

## The epidemiology, pathology, and management of goitre in Yemen

Khalid A. Al-Hureibi, MBBS\*; Yasser A. Abdulmughni, MBBS, FRCSI\*\*; Mohammed A. Al-Hureibi, MBBS, PhD†; Yahia A Al-Hureibi, MBBS, FACHARTZ‡; Mohammed A. Ghafoor, MBBS, MD\*\*

**Background:** The total goitre rate in Yemen declined by half after the country adopted universal salt iodisation in 1995. We investigated the recent epidemiology, pathology, and management of goitre so as to evaluate changes since the initiation of the salt iodisation programme. We also sought to determine the effect of new diagnostic tools in the pre-operative work-up of surgically treated patients.

**Methods:** Data were collected from the records of 667 patients with goitre seen in Kuwait University Hospital between 1997 and 2001.

**Results:** Females constituted 92.5 % (n=617) of the series. The mean age of all patients was 35.2±11.58 years (range, 13 to 90 years). Most patients (93%) came from highland areas with an average altitude of 2000 to 2600 meters above sea level. The average duration since patients noticed swelling until the diagnosis was made was about 4 years. Multinodular bilateral swelling was the most common clinical finding (44.9%), while solitary nodules constituted the least common (17.4%). The most common associated symptom was dyspnoea (20.5%). The most common histopathological finding was nodular and colloid goitre (62.8%), while malignancy accounted for 17.7%. Subtotal thyroidectomy was the most frequent procedure, and the most common postoperative complication was hypocalcaemia.

**Conclusions:** Goitre is a national problem in Yemen. The late presentation, which may be important in malignant transformation of the thyroid gland, makes surgery imperative. The salt iodisation programme has been associated with a decrease in the malignancy rate. Yemen is in great need of experienced cytologists and radiologists to increase the efficacy of fine needle aspiration cytology and ultrasonography in the diagnosis of thyroid lesions. Patients need to be educated about the importance of post-operative follow up.

**Key words:** Goiter, universal salt iodination, fine needle aspiration cytology, ultrasonography, epidemiology, Yemen

*From the \*Department of Surgery, Hull Royal Infirmary, Hull, UK; \*\*Department of Surgery, University of Sana'a, Sana'a, Yemen; †Department of internal medicine, University of Sana'a, Sana'a, Yemen; ‡Department of Anaesthesia, University of Sana'a, Sana'a, Yemen.*

*Correspondence to:*  
Yasser A. Abdulmughni, FRCSI  
Department of Surgery,  
Faculty of Medicine  
Sana'a University  
P.O.Box 2481  
Sana'a, Yemen.  
E-mail: yabdulmughni@yahoo.co.uk.

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The WHO classified seven percent of the world population as suffering from clinically apparent goitre.<sup>1</sup> Most patients are in developing countries, where the disease is attributed to iodine deficiency. Yemeni health authorities did not perceive iodine deficiency disorders (IDD) as a public health problem until 1991 when a rapid assessment of school children was done in Sana'a City and four governorates in the north (central highland areas). The investigators reported a total goitre rate (TGR) of 32%; the goitre prevalence was 60% to 100% in some areas, and at least 5 million people were estimated to have goitre. These figures indicated that Yemen was among the countries with a severe IDD problem.<sup>2</sup>

Iodised salt is considered the most appropriate means of iodine supplementation.<sup>3</sup> In collaboration with the Ministry of Health, UNICEF launched the national IDD control programme in 1995 and adopted universal salt iodisation as the major strategy to combat IDD. This raised the percentage of households who consumed iodised salt

from 22% to 60%.<sup>4</sup> The programme had a great impact on the TGR, which dropped from 32% in 1991 to 16.8% in 1999.<sup>5</sup> Yemen was reclassified among countries with mild IDD.

Descriptions of the clinical presentation and management of goitre in Yemen are scarce. One study described goitre pathology and surgical management in the 1970s and 1980s (Al-Hureibi et al; 1990).<sup>6</sup> We investigated the epidemiology, pathology, and management of goitre so as to evaluate changes since the initiation of the salt iodisation programme. We also sought to determine the effect of new diagnostic tools in the pre-operative work-up of surgically treated patients.

### Methods

Kuwait University Hospital is one of the main referral hospitals in the capital Sana'a, and the only major hospital in the city that is free of charge, so the influx of patients from mixed socio-economic backgrounds is considerable. The study population comprised patients

who were admitted to Kuwait University Hospital (KUH) complaining of thyroid swelling (n=667) from January 1997 through December 2001. The clinical records of the patients were retrospectively reviewed and a questionnaire was used to obtain information from the records. The data collected included age, gender, district of patient residence, clinical presentation, methods used in diagnosis, results of postoperative histopathological examination of the resected thyroid gland, surgical treatment received, complications, and length of hospital stay. SPSS Software (version 10.0) was used for statistical analysis.

## Results

Of 667 patients, 92.5% (n=617) were females and 7.5% (n=50) were males. Ages ranged from 13 to 90 years with a mean±SD of 35.2±11.58 years. Most patients came from highland areas with an average elevation of 2000 to 2600 meters above sea level (Table 1). Average time to seek medical help after having any symptom was 4 years (Figure 1). The most common presentation was a multinodular swelling of the gland (Table 2). The most common symptoms and signs associated with the swelling are summarized in Table 3. A family history was found in 4.6%

(n=31) of the studied patients. For diagnostic evaluation, 62% of the patients (n=417) had a hormone assay, more than half of the patients (n=341) had ultrasonic imaging and about one third (n= 243) had fine needle aspiration cytology. All patients due to have surgery underwent indirect laryngoscopy. The majority of patients who had a hormone assay were euthyroid (80%); hyperthyroidism was found in 15% and hypothyroidism in 5%. Figure 2 summarizes histopathological findings. The most common surgical procedure was subtotal thyroidectomy, which was performed in more than half of patients who underwent surgical procedures (Table 4). The most common postoperative complication was hypocalcaemia, which occurred in 25 patients (4.1%).

## Discussion

The total goitre rate in Yemen has dropped to half of that reported before launching the salt iodisation programme.<sup>5</sup> The majority of patients are still from high altitude areas (2000 to 2600 meters above sea level), which means that most cases of thyroid swellings are of the endemic variety and are related to iodine deficiency. Nevertheless, other causes like dyshormonogenesis and the

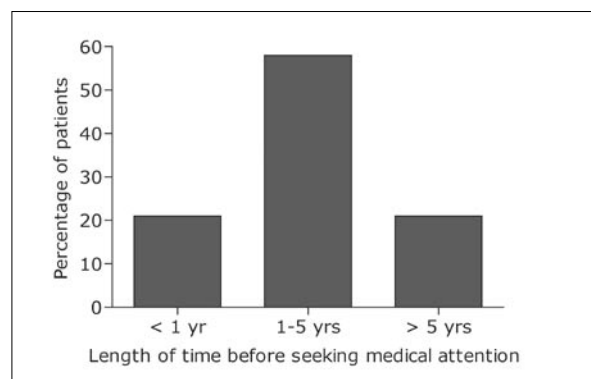
**Table 1.** Geographical distribution of patients with goitre.

City	Altitude (meters*)	Patients (n)	(%)
Sana'a	2200-2800	336	50.4
Ibb	2200-2800	123	18.4
Taiz	1600-2200	52	7.8
Dhamar	2200-2800	46	6.9
Bayda	1600-2200	30	4.5
Mahweet	2200-2800	22	3.3
Hajja	2200-2800	14	2.1
Hodaidah	0-200	9	1.3
Marib	1000-1600	6	0.9
Aden	0-200	5	0.7
Dala'a	1000-1600	7	1.0
Jaouf	1000-1600	2	0.3
Lahj	0-200	1	0.1
Hadramout	0-1600	1	0.1
Abian	400-1000	1	0.1
Sa'ada	1600-2200	1	0.1
Shabwa	400-1000	1	0.1
Foreigners		10	1.5
Total		667	100.0

\*Above sea level

**Table 2.** Clinical description of the thyroid swellings.

Description of swelling	Patients (n)	(%)
Multinodular swelling	299	44.9
Unilateral swelling	148	22.1
Diffuse swelling	104	15.6
Solitary nodule	116	17.4
Total	667	100.0



**Figure 1.** Length of time before seeking medical attention after noticing symptoms or signs of goitre (n=667).

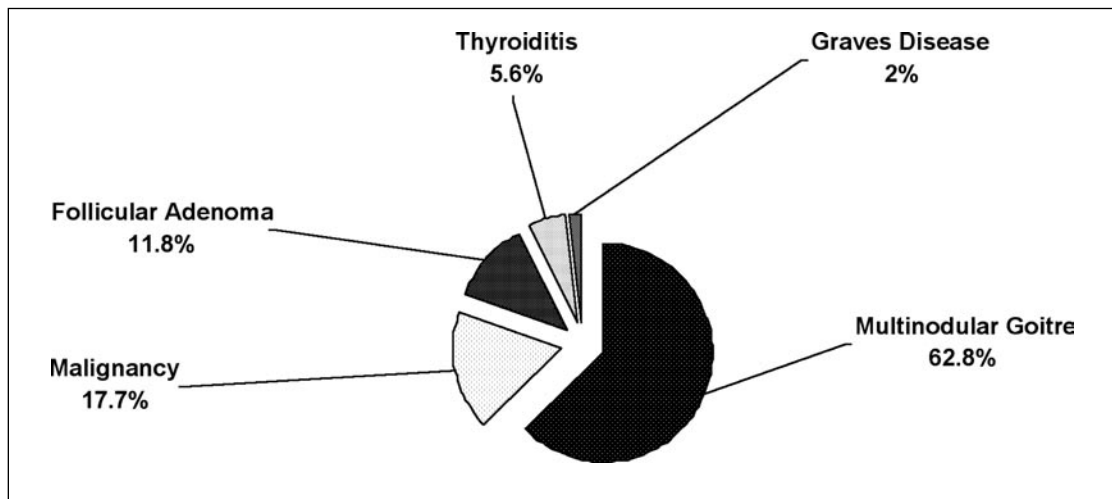


Figure 2. Histopathological diagnosis (n=549).

Table 3. Common symptoms and signs accompanying thyroid swellings.

Signs and symptoms	Patients (n)	%
Dyspnoea	137	20.5
Thyrotoxic symptoms	126	18.9
Dysphagia	111	16.6
Pain	55	8.2
Symptoms of hypothyroidism	41	6.0
Hoarseness	35	5.2
Enlarged lymph nodes	32	4.8
Exophthalmus	12	1.8

Table 4. Surgical procedures in patients with goitre.

Procedure	Patients (n)	%
Subtotal thyroidectomy	297	51.1
Haemithyroidectomy	115	19.8
Lobectomy	103	17.7
Near total thyroidectomy	30	5.2
Total thyroidectomy	20	3.4
Lumpectomy	9	1.6
Incisional biopsy	6	1.0
Total thyroidectomy with dissection	1	0.17
Total	581*	100.00

\*62 patients did not undergo surgical procedures; records of 24 surgical patients were not available.

Table 5. Histopathological findings in the current study and in a study done 12 years ago.

Histopathological Finding	Current study	Al-Hureibi et al
	2002	1990
	n (%)	n (%)
Multinodular goitre	345 (62.8)	87 (44)
Follicular adenoma	65 (11.8)	39 (19.7)
Malignancy	97 (17.7)	59 (29.8)
Thyroiditis	31 (5.6)	8 (4)
Graves Disease	11 (2)	5 (2.5)
Total	549* (100)	198 (100)

\*The results of histopathological examination of 32 patients were not available.

intake of goitrogenics should be evaluated. The geographical distribution of cases is similar to that reported previously.<sup>6</sup> Only 21% of patients presented one year after noticing the swelling or the development of other symptoms (Figure 1). The average period before seeking help was 4 years, which is a quite a long time. Some patients took up to 40 years before seeking any kind of medical help due to the cultural background and lack of education. Late presentation leads to progression of goitre to an irreversible nodular stage, which is not amenable to medical treatment, and this mandates surgical intervention. Hundahl et al.<sup>7</sup> found that long standing goitre (for more than 5 years) is regarded as the strongest risk factor for thyroid carcinoma in a series of 5583 patients with thyroid carcinoma. There is also experimental evidence suggesting an association between prolonged high TSH, which is found in iodine deficient patients, and thyroid carcinoma.<sup>8</sup>

Consequently, earlier presentation will decrease the frequency of surgical intervention, with its associated morbidity and economic burden, provided that the thyroid swelling has not reached an irreversible state. Also, early detection and management might decrease the incidence of thyroid malignancy, which complicates long standing non-treated goitre.

Patients can be managed in the early stage by suppressing the gland, and by giving iodine supplements. Radioactive iodine could be a choice in some cases, but is not yet available in Yemen. Important diagnostic tools like hormone assays, ultrasonic imaging, and fine needle aspiration cytology (FNAC) became widely available at the beginning of the 1990s. Lack of such tools in the past resulted in uncertainty and difficulty in the diagnosis of thyroid lesions and subsequently in management, particularly in the differentiation between benign and malignant lesions. The increased use of such tests in recent years has to some extent improved diagnostic ability, but still the differentiation between benign and malignant lesions is a clinical problem in our setting. We think this is due to the lack of an accepted level of expertise in procedures like FNAC. The sensitivity of this procedure was 38% in an audit that correlated FNAC to post-operative histopathological findings.<sup>9</sup> Ultrasonic imaging and hormone assay are not quite as informative in the differentiation between benign and malignant lesions, particularly in the light of the lack of well-trained and experienced Yemeni radiologists who can interpret the results properly. The occurrence of occult thyroid carcinoma inside the multinodular goitre is another problem in the differentiation of benign and malignant lesions. Diagnostic pitfalls make it difficult for the treating physician to adhere to current recommendations in the management of thyroid swellings. Diagnosis is highly dependent on interpretations of the tests, and the cost effectiveness of tests is frequently questionable.

There have been many changes in the pathology of goitre in Yemen in recent years (Table 5). Al-Hureibi et al<sup>6</sup> reported a malignancy rate of 29.8 %, whereas in our study the rate was 17.7%, a change that coincided with a halving in the TGR.<sup>5</sup> These improvements might be explained by greater iodine intake. Iodine prophylaxis prevents the malignant transformation of goitre. In Switzerland, the incidence of thyroid cancer declined during a period when iodine intake increased to an optimal value.<sup>10</sup> In Poland, which used to be regarded as an endemic goitre area, the frequency of neoplastic lesions significantly decreased after correction of iodine deficiency.<sup>11</sup> The malignancy rate in Yemen before salt iodisation is comparable to that found in neighbouring areas, such as certain regions of Saudi Arabia where the TGR is 29% and iodine deficiency is endemic.<sup>12</sup> Even better rates might be achieved if iodine supplementation is further increased. An interesting finding is that the frequency of malignancy in our series is more than the frequency of follicular adenoma. Our finding is dissimilar to reports that found follicular neoplasm to be the most common thyroid neoplasm.<sup>13</sup> Our finding is an indication that the malignancy rate in Yemen is still high.

Indications to operate are mainly compressing symptoms, fear of malignancy and thyrotoxicosis. Subtotal thyroidectomy is the treatment of choice in this hospital for patients with multinodular goitre. In many cases the procedure has been done for lesions that presumably were thought to be benign, but this diagnosis may have been due to the low sensitivity of preoperative FNAC and to the presence of papillary microcarcinoma inside the multinodular goitre, which poses a diagnostic problem. Although, the most common surgical procedure is subtotal resection of the gland, there is a relatively high rate of immediate postoperative hypocalcaemia, which developed in 25 patients (4.1%). We do not know the number of patients who developed permanent hyperparathyroidism because a follow-up of six months or more is needed to confirm this diagnosis. The majority of patients do not return for follow up care.

In conclusion, we would like to emphasize the existence of the continuing goitre problem in Yemen. After introduction of the national salt iodisation programme the TGR improved and the rate of malignancy decreased, but a significant problem still exists. Late presentation makes surgical intervention, with its morbidity and economic consequences, mandatory. Late presentation might also increase the incidence of thyroid carcinoma. Yemen is badly in need of experienced cytologists and radiologists who can improve the diagnostic work up and raise the scale of sensitivity to differentiate malignant from non-malignant lesions, and to improve the cost-effectiveness of testing. This is especially important considering the limited economic resources that Yemen has as a developing country. Post discharge information and follow up are still major problems. Patients need to be educated about the importance of post-operative follow up.

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