

Patterns of Differentiated Thyroid Cancer in Baluchistan Province of Pakistan: Some Initial Observations

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SUMMARY

The incidence of thyroid cancer is increasing in several countries. The main objective of this retrospective study was to find and describe province-specific estimates of incidence in males and females by age groups for differentiated thyroid cancer (DTC). This study reports on 87 cases of DTC from Baluchistan province of Pakistan treated with post operative radioiodine at the Center for Nuclear Medicine and Radiotherapy (CENAR) Quetta from January 2003 to December 2009. The patient data has been collected from CENAR Quetta. Patients with DTC were confirmed by clinical examination, thyroid scintigraphy (Thyroid scan), blood tests (T3, T4, TSH) and histopathology tests and then treated with radioiodine. The Median age of the patients was 35.5 years (Range 12-70 years). The final histological diagnosis was papillary carcinoma in 71 (81.6 %) cases, follicular carcinoma in 6 (6.9 %) cases while 10 (11.5 %) cases presented with mixed papillary and follicular carcinoma. About 53 % cases were found in females with age 21-40 years. No strike predominance was observed in any age group for males. Four patients presented with recurrence while six patients showed metastasis in cervical lymph nodes. The small annual incidence did not follow any definite pattern. DTC has a small incidence in Baluchistan due to lack of education and health care facilities. The incidence of DTC is higher in females when compared with males as per this study. This preliminary study will provide an insight to incidence of DTC, its treatment facilities and future planning strategies in Baluchistan, Pakistan.

KEY WORDS:

Differentiated Thyroid Cancer, Radioiodine, Thyroid Scintigraphy

INTRODUCTION

Thyroid cancer is a relatively rare neoplasm worldwide, accounting for approximately 1–5% of all cancers in females and less than 2% in males. Although the incidence of thyroid cancer is relatively rare, it is the most common endocrine malignancy worldwide. While the international incidence varies considerably, a fairly consistent female-to-male ratio of three-to-one has been observed in almost all geographic areas and ethnic groups¹.

A thyroid cancer incidence rate has been increased between 1973 and 2002 in most populations worldwide. An average increase of 48.0% among males and 66.7% among females

has been observed. More recently, the age-adjusted international thyroid cancer incidence rates from 1998–2002 varied 5-fold by geographic region for males and nearly 10-fold for females by geographic region².

The use of radioiodine for the treatment of thyroid cancer has been increased tremendously since its introduction in 1942^{3,4}. Radioiodine emits two types of ionizing radiations namely, 364 KeV gamma rays and 192 KeV beta rays. The significant radiobiological effect of radioiodine is the product of the beta particles. Radioiodine therapy is considerably safe, relatively inexpensive and convenient for the patient. Also the uptake of radioiodine can be increased by instructing the patient to avoid all iodide containing substances prior to therapy. Lithium carbonate, in addition, has been used to enhance radioiodine retention by the thyroid and/or metastases⁵. The patient treated with radioiodine shows occasional symptoms of hypothyroidism⁶.

In Pakistan thyroid cancer is responsible for 1.2% cases of all malignant tumors. Previous reports from this region show papillary thyroid cancer to constitute 57 to 89% of all thyroid malignancies^{7,8}. The female to male ratio in this part of the world is noted to be between 2.5 to 4:1, which is comparable to international data. However, available data of thyroid cancers and its treatment using radioiodine from all parts of Pakistan especially is too little and scattered^{9,13}. This study was aimed to highlight the incidence, types, patient characteristics and treatment of differentiated thyroid cancer using radioiodine in Baluchistan, Pakistan.

MATERIALS AND METHODS

Baluchistan is the largest province of Pakistan by area. Geographically, it borders Iran in the west, Afghanistan in the north, Punjab and Sindh in the east and Arabian Sea in the south. The capital of the province is Quetta. The province is administratively divided in 27 units called districts. Besides a large number of Afghan immigrants, the local inhabitants are mainly Pushtuns, Baloch, Brahvi and Hazara's. Regarding the climate, very hot summers and very cold winters fall in this region. Large mines of coal, marbles and natural gas are the pillars of the economy. Recently the world's largest deposits of gold and copper have been found at Chagai district of the province. The newly established Gwadar sea port is also in spot light due to its strategic and commercial importance. In spite of being politically conscious, resource-rich Baluchistan

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is Pakistan's least-developed province with lack of education and health care facilities and high rates of poverty and malnutrition.

Data on thyroid cancer incidence, histology, patient characteristics and its treatment was collected from the Centre for Nuclear Medicine and Radiotherapy (CENAR) Quetta, which is the only center in Baluchistan for the treatment of all kinds of cancers. This retrospective study pertains to six years i.e. from 2003 to 2009. The records of all patients of the study period were deeply reviewed and only cases confirmed by histopathology and then treated with radioiodine were collected for this study. The analyses were restricted to the major histological categories associated with thyroid cancer: Papillary, follicular and mixed papillary and follicular. Other parameters recorded were patient's age, sex, activity given, dose rate till its admissible limits, and follow up period. Pregnancy and lactation were ruled out in all female patients. All patients were subjected to scintigraphic evaluation using Tc-99m pertechnetate prior to treatment using standard imaging protocols. Almost all patients of thyroid cancer considered in this study received surgical treatment followed by radioiodine therapy. The radioiodine was administered in a 6 hour fasting state to all patients.

RESULTS

A total of 87 patients of thyroid cancer were identified and treated with radioiodine at the Center for Nuclear medicine and Radiotherapy (CENAR) Quetta during the study period of 2003 to 2009. Of all the 87 patients (Median age, 35.5 years; Range 12-70 years), 29 (33.3 %) were male (Median age, 43 years; Range 16-70 years) and 58 (66.7 %) were female (Median age, 35 years; Range 12-70 years). A summary of the types of the thyroid cancer found in Baluchistan is presented in Table I. It has been found that the leading thyroid cancer in Baluchistan is papillary carcinoma which accounts for 71 (81.6 %) cases. Follicular carcinoma has been reported in 6 (6.9 %) cases while 10 (11.5 %) cases presented with mixed papillary and follicular carcinoma.

The age and sex distribution of thyroid cancer patients in Baluchistan is presented in Figure 1. For females, the most affected age group was 31-40 years with 27.6 % occurrence followed by 21-30 years group (25.3 % occurrence). The least affected female age group was ≥ 60 years with occurrence of 1.1 %. For males, no predominance was observed in any particular age group. However, male patients with age either below 20 years or above 60 years were least affected.

The annual incidence rate for thyroid cancer in Baluchistan from 2003 to 2009 is presented in Table II. The highest incidence of thyroid cancer per 1, 00,000 populations have been observed in 2008. The mean incidence per 1, 00,000 populations over the past six years was 0.16.

The thyroid cancer patients of Baluchistan treated with radioiodine were also classified geographically. The maximum of 45 (51.7 %) patients were received from Quetta followed by Noshki with 6 (6.9 %) patients. Sibi and Zhob were at third place each with 5 (6.9 %) patients.

The primary therapy included a total thyroidectomy in almost all patients and adjuvant radioiodine therapy in all patients. The median radioiodine given was 150 mCi (Range 30-200 mCi). Only three patients presented with single recurrence. For each case, the recurrence appeared after one year of the first radioiodine therapy and was treated again with a second dose. One patient presented with a double recurrence; the first after 14 months while the second after 21 months of the first treatment. All the recurrent cases were papillary carcinoma with a median age of 40.5 years. Five patients showed metastasis. In each case, the cervical lymph nodes were involved.

DISCUSSION

The present study was a preliminary investigation in Baluchistan province of Pakistan regarding differentiated thyroid cancer and radioiodine therapy. The data show information about the incidence of thyroid cancer and important patient variables such as age, sex and histological type. There was no clear trend in the incidence of the thyroid cancer during 2003-2009 in Baluchistan. The overall incidence was, however, small as compared to the developed regions of the world. For example, the incidence of thyroid cancer in USA is 8.9, in UK is 2.9 and in Europe is 2.7 per 1, 00,000 populations^{14, 15}. Several factors contribute in explaining this relatively smaller incidence in Baluchistan. However, the vital role is played by the backward market of education and low socio-economic conditions of Baluchistan. Access to all levels of education unlocks people's potential and is accompanied by improvements in health, nutrition, and well-being of their families. According to reports, only 27 per cent of the students in Baluchistan complete primary or higher education¹⁶. Due to the lack of girls' schools in the province only 23 per cent rural girls are lucky enough to be enrolled in primary school. According to poverty-related reports the percentage of the population living below the poverty line stands at 63 per cent in Baluchistan¹⁶. 52 per cent of the population in Baluchistan uses wells and open ponds for drinking water¹⁷. The lack of health care facilities, inflexible culture and gender discrimination are other loudly speaking factors for the small incidence of thyroid cancer in Baluchistan. It has been reported that Baluchistan have the highest rate of female unemployment among all provinces of Pakistan¹⁸. Women's vocational and training centers in the country make women more capable and confident to qualify for a better life style. But unfortunately, for a total of about 3.8 million women, only one centre is working in Baluchistan¹⁸. Regarding the health care facilities, for the provincial population of above 8 million, only one cancer treatment centre is available. Evidently, this centre is far away from most of the peripheral areas of the province. This fact is reflected clearly by the much higher incidence (up to 1.30) of thyroid cancer in Quetta, which is the host city of the CENAR. The other districts with relatively high incidence like Noshki, Sibi and Zhob are located near to Quetta. Also, being the capital, Quetta enjoys better educational market and somewhat higher socio-economic conditions. Different programs for the awareness of various types of cancer are conducted by different local and national institutes from time to time. It must be emphasized, in summary, that the true incidence of thyroid cancer in Baluchistan is much higher than the finding presented in this study.

Table I: Types of Thyroid Cancer in Diagnosed in Baluchistan

Disease	Male		Female		Total
	No. of Pts.	Percentage	No. of Pts.	Percentage	
Papillary	23	33	48	67	71
Follicular	2	34	4	66	6
Mixed	4	40	6	60	10
Total	29	33	58	67	87

Table II: Thyroid cancer incidence in Baluchistan during 2003-2009

Year	Patients	Populations	Incidence (per 1000000)
2003	12	7417831.3	0.16
2004	6	7601051.7	0.08
2005	7	7788797.7	0.09
2006	14	7981181.0	0.18
2007	17	8178316.2	0.21
2008	20	8380320.6	0.24
2009	11	8587314.5	0.13

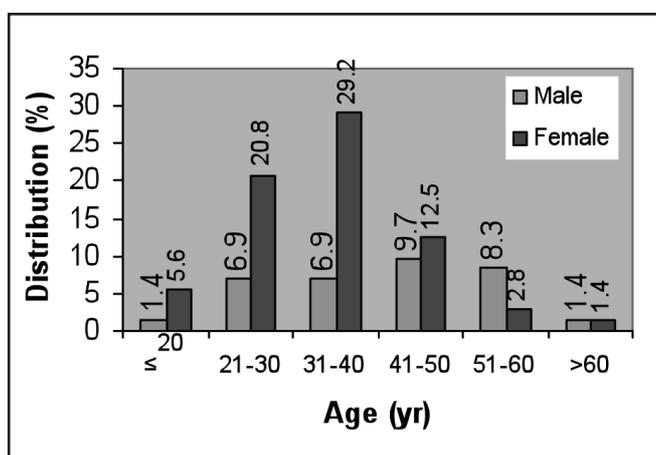


Fig. 1: Age-wise distribution of thyroid cancer patients in Balochistan.

There was female predominance in almost all age groups as stated by many other studies. 53 % of the total cases were female in the age of 21 to 40 years. During this life span, the females are most active sexually. Therefore, sex hormones may be the risk factor for thyroid cancer in this respect. However, no impairment in female fertility was noticed during the follow up of the patients. Other factors such as iodine deficiency, low intakes of antioxidants, high burden of work and little rest may also contribute. In agreement with many studies, the papillary carcinoma was dominant than other histological types of thyroid cancer¹⁹.

Due to lack of education, as stated earlier, most patients received were at advance stages of the thyroid cancer. In such cases, the management becomes difficult by the presence of an aggressive thyroid tumor both regarding surgery and radioiodine therapy. Therefore, for the better prognosis of the patient, somehow higher dose (150 mCi) of postoperative radioiodine was given, especially in case of metastasis. It also benefits the patient by reducing the long-term risk of recurrent as well as death rates.

Lung metastases are more frequent in young patients with papillary carcinoma while bone metastases are more common in older patients and in those with follicular carcinoma. However, no such case was found in the present study. Only local metastases to the cervical lymph nodes were noticed.

CONCLUSION

Thyroid cancer has a small incidence in Baluchistan due to lack of education and health care facilities. The incidence of DTC is higher in females when compared with males as per this study. This preliminary study will provide an insight to incidence of thyroid cancer, its treatment facilities and future planning strategies in Baluchistan.

REFERENCES

1. Curado MP, Edwards B, Shin HR, *et al.* IARC Scientific Publications: Cancer Incidence in Five Continents. Lyon 2007, IARC Publication No. 160.
2. Kilfoy BA, Zheng T, Holford TR, *et al.* International patterns and trends in thyroid cancer incidence, 1973-2002. *Cancer Causes Control* 2009; 20(5): 525-31.
3. IAEA-TECDOC-1228. Therapeutic applications of radiopharmaceuticals, Proceedings of an international seminar held in Hyderabad, India, 18-22 January 1999.
4. Clark, S. E. M. *Thyroid Disease in Clinical Nuclear Medicine*: Chapman & Hall London 1998.
5. Pons F, Carrio I, Estorch M, Ginjuama M, Pons J, Milian R. Lithium as an adjuvant of iodine-131 uptake when treating patients with well-differentiated thyroid carcinoma. *Clin. Nucl. Med.* 1987; 12: 644-7.
6. Muhammad W, Faaruq S, Hussain A, Kakakhail M B, Fatmi S, Matiullah. Quantitative analysis of the factors responsible for over or under dose of I-131 therapy patients of hyperthyroidism. *Rad. Prot. Dosi.*2008; 128: 90-97.
7. Al-Salamah SM, Khalid K, Bismar HA. Incidence of differentiated cancer in nodular goiter. *Saudi Med J* 2002; 23: 947-52.
8. Mulaudi TV, Ramdial PK, Madiba TE, *et al.* Thyroid carcinoma at King Edward VIII Hospital, Durban, South Africa. *East Africa Med J* 2001; 78: 252-5.
9. The Report on the World Nutrition Situation: United Nations Standing Committee on Nutrition, March 2004.
10. Iftikhar A, Karim K, Khushnaseeb A, *et al.* Thyroid Disorders in Peshawar Pakistan - One Year Experience. *Medical Forum* 2009; 20(7): 6-9.
11. Uzma B, Saleem S. Thyroid carcinoma- experience at Jinnah Postgraduate Medical Centre, Karachi. *J Pak Med Assoc* 2010; 64(5): 365-7.
12. Waseem M, Tariq W K, Abdul S, Basant K. Incidence of thyroid carcinoma in multinodular goiters. *Rawal Med J* 2010; 35(1):65-67.
13. Lubna M Z, Yawar A, Najmul I, Abdul J. Clinical presentation of Thyroid Cancer patients in Pakistan- AKUH Experience. *J Pak Med Assoc* 2004; 54(10): 526-8.

14. GLOBOCAN 2002. Cancer Incidence, Mortality and Prevalence Worldwide. IARC Cancer Base No.5, Version 2.0. IARC Press, Lyon, 2004.
15. Louise D, Gilbert W. Increasing Incidence of Thyroid Cancer in the United States, 1973-2002," JAMA 2006; 295: 2164-7.
16. Pakistan Social and Living Standards Measurement (PSLM) Survey, Federal Bureau of Statistics, Islamabad, Government of Pakistan, 2006-07.
17. Pakistan Social and Living Standards Measurement (PSLM) Survey, Federal Bureau of Statistics, Islamabad, Government of Pakistan, 2004-05.
18. State Bank's Annual Report, State Bank of Pakistan, 2005-06.
19. Lang BH, Lo CY, Chan WF, Lam KY, Wan KY. Prognostic factors in papillary and follicular thyroid carcinoma: their implications for cancer staging. Ann. Surg. Oncol. 2007; 14(2): 730-8.