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A study on the relationship between age and incidence rate of thyroid cancer in Sri Lanka

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Thyroid cancer is reported as the most common endocrine cancer with a continuously increased incidence rate across the world with a few exceptions in countries like Sweden and Norway. Literature reveals different opinions on likely causes for the rise in observed incidence. These include advancement in diagnostic tools as well as changes associated with reproductive and hormonal risk factors. This study aimed at modelling the relationships between gender specific thyroid cancer incidence rate and age. Hormonal changes in the body are closely linked to age and gender. Thus, the developed models improve the ability to assess the variation of thyroid cancer incidence associated with hormonal changes. This study used the age specific thyroid cancer incidence rates for 5 year age groups published by the National Cancer Control Programme, Colombo, Sri Lanka for the period from 2005 to 2010. The age groups of 0 to 4 years and 5 to 9 years were different from the rest of the age groups, had minimal incidence and were excluded in this analysis. Scatter plots of incidence rate against age indicated abrupt changes in the incidence as well as clustering of ages with respect to the relationship between the two. This led us to choose break-point regression analysis. Several models fitted equally well to each of the two gender groups. Among these, based on goodness of fit criteria and practicality, a model with a quadratic component in age and year as breaking variables and a linear component in age as a non-breaking variable was identified as best for thyroid incidence in females. The selected model for females indicated two abrupt change points at ages of 22 years and 42 years resulting in three distinct age groups. For males, a model with linear components in age and gender as breaking variables was selected and three change points were identified at ages 23 years, 43 years and 50 years resulting in four distinct age clusters. The non-accessibility of readily available data on thyroid cancer incidence in Sri Lanka related to recent years adds on a shield to the strengths of the findings of this work. Nonetheless, we firmly believe that the findings of this preliminary study will be useful for designing future research studies in this area.

Keywords: Break point, break point regression analysis, incidence, incidence rate