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Analysis of Child Tuberculosis Screening With MT (Mauntox Test) on the Nutritional Status of Toddlers

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Abstrak

Uji Tuberkulin/Tubelculin Skin Test (TST) merupakan uji diagnostic tuberculosis yang relevan, dengan sensitivitas dan spesifisitas ≥ 90%. Status gizi merupakan faktor yang penting bagi terjadinya penyakit infeksi termasuk penyakit TB. Status gizi sangat menentukan kemampuan tubuh untuk melawan kuman TB, Anak dengan gizi baik mampu mencegah penyebaran penyakit sedangkan anak dengan status gizi kurang ataupun stunting dapat menyebabkan penyakit paru dengan kavitas yang luas pada usia dini. Tujuan penelitian ini untuk mengetahui Skrining Tuberkulosis Anak melalui MT (Mauntox Test) terhadap Status Gizi Balita. Populasi penelitian ini adalah balita usia 1-59 bulan dengan stunting.Tahapan penelitian ini meliputi: Sistem skoring yaitu pembobotan terhadap gejala atau tanda klinis pada anak yang dicurigai sakit TB dengan melakukan anamnesis dan pemeriksaan Fisik (Skoring gejala dan pemeriksaan penunjang TB), Penentuan Status Gizi balita diukur secara anthropometri berdasarkan tinggi badan menurut umur (TB/U) dan (BB/U) dengan Z-Score, Uji Tuberkulin. Uji Analisa data dengan Regresi Logistik, untuk melihat tingkat pengaruh Skrining tuberculosis melalui *Mountox Test* terhadap Kejadian Stunting sedang uji bivariat dengan *chi kuadrat* dan uji multivariat dengan *Regresi Logistik*. Hasil Penelitian usia, jenis kelamin, status imunisasi dan hasil skrining Mauntox tes tidak mempengaruhi status gizi balita baik berdasarkan PB/U maupun BB/U karena dilihat p-value >0,10. Sedangkan jenis kelamin beresiko 1,258 kali terjadinya stunting (PB/U) dan umur beresiko 2,054 kali terjadinya status gizi sangat kurang (BB/U). Kesimpulan tidak ada pengaruh Mauntox tes terhadap status gizi balita.

Abstract

The Tuberculin Skin Test (TST) is a relevant tuberculosis diagnostic test, with sensitivity and specificity ≥ 90%. Nutritional status is an important factor in the occurrence of infectious diseases, including TB. Nutritional status greatly determines the body's ability to fight TB germs. Children with good nutrition can prevent the spread of the disease, while children with poor nutritional status or stunting can cause lung disease with large cavities at an early age. This research aims to determine Child Tuberculosis Screening via MT (Mauntox Test) on the Nutritional Status of Toddlers. The population of this study were toddlers aged 1-59 months with stunting. The stages of this research include: Scoring system, namely weighting symptoms or clinical signs in children suspected of having TB by carrying out anamnesis and physical examination (Symptom scoring and TB supporting examinations), Determining Status Toddler nutrition is measured anthropometrically based on height for

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age (TB/U) and (WW/U) with Z-Score, Tuberculin Test. Test data analysis using Logistic Regression, to see the level of influence of Tuberculosis Screening via the Mountox Test on the incidence of Stunting, while bivariate testing using chi-square and multivariate testing using Logistic Regression. Research results: age, gender, immunization status, and the results of the Mauntox screening test did not affect the nutritional status of toddlers, whether based on PB/U or BB/U because it was seen that the p-value was >0.10. Meanwhile, gender has a 1,258 times risk of stunting (PB/U) and age has a 2,054 times risk of very poor nutritional status (BB/U). The conclusion is that there is no effect of the Mauntox test on the nutritional status of toddlers.

Introduction

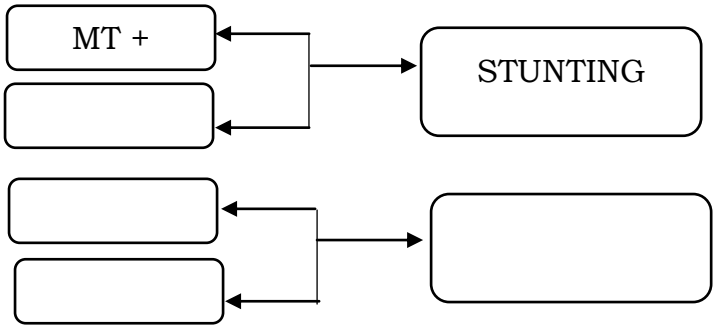
The World Health Organization (WHO) reports that 10.6 million people were diagnosed with TB or around 600,000 cases in 2020. 6 million cases in adult men, 3.4 million cases in adult women, and 1.2 million cases in children. Indonesia is in second place in the world with 969,000 cases of TB sufferers in 2021, this is an increase of 17% from 2020. Of the TB cases in Indonesia, 443,235 (45.7%) cases have been found, and 525,765 (54.3%)) cases have not been discovered and reported(Organization, 2021). The results of a study stated that the symptoms that arise from pulmonary tuberculosis in children are not specific, the symptoms include fever, cough, weight that has not increased or even decreased in the last 2 months, night sweats, lethargy, and the child seems less active in playing (Pratama, 2021). 3 factors influence TB disease, namely 1) individual characteristics including age, gender, BCG immunization status, and nutritional status. 2) level of exposure (concentration of phlegm splashes in the air, and duration of breathing the air. 3) home environment, including ventilation, lighting, humidity, and density of home occupancy (Febrian, 2015). Nutritional status is an important factor in the occurrence of infectious diseases, including TB. Nutritional status greatly determines the body's ability to fight TB germs. Children with good nutrition can prevent the spread of the disease, while children with poor nutritional status or stunting can cause lung disease with large cavities at an early age (Crofton et al., 2002)(Chin, 2009). Nutritional status influences reducing the body's resistance to bacterial invasion, every case of nutritional disorders will affect the immune system against infectious diseases. One of the problems with chronic nutritional status caused by a lack of nutritional intake over a long period is Stunting. Stunted malnourished toddlers have a higher risk of contracting TB (Prihartono et al., 2013). Short and very short toddlers have a risk of TB disease of 3.5 times and 9 times respectively (Prihartono et al., 2013). In 2020, in Indonesia the percentage of

toddlers aged 0-59 with very stunted at 3.0% and stunted at 8.5% calculated using the TB/U indicator.

The Tuberculin Skin Test (TST) is a relevant tuberculosis diagnostic test, with sensitivity and specificity ≥90%. Based on the results of the tuberculin test, we can find the tuberculin index as a guide to determine the level of tuberculosis infection so that we can measure the prevalence of tuberculosis infection and ARTI (Annual Risk of Tuberculosis Infection) in children. In another study, it was stated that the prevalence of positive tuberculin test results was 30.3% in pulmonary TB sufferers and it was found that the prevalence of positive contact history was 30.8% of all TB cases, with the number of research subjects being 605 children aged ≤ 12 years.(Ramachandran et al., 2013). The tuberculin test showed that the prevalence of infection was 46.3% (90 children) from subjects of 205 children in household contact with adult TB sufferers who were BTA positive 8. This research is very important to carry out because it has negative impacts due to stunting, including reduced quality of life, impaired growth, and mental development disorders in children, and is one of the causes of high mortality rates(Sidhi, 2010). Poor nutritional status can affect the body's response in the form of the formation of antibodies and lymphocytes to the presence of disease germs. This formation requires the raw materials protein and carbohydrates, so that in children with poor nutrition the production of antibodies and lymphocytes is hampered. Poor nutrition can cause immunological disorders and affect the disease-healing process. Any form of nutritional disorder will disrupt the immune system against infectious diseases because nutritional status influences reducing the body's resistance to facing germ invasion. Stunting is a chronic nutritional problem caused by insufficient nutritional intake over a long time, which will affect the toddler's ability to fight TB germs. Stunted toddlers are more susceptible to contracting TB disease compared to normal nutritional toddlers. This research aims to determine Child Tuberculosis Screening via MT (Mauntox Test) on the Nutritional Status of Toddlers.

Method

This type of research is quantitative research with a case-control study design. In this study, there were two groups, namely the stunting group and the non-stunting group.



The population was toddlers aged 1-59 months with the inclusion criteria of toddlers being stunted and not experiencing weight gain for 2 consecutive months, totaling 30 respondents. 15 respondents in the intervention group were with stunting and 15 respondents in the control group were without stunting. The research sites were the Fishermen's Health Center and the Panceng Gresik Health Center. Univariate data analysis using percentages, bivariate using Chie Square, and Multivariate tests (logistic regression).

Result and Discussion

Table 1
Frequency Distribution of Respondent Characteristics

Characteristics	Nutritional Status of Toddlers PB/U				Nutritional Status of Toddlers BB/U			
	Stunting N=15		Not Stunting N=15		Very Underweight N=15		N's Weight N=15	
	F	%	F	%	F	%	F	%
Age								
0-36 Months	9	60	10	66,7	12	80	7	46,7
>36-60 Months	6	40	5	33,3	3	20	8	53,3
Gender								
Male	9	60	10	66,7	9	60	10	66,7
Female	6	40	5	33,3	6	40	4	33,3
Immunization Status								
Complete	15	100	12	80	12	80	15	100
Incomplete	0	0	3	20	3	20	0	0
Mantoux test								
Positive	2	13,3	2	13,3	3	20	1	6,7
Negative	13	86,7	13	86,7	12	80	14	93,3

Table 1 explains that the nutritional status is based on PB/U with very short nutritional status (Stunting) seen from the age characteristics of the majority aged 0-36 months as many as 9

respondents (60%) and the gender is mostly male as many as 9 respondents (60 %). Meanwhile, nutritional status is based on BB/U with very poor nutritional status seen from the age characteristics of the majority aged 0-36 months, 12 respondents (80%) and gender, mostly men, 9 respondents (60%). Research at the Kaliwates Community Health Center in 2020 showed that the highest number of toddlers who experienced stunting and several stunting were boys, 64% (Yuningsih & Perbawati, 2022). A study in Rwanda also confirmed that the prevalence of stunting was higher in males (60.1%) aged 1-36 months (Utumatwishima et al., 2024). This research is in line with a survey conducted in North Maluku, the prevalence of risk factors for stunting is children aged 0-23 months and male (Ramli et al., 2009). This happens because boys have a greater risk of infection and malnutrition than girls. But this is all also influenced by care and feeding practices (Thompson, 2021). Characteristics of immunization status were complete immunization for 15 respondents (100%) and negative Mauntox test results for 13 respondents (86.7%), while nutritional status BB/U characteristics of immunization status showed complete immunization for 12 respondents (80%) and negative Mauntox test results. 12 respondents (86.7%). Research in Jember Regency revealed that there were 8.2% of stunted toddlers whose tuberculin skin test results were positive, this was influenced by a history of close contact with TB sufferers, residential density, and natural lighting in the house.(Utami et al., 2024). While the history of immunization has an indirect impact on the nutritional status of toddlers, this is following research which states that toddlers who are not fully immunized are correlated with the occurrence of ISPA (Acute Respiratory Infection), it is assumed that nutrients are needed to form body immunity (Antibodies). The better the nutritional status, the better the body's immunity(Muchtar, 2019).

Table 2
Prevalence of Mauntox Test on the Nutritional Status of Toddlers

Assessment criteria	PB/U		BB/U	
	p-value	OR	p-value	OR
Age	0,410	0,469	0,432	2.054
Gender	0,783	1,258	0,411	0,492
Immunization Status	0,999	0,000	0,999	0,000
Mantox Test	0,966	0,952	0,600	0,506

Based on the research output above, it can be concluded that age, gender, immunization status, and the results of the Mauntox screening test do not affect the nutritional status of toddlers either based on PB/U or BB/U because it is seen that the p-value is >0.10. Meanwhile, gender has a 1,258 times risk of stunting (PB/U) and age has a 2,054 times risk of very poor nutritional status (BB/U). This is in line with research (Anggraeni et al., 2020) stated that there was no significant relationship between gender and the incidence of stunting. Toddlers with BCG immunization form E-rosettes and SRBC (sheep red blood cells) per lymphocyte, this is positively related to the size of wasting and is not related to the size of stunting. Cellular immunity is impaired in underweight children, even in children with mild to moderate stunting, but not in children with stunting (Rivera et al., 1986). In other research, it was stated that BCG immunization did not produce cytokine modulation in response to pure protein derivatives of Mycobacterium tuberculosis and phytohemagglutinin. This indicates that the overall ability to produce IFN-γ is maintained in stunted children (Gaayeb et al., 2014). The lack of a clear relationship between nutritional status and a child's response to immunization may be caused by a complex interaction between genetic factors and seasonal factors, infections, population age, and nutrition itself.

Conclusion

The characteristics of stunted toddlers are toddlers aged 0-36 months and males. Meanwhile, the history of immunization status and Mauntox test results do not correlate with stunting, but these factors need attention and more in-depth study. In future research, research can be continued by involving more respondents and antigen examination to see the formation of body immunity (immunoglobulins).

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