

LUNG CARCINOMA TYPES, GENDER AND ITS CHANGING TREND IN THE PUNJAB, 2008-2012.

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ABSTRACT: Lung carcinoma is the foremost cause of both morbidity and mortality in the world with an expected growth rate of 1.67 million each year. Purpose of the present study was to observe the prevalence of different lung cancer types in both genders and to observe their varying trends with time. It is a retrospective analytical study from 2008 to 2012. Total 1498 patients were analyzed for this research. Cases only from the Punjab province were included in the present study. Data was analyzed in SPSS version 15.0 and the tests applied for analysis were Paired Samples T- Test and One Samples T- Test. Squamous Cell was found in 26.08% of cases. The overall male to female ratio was 34.33:7. Squamous Cell Carcinoma prevalence increased from 17.57- 27% while the Adenocarcinoma increased from 10-15.3%. Non- Small Cell type showed decrease from 28-11.3%. Increased in the prevalence of Squamous Cell Carcinoma was found in both male and females. While as, the changes in the prevalence of Large Cell Carcinoma were found only in male. In our region, Squamous cell carcinoma was the most widespread variant of lung cancer followed by the small cell carcinoma. Male to female ratio across the various histological patterns did not show important variation. Increase prevalence in squamous cell carcinoma was statistically significant in both genders, but in the case of adenocarcinoma change in its prevalence was only significant in females.

Keywords: Lung cancer, Histopathology, Gender prevalence, Chromotherapy, Punjab.

INTRODUCTION:

Lung cancer has been considered as one of the deadliest form of non-communicable disease to mankind. Western culture influences and dietary way of life have to be resulted in lung cancer (1). Lung cancer is now estimated as one of the most common cancer in world. It is also the most common reason of morbidity and mortality worldwide in both male and females with 1.67 million cases and 1.38 million deaths (18.2% of the total deaths). Majority of cases are now occurring in the developing countries as compared to developed countries (2). Uncontrolled growths of abnormal cells cause a disease that is known as cancer. Lung cancer begins to develop when normal cells start to damage. Primary lung cancer symptoms include cough, chest pain, coughing up blood and shortness of breath (3). Global trends indicate that there has been a shift in the distribution of histological types of lung cancer since the decade of the 1980s with adenocarcinoma now being the most commonly diagnosed histological subtype of lung cancer in most locales. This contrasts with squamous cell carcinoma being the most predominant morphologic pattern documented in most cancer registries up until the 1980s (4). Changing trends in histological patterns of lung cancer has observed during different time periods and it is due to change in different risk factor like smoking. Besides smoking, other factors of lung cancer expansion are tobacco chewing, dietary habits, occupational exposure and as well as indoor & outdoor pollution. Though, the survival rate for all types of lung cancer is poor and the prognosis is not more than 5 years (5). Non-small cell lung (NSCL) cancer constitutes 80% of all cases of lung cancer and 30-40% of that is Squamous cell carcinoma (6). In developing countries like Pakistan, lung cancer incidence is rising at an alarming rate in current years especially in male lung cancer which is now on top the list. Approximately 3 million lung cancer patients in Pakistan annually registered. Out of which 1, 62,000 were from the

Punjab (7). Diagnosis of lung carcinoma at an earlier stage is palpable but high cost of diagnosis make it difficult to acknowledge at an early stage. A lot of patients in developing countries like Pakistan die because of lack of awareness, high cost of treatment and failure to attend treatment centers at earliest.

The study was conducted to see the prevalence of different lung cancer types in both gender and to observe their varying trends with time.

MATERIALS AND METHODS:

A retrospective study was conducted. Data for the present study was collected from 11 lung cancer dealing hospitals. Data of some hospitals were taken directly by visiting concerned hospitals. While the data of some hospitals were taken from Pakistan Society of Clinical Oncology, a Government organization was formed on 21st November 1999 that retains data on the epidemiological and clinic-pathologic feature of cancers and then formulates a central registry. Society collects data of all cancer's type affecting people in the Punjab through local hospitals and registers it in digital database. Data analyzed for the study was over the period of 2008-2012. Patients from all districts of the Punjab province were included in the present study. Only lung carcinoma patients with gender and histological findings were included while the patients of other carcinomas were excluded. Data was arranged and tabulated in MS Excel 2010 and analyzed in SPSS (version 15) by using Paired-Samples T Test and One-Samples T Test. Results were considered significant when the $p < 0.05$.

RESULTS:

Total 1498 Cases of lung cancer were analyzed. Overall, patient's population was ranged from young to old age. Out of the total 1498 cases, Squamous cell carcinoma was found to be the most prevailing with 388 cases (26.08%) followed by Small cell carcinoma (19.08%), Adenocarcinoma

(18.48%), Non- small cell carcinoma (16.73%), Carcinoid carcinoma (11.56%), undifferentiated carcinoma (4.23%) and large cell carcinoma (3.83%) as shown in Figure.1. There were 1236 males and 252 females in the total with overall male to female ratio of 34.3:7. This ratio was the highest in Squamous cell carcinoma patients (6.5:1) followed by the Small cell carcinoma (5.6:1), Carcinoid (4.9:1), Non-small cell (4.2:1) and Adenocarcinoma (4:1).

Throughout the study period, the prevalence of Squamous Cell Carcinoma was increased from 17.57- 27% (p=0.035). Similarly Adenocarcinoma showed an increase of 10.0- 15.3 % (p=0.072) and carcinoid carcinoma also showed an increase of 12.1- 16.4 % (p=0.026) but on the other hand, Non- small cell showed a decrease from 28.0-11.3% (p=0.021) and in Small cell carcinoma decrease was also seen from 22.5- 18.9% (p= 0.0348) Undifferentiated type also showed the decrease of 7.5-6.5% (p= 0.031) which is obvious from Table 1. Overall, in both genders the squamous cell cancer was found to be the most prevalent in males (26.94%) and females (21.8%) as shown in Table-2. However, in both genders a statistically significance increase in the prevalence of Squamous cell carcinoma had been shown across the study period (male: p= 0.020, females: p=0.021).

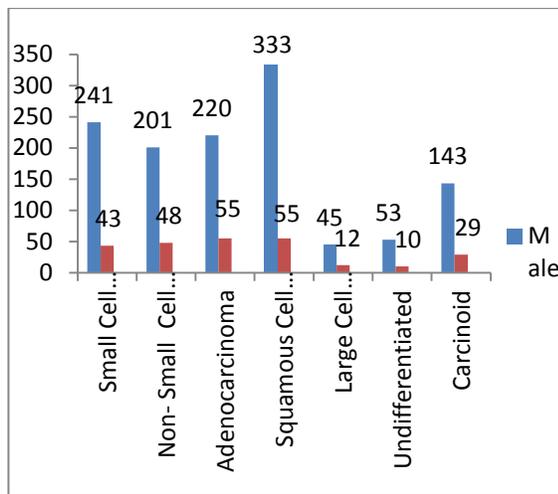


Figure-1: Male to Female variation in lung carcinoma types during different time periods

DISCUSSION:

Major findings that have emerged from our analyses are as follows:

First of all it has been noticed from the data collected from all the cancer registries of the Punjab that there was persistence increase of Squamous cell carcinoma in both male and female. Prevalence of the Squamous cell carcinoma may be an attribute of the smoking behavior which was thought to be more strongly connected with Squamous cell carcinoma than Adenocarcinoma. One cause would be the switching from the non-filtered cigarettes to the filtered cigarettes. Early cigarettes were primarily high tar products, unfiltered and the smoke from these products was considered to be irksome to the central bronchi, where the squamous cell carcinomas mainly arise (4).

Some studies showed the Adenocarcinoma the most common type in both genders with relative prevalence ranging between 38.3-52.5% (8, 9). Though, a momentous number of studies have reported Squamous cell carcinoma to be the most widespread histological type with frequency ranging from 42.7% (5, 10, and 11). These results were in good agreement with our study which showed Squamous cell carcinoma to be the most prevalent type 26.08% (table 3). The ratio male to female in the present study was 34.3:7 which was not compatible in other Asian countries 2.67:1 (5). In our study, the ratio was the highest in Squamous cell carcinoma (6.5:1) which was much similar to the results shown by other researches (5, 8). During the five years study period, a significant increases was seen in the prevalence of Squamous cell carcinoma (p=0.021). Although small cell carcinoma was the second most prevalent type in our study but it failed to show a significant change in its prevalence over time (p=0.035). Some studies have shown an increase in the prevalence of Squamous cell carcinoma which are in good agreement with our study (5). However, this was in dissimilarity to obtain literature which has shown Adenocarcinoma the second most prevalent type (5). Increase in the prevalence of Squamous cell carcinoma was noteworthy in both genders (male= 0.020, females=0.021). While as far as Adenocarcinoma is concerned, major change in its incidence was only noted in females (0.024). This was not in contrast to some studies which have shown an increase in the prevalence of squamous cell carcinoma in both genders with time (5)

Table 1: Histological Patterns of various lung carcinomas during the year 2008-2012

Lung Cancer Type	2008	2009	2010	2011	2012	Total	P
Small Cell	54(22.59)	36(21.42)	47(18.00)	95(17.39)	52(18.97)	284	0.035
Non Small Cell	67(28.03)	27(16.07)	50(19.15)	74(13.53)	31(11.31)	249	0.021
Adenocarcinoma	24(10.04)	36(21.42)	41(15.70)	132(24.17)	42(15.32)	275	0.072
Squamous Cell	42(17.57)	38(22.61)	81(31.03)	153(28.02)	74(27.00)	388	0.021
Large Cell	5(2.092)	3(1.785)	14(5.363)	23(4.212)	12(4.37)	57	0.106
Undifferentiated	18(7.531)	12(7.142)	4(1.532)	11(2.014)	18(6.56)	63	0.031
Carcinoid	29(12.13)	16(9.523)	24(9.195)	58(10.62)	45(16.42)	172	0.026
Total Cases (N)	239	168	261	546	274	1488	

Table 2: Gender-Wise Histological Patterns of Lung Cancer from 2008-2012

Lung Cancer Type		2008	2009	2010	2011	2012	Total	P
Small Cell	M	40(21.3)	29(22.4)	41(19.1)	92(19)	39(17.4)	241	0.012
	F	14(27)	7(18)	6(2.80)	3(4.76)	13(25.4)	43	0.015
Non-Small Cell	M	47(25.1)	22(17.0)	40(18.6)	68(14)	24(10.7)	201	0.009
	F	20(38.5)	5(12.8)	10(21.2)	6(9.52)	7(13.7)	48	0.025
Adenocarcinoma	M	18(9.62)	25(19.37)	34(15.8)	109(22.5)	34(15.2)	220	0.056
	F	6(11.8)	11(28.2)	7(14.8)	23(36.5)	8(15.6)	55	0.024
Squamous Cell	M	37(19.7)	30(23.2)	69(32.2)	131(27.1)	66(29.5)	333	0.020
	F	5(9.61)	8(20.5)	12(25.5)	22(34.9)	8(15.6)	55	0.021
Large Cell	M	5(2.67)	2(1.55)	9(4.20)	21(4.34)	8(3.58)	45	0.050
	F	-	1(2.56)	5(10.6)	2(3.17)	4(7.84)	12	0.061
Undifferentiated	M	16(8.55)	9(6.97)	2(0.93)	10(2.07)	16(7.17)	53	0.015
	F	2(3.84)	3(7.69)	2(4.25)	1(1.58)	2(3.92)	10	0.003
Carcinoid	M	24(12.8)	12(9.30)	19(8.87)	52(10.7)	36(16.1)	143	0.15
	F	5(9.61)	4(10.2)	5(10.6)	6(9.52)	9(17.6)	29	0.003
Total Cases (N)	M	187	129	214	483	223	1236	
	F	52	39	47	63	51	252	

Table 3: Histological Patterns of Lung Cancer in various Studies

Author	Year	Region	Squamous Cell Carcinoma (%)	Adenocarcinoma (%)	Small Cell Carcinoma (%)
Present Study	2014	Punjab Pakistan	26.08	18.48	19.08
Siddiqui	2010	Khyber Pakhtunkhwa	42.7	20.3	16.4
Menon	1979	Finland	34	25	12
Peng	1996	Taiwan	37.1	38.3	12.2
Sntoz- Martine	2005	Malaysia	33	30	-
Lee	2000	Korea	44.7	27.9	-

In the present study, it has also been found that the rate of lung carcinoma incidence among male population peaked throughout the study period as compared to the female population. Both statistical and clinical researches established an optimistic relationship between exposure to the tobacco smoke and the incidence of lung cancer (4). It is expected that around 90% of lung cancers in male and 79% in female are directly attribute to smoking exposure (4). Besides smoking habits, it may be because of the air pollution and occupational exposures. Men spend more time outside so that they are more prone to air pollution, radon and asbestos.

Even though available data clearly demonstrates differing trends in lung cancer incidence, the rates for squamous cell, Non-small cell, Small cell, undifferentiated and Carcinoid carcinoma among men peaked in 2008 but decreased in the year 2009. Trends in the incidence rates among men for small cell, non-small cell, adenocarcinoma, squamous cell, large cell carcinoma increased during the year 2010 and 2011 but in 2012, the incidence of all major histological type showed a dramatic decrease as compared to the last two years as shown in figure 2. On the contrary, in females the incidence rate for small cell, non-small cell and carcinoid were peaking in the 2008 but in 2009, a decrease was seen in these carcinoma types and an increase was noticed in the incidence rate of adenocarcinoma

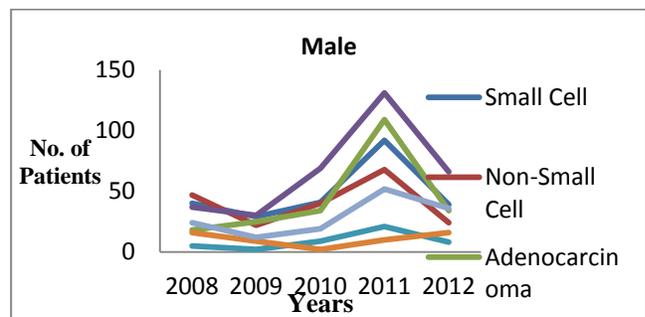


Figure 2: Trends of various lung carcinomas are shown among male from 2008-2012

, squamous cell and undifferentiated carcinoma than 2008. In 2010, rise in the incidence of squamous, non-small, large cell and carcinoid carcinoma was also observed among women. However during 2011, except adenocarcinoma and squamous cell carcinoma, decrease was seen in the incidence of all carcinoma types among females. In 2012, incidence rate of all types were increased expect adenocarcinoma and squamous cell carcinoma. It was also noticed that overall number of females were r

duced in 2012 than the year 2011 as shown in figure 3. It is also interesting to note that overall fluctuations in lung carcinoma incidence from 2008-2012 was seen. This may be because of so many reasons:- In years (2008, 2010, 2011) when high incidence were reported reasons can be improved registry system, modification in the definition of new biopsy

techniques which have greatly improved the diagnosis. But on the other hand, in years (2009, 2012) when low incidence rate was reported. It may be because of low awareness among people about lung cancer, poor registry system, and financial condition of the people and high inflation could have also effected reporting.

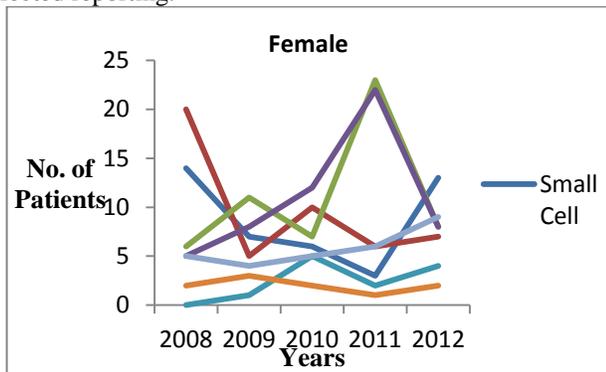


Figure 3: Trends of various lung carcinomas are shown among female from 2008-2012

One major point that arise from our study is a large gap was seen in number of cases from 2011-2012.

SUGGESTIONS

Our findings suggested that due to illiteracy and unawareness, most of the patients do not get registered in hospitals so a proper data registry system is required not only at district level but also at tehsil level. It is also suggested that people should be given awareness about the importance of routine medical checkup for early detection and availability of cancer treatments. As per study, it was concluded that people are also very interested in taking first line treatment at home. Previously Chromotherapy (treatment with visible range electromagnetic radiations, colors) has shown remarkable effect on antioxidant enzyme, superoxide dismutase (13). Chromotherapy has also been suggested as a low cost, safe, yet an effective treatment for lung cancer (14, 15). It is also suggested that Cancer awareness campaigns are required especially for rural population and print and electronic media (newspaper, radio, TV), cancer hospitals and cancer research centers can play a main role in this context. In addition, working and environmental factors responsible for higher cancer in male should be reduced and such chemicals should be strictly banned e.g. tobacco, alcohol, smoke. Factories waste having carcinogens and asbestos should be properly wasted to make sure that it is harmless for public. These are the some measures which can be taken to reduce cancer. In addition such studies should be conducted on larger scale and at regular intervals.

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REFERENCES

- Mayer, A. I (2007) Medical Geography. New Delhi. A.PH Publishing Corporation.
- Globocan Cancer Fact Sheet (2013). Retrieved from <http://globocan.iarc.fr/factsheets/cancers/lung.asp> on 7-11-2013.
- Ahmed, K. Emran, A. A. Jesmin, T. Mukti, F. R. Rahman, Z. Md. Ahmed, F (2013) Early Detection of Lung Cancer Risk using Data Mining. Asian Pacific Journal of Cancer Prevention. Doi: <http://dx.doi.org/10.73141/APTCP.2013.14.1.595>.
- Blake, G. Hanchard, B. Gibson, T. Wolff, C. Waugh, N. Reynolds, A (2006) Trends in Incidence and Histological Subtypes of Lung Cancer, Kingston and St Andrew, Jamaica. West Indian Med J. Vol. 55 no.1 Mona Jan.2006.
- Siddiqui, S. Ali, U. M. Ali, A. M. Shah, N. Nasreen, S (2010) Lung Carcinoma: Its Profile and Changing Trends. J Ayub Med Coll Abbottabad 2010; 22(3).
- Haider, N. Shaharyar, Rasul, S. Rehman, U. E. Allaudin, Z. Muhammad, A (2007) A Phase 2 Study of Cisplatin and 5- Fluorouracil Combination Chemotherapy and Concurrent Thoracic Radiation in Squamous Cell Carcinoma of Lung. Pak J Med Sci 2007 Oct-Dec (Part1); 23 (5): 698-702.
- Shaharyar (2012). *Exercise, Vegetables can cut cancer risk by 20 percent*. Today Newspaper. Retrieved from <http://www.thenews.com.pk/Todays-News-2-143371-Exercise-vegetables-can-cut-cancer-risk-by-20-percent-say-experts> on 9-10-2013.
- Morita, T (2002) A Statistical Study of Lung Cancer in the Annual of Pathological Autopsy Cases in Japan from 1958 to 1997, with reference to Time Trends of Lung Cancer in the World. Jpn J Cancer Res 2002. 93(1) 15-23.
- Perng, DW. Perng, RP. Kuo BI. Chiang SC (1996). The Variation of Cell Type Distribution in Lung Cancer: a Study of 10,910 Cases at a Medical Center in Taiwan between 1970 and 1993. Jpn J Clin Oncol 1996. 26(4) 229-33.
- Santos-Martínez, MJ. Curull, V. Blanco, ML. Macià, F. Mojal, S. Vila, J. Broquetas, JM (2005). Lung cancer at a university hospital: epidemiological and histological characteristics of a recent and a historical series. Arch Bronconcomol 2005; 41(6): 307-12.
- Menon, M. A. Saw, S. H (1979) Lung Cancer in Malaysia. Thorax April 1979; 34(2)269-73.
- Lee, C. Kang, K. H, Koh, Y. Chang, J. Chung, H. S. Park, S. K. Yoo, K.Song, J.S (2000) Characteristics of Lung Cancer in Korea, 1997. Lung Cancer 2000; 30(1): 15-22.
- Azeemi *et al.* "Effect of Different Wavelengths on Superoxide Dismutase" *J Acupunct Meridian Stud* 2009; 2(3):236-238
- A. Shamsuddin, "Colour Therapy," *Al-Kitab Publications*, Karachi, 1999.
- Azeemi Shamsuddin, "Rang-o-Roshni sey Elaj", *Al-Kitab Publications*, Karachi