 45 years age group (Fig 3). The overall prevalence for both sexes according to age group is shown in Fig 4.

Discussion

The prevalence of goitre is much lower than that reported in Sarawak. Maberly *et al*⁵ reported a prevalence of 99.5% of which 85% of goitres were of grade 2 and 3 in the Ai river region of Sarawak. Chen *et al*⁶, in a study in Tinjar area in Sarawak, also reported a high prevalence — 77.7% in females aged 15 years and above. The overall prevalence of 36.8% found in this study is almost similar to the prevalence of 35.1% found by Rozia Hanis *et al*⁷ in their study of 7 villages in Kedah. The reason for this discrepancy between the 2 states of Peninsular Malaysia and Sarawak could be the existence of a better infrastructure in the 2 states of Peninsular Malaysia than in Sarawak. The road system is not well-developed in Sarawak and transportation to the inland area is almost exclusively by rivers, while in Kedah and Kelantan the road system is well-developed, hence easier accessibility and presumably wider variety of foodstuffs. There were regional differences in the prevalence rate — the inland area being higher than the coastal area. This finding is consistent with the findings in Kedah and Sarawak^{5,7}. It has been postulated that the discrepancy was due to easy availability of iodine-rich seafood in the

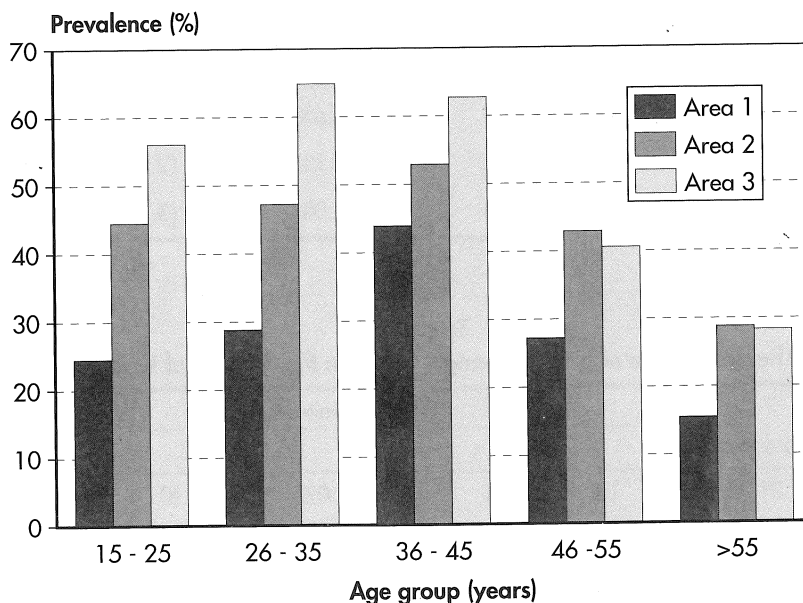


Fig 2: Prevalence of goitre in females in relation to age.

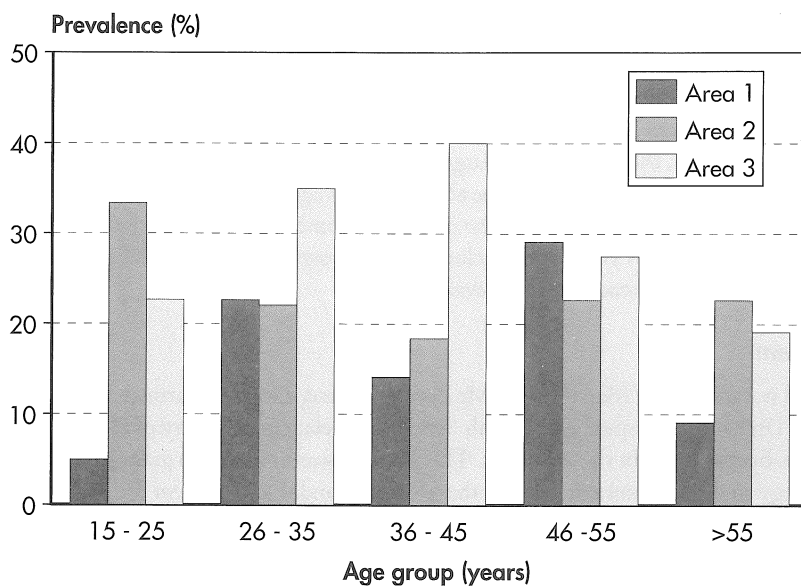


Fig 3: Prevalence of goitre in males in relation to age.

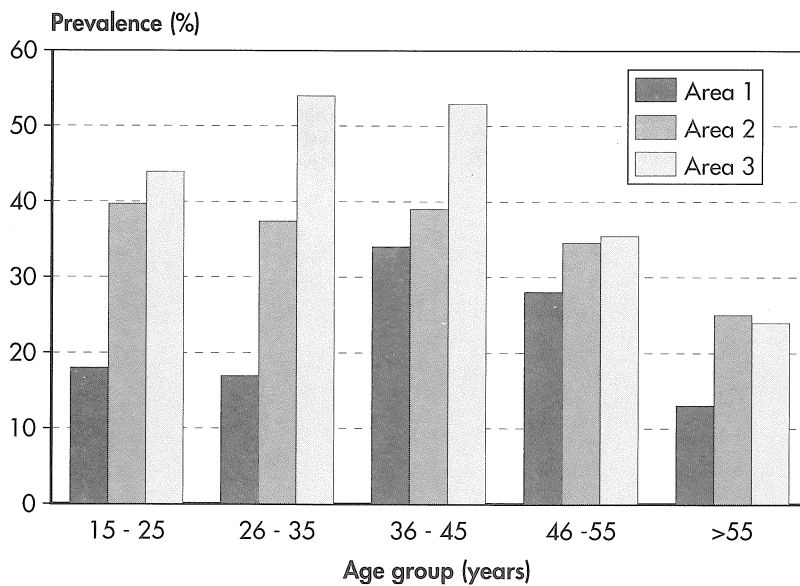


Fig 4: Prevalence of goitre in relation to age.

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coastal than in the inland areas. There are other factors incriminated in the aetiology of endemic goitres, such as cassava, polluted drinking water and bacterial contamination by *E. coli*⁹. Interestingly, there was also a difference between different localities in the coastal area. The localities of Kota Bharu, Penampang and Badang are nearer to the coast than the other localities and the 3 localities were more urbanised than the rest — being in and around the capital town of the state. The prevalence was higher in females than males and the young and middle-aged groups than the elderly. The findings are similar to other epidemiological studies^{7,9}. The prevalence of large goitres (grades 2 and 3) was, however, small. This is a marked contrast to earlier studies in Kedah and Sarawak. In Kedah, the prevalence of large goitre ranged from 0% to 41.8%, whilst in Sarawak it was between 18% to 90%. The 2 studies were done about 10 years ago and one could postulate that the lower prevalence of large goitre in Kelantan was due to the rapid development and improved socio-economic status seen in the country over the last few years. We concluded that the overall prevalence of goitre in Kelantan was high and there were regional differences in the prevalence.

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