

Arsenosis is one of the Predisposing Factor of Carcinoma of Lung in Non- Smokers

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Abstract: The cause of lung cancer is commonly ascribed to tobacco smoking. Arsenic is the prominent non-tobacco carcinogens strongly associated with lung cancer carcinoma. The study identified 65 lung cancer cases and 40 controls, in which 46 males and 19 females, histologically 52 cases of Squamous Cell Carcinoma of lung and 13 were Adenocarcinoma of lung. These 65 diagnosed cases all are non-smokers. The arsenic in the samples was determined by Atomic Absorption Spectrophotometry. We examine the relationship between lung cancer and arsenic in a case-control study involving patients diagnosed with lung cancer between 2011 and 2012 and controls. The blood samples were collected from the Department of Oncology, NIMRA Centre, LUMHS, Jamshoro. The results indicate that the level of arsenic was significantly higher in non-smokers as compared to controls ($p < 0.01$). This study confirms the increased risk of lung carcinoma in non- smokers in relation to Arsenic concentrations in blood and water.

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1. Introduction

Humans are exposed to arsenic through environmental and occupational sources. Lung cancer is known to be caused by occupational exposure to arsenic via inhalation [1]. The most extensive human exposure to arsenic, however, results from naturally occurring arsenic in drinking water, long known to be a cause of cancer. Unexpected facts, originating from studies in Asia, indicated that the ingestion of arsenic also increases mortality from cancer originate in different inside positions including lungs. [2–9]. Further evidence of an association between the intake of arsenic and increased lung cancer risks, it is reported that in Japan involving residents using well water contaminated with arsenic [10].

The purpose of the present study was to examine arsenic and lung cancer in non-smokers with individual assessment of exposure based on arsenic concentrations in serum samples.

The International Agency for Research of Oncology has classified arsenic in drinking water as a known cause of human cancer of the skin, bladder, and lung [4]. Numerous studies have shown that the human lung is especially susceptible to ingested arsenic [5–9] and some data suggest that lung cancer is the most common cause of death from arsenic in drinking water [10].

Arsenicosis, arsenic toxicity due to chronic exposure, manifests itself as a variety of diseases of the dermal, cardiovascular, nervous, hepatic,

hematological, endocrine and renal systems [11, 12]. The lifetime mortality from arsenic-related internal cancers has been estimated to be doubled due to arsenic in drinking water in Bangladeshi population, compared with historical estimates in the absence of arsenic exposure [13].

2. Material and Methods

The blood samples were collected from Department of Oncology, NIMRA, LUMHS, Jamshoro. A questionnaire containing a comprehensive record of all patients was completed from each patient. Digital X- ray and CT Scan Chest were being done for all patients. For each residence, participants were asked about drinking water sources (Private well, Community Supply, Bottled water, or other) and filter use at the time they lived there. Questions regarding tobacco covered ages when smoking started and stopped. Histologically reports also showed that 52 cases were of Squamous Cell Carcinoma of lung and 13 were Adenocarcinoma of lung.

Chemicals, Reagents and Stock Solutions and working Metal standards

Concentrated nitric acid (65%) and hydrogen peroxide (30%) were obtained from Merck (Darmstadt, Germany) and Working standard solutions of Arsenic, was prepared prior to their use by stepwise dilution of certified standard solutions

(1,000 ppm; Fluka Kamica, Buchs, Switzerland) in 0.2 M HNO₃.

All chemicals were of analytical grade.

Statistical analyses were performed with Excel X State computer program (Microsoft Corp., Redmond, WA, USA)

Demographic Table

65 diagnosed cases (non-smokers)	46 males 19 females)
40-50 years	7 males 3 females = 10 cases
51-60 years	9 males 4 females = 13 cases.
61-70 years	18 males 09 females = 27 cases
>71 years	12 males 3 females = 15 cases.

3. Results

The mean concentrations with standard deviations for Arsenic in the samples are shown in Table 1 and Fig: 1 the levels of blood Arsenic were found to be in patients 6.07 ± 0.31 and in controls 2.04 ± 0.21 . All values are shown as mean \pm SEM

Table: 1

Metal	Patients	Controls
Arsenic	6.07 ± 0.31	2.04 ± 0.21

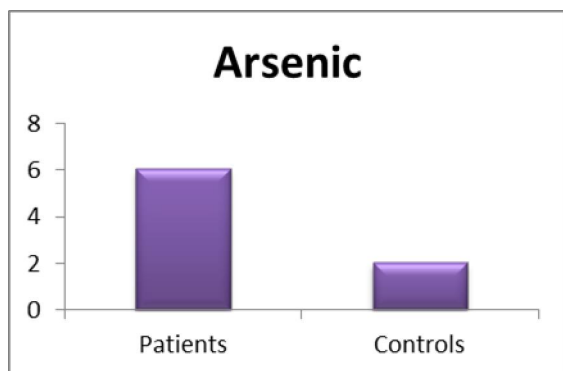


Fig: 1: shows arsenic levels with controls

4. Discussions

In the present study, we determine level of arsenic in serum samples of patients with lung carcinoma in non- smokers persons. We observed a high level of arsenic in serum samples in patients as compared with the controls. Results of this study suggested that peoples in this case control with a history of non-smoking and the effect of arsenic exposure from drinking water may be more susceptible to incident of lung cancer.

Chronic arsenic exposure is well established as carcinogenic but interest in the non-cancer disease endpoints of arsenic exposure is of great interest. The non-cancer disease endpoints include cardiovascular disease [14] and immune dysfunction [15], as well as neuropathies and ocular diseases [16, 17, and 18]. In the present study, we focused on blood samples of lung carcinoma in non- smoker's in a population exposed to high levels of arsenic in serum.

Arsenic is also a known carcinogen [19]. There is an evidence of an increased risk of bladder and skin cancers following the consumption of water with high arsenic contamination, and a risk of lung cancer following smoking as well as non-smoking [20, 21]. A causal association has been established between the exposure to environmental tobacco smoke and lung cancer, with a relative risk in the order [22, 23]. The arsenic levels in the serum and blood cells correlate with worsening kidney disease, with the development and progression of chronic kidney disease, which are attributed to arsenic-induced oxidative stress [24].

A problematical situation is noticed in Pakistan and other countries, where people are chronically exposed to as from contaminated groundwater due to lack of pure and clean drinking water; however, there are some other co-factors that increase or accelerate the toxic effects of Arsenic, i.e., malnutrition and smoking [25]. The high levels of arsenic in the aquatic environment may cause tracheobronchitis, rhinitis, and pharyngitis, shortness of breath, nasal congestions, and black foot disease [26].

The role of gender on respiratory effects remains somewhat unclear. It is reported that, two studies from India a higher risk for respiratory symptoms in males, while one from Bangladesh found a higher risk in females. [27,28] Interestingly, one study reported a higher risk for respiratory symptoms among males, but observed statistically significant effects only among females exposed to high levels of As.11 We found that there was a higher risk in females compared with males (HR 1.35, 95% CI 1.17 to 1.56) after adjusting for smoking status. The dose response relationship between as exposure levels and respiratory symptoms however does not differ appreciably by gender (data not shown). Other factors such as nutritional factors and indoor air pollution from cooking might explain some of the differences in risks across gender [11 25 28]; however, more research is needed to uncover the underlying mechanisms.

5. Conclusion

It is concluded that arsenic in blood is not only associated with an increased level of reactive oxygen radicals but is also inversely related to the antioxidant capacity in plasma of humans. The results of this study indicate that arsenic is a significant

environmental toxicant that increases the risk of Cancer. More research is still needed to understand arsenic exposure, metabolism, effects, and for cancer. This knowledge will lead to better protection of populations at risk from arsenic-related illnesses.

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