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Mothers'perceptions and exposure to information associated with the acceptance of children's tuberculosis prevention therapy in Bali Indonesia

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ABSTRACT

Background and purpose: Children face risk of tuberculosis (TB) infection within households where an index case is present. TB prevention therapy (TPT) for children is a recommended measures to provide protection against TB. This study aims to investigate the relationship between maternal perceptions and the information exposure received by mothers with the acceptance of TPT for toddlers.

Methods: A cross-sectional study was conducted in Badung District, Bali Province, using the register of tuberculosis patients from 2018-2019 as the sampling frame. A systematic random selection yielded 138 mothers with eligible criteria out of 226 children. Home interviews was conducted with mothers regarding maternal characteristics, knowledge, toddlers' characteristics, perceptions, information exposure, and acceptance of TPT for their children. The relationship between acceptance of TPT and perceptions, information, and other variables was tested using Chi-square test, followed by multivariable analysis using forward logistic regression.

Results: The majority of mothers were aged 30-39 years (57.8%), had completed high school (43.5%), unemployed (43.5%), resided in the Kuta sub-district (23.9%), and had ≤2 living children (73.2%). About 19.2% of mothers accepted TPT for their children. The acceptance of TPT for children was significantly associated with information sources from health worker (aOR=26.70; 95%CI: 1.25-569.38), the presence of ≥2 family members with TB (aOR=14.29; 95%CI: 1.22-166.68), duration of child care by the index case ≥8 hours/day (aOR=10.04; 95%CI: 2.05-49.26), receiving complete information (aOR=9.01; 95%CI: 1.64-49.64), and perceiving minimal barriers (aOR=4.08: 95%CI: 1.22-13.62).

Conclusion: Adequate information exposure, longer duration of care by TB patients, and low perceived barriers contribute to the acceptance of TPT for children. Education to parent is essential to improve acceptance to TPT.

Keywords: Information, mothers' perception, tuberculosis prevention therapy (TPT), acceptance

INTRODUCTION

Tuberculosis (TB) poses a global health challenge with a significant burden of morbidity, disability, and mortality.[1] It stands as one of the top 10 leading causes of death attributed to a single infectious agent, contributing to 1.3 million deaths. The disease burden of TB is measured through its incidence, prevalence, and mortality rates.[2] According to the World Health Organization (WHO), in 2017, two-thirds of the global TB burden was concentrated in eight countries, with Indonesia placed in third ranking (8%) after India and China. The incidence of TB in Indonesia in 2017 was recorded at 319 per 100,000 population, with a mortality rate of 40 per 100,000 population.[3]

The global incidence of TB in the year 2017 is estimated to be around 10 million cases, with approximately 10% of these cases occurring in children under the age of 15.[2] The coverage of TB diagnosis in children is notably limited, and it is estimated that only 7.1% of pediatric TB cases were reported.[4] Meanwhile, the number of children infected with TB and progressing to latent TB is estimated to constitute 23% of the world's population. The highest risk of latent TB infection is observed in toddlers, with the risk decreasing as age increases.[5] The incidence of TB in children aged 0-14 in the Southeast Asia region in 2017 was reported at 49 cases per 100,000 population per year, resulting in 194,000 deaths.[2]

The administration of Bacillus Calmette-Guérin (BCG) vaccination and tuberculosis prevention therapy (TPT) constitutes preventive measures against pediatric tuberculosis (TB).[6] The effectiveness of the BCG vaccine in preventing TB is reported to vary (50-80%), with its effects lasting only 10-15 years.[7-10] Therefore, preventive efforts in the form of TPT are deemed necessary especially if the children are at intense contact with TB patients.[2,11,12] According to the World Health Organization (WHO), the global coverage of TPT for the years 2015-2017 amounted to 87,224, 163,720, and 292,172 children, respectively. Despite these achievements, WHO estimates that only approximately 27.5% of the 1.3 million eligible children worldwide received TPT. The number of exposed children continues to rise, yet the implementation of TPT remains low. In the period 2018-2022, at least 30 million eligible children globally are expected to require TPT. [2]

In the year 2018, the incidence of TB in Bali was reported at a rate of 4 cases per 100,000 population, with 4.4% of these cases observed in individuals aged 0-14 years.[13] Within the same year, 135 children in Bali received TPT, and 30.4% of them successfully completed the TPT regimen.[14] The implementation of TPT in Badung District exhibited the highest proportion compared to other 8 districts in Bali. In 2018, 88 children in this region met the criteria for receiving TPT, however, only 22.7% of them receiving the therapy. By the first semester of 2019, the coverage of TPT had increased to 25.4% among 121 eligible children.[15] The low acceptance of children's TPT, and a significant sample size served as a rationale for selecting the Badung District as the research location to discern the contributing factors to TPT acceptance.

The highest risk of latent TB infection occurrence is observed in toddlers, diminishing with increasing age.[5] The administration of TPT effectively reduces TB incidence among children residing in households with TB patients.[16,17] Children not receiving TPT exhibit a significantly higher cumulative TB incidence within a two-year period compared to those with a negative TB status, with the highest incidence is prevalent in toddlers (19%; 95%CI: 8.4-37.4).[18] The low acceptance of TPT is attributed to not all children meeting the initiation criteria for TPT, with various reasons, including considerations regarding the unavailability of Isoniazid (INH), inadequate commitment from policymakers and healthcare providers, and a 20% concern about treatment interruption.[19,20] Other findings indicate that the acceptance of TPT in toddlers is influenced by parental

perceptions. Parents believe that their children do not require preventive treatment due to their healthy condition.[21] The majority of parents exhibit low awareness, a perception of low risk, insufficient knowledge about TB, and preventive treatment.[22,23] Parents state that they do not receive comprehensive information from healthcare providers, and if TPT is administered, they fear social stigma.[24] The divergence in perceptions between parents and healthcare providers constitutes a barrier leading to low TPT acceptance.

Based on the aforementioned exposition, it is imperative to conduct an evaluative study on the acceptance of TPT among children in close contact with TB patients.[25] A review of the existing literature reveals a scarcity of published findings on the topic of TPT conducted in Indonesia. The identified studies have not delved into the dissemination of information or the specific role of perceptual factors in the acceptance of TPT among toddlers. This research aims to examine the relationship between variables such as child characteristics, parental attributes, knowledge levels, and perceptions with the acceptance of TPT in children. By addressing these gaps, the study seeks to contribute to a more comprehensive understanding of the factors influencing TPT acceptance in this specific demographic.

METHOD

A cross-sectional study was conducted in the working areas of 12 public health centers within the Badung District, Bali, Indonesia. The designated sample consisted of mothers with toddlers in close contact with bacteriologically positive TB patients, both those who received TPT and those who did not. The participants resided within the public health centers' working areas and expressed a willingness to participate as respondents. Data from pediatric TB patients in the years 2018-2019 served as the sampling frame. A sample size of 138 mothers was determined from the pool of 226 eligible children, utilizing systematic random sampling. This minimal sample size was calculated using the formula for testing hypotheses involving two proportions, with 95% confidence level, 80% power, values of P1 representing the proportion of respondents receiving TPT with good knowledge of TPT procedures (35%)[26] and P2 representing the proportion of respondents receiving TPT with insufficient knowledge of TPT procedures (20%).[26]

The unit of analysis for maternal sociodemographic characteristics, index case characteristics, knowledge, perception, and information exposure are the total number of 138 mothers. Meanwhile, the unit of analysis for TPT acceptance is the total number of children (167 individuals) due to the existence of mothers with more than one child. In bivariate and multivariate analyses, the number of mothers is adjusted to the number of children by accounting for duplications. In cases where a mother has more than one child, the likelihood of acceptance may vary for each child. Data duplication for mothers is implemented to mitigate challenges associated with selecting which child to exclude from the analysis.

The research instrument was developed by the researchers, and data collection was facilitated by enumerators from the health profession. Prior to data collection, enumerators underwent training and questionnaire pilot testing. This survey assesses information exposure based on completeness, sources, and frequency. Completeness of information is measured using five topic-specific questions, and the mean scores are categorized into two groups. Information sources are evaluated based on data obtained from healthcare providers, media, and other sources. Frequency of information is gauged by how often mothers receive information within a month. The survey also measures maternal perceptions (perceived vulnerability, perceived severity, perceived benefits, and perceived barriers).[27] Each perception is assessed through five questions, with four response options: "not sure" scores 1, "somewhat sure" scores 2, "sure" scores 3, and "very sure" scores 4. For perceived barriers and benefits, response options are "none" scores 1, "low" scores 2, "moderate" scores 3,

and "high" scores 4. Subsequently, total scores are obtained for each perception, and based on mean scores, they are grouped into two categories. Maternal knowledge levels are measured based on ten statements, encompassing both positive and negative aspects, related to pediatric TB, typical symptoms, transmission risks, BCG immunization, and TPT. Respondents can choose from three options: "correct" scores 1 and "incorrect or do not know" scores 0. Total scores are then calculated, and based on mean scores, they are categorized into three groups: good, moderate, and poor knowledge levels.

Descriptive analysis was conducted to measure characteristics and TPT acceptance distribution. Bivariable analysis then was conducted to explore the relationship between perception and information exposure variables with the acceptance of TPT, utilizing the Chi-square test. Variables with a significance level of $p \leq 0.25$ in the bivariable analysis were included in the multivariable analysis using the Forward Logistic Regression Method to obtain the adjusted odds ratios.

The research has received ethical approval from the Ethics Commission of the Faculty of Medicine, Udayana University/Sanglah General Hospital, Denpasar, on June 26, 2020, with the reference number 2020.02.1.0574.

RESULT

Table 1 presents the characteristics of mothers, children, and index cases. The majority of mothers fall within the age range of 30-39 years (57.8%), have completed at least high school education (64.5%), work in the private sector or as entrepreneurs (47.1%), and have two or fewer living children (73.2%). Meanwhile, the average age of the children is 3 years, with a balanced distribution between male and female, and the majority have received BCG immunization.

Within the families, more than half of the index cases are not parents (56.5%), with at least one other family member present in 92% of cases, and a consistent adherence to the medication regimen in 94.9% of cases. All the children co-reside with the index cases, with the majority having lived together for over a year (76%). Nearly half of them share sleeping quarters with the index cases (40.1%), and the caregiving time for index cases is evenly split, with 37.7% receiving care for at least 8 hours per day, closely matched with those not under the care of the index cases (38.9%).

Table 2 illustrates the maternal knowledge levels and the information exposure received by mothers. Overall, there is a high percentage of correct responses only for items related to TB transmission through cough droplets (79%) and BCG immunization (85.5%). Other items exhibit a notably high percentage of incorrect responses, such as the risk of TB transmission through prolonged contact with the index case (69.6%), the belief that pediatric TB is incurable (82.6%), the misconception that BCG immunization does not provide protection (76.8%), and the perception that preventive therapy is not free (92%).

The primary source of information is healthcare providers; however, the completeness of information regarding TB transmission, the dangers of TB, as well as the indications, duration, and procedures for TPT tends to be relatively low.

Regarding mothers' perceptions, 43.5% of mothers exhibit a high vulnerability perception (cut-off=16), while 34.1% have a high severity perception (cut-off=15). Nearly half of the mothers (45.7%) possess a substantial perception of benefits (cut-off=16) related to TPT, and a nearly equivalent proportion holds a substantial perception of barriers (cut-off=9) to TPT (40.6%). The acceptance of TPT is observed in only 19.2% of the respondents (Table 3).

Table 1. Sociodemographic characteristics of mothers, children, and index case

Characteristics	f (n=138)	%
Mothers		
Age (*median*, min-max, years)	32 (20-53)	
20-29	53	38.4
30-39	63	57.8
40+	20	14.5
Education		
Not schooling, elementary and junior high	49	35.5
High school, diploma, and bachelor	89	64.5
Occupation		
Not working	60	43.5
Civil servant	4	2.9
Private sector	65	47.1
Labor	9	6.5
Number of living children		
≤2	101	73.2
>2	37	26.8
Children		
Age (mean, min-max, years)	3 (1-7)	
Sex		
Boy	79	47.3
Girl	88	52.7
BCG immunization status		
No	3	1.8
Yes	164	98.2
Index Case		
Relation between children and index case		
Parents (father, mother)	60	43.5
Other family member	78	56.5
Number of index case in the family		
≥2	11	8.0
1	127	92.0
History of treatment interruption		
Yes	7	5.1
No	131	94.9
Number of children in the same house		
≥2	58	34.7
1	109	65.3
Duration of living in the same house (years)		
>1	127	76.0
≤1	40	24.0
Sleeping with index case		
Yes	67	40.1
No	100	59.9
Duration of being cared by index case (hours per day)		
≥8	63	37.7
<8	39	23.4
Not applicable	65	38.9

Table 2. Level of mothers'knowledge and information exposure

Items of knowledge questions (n=138)	Correct f (%)
TB in children is transmitted through the coughing of a TB patient….	109 (79.0)
Typical symptoms of TB in children include a cough lasting more than 2 weeks…….	93 (67.4)
Children living with a TB patient are not at risk of transmission*…	42 (30.4)
TB in children is incurable with a 6-month treatment*	24 (17.4)
BCG immunization is administered to infants on the upper arm..….	118 (85.5)
BCG immunization does not provide protection*…….	32 (23.2)
Healthy children in household contact are given preventive therapy……	86 (62.3)
If a child does not receive preventive therapy*……	90 (65.2)
Complete 6-month preventive therapy for TB.	81 (58.7)
Preventive therapy for TB is not provided for free*……...	11 (8.0)
Completeness of information (topics)	**Yes, n (%)**
TB transmission	64 (46.4)
Dangers of TB	58 (42.0)
TPT indication	51 (37.0)
TPT duration	52 (37.7)
TPT procedure	47 (34.1)
Source of information	**Yes, n (%)**
Health workers	69 (50.0)
Media (newspaper, electronic, social media)	0 (0.0)
Others (family member, neighbor)	1 (0.7)
None	68 (49.3)
Frequency of information	
Frequently (≥2 times per month)	12 (8.7)
Sometimes (1 times per month)	58 (42.0)
Never	68 (49.3)

*Negative sentences

Table 3. Mothers' perception based on mean score and TPT acceptance

Variable	f (n=138)	%
Perceived susceptibility (mean (min-max))	15.87 (5-20)	
High	60	43.5
Low	78	56.5
Perceived severity (mean (min-max))	14.5 (5-20)	
High	47	34.1
Low	91	65.9
Perceived benefit (mean (min-max))	16.14 (5-20)	
High	63	45.7
Low	75	54.3
Perceived obstacles (mean (min-max))	9.12 (5-20)	
High	82	59.4
Low	56	40.6
TPT acceptance		
Accept	32	19.2
Not accept	135	80.8

*cut-off point of perceived susceptibility based on the mean score=16, perceived severity=15, benefit=16 and obstacle=9

Table 4 presents the results of bivariable and multivariable analyses considering several characteristics of index cases, knowledge, information exposure, and perceptions in relation to TPT acceptance. In the bivariable analysis, five index case variables, four knowledge and information exposure variables, and four perception variables have values of $p \leq 0.25$, and all are included in the multivariable analysis. In the final multivariable analysis, five variables demonstrate significant results, including the number of family members with TB, the duration of a child being cared for by the index case, information source and completeness, as well as the perception of barriers.

Table 4. Association of mothers'characteristics, knowledge, perception, information exposure and index case characteristics with TPT acceptance

Variable	TPT acceptance				p	aOR	95%CI		p
	Accept		Not Accept				lower	upper	
	f	%	f	%					
Number of family member with TB					0.007				
≥2 (n=11)	6	54.5	5	45.5		14.29	1.224	166.68	0.034
1 (n=156)	26	16.7	130	83.3		ref			
Relation of children and index case					0.010				
Parents (n=68)	20	29.4	41	70.6					
Other family member (n=99)	12	12.1	87	87.9					
History of TB drug interruption					0.650				
Yes (n=8)	2	25.0	6	75.0					
No (n=159)	30	18.9	129	81.1					
Children in the same house					0.003				
≥2 (n=58)	4	6.9	54	93.1					
1 (n=109)	28	25.7	81	74.3					
Duration of household contact					0.319				
>1 year (n=127)	27	21.3	100	78.7					
≤1 year (n=40)	5	12.5	35	87.5					
Duration of children being taken care by index case per day					0.064				
≥8 hours (n=63)	16	25.4	47	74.6		10.04	2.05	49.27	0.004
<8 hours (n=39)	9	24.3	28	75.7		7.39	1.90	28.82	0.004
Not being taken care (n=65)	7	10.4	60	89.6		ref			
Sleeping with index case					0.101				
Yes (n=67)	20	25.0	60	75.0					
No (n=100)	12	13.8	75	86.2					
Level of knowledge					0.000				
Good (n=16)	9	56.3	7	43.8					
Fair (n=112)	20	17.9	92	82.1					
Poor (n=39)	3	7.7	36	92.3					
Perceived susceptibility					1.000				
High (n=90)	17	18.9	73	81.1					
Low (n=77)	15	19.5	62	80.5					
Perceived severity					0.080				
High (n=89)	22	24.7	67	75.3					
Low (n=78)	10	12.8	68	87.2					
Perceived benefit					0.137				
High (n=98)	23	23.5	75	76.5					
Low (n=69)	9	13	60	87.0					
Perceived obstacles					0.001				
High (n=77)	24	31.2	53	68.8		4.08	1.22	13.62	0.022
Low (n=90)	8	8.9	82	91.1		ref			
Completeness of information					0.000				
Complete (n=69)	29	42	40	58.0		9.01	1.64	49.64	0.012
Incomplete (n=98)	3	3.1	95	96.9		ref			
Source of information					0.000				
Health officer (n=81)	30	38.3	50	61.7		26.70	1.25	569.38	0.035
Other sources (n=1)	0	0.0	1	100.0		0.00			1.000
None (n=85)	1	1.2	84	98.8		ref			
Frequency of information					0.000				
Frequently (n=13)	9	69.2	4	30.8					
Sometimes (n=69)	22	31.9	47	68.1					
Never (n=85)	1	1.2	84	98.8					

*cut-off point of perceived susceptibility based on the mean score=16, perceived severity=15, benefit=16 and obstacle=9
*mean score completeness of information 1.958 (min-max = 0-5)

DISCUSSION

This study reveals a notably lower acceptance of TPT at 19.2% compared to the reported acceptance rates in Badung District at 22.7% in 2018 and 25.4% in 2019.[15] Nevertheless, this rate is higher than the national acceptance of TPT reported in 2019 at 5.9%.[28] The disparity is largely attributed to the timing of the study during the COVID-19 pandemic, during which it was reported that many parents of children with TB relocated to other provinces. However, important notes that even considering these circumstances, the TPT acceptance rate remains low. Another key finding, TPT acceptance was associated with the number of family members affected by TB, the duration of a child being taken cared by the index case, the source and completeness of information, as well as perceptions of barriers.

This study underscores the pivotal role of information sources and completeness in TPT acceptance. Almost half of the mothers in the study reported never receiving information, with none obtaining information from media sources. This indicates that healthcare providers serve as the primary disseminators of information. Some mothers explained that information was communicated during healthcare provider home visits or when their children commenced TPT treatment at public health centers.[29] Furthermore, our study reveals that the information provided to mothers tends to be incomplete, particularly regarding transmission, risks, indications, and the procedures and duration of TPT. Cross-tabulation analysis indicates a higher likelihood of TPT acceptance among mothers who receive more comprehensive information. This informational inadequacy eliminates crucial decision-making cues,[30] foundational for the decision to administer TPT to their children. Our findings align with research in India, indicating that low TPT acceptance is attributed to insufficient information provided by healthcare providers,[23] focusing primarily on TB-related information rather than comprehensive details about TPT.[24] Some study outcomes also support the limited understanding among parents regarding TPT, such as the misconception that children receiving TPT are afflicted with TB[29] and a lack of comprehension regarding the preventive treatment benefits of TPT. [32]

In our study, knowledge was found to be nonsignificant in influencing TPT acceptance in multivariable analysis[26] yet the majority of mothers exhibited remarkably low knowledge levels, particularly regarding the transmission risk of TB to children and the administration of TPT.[33] Cross-tabulation analysis) revealed a higher TPT acceptance rate among mothers with good knowledge. This supports the study's finding that the information received by mothers is inadequately provided, both in substance and frequency, as well as in the available information sources, thereby contributing to the observed low TPT acceptance.

This study identifies perceived barriers as a significant factor influencing TPT acceptance. Mothers with low perceived barriers are inclined to accept TPT (31.2%).[30] Our study reveals that one-third of parents believe their children to be healthy, perceiving them as not requiring treatment (36.3%). Meanwhile, perceived barriers are high concerning the complexity of medication intake (65.7%), the bitterness of tablet medications (47.6%), and the provision of medication only for a 1-2 weeks duration, coupled with extended service wait times. These findings contribute additional impediments to those reported in other studies, such as the intricate TB screening procedures posing time and cost constraints,[34] unfriendly healthcare facility services,[26] the belief that TPT is not an effective treatment method,[21,26] challenges in the continuity of TPT availability, and the absence of home visits.[22]

We found higher number of family members with TB and a longer duration of a child being taken cared by the index case play a role in TPT acceptance. In vulnerable toddlers, the proximity, duration, and intensity of contact with the index case influence the risk of transmission,[35] and having more family members with TB

exposes the child to a higher risk. Although in our study, the perception of vulnerability or threat did not prove to be significantly associated with TPT acceptance, the results indicate that parents perceived a threat[36] to their child being infected with TB due to a higher number of family members with TB and prolonged exposure time,[16] thereby influencing the TPT acceptance.[30] In other regions, these factors were found to be non-significant in TPT acceptance.[26,37]

Several factors were found to be non-significant, such as perception of susceptibility, severity, and benefits; however, they appear to be heavily influenced by a low understanding of TB and TPT.[21,32,35] The data suggests respondents perceived low susceptibility and severity of TB in their children, possibly due to a lack of awareness regarding the risks and consequences of TB infection. This aligns with the Health Belief Model,[27] which posits that individuals are more likely to engage in health-promoting behaviors when they perceive themselves as susceptible to a health threat and believe the threat to be severe. Moreover, the observed lack of perceived benefits and the perception of TPT as a barrier may be attributed to the overall low comprehension of TPT and its advantages. The respondents did not perceive their children to be at risk for TB infection, leading to the belief that the benefits of TPT were negligible. Meanwhile, the perception that TPT poses more barriers than advantages. The frequency of information was also found to be non-significant, likely due to the non-varied information sources, primarily from healthcare providers, making the frequency data tend to be homogeneous. All of these suggest a potential miscommunication or misunderstanding about the efficacy and practicality of preventive measures that need to be considered in future health promotion.

The rapid and intensive development of information technology, particularly during the COVID-19 pandemic, is noteworthy. The 2015 data of Ministry of Health Research and Development Centre *(Puslitbang)* indicated a continual increase in household internet access in Indonesia, reaching at least 35.1% (22.8 million households), with higher rates in urban areas compared to rural areas (47.9% vs. 24.7%).[38] The Indonesia Digital Mums (IDM) 2018 annual research reported a 48.7% increase in internet usage among mothers, signifying an increased digital literacy.[39] Meanwhile, television access is much higher, with 86.7% (56.4 million) households, with urban areas surpassing rural areas (93.5% vs. 81.1%).[38] This presents an opportunity for disseminating information about TPT more widely and comprehensively, reaching family members or other communities not reached through home visits or during initiation at health centers. In general, the standard duration for TPT is typically around 6 months,[28,30] which is quite long. The exact duration may depend on factors such as the specific regimen prescribed, the child's age, and the level of exposure or risk to tuberculosis (TB). This could lead to technical complexity that hamper their obedient, therefore providing medication for a longer duration, conducting home visits while bringing medication, and striving for medication formulations more acceptable to children; may be an option to support the treatment.

Our study has several limitations. It reflects solely the perspective of mothers, omitting the role of healthcare providers, overlooks the role of males as heads of households and cultural factors influencing TPT acceptance, as well as other factors such as HIV status, nutritional status, smoking habits, and family support. Future studies should consider these aspects. Information bias might occur in certain variables, such as BCG status information, as medical records or immunization cards were not successfully located, but we tried to find the scars on the arm as evidence of TB immunization.

CONCLUSION

The acceptance of TPT in children was relatively low and influenced by the source and completeness of information from healthcare providers. The index case factors such as high number of family members with

TB, the duration of child being taken care by the index case, and the low perception of barriers to TPT, also play a role in the TPT acceptance. Efforts should be made to enhance information exposure through digital media and reduce technical barriers, such as increasing the quantity of medication per visit, conducting home visits, and altering the medication formulation to syrup. Future study should explore perspectives of other family members and also health providers as well as considering the exploration of broader factors such as nutritional status and others.

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AUTHOR CONTRIBUTION

Conception and design: IMA, AASS, NKS; Acquisition of data: IMA; Analysis and interpretation of data: IMA, AASS, NKS; Drafting of the manuscript: IMA, AASS; Critical revision of the manuscript for important intellectual content: AASS, NKS; Supervision: AASS, NKS

CONFLICT OF INTEREST

All authors have no competing interest in this study

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REFERENCES

1. Hay SI, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, et al. Global, regional, and national disability-adjusted life-years (DALYs) for 333 diseases and injuries and healthy life expectancy (HALE) for 195 countries and territories, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*. 2017; 390(10100): 1260–1344.
2. World Health Organization. Global tuberculosis report 2018. Geneva: World Health Organization; 2018.
3. World Health Organization. Global tuberculosis 2018 [Internet]. 2018. Available from: https://www.who.int/teams/global-tuberculosis-programme/data
4. Thomas TA. Tuberculosis in children. *Pediatric Clinics*. 2017; 64(4): 893–909.
5. Zelner JL, Murray MB, Becerra MC, Galea J, Lecca L, Calderon R, et al. Bacillus Calmette-Guerin and isoniazid preventive therapy protect contacts of patients with tuberculosis. *American Journal of Respiratory and Critical Care Medicine*. 2014; 189(7): 853–859.
6. Word Health Organization. Tuberculosis in children [Internet]. 2017. Available from: http://www.searo.who.int/tb/topics/tb_children/en/

7. Colditz GA, Brewer TF, Berkey CS, Burdick E, Fineberg HV, Mosteller F. Efficacy of BCG vaccine in the prevention of tuberculosis: Meta-analysis of the published literature. *Jama*. 1994; 271(9): 698–702.
8. Fine PE. Variation in protection by BCG: Implications of and for heterologous immunity. *The Lancet*. 1995; 346(8986): 1339–1345.
9. Kateralis AL, Jackson C, Southern J, Gupta RK, Drobniewski F, Lalvani A, et al. Effectiveness of BCG vaccination against Mycobacterium tuberculosis infection in adults: A cross-sectional analysis of a UK-based cohort. *The Journal of Infectious Diseases*. 2019; 221(1): 146–155.
10. Qu M, Zhou X, Li H. BCG vaccination strategies against tuberculosis: Updates and perspectives. *Human Vaccines & Immunotherapeutics*. 2021; 17(12): 5284-5295.
11. Perez-Velez CM, Marais BJ. Tuberculosis in children. *New England Journal of Medicine*. 2012; 367(4): 348–361.
12. Orme IM. Tuberculosis vaccine types and timings. *Clinical and Vaccine Immunology*. 2015; 22(3): 249–257.
13. Bali Province Health Office. Data profil kesehatan Provinsi Bali 2018 [Data of health profile in Bali Province]. Denpasar: Bali Province Health Office; 2018.
14. Bali Province Health Office. Laporan program penanggulangan tuberkulosis [Report of tuberculosis management program]. Denpasar: Bali Province Health Office; 2019.
15. Badung District Health Office. Laporan program penanggulangan tuberkulosis [Report of tuberculosis management program]. Badung: Badung District Health Office; 2019.
16. Assebe LF, Reda HL, Wubeneh AD, Lerebo WT, Lambert SM. The effect of isoniazid preventive therapy on incidence of tuberculosis among HIV-infected clients under pre-ART care, Jimma, Ethiopia: A retrospective cohort study. *BMC Public Health*. 2015; 15(1): 1–9.
17. Abossie A, Yohanes T. Assessment of isoniazid preventive therapy in the reduction of tuberculosis among ART patients in Arba Minch Hospital, Ethiopia. *Therapeutics Clinical Risk Management*. 2017; 13: 361–366.
18. Martinez L, Cords O, Horsburgh CR, Andrews JR, Acuna-Villaorduna C, Desai Ahuja S, et al. The risk of tuberculosis in children after close exposure: A systematic review and individual-participant meta-analysis. *The Lancet*. 2020; 395(10228): 973–984.
19. Teklay G, Teklu T, Legesse B, Tedla K, Klinkenberg E. Barriers in the implementation of isoniazid preventive therapy for people living with HIV in Northern Ethiopia: A mixed quantitative and qualitative study. *BMC Public Health*. 2016; 16(1): 1–9.
20. Datiko DG, Yassin MA, Theobald SJ, Cuevas LE. A community-based isoniazid preventive therapy for the prevention of childhood tuberculosis in Ethiopia. *International Journal of Tuberculosis and Lung Disease*. 2017; 21(9): 1002–1007.
21. Garie KT, Yassin MA, Cuevas LE. Lack of adherence to isoniazid chemoprophylaxis in children in contact with adults with tuberculosis in Southern Ethiopia. *PLoS One*. 2011; 6(11): 1–4.
22. Singh AR, Kharate A, Bhat P, Kokane AM, Bali S, Sahu S, et al. Isoniazid preventive therapy among children living with tuberculosis patients: Is it working? A mixed-method study from Bhopal, India. *Journal of Tropical Pediatrics*. 2017; 63(4): 274–285.
23. Shivaramakrishna HR, Frederick A, Shazia A, Murali L, Satyanarayana S, Kumar AM, et al. Isoniazid preventive treatment in children in two districts of South India: Does practice follow policy?. *The International Journal of Tuberculosis and Lung Disease*. 2015; 18(8): 919–924.
24. Triasih R, Padmawati RS, Duke T, Robertson C, Sawyer SM, Graham SM. A mixed-methods evaluation of adherence to preventive treatment among child tuberculosis contacts in Indonesia. *The International Journal of Tuberculosis and Lung Disease*. 2016; 20(8): 1078–1083.
25. Benjumea-Bedoya D, Marín DM, Robledo J, Barrera LF, López L, Del Corral H, et al. Risk of infection and disease progression in children exposed to tuberculosis at home, Colombia. *Colombia Medica*. 2019; 50(4): 261–274.
26. Birungi FM, Graham S, Uwimana J, van Wyk B. Assessment of the isoniazid preventive therapy uptake and associated characteristics: A cross-sectional study. *Tuberculosis Research and Treatment*. 2018; 1–9.
27. Abraham C, Sheeran P. The health belief model, Cambridge handbook of psychology, health and medicine. 2nd ed. Cambridge: Cambridge University Press; 2014.
28. Ministry of Health of The Republic of Indonesia. Pengobatan pencegahan tuberkulosis di Indonesia [Treatment prevention of tuberculosis in Indonesia]. Jakarta: Ministry of Health of The Republic of Indonesia; 2020.

29. Ministry of Health of The Republic of Indonesia. Petunjuk teknis manajemen dan tatalaksana TB anak [Technical guideline of management and treatment of tuberculosis of children]. Jakarta: Directorate General of Disease Prevention and Control; 2016.
30. Glanz K, Rimer BK, Viswanath K. Health behavior: Theory, research, and practice. 5th ed. San Fransisco: Jossey Bass; 2015.
31. Skinner D, Hesseling AC, Francis C, Mandalakas AM. It's hard work, but it's worth it: The task of keeping children adherent to isoniazid preventive therapy. *Public Health Action*. 2013; 3(3): 191–198.
32. Chiang SS, Roche S, Contreras C, Del Castillo H, Canales P, et al. Barriers to the treatment of childhood tuberculous infection and tuberculosis disease: A qualitative study. *The International Journal of Tuberculosis and Lung Disease*. 2017; 21(2): 154–160.
33. Rutherford ME, Ruslami R, Anselmo M, Alisjahbana B, Yulianti N, Sampurno H, et al. Management of children exposed to Mycobacterium tuberculosis: A public health evaluation in West Java, Indonesia. *Bulletin of the World Health Organization*. 2013; 91(12): 932-941.
34. Assefa D, Klinkenberg E, Yosef G. Cross sectional study evaluating routine contact investigation in Addis Ababa, Ethiopia: A missed opportunity to prevent tuberculosis in children. *PLoS One*. 2015; 10(6): 1–10.
35. Lienhardt C, Fielding K, Sillah J, Tunkara A, Donkor S, Manneh K, et al. Risk factors for tuberculosis infection in sub-Saharan Africa: A contact study in The Gambia. *American Journal of Respiratory and Critical Care Medicine*. 2003; 168(4): 448–455.
36. Okwara FN, Oyore JP, Were FN, Gwer S. Correlates of isoniazid preventive therapy failure in child household contacts with infectious tuberculosis in high burden settings in Nairobi, Kenya - a cohort study. *BMC Infectious Diseases*. 2017; 17(1): 1–11.
37. Burmen B, Mutai K, Malika T. Isoniazid preventative therapy uptake for child household contacts of tuberculosis index cases, Kisumu County, Kenya, 2014-2015. *Journal of Public Health in Africa*. 2019; 10(1): 24–30.
38. Ministry of Communication and Information of Republic Indonesia. Hasil survei indikator TIK 2015 rumah tangga dan individu [Result of survey of TIK indicator 2015 household and individu] [Internet]. 2016. Available from: http://www.kominfo.go.id
39. Oketechno. Riset ungkap ibu-ibu semakin gencar bermain internet [Study report that mothers eagerly use internet] [Internet]. 2018 (cited 2023 Dec 6). Available from: https://techno.okezone.com/read/2018/09/17/56/1951473/riset-ungkap-ibu-ibu-semakin-gencar-bermain-internet