

A Five- Year Retrospective Study of Tuberculosis Epidemiological Trends and Clinical Features in Diyala province, Iraq

Mazin Khalid Abdullah (M.Sc.)

Mazinarashide@gmail.com

master's degree in community health, Public Health Department.

Marwah Qader Salman (B.S.)

Marwakader327@gmail.com

Bachelor's degree in veterinary medicine and surgery, public Health Department.

Raghad Jameel Abbood (Dip. MD)

Raghadgameelabood@yahoo.com

Diploma in Family Medicine. Diyala Department of Health.

Abstract

Tuberculosis remains a major threat to general health in the world, affecting both pulmonary tuberculosis (PTB) and tuberculosis outside the lung (EPTB). This study aims to analyze tuberculosis properties in Diyala Governorate, Iraq during the period from January ٢٠١٧ to December ٢٠٢٢. The study included ١,٧٥١ patients whose data were collected from the chest diseases clinic in Diyala.

The results showed that the female percentage (٥٦%) was higher than males (٤٤%), and that the most affected age group was over ٦٥ years (٢٢%). Pulmonary tuberculosis was more common than tuberculosis outside the lung. He also recorded the highest infection in ٢٠١٧ (١٩,٦٧), with a gradual decrease in the following years. The relapse rates were higher in pulmonary tuberculosis, while the results of treatment were ٨٣% positive.

The results indicate the continuous need for monitoring, early detection and treatment to reduce the impact of tuberculosis on public health in Diyala.

Key words: epidemic, Diyala, Iraq, pulmonary tuberculosis, tuberculosis outside the lung.

١. Introduction

Tuberculosis (TB) is a significant infectious disease caused primarily by the gram-positive bacillus *Mycobacterium tuberculosis*, and it is one of the deadliest infectious diseases, killing thousands of people across the globe. It is transmitted from one person to another through various routes like a sneeze, droplets in the air, coughing, etc. Common symptoms presented in TB include mortification, fever, loss of body mass, profuse night sweats, and extreme fatigue or lethargy. [١]

Tuberculosis (TB) has two forms clinically: extrapulmonary TB (EPTB) and pulmonary TB (PTB). The former is responsible for ٨٠٪ of TB cases, and the latter is responsible for only ٢٠٪ of cases [٢]. Tuberculosis was recognized several decades ago and effective anti-tuberculosis medications have been available for more than ٥٥ years, but it still remains a major cause of death and public health burden worldwide [٣].

Globally, approximately ١٠ million people develop tuberculosis (TB), with ١٣٢ cases per ١٠٠,٠٠٠ people every year, according to ٢٠١٨ estimates. Men, women and children comprise the following distributions of the reported figures: ٥,٧, ٣,٢, and ١,١ million (٥٧, ٣٢, and ١١٪, respectively). On the national level, incidence rates (IRs) vary from ٥٠٠٠ per ١,٠٠٠,٠٠٠ populations per year. South-East Asia reported the highest number of cases (٤٤٪), followed by Africa (٢٤٪) and Western Pacific (١٨٪) [٤]. In contrast, in ٢٠١٨ compared to ٢٠١٧, there was a ١,٦٪ annual decrease in the IR of new TB cases. TB-related deaths have also been reduced by ٥٪ [٥]

The world has failed to meet all of the United Nations General Assembly's (UNGA) goals by ٢٠٢٠ [٦]. As a result, the slight yearly decline in TB incidence that had been observed in prior years essentially stopped, with notifications of TB cases declining by ١٨٪ from the year before. For the first time in nine years, the anticipated number of deaths from tuberculosis has increased. More than half of those who became ill due to TB were not identified and treated because of limited access to interrupted TB care in the wake of the COVID-١٩ outbreak. Additionally, there is a notable decline in the number of individuals undergoing treatment for LTBI and drug-resistant TB [٧].

Iraq has made tuberculosis (TB) a public health priority because it is one of seven countries in the region with a high prevalence of the disease [٨].

As a result, the aim of this epidemiological study is to investigate the numbers and percentages of patients infected with EP and PTB in Diyala Governorate over the course of five years to highlight the importance of this threatening disease.

٢. objective

To Describe the clinical features and epidemiological pattern of TB cases in Diyala province from Jan ٢٠١٧ to December ٢٠٢٢.

٣. Material and Methods:

٣,١ Administrative arrangement:

Before collecting data, necessary official permissions agreement was obtained from the of the directorate of Diyala health with the approval of the public health department directorate.

٣,٢ Design and setting of the study: A cross-sectional study with a convenient sample of (١٧٥١) patient was conducted in Diyala province from the period ١st of October ٢٠٢٣ to ١st of April ٢٠٢٤.

٣,٣ Data Collection

The data was gathered from the patients' records of the Chest and Respiratory Infections Consultation Clinic / Diyala public health department for ٥ years (٢٠١٧-٢٠٢٣), which included information on all patients recorded and treated in all health sectors of Diyala province, including all their PHCCs.

٣,٤ Statistical Analysis

The Data were statically analyzed and presented as frequency and percentage using Excel version ٢٠١٩ and Epi. Info programs.

٤. Results**Table ١: the demographic characteristics features of tb patients.**

Characteristics	(NO.)	(%)
١-Gender		
* Male	٧٧٧	٤٤%
* Female	٩٧٢	٥٦%
٢-Age Group		
٠-٤	١٩	١%
٥-١٤	٨٠	٥%
١٥-٢٤	٢٢٨	١٣%
٢٥-٣٤	٢٢٠	١٣%
٣٥-٤٤	٢٢٥	١٣%
٤٥-٥٤	٢٨١	١٦%
٥٤-٦٤	٣٠٦	١٧%
٦٥+	٣٩١	٢٢%
Total	١٧٥٠	١٠٠%

Table ٢: the distribution of cases according to health sectors.

Sectors	(NO.)	(%)	Prevalence
Ba'qubah ١	٤٧٧	٢٧%	١١,٨٢
Al Muqdadia	٢٩٢	١٧%	١٢,١٠
Al khalis	٢٧٩	١٦%	٩,٩١
Baladroz	٢٤٧	١٤%	١٤,١١
Ba'qubah ٢	٢٤٢	١٤%	٨,١٩
Khanaqin	١٤٢	٨%	٥,٧٧
Al Mansuria	٧١	٤%	٥,٥٦
Total	١٧٥٠	١٠٠%	

Table ٣: the Incidence and prevalence rates according to the years of reporting.

Years	Incidence	Prevalence
٢٠١٧	١٩,٦٧	٢١,٨٧
٢٠١٨	١٩,٣١	٢١,٧٢
٢٠١٩	١٩,١٩	٢١,٢٢
٢٠٢٠	١١,٨٤	١٢,٦٥

٢٠٢١	١١,٦٥	١٢,٦٦
٢٠٢٢	١١,٨٥	١٢,٩٠

Table ٤: the frequency of Relapsed cases according to Gender and Type of Tb infection.

Relapses	Female		Male		P-Value
	NO.	%	NO.	%	
R (EP) ^١	٢٩	٣٣%	٨	١١%	٠,٠٠١
R(PT) ^٢	٥٩	٦٧%	٦٢	٨٩%	

Table ٥: the frequency of cases according to category of treatment and Type of Tb infection.

Site of TB	CAT ١		CAT ٢		P-Value
	NO.	%	NO.	%	
EP	٥٤٦	٣٤%	٣٧	٢٣%	٠,٠٠٣
PT	١٠٤٢	٦٦%	١٢٤	٧٧%	

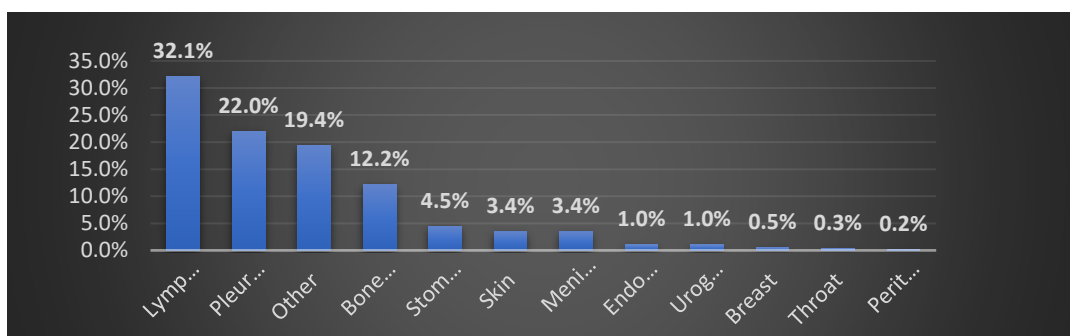


Figure ١: % of cases according to the site of infection of (EP) patients

Table ٦: the distribution of cases according to Age group and Type of Tb infection.

Age Group	ETB		PTB	
	NO.	%	NO.	%
٠-٤	١٢	٢%	٧	١%
٥-١٤	٥٠	٩%	٣٠	٣%

^١ EP (Extra-pulmonary Tuberculosis)

^٢ PT (pulmonary Tuberculosis)

١٥-٢٤	٩٥	١٦%	١٣٣	١١%
٢٥-٣٤	٩٨	١٧%	١٢٢	١٠%
٣٥-٤٤	٨٣	١٤%	١٤٢	١٢%
٤٥-٥٤	٧٩	١٤%	٢٠٢	١٧%
٥٤-٦٤	٨٩	١٥%	٢١٧	١٩%
٦٥+	٧٧	١٣%	٣١٤	٢٧%
Total	٥٨٣	١٠٠%	١١٦٧	١٠٠%

Table ٧: the frequency of the patient's outcome

<i>Outcome</i>	
<i>Complete</i>	١٠٤٧
<i>Cure</i>	٤٢٠
<i>Death</i>	٤٦
<i>Default</i>	٣
<i>Fail</i>	١٠
<i>Transfer</i>	٣
<i>(blank)</i>	٢٢١

٥. Discussion

The current study presented that the percentage of females is slightly higher than the percentage of males and was ٥٦% of the number of samples, and this percentage is consistent with another study conducted in Silmaniyah in ٢٠١٦ [١٠] as well as another study in South Africa carried out in the year ٢٠٢٣ [٩] that shows ٦٠% of the samples were female.

It also showed that the most affected age group was the group over ٦٥, and this result was not similar to a study conducted in South Africa in ٢٠١٧, where that study showed that the highest in people affected was ٣٥-٤٤ years, but the results of this study coincided with a study in Erbil in ٢٠٢٢ [١١].

The current study showed that the PTB rate was more from EP; this result differs from a study applied in Erbil in ٢٠٢٢, as that study showed that ٦٣,٥% was EP [١٢].

The results of this study also indicated that the highest percentage of injuries outside the lung was ٣٠% of the injuries: lymph node, and this result was identical to many studies, including in Sulaymaniyah, Iraq [١٠], as well as in America [١٧].

A study conducted in Germany [١٣] also showed that most extrapulmonary infections were among women, and this is also what the current study showed.

The incidence rate in this study was recorded at its highest rate in the year ٢٠١٧ and was at a rate of ١٩,٦٧. It was noted that this rate was higher than many other studies that were carried out in Iran, India, and Vietnam. [١٤, ١٥, ١٦], respectively.

The results of this study were somewhat similar to the rates of recovery and completion of treatment with a study applied in Uzbekistan [١٨] and show that in this study, ٨٣% of patients were successfully treated.

The prevalence in our study agrees with a study done in Diyala (٢٠٢٣), which was ١٨,٦ per ١٠٠,٠٠٠ [١٩], and globally, which was ٢٤,٨ in ٢٠١٩ [٢٠], and disagrees with another study done in Rwanda [٢١].

٦. References

- ١- Ahmed Abduljabbar Jaloob Aljanaby, Qassim Muhsin Hashim Al-Faham, IJ Aljanaby, HH Hasan, Immunological role of cluster of differentiation ٥٦ and cluster of differentiation ١٩ in patients infected with mycobacterium tuberculosis in Iraq, Gene Reports, Volume ٢٦, ٢٠٢٢, ١٠.١٥١٤, ISSN ٢٤٥٢-٠١٤٤, <https://doi.org/10.1016/j.genrep.2022.101514>.
- ٢- J. Mehraj et al. Extrapulmonary tuberculosis among females in South Asia—gap analysis Int J Mycobacteriology (٢٠١٦).
- ٣- J. Negin et al. Tuberculosis among older adults - time to take notice Int J Infect Dis (٢٠١٥)
- ٤- A.L. Bañuls et al. Mycobacterium tuberculosis: ecology and evolution of a human bacterium; J Med Microbiol (٢٠١٥)
- ٥- J.Y. Lee; Diagnosis and treatment of extrapulmonary tuberculosis Tuberc Respir Dis (Seoul) (٢٠١٥)
- ٦- S Sahu, L Ditiu, KS Sachdeva, A. Zumla Recovering from the Impact of the Covid-١٩ Pandemic and Accelerating to Achieving the United Nations General Assembly Tuberculosis Targets Int J Infect Dis, ١١٣ Suppl ١ (٢٠٢١), pp. S١٠٠-S١٠٣, ١٠.١٠١٦/j.ijid.٢٠٢١.٠٢.٠٧٨ Dec Epub ٢٠٢١ Mar ١١ PMID: ٣٣٧١٦١٩٨; PMCID: PMC٧٩٤٨٥٢٧.
- ٧- Jeremiah Chakaya, Eskild Petersen, Rebecca Nantanda, Brenda N. Mungai, Giovanni Battista Migliori, Farhana Amanullah, Patrick Lungu, Francine Ntoui, Nagalingeswaran Kumarasamy, Markus Maeurer, Alimuddin Zumla, The WHO Global Tuberculosis ٢٠٢١ Report – not so good news and turning the tide back to End TB, International Journal of Infectious Diseases, Volume ١٢٤, Supplement ١, ٢٠٢٢, Pages S٢٦-S٢٩, ISSN ١٢٠١-٩٧١٢, <https://doi.org/10.1016/j.ijid.2022.03.011>. (<https://www.sciencedirect.com/science/article/pii/S1201971222001497>).
- ٨- Ahmed Abduljabbar Jaloob Aljanaby, Qassim Muhsin Hashim Al-Faham, Israa Abduljabbar Jaloob Aljanaby, Thu'alfakar Hayder Hasan, Epidemiological study of Mycobacterium Tuberculosis in Baghdad Governorate, Iraq Gene Reports, Volume ٢٦, ٢٠٢٢, ١٠.١٤٦٧, ISSN ٢٤٥٢-٠١٤٤, <https://doi.org/10.1016/j.genrep.2021.101467>.
- ٩- Matji R, Maama L, Roscigno G, Lerotholi M, Agonafir M, Sekibira R, Law I, Tadolini M, Kak N. Policy and programmatic directions for the Lesotho tuberculosis programme: Findings of the national tuberculosis prevalence survey, ٢٠١٩. PLoS One. ٢٠٢٣ Mar ٩; ١٨(3):e٠٢٧٣٢٤٥. doi: ١٠.١٣٧١/journal.pone.٠٢٧٣٢٤٥. PMID: ٣٦٨٩٣١٧٥; PMCID: PMC٩٩٩٧٩٧٧.

- ١٠- Karadakhly K, Othman N, Ibrahim F, Saeed AA, Amin AAH. Tuberculosis in Sulaimaniyah, Iraqi Kurdistan: A Detailed Analysis of Cases Registered in Treatment Centers. *Tanaffos*. ٢٠١٦; ١٥(٤): ١٩٧-٢٠٤. PMID: ٢٨٤٦٩٦٧٥; PMCID: PMC٥٤١٠١١٥.
- ١١- Moyo S, Ismail F, Van der Walt M, Ismail N, Mkhondo N, Dlamini S, Mthiyane T, Chikovore J, Oladimeji O, Mametja D, Maribe P, Seocharan I, Ximiya P, Law I, Tadolini M, Zuma K, Manda S, Sismanidis C, Pillay Y, Mvusi L. Prevalence of bacteriologically confirmed pulmonary tuberculosis in South Africa, ٢٠١٧-١٩: a multistage, cluster-based, cross-sectional survey. *Lancet Infect Dis*. ٢٠٢٢ Aug; ٢٢(٨): ١١٧٢-١١٨٠. doi: ١٠.١٠١٦/S١٤٧٣-٣٠٩٩(٢٢)٠٠١٤٩-٩. Epub ٢٠٢٢ May ١٧. Erratum in: *Lancet Infect Dis*. ٢٠٢٢ Jul; ٢٢(٧): e١٧٧. PMID: ٣٥٥٩٤٨٩٧; PMCID: PMC٩٣٠٠٤٧١.
- ١٢- Balaky STJ, Saniotis A, Mawlood AH, Hussein AM, Shabila NP. Incidence and geographical distribution of tuberculosis disease in Erbil city, Iraq. *Braz J Microbiol*. ٢٠٢٢ Jun; ٥٣(٢): ٥١٩-٥٢٣. doi: ١٠.١٠٠٧/s٤٢٧٧٠-٠٢٢-٠٠٧١٧-١. Epub ٢٠٢٢ Mar ٢٩. PMID: ٣٥٣٤٩١٢٤; PMCID: PMC٩١٥١٩٤٣.
- ١٣- Forssbohm M, Zwahlen M, Loddenkemper R, Rieder HL. Demographic characteristics of patients with extrapulmonary tuberculosis in Germany. *Eur Respir J* ٢٠٠٨; ٣١ (١): ٩٩-١٠٥. [PubMed] [Google Scholar]
- ١٤- Moosazadeh M, Khanjani N, Bahrampour A. Seasonality and temporal variations of tuberculosis in the north of Iran. *Tanaffos* ٢٠١٣; ١٢ (٤): ٣٥-٤١. [PMC free article] [PubMed] [Google Scholar]
- ١٥- Rao VG, Bhat J, Yadav R, Gopalan GP, Nagamiah S, Bhondeley MK, et al. Prevalence of pulmonary tuberculosis--a baseline survey in central India. *PLoS One* ٢٠١٢; ٧ (٨): e٤٣٢٢٥. [PMC free article] [PubMed] [Google Scholar]
- ١٦- Hoa NB, Sy DN, Nhung NV, Tiemersma EW, Borgdorff MW, Cobelens FG. National survey of tuberculosis prevalence in Viet Nam. *Bull World Health Organ* ٢٠١٠; ٨٨ (٤): ٢٧٣-٨٠. [PMC free article] [PubMed] [Google Scholar]
- ١٧- Karadogan D, Abduloglu B, Kiter G. How did the tuberculosis patients reach to a tuberculosis dispensary and how long did it take?. *European Respiratory Journal* ٢٠١١; ٣٨ (Suppl ٥٥): p٤٣٦٨. [Google Scholar]
- ١٨- Gadoev J, Asadov D, Tillashaykhov M, Tayler-Smith K, Isaakidis P, Dadu A, et al. Factors Associated with Unfavorable Treatment Outcomes in New and Previously Treated TB Patients in Uzbekistan: A Five Year Countrywide Study. *PLoS One* ٢٠١٥; ١٠ (٦): e٠١٢٨٩٠٧. [PMC free article] [PubMed] [Google Scholar]

- ١٩-Marwah Qader Salman , Nameer Kamal Hameed, Hiba Faisal Mahmood , Mazin Khalid Abdullah, Prevalence of Tuberculosis Patients Treated in Ba'qhuba Primary Health Care Centers (PHCCs) ٢٠٢٣; <https://djm.uodiyala.edu.iq/index.php/djm/issue/view/٦٩> :
- ٢٠-Migambi P, Gasana M, Uwizeye CB, Kamanzi E, Ndahindwa V, Kalisvaart N, Klinkenberg E. Prevalence of tuberculosis in Rwanda: Results of the first nationwide survey in ٢٠١٢ yielded important lessons for TB control. *PLoS One*. ٢٠٢٠ Apr ٢٣;١٥(٤):e٠٢٣١٣٧٢. doi: ١٠.١٣٧١/journal.pone.٠٢٣١٣٧٢. PMID: ٣٢٣٢٤٧٥٠; PMCID: PMC٧١٧٩٨٤٩١٣-
- ٢١-Cohen A, Mathiasen VD, Schön T, Wejse C. The global prevalence of latent tuberculosis: a systematic review and meta-analysis. *Eur Respir J*. ٢٠١٩ Sep ١٢;٥٤(٣):١٩٠٠٦٥٥. doi: ١٠.١١٨٣/١٣٩٩٣٠٣,٠٠٦٥٥-٢٠١٩. PMID: ٣١٢٢١٨١