

# Comparative Analysis of Thyroid Carcinomas in Kingston and St Andrew, Jamaica, between Two Consecutive 15-year Periods

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## ABSTRACT

**Objective:** To compare the distribution of histological subtypes of thyroid cancer in Kingston and St Andrew (KSA), Jamaica, within two consecutive 15-year periods.

**Methods:** We extracted all cases of thyroid carcinoma archived in the Jamaica Cancer Registry files over the 30-year period from 1978 to 2007. The cases were separated into two groups: 1978–1992 (Group I) and 1993–2007 (Group II). We analysed age, gender and histological subtype distribution within each group, and then made comparative analyses between the two periods.

**Results:** There were 311 cases in which the histological subtype was documented. The patients ranged in age from 12 to 94 years, with male to female ratios of 1:4.2 (group I) and 1:5.6 (group II). The highest frequencies of cases occurred in patients between the ages of 20 and 59 years. The commonest histological subtype in group I was follicular (52.7%); in group II, it was papillary (60%), followed by follicular (26.7%) and medullary (6.7%). There was an overall 263% increase in the papillary to follicular cancer ratio from group I (0.62) to group II (2.25). The increase in papillary carcinomas was statistically significant ( $p < 0.001$ ) overall, and in patients less than 50 years of age ( $p < 0.001$ ).

**Conclusion:** The recent KSA thyroid cancer data show a histological profile similar to that described globally, with papillary carcinomas being commonest, followed by follicular and then medullary. The significant increase in papillary cancer frequency in KSA is most likely the result of gradual recognition of the entity follicular variant of papillary cancer.

**Keywords:** Follicular cancer, Jamaica, papillary cancer, thyroid cancer

# Análisis Comparativo de Carcinomas de Tiroides en Kingston y Saint Andrew, Jamaica, Entre dos Período Consecutivos de 15 Años

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## RESUMEN

**Objetivo:** Comparar la distribución de subtipos histológicos del cáncer tiroideo en Kingston y Saint Andrew (KSA), Jamaica, dentro de dos periodos consecutivos de 15 años.

**Métodos:** Se extrajeron todos los casos de carcinoma de la tiroides registrados en los archivos del Registro de Cáncer de Jamaica por un periodo de 30 años, de 1978 a 2007. Los casos estaban separados en dos grupos: 1978–1992 (Grupo I) y 1993–2007 (Grupo II). Se analizó la edad, el género y la distribución de subtipos histológicos dentro de cada grupo, y se llevó a cabo entonces un análisis comparativo entre los dos periodos.

**Resultados:** Hubo 311 casos en los que se documentó el subtipo histológico. La edad de los pacientes fluctuó de 12 a 94 años, con una proporción varón/hembra de 1:4.2 (grupo I) y 1:5.6 (grupo II). Las frecuencias más altas de casos ocurrieron en pacientes entre 20 y 59 años de edad. El subtipo histológico más común en el grupo I fue el folicular (52.7%), en tanto que en el grupo II fue el papilar (60%), seguido del folicular el (26.7%) y medular (6.7%).

Se produjo un incremento general de 263% en la proporción de cáncer papilar frente al folicular del grupo I (0.62) al grupo II (2.25). El aumento en los carcinomas papilares fue estadísticamente

significativo ( $p < 0.001$ ) de manera general y en los pacientes con menos de 50 años de edad ( $p < 0.001$ ).

**Conclusión:** Los datos recientes del cáncer de tiroides en KSA muestran un perfil histológico similar al que se describe globalmente, siendo los carcinomas papilares los más comunes, seguidos por el folicular y luego el medular. El aumento significativo en la frecuencia de cáncer papilar en KSA es muy probablemente el resultado del reconocimiento gradual de la variante de la entidad folicular del cáncer papilar.

**Palabras claves:** Cáncer folicular, Jamaica, cáncer papilar, cáncer de la tiroides

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## INTRODUCTION

Worldwide, it has been reported that the commonest histological subtype of thyroid carcinoma is the papillary subtype (50–80%), followed by the follicular (10–40%) and medullary [5–15%] (1). A previous study conducted at the University Hospital of the West Indies in St Andrew, Jamaica, reported equal numbers of follicular and papillary thyroid cancers over the period 1986–1995 (2) and suggested that the higher than expected number of follicular cancers may have been due to the recent (1977) introduction of the concept of the follicular variant of papillary thyroid cancer (3).

We decided, therefore, to investigate and compare the distribution of the histological subtypes of all cases of thyroid cancer diagnosed in residents of the Kingston and St Andrew region of Jamaica (the population base of the Jamaica Cancer Registry) within two consecutive 15-year periods. The earlier period commenced at the time of introduction of the concept of follicular variant of papillary thyroid carcinoma to the medical literature (3).

## MATERIALS AND METHODS

We reviewed the archives of the Jamaica Cancer Registry (JCR) and all cases of thyroid carcinoma diagnosed over the 30-year period from 1978 to 2007 were extracted. The cases were subsequently separated according to date of diagnosis, into two groups, defined by the two 15-year periods of the study: 1978–1992 (Group I) and 1993–2007 (Group II). For each case, we abstracted age, gender and histopathological diagnosis and made the following analyses for each period:

- \* Age and gender distribution of thyroid cancer
- \* Proportion of cases contributed by each histopathologic subtype

We then made comparative analyses between the two groups for each of the above.

In the periods under review, cancers recorded in the JCR were coded using the International Classification of Diseases, version 9 (ICD-9). The subtypes of thyroid carcinoma recorded in the JCR files were: papillary, follicular, medullary, anaplastic, poorly differentiated (insular), Hurthle cell and other descriptive terminology that were documented as “other” in this study.

Data were expressed as frequencies, percentages and ratios. The Chi-square test was used to compare differences

in distribution of histological subtype between the two time periods and the phi coefficient was calculated to determine the strength of association between time period and distribution of histological subtype. Analyses were conducted on the total sample, on patients less than 50 years of age, and on patients 50 years of age and older using the statistical analysis software, SPSS®, version 12.0.

## RESULTS

A total of 339 cases of thyroid cancer were recorded in the JCR archives over the 30-year period, and in 28 of these, the histological subtype was unknown. The latter cases were excluded from further analysis, leaving a total of 311; 146 in Group I and 165 in Group II.

Patients in the first group ranged in age from 13 to 94 years and in the second, from 12 to 90 years, with overall male to female ratios of 1:4.2 and 1:5.6, respectively. In each group, the highest frequencies of thyroid cancer cases occurred in patients between the ages of 20 and 59 years, with the majority of these patients being less than 50 years old (Fig. 1).

Overall, follicular and papillary carcinomas were the commonest subtypes in both groups. In Group I, follicular cancer was the commonest subtype seen, accounting for 52.7% of cases, followed by papillary (32.9%), anaplastic (4.8%), Hurthle cell (3.9%) and medullary (2.7%) cancers (Fig. 2). In Group II, papillary cancer was the commonest histological subtype (60%), followed by follicular (26.7%), medullary (6.7%) and anaplastic [3.6%] (Fig. 2).

No follicular cancers were diagnosed in the 10–19, 80–89 and 90–99-year age groups in the second study period (1993–2007), and in the 70–79-year age group, the ratio of papillary to follicular carcinoma was the same in both time periods (Fig. 3A). In all other age groups, there was an increase in the papillary to follicular cancer ratio in the second period compared to the first (Fig. 3A). The increase in papillary cancers in the second time period was statistically significant ( $p < 0.001$ ;  $\phi = 0.271$ ). Statistical significance was maintained, and the strength of the correlation between time period and histological subtype was greater, when only younger patients (0–49 years) were analysed ( $p < 0.001$ ;  $\phi = 0.332$ ). The increase in papillary cancers in patients aged 50 years and over was not

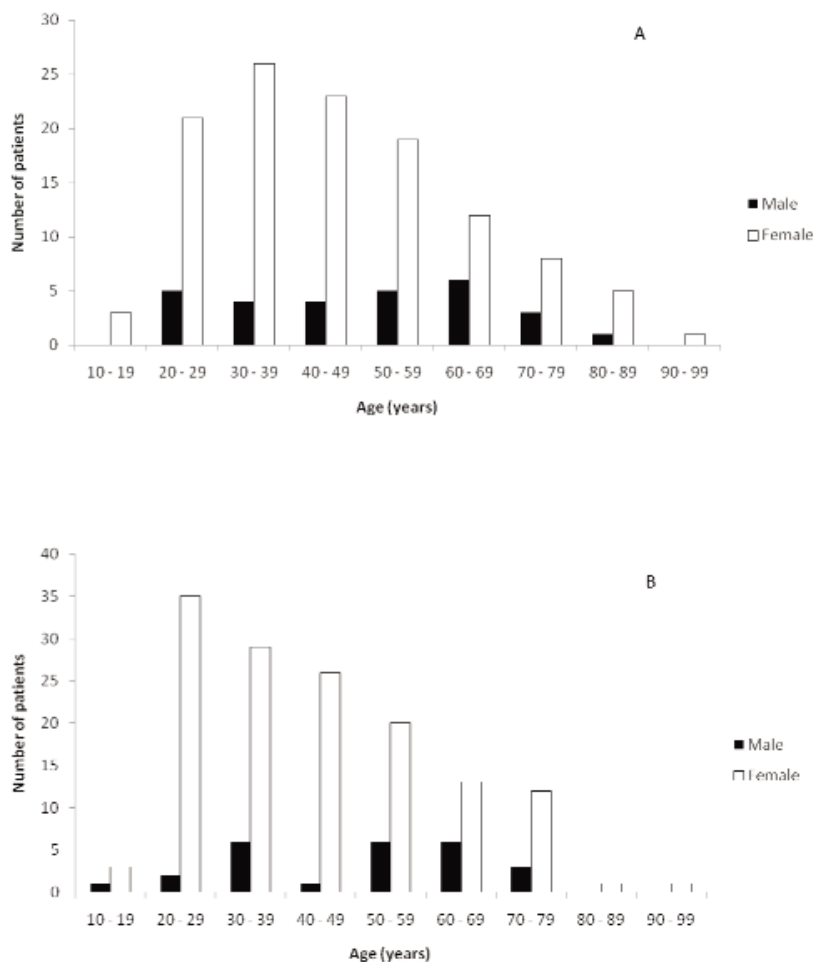


Fig. 1: Age and gender distribution of patients with thyroid cancer, Kingston and St Andrew, Jamaica, (A) 1978–1992 and (B) 1993–2007.

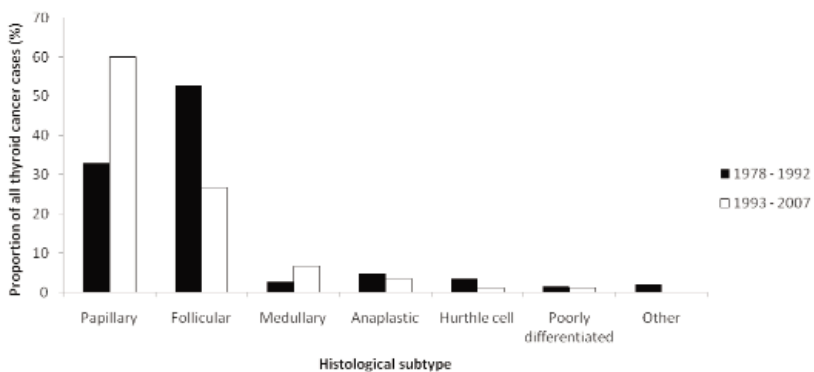


Fig. 2: Distribution of histological subtypes of thyroid cancer, Kingston and St Andrew, Jamaica, 1978–1992 and 1993–2007.

statistically significant ( $p = 0.06$ ;  $\phi = 0.171$ ). The overall percentage change in papillary to follicular cancer ratio between the two groups (0.62 in 1978–1992 and 2.25 in

1993–2007) was 263%. The percentage change was most marked in patients in the 30–39 (567%) and 40–49-year (598%) age groups (Fig. 3B).

## Thyroid Cancer

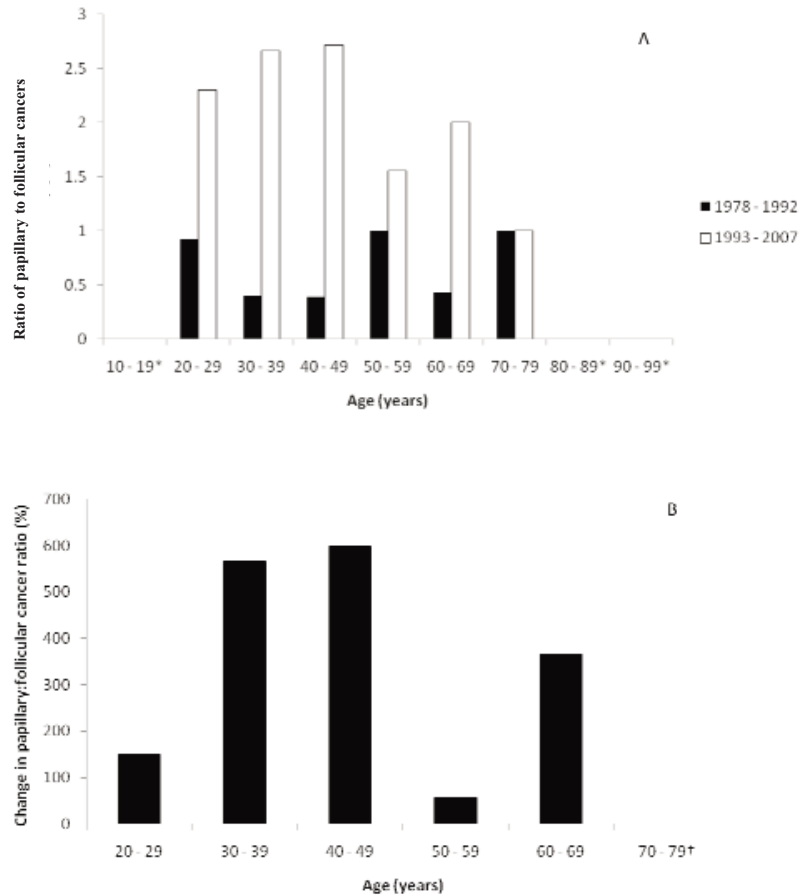


Fig. 3: (A) Ratio of papillary to follicular thyroid cancers by age group, Kingston and St Andrew, Jamaica, 1978–1992 and 1993–2007. (B) Percentage changes in papillary to follicular carcinoma ratio between two 15-year periods (1978–1992 and 1993–2007), by age group, Kingston and St Andrew, Jamaica.

\*No cases of follicular cancer were diagnosed in group II (1993–2007).

Figure 4 shows the distribution of the various histological subtypes of thyroid cancer in Group II, by age. Papillary carcinomas were seen in all age groups, and the greatest numbers of cases were seen in patients between the ages of 20 and 49 years. Follicular cancers were seen in all age groups between the ages of 20 and 79 years, and did not exhibit substantial variation across age groups. Medullary carcinomas were represented in all age groups under age 80 years and showed only minimal variation from one age group to the next. All thyroid cancers diagnosed in patients aged 10–19 years were either papillary or medullary in subtype.

## DISCUSSION

Across the globe, there has been documented stability, or slow (< 1%/year) increase, in the incidence of thyroid cancer (1). In some countries, the increase in thyroid cancer incidence is explained by population exposure to ionizing radiation, such as in Belarus and Ukraine following the

Chernobyl nuclear accident of 1986 (1); in other countries where there is an increasing incidence, the risk factors are uncertain (1, 6).

The incidence rates of thyroid cancer in KSA, Jamaica, have remained fairly stable over the past several years, with age standardized rates (ASRs) fluctuating between 0.3 per 100 000 (1993–1997) and 1.3 per 100 000 (1978–1982) in males and 2.2 per 100 000 (1988–1992) and 3.8 per 100 000 (1978–1982) in females, over the 30-year period of this study (5, 7–11). The most recent incidence rates (2003–2007) are 1.2 per 100 000 (males) and 3.2 per 100 000 [females] (11). The relatively stable incidence rates are not surprising, since there has been no documented exposure of the Jamaican population to substantial doses of ionizing radiation.

The male to female incidence ratio of 1:2.7 seen in the KSA data is consistent with the worldwide thyroid cancer male to female incidence rate ratio of 1:2–3 (1).

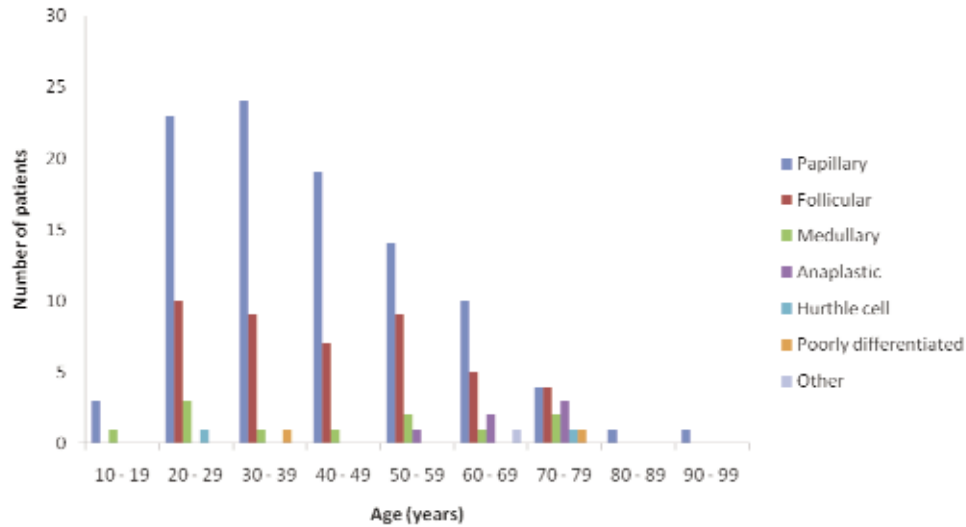


Fig. 4: Frequency of histological subtypes of thyroid cancer by age group, Kingston and St Andrew, Jamaica, 1993–2007.

### Papillary carcinoma

Papillary carcinoma is the commonest thyroid cancer subtype seen worldwide (1) and in countries in which there has been a notable recent increase in thyroid cancer incidence following radiation, the increase has occurred primarily in the papillary cancer subtype (1, 6). In other countries with increasing thyroid cancer incidence, but without documented significant ionizing radiation exposure, the increase has also been attributed to increased numbers of papillary cancers. In some of these latter countries, the increase has been explained by the increased detection of small, subclinical papillary cancers (6), but in others, the reasons for the increase in papillary cancers remain obscure (1, 6).

Although there has been no increase in thyroid cancer incidence in KSA, there was a significant increase in the papillary to follicular cancer ratio over the 30-year study period, with papillary cancers replacing follicular cancers in recent years as the commonest thyroid cancer subtype. We believe that this change has occurred as a result of the gradual recognition over the last several years of the entity follicular variant of papillary carcinoma, first described by Chen and Rosai in 1977, and first recognized by the World Health Organization (WHO) in its 1988 classification of thyroid tumours (12). Prior to Chen and Rosai's description of this entity as a variant of papillary carcinoma, these neoplasms would have been diagnosed as follicular carcinomas, resulting in high numbers of follicular and low numbers of papillary cancer. Other studies have also documented increased numbers of papillary cancers over a time period similar to that reported in this study, and have also partially attributed the increase to the change in histological criteria for papillary cancer diagnosis (13).

The age distribution of papillary cancer in recent years in KSA is consistent with that reported worldwide, where the disease is commonest in the third to fifth decades of life (14).

### Follicular carcinoma

Worldwide, follicular cancers have been reported as the second commonest histological subtype of thyroid cancer (1). The most recent KSA thyroid cancer data (Group II patients in this study) are consistent with this finding. Whereas follicular cancers worldwide exhibit peak incidence in the fifth and sixth decades (14), in the KSA data, there was no age group that appeared to exhibit substantially greater numbers than other groups. The reason for the difference between our age distribution pattern and that reported elsewhere is uncertain.

### Medullary carcinoma

The proportion of thyroid carcinomas comprising the medullary subtype increased from the first 15-year period to the second, with an increase in ranking from fifth place to third. This is consistent with the third place ranking of medullary carcinoma reported globally (1).

The increase in numbers of medullary carcinoma in the second period of this study is unlike that documented elsewhere, where there has been no significant change in medullary carcinoma incidence (6, 13). The reason for this difference is uncertain, but given the fact that this increase is concomitant with a decrease in numbers of anaplastic carcinomas, it is possible that anaplastic variants of medullary carcinoma (15) may have been classified as anaplastic rather than medullary carcinoma in the earlier period, resulting in lower numbers of medullary and greater numbers of anaplastic carcinoma.

Medullary thyroid carcinomas may be sporadic or familial. Cases of the latter may occur as Familial Medullary Thyroid Carcinoma (FMTC), or as a part of Multiple Endocrine Neoplasia (MEN) Type 2A or 2B. Sporadic and FMTC cases show peak incidence in the fifth and sixth decades (14), while patients with MEN 2 generally present with medullary thyroid cancer at younger ages, including childhood (14). As we did not have access to patients' clinical records to verify whether medullary cancer cases were sporadic or familial, we are unable to comment on the age distribution of medullary cancers in KSA.

## CONCLUSION

Although the incidence of thyroid cancer in Kingston and St Andrew, Jamaica, has remained fairly stable over the last several years, there has been a change in the histopathologic profile in recent years, with papillary cancers surpassing follicular cancers to become the commonest subtype, and medullary carcinomas surpassing the anaplastic and Hurthle cell subtypes to become the third commonest. This gives the histopathology of thyroid cancers in Jamaica a current profile that is similar to that described on a global scale, with papillary carcinomas being the commonest, followed by follicular and then medullary carcinomas.

The significant change in the papillary to follicular cancer ratio in our data is most likely the result of the gradual recognition amongst pathologists over the past several years, of the follicular variant of papillary cancer. We are unable to adequately explain the increased numbers of medullary carcinomas documented in recent years.

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