Original Article

Trends of endometrial cancer incidence in Sri Lanka from 2011 to 2020: An analysis of annual national cancer incidence data reports

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Abstract

Introduction: The incidence of endometrial cancer in low-income countries is rising at a rapid rate. This could be due to changes in risk factors and socio-economic transitions occurring in developing countries. The main aim of this study was to assess the changes in endometrial cancer incidence in Sri Lanka. **Materials and Methods:** Incidence data for uterine corpus cancer and endometrial cancer between 2011 and 2020 were extracted from the National Cancer Register of Sri Lanka. This included the crude rate, age standardised incidence rate, and age-specific incidence. Joinpoint trend analysis software was used to analyse the temporal pattern of incidence. The estimated annual percentage change of incidence (EAPC) was calculated. **Results:** A total of 8332 patients with uterine corpus cancer were reported with the highest incidence in the 60–70-year-old age group. The EAPC of uterine corpus cancer was 9.26%, while it was 8.26% for endometrial cancer. The highest rise of age-specific incidence was observed in the 70 years plus age group (EAPC 13.3968%, 95% confidence interval (CI): 9.6916–17.1994). **Conclusion:** There is a clear rise in endometrial and uterine cancer incidence in Sri Lanka. While part of this could be due to better reporting of new cases, a true increase in incidence should have occurred due to different rates of EAPC among age categories. Studies to evaluate the factors leading to the rising incidence of endometrial cancer are recommended.

Keywords: Endometrial cancer, incidence, rising, South Asia, Sri Lanka

Introduction

Endometrial cancer (EC) is the second most common gynaecological cancer worldwide. Since a vast majority of uterine cancers are due to ECs, incidence data on uterine corpus cancer would be referred to as a proxy indicator of EC incidence in this article. With 417,367 new cases and 97,370 deaths in 2020, uterine corpus cancer is the sixth most common cancer in women representing 4.5% of cancers. The age standardised incidence rate (ASR) of uterine corpus cancer/EC is more than three times higher in developed countries compared to low-income nations. However, the incidence of these cancers has been rising at an alarming rate in low-income countries in recent years.[1,2] The annual percentage rise (APR) of EC varies significantly in different regions of the world. An analysis of EC incidence data from 1978 to 2007 among 42 countries demonstrated an APR ranging from (−)3.3 to +11.3.[2]

Unopposed oestrogen exposure due to obesity, polycystic ovary syndrome, infertility, anovulation, early menarche, infertility and late menopause are known to be associated with EC. In addition, increased life expectancy seems to be a contributing factor towards rising incidence.[3–6] With rapid socio-economic transitions, some countries might face an unfavourable increase in EC morbidity, causing a significant burden on health care services.

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The Sri Lanka National Cancer Control Program (NCCP) collects nationwide cancer data from all cancer treatment centres, major state and private hospitals and pathology laboratories. All the cancers are classified according to International Classification of Diseases (ICD) 10 system. It is estimated to cover of more than 80% of the malignancies diagnosed in Sri Lanka.[7,8] Since the majority of surgical treatment and adjuvant treatments for ECs happen in the main government hospitals and a few major private hospitals, coverage probably exceeds 80% for endometrial malignancy.

The main objective of this study was to assess the trends of EC incidence in Sri Lanka over a decade (2011–2020) and to compare them with international data.

Materials and Methods

Annual cancer incidence data published by the NCCP between 2011 and 2020 was referred to. All the documents classified cancers according to site by ICD 10 classification. EC cases were included under ICD C54 (uterine corpus cancers) and ICD C55 (uterine cancer, not otherwise specified). Uterine cervix cancers were reported separately under ICD C53.

Incidence data for uterine cancer (ICD C54 and ICD C55) between 2011 and 2020 were extracted from the annual cancer incidence data reports published by NCCP. These annual reports included crude rate incidence (CR) data, ASR data and age-specific incidence data. ASR is a weighted mean of the age-specific rates, where the weights are taken from a standard population. The World Health Organisation (WHO) age-standardised population was used by the NCCP to calculate ASR for 100,000 population. ASR makes it easier to compare data between populations of different age distributions. We extracted the incidence of carcinoma of the endometrium from the annual reports where histological subcategorization was available.

Ethical clearance was obtained from the ethics review committee of Castle Street Hospital for Women, Sri Lanka (ERC/326/08/2023).

Statistical analysis

Joinpoint trend analysis software was used to analyse the temporal pattern of incidence. Joinpoint regression analysis identifies points where a statistically significant change in trend has occurred over time. A joinpoint is where two lines of different trends are connected together. The user sets the minimum and maximum number of joinpoints allowed and the software selects the simplest model suitable for the data provided. The Monte Carlo Permutation method is used to test the significance of the joinpoint models. A maximum of three joint points were set for the analysis. To assess the magnitude of the change in incidence, an estimated annual percentage change (EAPC) is calculated. The *P*-value was set at <0.05 to identify a significant change of EAPC.

Results

Crude incidence rate data, ASR incidence data and age-specific incidence were available for the ICD C54 and ICD C55 categories in all reports. Except in the 2012, 2013 and 2014 annual reports, all other documents subcategorized uterine corpus cancer incidence according to histological diagnosis. However, age-specific incidence data were not available for each histology group.

A total of 8332 patients with uterine corpus cancer were reported between 2011 and 2020, while 5695 belonged to the EC category (excluding 2012, 2013, and 2014). There were 6458 uterine corpus cancers when the data from 2012, 2013, and 2014 were excluded. Therefore, 88.2% (5695/6458) of the uterine corpus cancers were ECs. Age-standardised incidence rates for uterine corpus cancer and EC are shown in Table 1.

When age-specific incidence rates of uterine corpus cancer were analysed, the highest incidence was reported in the 60–70-year-old age group in all the years. Overall, all the age groups demonstrated a rising incidence of uterine cancer. Details of age-specific incidence rates are shown in Table 2.

Trends of ASR of cancer of the uterine corpus/EC and age-specific incidence rate of uterine corpus cancer were assessed by joinpoint analysis and data are shown in Table 3 and Figures 1–3.

Discussion

Sri Lanka is a lower-middle-income country with a population of 22 million and a per capita annual income of 3354 US dollars.[9] The Sri Lankan government health care system provides both curative and preventive services free of charge to all citizens. While there are small to large-scale private health care facilities, their contribution to in-patient care remains around five percent.[10] Due to the extremely high cost, treatment for cancer in Sri Lanka is mainly provided through government facilities. Therefore, rising cancer incidence would indefinitely put more strain on the government health service.

Table 1: Incidence (cases per 100,000) of uterine corpus cancer and EC from 2011 to 2020

Year	UCC cases	EC cases	CR UCC	ASR UCC	EC ASR	Female population
2011	411	373	3.9	4.1	3.7	10511000
2012	546	-	5.2	4.4	-	10502000
2013	668	-	6.3	5.2	-	10619000
2014	660	-	6.2	5.1	-	10718000
2015	771	675	7.1	6.0	5.3	10817726
2016	977	904	8.9	7.5	6.9	10937361
2017	1008	890	9.1	7.6	6.7	11061978
2018	1020	891	9.1	7.6	6.6	11178049
2019	988	845	8.8	7.4	6.3	11246756
2020	1283	1117	11.4	9.6	8.4	11306763

UCC=Uterine corpus cancer, EC=Endometrial cancer

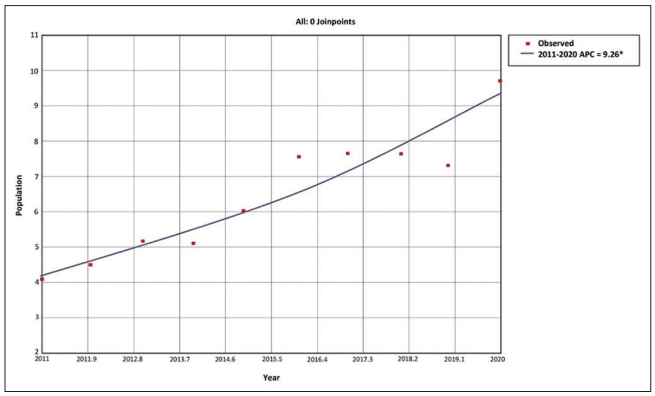

Figure 1: Trends of ASR of uterine corpus cancer – joinpoint analysis

Table 2: Age-specific incidence (cases per 100,000 population) of cancer of the uterine corpus from 2011-2020

	<40 years	40–50 years	50–60 years	60–70 years	70+ years
2011	1.6	7.8	30.6	45.5	30.1
2012	4	7.9	29	49.2	32.1
2013	3.2	9.5	36.5	54.6	43.6
2014	2.4	7.7	37.5	59.5	40.3
2015	3	11	42	71.5	41.2
2016	7.8	11.6	51.5	85.1	60.4
2017	3.7	15	51.6	84.8	65.5
2018	5.3	12.5	43.7	93.4	68.9
2019	4.6	15.8	41	84.3	74.1
2020	6.1	17.5	54	109.2	99.5

Table 3: Age-specific EAPC of uterine corpus cancer incidence

Age category (in years)	EAPC of incidence	Upper confidence interval	Lower confidence interval
<40	11.1177*	1.8206	21.0707
40–50	9.8829*	6.9384	12.8893
50–60	5.7593* (average)	1.0332	10.8113
60–70	9.8959*	7.6555	12.1995
>70	13.3968*	9.6916	17.1994

*Indicates that EAPC is significantly different from zero with alpha=0.05

Currently, there are 24 government cancer treatment centres in Sri Lanka.[11]

In 2020, the highest ASR of uterine corpus cancer was reported in North America at 21.1 cases per 100,000 with Eastern and Northern European countries closely following behind. While Southeast Asia reported an ASR of 6.6 per 100,000, Eastern/Middle Africa and South Central Asia reported the lowest incidence at a rate of less than three cases per 100,000.[1] However, currently, there is a worldwide rise in the incidence of EC. It is interesting to see that the highest rise is demonstrated among the nations with historically low rates. While South Africa, Japan, Brazil and India were known to be countries with a low incidence of EC, they were reported to have the highest rise in incidence globally.[2] The rapidly ageing population could

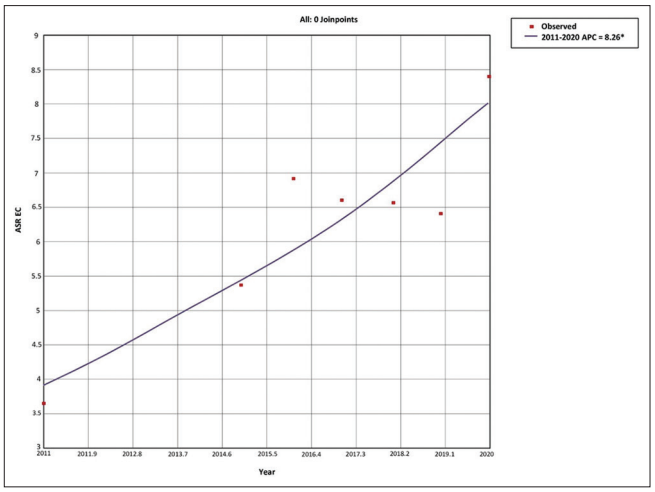

Figure 2: Trends of ASR incidence of EC – joinpoint analysis

have contributed to the rising incidence in Japan, whereas the rapidly changing socio-economic landscape and changes of lifestyle-related risk factors might be responsible for the trends seen in other countries.

The situation in Sri Lanka seems to be not much different. In 2011, the ASR of uterine corpus cancer was 4.1 per 100,000, which corresponds well with regional countries such as India and Thailand.[2] Overall, there has been a steady rise in the ASR of uterine corpus cancer and EC between 2011 and 2020. ASR of uterine corpus cancer increased by 234% during this period. According to our study, the EAPC of cancer of the corpus of the uterus and EC in Sri Lanka is around 9% and 8%, respectively. At this rate, the incidence of EC would double before 2030. With very limited human and physical resources, our health services would face significant challenges in providing suitable care for these patients.

While a proportion of the rising incidence of endometrial/uterine corpus cancers could be due to better reporting of new cases, a true increase in cancer cases should have occurred. The EAPC of age-specific incidence ranged from 5.7593 to 13.3968. A rise in incidence only due to better reporting would not explain this significant variation of EAPC. Another reason for this observation is the isolated, relatively statistic incidence of uterine corpus malignancies in the 50–60 year age groups between 2016 and 2020, with a persistent rise in all other age groups. This might indicate different risk factors acting at different proportions at different ages.

The association of obesity and metabolic syndrome with EC is well established.[4-6] Fat cells are able to produce oestrogen by aromatisation of androgens and become the most prominent site of oestrogen production in post-menopausal women. In addition, the level of sex hormone-binding globulin is reduced with increasing levels of adipose tissue. Therefore, both of the above mechanisms ultimately increase oestrogen levels in the body. Furthermore, adpokines secreted from adipose tissue have proliferative effects on the endometrium.[12,13] Adipokines are

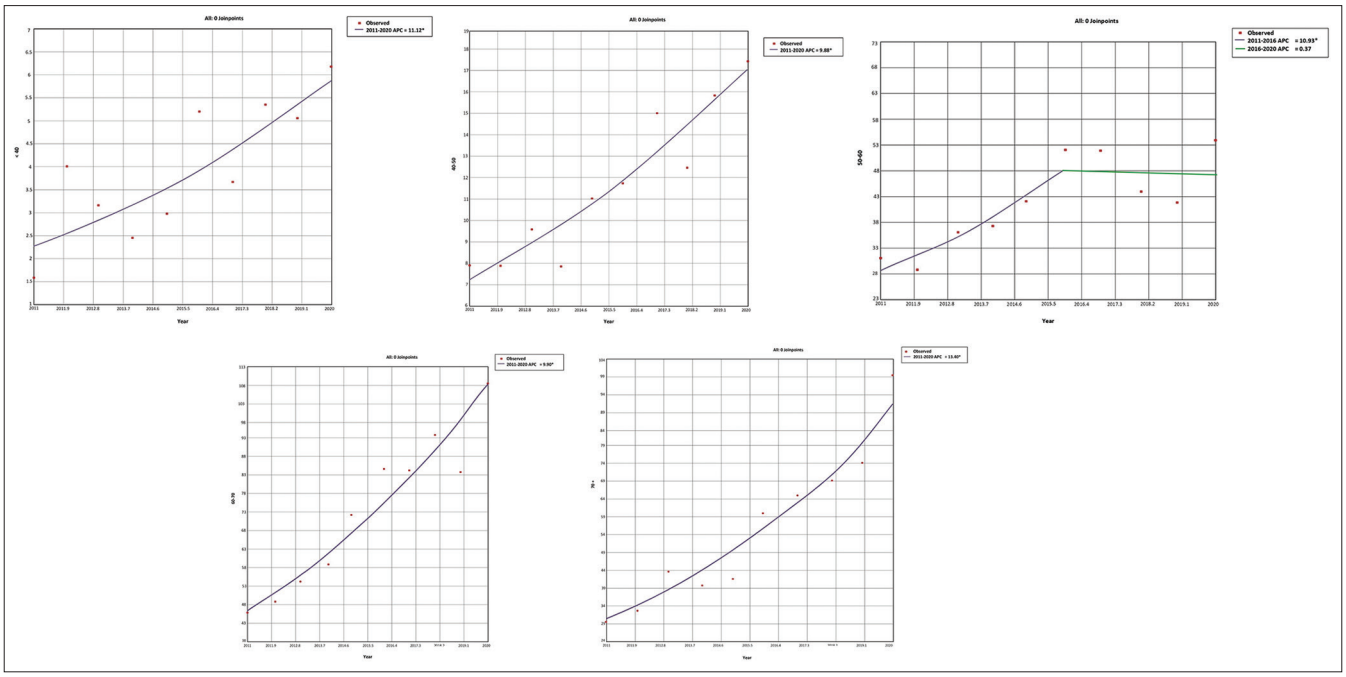

Figure 3: Age-specific incidence rate of uterine corpus cancer – joinpoint analysis

thought to be independently associated with an increased risk of EC.[14] While diabetes is associated with obesity, its relation with EC seems to be mutually exclusive.[15,16] Insulin and insulin-like growth factor I are known to promote the proliferation of the endometrium.[17,18] This might explain the possible independent relationship between diabetes and EC.

The rising prevalence of obesity and diabetes in Sri Lanka might explain this massive rise in EC. Abdominal obesity among adults in urban Sri Lanka is around 58% and females have shown a higher prevalence compared to males.[19] The Sri Lanka Health and Ageing Study in 2018/2019 has reported the prevalence of diabetes in women to be 25.5% with the highest crude prevalence between 60 and 69 years of age at 43%.[20] This figure is significantly higher than the 13.5% prevalence of diabetes in women reported in 2005.[21] This, rise of metabolic risk factors among Sri Lankan women could be responsible for the increasing incidence of EC.

The Sri Lankan population structure is currently at a rapid transition due to a reduced fertility rate and an increased life span. The fertility rate in Sri Lanka has declined from a high 5.5 to the current 2.0 over the last 60 years and the life expectancy at birth for a female has increased to 80 years.[22,23] The age at first childbirth in Sri Lankan women has increased to 26 years, which is probably due to better education and occupational opportunities.[24] This invariably increases endometrial oestrogen exposure, which is a well-known risk factor for EC. In our study, the highest rise age-specific incidence was observed in 70 years plus age group, which could be explained by the ageing of the population. In addition, reduced fertility rate and obesity can increase the risk of EC among young women. In our study, the second highest rise of uterine corpus cancer was observed in the less than 40-year-old age group.

This study was conducted using the incidence data published by the NCCP of Sri Lanka and we did not have access to individual patient data. Therefore, we could not comment on other important parameters such as the stage of the cancer at diagnosis, parity, co-morbidities and racial/geographic distribution. Also, we could not analyse the age-specific EAPC for EC since only age-specific incidence data for uterine corpus cancer was available. We identify this as a limitation of our study. In addition, histology diagnosis was not available for 2012, 2013 and 2014. Therefore, we did not have incidence rates for EC in these years, which is another limitation of our study. The NCCP cancer register did not receive information on all the new cases of cancer diagnosed in Sri Lanka and there is probably increased reporting of cases over time. This is also a limitation of our study since part of the increased incidence over time could be due to better reporting.

In conclusion, the incidence of EC is increasing at a very rapid rate in Sri Lanka. While some proportion of the rising incidence could have been due to better reporting of cancer cases, the current ASR is as much as three times the incidence of some of the South Central Asian countries.[1] The ageing population, change of fertility and rising metabolic risk factors could have probably triggered this rise and would have caused significant challenges to health services. Therefore, health policymakers should focus on preventive strategies as well as should be prepared to provide suitable diagnostic and curative services to patients with EC. Further studies to evaluate the reasons behind the rise in the incidence of EC are suggested.

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Conflicts of interest

There are no conflicts of interest.

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