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Tuberculosis in health workers. Dos de Mayo Teaching National Hospital. Lima, Perú

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Abstract:

Introduction: *Tuberculosis represents an occupational risk for both health workers and health sciences students who are obliged to visit hospitals and stay in touch with specific patients. The risk of acquiring tuberculosis in hospitals is 2 to 50 times more than in the normal population. High rates of tuberculosis infection in Peruvian hospitals translate into a constant threat to health workers.*

Objectives: *To determine the epidemiological profile of Tuberculosis in health workers.*

Design: *Analytical, retrospective study.*

Place: *Dos de Mayo Teaching National Hospital. Lima-Perú.*

Participants: *Health workers diagnosed with tuberculosis.*

Interventions: *The hospital database of health workers affected by tuberculosis for five years was reviewed. For the analysis, statistical tests of central tendency and dispersion were used, 2x2 contingency tables were elaborated. Bivariate analysis was performed, Odds ratio was determined with 95% confidence intervals, the p value of 0.05 was considered as significant.*

Main outcome measures*: Incidence rate, form of diagnosis, occupational group, workplace inside the hospital, symptomatology and employment status.*

Results: *The incidence rate was 4.7, only 52.40% was diagnosed with positive smear. Doctors, nurses and residents were the most affected groups, predominating the contagion in the medical and emergency wards. There were no significant differences between permanent and eventual health workers staff.*

Conclusions: *Nosocomial tuberculosis predominantly affects physicians, nurses and residents, young adults, most of them acquired the disease in the first eleven years of work (71.42%).*

Keywords: *tuberculosis, Mycobacterium tuberculosis, health workers, tubercle bacillus.*

1. INTRODUCTION

The World Health Organization (WHO) has determined that tuberculosis (TB) is the most frequent cause of disease by infectious agent in the world and has declared it a global emergency. [1]

The high incidence rates in our population is one of the main factors for the occurrence of TB in health workers. About 50% of all cases of tuberculosis in our country occur in Lima, the capital of Perú, obviously, the large population that counts, about 50% of the total population, the high migratory load, the widespread overcrowding (housing , hospitals, transportation), the increase in cases of HIV infection (since the 1980s), make the city of Lima vulnerable not only to the infection and spread of tuberculosis, but also to other airborne diseases. Dos de Mayo National Hospital registers approximately 3% of the cases of tuberculosis reported nationwide and each year there are between four to twelve new cases of disease in health workers and more than 50% of them are workers in the departments of internal medicine and emergency. Carballo and Bayona in 1999, carried out a study in the hospitalization rooms of medicine, infectology and pneumology in Dos de Mayo Hospital, they reported that the risk of becoming infected with tuberculosis by health workers was 75 to 88 times higher than that of the general population. [2]

The risk of infection with the tubercle bacillus in health workers has been present since the dawn of history, as well; doctors like Xavier Bichat, creator of the general pathology died of TB meningitis, Teófilo Jacinto Laenec, inventor of the stethoscope prototype and pioneer of the technique of auscultation died infected by the

"white plague" TB was known like a white plague at that time. The main factor that predisposes to tuberculosis infection in health workers is contact with smear-positive patients, the risk of infection increases if occurs prolonged contact with patients with pulmonary tuberculosis smear positive. This risk is lower if the contact is with patients with smear negative and is even lower with patients with extra pulmonary tuberculosis. [3]

Several researches in the world have determined that the risk of acquiring tuberculosis in hospitals is 2 to 50 times more than in the normal population. [4][5][6][7]. The high rates of tuberculosis infection in Peruvian hospitals translate into a constant threat to the health personnel. Rey de Castro et al, in the Cayetano Heredia Hospital in 1986, reported a prevalence of TB, 23 times more than in the general population. Likewise, it reports prevalence of 63% and 2.4% of tuberculous infection and disease, respectively. [8]

Danilla et al, [9] a 5-year study at the Arzobispo Loayza Hospital reported 42 cases of tuberculosis in health workers, with incidence rates of 3.6 / 1000 workers year and prevalence rate of 18.6 / 1,000 workers year, being the occupational group most affected were student during medical internship.

The objective of the study was to determine the epidemiological profile of health workers with tuberculosis in the Dos de Mayo Teaching National Hospital.

2. METHODS

An observational, descriptive, quantitative, exploratory, cross-sectional and retrospective study was designed. The investigation was carried out in the Dos de Mayo Teaching National Hospital. Lima, Perú. The database of tuberculosis health workers for five years (from 2004 to 2008) was reviewed. There were 45 cases of tuberculous infection. Health workers diagnosed with pulmonary tuberculosis, who at the time of the investigation were registered in the health worker doctor database, over 18 years old were included. Three cases were diagnosed with extrapulmonary tuberculosis, so they were excluded for general analysis.

The unit of analysis was the existing data of each case of nosocomial tuberculosis, in addition the clinical records of most of cases were reviewed to obtain quantitative data.

An instrument was designed for the data collection prepared by the researcher, which included general data: such as age, sex, place of work, time of service, employment status (permanent or eventual worker), occupational group, presence of some comorbidity in the affected health worker. Finally, clinical data were collected, especially those related to body mass index, clinical symptomatology and diagnostic methodology.

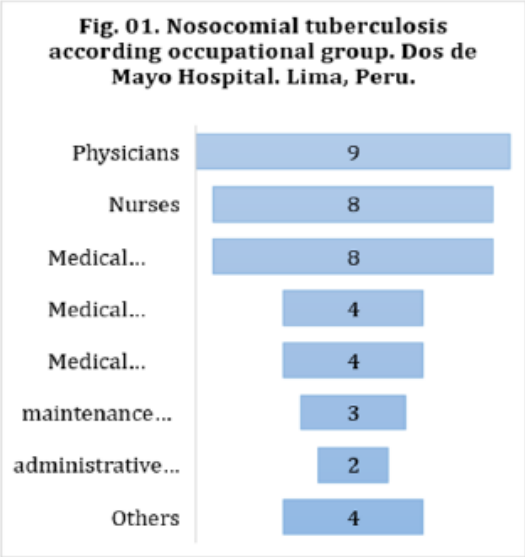
The data collected were coded and entered into a database and then proceed to its statistical analysis with the SPSS program version 23.00 in Spanish. The results were expressed as a distribution of absolute and relative frequencies for qualitative variables. The arithmetic average, standard deviation (+ 1DS), mode, median, range and percentiles (25 and 75), were the main statistical measures of central tendency that were used for the processing of quantitative variables. 2x2 contingency tables were prepared, the bivariate analysis was carried out, the Odds ratio was determined with the 95% confidence intervals in each case, the value of $p < 0.05$ was considered significant.

3. RESULTS

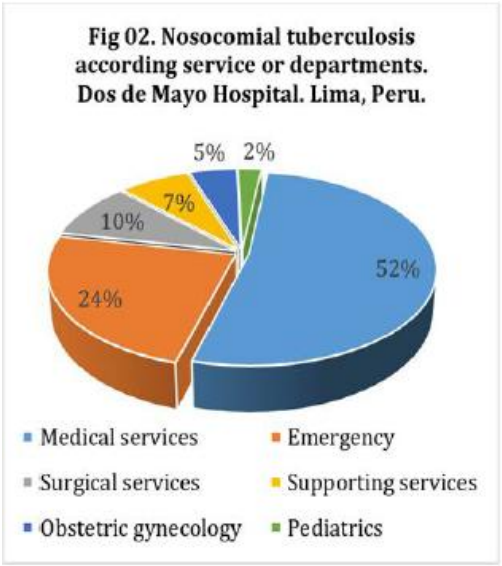
The mean age of the population was 35.69 years (SD±10.24), median of 34.5 years, minimum age of 22 and maximum of 55 years. The 25th and 75th percentiles for age corresponded to 26.45 and 45.00 years respectively. The 71.42 % of health workers had less than or equal to 37 years old.

54.8% (23/42) of the patients were male and 45.20% (19/42) female, the male / female ratio was 1.2, no significant difference was found with respect to sex according to the variable sex (P: 0,22). Four health workers (9.52%) had previous diagnosis and treatment, reaching the cure of the disease in a satisfactory way. All of them had drug-sensitive tuberculosis used in the treatment conventionally.

21.4% (9/42) of health workers affected by tuberculosis were physicians, 19% (8/42) nurses, 19% (8/42) medical residents, 9.5% (4/42) medical students, 9.5% (4/42) medical technicians, 7.1% (3/42) maintenance workers, 4.8% (2/42) administrative employees and 9.5% (4/42) others. **(Figure 01),** the group of others emphasize the presence of a pharmaceutical chemist, an obstetrician, a radiology technician and a lawyer.



The medical professionals affected by tuberculosis were those who worked permanently (internists), in the hospitalization wards of internal medicine (52%), and in some cases subspecialist doctors who by the modality of hospital work visited frequently the hospitalization wards. The second place with the highest incidence of tuberculosis was the emergency department (24%), surgical, gynecology, obstetrics, pediatrics and supporting services recorded lower cases. **(Figure 02)**



52.40% (22/42) of the studied population was at that time working as permanent worker and 47.60% (20/42), was hired staff in different modalities. Regarding the service time of workers, the mean was 7.21 years (SD ± 6.17), median of 4 and mode of 2. Three health workers (6.66%). presented extrapulmonary tuberculosis (a case of renal tuberculosis, a case of pleural TB and a cases of lymph node TB).

The incidence rate was determined during the five years of study, it was 3.65 in 2004, 4.69 in 2005, 3.52 in 2006, 3.80 in 2007 and 4.60 in 2008, the highest rate occurred in 2008. Most of cases were presented in 2005 and 2008 with nine and ten cases of nosocomial tuberculosis respectively **(Figure 03).**

The clinical experience is strengthened with the patients who present precisely the symptoms that, according to the professor and the medical books should not happen. The essence of the pathological is the paradox and the unforeseen. For this reason, the clinical characteristics presented by the health workers affected by pulmonary tuberculosis were reviewed.

The tuberculous symptomatology found in health workers does not differ greatly from the classic symptomatology described by the ancient semiologists, but around 16.17% of the cases were not symptomatic respiratory. In 76.20% of the cases, there was weightless between three and five kilograms from the beginning of their symptoms until the diagnosis. Hyporexia was present in most of cases but, was absent in the 35.70%. Absence of fever was reported in 21.40% of the cases. The absence of fever was more frequent in the female sex, according to the bivariate analysis, women had three times more likely to present absence of fever than males (OR: 3,15).

Hemoptysis, the cardinal sign and most important for the diagnosis of tuberculosis, was only reported in 33,30% of the cases. **(figure 04).**

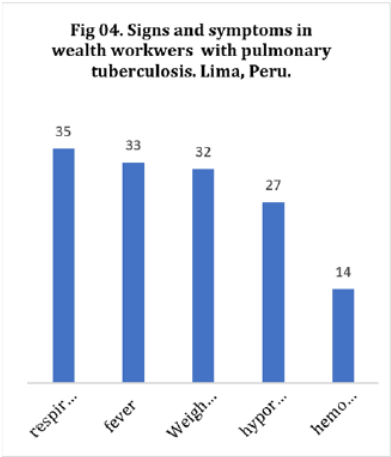


Fig 04. Signs and symptoms in wealth workwers with pulmonary tuberculosis. Lima, Peru.

The bacilloscopic study in the great majority (47.60%), of the health workers were negative, 28.60% (12/42), had sputum smear with one cross (+), 19.0% (8/42), two crosses (++), and 4.80 % (2/42) sputum smear with three crosses (+++), respectively.

Most of health workers followed specific treatment with optimal evolution and the cure was achieved, with no deaths during the study period.

4. DISCUSSION AND CONCLUSIONS

Tuberculosis of health personnel is currently considered an occupational disease, that is, the worker contracts the disease in his workplace. [10] [11] [12]. There are several factors that condition the increased risk of infection, for example, the hospital overcrowding, especially in critical areas, the specialty or profession of the health team, time spent in contact with smear-positive patients, degree of use of biosafety measures, infrastructure and ventilation systems of hospital environments, diagnostic delay, among others. The probability of transmission of tuberculosis to health workers is usually related to the number of patients with active tuberculosis in contact with the worker, the contacts of the index case, the duration of the exposure, and air ventilation in the ambient.[13] The overcrowding of hospitals in the capital and the coexistence of other factors has increased the risk of acquiring tuberculosis in health employee up to 50 times more than the general population. [13] [14]. Seventeen years ago, an extraordinary increase in incidence was reported, reaching the surprising rate of 1263/100 000, which by that time, was nine times more than the national rate 141.4 / 100 000. [14]. The average incidence found in our study was 4.10 (SD ±0.50), similar to that found in the Hipolito Unanue Hospital by Nakandakari et al, who reported an average rate of 3.82. [15]. This finding probably be explained because these two hospitals share many common characteristics such as location in areas of high incidence of tuberculosis, profile of patients who come to receive health care, hospital infrastructure, diagnostic technology, level of complexity and even the personnel that include the teams of health care.

Regarding the most affected occupational group, we found that the physicians were the predominant (21.40%). The nurses and medical residents were the ones who followed in frequency with eight cases in each group (19.0%). These three occupational groups (physicians, nurses and medical residents), represent 50.5% of all cases of tuberculosis in the health workers in Dos de Mayo National Hospital. The results of other investigations may vary with respect to the group most affected by the different study methodologies, temporary spaces and different classifications.

Results like ours were found by Nakandakari et al, [15], in their research conducted at the Hipolito Unanue Hospital. Accinelli et al, in their study conducted from 1997 to 2007 at Cayetano Heredia National Hospital, found the most affected groups of residents of medicine (16.40%) and medical students (13.8%). Danilla et al, reported a lower incidence in the Hospital Arzobispo Loayza (3.6/ 100 health workers), likewise, it registered a predominance of tuberculosis in the group of medical students (21.4%). Conversely, in Sánchez's study, conducted at the Sergio Bernales Hospital de Collique [16]. She reported an incidence of 1.33 / 100 workers, where the predominant group was nursing technicians (34%) followed by hospital cleaning worker and vigilance employees (20%) and administrative workers (13%), the author reported that 70% (21/30), of the cases had a history of tuberculosis. It drawn attention, the low incidence of tuberculosis in health personnel and the high frequency of affection in cleaning worker and vigilance employees, which occupies the second place in frequency, these findings are probably related to its location of this hospital in the North of Lima, less overcrowding and better ventilation of their hospital rooms, because, it is a hospital has horizontal model infrastructure. Regarding the group affected by the vigilance and cleaning worker, it was probably related to the proximity of these workers to rooms of the tuberculosis control program (PCT). The proximity of the surveillance control booth with the PCT room was verified.

Extrapulmonary tuberculosis represented 7.14%, rate lower than that found by Nakandakari (21.40%) and Accinelli (23.27%), these differences are probably due to the number of cases recruited during the period of study, the first researcher, reported 57 cases in 8 years (from 2007 to 2013), and the second reported 159 cases in 13 years of study (from 1994 to 2007).

The smear results of our patients in most of them were negative (47.60%), a cross (28.6%), two crosses (19.0%) and three crosses (4.80%). Results relatively similar to different studies reporting up to 60.7% negative sputum smear.[15-17]

Regarding the services or departments with the highest proportion of tuberculosis in health personnel, we report the medical hospitalization rooms, and emergency rooms are the most affected with 52.40% and 23.80% respectively, these results are probably be because symptomatic respiratory patients come to emergency and / or external consultation and are then hospitalized in the medical wards (pulmonology, internal medicine, hematology, gastroenterology, etc.), and there was longer contact time with the staff during their hospitalization. Special consideration deserves the emergency service that in recent years has been the main source of contagion for health workers, especially in triage room, and emergency topics. This was corroborated by the investigations of Escombe et al, who studied tuberculosis in health workers in the emergency department of Dos de Mayo Hospital. He found an infection rate of 30%, this means that, 30 health workers for each 100 people who work in emergency are infected by the bacillus during a year of follow-up. [17]

We concluded that Nosocomial tuberculosis predominantly affects physicians, nurses and residents, principally young adults, most of them acquired the disease in the first years of work. 71.42% (30/42) of health workers who acquired the nosocomial tuberculosis had less than 11 years of service time.

The productive cough and nocturnal evening fever were the most constant symptomatology, which were present in 83.33% and 78.57% respectively.

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