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INVESTIGATION OF CONTRIBUTING FACTORS TO LUNG CANCER IN NAJAF CITY

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Abstract:

Lung cancer is still one of the world's leading causes of illness and death, and a number of environmental, genetic, and lifestyle variables can contribute to its genesis. The purpose of this study is to assess the variables influencing the incidence of lung cancer in the Iraqi governorate of Najaf Al-Ashraf. We performed a thorough examination of patient medical records, environmental data, and lifestyle questionnaires from people who received a lung cancer diagnosis between 2015 and 2023. The study's main objectives were to evaluate the effects of smoking, air pollution, occupational risks, genetic predispositions, and socioeconomic status. According to (Tekeste 18), smoking accounts for around 65% of instances and is the main risk factor. The illness is also far more common in areas where workplace safety regulations are deficient and individuals are exposed to industrial toxins. Genetic factors are also very important, especially if there is a family history of cancer because family history of cancer/having a close relative with cancer. If two members of a family share at least 50% of their DNA, they are regarded as first-degree relatives. Parents, kids, and siblings are all included in this. If they share 25% of a person's DNA, grandparents, uncles, aunts, nephews, nieces, half-siblings, and double cousins are all regarded as second-degree relatives. They can reveal a heightened risk due to inherited gene mutations. Iraq, including Najaf, faces environmental challenges due to past conflicts, which may interact with genetic predispositions. Studies on breast cancer in Najaf, assessing family history, provide indirect insights into genetic influence. The prevalence of cancers like breast and colorectal cancer in the region suggests genetic factors play a role. Lower income groups are disproportionately affected, according to the socioeconomic study; this finding may be explained by their reduced access to preventative care and healthcare. This study emphasises that in order to reduce the incidence of lung cancer in the Najaf Al-Ashraf Governorate, focused public health initiatives, stronger environmental laws, and improved healthcare accessibility are required.

Key Words: Lung Cancer, Najaf Al-Ashraf, City, Smoking, Air Pollution, Genetic Predispositions, Socioeconomic Status

1. Introduction:

It is for this reason that Lung cancer is still consider a major issue of concern to the general public and still causes a large number of deaths globally. (Anand; et al 2097-2116)Despite the improvements in science and technology that has unveiled causes and means of treating this disease, it remains as one of the biggest threats to human life especially for those in the developing world and impoverished areas. Particularly in Iraq, lung cancer is categorized among the frequently diagnosed cancers in the region that exhibits worrisome incidence rates with significantly low survival rates (Chimed et al.5). It is therefore for these points that the Najaf Al-Ashraf Governorate, based in the central region of Iraq, is no exemption for this dark reality that lung cancer cases, and associated mortality rates are significantly higher than the national average (Kibret, et al. 2)

It conclusively shows that lung cancer has a global etiology and is influenced by multiple factors which interact in sequence or concurrently to cause the disease (Feuchtneret al 14). Tobacco smoking is acknowledged as the single leading cause of lung cancer across the world, however, other causes exist civil, environmental, occupation and hereditary factors also contribute to lung cancer (Solomon and Mulugeta 163-172)Smoking, air pollution, asbestos, certain minerals like radon, heavy metals, (Hailu et al 13) lung cancer and some work related exposures are well known risk factors for lung cancer. (Espina et al 40-51)Also, access to quality education, as well as quality and store-bought food contribute to an individual's risk of acquiring this sickness and so does genes. (Alaa, and Shah2339-2343), and (Pallari and Lewison 5159-5174) Knowing all those concrete factors that exert an impact on the lung cancer rates in the given area is going to be a very important step toward the creation of a valuable prevention and intervention program. (Adamek et al 151) and (Qarmicheet al 33) In general, it should be noted that there is much evidence concerning the high incidence of lung cancer, which prevails in the Najaf Al-Ashraf Governorate; however, the overall number of studies that aims to explain associated risks and their contributions towards disease occurrence are relatively low (Fanelliet al369-389) and (Tilahunet al 19) Consequently, this research will seek to contribute directly to filling this important knowledge gap by carrying out a comprehensive assessment of all the potential antecedent aspects related to lung cancer occurrence in the Najaf Al-Ashraf Governorate. (Richard et al and Casal-Mouriño et al 506-518) Based on the patient demographics and medical history, environmental records, questionnaires and other data of patients as well as other sources, this study looks to unveil major predisposing factors such as smoking history, air quality, working conditions, heredity, and social factors (Przybyła et al 537-546) and (Kang 402) The research conclusions can further discuss potentially directed health initiative programs, policy-making, and prevention strategies that will address the needs of the Najaf Al-Ashraf Governorate (Das et al548-558) and (Ribeiro et al 6277-6307) Out of them, there are strengths such as clarifying the contributions and likelihood of numerous risk; thus, healthcare practitioners and policymakers could easily prioritize and apply solutions to reduce lung cancer risks, encourage timely diagnosis, and provide quality treatment to the patients (Endalie et al961) Questioned members of the

general public in person using a complementary and alternative medicine (CAM) method that has been shown to be successful in determining cancer awareness. A total of 600 individuals were enrolled in the study via the use of a multistage sampling technique. Of these individuals, 315 were male and 285 were female. For the purpose of determining the level of cancer awareness, we employed one open-ended question in addition to ten closed-ended questions. Twelve of the questions were multiple-choice, and there was one question that was free-form. Logistic regression analysis was utilised to assess the link between sociodemographic status and awareness of cancer symptoms, risk factors, and signs. With respect to the closed-ended questions, the majority of respondents considered extreme tiredness to be a symptom of cancer, accounting for 80.7% of the total. Similarly, a comparable amount of respondents considered alcohol use to be a risk factor for cancer, namely 82.5 percent (Tekeste et al 18) Dehdarpresent a machine learning model that has the potential to predict characteristics linked with a delayed diagnosis of breast cancer. XG Boost, RF, NNs, and LR were the four machine learning algorithms that were used after the data of 630 women who had been diagnosed with breast cancer had been evaluated. Living in an urban location, having a history of breast sickness, having other medical illnesses, the age at which a woman gave birth for the first time, whether or not she was nulliparous, and marital status was major risk factors for a delayed detection of breast cancer. Risk factors for cancer are substantial, but the degree to which they are relevant is contingent on the degree to which they are related to the severity of the illness (Dehdar et al 13)

3. Objectives:

- To assess the causes of lung cancer in Iraq's Najaf Al-Ashraf Governorate.
- To compare the risks of lung cancer due to cigarette smoking, exposure to air pollution, occupational hazards, inherited susceptibilities, and socioeconomic position.
- To ascertain the weight that each risk factor had in predicting the total lung cancer incidence within the sample.
- To lower the lung cancer burden in the area by identifying high-risk populations and prospective targets for intervention techniques and preventative measures.
- To reduce the prevalence of lung cancer in the Najaf Al-Ashraf Governorate by recommending public health policies, environmental controls, and better access to healthcare based on evidence.

4. Statement of the Problem:

Therefore, it continues to be a big concern for public health all over the globe, and in particular in the Najaf Al-Ashraf Governorate of Iraq for that matter. The high incidence and death rates of lung cancer in this area may be attributed to a number of variables, including lifestyle factors, late stage illness, and the ineffectiveness of preventive, early detection, and treatment efforts. It is now common knowledge that the development of this fatal condition is influenced by a wide variety of factors, including the environment, the materials, and the alternatives that individuals choose in their day-to-day lives, in addition to the genes that they possess. The results of this research, on the other hand, do not provide a thorough knowledge of the particular elements that contribute to the risk of lung cancer within the Najaf Al-Ashraf Governorate. In contrast to the earlier studies, which focused mostly on large-scale national or even continental trends, the purpose of this study is to provide a contribution to the filling of a research gap concerning the socio-cultural, environmental, and demographic peculiarities of this particular governorate.

Because of this lack of understanding, there is a restriction placed on the creation and utilisation of interventions and protective measures that are culturally sensitive, correctly informed, and tailored to the group in question. In addition, there is a lack of understanding about the precursors of lung cancer among both the general public and medical professionals, which may contribute to another source of worry. This lack of information may result in a poorer prognosis and insufficient therapy of the potential causes of the disease. In order to provide a response to this essential area of practice, it is necessary to conduct a comprehensive investigation into the factors that may have contributed to the occurrence and prevalence of lung cancer in the Najaf Al-Ashraf Governorate. The goal of this investigation is to identify the factors that are sensitive to change.

5. Significance of the Study:

The results of this research have significant significance for improving our knowledge of the epidemiology of lung cancer and for controlling the disease not just in the NAG but also in other districts or regions of Iraq. The outcome will be vital in giving policy makers with critical mandates towards adopting focused intervention in the public health sector. This is because the research, which uses an extensive evaluation of the many ante toxicant risk factors for the incidence of lung cancer, will provide the findings. A unique environmental, occupational, and lifestyle focused awareness campaign, legal strategy, and behaviour modification plan will be developed with the assistance of the elements that are connected with the development of lung cancer. All of these things, which can lead to a reduction in the burden of lung cancer in the region, can be accomplished through the implementation of such initiatives, which can raise awareness and advocate for changes in lifestyle that are more conducive to a healthy lifestyle. It is also possible to formulate suitable screening and early diagnostic methods for patients if they are aware of how their genetic profile and/or social-economic position impact the prognosis. This allows patients to have a greater chance of obtaining the right diagnosis and treatment throughout the course of their disease.

The findings of the study will fill in gaps in the current body of literature and contribute to the advancement of scientific knowledge on the causes of lung cancer in patients all over the globe, particularly those who come from populations that have received little attention from researchers and who come from developing countries. This more in-depth understanding has been developed to have the potential to provide a foundation for further research studies and initiatives, as well as to encourage collaborative effort in the development of innovative techniques for prevention and repair. To summarise, the authors believe that this work, which was investigated with a great deal of attention paid to the context framework, will help to improve the health of the people, reduce the costs of lung cancer treatment, and serve as a reference for similar studies in other regions that have excessively high rates of lung cancer illness. This is because the authors believe that the current situation regarding the incidence of lung cancer in the presented region is extremely critical.

6. Research Methodology

Methods:

The governorate of Najaf Al-Ashraf has central geographic location in Iraq and is found about 160 kilometers south-west of Baghdad, the capital of Iraq. Najaf Al-Ashraf has a total area of 28824 square kilometers, and thus is one of the largest governorates in the country. A population-based face-to-face interview was conducted applying a validated cancer awareness measure (CAM) tool. Total of (203) adults (107) males and (96) females were recruited using a multistage sampling technique. One open-ended and ten closed-ended questions were used to assess awareness of cancer signs and symptoms. To assess awareness of cancer risk factors, one open-ended and twelve closed-ended questions were used. Logistic regression analysis was used to test the association between sociodemographic status and awareness of cancer signs, symptoms, and risk factors. A case-control study was carried outpatient Najaf Al-Ashraf oncology center through the period from 08 May to 02 September 2023.

Sampling:

The most convenient sample that includes 203 patients that are available.

Case:

A specialised diagnosis was made, and the patient was sent to the centre.

Controls:

Matched in terms of age and gender.

People in a family are considered to have a first degree relative if they share at least half of their DNA with that person. This includes parents, children, and siblings. Uncles, aunts, nephews, nieces, grandparents, half-siblings, and double cousins are all considered second-degree relatives if they share 25% of a person's DNA. Interviewees who are currently smokers are those who have smoked in the past but are not now quitting. It encompasses Cigarette smoking duration, average daily cigarette consumption, age at first light (in years), and number of packs smoked. Also we examined variations in cigarette smoking by socioeconomic status (education and poverty status) in relation to population sociodemographic characteristics (age, region and sex)

Data Collection:

After examining prior research, data for lung cancer patients' risk variables were acquired by direct observation using a standardised questionnaire. Patient demographics, risk factors (such as smoking, radon exposure, and family medical history), and other information is gathered via the questionnaire. “Everyone in a family may be considered a first-degree relative if they share at least half of their DNA with another family member. This includes parents, children, and siblings. Uncles, aunts, nephews, nieces, grandparents, half-siblings, and double cousins are all considered second-degree relatives if they share 25% of a person's DNA.

Measurement of Radon:

The alpha guard professional radon monitors a state-of-the-art instrument for studying radiation and, in particular, for measuring radon gas values, was utilised in patient rooms in collaboration with the Najaf Al-Ashraf environment directorate. The World Health Organisation (WHO) has established a normal value for radon gas at 100Bq/M3.

Statistical Technique:

Plain old frequency, percentage, mean, standard deviation, and range (low to high numbers) were used to display the data. Odd ratio, confidence interval around odd ratio and the importance of distinct means (quantitative data).

Statistical Analysis:

The Statistical Package for the Social Sciences (SPSS/version 25) was used for data analysis.

7. The Results of the Study:

General characteristics of the study participants table 1 show the general characteristics of the study participants. The awareness of cancer signs and risk factors was assessed among (203) Najaf residents aged 18 and older. The majority of the study participants (67%) were between the ages of 18 and 39. About 47.29 %of participants were women, 48.27 % were married, and 53.68 % had completed post-secondary education. More than 30% of the participants had a monthly income of more than 500000 Dinar, and 20.68% were government employees.

Table 1: General characteristics of the study participants (N = 203)

Socio-Demographic Characteristics		**Number**	**%**
Gender	Male	107	52.7
	Female	96	47.29
	Single	84	41.37
Marital Status	Married	98	48.27
	Divorced	12	5.91
	Prefer not to say	9	4.43
Education Levels	Illiterate	15	7.38
	Primary	22	10.83
	Secondary	48	23.64
	Degree and above	72	35.46
	Diploma	37	18.22
	Prefer not to say	9	4.43
Employment	Unemployed	29	14.28
	Governmental Organization	42	20.68
	Non-Governmental Organization / Private	104	51.23
	Retired	9	4.43
	Prefer not to say	19	9.35
Age in Years	18-29	76	37.43

	30-39	61	30.04
	40-49	33	16.25
	50-59	17	8.37
	≥ 60	16	7.88
Monthly Income	> 500000 Dinar	63	31.03
	≤500000 Dinar	50	24.63
	Prefer not to say	90	44.33

The results in Table 2 revealed that 8.3% of patients with lung cancer had a personal or family history of the disease, with 3.9% having a first-degree relative and 4.4% having a second-degree relative. There was a 23.6% likelihood of lung cancer in patients with a history of any other kind of cancer in their families; 3.9% of these cases were first degree and 19.7% were second degree.

Table 2: Cancer risk in families: a comparison of cases and controls

Variables		**Family History of Lung Cancer**		**No Family History**	**Family History of Other Cancer**		**No Family History**
		First Degree	**Second Degree**	-	**First Degree**	**Second Degree**	-
(Cases)	No.	8	9	186	8	40	155
	%	3.9	4.4	91.6	3.9	19.7	76.4
Controls	No.	-	1	202	3	12	188
	%	-	0.5	99.5	1.47	5.9	92.6
OR		8.69	9.77	Reference	3.23	4.04	Reference
95% C.I		0.08-70.03	1.23-77.89	Reference	0.84-12.40	2.05-7.98	Reference
P-Value			0.009		0.071	0.0001	

It was shown in table 3 that 75.8% of patients with lung cancer were smokers at the time of diagnosis. Compared to non-smokers, current smokers have a threefold increased chance of investigation.

Table 3: The link between smoking and lung cancer

Smoking Habits		**Current Smoker**	**Passive Smoker**	**Not Smoker**
Lung Cancer (cases) 203	No.	154	32	17
	%	75.8	15.7	8.5
Controls 203	No.	140	42	21
	%	69	20.7	10.3
OR		3.07	0.94	Reference
95%C.I		0.65 -2.47	0.43-2.07	Reference
P-value		0.496		

Workers in the brick industry, those who handled pesticides and chemicals in the course of their jobs, those who were in the vicinity of an asphalt factory, and people who operated generators are among the others.

Table 4: Linkage of additional risk variables to lung cancer in the population under investigation

Risk Factors and Duration of Exposure	**Lung Cancer (Cases) 203**		**Controls 203**		**OR**	**95% C.I**	**P-Value**
	No.	**%**	**No.**	**%**			
Asbestoses Exposure	25	12.3	8	3.9	3.42	1.51-7.79	0.002
Duration (Years)	13.8± 6.9 (2 - 33)		12.6± 2.4 (9- 17)			0.628	
Beryllium Exposure	46	22.7	18	8.9	3.01	1.68-5.41	0.0001
Duration (Years)	16.6± 5.8(7 -29)		18.9± 7(11- 32)			0.177	
Cadmium Exposure	11	5.4	2	1	5.76	1.26-26.32	0.011
Duration (Years)	9.5± 3.4 (3- 14)		8.5 ± 4.9(5- 12)				
Chromium Exposure	9	4.4	4	2	2.31	0.70-7.62	0.159
Duration (Years)	12.1 ± 6.6 (5 -28)		12.8± 1.3(11- 14)			0.855	
Diesel Exposure	27	13.3	7	3.4	4.30	1.83-10.11	0.0001
Duration (Years)	9.8 ± 5.2(3 -27)		7.9 ± 2.9 (4- 12)		0.361		
Others*	31`	15.3	26	12.8	1.23	0.70- 2.15	0.475
Duration (Years)	14± 11.2 (2-52)		12.5 ± 7.1(4-34)		0.558		

The Results in table 5demonstrated that a significant connection was observed between exposure to beryllium (22.7%), diesel exhaust (13.3%), asbestos (12.3%), and cadmium (5.4%)

Table 5: Results demonstrated that a significant connection was observed between exposures

Risk Factors and Duration of Exposure	**Lung Cancer (Cases) 203**		**Controls 203**		**OR**	**95% C.I**	**P-Value**
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Duration (Years)	14± 11.2 (2-52)		12.5 ± 7.1(4-34)		0.558		

In this graph, we can see the radon level in seventy-seven lung cancer patients. The radon levels were all within the acceptable range. There was a p-value of 0.0001 for the exposure length of 21.2±6 range (5 - 32).

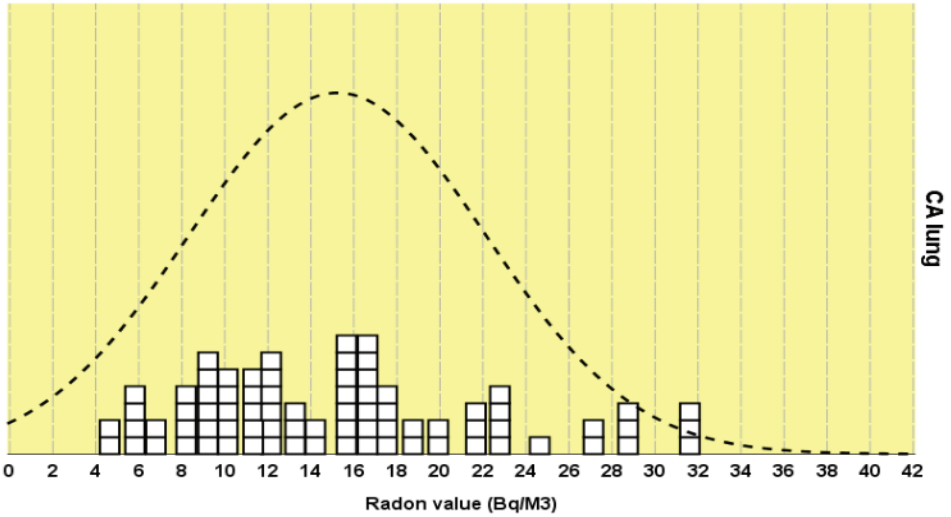

Figure 1: The radon value distribution among lung cancer patients.

Discussion of the Study Results:

The study was conducted at the oncology centre in Najaf city, which treats all lung cancer patients in the governorate, and found that smoking, being 60 years of age or older, and living in a rural area were the main factors associated with lung cancer risk factors in the city. In addition to differences in smoking patterns, Torre et al. and Kim et al. reported that lung cancer rates varied by sex, age, socioeconomic status, and geographic distribution. In the United States, lung cancer rates were higher among males, lower socioeconomic status, and rural areas. Yet over half of all lung cancer diagnoses and deaths occur in low- and middle-income nations annually. According to the findings of this study, the age group ranging from 60 to 69 years had the highest percentage of instances, which was 43.3%. Lung cancer was detected in a much higher percentage of males (89.5%) than in females. The findings of this study are in accordance with those of earlier studies demonstrating that smoking increases the risk of lung cancer compared to non-smokers, men over females, and those aged 50 and above. Because men are more likely to smoke, be exposed to second-hand smoke, have different sorts of employment, 43and have other risk factors, the gender disparity may be explained by the fact that men are more likely to have these risk factors. This study, along with previous studies, has shown that smoking cigarettes is a significant contributor to the development of lung cancer." These studies have also demonstrated that the incidence of lung cancer among current smokers is three times higher than that of non-smokers. In line with the results (Von et al and Schober et al 1763-68) who also found that lung cancer was more prevalent in rural regions than in ones, the current investigation likewise revealed that 71.4% of patients resided in rural areas. This conclusion is consistent with the findings of an earlier study (Mukaka et al 69-71)

The results of this study demonstrated that the chance of developing lung cancer was dramatically elevated by 22.7%, 13.3%, and 12.3%, respectively, when individuals were exposed to beryllium, diesel exhaust, and asbestoses. The findings were in line with those gained from earlier study. Based on the findings of these studies, it has been shown that exposure to radon, asbestos, beryllium, cadmium, chromium, and diesel exhaust are significant risk factors for lung cancer (Tang et al 83-92) and (Joseph et al 531-538)

Cadmium, diesel exhaust, and cadmium are some of the other occupational hazards that might be encountered. It was shown that patients who had lung cancer had a higher likelihood of having a first-degree relative who also had the condition. (Zhang et al) There was an 8.7 times greater likelihood that a patient with lung cancer had a first-degree relative who was also affected by the illness. This is consistent with the results of a study that suggested that there may be an increased risk of lung cancer among close relatives, especially in situations where the relative was diagnosed at a younger age. The degree to which genetics plays a role in this risk is uncertain (Ibrahem et al 1545-1556)

There were a number of limitations that prohibited us from incorporating all of the examples, despite the fact that the research's handy sample included all of the instances that were available at the time of the inquiry. Because only 77 individuals were included in the radon levels measurement, it is possible that the results may not accurately reflect the total patient group. There was only one radon gas measurement device available at the directorate of environment in Najaf Al-Ashraf, and the distance between the homes of the patients was too considerable. This is the reason why this occurred (Wang et al 1-13)

8. Conclusion:

Cancer signs awareness was lower in those aged 60 and older, as well as those who were illiterate. Individuals aged 60 and older also had a low awareness of cancer risk factors. Thus, the above-mentioned groups may benefit more from public health campaigns aimed at raising their awareness of cancer signs, symptoms and risk factors. Although the Iraqi government authorized the integration of cancer education into all public health facilities in the country but elderly people are less likely to benefit from

such programs because financial constraints inhibited them from seeking medical help, visiting health institutions, and benefiting from cancer education provided in public health facilities.

The most significant risk factors for lung cancer in the city of Najaf include smoking, being a male, being at least sixty years old, and residing in a rural area. There is a very significant link between smoking and the occurrence of lung cancer, as shown by a p-value that is less than 0.05.The results presented in this article reflect the profile of lung cancer in Al Najaf city. The prevalence of lung cancer in this city is almost similar to that reported previously in Iraq and some neighbouring and regional countries.

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