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Original Research

Oral cancer burden in Sri Lanka- 2005 to 2019: does it differ with site and sex?

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Abstract

Introduction: Oral cancer is the commonest cancer among Sri Lankan males for decades.

Objectives: To describe the sex difference in site specific cancers in oral cavity and to analyse the incidence trends according to sex, sites and age category of oral cancer in Sri Lanka between 2005 and 2019

Methods: Data on oral cancers were obtained from National Cancer Registry, Sri Lanka (NCR-SL) from 2005 to 2019. Sex difference for lip, tongue and mouth cancers were analysed. Analysis was performed with Joinpoint Trend Analysis Software on age standardized incidence rate (ASR) to examine the trends in sites, sex and age group categories over a 15-year period.

Results: Data of a total of 31 919 oral cancer patients (males: 24 982; 78.3%; females: 6937; 21.7%) were analysed. All three site specific sub types showed a higher incidence in males than females. ASR has increased over the 15-year period in both sexes. The proportional increase in incidence was higher for males (1.9-fold increase with ASR; 9.8 to 18.9, average annual percentage change (AAPC) of 5.4; 95% CI: 4.1, 6.7) than females (1.55-fold increase with ASR; 2.9 to 4.5, AAPC of 3.1; 95% CI: 1.8, 4.5; $p<0.001$ for trend). A statistically significant increasing trend was detected in all three types according to anatomical sites and in both sexes with a higher proportional increase in lip cancers (AAPC of 10.5; 95% CI: 5.9, 15.3 in males; AAPC of 6.9; 95% CI: 1.5, 12.6 in females; $p<0.05$ for trend). An increasing trend in ASR was detected for all age categories. The rate was higher in less than 40 years age groups in both sexes (AAPC of 6.5; 95% CI: 3.3, 9.8 in males; AAPC of 7.8; 95% CI: 3.4, 12.4 in females; $p<0.05$ for trend).

Conclusions & Recommendations: The incidence of oral cancer in Sri Lanka has shown an increasing trend with a greater proportional rise in males. It showed a higher incidence in males than females in all three subtypes. Structured prevention, screening and early detection programmes have to be planned to reduce the burden of oral cancer in Sri Lanka.

***Key words**: oral cancer, trend, age category, risk factors*

Introduction

In Sri Lanka, oral cancer involving mainly lips, tongue and mouth (ICD 00-ICD 06) were the commonest cancers among Sri Lankan males and it became the second leading cause of death among males with cancer over the last few decades (1).

This is a preventable cancer if identified at an early stage. Differences in the pattern of oral cancer worldwide reflect variations in the prevalence of specific risk factors within the regions. Cancers of the lip and oral cavity are highly prevalent in South Central Asia (e.g., India, Sri Lanka, Pakistan) as well as in the Melanesia region (Papua New Guinea reports the highest incidence rate worldwide in both sexes) (2).

According to GLOBOCAN estimates, the number of new oral cancer cases globally (C00- 06) in 2020 was 377 713 (males 264 211 and females 113 502) with ASR 4.1 per 100 000 population (male: 6.0 per 100 000; female: 2.3 per 100 000) (2). In year 2020, the ASR was highest in Melanesia region with 22.2 per 100 000 males and 11.9 per 100 000 females. In South Central Asian region, 174 448 new cases (males: 130 725; ASR=13.3 per 100 000 population; females: 43, 723; ASR=4.6 per 100 000 population) were reported (2). According to latest statistics, ASR for oral cancer incidence in males in Sri Lanka is 18.9 per 100 000 population in 2019, which is only second to the highest rate reported in Papua New Guinea (1-2). The total number of deaths in the South-Central Asia due to lip and oral cavity cancer in 2020 was 98 015 (72 311 males) (2). The Sri Lankan oral cancer burden was estimated by the ASR, incidence cases and crude rates and is published yearly in the NCR-SL by the National Cancer Control Programme (NCCP). Data are collected from government and private sector cancer treatment centres, oral maxillofacial surgery units and pathology laboratories. These facilities have been gradually increased over the years facilitating the improvement of data collection (1). A regression analysis conducted using five yearly published oral cancer incidence data in NCR-SL for the years 1985-2005 period reported a significant reduction of 1.9% per year (3).

As per the aetiology of oral cancer, the global and regional literature revealed the tobacco use, especially of smokeless tobacco, arecanut consumption and alcohol use. Alcohol is frequently acts in the presence of poor diet and poor oral health (3-5). Arecanut is a substance which contains known carcinogens and induce several cytotoxic effects in oral cells (5). The tobacco use in the form of smokeless tobacco and smoking and the poor socio-economic backgrounds and certain risk occupational status are identified as associated risk factors for oral cancer in Southeast Asian countries including Sri Lanka (6-7). High incidence rates in Eastern and Western Europe, Australia and New Zealand have been linked to alcohol consumption, tobacco smoking, HPV infection (for cancers of the oropharyngeal region) and to ultraviolet radiation from sunlight exposure (for lip cancers) (8-10).

Smokeless tobacco is consumed predominantly in Sri Lanka by chewing it as an ingredient in betel quid containing tobacco, arecanut, lime and betel leaves (11). Smokeless tobacco preparations are available as, packaged pan masala or gutkha, a chewable tobacco containing arecanut. These products are shown to be primary carcinogens for oral cancer and is commonly used among younger age groups in Asian countries (4-5). The use of commercially available blends of pan masala and gutkha is increasing, not only among men, but also among children, teenagers and women (3-4) Smokeless tobacco consumption among Sri Lankan men and women are 26% and 5.3%, respectively in 2015 (12).

The majority of oral cancers are squamous cell carcinomas. They occur from pre-existing longstanding lesions, now termed 'oral potentially malignant disorders' (OPMD). Oral sub mucous fibrosis, leucoplakia, erosive lichen planus are common OPMDs in South Asia. The same etiological factors for OPMDs cause oral cancers with prolonged duration (13). The Sri Lanka screening program has introduced identification of OPMD stage.

A considerable economic burden is reported due to oral cancers as the bread winners of the families are mostly affected with in certain occupation groups (7).

Ministry of Health has identified the gravity of this public health problem, where surgical and preventive management have been provided free of charge at the point of delivery (14). In this backdrop, oral cancer is still reported at a high rate in Sri Lanka compared to the South -Central Asian region.

An expert review by the integrated mission of Programmes of Action for Cancer Therapy (imPACT) took place in 2019 has recommended a comprehensive national programme for management of this deadly but preventable disease (15). The National Strategic Plan developed by NCCP has included several strategies to promote early detection, timely access to services and increasing screening opportunities for common cancers including oral cancers (16). Therefore, there is a necessity of analysing oral cancer incidence data utilizing published data in NCR-SL to be used for policy making and programmatic planning. The present study aims to describe the sex difference of site-specific cancers in oral cavity in Sri Lanka during 2005-2019 and to analyse the trends of oral cancer incidence rates according to sex, anatomical sites and age category in Sri Lanka.

Methods

Oral cancer related details of all patients diagnosed between 1 January 2005 and 31 December 2019 were extracted from NCR-SL published by the NCCP (1). The classification of oral cancer was based on ICD-10 system. Lip and oral cavity, which includes lip (C00), tongue (C01 and C02), gum (C03), floor of mouth (C04), palate (C05) and other unspecified parts of mouth (C06) were included into this analysis. According to the classification, C04 to C06 were taken as cancer of the mouth.

Crude incidence rates (CR) for cancers in oral cavity according to anatomical sites (lip, tongue and mouth) available in cancer registry were extracted for 2012-2019. Further, CR were calculated with row data for 2005-2011. Male: female ratio was calculated, and the sex difference was described.

Age standardized rates for total cancers in oral cavity and sub types according to anatomical sites were extracted/calculated for both sexes. Further, age group specific rates were calculated for three categories: <40 years, 40-59 years and 60 years or more. Joinpoint regression analysis was used to identify points where a statistically significant change over time in linear slope of the trend occurred (17). Analysis starts with the minimum number of joinpoints, and tests whether adding one or more joinpoints to the model becomes statistically significant. Joinpoint tests of significance use a Monte Carlo permutation method (18). In the final model, each joinpoint indicates a statistically significant change in trend, and an AAPC computed for each of those trends. Changes in direction or in the rate of increase or decrease were calculated with p values and p value<0.05 were considered as statistically significant. Regression analysis was performed using Joinpoint Trend Analysis Software (version 4.9.0).

Results

This analysis consisted of a total of 31 919 patients (males: 24 982, 78.3%) with newly diagnosed oral cancer over last 15-year period. The ranges of CR were 8.9-22.4 for males and 2.8-5.8 for females for oral cancer. For lip, tongue and mouth, ranges of CR among males were 0.21-2.4, 2.9-8.6 and 5.7-14.4, respectively. The corresponding values for females were 0.1-0.6, 0.2-1.7 and 1.9-4.0. Incidence of oral cancer in Sri Lanka was 3.6 times higher in men than women. In 2019, male: female ratio was 3.7:1, where male cases were 2170 and female cases were 583. All three sub types of cancers in oral cavity according to anatomical sites were rising in incidence throughout the time period in both sexes (Table 1). It revealed a higher incidence in males than females in all three sub types. Male to female ratio of lip cancers vary between 1.5 to 7.0 with median value of 3.0. Incidence of tongue cancers are 5.1 times higher in males than females. Regarding the cancers in mouth, males have more than 3.4 times higher incidence than females.

Trend analysis of the ASR in types according to three anatomical sites revealed a significant increasing trend for lip and mouth in both sexes over the time period. Tongue cancer also showed an increasing trend in both sexes which was statistically significant only in males (AAPC=3.8; 95% CI: 0.4, 7.3; $p<0.05$). Cancers of lip showed an increasing trend over the time period with the highest AAPC of 10.5 (95% CI: 5.9, 15.3) in males and 6.9 (95% CI: 1.5, 12.6) in females ($p<0.05$), compared to other two sites (Table 2). The Joinpoint trend graphs for anatomical sites are shown in Figure 1.

ASR of oral cancers for males in Sri Lanka has increased from 9.8 per 100 000 population in 2005 to 18.9 per 100 000 in 2019. It showed a 1.9-fold increase ($p<0.001$ for trend), with AAPC of 5.38 (95% CI: 4.1, 6.7). In females, ASR has increased from 2.9 per 100 000 in 2005 to 4.5 per 100 000 in 2019. There was a 1.55-fold increase ($p<0.001$ for trend), with an AAPC of 3.1 (95% CI: 1.8, 4.5). The joinpoint trend graphs for male and female are shown in Figure 2.

When considering the age group specific rates categories, it revealed a statistically significant increasing trend in males in all three age group categories from 2005 to 2019. However, a significant increasing trend was observed only in two age groups, below 40 and 60 or above years among females. Even though CRs are much lower comparing to other age groups, below 40-year age group revealed huge increasing trend in both sexes. Trend in males were higher than females in 40-59 year and 60 or above year age group categories. Increasing trend with a higher rate was detected in females than males in the less than 40-year age group category (females: AAPC=7.8; 95% CI: 3.4, 12.4; males: AAPC=6.5; 95% CI: 3.3, 9.8; $p<0.05$) (Table 2). Joinpoint trend graphs for age categories are shown as Figure 3.

Discussion

Based on the analysis of NCR-SL data from 2005 to 2019, the incidence of oral cancers appears to be increasing at a substantial rate. ASR for males and females showed a significant 1.9-fold and 1.5-fold increases respectively from 2005 to 2019. All three sub types according to anatomical sites showed a higher incidence in males than females. Trend analysis of age group categories as well as anatomical sites showed an increasing trend in both sexes in all three age group categories and sites from 2005 to 2019. The magnitude of the increasing trend differs with different age groups and the sites.

The higher prevalence of behavioural risk factors such as smoking, smokeless tobacco use, and alcohol use among males have contributed to the higher incidence among males (12, 19-20). According to the STEPS Survey (2015), current users of smokeless tobacco was higher in males (26%) than in females (5.3%) and more prevalent (37.3%) among 60-69-year age groups (12). Further the alcohol consumption among males are higher than females in all age groups (11-12). Male-dominated occupations such as fisheries industry, cultivation and bus driving, where smokeless tobacco usage as betel chewing is common might be a cause for higher incidence of oral cancers among males than females (21-22).

Male preponderance was reported in similar studies conducted in the Asian context (23-24). Higher incidence trend is reported among the Sri Lankan males. On the other hand, women in Netherland reported the higher trend of incidence than males due to increasing habits of smoking among them (25). This study observed a higher incidence among 60 year and above age group for both males and females. In Sri Lanka, being a country with an ageing population according to the Department of Census & Statistics, the incidence of many cancers is increasing including oral cancers in the older age groups than younger age groups (26). Similar trend patterns to our findings were observed in Asian countries; India and China over last two decades (23-24). A direct relation of increasing incidence of oral cancer with age was reported in India (23).

It is important to discuss the probable factors which may have contributed to the increasing trends. Increasing the exposure to major risk factors of oral cancer may be the first reason to be considered. The higher increasing trend in incidence in males than females may be due to the above-mentioned same

Table 1: Distribution of crude incidence rate per 100 000 population of sites specific cancer in oral cavity for both sexes

Year	Crude incidence rate of cancer														
	Lip			Tongue			Mouth			Oral			Total		
	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot	M	F	Tot
2005	0.3	0.1	2.4	2.9	0.7	4.3	5.7	2.0	2.9	8.9	2.8	3.1	62.3	73.4	0.9
2006	0.2	0.1	1.5	3.8	0.8	4.8	6.1	1.9	3.1	10.1	2.9	3.4	62.7	79.0	0.8
2007	0.3	0.1	4.0	3.5	0.7	5.1	6.12	2.1	2.9	9.9	2.9	3.4	63.8	72.2	0.9
2008	0.4	0.2	2.3	4.1	0.8	5.2	7.35	2.6	2.9	11.9	3.6	3.3	76.5	86.6	0.9
2009	0.4	0.2	2.4	4.7	0.9	5.1	7.82	2.9	2.7	12.9	4.0	3.2	77.4	87.7	0.9
2010	0.6	0.2	2.6	4.8	0.8	5.9	8.12	3.0	2.7	13.5	4.1	3.3	78.0	86.2	0.9
2011	0.7	0.2	3.6	4.9	0.2	30.3	8.98	2.6	3.5	14.5	2.9	5.0	80.6	86.7	0.9
2012	0.6	0.2	3.0	6.6	1.3	5.1	11.0	2.9	3.8	18.2	4.4	4.1	115.3	112.0	1.0
2013	0.6	0.2	3.0	6.1	1.3	4.7	11.0	3.0	3.7	17.7	4.5	3.9	114.0	114.0	0.9
2014	0.7	0.1	7.0	6.5	1.3	5.0	11.9	3.5	3.4	19.1	4.9	3.9	107.9	114.0	0.9
2015	0.9	0.4	2.3	7.3	1.4	5.2	13.5	4.0	3.4	21.7	5.8	3.7	137.1	139.0	0.9
2016	1.0	0.3	3.3	8.6	1.6	5.4	14.4	3.7	3.9	24.0	5.6	4.2	158.8	159.0	1.0
2017	0.8	0.2	4.0	8.2	1.7	4.8	13.0	3.4	3.8	22.0	5.3	4.1	150.4	152.0	0.9
2018	2.4	0.6	4.0	7.5	1.3	5.8	12.5	3.5	3.6	22.4	5.4	4.1	149.5	146.0	1.0
2019	1.0	0.2	5.0	6.3	1.3	4.9	13.2	3.7	3.6	20.5	5.2	3.9	140.6	151.0	0.9
Mean			3.4			6.8			3.3			3.8			0.9
Median			3.0			5.11			3.4			3.8			0.9

* M:F ratio for 1 female

risk factors (12, 19-20). Use of smokeless tobacco in the form of betel quid in Sri Lanka has been reported since ancient times as a cultural habit, especially among rural and disadvantaged groups (11, 19). The main mode of use is in the form of chewing betel quid containing tobacco, areca nut, lime and betel leaves. According to National Oral Health Surveys in 1994⁄95 and 2015/2016 in Sri Lanka, a declining trend in habits of BQ chewing was observed (27-28). Although the habit of BQ chewing has declined, other types such as commercially prepared tobacco and areca nut preparation are increasing among younger population. Meantime, alcohol use, which is a major risk factor for oral cancers, is increasing among general population where daily illicit liquor usage in socio-economically deprived groups is a common habit (12, 29). Per capita alcohol consumption in Sri Lanka has increased from 2010 to 2016 according to global status report (30). Additionally, other lifestyle factors like under nutrition, smoking (cigarettes, beedi) continued for long duration is contributing for the oral cancer burden (29). Though the betel chewing usage is declining the increasing use of commercially prepared smokeless tobacco, alcohol consumption and poor diet might be the causes of multifactorial aetiology for oral cancers end resulting an increasing trend of reported cases in Sri Lankan population.

The findings in this study is in contrast to the findings of the analysis of 1985-2005 for lip and oral cavity cancers (3). The two studies used two different analytical approaches. The earlier study used the simple regression for available five sets of data, whereas the present study used the Joinpoint analysis. Lifestyle changes with increasing risk

Table 2: Oral cancer incidence in Sri Lanka by gender, age group and anatomical sites with Joinpoint analysis of annual percentage change (AAPC)

	2005		2019		AAPC (95% CI)
Category	**No.**	**CIR[#]**	**No .**	**CIR[#]**	
Population covered					
Male	9,718,000	10,556,147			
Female	9,950,000	11,246,756			
Anatomical site of the cancer					
Male					
Lip	26	0.2	103	1.0	*10.5 (5.9, 15.3)
Tongue	286	2.9	669	6.3	3.8 (0.4, 7.3)
Mouth	551	5.7	1398	13.2	*4.5 (2.6, 6.4)
ASR		16.6		18.9	
Female					
Lip	11	0.1	27	0.2	*6.9 (1.5, 12.6)
Tongue	67	0.7	143	1.3	4.5 (-1.2, 10.5)
Mouth	202	2.0	413	3.7	2.3 (0.8, 3.8)
ASR		3.6		4.5	
Age group (years)					
Male					
<40	35	0.5	79	1.2	*6.5 (3.3, 9.8)
40-59	334	15.5	667	26.4	*5.7 (3.0, 8.5)
>=60	508	58.7	1194	100.2	*4.5 (2.6, 6.5)
Female					
<40	10	0.3	29	0.4	*7.8 (3.4, 12.4)
40-59	107	4.6	170	6.7	3.1 (-0.3, 6.6)
>=60	163	16.7	383	32.1	*3.3 (1.4, 5.2)

[#] Crude incidence Rate per 100,000 population; * AAPC is significant ($p<0.05$)

factors may have also contributed to the higher rates seen at present. Recent improvement of data reporting may have also contributed to the increasing trend observed in this study as Oral Maxi facial clinic centres increased from 4 in 2006 to 25 in 2019.

In the trend analysis, among the three age groups, highest AAPC was reported among 40-59 age group for both sexes. In high-incidence countries, such as India, high tobacco consumption that begins at a relatively young age undoubtedly contributes for high incidence of oral cancers (4). This could be a reason for higher AAPC in young (below 40) age group in Sri Lanka. Furthermore, young people with risk habits of smokeless tobacco with arecanut in packaged forms and increasing alcohol consumption could be contributing factors. Higher AAPC was detected among females in less than 40 years age group. Females in this age group may have favourable oral health seeking patterns than males in same age group as they have more access for oral health care programmes during their adolescent and

Table 3. Annual percent change and average annual percent change for age standardized rates, site-specific incidence rates and age specific incidence rates of oral cavity cancers in Sri Lanka, 2005-2019

Incidence rate		APC (95% CI) P value			
		Male		Female	
Age standardized rate		5.4 (4.1, 6.7)	5.4 (4.1, 6.7)	3.1 (1.8, 4.5)	3.1 (1.8, 4.5)
		<0.001	<0.001	<0.001	<0.001
Site specific rate					
Lip		10.5 (5.9, 15.3)	10.5 (5.9, 15.3)	6.9 (1.5, 12.6)	6.9 (1.5, 12.6)
		<0.001	<0.001	0.016	0.016
Tongue	(2005-2017)	6.7 (5.2, 8.3)	3.8 (0.4, 7.3)	4.5 (-1.2, 10.5)	4.5 (-1.2, 10.5)
		<0.001	0.026	0.16	0.16
	(2017-2019)	12.4 (-31.7, 12.5)			
		0.266			
Mouth	(2005-2016)	6.6 (5.4, 7.8)	4.5 (2.6, 6.4)	2.3 (0.8, 3.8)	2.3 (0.8, 3.8)
		<0.001	<0.001	0.006	0.006
	(2016-2019)	-3.0 (-10.9, 5.7)			
		0.455			
Age specific rate					
< 40 years		6.49 (3.3, 9.8)	6.49 (3.3, 9.8)	7.8 (3.4, 12.4)	7.8 (3.4, 12.4)
		0.001	0.001	0.002	0.002
40-59 years		5.69 (3.0, 8.5)	5.69 (3.0, 8.5)	3.1 (-0.3, 6.6)	3.1 (-0.3, 6.6)
		<0.001	<0.001	0.073	0.073
> =60 years		4.53 (2.6, 6.5)	4.53 (2.6, 6.5)	3.3 (1.4, 5.2)	3.3 (1.4, 5.2)
		<0.001	<0.001	0.002	0.002

Figure 1: Joinpoint trend graphs for oral cancer age standardized rates (ASR) of oral cancer incidence by anatomical sites for males and females in Sri Lanka, 2005-2019

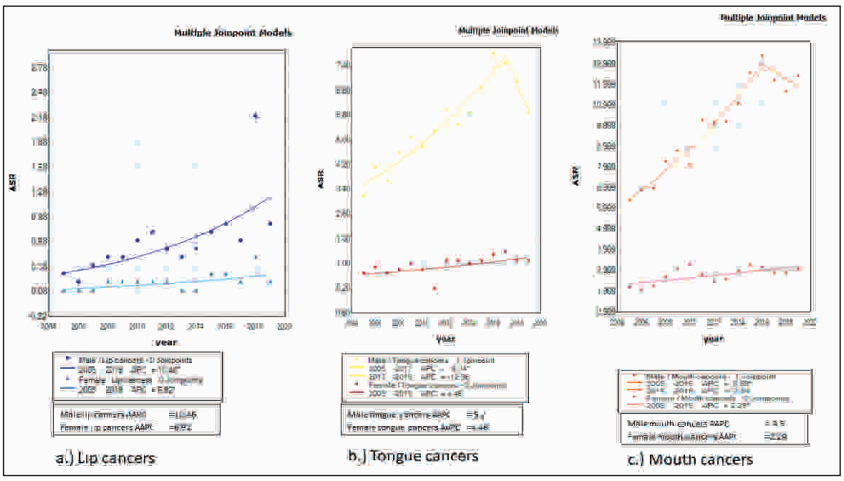


Figure 2: Joinpoint trend graphs for age standardized rates (ASR) of oral cancer incidence in males and females in Sri Lanka, 2005-2019

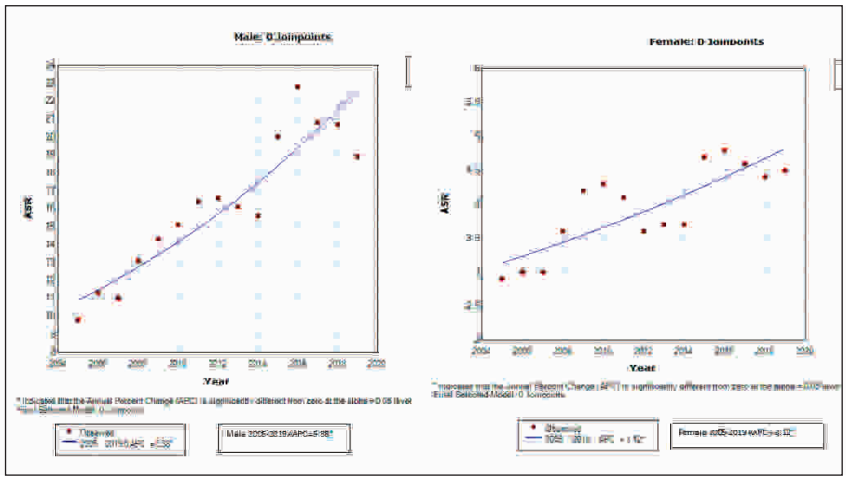
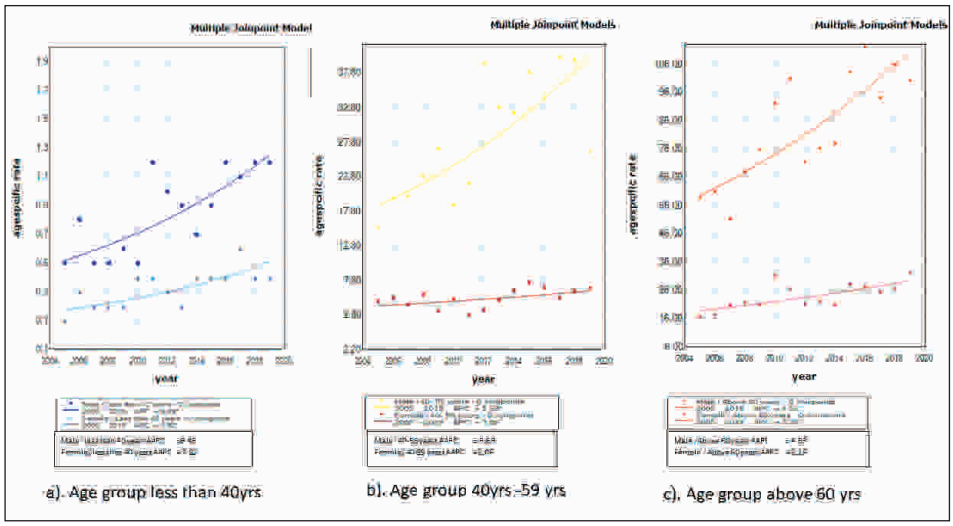


Figure 3: Joinpoint trend graphs for oral cancer incidence by age group categories for males and females in Sri Lanka, 2005-2019



pregnancy period. With the introduction of the antenatal oral health care programme in 2009, more lesions may have detected by the dental surgeons (31). Young males with higher job occupancy rates may have low attendance for routine check-ups (21). On the other hand, with the smaller number of cases in younger females, a small increase may give larger AAPC.

Sri Lankan government have initiated and is successfully implementing tobacco and alcohol reduction programmes. As an important step, in the year 2006, Sri Lanka enacted a National Authority on Tobacco and Alcohol (NATA) Act for comprehensive tobacco control. With NATA, in 2016, the Ministry of Health issued regulations prohibiting the manufacture, importation, and sale of smokeless tobacco products (32). In line with these laws, various social marketing campaigns might have caused a behavioural change leading to low consumption of betel chewing.

Burden of tobacco smoking and smokeless tobacco related cancer in Sri Lanka is significant (29). Morbidity, mortality and economic cost associated with oral cancers are enormous. It gives negative impact on both the healthcare system and families (7). The quality of life of the patients with late

presentations is affected by the surgical management, radiotherapy and chemotherapy. In order to mitigate socioeconomic effects of oral cancers, Sri Lankan health authorities have to prioritize the assessment of the related causes. Further prevention through oral cancer screening programmes with combined education on risky lifestyles should be conducted targeting high risk groups (33). It is an essential urgent need to strengthen the preventive and early detection strategies for oral cancers. Special emphasis should be given to high-risk categories such as the estate workers as a study has shown that workers in estate sector have high lifestyle risk factors which increase the risk of developing oral cancer (25). Well-planned structured programme for high-risk groups with referral pathways for screening should be established.

The strength of this study is the long-time span of 15 years that is confirming the increase of oral cancer in both sexes. As a limitation of the study, there may be under reporting of the cases as the data were based on hospital-based cancer registries than population based.

Conclusions & Recommendations

Oral cancers showed a higher incidence in males than females in all three sub types according to anatomical sites. A gradual increase in the incidence of oral cancers is observed in Sri Lanka during the time period of 2005 to 2019 by 5.4% and 3.1% per year in males and females, respectively. Presence of lifestyle risk habits mainly betel quid chewing; use of other forms of smokeless tobacco, arecanut and alcohol use with poor dietary patterns in low socio-economic background may have contributed to the trend. This trend analysis can be utilized in planning programmes to prevention and control with early detection of oral cancers by the health care planners.

Author Declarations

Competing interests: There are no competing interests by any of the authors.

Ethics approval and consent to participate: All the data in this paper are secondary data from Sri Lanka Cancer Registries from 2005-2019 without any identification at individual level. Ethical clearance for the methodology of cancer registry was obtained from the Ethics Review Committee of the Faculty of Medicine, University of Colombo through EC-10-106 on 22.11.2010.

Public Health Implications

- Oral cancer is the commonest cancer among males in Sri Lanka. The number of patients has been increasing over past 15 years.
- The burden affects the health system and individual families as well. The trend may be due to presence of lifestyle risk behaviours such as betel quid chewing with tobacco and arecanut, other smokeless tobacco and alcohol use. Urgent need for structured programmes focused on prevention and early detection to reduce oral cancer burden is advocated.

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Author contributions: All authors have contributed equally to the design the study; UP and AJ analysed the data and wrote the report. All authors contributed to the final draft and approved the final draft.

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