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Female Genital Tuberculosis Among Infertile Women and Its Contributions to Primary and Secondary Infertility

A systematic review and meta-analysis

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Abstract

Female genital tuberculosis (FGTB) is an infectious widespread disease among young women. This meta-analysis study aimed to investigate the prevalence of Female Genital Tuberculosis among infertile women and its contribution to primary and secondary infertility. A PubMed, MEDLINE, world cat log, Lens.org, direct Google search, Google Scholar, and Researchgate, from 1971 to July 17, 2021, were searched using the keywords; prevalence, epidemiology, urogenital tuberculosis, FGTB, infertile women, infertility complaints, and FGTB testing methods. Data extracted and meta-analysis was performed. 42 studies were selected with a total of 30918 infertile women. Of these, the pooled prevalence of FGTB was 20% (15-25%; 95%CI; I2 99.94%), and the prevalence of overall infertility, primary infertility, and secondary infertility among FGTB-population were 88%, 66% and 34%,

respectively. The proportion of FGTB is remarkable among infertile women globally. The biggest burden of the disease is presented in the low-income countries followed by the lower middle-income, and upper-middle-income countries.

Keywords: Female Genital Tuberculosis, Infertile women, Worldwide, Prevalence of FGTB, Infertility, Infertility Complaints, primary infertility, secondary infertility.

Introduction

Tuberculosis (TB) is an infectious disease caused by Mycobacterium Tuberculosis which is recently listed among the top ten diseases causing death around the world. According to the World Health Organizations (WHO), in 2019 TB was responsible for 10.0 million infections and 1.2 million people death.[1] The two-third of this global burden presented in eight countries included; India, Indonesia, China, the Philippines, Pakistan, Nigeria, Bangladesh, and South Africa.[1] Female Genital Tuberculosis is commonly secondary to pulmonary TB (PTB) or extrapulmonary TB (EPTB), with the incidence rate ranging between 9 to 20 and 5 to 13 among overall EPTB,[2,3] and PTB,[4,5] cases worldwide[6], respectively. Typically female genital Tuberculosis (FGTB) is known as the disease of young women (20-40 year-old)[5,7], and it is usually diagnosed during infertility evaluations.[2,8] A previous study indicated that the infertility rates in women is higher compared to men[9]. Moreover, 76% of infertile women had a history of TB[10], and infertility is the most frequent complaint of FGTB cases[11] which occurs due to the irreversible damage to the fallopian tube.[4] In addition to infertility, other clinical presentations of FGTB include pelvic pain or menstrual irregularities, and its remains a major health problem in low-income countries[8,12] Organs commonly affected by FGTB are the fallopian tube (90%), ovaries (10–30%), endometrium (50%), cervix, and vagina.[3,13] Infertile FGTB patients have been reported to have longer duration of infertility compared to infertility from other courses.[14]

This meta-analysis study was conducted to investigate the prevalence of FGTB among infertile women of reproductive age and to evaluate the incidence of primary and secondary infertility among FGTB patients around the globe.

Methods

Eligibility criteria

Studies were eligible if they; characterized the epidemiology of FGTB among women within reproductive age, if the study population were infertile women or at least indicated a proportion of infertility complaints with enough explanation of epidemiology of FGTB, published in English, the study published in period between 1971 to 17 July 2021, and the diagnostic methods of FGTB was

done based on the particular infertility centres testing protocol. Whereas studies were excluded; if articles characterized only PTB or EPTB regardless of FGTB, and any study in which the prevalence of FGTB reported was not that of infertile women.

Information sources

This study was carried out in accordance with the guidelines of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Several electronic databases such as; MEDLINE, world cat log, Lens.org, and PubMed were used to retrieve published articles. In addition, other search engines were intensively searched including direct Google search, Google Scholar, Researchgate retrieve studies that were not indexed in PubMed. All mentioned databases were searched from their commencement in period between 1971 to July 17, 2021, for human studies published in English.

Search strategy

The Boolean search terms (AND, OR) were used to develop the research strategy to retrieve studies from PubMed and world cat log. The final search strategy included the use of Title/Abstract related to (((Female genital tuberculosis) OR (urogenital tuberculosis)) AND ((prevalence) OR (epidemiology)) AND (infertile women) OR (infertility)) taken from the study objectives. Hand intensive searches were applied in direct Google search, Google Scholar and Researchgate for the same purpose.

Study selection process

In this study, all retrieved articles were first screened by title, abstract, and full-text screened. Then eligible articles exported the Mendeley citation manager software version 1.19.8, to be checked for duplication. Therefore, the duplicated articles were excluded from the study. Two authors (AA, & MA) screened and evaluated the remaining studies independently by a careful reading of the title and abstract then full-text articles screened if the particular records mentioned the outcomes of the review "Prevalence of Female genital tuberculosis among infertile women" in their titles and abstract. However, the screened full-text articles were considered for further evaluation based on the objectives, methods, participants, and key findings. The two authors (MA & AA) independently evaluated the quality of the studies against PRISMA checklist.[15] any inconsistency for the included articles was resolved through discussion, and by consulting an expert. The overall study selection process is presented using the PRISMA statement flow diagram Figure 1.

Data collection process

The relevant data from selected articles were extracted by three investigators independently (AA, MA, & SH) using a data extraction template through Microsoft word 2016. The extracted key points included author name, year of publication, reference, study country, study design/setting, sample size, FGTB proportion among infertile women, the prevalence of overall infertility, primary infertility, and secondary infertility among FGTB cases (Table 1). The data extraction accuracy was verified by comparing the data extraction results from the second group of investigators (AB, AI, & CA), who independently extracted the data in a randomly-selected subset of papers (30% of the total). The extracted quantitative data were summarized in a Microsoft Excel sheet. The prevalence of FGTB among infertile women and prevalence of pooled infertility (primary & secondary) among FGTB cases were conducted by STATA software version 16.

Data items

The main outcome of this study was the prevalence of FGTB among infertile women within reproductive age worldwide, and it is measured by the direct report from the individual studies. Out of these, 26 studies from India, 3 studies from Nigeria, 2 articles each from Ethiopia, South Africa and Pakistan were retrieved. Also, only one each article was retrieved from Egypt, Iraq, Iran, United State of America, Saudi Arabia, Sudan, and Yemen. To quantify the outcome, the investigators considered studies that reported the prevalence of FGTB among infertile women and the types of tuberculosis regarding FGTB among gynaecology admitted/infertile women in their statistics. The result was interpreted by the proportions of the infertile population which is having any type of FGTB from the total population studied.

Study risk of bias assessment

Inclusion criteria were appraised for all retrieved articles by using their title and abstract then, full-text articles were screened to check the quality of each study before the final selection. The quality assessment criteria for the studies included in the current meta-analysis and systematic review defined as follows: The diagnosis of the infertility cases were performed at infertility center with consideration that infertility is defined as a one year without conception after unprotected intercourse, the infertility was not due to male factor, the diagnosis including an infertile population who tested for FGTB willingly, the diagnosis of FGTB were conducted after excluding the patients with a confirmed FGTB, and finally, the sample size was representative of the population. A comprehensive search included electronic database, manual and grey literature, and unpublished studies was done to manage and minimize the risk of bias. Moreover, two groups of investigators (AA, MA, & SH) and (AB, AI, & CA)

used Joanna Briggs Institute Quality Assessment Tool as a critical appraisal tool for the same purpose[16]. The differences in the inclusion of the studies were resolved by consensus. The included studies were evaluated against each indicator of the tool and categorized as high-, moderate-, and low quality. Studies with a score greater than or equal to 60% were included. The publication bias for the included studies was checked by both the visual inspection of the funnel plot and check the statistical symmetry of the funnel plot using Egger's Regression Test.

Summary measures

From the standpoints of the study objectives, the proportion of FGTB among infertile women, proportion of the type of infertility among FGTB patients were used to synthesize and present the results for the analysis.

Synthesis methods

The collected data were synthesized and analysed by using the Stata software, version 16.0 (Stata Corp LLC, 77845 Texas, USA). The recommendations of the I^2 statistic described by Higgins et al.[17] (an I^2 of 75/100% and above suggesting considerable heterogeneity) were used to perform this meta-analysis. The effect size, with a 95% confidence interval (CI) and standard error (SE), was used to calculate the result of this study. The effect size of this study was the prevalence of FGTB and the prevalence of the type of infertility subgroups, and they were calculated using the binomial distribution, while the SE, was calculated using the sample size (n) and the proportion of FGTB (p), and applied it one SE formula: $\sqrt{P(1-P) \div n}$.

The potential publication bias was checked using a funnel plot, and Egger's Regression Test, and it was assumed to be significant if the P-values were less than 0.10. Subgroup analysis was applied to check the potential source of heterogeneity and possible source of bias. Any studies that had missing data and/or a risk of bias were excluded. Any study has a missing data and/or a high risk of bias were excluded. The study results were reported according to the PRISMA guidelines and the findings were presented using a narrative synthesis followed by a meta-analysis chart.

Results

Study selection

A total of 1203 records were identified through the major utilized databases and other relevant sources. Of these 961 records were removed due to duplication and title screening, while 242 records studies

were kept for further conclusive inspection. Then another 180 records were excluded after a very careful screening of abstracts. However, a total of 62 articles were eligible for full-text screening, 20 articles of them were excluded due to inconsistency with the study inclusion criteria. Finally, 42 records were fulfilled the eligibility criteria, involving 30918 participants with mainly infertility complaints, were included for the systematic review and meta-analysis. Figure 1 showed the selection process of the studies selected for the meta-analysis.

Study characteristics

A total of 42 studies including 30846 participants were included in the quantitative analysis for this meta-analysis review study; 2 (4.8 %) were from High-income countries, 4 (9.5%) from Upper middle-income countries, 32 (76.2%) from Lower middle-income countries, and the remaining 4 (9.5%) were from the Low-income countries. Of the total included studies, 17 were cross-sectional studies, 13 were prospective study design, and 12 were retrospective studies. Included studies were conducted between 1971 to 2021. The majority of them were hospital admitted patient settings and the most used diagnostic test was only PCR or PCR combined with other relevant test methods. Table 1 showed the detailed characteristics of all included studies.

Synthesis of results

This meta-analytical study showed that; out of 1203 retrieved records, only 42 records were included and analyzed. Of these a 20% (CI 15% to 25%) pooled prevalence of FGTB among infertile women out of overall study sample 30846 participants worldwide. Residual heterogeneity was high with p-value < .001, I^2 99.94% and ch^2(2553.37). for this analysis, the random effect model was employed (Figure 2). However, of 42 records only 5, 15, & 14 articles analyzed to evaluate the pooled prevalence of overall infertility, primary and secondary infertility among FGTB patients respectively which were provided an 88% (CI 74%-100%; I^2: 99.91), 66% (CI 56%-76%; I^2: 99.23), and 34% (CI 24%-43%; I^2: 98.04), with p-value < .001; respectively (table 2., Section A.). Also, the random effect model was applied because the heterogeneity was substantially high, with P-value < .001. the publication bias was checked by using the funnel plot of the forest plot, and the plot was visually symmetric with Egger's test (p-value 0.25).

Due to the very high heterogeneity level presented in FGTB among infertile women analysis, a two-subgroup analysis was performed to check the effect of the study's publication year and the World Bank Economical Country Classification on the pooled prevalence of FGTB among the infertile

198 population (Table 3). The included studies were divided as the particular country classified; High
199 income, Upper middle-income, Lower middle-income, and Low-income countries groups. The
200 analyzed data showed that the lower country economies is the highest pooled prevalence of FGTB, and
201 the highest income countries have the lower pooled prevalence of FGTB among infertile women. The
202 results presented as; 5.7% (I^2 78.56%), 14% (I^2 86.9%), 21% (I^2 99.95%), and 24% (I^2 99.48%) for high
203 income, Upper middle-income, Lower middle-income, and Low income countries, respectively (table
204 2., section B.)
205
206 Meanwhile the objective was to evaluate the effect of the study's publication year on the pooled
207 prevalence of FGTB among infertile women (table 2., Section C.) The included articles were divided
208 into three groups, and the results indicated an; 10%, 23%, & 22% pooled prevalence of FGTB among
209 infertile women for period before 2000, between 2001 to 2010, and between 2011 to 2021 study's
210 publication year subgroups, respectively (table 2., Section C.)
211
212 **Discussion**
213 Although men are significantly having the biggest burden of TB compared to women,[18] in 2018, WHO
214 estimated that 3.2 million women were infected with TB, and the disease is accompanied with severe
215 consequences especially in women of reproductive age.[18] Although, FGTB rarely occurs in developed
216 countries[3], it represent an important cause of infertility in developing countries especially in countries
217 with high TB-incidence rates.[18]
218
219 Recently, many published studied have investigated the prevalence of FGTB among infertile women of
220 reproductive age which is showed that the lowest prevalence was 0.45% in Nigeria[19] and the highest
221 prevalence was 52% in India.[20] Worldwide, the prevalence was 24.2% in the first published meta-
222 analysis and systematic review in 2016.[21] However, the current study finding is 20% which is slightly
223 decreased. This outcome is due to the relative progress in the availability of more sensitive TB
224 diagnosis methods such as GeneXpert and PCR in developing countries. Moreover, the relative
225 increase in number of TB healthcare services and many countries have adopted the WHO's END TB
226 STRATEGY around the globe.[22]
227
228 In the current comprehensive research finding, the prevalence of FGTB among infertile women
229 progressively increased over time to be 10%, 23%, & 22% for period before 2000, period between
230 2001 to 2010 and period between 2011 to 2021, respectively. This result may be due to the differences

in the diagnostic methods used for FGTB which have changed over times. Surprisingly, the researchers noted that the polymerase chain reaction (PCR) test was not used in studies published in period the before 2000 while the same diagnosis method was used by 70% and 80.8% for period between 2001 to 2010 and 2011 to 2021, respectively. The utilized methods in currently analyzed data were histopathological examination[23,24,25], culture[26,27], acid-fast bacilli test[28], and laparotomy[25]. According to the literature, no standard gold test for FGTB is fixed but it depends on the facilities test protocol. However, difference FGTB testing methods had been giving various results of the disease rate among infertile women.[20] The increase of the prevalence of FGTB among infertile women is due to the previously mentioned reasons including utilization of TB modern diagnosis methods and adopting the WHO Strategy of TB.[18] Furthermore, the global funds on TB control substantially increased in recent decades.[29]

Based on the aim of this study "to investigate the pooled prevalence of FGTB among infertile women globally", the collected data was divided into four subgroups according to the World and Bank Economical classification. The present study reveals that, the prevalence of FGTB is inversely proportional to the economic situation of the country. The smallest prevalence was 5.7% in the high-income countries while, the highest prevalence was 24% in the low-income countries. The upper middle-income and lower middle-income countries showed 14% and 22%, respectively (table 2., section B.).

Although, there was no published data to describe the rate of FGTB among infertile women in the different countries based on their economic status. Many other studies have shown that female genital tuberculosis is associated with PTB and EPTB as secondary infection.[2,3] This outcome may be due to the delay of TB diagnosis and other sociocultural reasons. In line with that, Getnet and colleagues reported a 42% of PTB delayed for a varied time (a month to a year) on TB-diagnosis in low income and middle-income countries setting.[30] Furthermore, *MacPherson et al*., indicated a 4% to 38% of TB-patients lost the follow-up to the treatment in the same setting.[31] In the Middle East and North Africa factors such being a women and low per capita income is relatively reflected to the delay in TB-diagnosis.[32] Although, the proportions are 1.24% and 1.26% respectively its considerable on FGTB incidence. In addition, the high incidence of FGTB in low- and middle-income setting is due to factors such as the higher rate of losses to follow-up with TB or EPTB treatment[33], the relatively negative experiences of TB-patient and their satisfaction with healthcare system.[34] Moreover, poverty and the high cost of the accurate diagnosis of FGTB[35] in developing countries has a huge negative effects on

FGTB control and treatment.[35,36] In accordance with that, D. Cazabon, et al., reported that, 32% and 46% of TB-patients had a negative experience and dissatisfaction with healthcare providers and TB services respectively.[34]

The finding of current study reveals that the pooled prevalence of infertility among overall FGTB-patient was very high 88%. Of this the pooled prevalence of primary infertility was higher than that of secondary infertility among FGTB-patients. Although, these results are in agreement with other meta-analysis findings done by *Kefayat, et al.*, which is reported 70.7%, 75.7% and 24.3% for infertility among FGTB-patient, primary infertility and secondary infertility respectively.[37] The present study showed slight an increase in the pooled prevalence infertility and secondary infertility incidence among FGTB compared to *Kefayat, et al.* study. On the other hand, the rate of primary infertility decreased over time.

To achieve the WHO End TB Strategy to eliminate catastrophic costs for TB-affected households by 2030 as Sustainable Development Goal target[18], a more thorough clinical investigation should be administrated at the level of TB and infertility clinics, particularly in low and lower-income settings.

Limitations

This review is not without limitation as articles published in languages other than English were excluded and the study population included only infertile women of reproductive age. Some grey literature may have also been omitted and regarding the incidence of FGTB among infertile women worldwide, no article however included published works from the Australian, European, and South American continents. The likelihood for publication bias is high.

Conclusions

The results of this meta-analysis found, that the pooled prevalence of FGTB among infertile women is 20%, and the pooled prevalence of overall infertility, primary infertility, and secondary infertility among FGTB patients globally, were 88%, 66%, and 34% respectively. In the last two decades, the FGTB incidence rate was increasing gradually. The biggest burden of FGTB is reported in the low- and lower-middle-income countries with a pooled prevalence of 46% globally.

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Authors' Contributions

MA, AAA, AI, CA, AB and SH conceived and designed the review. MA, AAA, and SH carried out the draft of the manuscript and MA is the guarantor of the review. MA, AAA, AI, CA, AB and SA developed the search strings. MA, AAA, and SH screened and selected studies, and extracted the data. AI, CA, and AB evaluated the quality of the studies. MA and AAA carried out the statistical analysis and interpretation. MA, AAA, AI, CA, AB and SH rigorously reviewed the manuscript.

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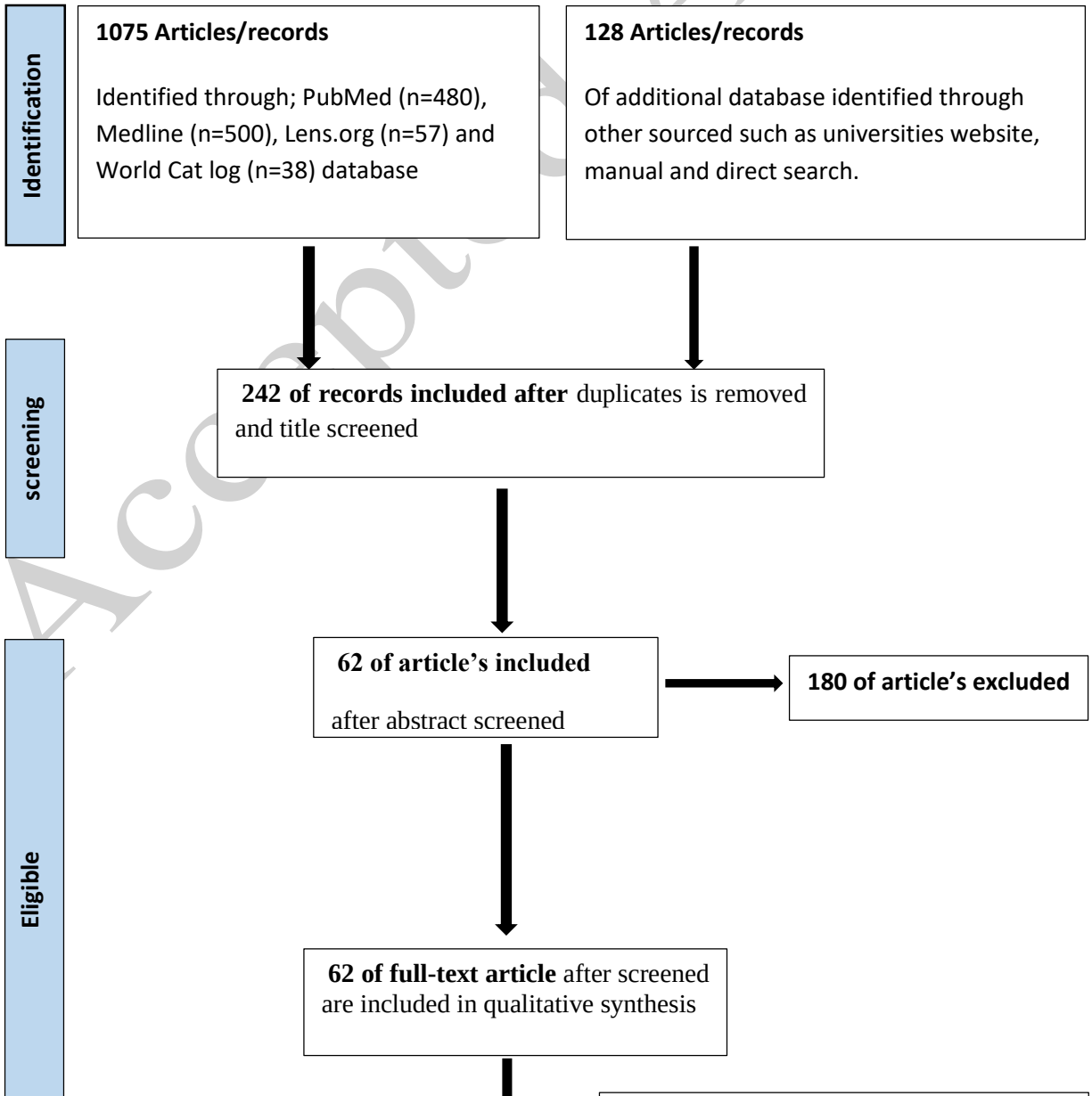

Figure 1: PRISMA Flow Diagram.

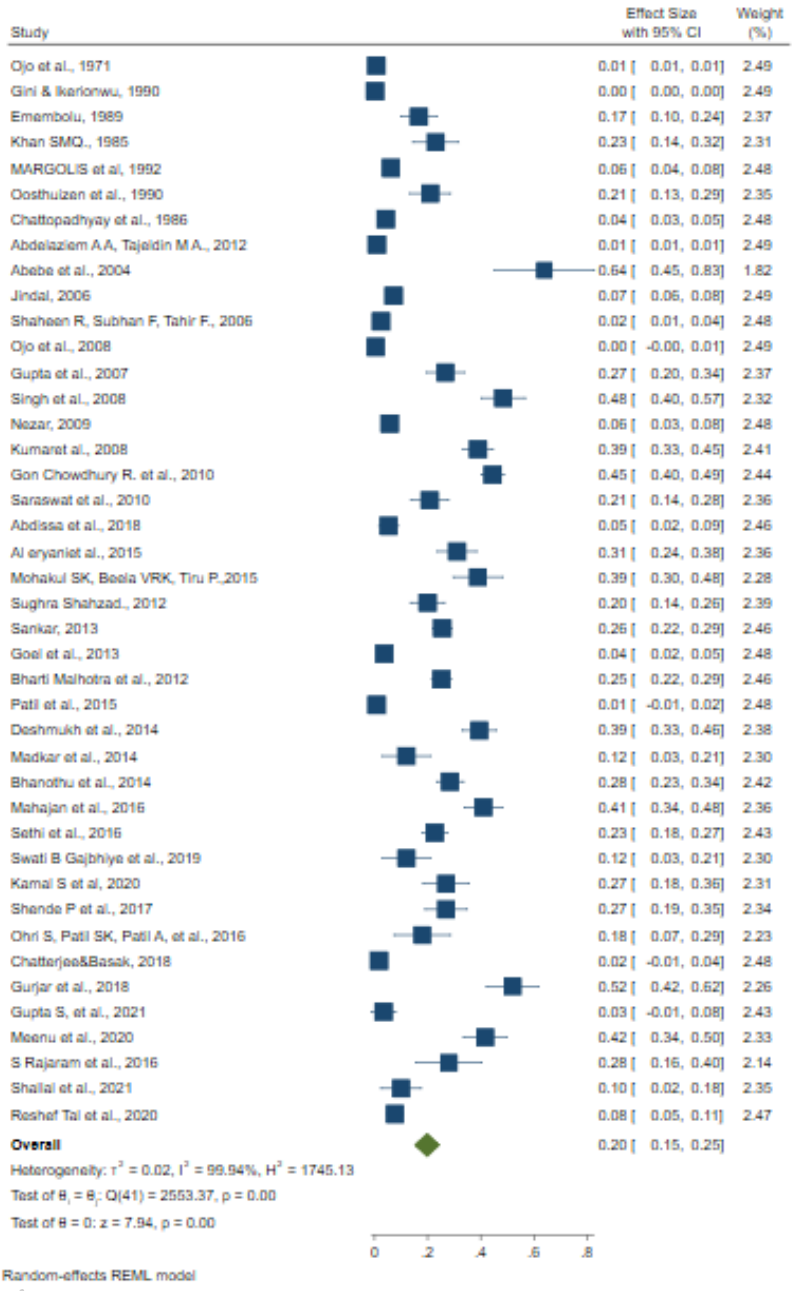

Figure 2: Forest plot (random-effects model) for the pooled prevalence of FGTB among infertile women.

503 **Table 1:** Main characteristics of studies included in the meta-analysis

Authors, year	Study Design/ Setting	World Bank Classification	Country	Inf. Pop	FGTB Testing method	Proportion of FGTB %(n)	Proportion of infertility among FGTB patient		
							Inf. overall	PI	SI
Chattopadhyay et al., 1986[38]	CS/HA	High income	Saudi Arabia	945	NA	4.2 (40)	NA	NA	NA
Reshef Tal et al., 2020[39]	PC/HC	High income	United States	323	QuantiFERON-TB	7.7 (25)	NA	NA	NA
Abdissa et al., 2018[4]	CS/HA	Low income	Ethiopia	152	PCR, CP, HE	5.3 (8)	62.5 (5)	50 (4)	12.5(1)
Abebe et al., 2004[13]	CS/HA	Low income	Ethiopia	25	AFB, CP, HE, PCR	64 (16)	NA	NA	NA
Abdelaziem, & Tajeldin., 2012[40]	CS/HA	Low income	Sudan	2778	HE	0.9 (25)	NA	NA	NA
Al eryaniet al., 2015[41]	P/O/HA	Low income	Yemen	151	AFB, PCR, CP, HE	31.1(47)	NA	NA	NA
Nezar, 2009[42]	P/O/HA	Lower middle income	Egypt	420	Laparoscopy, HE, PCR	5.7 (24)	100 (24)	NA	NA
Kumaret al., 2008[6]	CS/HA	Lower middle income	India	285	PCR	39 (111)	100 (111)	NA	NA
Mohakul SK, Beela VRK, Tiru P.,2015[5]	P/HC	Lower middle income	India	105	PCR, Hysteroscopy	39 (41)	100 (41)	58 (24)	42 (17)
Jindal, 2006[10]	R/HC	Lower middle income	India	2083	LAP, AFB, HE, MT, ELISA	7.2 (150)	97.3 (146)	70 (105)	27.3 (41)
Singh et al., 2008[43]	R/HC	Lower middle income	India	140	MH, laparoscopy &hysteroscopy	48.5 (34)	NA	NA	NA
Sankar, 2013[44]	R/HA	Lower middle income	India	620	AFB, PCR, CP, HE	25.5 (158)	95.5 (151)	78.8 (119)	21.2 (32)
Mahajan et al., 2016[45]	CS/HA	Lower middle income	India	180	PCR, CP	41 (74)	NA	NA	NA
Sethi et al., 2016[46]	CS/HA	Lower middle income	India	300	AFB, PCR, CP, HE	22.7 (68)	NA	NA	NA
Chatterjee&Basak, 2018[26]	CS/HA	Lower middle income	India	120	PCR	1.7 (2)	NA	NA	NA
Gon Chowdhury R. et al., 2010[47]	CO/HA	Lower middle income	India	517	PCR	44.5 (230)	49.7 (114)	NA	NA
Saraswat et al., 2010[48]	CS/HA	Lower middle income	India	125	PCR, CP	20.8 (26)	NA	NA	NA
Bharti Malhotra et al., 2012[49]	O/HA	Lower middle income	India	555	AFB, PCR, CP	25.22 (140)	NA	NA	NA
Swati B Gajbhiye et al., 2019[50]	CS/O/HA	Lower middle income	India	50	PCR	12 (6)	83.3 (5)	80 (4)	20 (1)
Bhanothu et al., 2014[51]	P/CC/HA	Lower middle income	India	302	PCR	28.47 (86)	NA	NA	NA
Gurjar et al., 2018[20]	O/HA	Lower middle income	India	100	PCR	52 (52)	NA	NA	NA
Patil et al., 2015[52]	CS/HA	Lower middle income	India	123	Gen-Probe MTD test	0.8 (1)	NA	NA	NA
Goel et al., 2013[53]	R/HA	Lower middle income	India	546	PCR	3.7 (20)	NA	NA	NA
Kamal S et al, 2020[54]	P/HA	Lower middle income	India	100	PCR, HE	27 (27)	NA	59.4 (16)	40.6 (11)
Gupta S, et al., 2021[55]	P/HC	Lower middle income	India	59	CBNAAT, HE	3.4 (2)	NA	100 (2)	0

Meenu et al., 2020[56]	CS/HA	Lower middle income	India	139 *	PCR	41.7 (58)	NA	NA	NA
Shende P et al., 2017[57]	P/HA	Lower middle income	India	120	PCR	27 (32)	NA	NA	NA
Deshmukh et al., 2014[7]	P/HC	Lower middle income	India	218	AFB, CP, HE, PCR	39.45 (86)	NA	NA	NA
Ohri S, Patil SK, Patil A, et al., 2016[58]	P/HA	Lower middle income	India	50	PCR	18 (9)	NA	88.9 (8)	11.1 (1)
Madkar et al., 2014[59]	P/HA	Lower middle income	India	50	PCR	12 (6)	NA	50 (3)	50 (3)
Gupta et al., 2007[60]	R/HA	Lower middle income	India	150	AFB, MT, PCR	26.7 (40)	NA	75 (30)	25 (10)
S Rajaram et al., 2016[61]	PC/HA	Lower middle income	India	50	HE, PCR	28 (14)	NA	NA	NA
Ojo et al., 2008[19]	R/HA	Lower middle income	Nigeria	661	AFB, HE	0.45 (3)	NA	33.3 (1)	66.7 (2)
Ojo et al., 1971[23]	CS/HA	Lower middle income	Nigeria	11896*	HE	0.7 (82)	NA	NA	NA
Emembolu, 1989[28]	R/HA	Lower middle income	Nigeria	114	AFB	16.7 (19)	NA	47.4 (9)	52.6 (10)
Gini & Ikerionwu, 1990[24]	R/HA	Lower middle income	Nigeria	4700	HE	0.2 (10)	NA	NA	NA
Sughra Shahzad., 2012[62]	R/HA	Lower middle income	Pakistan	150	AFB, PCR, CP	20 (30)	NA	83.3 (25)	16.7 (5)
Shaheen R, Subhan F, Tahir F., 2006[63]	CS/HA	Lower middle income	Pakistan	534	CP, AFB-ZN, HE	2.43 (13)	100 (13)	NA	NA
Khan SMQ., 1985[25]	R/HA	Upper middle income	Iran	91	LAP, HE	23.08 (21)	NA	71.4 (15)	28.6 (6)
Shallal et al., 2021[64]	P-CS/HA	Upper middle income	Iraq	60	PCR, HE	10 (6)	NA	NA	NA
MARGOLlS et al, 1992[26]	R/HA	Upper middle income	South Africa	650	CP	6.15 (40)	NA	40(16)	60 (24)
Oosthuizen et al., 1990[27]	CS/HA	Upper middle income	South Africa	109	CP	21 (23)	NA	NA	NA

PC = prospective cohort study; CS = cross-sectional study; R = retrospective study; O = observational study, CC = case control study; HA = hospital admitted patients; HC = infertility center admitted patient; ND = no data found; PCR = polymerase chain reaction test; AFB = acid-fast bacilli test; MT = mantoux test; CP = culture proven; HE = histopathological examination; Inf. Pop = infertile populations; Inf = infertility; PI = primary infertility; SI = secondary infertility; CBNAAT = cartridge based nucleic acid amplification test; MH = menstrual history; LAP = Laparotomy.
**Gynaecological admitted patient including infertility.*

Table 2: A: Pooled prevalence of infertility among FGTB patient; **B:** the pooled proportion of FGTB among infertile women based on world bank country economic classification; and **C.** subgroup analysis of FGTB among infertile women by study's publication year

Section	Subgroups Classification	Subgroups	No. of Studies	Total patient No.	FGTB proportion % (min-max) 95%CI	Infertility proportion % (min-max) 95%CI	Heterogeneity	
							I^2 (%)	P-value
A	**The type of infertility (among FGTB patients)**	Pooled infertility	5	430	-	88 (74-100)	99.912	<.001
		Primary infertility	15	560	-	66 (56-76)	99.226	<.001
		Secondary infertility	14	558	-	34 (24-43)	98.039	<.001

B	**World bank country economic Classification (among infertile patient)**	High income	2	1268	5.7 (2.3-9.1)	-	78.56	<.001
		Upper middle-income	4	910	14 (6-23)	-	86.91	<.001
		Lower middle-income	32	25562	21 (15-27)	-	99.95	<.001
		Low income	4	3106	24 (3-52)	-	99.48	.084
C	**Year of publication (among infertile patient)**	Before 2000	7	18530	10 (3-17)	-	99.96	<.001
		Between 2001 to 2010	11	7718	23 (10-36)	-	99.93	<.001
		Between 2011 to 2021	24	4623	22 (16-27)		97.98	<.001

514 *FGTB = Female Genital Tuberculosis.*