

Case Fatality Rates and Treatment Modalities for Lung Cancer Patients in Nineveh Province

Moayad Aziz Alabdaly¹, Dr. Israa Jawdat Mustafa²

¹Lecturer; Department of family and Community Medicine, Nineveh Medical College, IRAQ

²Senior Specialist in Community Medicine, MSc. Mosul Cancer Control Center, Directorate of Health in Nineveh, IRAQ

ABSTRACT

Globally, lung cancer is the dominant cause of cancer death in males and the second prominent cause in females. The aim of this study is to show the case fatality rates and treatment modalities of lung cancer patients in Nineveh province during the period of the study. The sample of the present study included all lung cancer patients registered at the Mosul cancer registry center and the related hospitals of lung cancer in Nineveh during 2010 to 2013 of all ages and both sexes. Chi-square test for independence was used and a p-value of ≤ 0.05 was considered to denote statistical significance using Micro Soft Excel 2010. The proportion of patients aged 55-69 years was relatively high. The study revealed that lung cancer is a strong male predominance, which had a high case fatality rate in both sexes, all age groups and stages except local stage. Chemotherapy is the most frequent treatment alone or in combination treatments of lung cancer patients.

Key words: Lung cancer, Mosul cancer registry center (MCRC), Case fatality rate (CFR), Treatment modalities, Chemotherapy.

INTRODUCTION

An estimated 1.8 million new lung cancer cases were diagnosed all over the world in 2012 ⁽¹⁾. Globally, lung cancer is the dominant cause of cancer death in males (1.1 million) and the second prominent cause in females 491,200, which is greater than breast cancer within females in developed countries ⁽²⁾. Lung cancer is the leading cancer killer in both men and women in the U.S. In 1987, it surpassed breast cancer to become the leading cause of cancer deaths in women ⁽³⁾. An estimated 158,080 Americans are expected to die from lung cancer in 2016, accounting for approximately 27 percent of all cancer deaths ⁽⁴⁾. An estimated 222,500 new cases of lung cancer in 2017 accounting for approximately 25 percent of all cancers diagnosed, with an estimated 155,870 Americans deaths ⁽⁵⁾.

The highest incidence rates of lung cancer in males 33/100000 were seen in Europe and Northern America, also in Uruguay and Eastern Asia of 22.8 - 32.9/100000, and the lowest rates 3.3 /100000 were in sub-Saharan Africa. Among females, the highest lung cancer rates were in Northern America (33.0 /100000), Europe (22.8 - 32.9 /100000), Australia, New Zealand, North Korea, and China (14.1 - 22.7/100000) ⁽²⁾. Although incidences are lower than in the West, of the Arab Middle-east countries, seven of thirteen have lung cancer as number one, the highest rate was in Bahrain (34.3 for males, 12.1 for females) followed by Qatar (18.5 and 5.5) and Kuwait (13.8 and 4.0); the lowest rates were in Saudi Arabia (4.8 and 1.3 for females) per 100000 of population ⁽⁶⁾.

Primary lung cancer represents one of the major 5 incident malignancies and the leading cause of cancer-related deaths in Basrah and the rest Iraq ⁽⁷⁻¹¹⁾. Lung cancer is the most frequent cancer among men in Iraq. It ranked the second commonest cancer after breast cancer, but it is the first cancer among males ^(12,13). Evidence from local studies suggests that lung cancer is fatal in the absolute sense and in terms of the 5-year survival rate, which might be as low as 0% ^(9-11,14). The prognosis seems only modestly related to the stage of cancer at diagnosis. Fatality, though reduced among patients with early-detected cancer, remains high among the overall mix of cases ⁽¹⁵⁾.

This would leave primary prevention as the best alternative strategy on the long run. Evidence in the global literature is sufficient enough to discriminate smoking as the major cause of lung cancer ⁽¹⁶⁻¹⁸⁾. At the Egypt crude incidence rate was 3.0 per 100000 of the general population, which present of (2.70%) of total cancer in Egypt ⁽¹⁹⁾. In Iraq, lungs and the bronchi were the second most common cancer and the first most common site in males. Cancer in the lung and bronchus accounted for 8% of all cancers ⁽²⁰⁾.

Treatments Pattern in Lung Cancer

Only (13%) of lung cancer is categorized as small cell lung cancer while (83%) are non-small cell lung cancer, for the purposes of treatment ^(2,21). Treatments include surgery, radiation therapy, chemotherapy, and or targeted therapies according to the type and stage of cancer. Surgical treatment is frequently the treatment of choice in case of early stage non-small cell lung cancers; sometimes chemotherapy in combination with radiation therapy may be given as well ⁽²²⁾. On the other hand, chemotherapy, targeted drugs such as (angiogenesis inhibitors, epidermal growth factor receptor inhibitors, and anaplastic lymphoma kinase inhibitors), or combination of the two, is used in advanced-stage non-small cell lung cancer patients ⁽²⁾.

AIM OF THE STUDY

The aim of this study is to show the case fatality rates and treatment modalities of lung cancer patients in Nineveh province for the period 2010 – 2013. The present study tries to illustrate the lung cancer case fatality rates, according to age, sex of the patients and stage of cancer and to demonstrate type of different treatment modalities used for the patients with the lung cancer.

MATERIALS AND METHODS

Study Settings:

The study was conducted at the Mosul Cancer Registry center (MCRC). This center collects information on all cancer cases in the area, according to the preformed information referral form.

Study period:

Data collection of this study was done from the first of January, 2010 to 31th of December, 2013

Study sample:

The sample of the present study included all lung cancer patients registered at the Mosul cancer registry center and the related hospitals of lung cancer in Nineveh in 2010 to 2013 of all ages and both sexes, as recoded data (Can Reg 3 format).

The cancer cases are registered by trained personnel with respect to patient number, age, sex, clinical stage, cancer and coded according to the International Classification of Diseases (ICD10) ⁽²³⁾. The primary - site code was lung cancer C34 ^(24,25). All the data are fitted on Can Reg 3 format and fed into the computerized database of the MCRC, Staging is done according to the summary stage system ^(26,27); in which the stage is considered in situ, if cancer cells are present only in the layer of cells where they developed. The cancer has become invasive and is categorized as local, regional, or distant based on the extent of spread, if cancer cells have entered beyond the original layer of tissue ⁽²⁶⁾. Stage “unknown” has been recorded to include tumour morphologies for which the summary stage system is not strictly applicable. In this analysis according to stage, patients with cancer of an unknown stage or carcinoma in situ were excluded from the present study.

The criteria of the age groups chosen were those used for the international standard cancer patient population ⁽²⁸⁾. With age been categorized into three groups (0–54, 55–69 and 70+ years).

The sex was examined as a potential confounding variable for lung cancer for presentation of some descriptive results. The final number of included subjects was 488 (lung cancer) (male and female patients).

Administrative Agreement:

Administrative agreement was obtained from the directorate of health in Nineveh, including the Mosul Cancer Registry Center (MCRC).

Statistical Analysis:

Chi-square test for independence is an important method for determining if there is a relationship between variables, was used to study the relationship between age groups, sex and stage of extension variables and some results ^(29,30). A P-value of ≤ 0.05 was considered to denote statistical significance. Micro Soft Excel 2010 was used for statistical analysis. Bar chart and pie chart were used to present continuous variables and tables used for categorical data.

RESULTS

The total number of the lung cancer cases during each year of the period 2010-2013, according to age, sex and stage of extension of the cancer are shown in (Table 1). However 80.6% of those living with lung cancer were >55 years of age, the proportion of patients aged 55-69 years was relatively high (51.0%). The distribution of the lung cancer cases shows, male cases more than female cases in all the period of the study, with total male to female ratio of 5.1. It was not possible to determine the stage for 161 (33.0%) cases, a very high proportion, but 161 (33.0%) of all cases are of distant stage.

Table 1; The frequency distribution of the lung cancer cases, according to age, sex and stage of disease (2010-2013).

Lung Cancer Cases (488)		Date of Diagnosis				Total	%
		2010	2011	2012	2013		
Age group	0-54	20	42	29	10	101	21%
	55-69	43	71	81	54	249	51%
	≥70	27	53	30	28	138	28%
Sex	Male	79	136	116	77	408	83.6%
	Female	11	30	24	15	80	16.4%
Stage	Local	9	9	16	10	44	9.0%
	Regional	24	58	19	21	122	25.0%
	Distant	30	57	43	31	161	33.0%
	Unknown	27	42	62	30	161	33.0%

For lung cancer death, about half of people (52.9%) die, is of 55-69 year of age, as shown in (Table 2), the male deaths, were more than female deaths and the reported data for 282 patients, who was dying between 2010 and 2013 in the Mosul cancer registry center, were (6.4%) for local stage cancer patients, (26.2%) of regional stage patients, (34.0%) for distant stage patients.

Table 2; The frequency distribution of the lung cancer deaths, according to age, sex and stage of disease (2010-2013).

Lung Cancer Deaths (282)		Date of Diagnosis				Total	%
		2010	2011	2012	2013		
Age group	0-54	17	15	13	10	55	19.5%
	55-69	37	34	40	37	148	52.5%
	≥70	15	21	20	23	79	28.0%
Sex	Male	63	61	60	55	239	84.8%
	Female	6	9	13	15	43	15.2%
Stage	Local	4	4	5	5	18	6.4%
	Regional	19	18	18	19	74	26.2%
	Distant	23	24	26	23	96	34.0%
	Unknown	23	24	24	23	94	33.3%

Statistical analysis was done to see the association of age, sex and stage variables with the case fatality rates of cancer, as was seen in the (Table 3), with a p value = (0.903173) for age, while for sex, p value = (0.676027) and at stages the p value = (0.426183), these results were statistically not significant at p value ≤ 0.05.

Table 3; The overall case fatality rate (CFR %) of the lung cancer patients, according to age, sex and stage of disease (2010 – 2013).

Lung Cancer Cases (488)		(CFR %)	P value*
	55-69	59.4	0.903173 Not significant
	≥70	57.2	
Sex	Male	58.6	0.676027. Not significant
	Female	53.8	
Stage	Local	40.9	0.426183 Not significant
	Regional	60.7	
	Distant	59.6	

*Chi square test of independence

Most patients with lung cancer receive chemotherapy (83%). (51%) had radiotherapy and (36%) had surgery. (Figure1).

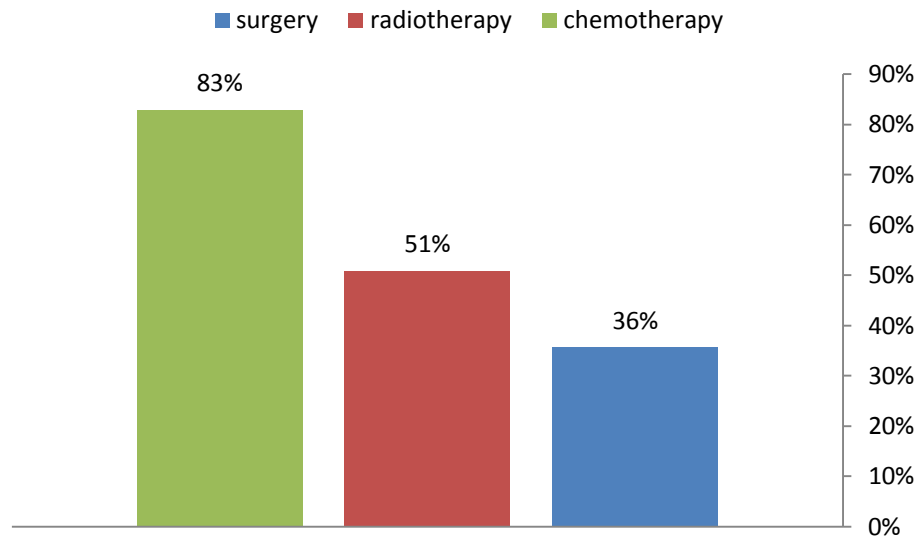


Figure 1; Type of treatment used for the lung cancer cases during the period of study.

The most frequent treatments or combinations of lung cancer were chemotherapy only (33%), chemotherapy plus radiotherapy (28%), surgery plus chemotherapy (19%), surgery plus chemotherapy plus radiotherapy (11%), and surgery only (9%), are shown in (Figure 2).

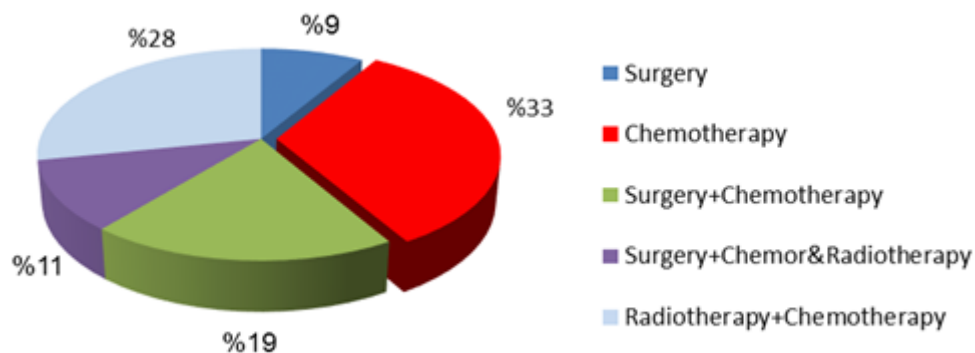


Figure 2; Type of treatment combinations of the lung cancer cases during the period of study

DISCUSSION

For lung cancer, the proportion of patients aged 55-69 years was relatively high (51.0%). This was similar to study in Turkey^(31, 32) and lower than those observed in Australia, which was at the age of 71 years⁽³³⁾, UK at 71 years⁽³⁴⁾ and Canada, Denmark, Norway and Sweden were at the age of 70.3 years⁽³⁵⁾. This may be due to loss of cases for records and many cancer patients are complaining from other morbidities. In addition, lung cancer patients often do not become symptomatic until the cancer is well advanced. As a result, the cancer has often metastasized and there is little hope of long term survival, even with modern treatments.

The distribution of the lung cancer cases shows, male cases more than female cases. The majority of lung cancers (33.0%) are diagnosed at a distant stage, because early disease is typically asymptomatic; only (9.0%) of cases are diagnosed at a local stage. This finding was similarly seen in Denmark, which shows the extent of disease was the most important predictor of survival⁽³⁶⁾.

Worldwide differences in lung cancer rates mainly shown changes in the cancer extent and the amount of the tobacco smoked extensively⁽³⁷⁾. Suggestion in this respect is acceptable enough to categorize cigarettes smoking as the main cause of lung cancer⁽¹⁶⁻¹⁸⁾.

In this study, most patients with lung cancer received chemotherapy in a percentage of (83%). While 51% had radiotherapy and 36% had surgery. The most frequent treatments or combination of treatments of lung cancer used

chemotherapy only in (33%), chemotherapy plus radiotherapy (28%), surgery plus chemotherapy (19%), surgery plus chemotherapy plus radiotherapy (11%), and surgery only (9%). A similar result was seen in another study⁽²²⁾. Chemotherapy alone or combined with radiation is the usual treatment for lung cancer; on this treatment, a large part of cancer cases show remission, though the cancer often returns⁽²²⁾.

CONCLUSIONS

Cancer is currently one of the major public health problems in Nineveh. The proportion of patients aged 55-69 years was relatively high. The study revealed that, lung cancer had a high case fatality rate. Cancers of the lung is a strong male predominance. Chemotherapy is the most frequent treatment alone or combination of treatments.

RECOMMENDATIONS

The fight against tobacco, responsible for one third of cancers should be applied with direct effect. Thus, primary prevention should focus on prevention of smoking and/or cessation of smoking. Provide better health services for cancer patients located in the province of Nineveh, in terms of diagnostic, therapeutic and early detection of cancer in addition to the development of educational programs and awareness of the importance of participation in early detection programs for cancer.

REFERENCES

- [1]. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray F. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *International journal of cancer*. 2015 Mar 1;136 (5): E359-86.
- [2]. American Cancer Society. *Global Cancer Facts & Figures 3rd Edition*. 2015; 1-37.
- [3]. File CM. File 1999–2006. CDC WONDER On-line Database, compiled from Compressed Mortality File 1999-2006 Series 20 No. 2L, 2009. Centers for Disease Control and Prevention. National Center for Health Statistics. <http://wonder.cdc.gov/cmf-icd10>. Html. Accessed March. 2014;31.
- [4]. Miller KD, Siegel RL, Lin CC, Mariotto AB, Kramer JL, Rowland JH, Stein KD, Alteri R, Jemal A. Cancer treatment and survivorship statistics, 2016. *CA: a cancer journal for clinicians*. 2016 Jul; 66(4):271-89.
- [5]. American Cancer Society: *Cancer Facts and Figures 2017*. Atlanta, Ga: American Cancer Society, 2017; 18
- [6]. Al-Hamdan N, Al-Jarallah M, Ravichandran K, Al-Sayyad J, Al-Lawati J, Khazal Z, Al-Khateeb F, Abdulwahab A, Al-Mulla A, Al-Asfour A, Bazarbashi S. The incidence of lung cancer in the Gulf Cooperation Council countries. *Annals of Saudi medicine*. 2006;26(6):433-8.
- [7]. Iraqi Cancer Board. Results of the Iraqi Cancer Registry 2012. Baghdad, Iraq, Iraqi Cancer Registry Center, Ministry of Health, 2015.
- [8]. Basrah Cancer Research Group. Cancer in Basrah: Epidemiological analysis of incident cancer 2005-2008. Basrah (IQ): *Dar Al-Kutub*. 2010.
- [9]. Habib OS, Al-Diab JM, Mohsin AA, Al-Elwe WM, Hasan JG, Al-Haroon SS, Al-Emara KA. Experience and outcome of population-based cancer registration in Basrah-Southern Iraq in 2005-2008. *Asian Pac J Cancer Prev*. 2010 Jan 1;11 (4): 1151-4.
- [10]. Al-Hilfi RA, Habib OS. Cancer mortality in Basrah: A household survey results. *The Medical Journal of Basrah University*. 2015;33(1):10-16.
- [11]. Essa SS, Habib OS, Al-Diab JM, Al-Imara KA, Ajeel NA. Cancer mortality in Basrah. *The Medical Journal of Basrah University* 2007;25(1):55-60.
- [12]. Iraqi Cancer Board. Results of the Iraqi Cancer Registry 2010. Baghdad, Iraqi Cancer Registry Center, Ministry of Health 2010.
- [13]. Iraqi Cancer Board. Results of the Iraqi Cancer Registry 2009. Iraqi Cancer Registry Center, Ministry of Health 2012.
- [14]. Habib OS, Al-Ali JK, Al-Diab JMA. Cancer registration in Basrah 2005-2006-A Report compiled by Basrah Cancer Research Group. Baghdad (IQ): Peoples Medical Clinics Press; 2008.
- [15]. Manser RL, Irving LB, Byrnes G, Abramson MJ, Stone CA, Campbell DA. Screening for lung cancer: a systematic review and meta-analysis of controlled trials. *Thorax* 2003; 58: 784-9.
- [16]. Bilello KS, Murin S, Matthay RA. Epidemiology, aetiology and prevention of lung cancer. *Clin Chest Med* 2002; 23: 1-25.
- [17]. Ebbert JO, Yang P, Vachon CM, Viekant RA, Cerhan JR, Folsom AR, et al. Lung cancer risk reduction after smoking cessation: observations from a prospective cohort of women. *J Clin Oncol* 2003; 21: 921-6.
- [18]. Song YM, Sung J, Cho HJ. Reduction and cessation of cigarette smoking and risk of cancer: a cohort study of Korean men. *J Clin Oncol* 2008; 26: 5101-6.
- [19]. Amal S. Ibrahim, et al. Cancer Incidence in Egypt. *Journal of Cancer Epidemiology*. 2014; 18: 10.
- [20]. Al Hasnawi S M, Al Mosawi A J, Amir A et al.,. Cancer in Iraq: Distribution by primary tumour site. *The New Iraqi Journal of Medicine*. 2009; 5 (1): 5- 8.
- [21]. Howlader N, Noone AM, Krapcho M. SEER Cancer Statistics Review, 1975-2012 [seer. cancer. gov/csr. 1975_2012/, based on the November 2014 SEER data submission, posted to the SEER website April 2015]. Bethesda, MD: National Cancer Institute. 2015.
- [22]. American College of Surgeons, Commission on Cancer. National Cancer Database, 2013 Data Submission. Chicago, IL: American College of Surgeons; 2015
- [23]. International Agency for Research on Cancer: Globocan 2012. Lyon, France, World Health Organization, *International Agency for Research on Cancer*, 2013.

- [24]. International agency for research on cancer. "World cancer fact sheet UK 2012." World Health Organization. [www. cancer researchuk.org](http://www.cancerresearchuk.org), 2014.
- [25]. Lindsey A. Torre, Rebecca L. Siegel, Elizabeth M. Ward, et al. Global Cancer Incidence and Mortality Rates and Trends: *Cancer Epidemiology, Biomarkers & Prevention*. 2016; 25:16-27.
- [26]. Bray F, Jemal A, Grey N, Ferlay J, Forman D. Global cancer transitions according to the Human Development Index (2008-2030): a population-based study. *Lancet Oncol*. 2012;13: 790-801.
- [27]. GBD 2013. Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2015; 385:117–71.
- [28]. Corazzari I, Quinn M, Capocaccia R. Standard cancer patient population for age standardizing survival ratios. *EUR J Cancer* 2004; 40: 2307–16.
- [29]. Ryabko BY, Stognienko VS, Shokin YI. A new test for randomness and its application to some cryptographic problems. *Journal of statistical planning and inference*. 2004 Jul 1;123 (2): 365-76.
- [30]. Yu XQ, Baade PD, O'Connell DL. Conditional survival of cancer patients: an Australian perspective. *BMC cancer*. 2012 Dec; 12 (1): 460.
- [31]. Gonlugur U, Gonlugur TE, Kaptanoglu M, Nadir A, Cinar Z. The changing epidemiological trends for carcinoma of the lung in Turkey. *Saudi medical journal* 2008;29(5):749-53.
- [32]. Demirci E, Daloglu F, Gundogdu C, et al. Incidence and clinicopathologic features of primary lung cancer: a northeastern Anatolia region study in Turkey (2006-2012). *Asian Pac J Cancer Prev* 2012, 14, 1989-93.
- [33]. Cancer Australia. Report to the Nation-Lung Cancer 2011. Cancer Australia, Sydney, NSW. 2011.
- [34]. Hippisley-Cox J, Coupland C. Identifying patients with suspected lung cancer in primary care: derivation and validation of an algorithm. *Br J Gen Pract*. 2011 Nov 1;61 (592): e715-23.
- [35]. Coleman MP, Forman D, et al: Cancer survival in Australia, Canada, Denmark, Norway, Sweden, and the UK, 1995–2007 (the International Cancer Benchmarking Partnership): an analysis of population-based cancer registry data. *Lancet* 2011, 377 (9760): 127–38.
- [36]. Rebecca L. Siegel, Kimberly D. Miller, Ahmedin Jemal. Cancer Statistics, 2017. *CA Cancer J Clin* 2017;67:7–30.
- [37]. Colditz GA, Sellers TA, Trapido E.. Epidemiology - identifying the causes and preventability of cancer? *Nature Rev Cancer*.2006: 75-83.