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Gall bladder Cancer Incidence Trend over the time period in Bengaluru Population Based Cancer Registry (1982-2012)

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Abstract
Background: *Gall Bladder cancer has emerged as one of the frequent cancer among men and women in Bengaluru, with incidence increasing rapidly over the past two decades. Incidence has also been increasing in some of the registries across India. We conducted a study at Kidwai Cancer Institute.(KCI) to know the Gall Bladder cancer trend in Bengaluru population based cancer registry. The study is important because Gall Bladder cancer is having low screening facility and the prognosis is very poor.*
Materials and Methods; *Gall Bladder cancer (GBC) cases were drawn from data base of Bengaluru population-based cancer registry located at Kidwai Memorial Institute of Oncology which is functioning from 1982 under the network of National Cancer Registry Programme (ICMR). Age adjusted incidence rates were calculated. Time trends in age-standardized cancer incidence rates were analysed by using statistical tools like Joinpoint and Annual parentage Change over the study period, using relative change.*
Results: *The highest relative percentage change observed 228% in men from 1982-1990 to 1991-2000, similarly in females 266% change was observed between 1991-2000 to 2001-2012. Joinpoint regression showing from 1986 to 2012 significantly increased in GBC trend was observed in PBCR Bengaluru in segment 1 1982-1986. In Mumbai from 1982 to 1989, increasing trend- 13% annual percentage change was observed, after 1990 trend is stabilized. Similar trend was also observed in Delhi, Sikkim, Kamrup urban registries. Similarly increasing trend was observed in Females in almost all registries.*
Conclusion: *Gall Bladder cancer trend is significantly increasing in Bengaluru, also same trend is observed in other registries in India. The screening to diagnose at early stage is difficult and very poor prognosis is found in Gall Bladder cancer. Hence prevention is the only method to reduce the Gall Bladder cancers in India.*
Keywords: *Gall Bladder Cancer, Cancer trend,Comparison of Gall Bladder cancer trend in India, Kidwai Memorial Institute of Oncology.*

Introduction

There were 14.1 million new cancer cases, 8.2 million cancer deaths and 32.6 million people living with cancer according to GLOBOCAN estimation. The overall age standardized cancer incidence rate is almost 25% higher in men than in women, with rates of 205 and 165 per 100,000, respectively. Male incidence rates vary almost

five-fold across the different regions of the world. Gall Bladder cancer (GBC) is considered as a rare cancer and it is the 20th leading cancer in the world after combined both the sex [1]. Chile has the highest rate of gall bladder cancer incidence rate, age adjusted rate found to be 7.8 and 12.8 in men and women respectively [2]. In India highest incidence was observed in Kamrup urban registry and showed highest Age adjusted rate (8.8) followed by Delhi (5.3) and Cachar district (5.2) in Males. In females highest incidence rate observed in Kamrup urban district 10.8, followed by Delhi (10.2) and Papumpare district (10.2) in Bengaluru. Age adjusted rate observed 1.2 and 1.1 in males and females respectively [3]. In India it is estimated that about 19,000 new cancer cases and 16,000 mortality was observed and the MI ratio found to be 0.8 [4]. Gall Bladder cancer is up to three times higher among women than men in all populations [5].

Changes in cancer pattern are often studied with regard to rank of leading sites, variation in age adjusted rates of sites over the time or with the help of time trends. However, these methods do not quantify the changes in relation to overall changes that occurred in the total cancer cases over the period of time, hence joinpoint regression analysis was used. It will clearly show trend like moving average with segment wise. The gall bladder cancer is rare cancer in Bengaluru as like other south Indian registries but prognosis is very poor hence this paper intention is to establish trend alarming registry to do the extensive work to know the possible risk factor.

Materials and Methods

Population based cancer registration in Bangalore urban agglomeration began in 1982 under the network of national cancer registry programme of India, the registry is part of Kidwai Memorial Institute of Oncology. Kidwai Cancer Institute is regional cancer institute. The population based cancer registry covers an area of 741sq.Kms with 8.97 million estimated based on 2001 and 2011 population census[6]. As like other part of India

Cancer registration is carried out by active case finding method. Trained social scientist from the population based cancer registry visits various sources which include cancer treating hospitals, pathological and radio diagnosis labs general hospital were operation facility exists and death registration centers. From 2010 onwards, all cause death data is also collected to minimize the missing cases in Incidence and improve MI ratio. The incidence cases were matched with morbidity cases. The primary sites and morphology are coded using international classification of disease for oncology (ICD-0).

After data entry, quality and data completeness check is carried out to improve quality of data as per the direction of IARC using NCRPDM2.0 software. The data reported using the International classification of diseases, tenth Revision (ICD-10) codes for old cases appropriate transformation was made by using IARC tool for conversion software provided by IARC.

Age adjusted incidence rates were calculated using mid-period population figures annually and using direct method with world standard population. We used joinpoint regression analysis to identify points where a statistically significant change over time in linear slope of the trend occurred[6]. In joinpoint analysis, the best-fitting points where the rate changes significantly (increase or decrease) are chosen. The analysis starts with the minimum number of joinpoints, and tests whether one or more joinpoints are statistically and an annual percentage change (APC) is computed for each of those trends by means of generalised linear models assuming a Poisson distribution. Significant changes include changes in direction or in the rate of increase or decrease. National cancer registry data was utilized to compare trend between the registries (6&7).

Results

More than One lakh twenty seven thousand cases registered in population based cancer registry (PBCR) Bengaluru, from 1982 to 2012. Among

registered cases, 48% was males and 52% was female cases. 1083 cases of Gall Bladder cancer was registered in PBCR, Bengaluru and out of that 551 cases are males and 568 cases are females. The highest relative percentage change observed 228% in men from 1982-1990 to 1991-2000, similarly in females 266% change observed between 1991-2000 to 2001-2012. Detailed AAR and decadal changes are given in Table 1.

Table2 gives the Joinpoint regression trend over the year of Gall Bladder cancer in Bengaluru, PBCR area.From 1986 to 2012, significantly increasing trend was observed in PBCR Bengaluru in segment 1. 1982-1986 high annual percentage with not significant trend was observed and it is due to small number of Gall Bladder cancer..

Table3 gives the comparison of male Gall Bladder cancer trend over the year between the PBCR, Bengaluru with various registries which show the Gall Bladder cancer as within 10 leading site in Mumbai population based cancer registry from 1982 to 1989 increasing trend, 13% annual percentage change observed after 1990 trend is stabilize. In Delhi also similar trend from 1988 to 1991 annual percentage found to be significant, 30.7% change observed from 1991 to 2012 also same increasing trend observed with 1.3% annual percentage change. Dibrugarh and Kamrup also exhibit significantly increasing trend over the year detailed analysis tabulated in table no2. Fig no 1 depicts the joinpoint trend over the period of the different registries.

Table4. gives the APC (Annual Percent Change) of Gall Bladder cancer in women from 1982 to 2012, increasing trend in female Gall Bladder cancer with 5.2% annual percentage change observed in Bengaluru PBCR, similar trend observed in Chennai population Based cancer registry with 6.1 annual percentage change. Mumbai showing similar trend as like as male in first segment from 1982 to 1990, increasing trend 9.3 annual percentage changes observed. In Delhi 1988 to 1990 increasing trend was observed and after 1990 trend was stabilized, In Dibrugarh and Sikkim registry also increasing trend were observed fig2 depict the trend over the period of the different registries.

Table1: Summary Statistics-Bangalore PBCR-(1982-2012)

Cancer Incidence	Males				Females			
	1982-2012	1982-1990	1991-2000	2001-2012	1982-2012	1982-1990	1991-2000	2001-2012
Cases	515	38	125	352	568	46	112	410
Crude Rate	0.84	0.42	0.95	1.07	1.06	0.75	0.99	1.35
AAR	0.79	0.36	0.73	1.17	0.96	0.56	0.75	1.43
Relative % Change			228.9	181.6			143.5	266.1

Table 2: Joinpoint Regression Gall bladder Cancer Bangalore (1982-2012)

Segment	Lower Endpoint	Upper Endpoint	APC	Lower CI	Upper CI
1	1982	1986	33.6	-0.4	79.3
2	1986	2012	4.9*	3.1	6.7

Table 3: Joinpoint trend of Gall bladder Cancer, Males, Over the Registries (1982-2012)

Bengaluru	Lower Endpoint	Upper Endpoint	APC	P-Value
1	1982	1986	33.7	0.064
2	1986	2012	4.9	0.000
Mumbai				
1	1982	1989	13.0	0.000
2	1989	2012	0.7	0.161
Delhi				
1	1988	1991	30.7	0.001
2	1991	2012	1.3	0.001
Dibrugarh	2003	2012	6.7	0.005
Kamrup Urban	2003	2012	12.5	0.007

Table 4: Joinpoint trend of Gall bladder Cancer, Males, Over the Registries (1982-2012)

Registries	Lower Endpoint	Upper Endpoint	APC	P-Value
Bangalore	1982	2012	5.2	0.000
Chennai	1982	2012	6.1	0.000
Mumbai				
1	1982	1990	9.3	0.002
2	1990	2012	0.6	0.327
Bhopal				
1	1988	1990	-30.3	0.112
2	1990	2012	5.0	0.000
Delhi				
1	1988	1990	25.7	0.019
2	1999	2012	0.4	0.407
Dibrugarh	2003	2012	4.7	0.011
Kamrup urban	2003	2012	4.5	0.205
Imphal	2003	2012	2.5	0.647
Sikkim	2003	2012	11.9	0.112

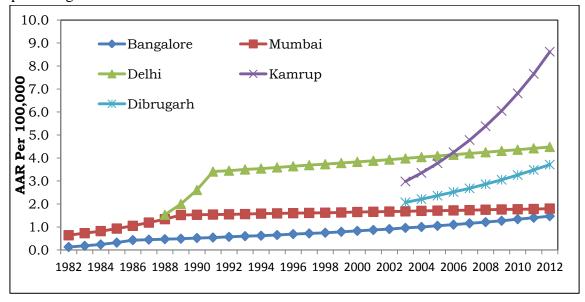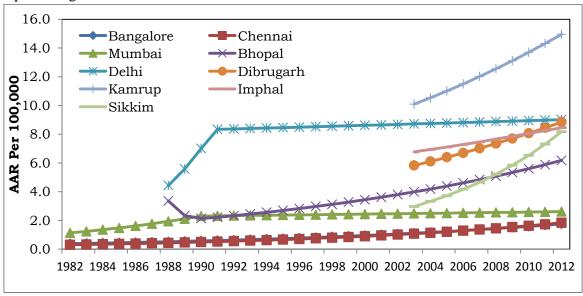**Fig1:** Joinpoint Regression of Gall bladder trend Males-1982-2012

Fig 2: Joinpoint Regression of Gall bladder trend Females-1982-2012

Discussion

Gall Bladder cancer is the most common cancer of the biliary tract worldwide [8]. This has poor prognosis due to aggressive biologic behavior and lack of screening tests for early diagnosis most of this type of malignances diagnosis in advance stage [9] and it is also most aggressive cancer of the biliary tract with shortest survival [10]. Chile has the highest rate of Gall Bladder cancer, followed by Bolivia and the Republic of Korea (South Korea). 65 of Gall Bladder cancer occur in less developed countries, the highest incidence found in South America and Asia, and the lowest incidence is in Africa. Epidemiological studies reported that Gall Bladder Cancer (GBC) is not common cancer in India [11-13]. The Incidence of GBS distribution varies widely within India, GBC is much more common in women the sex ratio male to female is 0.6:1, in Bengaluru 0.9:1 ratio observed.

GBC is much more common, especially in women, in north and central India than in the west and south [14]. The Age adjusted rate in Bengaluru is 1.7 in male and 1.5 in females. In Delhi Age adjusted rate is found to be 5.3 and 11.8 in males and females respectively. Kamrup urban registry AAR is found to be 8.8 and 10.8 per 100,000 in males and females respectively in the year 2012-2014. The rates are much higher than south Indian (Bengaluru and Chennai registry)

The GBC incidence rates increased in PBCR Bengaluru after 1996 in males, in females also from the beginning of registry established rise in gall bladder trend is observed and higher relative percentage change is observed between time of establishment of registry to recent decades, hence Gall Bladder cancer is emerging cancer, similar trend observed in chennai, Bhopal although higher incidence rates found in Delhi during first segment after some year a stabilizing in AAR or almost similar change in trend observed like other registry.

Geography and ethnicity is one of the risk factor for GBC, is prevalent in other countries in the northern part of the Indian subcontinent, including Pakistan. Hassan et al [15]. The below evidences are proved that Indians are at higher risk of having GBC and is reflected in the higher incidence of GBC in those who have migrated to various countries, such as Fiji, Kuwait and Singapore, as compared to the native populations in these countries [16]. In Fiji, the incidence of GBC in Indian migrant women was 8 times as high as that in native Fijian women. In the UK, the relative risk of mortality from GBC was higher in Indian migrants as compared to the UK-born population—3.4 (2.4–4.7) in men and 6.6 (5.1–8.5) in women [15].

The GBC incidence rate was more in Females compared to Males due to higher gravidity and parity [17] and incidence of GBC also increases with age [18] and Obesity [19]. The most important risk factor for the development of Gall Bladder cancer is gallstones, with an 8.3x higher risk than the general population [20]. The exact mechanism whereby cholelithiasis causes/predisposes to Gall Bladder cancer remains debatable. The above Risk factors may be the cause for the GBC increasing trend.

Conclusion

Gall Bladder cancer trend is significantly increasing in Bengaluru, also same trend is observed in other registries in India. The screening to diagnose at early stage is difficult and very poor prognosis is found in Gall Bladder cancer. Hence prevention is the only method to reduce the Gall Bladder cancers in India.

References

1. Rajveer Hundal and Eldon A Shaffer. "Gall Bladder cancer: epidemiology and outcome". Clin Epidemiol. 2014; 6: 99–109.
2. Ferlay J, Soerjomataram I, Ervik M, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray, F. GLOBOCAN 2012 v1.1, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon,

France: International Agency for Research on Cancer; 2014. Available from: http://globocan.iarc.fr, accessed on 21/04/2015.

3. Three year report of population Based Cancer Registres 2012-2014; National Cancer Registry Progranne (ICMR), Bangalore, 2016.

4. Ferlay J, Soerjomataram I, Ervik M, et al; International Agency for Research on Cancer. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11. globocan.iarc.fr. Accessed December 12, 2013.

5. Dr. Eduardo C. Lazcano-Ponce MD, PhD et.all. "Epidemiology and Molecular Pathology of Gall Bladder Cancer. A Cancer Journal for clinician. 2001; 51: 349–364.

6. Kim H-J, Fay MP, Feuer EJ, Midthune DN. Permutation tests for joinpoint regression with applications to cancer rates. *Stat Med 2000*; *19*: *335*–351. *Cross Ref Medline Web of Science.*

7. Time trend in cancer incidence rates 1982-2010: National Cancer Registry Programme (ICMR), Bengaluru, 2013.

8. C. H. E. Lai and W. Y. Lau, "Gall Bladder cancer a comprehensive review," Surgeon, vol. 6, no. 2, pp. 101–110, 2008. View at Publisher · View at Google Scholar · View at Scopus.

9. U. Dutta, "Gall Bladder cancer: can newer insights improve the outcome?" Journal of Gastroenterology and Hepatology, vol. 27, no. 4, pp. 642–653, 2012. View at Publisher · View at Google Scholar · View at Scopus

10. X. Zhu, T. S. Hong, A. F. Hezel, and D. A. Kooby, "Current management of Gall Bladder carcinoma," The Oncologist, vol. 15, no. 2, pp. 168–181, 2010. View at Publisher · View at Google Scholar · View at Scopus

11. Diehl AK. Epidemiology of gall bladder cancer: A synthesis of recent data. J Natl Cancer Inst 1980;65:1209–14.

12. Tominaga S, Kuroishi T. Biliary tract cancer. Cancer Surv 1994;19–20:125–37.

13. Three year report of population Based Cancer Registres 2009-2011; National Cancer Registry Progranne (ICMR), Bangalore, 2013.

14. V. K. KAPOOR, A. J. McMICHAEL. Gall Bladder cancer: An 'Indian' disease. The National Medical Journal of India Vol16,4,2003.

15. Hassan TJ, Zuberi SJ, Maqsood R. Carcinoma of gall bladder. J Pak Med Assoc 1978;28:33–4.

16. Pal A, Sharma SK, Pal A, Ghosh S, Agarwal SK, Maitra TK, et al. Ultrasonographic evaluation of carcinoma of the gall bladder. Natl Med J India 1990;3:167–70.

17. R. Hundal and E. A. Shaffer, "Gall Bladder cancer: epidemiology and outcome," Clinical Epidemiology, vol. 6, no. 1, pp. 99–109, 2014. View at Publisher.

18. C. H. E. Lai and W. Y. Lau, "Gall Bladder cancer—a comprehensive review," Surgeon, vol. 6, no. 2, pp. 101–110, 2008. View at Publisher.

19. K. Y. Wolin, K. Carson, and G. A. Colditz, "Obesity and cancer," The Oncologist, vol. 15, no. 6, pp. 556–565, 2010.

20. G. Miller and W. R. Jarnagin, "Gall Bladder carcinoma," European Journal of Surgical Oncology, vol. 34, no. 3, pp. 306–312, 2008.