Cancer Esophagus Karachi 1995-2002:Epidemiology, Risk Factors and Trends

Y. Bhurgri (Karachi Cancer Registry, Aga Khan University Hospital, Sindh Medical College)
N. Faridi (Liaquat National Hospital)
L. A.G. Kazi (Dow Medical College)
S. K. Ali (Sindh Medical College)
H. Bhurgri (Aga Khan University Hospital)
R. Ahmed (Aga Khan University Hospital)
Muzaffar (Aga Khan University Hospital)
N. Kayani (Aga Khan University Hospital2)
A. Usman (Jinnah Postgraduate Medical Centre)
J. Malik (Liaquat National Hospital,Ziauddin Cancer Hospital)
A. Bhurgri (Karachi Cancer Registry,Sindh Medical College)
R.Ahmed (Aga Khan University Hospital)
S. Pervez (Aga Khan University Hospital2)
S. H. Hasan (Aga Khan University Hospital)

Introduction

Cancer oesophagus, ICD-10 (International Classification of Diseases 10th Revision) category C15 is a disease with a wide range of global variation in its incidence.1 In males the ASIR (Age Standardized Rates) ranges from 0.18 to 38.66 and in females from 0.17 to 26.5.2 Most world regions show a greater risk in males. Squamous cell carcinoma is the most common neoplasm of the esophagus worldwide. Major risk factors identified are low income, moderate/heavy alcohol intake, tobacco use, infrequent consumption of raw fruits and vegetables, exposure to nitrosamines, thermal irritation associated with salted hot beverages and disease conditions such as reflux, achalasia, Plummer-Vinson syndrome, Barrett's esophagus and celiac disease. 3-11

Cancer esophagus is common in developing countries; there are two geographical esophageal belts on the globe where the annual incidence is above 20/100,000 (Table). Most of these areas are mountainous, 1000 feet above sea level or more. The 'Asian cancer esophagus belt' comprises Mongolia, China, Kashmir, Iran, Turkmenistan and Quetta in Pakistan. The 'African cancer esophagus belt' comprises certain Eastern and South African countries viz. Kenya, Malawi and Botswana-Lesotho. In contrast, the incidence is much lower in Japan, US and Western Europe.

Table 1. Incidence and Gender Ratio of Cancer Oesophagus.

	Males; ASIR 100,000/year	Females; ASIR 100,000/year	Gender ratio M/F
Pakistan			
Karachi South	6.2	7.0	0.9
Quetta	25.5	23.4	1.1
High risk countries			
Eastern Asia			
Mongolia	24.46	19.55	1.3
China	24.51	10.92	2.3
South Central Asia			
Kashmir	43.51	27.9	1.6
Iran	24.07	21.19	1.1
Wastern Africa			
Malawi	38.66	26.54	1.5
Kenya	21.89	7.55	2.9
Shouthern Africa			
Botswan; Lesotho	37.25	10.82	3.4
Turkmenistan	26.45	20.38	1.3
Low risk countries			
Japan	9.98	1.57	6.4
Western Rurope	7.68	1.29	6.0
United States	4.92	1.37	3.6

Pakistan, the seventh-most populous country in the world, is a republic in south central Asia. It shares international geographical boundaries and cultural similarities with India in the east and southeast, Iran and Afghanistan on the west and northwest and China and Soviet Central Asian Republics in the north. This cross-cultural heritage is reflected in the emerging patterns of cancer in the country. The variation in the incidence is strongly reflected in the epidemiological pattern of cancers in Pakistan. The high incidence zone in Iran extends to Quetta and the medium incidence zone of esophageal cancer in India extends to Karachi. 12

The epidemiological cancer data for this article is from the Karachi South (KS) catchment area, of Karachi Cancer Registry (KCR), the oldest population-based cancer registry in Pakistan (1995-2002), a collaboration of International Agency for Research on Cancer and a member of the International Association of Cancer Registries. 13,14

Karachi is the largest city of Pakistan, capital of Sindh Province, located on the coast of Arabian Sea (latitude: 24 -56'-00" and longitude: 67 -01'-00"). It is divided into 5 districts, South, Central, West, East and Malir. Karachi South (KS), the southern-most district has a population of 1,724,915 with 929,394 (54%) males and 795,521 (46%) females.15 It includes all ethnicities of the country, namely Sindhis, Punjabis, Pathans, Baluchs and Mohajirs with a fair representation of all socio-economic categories. In the absence of a national cancer registration system, it qualifies as a sample population of the country. A profound effect of westernization is apparent in parts of this district, in stark contrast to an extreme cultural conservativeness in other parts.

Methods

Incident esophageal cancer cases recorded at the Karachi Cancer Registry during 1st January 1995 to 31st December 2003 were reviewed. For maximum completion of data, incident cases registered from 1st January 1995 to 31st December 2002 for Karachi South were included for analyses.

The data were classified using ICD-O2 (International Classification of Diseases-Oncology, 2nd edition) and computerized using a customized version of Canreg-3, with internal checks on the validity of the entered data.16 Manual and computerized validity checks for the cancer data were performed as per recommendations of International Agency for Research on Cancer (IARC) and International Association of Cancer Registries (IACR). This involved factors influencing comparability i.e. classification and coding. 17,18

Standardized incidence rate was calculated with an

[(0)]

[(1)]

[(2)]

external reference population, the 'world' population with a given 'standard' age distribution.19 'The standardized rate is the incidence rate that, theoretically, would have been observed if the population had a standard age distribution. The methodology applied was direct standardization. The rates given are the annual incidence per 100,000 population, averaged over the number of years for which data are presented'. Incidence tables were based on ICD-10. 1

Results

The Age Standardized Incidence Rates of cancer esophagus in Karachi South remained identical in 1995-1997 (ASIR 6.5/100,000) and 1998-2002 in males (ASIR 6.4/100,000) as observed in Figure 1. In females, a slight upward trend was observed in 1998-2002 (ASIR 8.6/100000) in comparison to 1995-1997 (ASIR 7.0/100000).

The mean age of cancer esophagus in males, 1995-1997 was 55.8 years (95% CI 53.4; 58.0) and in 1997-2002, it was 53.3 years (95% CI 51.0; 55.5). The mean age of cancer esophagus in females, 1995-1997 was 54.3 years (95% CI 52.1; 56.5) and in 1997-2002, it was 53.3 years (95% CI 51.0; 55.0).

The gender-ratio was 1 in 1995-1997 and 1.4 in 1998-2002. Age specific rates showed a gradual rise to a maximum in the 7th decade with an apparent decrease in risk subsequently in both genders (Figures 2 and 3). Cancer esophagus became apparent a decade earlier in the males and the earliest cases were observed in the 20-24 year age groups. In females the earliest cases were apparent in the 20-24 year age groups in the 1995-97 and 1998-02 data. In both genders, a marginal increased risk was observed for all age groups. The disease persisted as a predominantly grade 2, stage 3 disease at presentation, the predominant morphological pattern was squamous cell carcinoma in 90% of the cases. The topographic sub-categories were thoracic and cervical parts of esophagus in 70% of the cases. Adenocarcinoma, malignancies of other specified and unspecified morphology accounted for 10% of the cases. Histological verification was observed in 88.6% of the cases in 1995-1999 and 91.9% of the cases in 1998-2002.

Discussion

There is a moderately high incidence of cancer esophagus in Karachi. The ASIRs in males have remained stable during the last decade, but an upward trend is observed in females, suggesting a progressively higher exposure to risk factors in the latter. The incidence in Karachi is identical to most geographical areas of India. Studies from India have identified bidi smoking; paan chewing, paan and tobacco chewing, cigarette smoking, alcohol and nasal snuff inhalations as risk factors.8-11 Cultural and lifestyle characteristics retained by Indian migrants in Karachi are thus the probable determinants of the disease.

The practice of chewing rates are high in all socio-economic circles. A survey indicated 36% of

the males and 44% females in Karachi chew paan or paan with tobacco.20,21 The higher risk of cancer esophagus in Karachi females may reflect this observation. This habit is also intensely popular in 2nd and 3rd generation British migrant populations of the subcontinent origin from early childhood. 22

The high incidence of cancer esophagus in Quetta, reflects the ethnic, genetic and environment risk factors prevalent in northwest Pakistan. The risk factors in Karachi would have a negligible importance in this high incidence region, eg chewing (betel quid, areca nut, tobacco leaves) is not a prevalent habit. The ethnicity of the 'Baluch' residents of Quetta is similar to the population of Iran and Afghanistan and differs from the southeastern provinces of Pakistan with ethnic similarities to the Indo-Pak Subcontinent. The preponderance of cancer esophagus in Quetta maybe an indicator of environmental carcinogens, of probable dietary type, acting equally on both sexes (the gender ratio being equal).12 The staple diet of residents is meat cooked in animal fat. Popular meat types specific to this region are 'Landhi' dried meat pickled in salt and 'Surkol' meat cooked over charcoal or wood. Drinking hot salted tea 'kahwa' and exposure to dietary amines and nitrate appear to be other major risk factors, similar to Kashmir and Iran. 23-26

The oral use of 'naswar' is also a common custom with males and to a much lesser extent in the females. The use of naswar is widespread in Soviet Central Asia, Iran, parts of Pakistan (Baluchistan and Frontier province) and Afghanistan.27 It is composed of tobacco (50%), wood ash (20-30%), oil (10-15%) and sometimes lime (9-10%). The naswar used in Quetta is a green tobacco powder used for its anti-bactericidal (and addictive) effect. Males also partake of red or brown naswar as snuff. The risk maybe further compounded by consumption of opium residues.

Quetta has a close proximity to the Pakistan nuclear testing site. An excess esophageal cancer incidence near nuclear testing sites has been reported.28 However in Quetta a temporal sequence cannot be established. Apart from Quetta the only other high risk cancer esophagus zone in Pakistan was identified in Kohat. This region has ethnic, cultural and lifestyle pattern similarities with Quetta. Alcohol consumption is not a prevalent habit in any region of Pakistan, therefore not a major risk factor.

Conclusion

There is a moderately high incidence of cancer esophagus in Karachi. The ASIRs in males have remained stable during the last decade, but an upward trend is observed in females suggesting a progressively higher exposure to risk factors in the latter. There is a necessity to actively control proven risk factors and address the existence of other risk factors. The likely major risk factors in Karachi are use of all forms of tobacco, areca nut, paan and paan masala, infrequent consumption of raw fruits and vegetables and diet deficiencies. The primary recommended strategy for 'Cancer Control' would therefore be legislation and public health education against tobacco and areca nut in Pakistan. The risk factors of cancer esophagus identified in this article need to be further confirmed.

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Abstract

bjective: To study the trends of cancer esophagus in Karachi South during 1995-2002 and identify risk factors.

Methods: Incident esophageal cancer cases recorded at the Karachi Cancer Registry for Karachi South, during 1st January 1995 to 31st December 2003 were reviewed. For maximum completion of data, incident cases registered from 1st January 1995 to 31st December 2002 were included for final analyses.

Results: The Age Standardized Incidence Rates (ASIRs) of cancer esophagus in Karachi South for males were 6.5/100,000 (1995-1997) and 6.4/100,000 (1998-2002). In females the observed rates were 7.0/100,000 (1995-1997) and 8.6/100,000 (1998-2002).

Conclusion: In the moderately high incidence, cancer esophagus zone of Karachi, the ASIRs in males remained stable during the last decade, but in females, an upward trend was observed suggesting a progressively higher exposure to risk factors in the latter. The potential risk factors in Karachi are use of all forms of tobacco, areca nut, infrequent consumption of raw fruits and vegetables and diet deficiencies. There is a necessity to actively control the proven risk factors and address the existence of other risk factors. The primary recommended strategy for the control of cancer esophagus would therefore be legislation against tobacco and areca nut in Pakistan and public health education. The risk factors of cancer esophagus identified in this article need to be further confirmed (JPMA 54:345;2004).