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Epidemiology of lung cancer and approaches for its prediction: a systematic review and analysis

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Abstract

Background: Owing to the use of tobacco and the consumption of alcohol and adulterated food, worldwide cancer incidence is increasing at an alarming and frightening rate. Since the last decade of the twentieth century, lung cancer has been the most common cancer type. This study aimed to determine the global status of lung cancer and to evaluate the use of computational methods in the early detection of lung cancer.

Methods: We used lung cancer data from the United Kingdom (UK), the United States (US), India, and Egypt. For statistical analysis, we used incidence and mortality as well as survival rates to better understand the critical state of lung cancer.

Results: In the UK and the US, we found a significant decrease in lung cancer mortalities in the period of 1990–2014, whereas, in India and Egypt, such a decrease was not much promising. Additionally, we observed that, in the UK and the US, the survival rates of women with lung cancer were higher than those of men. We observed that the data mining and evolutionary algorithms were efficient in lung cancer detection.

Conclusions: Our findings provide an inclusive understanding of the incidences, mortalities, and survival rates of lung cancer in the UK, the US, India, and Egypt. The combined use of data mining and evolutionary algorithm can be efficient in lung cancer detection.

Keywords: Lung cancer, Incidence and mortality rates, Data mining, Evolutionary algorithms

Background

Worldwide, lung cancer is the leading cause of cancer-related death. However, according to the latest medical research reports [1–3], if the nature and symptoms of cancer are correctly identified at an early stage, it can be cured. The cancer spreads to other parts of the body through the blood and lymphatic system, which is a process called metastasis, and then quickly causes the development of secondary tumors [4]. Some high-risk factors like smoking, breathing polluted air, and living in a polluted area can negatively affect the prognosis and quality of life of lung cancer patients [1, 5]. Lung cancer can also be hereditary [2].

At the beginning of the twentieth century, the incidence of lung cancer was very low, but now its incidence is increasing rapidly [4, 6]. According to the GLOBOCAN 2012 report, there have been 1.8 million new cases (incidence) of lung cancer globally, constituting 12.9% of the total estimated cancer incidence in the year 2012 [2]. Of these cases, 58.0% are from the underdeveloped countries [2]. Hungary had the highest incidence of lung cancer (51.6%), followed by Serbia (45.6%) and Korea (44.2%) [2]. In 2012, lung cancer incidences for both men and women were highest in North America; the incidences were lowest in Africa, followed by Latin America and the Caribbean. In the same year, incidence of lung cancer in men was highest in Hungary (76.6%), followed by Armenia (72.9%) and Macedonia (44.2%) [2]. In India, the lung cancer mortality is high [7]. In 2012, the World Health Organization (WHO) reported that, worldwide, lung

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