

Epidemiological Features of Extrapulmonary Tuberculosis Detected Among the Military Personnel Serving in the Armed Forces of the Republic of Azerbaijan

S. B. Ahmedov and E. S. Jafarov*

Military Academy of the Azerbaijan Armed Forces - War College of the Armed
Forces, Republic of Azerbaijan, Baku, Azerbaijan

*Corresponding author

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Abstract

Background: The study is dedicated to the analysis of the epidemiological features of early detected extrapulmonary tuberculosis among the military personnel of the Armed Forces of the Republic of Azerbaijan served between 2009 and 2018.

Methods: Retrospective cohort study of extrapulmonary tuberculosis patients (military personnel) admitted to the Armed Forces Pulmonary Diseases Hospital (AFPHD). An analysis has been conducted based on the medical records of the servicemen discharged from the Army due to extrapulmonary tuberculosis, the features of the epidemic process have been studied and the results have been assessed.

Results: The incidence of disease by age group, duration of service and seasonal frequency have been examined on the basis of the medical records of 18 to 49 year old military personnel diagnosed with extrapulmonary tuberculosis in the Armed Forces Pulmonary Diseases Hospital (AFPHD). The conscripts were grouped into three age bands (18-21, 22-29, 30-49), the duration of service was divided into three groups, with the first 0-3 months, 3-6 months and more than 6 months of military service.

Conclusion: This is the first study of extrapulmonary tuberculosis in the Armed Forces of the Republic of Azerbaijan and showed increasing trends in noti-

fied extrapulmonary tuberculosis cases over the last years. Extrapulmonary tuberculosis have been observed among the personnel of the Armed Forces of the Republic of Azerbaijan in all years involved in the study. The incidence of extrapulmonary tuberculosis was high in the 18-21 age group and after 6 months of military service.

Keywords: military personnel, extrapulmonary tuberculosis (EPTB), age groups, duration of military service (military service period), seasonality of tuberculosis.

Introduction

Tuberculosis (TB) is the biggest public health problem in the world. The World Health Organization (WHO) estimated 10.4 million TB cases and 1.67 million TB deaths in 2017 [1]. The two types of clinical manifestation of TB are pulmonary TB (PTB) and extrapulmonary tuberculosis (EPTB). The former is most common [1]. Although TB mostly damages the lungs, an EPTB can also affect other organs. 16% of the 6.3 million new tuberculosis cases recognized by the WHO in 2017, were EPTB cases. Studies in developed countries over the past few decades have shown that EPTB cases account for an increasing proportion of total TB cases. The term EPTB refers to various clinical forms of TB localized outside the pulmonary parenchyma. There is no organ in the human body that is not infected with tuberculosis. The most common anatomic sites affected by EPTB are the lymph nodes, pleura, bones and joints and meninges genitourinary organs [2,3].

A variety of factors associated with EPTB have been discussed in the literature. Age, gender, origin/extraction and human immunodeficiency virus (HIV) infection are primary risk factors for EPTB [1]. Padberg and et al. examined the distribution of age, sex, place of birth, seasonality and recurrence of TB disease in different types of TB organ manifestations [4]. Ramirez-Lapausa, et al., Sharma and Mohan elaborated on the types of EPTB and introduced the measures for treatment [5,6]. Forssbohm, et al. examined demographic characteristics of patients with extrapulmonary tuberculosis in Germany [7]. Gomes, et al. introduced a hierarchical model on the epidemiology of extrapulmonary tuberculosis in Brazil [8]. Taj Eldin Mohammedin Abdallah, et al. discussed epidemiology of EPTB in Eastern Sudan [9]. According to the studies conducted in the United States, lymph node tuberculosis and tuberculous pleurisy account for the largest proportion of EPTB cases. EPTB cases are more prevalent among the males. Pleural tuberculosis, for example, accounts for 67% [10].

Due to the improvement of social situation and the availability of effective drugs against TB, the number of TB cases in industrialized countries had been steadily declining. This decline was halted between 1985 and 1992 due to the weakening of TB prevention and control programs, the increase in HIV infection, and the surge in the number of people migrating from countries where TB is more prevalent. Although the overall number of TB cases decreased, the low incidence

of EPTB has not been observed, leading to an increase in it compared with PTB. In the United States, for example, EPTB accounted for 15.7% of all TB cases in 1993 and 21% in 2006 [11]. Generally speaking, there was downward trend in the cases of TB in Azerbaijan from 2009 till 2018. If in 2009, the incidence of TB was at level of 133 cases per 100,000 people, in 2018, this figure was 63 [12]. In 2008-2010, EPTB accounted for 20.1% among primary patients in Azerbaijan [13,14]. New army conscripts, policemen and prison employees, medical staff, and other related occupations are included in the risk groups for tuberculosis.

The objective of the study is to conduct a retrospective epidemiological analysis of the medical records of discharged servicemen with an initial diagnosis of EPTB among the military personnel.

In order to achieve this objective, the following tasks have been set:

- analysis of multi-year distribution of EPTB based on the medical records of the military personnel involved in the study (with percentage);
- study of distribution dynamics of the EPTB by the age groups among the military personnel;
- comparative study of multi-year dynamics of EPTB among the military personnel in terms of the duration of the military service;
- comparative analysis of indicators of the EPTB epidemic process among the military personnel with regard to seasons.

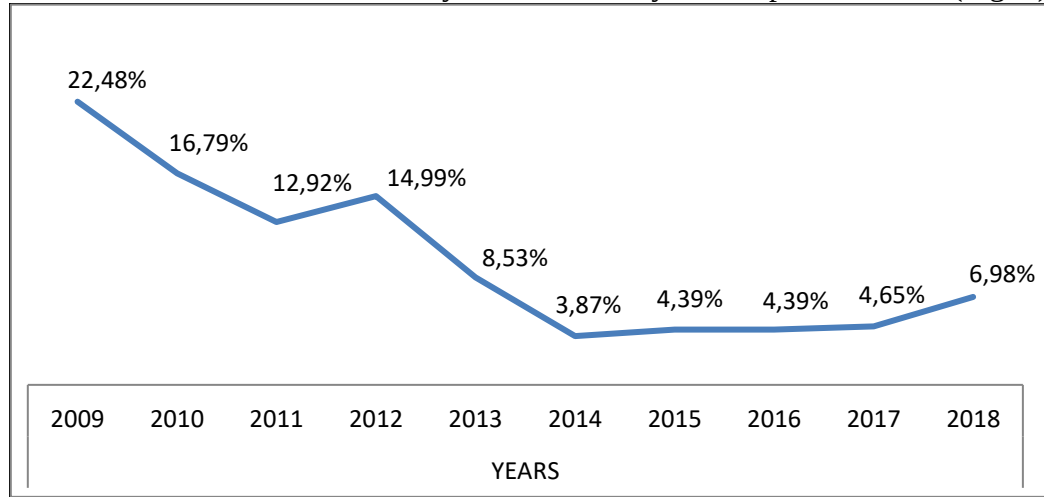
Materials and Methods

Periodic medical reports, archival materials (epidemiological anamnesis, medical histories and medical certificates) and official statistical data about the disease were used as the basis of the research. The research was carried out on the basis of medical documents of 18-49 year-old military personnel who were admitted to the Armed Forces Pulmonary Diseases Hospital (AFPDH) with tuberculosis from the military units located in various geographical regions of the Republic of Azerbaijan and then were discharged from the Army between 2009 and 2018. This age group has been included in the study, since the vast majority of the military personnel serving in the army are in the 18-49 age range. During the study, the clinical forms were classified in accordance with the International Classification of Diseases (ICD-10) on the basis of medical certificates of the military personnel discharged from the AFPDH with the diagnosis of EPTB. Male and female servicemen were generally examined in the analysis.

The final diagnosis was made as a result of complex subjective and objective examinations, radiation diagnostic, clinical and laboratory analysis of all patients and was approved by the doctors and experts of Main Clinic Hospital of the Armed Forces, the Scientific-Research Institute of Pulmonary Diseases and Central Military Medical Commission. Mathematical processing of the obtained results was carried out with the help of statistical analysis program of MS office package (Excel 2013 for Windows 2013).

Results and Discussion

The incidence of disease among the military personnel discharged with the diagnosis of EPTB has been studied in regard to age groups, duration of military service and seasons using the archival materials of the AFPDH. The incidence of EPTB in 2009-2018 has been analyzed on a multi-year comparative basis (Fig. 1).



(Source: medical reports of the AFPDH)

Figure 1. Multi-year distribution dynamics of the patients with total EPTB from the AFPDH in 2009-2018

In the 10 years involved in the study, the highest percentage of total EPTB cases occurred in 2009 (22.48%) and the lowest in 2014 (3.87%). Although there has been a downward trend in the incidence of EPTB among the military personnel in all years, an upward trend has been observed in some years. In the first 5 years of analysis (2009-2014), with the exception of 2012, there was a downward trend in the distribution of EPTB. After 2014, the increase in EPTB frequency (frequency of occurrence) has been observed.

The military personnel, who were admitted to the AFPDH with the diagnosis of EPTB in 2009-2018 and discharged from the army due to this disease were divided into 3 age groups (18-21, 22-29 and 30-49). The distribution of EPTB incidence in these age groups has been comparatively analyzed (Fig. 2).

The military personnel in the 18-21 age group are predominantly conscripts. The majority of the personnel in the 30-49 age group are those who serve on a voluntary basis.

During the years involved in the study, 83.54% of the total number of EPTB cases fell in the 18-21 age group, 14.14% in the 22-29 age group and 2.32% in the 30-49 age group. EPTB cases were observed in all years of age groups 18-21 and 22-29. In the first 7 years of analysis (2009-2015), no cases were reported in the 30-49 age group, except for 2011.

The highest incidence of EPTB occurs in the 18-21 age group. The incidence rate in the 18-21 age group was high in 2009 (95.4%). The lowest incidence in the 18-21 age group was observed in 2018 (42.86%).

The incidence of EPTB was observed in all years in the age group 22-29. In 2018, the highest incidence of EPTB was in the age group of 22-29 (39.28%). The lowest incidence in the 22-29 age group was in 2009 (4.6%). In the 22-29 age group, with the exception of some years (2014; 2016), there has been an increasing trend in the proportion of EPTB cases over the years.

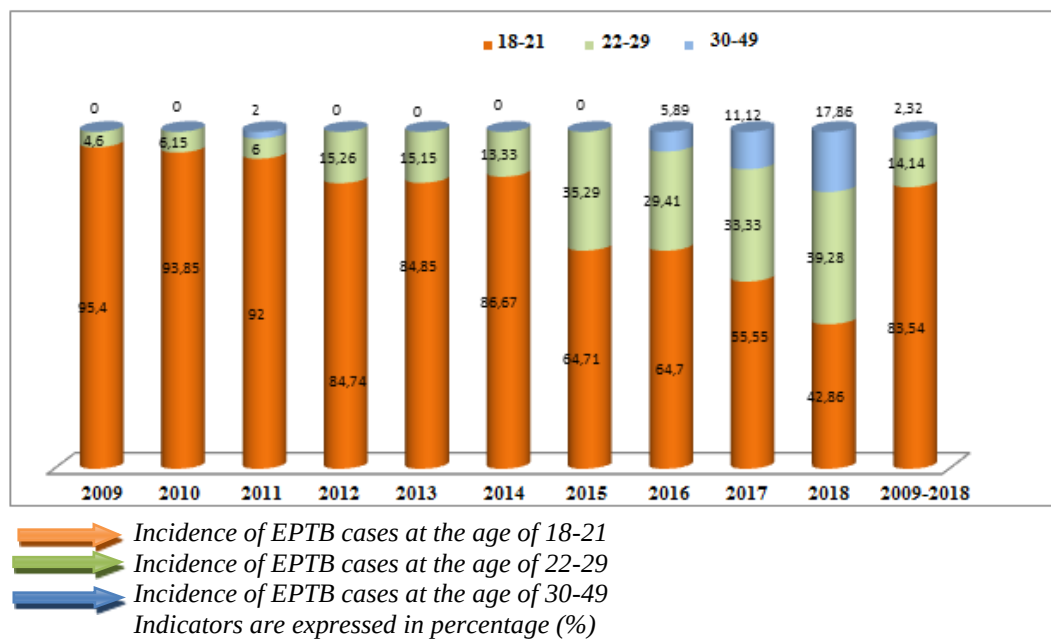


Figure 2. Comparative analysis of the distribution dynamics of the EPTB cases by age groups among the military personnel of the Armed Forces of the Republic of Azerbaijan in 2009-2018

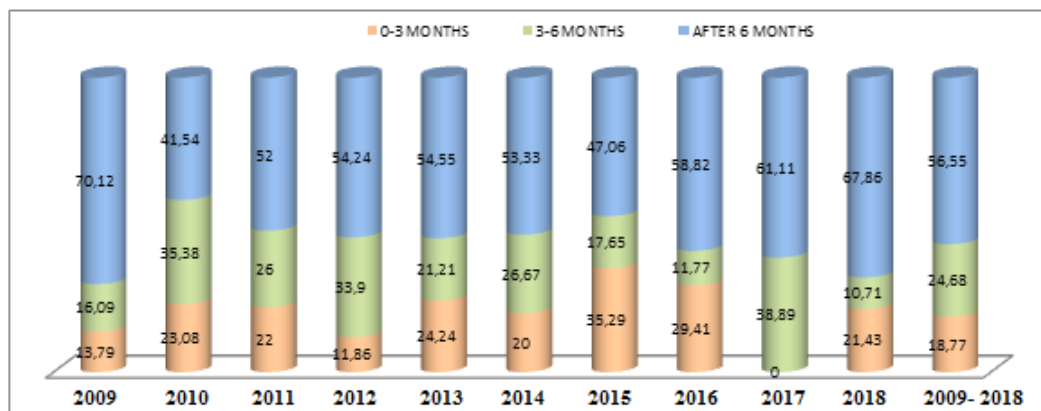
Considering the 10 years involved in the study, an upward incidence rate (increasing trend) was observed in the age group 30-49 in 2016-2018. The highest incidence of EPTB in the 30-49 age group was in 2018 (17.86%). A surge in the number of personnel enrolled in the military on a voluntary basis in the 20-35 age group since 2014 has led to an increase in the incidence of EPTB among the 30-49 age group.

In 2012-2013, the incidence in the 18-21 and 22-29 age groups was almost equally distributed. In 2012-2013, there were no cases of EPTB in the age group 30-49.

According to the legislation of the Republic of Azerbaijan, the duration of military service of conscripts with secondary education, incomplete higher education and extramural or correspondence education is 16 months and with bachelor's or master's degree is 12 months.

In 2009-2018, the incidence of EPTB in the AFPDH was studied in the following groups of patients:

- the first three months (0-3 months);
- the second three months (the 3rd-6th months);
- after 6 months of military service (Figure 3).



-  Distribution of EPTB cases in the first 3 months of military service (0-3 months)
 Distribution of EPTB cases in the 3rd-6th months of military service
 Distribution of EPTB cases after 6 months of military service

Figure 3. Comparative analysis of the distribution of EPTB cases among the military personnel of the Armed Forces of the Republic of Azerbaijan in 2009-2018 with regard to the duration of the military service (%)

The periods of military service are grouped as 0-3 months, 3-6 months and after 6 months of service. 18.77% of the average incidence of EPTB with regard to the duration of service was found in the first three, 24.68% in the second three months of military service and 56.55% after the sixth month of military service.

EPTB has been observed in all years involved in the study, except for the first three months of service in 2017. 38.89% of cases in 2017 was observed in the second three months of military service and 61.11% after sixth months of military service. The highest incidence of the first three months of military service was in 2015 (35.29%) and the lowest in 2012 (11.86%) according to the average multi-year indicator (18.77%).

Incidence of EPTB has been observed in the second three months of the military service in all years involved in the study. The average incidence of total EPTB cases in the second three months of military service was 24.68%. The highest incidence occurred in 2017 (38.89%). In 2017, due to the absence of disease incidence in the first three months of military service, there was an increase in the proportion of EPTB in other periods of service, i.e. in the second three months and after the sixth month of military service. The lowest incidence of EPTB in the second three months of military service was observed in 2018 (10.71%).

Incidence of EPTB has been observed after the sixth months of the military service in all years involved in the study. The average incidence of total EPTB after the sixth months of military service was 56.55%. The incidence of EPTB after the sixth months of military service was higher than in other years of service (the first and second three months of military service). The highest incidence rate after the sixth months of military service was observed in 2009 (70.12%) and the lowest in 2010 (41.54%)

According to the legislation of the Republic of Azerbaijan, conscription is carried out four times a year - in January, April, July and October. In 2009-2018, the percentage distribution of the personnel discharged from the Army with a diagnosis of TB in accordance with the seasons has been calculated. The analysis of the results obtained by the indicators of the seasons is shown in Fig 4.

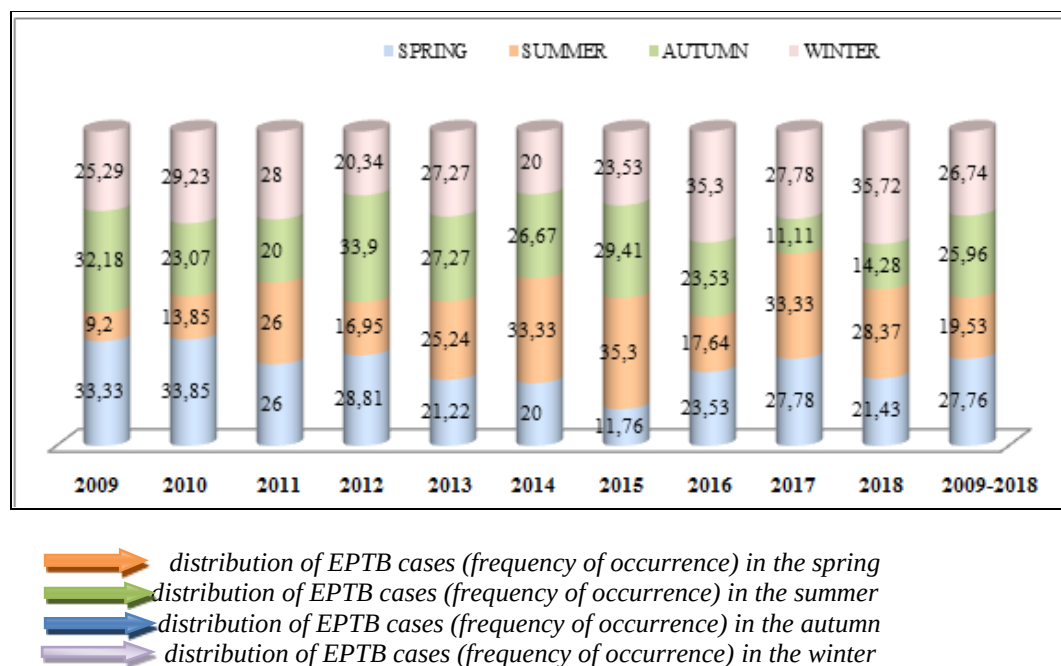


Figure 4. Comparative analysis of the distribution of EPTB cases by seasons among the military personnel of the Armed Forces of the Republic of Azerbaijan in 2009-2018 (%)

The frequency of seasonal cases of EPTB has been examined in the study. The incidence of disease has been observed in all seasons.

The highest incidence in the spring was in 2009 (33.85%), according to the share by years and the average multi-year indicator (27.76%). The lowest incidence of disease was observed in 2015 (11.76%).

The highest incidence rates in the summer were observed in 2015 (35.3%) and 2014 (33.33%) according to the share by years and the average multi-year indicator (19.53%). The lowest incidence in the summer was in 2009 (2.9%).

In the autumn, the highest incidence rates were observed in 2012 (33.9%) and 2009 (32.18%), according to the share by years and the average multi-year indicator (25.96%). The lowest incidence was in 2017 (11.11%).

In the winter, the highest incidence rates were observed in 2018 (35.72%) and 2016 (35.3%), according to the share by years and the average multi-year indicator (26.74%). The lowest incidence was in 2014 (20%).

Thus, the lowest incidence of EPTB was observed in the summer (19.53%) during the years involved in the study. In the spring (27.76%), autumn (25.96%) and winter (26.74%), the incidence was approximately the same according to the average multi-year indicator.

High incidence of disease in the spring is associated with a weakened immune system and an increased occurrence of respiratory infections during the winter.

Conclusions

Thus, there have been cases of EPTB among the personnel of the Armed Forces of the Republic of Azerbaijan in all years involved in the study, and the dynamic increase in the number of cases over the past five years underscores the topicality of the issue. In accordance with the proportion by years and the average multi-year indicator, the incidence of EPTB was high in the 18-21 age group and after the sixth months of the military service. Taking the average multi-year indicator into consideration, the seasonality is not characteristic in the incidence of EPTB.

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