Treatment Response Analysis in Patients with Multidrug Resistant Tuberculosis (MDR TB) at Labuang Baji Public Hospital in Makassar City

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ABSTRACT

This study aims to describe the results of analysis of some risk factors including education level, income level, treatment compliances, comorbidity history, role of health centre staff, and family support in relation with treatment response in patients with Multidrug Resistant Tuberculosis (MDR TB). The research was conducted at Labuang Baji Public Hospital in Makassaar city. It used the retrospective cohort research design with a total sample of 48 people. The sampling technique used in the research was the purposive sampling. The data were collected using direct interviews with a questionnaire, and they were analyzed with univariate, bivariate , and multivariate methods using the Relative Risk (RR) test. The result reveal that the significant risk factor is treatment compliance (RR = 4.25, 95% CI = 2.007 to 9.021; p = 0.000), while the insignificant factors are the level of education (RR = 1.04; 95% CI= 0.504 to 2.151), income level (RR = 1.13; 95% CI= 0.432 to 2.973) comorbidity history (RR = 1.02; 95% CI=0.514 – 2.013), support from health centre staff (RR= 1.81, 95% CI= 0.969 – 3.385) and family support (RR= 1.94; 95% CI=0.986 – 3.821). The multivariate analysis shows that treatment compliance is the most significant risk factor for the result of treatment response in patients with MDR TB (RR = 17.930)

CCS Concepts

·Social and professional topics → User characteristics

Keywords

MDR TB; treatment response; compliance; comorbidities history

1. INTRODUCTION

Pulmonary tuberculosis is still a public health problem worldwide, especially in developing countries. Although the incidence and rate of death of overall pulmonary TB has decreased but treatment progress has been challenged by the emergence of cases of resistance to Drugs Anti Tuberculosis (OAT), better known as Multidrug Resistant Tuberculosis (MDR TB). MDR TB is a type of TB with resistance to the two most effective anti-TB drugs, namely Rifampicin and Isoniazid [1]

Indonesia ranks 8th out of 27 countries with high burden and priority activities for MDR TB. MDR TB burden in 27 countries accounted for 85% of the global MDR TB burden. The countries included in this list have at least estimated 4000 cases of MDR TB or at least 10% of all new cases of MDR TB [2].

The South Sulawesi Provincial Health Service report shows that the suspected MDR TB from 2011 to 2015 is about 1,584 cases. Then the prevalence of MDR TB in Makassar city is about 573 cases [3]. MDR TB sufferers in South Sulawesi are referred and treated at Labuang Baji General Hospital which is a referral hospital selected by Kemenkes located in Makassar city [4].

The increased incidence of MDR TB is influenced by several factors that includes uneven TB treatment service facilities in 34 provinces, unavailability and uneven distribution of MDR TB referral hospitals, and not all hospitals have Directly Observed Treatment Short-couse (DOTS) which is sufficient. In addition, From the patient point of view, MDR TB case occurred because of low compliance of drug that often caused by side effect of drugs [5].

Other studies related to the risk factors of MDR TB mention that the history of treatment is a major factor of MDR TB (OR = 716,6; 95% CI: 282.1-1820.8), then MDR TB patients were more likely in men and between the ages of 18 to 45 years and based on multivariate analysis results found that the status of education, occupation, smoking status and type 2 diabetes mellitus was significant with MDR incidence TB in Bangladesh [6].

The rate of sputum conversion and culture in the intensive phases of treatment performed in 865 patients in China was related to treatment outcomes in MDR TB patients with p <0.001 and there were differences in treatment response rates by treatment category [7]. Research conducted by Mpagama et al ([8]in Tanzania shows that the median conversion in patients with MDR TB is 2 months or between 1-3 months in intensive or early treatment. But there are still many patients who undergo conversion after 3 months of treatment [8]. The time of sputum conversion and culture was confirmed by research conducted in Peru in 2014 which concluded that 92.5% of MDR TB patients undergoing conversion occurred in the first 6 months of treatment [9].

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Treatment outcomes are often associated with a patient's educational background. Research conducted in South Korea in 2014 mentions that low education levels have a 1.40 times risk of treatment failure in MDR TB patients [10]. Similarly, a study conducted in Georgia in 2013 showed that the secondary education level in people with TB had a risk of 0.90 times against treatment failure [11]. Subsequently low income levels are expected to affect sputum conversion changes to negative in intensive periods. This can be due to MDR TB patients every day should seek treatment so that sometimes stop because of the cost of transport [11]

In a study conducted in Central Java by Tirtana [12] showed that 46.7% did not adhere to treatment with a value of p <0.001 . Another study conducted by Thaha [13] showed that respondents who did not adhere to taking the drug would risk 41.80 times the failure of BTA conversion (+) than the respondents who adhered to taking drugs [13]

A history of comorbidities may also affect the outcome of treatment of MDR TB patients. The results of a study in China conducted by Liu et al., (2011) showed that comorbidity of diabetes mellitus had OR = 0.73 (95% CI: 0.38-1,43) with p = 0.369 for MDR TB treatment failure , as well as hypertension with OR = 0.63 (95% CI: 0.20- 1.96) with a value of p = 0.423 against MDR TB treatment failure [14].

Research Mc Ewen and Boyle [15] suggests that lack of quality interactions with nurses makes patients feel compelled to perform the treatment. In the study found the expression of feel compelled and pretend to be obedient. Family support has an effect on patient medication adherence which will affect the patient's treatment response and outcomes [3].

Therefore, in this research will be analyzed on factors related to treatment response result in MDR TB patient in RSU Labuang Baji Makassar. Factors that was analyzed were level of education, income level, treatment compliance, history of illness, the role of health workers and family support).

2. METHODOLOGY

2.1 Research Design

The type of research used in this research is an observational epidemiological analytic study using retrospective cohort design. The principle of the retrospective cohort remains the same as the ordinary cohort, but in this form, the observation begins when the effect or effect has occurred. The observed population remains eligible for the cohort population and observed are past risk factors obtained through complete data recording. Thus a retrospective cohort study form can only be performed when data on risk factors is well documented since exposure to the same population group with the effects found at baseline. This research is intended to know the results of the analysis of several factors that affect the outcomes of treatment response after two months treatment in patients with MDR TB.

2.2 Location and Time of Study

This research was conducted at Labuang Baji General Hospital of Makassar city because Labuang Baji Hospital is a referral hospital for MDR TB patient in South Sulawesi province. The time schedule for the research is March to April 2016.

2.3 Population and Sample

The population in this study were all patients diagnosed with MDR TB and recorded in the register book of MDR TB TB RSU Labuang Baji Kota Makassar period January 2014 till february 2016. Samples in this study were patients diagnosed with MDR TB and were undergoing initial treatment of MDR TB TB at RSU Labuang Baji Kota Makassar. Sample selection technique in this study using non-random sampling technique that is by purposive sampling, that is taking samples based on consideration of who meets the criteria to be sampled. In this study, researchers used a minimal sample size. The minimum sample size can be calculated based on the formula (Lemeshow, 1992) and the sample size was 33.

2.4 Data Collection Method

Primary data obtained through direct interviews to the respondents related to the research variables by using questionnaires. Secondary data were obtained from medical record book or TB-03 TB-TB MDR TB RSU Labuang Baji Kota Makassar registering all data required in the study.

2.5 Data Analysis

Data analysis using SPSS 20.0. Analysis was done in terms of Bivariate analysis is done by analysis of two variables or by cross tabulation, that is by looking at the relationship between independent variables with dependent variable, so it will be known which risk factor which have influence to result of treatment response in patient of MDR TB. The most commonly used measure for assessing the magnitude of the effect of exposure factors on events is the level or magnitude of Relative Risk (RR) which is a measure showing how many times the risk is relative to experience (effects) in exposed populations when compared with those not exposed. In addition, Multivariate analysis was done by analyzing all independent variables having p value <0,25 on bivariate analysis to dependent variable. So it will be seen the influence of the most significant variables on treatment response outcomes in patients with MDR TB.

2.6 Research Ethics

This study was conducted after obtaining approval from research ethics commission on human Faculty of Medicine UNHAS with registration number UH16020136.

3. RESULT AND DISCUSSION

3.1 Bivariate Analysis

The result of bivariate analysis shows independent variable risk factor (education level, income level, medication compliance, history of comorbidity, role of health officer and family support) to dependent variable (treatment response result) in MDR TB patient at RSU Labuang Baji Makassar city are as follows.

3.1.1 Risks of Education Levels to Treatment Response Outcomes MDR TB Patients

The risk of education level on the treatment response result of MDR TB patient can be seen in table 1. From Table 1, it is observed that respondents with a lower education level are more likely to have a negative treatment response rate of 30% compared with a positive response of 28.6%. Based on statistical test results, RR value of 1.04 (RR> 1) means that low education level is a risk factor, whereas MDR patients with low education level are at risk 1.04 times have negative treatment response outcomes compared with patients with MDR TB with level higher education. However statistically not significant because 95% CI value includes value 1 (0,504 - 2,151).

Table 1. Risk Factors Analysis of Education Level on the Response Results of Treatment of MDR TB Patients at RSU Labuang Baji Makassar City 2016

Education Level	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Low	6	30.0	8	28.6	14	29.2	1.04(0.504 – 2.151)
High	14	70.0	20	71.4	34	70.8	
Total	20	100	28	100	48	100	

3.1.2 Risk of Income Level on Response Results Treatment of TB Patients with TB

Risk of income level to result of treatment response of patient of MDR TB can be seen in table 2. From Table 2, it shows that respondents with lower income levels have more negative treatment response rate of 85.0% than the positive response is 82.1%. Based on statistical test results, RR value of 1.13 (RR> 1) means that low income level is a risk factor, whereas MDR patients with low-risk incomes 1.13 times have negative treatment response outcomes compared with MDR patients with TB high income. However statistically not significant because 95% CI value includes value 1 (0,432 - 2,973).

Table 2. Risk Factor Risk Analysis of Treatment Response Results of MDR TB Patients at RSU Labuang Baji Makassar City 2016

Income Level	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Low	17	85.0	23	82.1	40	83.3	1.13(0.432 – 2.973)
High	3	15.0	5	17.9	8	16.7	
Total	20	100	28	100	48	100	

3.1.3 Compliance Risk Treatment for Treatment Response Results MDR TB Patients

Compliance Risk Treatment of treatment response results of patients with MDR TB can be seen in table 3. From table 3, Table 17 shows that more non-adherent respondents had negative treatment response outcomes, ie 70.0% compared with positive response result that is 10.7%. Based on the results of statistical tests, obtained RR value of 4.25 (RR> 1) means non-adherence to treatment is a risk factor, where patients with MDR TB who do not adhere to treatment at risk of 4.25 times have a negative treatment response outcomes compared with patients with MDR TB with a medication-obedient and statistically significant because the value 95 % CI does not include a value of 1 (2,007 - 9,021).

Table 3. Analysis of Risk Factors for Adherence to Treatment Results of Treatment Response MDR TB Patients at RSU Labaji Baji Makassar city in 2016

Treatment Compliance	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
No	14	70.0	3	10.7	17	35.4	4.25 (2.007 – 9.021)
Yes	6	30.0	25	89.3	31	64.6	
Total	20	100	28	100	48	100	

3.1.4 Risk of Complicating Disease History Against Response Treatment of TB Patients with TB

The risk of the history of comorbidities on the outcomes of treatment response of patients with MDR TB can be seen in table 4. From table 4, it is observed that respondents who have a history of comorbid disease have a negative treatment response rate of 40.0% compared with a positive response of 39.3%. Based on statistical test results, RR value of 1.02 (RR> 1) means that having a history of comorbidities is a risk factor, whereas MDR TB patients have a history of comorbidities at risk of 1.02 times having negative treatment response outcomes compared with patients with MDR TB with which has no history of comorbidities. However statistically not significant because 95% CI value includes value 1 (0,514 - 2,013).

Table 4. Risk Factors Analysis of Complicative Disease History Against the Response Results of Treatment of MDR Patients TB at RSU Labuang Baji Makassar city in 2016

Disease History	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
There is	8	40.0	11	39.3	19	39.6	1.02(0.514 – 2.013)
None	12	60.0	17	60.7	29	60.4	
Total	20	100	28	100	48	100	

3.1.5 Risk of Health Officer's Role To Response Results Treatment of TB Patients with TB

Risk of health officer role to result of treatment response of patient of MDR TB can be seen in table 5. Table 5shows that less respondents get the role of health workers more that have negative treatment response result that is 35,0% compared with result of positive response that is 14,3%. Based on statistical test results, RR value of 1.81 (RR> 1) means that the lack of health personnel role is a risk factor, whereas MDR patients with TB who lack the role of health workers at risk 1.81 times have negative treatment response outcomes compared with MDR patients TB with enough to get the role of health care workers. But it is not statistically significant because of the value 95% CI includes a value of 1 (0.969 - 3.385).

Table 5. Risk Factor Analysis Role of Health Officers Against the Response Results of Treatment of MDR Patients TB at RSU Labuang Baji Makassar city in 2016

Health Officer's Role	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Less	7	35.0	4	14.3	11	22.9	1.81 (0.969 – 3.385)
Sufficient	13	65.0	24	85.7	37	77.1	
Total	20	100	28	100	48	100	

3.1.6 Risk of Family Support to Response Results Treatment of TB Patients with TB

The risk of family support for the treatment response outcomes of patients with MDR TB can be seen in table 6. From table 6, it is seen that respondents who did not get more family support had a negative treatment response rate of 15.0% compared with a positive response of 3.6%. Based on the results of statistical tests, obtained RR value of 1,94 (RR> 1) means that lack of family support is a risk factor, whereas MDR TB patients who do not get family support at risk of 1.94 times have negative treatment response outcomes compared with MDR of TB patients with family support. However, statistically not significant because 95% CI value includes value 1 (0.986- 3,821).

Table 6. Risk Factors Analysis of Family Support on Treatment Response Results of MDR TB Patients at RSU Labuang Baji Makassar City 2016.

Family's support	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Not supportive	3	15.0	1	3.6	4	8.3	1.94(0.986 – 3.821)
Supportive	17	85.0	27	96.4	44	91.7	
Total	20	100	28	100	48	100	

Furthermore, in facilitating multivariate analysis, Table 7 shows a summary of RR and p values. Table 7 shows that from 6 independent variables only 2 variables will be analyzed further in multivariate analysis because it has value p value <0,25 that is medication compliance and health officer role.

Table 7. Summary of RR and p value Based on Analysis Bivariate

No	Variable	RR	p value
1	Education Level	1.04	0.915
2	Income Level	1.13	0.793
3	Treatment Compliance	4.25	0.000
4	Disease History	1.02	0.963
5	Health Officer's Role	1.81	0.092
6	Family's support	1.94	0.158

3.2 Multivariate Analysis

Multivariate analysis was only performed on treatment compliance variables and the role of health personnel because both had p value <0.25. The result of analysis by using Enter method can be seen in Table 8. Table 8 shows that the variables most at risk for treatment response outcomes of patients with MDR TB were treatment compliance variables. The value of statistical test showed that the compliance variable treatment significantly risked the result of treatment response of MDR TB patients 17,930 times. Based on the results of the analysis can be made a logistics equation for the treatment response results of patients with MDR TB was found to be p = 0.10 or 10%. Thus, this means that MDR TB patients who do not get the role of health workers and disobedient treatment have a probability related to the results of treatment response of patients with MDR TB by 10%.

Table 8. Multivariate Analysis Results Risk Factors on Response Treatment Results of MDR TB Patients at RSU Labuang Baji Makassar City 2016 with Method Enter

Variable	B	SE	Wald	Sig	RR	95% CI	
						Lower	Upper
treatment compliance	2.886	0.790	13.351	0.000	17.930	3.812	84.334
role of health Officer	0.865	0.887	0.953	0.329	2.376	0.418	13.503
Constant	-5.906	2.080	8.065	0.005	0.003		

3.3 Overall Discussion

Another supporting study is a study conducted by Rifat et al [6] in Bangladesh showing that low / moderate educational risk 2.38 causes MDR cases of TB treated or treated in hospitals . Similar results in Georgia in 2015 showed that education rates were associated with TB treatment outcomes with a value of p <0.05 [11]. Another study conducted by Nagu et al (2015) in Tanzania to look at factors related to the incidence of TB resistance by 2015 indicates that patients with at-risk level are at risk (RR = 1.05; 95% CI: 0.57-1.93) of treatment outcomes [16] .A similar study was also conducted by Choi et al [10] with the result that Patients with low education levels had a risk of 1.40 times for adverse treatment outcomes (RR = 1.40; 95% CI: 1.27- 5.01).

These results of this study are similar to those in Central Java that show that low-income MDR TB patients are higher at 66.7% than those with high incomes [12]. And supported by research by Goswami et al [17] in Kolkata, India with MDR TB patients tended to be more in low- and moderate-income groups The study was supported by a study conducted by Kang et al [18] in South Korea that demonstrated that treatment adherence was a risk factor, in which MDR patients with non-adherent TB treatment had a 2.52-fold risk of successful treatment (OR = 2.52, 95 % CI: 0.86-7.40, p = 0.09). Similarly, studies that are also in South Korea conclude that treatment compliance may increase the chance of recovery in MDR TB patients [10].

A similar study conducted by Velayutham et al [7] in India shows that MDR TB patients who have comorbidity in the form of DM disease has a risk of 1.28 times against the result of negative sputum (OR = 1.28, 95% CI: 0.94-1.76, p value = 0.118). and supported by research by Choi et al. [10] in South Korea with DM disease having a risk of 2.52 times the value of adverse medical outcomes (RR = 2.52; 95% CI: 1.27-5.01). The study was also supported by Kirom (2011) in Konawe Southeast Sulawesi indicating that coexistence is a significant risk factor for TB patient conversion failure (OR = 9,12; 95% CI: 3,46 - 23,98).

This research is supported by research conducted Septia et al [19] in RSUD Arifin Ahmad with the result that there is a significant relationship between family support to the success of treatment (p = 0.036). Of course the success of treatment can not be separated from the result of good treatment response also [19].

4. CONCLUSION

In this work, factors related to treatment response result in MDR TB patient in RSU Labuang Baji Makassar was analyzed. The key results showed that that the significant risk factor is treatment compliance (RR = 4.25, 95% CI = 2.007 to 9.021; p = 0.000), while the insignificant factors are the level of education (RR = 1.04; 95% CI= 0.504 to 2.151), income level (RR = 1.13; 95% CI= 0.432 to 2.973) comorbidity history (RR = 1.02; 95% CI=0.514 – 2.013), support from health centre staff (RR= 1.81, 95% CI= 0.969 – 3.385) and family support (RR= 1.94; 95% CI=0.986 – 3.821). The multivariate analysis shows that treatment compliance is the most significant risk factor for the result of treatment response in patients with MDR TB (RR = 17.930).

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CCS Concepts

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Keywords

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1. INTRODUCTION

Pulmonary tuberculosis is still a public health problem worldwide, especially in developing countries. Although the incidence and rate of death of overall pulmonary TB has decreased but treatment progress has been challenged by the emergence of cases of resistance to Drugs Anti Tuberculosis (OAT), better known as Multidrug Resistant Tuberculosis (MDR TB). MDR TB is a type of TB with resistance to the two most effective anti-TB drugs, namely Rifampicin and Isoniazid [1]

Indonesia ranks 8th out of 27 countries with high burden and priority activities for MDR TB. MDR TB burden in 27 countries accounted for 85% of the global MDR TB burden. The countries included in this list have at least estimated 4000 cases of MDR TB or at least 10% of all new cases of MDR TB [2].

The South Sulawesi Provincial Health Service report shows that the suspected MDR TB from 2011 to 2015 is about 1,584 cases. Then the prevalence of MDR TB in Makassar city is about 573 cases [3]. MDR TB sufferers in South Sulawesi are referred and treated at Labuang Baji General Hospital which is a referral hospital selected by Kemenkes located in Makassar city [4].

The increased incidence of MDR TB is influenced by several factors that includes uneven TB treatment service facilities in 34 provinces, unavailability and uneven distribution of MDR TB referral hospitals, and not all hospitals have Directly Observed Treatment Short-couse (DOTS) which is sufficient. In addition, From the patient point of view, MDR TB case occurred because of low compliance of drug that often caused by side effect of drugs [5].

Other studies related to the risk factors of MDR TB mention that the history of treatment is a main factor of MDR TB (OR = 716,6; 95% CI: 282.1-1820.8), then MDR TB patients were more likely in men and between the ages of 18 to 45 years and based on multivariate analysis results found that the status of education, occupation, smoking status and type 2 diabetes mellitus was significant with MDR incidence TB in Bangladesh [6].

The rate of sputum conversion and culture in the intensive phases treatment performed in 865 patients in China was related to treatment outcomes in MDR TB patients with p <0.001 and there were differences in treatment response rates by treatment category [7]. Research conducted by Mpagama et al ([8]in Tanzania shows that the median conversion in patients with MDR TB is 2 months or between 1-3 months in intensive or early treatment. But there are still many patients who undergo conversion after 3 months of treatment [8]. The time of sputum conversion and culture was confirmed by research conducted in Peru in 2014 which concluded that 92.5% of MDR TB patients undergoing conversion occurred in the first 6 months of treatment [9].

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Treatment outcomes are often associated with a patient's educational background. Research conducted in South Korea in 2014 mentions that low education levels have a 1.40 times risk of treatment failure in MDR TB patients [10]. Similarly, a study conducted in Georgia in 2013 showed that the secondary education level in people with TB had a risk of 0.90 times against treatment failure [11]. Subsequently low income levels are expected to affect sputum conversion changes to negative in intensive periods. This can be due to MDR TB patients every day should seek treatment so that sometimes stop because of the cost of transport [11]

In a study conducted in Central Java by Tirtana [12] showed that 46.7% did not adhere to treatment with a value of p <0.001 . Another study conducted by Thaha [13] showed that respondents who did not adhere to taking the drug would risk 41.80 times the failure of BTA conversion (+) than the respondents who adhered to taking drugs [13]

A history of comorbidities may also affect outcome of treatment of MDR TB patients. The results of a study in China conducted by Liu et al., (2011) showed that comorbidity of diabetes mellitus had OR = 0.73 (95% CI: 0.38-1,43) with p = 0.369 for MDR TB treatment failure , as well as hypertension with OR = 0.63 (95% CI: 0.20- 1.96) with a value of p = 0.423 against MDR TB treatment failure [14].

Research Mc Ewen and Boyle [15] suggests that lack of quality interactions with nurses makes patients feel compelled to perform the treatment. In the study found the expression of feel compelled and pretend to be obedient. Family support has an effect on patient medication adherence which will affect the patient's treatment response and outcomes [3].

Therefore, in this research will be analyzed on factors related to treatment response result in MDR TB patient in RSU Labuang Baji Makassar. Factors that was analyzed were level of education, income level, treatment compliance, history of illness, the role of health workers and family support).

2. METHODOLOGY

2.1 Research Design

The type of research used in this research is an observational epidemiological analytic study using retrospective cohort design. The principle of the retrospective cohort remains the same as the ordinary cohort, but in this form the observation begins when the effect or effect has occurred. The observed population remains eligible for the cohort population and observed are past risk factors obtained through complete data recording. Thus a retrospective cohort study form can only be performed when data on risk factors is well documented since exposure to the same population group with the effects found at baseline. This research is intended to know the results of the analysis of several factors that affect the outcomes of treatment response after two months treatment in patients with MDR TB.

2.2 Location and Time of Study

This research was conducted at Labuang Baji General Hospital of Makassar city because Labuang Baji Hospital is a referral hospital for MDR TB patient in South Sulawesi province. The time schedule for the research is March to April 2016.

2.3 Population and Sample

The population in this study were all patients diagnosed with MDR TB and recorded in the register book of MDR TB TB RSU Labuang Baji Kota Makassar period January 2014 till february 2016. Samples in this study were patients diagnosed with MDR TB and were undergoing initial treatment of MDR TB at RSU Labuang Baji Kota Makassar. Sample selection technique in this study using non-random sampling technique that is by purposive sampling, that is taking samples based on consideration of who meets the criteria to be sampled. In this study, researchers used a minimal sample size. The minimum sample size can be calculated based on the formula (Lemeshow, 1992) and the sample size was 33.

2.4 Data Collection Method

Primary data obtained through direct interviews to the respondents related to the research variables by using questionnaires. Secondary data were obtained from medical record book or TB-03 TB-TB MDR TB RSU Labuang Baji Kota Makassar registering all data required in the study.

2.5 Data Analysis

Data analysis using SPSS 20.0. Analysis was done in terms of Bivariate analysis is done by analysis of two variables or by cross tabulation, that is by looking at the relationship between independent variables with dependent variable, so it will be known which risk factor which have influence to result of treatment response in patient of MDR TB. The most commonly used measure for assessing the magnitude of the effect of exposure factors on events is the level or magnitude of Relative Risk (RR) which is a measure showing how many times the risk is relative to experience (effects) in exposed populations when compared with those not exposed. In addition, Multivariate analysis was done by analyzing all independent variables having p value <0,25 on bivariate analysis to dependent variable. So it will be seen the influence of the most significant variables on treatment response outcomes in patients with MDR TB.

2.6 Research Ethics

This study was conducted after obtaining approval from research ethics commission on human Faculty of Medicine UNHAS with registration number UH16020136.

3. RESULT AND DISCUSSION

3.1 Bivariate Analysis

The result of bivariate analysis shows independent variable risk factor (education level, income level, medication compliance, history of comorbidity, role of health officer and family support) to dependent variable (treatment response result) in MDR TB patient at RSU Labuang Baji Makassar city are as follows.

3.1.1 Risks of Education Levels to Treatment Response Outcomes MDR TB Patients

The risk of education level on the treatment response result of MDR TB patient can be seen in table 1. From Table 1, it is observed that respondents with a lower education level are more likely to have a negative treatment response rate of 30% compared with a positive response of 28.6%. Based on statistical test results, RR value of 1.04 (RR> 1) means that low education level is a risk factor, whereas MDR patients with low education level are at risk 1.04 times have negative treatment response outcomes compared with patients with MDR TB with level higher education. However statistically not significant because 95% CI value includes value 1 (0,504 - 2,151).

Table 1. Risk Factors Analysis of Education Level on the Response Results of Treatment of MDR TB Patients at RSU Labuang Baji Makassar City 2016

Education Level	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Low	6	30.0	8	28.6	14	29.2	1.04(0.504 – 2.151)
High	14	70.0	20	71.4	34	70.8	
Total	20	100	28	100	48	100	

3.1.2 Risk of Income Level on Response Results Treatment of TB Patients with TB

Risk of income level to result of treatment response of patient of MDR TB can be seen in table 2. From Table 2, it shows that respondents with lower income levels have more negative treatment response rate of 85.0% than the positive response is 82.1%. Based on statistical test results, RR value of 1.13 (RR> 1) means that low income level is a risk factor, whereas MDR patients with low-risk incomes 1.13 times have negative treatment response outcomes compared with MDR patients with TB high income. However statistically not significant because 95% CI value includes value 1 (0,432 - 2,973).

Table 2. Risk Factor Risk Analysis of Treatment Response Results of MDR TB Patients at RSU Labuang Baji Makassar City 2016

Income Level	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Low	17	85.0	23	82.1	40	83.3	1.13(0.432 – 2.973)
High	3	15.0	5	17.9	8	16.7	
Total	20	100	28	100	48	100	

3.1.3 Compliance Risk Treatment for Treatment Response Results MDR TB Patients

Compliance Risk Treatment of treatment response results of patients with MDR TB can be seen in table 3. From table 3, Table 17 shows that more non-adherent respondents had negative treatment response outcomes, ie 70.0% compared with positive response result that is 10.7%. Based on the results of statistical tests, obtained RR value of 4.25 (RR> 1) means non-adherence to treatment is a risk factor, where patients with MDR TB who do not adhere to treatment at risk of 4.25 times have a negative treatment response outcomes compared with patients with MDR TB with a medication-obedient and statistically significant because the value 95 % CI does not include a value of 1 (2,007 - 9,021).

Table 3. Analysis of Risk Factors for Adherence to Treatment Results of Treatment Response MDR TB Patients at RSU Labaji Baji Makassar city in 2016

Treatment Compliance	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
No	14	70.0	3	10.7	17	35.4	4.25 (2.007 – 9.021)
Yes	6	30.0	25	89.3	31	64.6	
Total	20	100	28	100	48	100	

3.1.4 Risk of Complicating Disease History Against Response Treatment of TB Patients with TB

The risk of the history of comorbidities on the outcomes of treatment response of patients with MDR TB can be seen in table 4. From table 4, it is observed that respondents who have a history of comorbid disease have a negative treatment response rate of 40.0% compared with a positive response of 39.3%. Based on statistical test results, RR value of 1.02 (RR> 1) means that having a history of comorbidities is a risk factor, whereas MDR TB patients have a history of comorbidities at risk of 1.02 times having negative treatment response outcomes compared with patients with MDR TB with which has no history of comorbidities. However statistically not significant because 95% CI value includes value 1 (0,514 - 2,013).

Table 4. Risk Factors Analysis of Complicative Disease History Against the Response Results of Treatment of MDR Patients TB at RSU Labuang Baji Makassar city in 2016

Disease History	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
There is	8	40.0	11	39.3	19	39.6	1.02(0.514 – 2.013)
None	12	60.0	17	60.7	29	60.4	
Total	20	100	28	100	48	100	

3.1.5 Risk of Health Officer's Role To Response Results Treatment of TB Patients with TB

Risk of health officer role to result of treatment response of patient of MDR TB can be seen in table 5. Table 5shows that less respondents get the role of health workers more that have negative treatment response result that is 35,0% compared with result of positive response that is 14,3%. Based on statistical test results, RR value of 1.81 (RR> 1) means that the lack of health personnel role is a risk factor, whereas MDR patients with TB who lack the role of health workers at risk 1.81 times have negative treatment response outcomes compared with MDR patients TB with enough to get the role of health care workers. But it is not statistically significant because of the value 95% CI includes a value of 1 (0.969 - 3.385).

Table 5. Risk Factor Analysis Role of Health Officers Against the Response Results of Treatment of MDR Patients TB at RSU Labuang Baji Makassar city in 2016

Health Officer's Role	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Less	7	35.0	4	14.3	11	22.9	1.81 (0.969 – 3.385)
Sufficient	13	65.0	24	85.7	37	77.1	
Total	20	100	28	100	48	100	

3.1.6 Risk of Family Support to Response Results Treatment of TB Patients with TB

The risk of family support for the treatment response outcomes of patients with MDR TB can be seen in table 6. From table 6, it is seen that respondents who did not get more family support had a negative treatment response rate of 15.0% compared with a positive response of 3.6%. Based on the results of statistical tests, obtained RR value of 1,94 (RR> 1) means that lack of family support is a risk factor, whereas MDR TB patients who do not get family support at risk of 1.94 times have negative treatment response outcomes compared with MDR of TB patients with family support. However, statistically not significant because 95% CI value includes value 1 (0.986- 3,821).

Table 6. Risk Factors Analysis of Family Support on Treatment Response Results of MDR TB Patients at RSU Labuang Baji Makassar City 2016.

Family's support	Response Results Treatment				N	%	RR 95% CI (LL – UL)
	Negative		Positive				
	n	%	n	%			
Not supportive	3	15.0	1	3.6	4	8.3	1.94(0.986 – 3.821)
Supportive	17	85.0	27	96.4	44	91.7	
Total	20	100	28	100	48	100	

Furthermore, in facilitating multivariate analysis, Table 7 shows a summary of RR and p values. Table 7 shows that from 6 independent variables only 2 variables will be analyzed further in multivariate analysis because it has value p value <0,25 that is medication compliance and health officer role.

Table 7. Summary of RR and p value Based on Analysis Bivariate

No	Variable	RR	p value
1	Education Level	1.04	0.915
2	Income Level	1.13	0.793
3	Treatment Compliance	4.25	0.000
4	Disease History	1.02	0.963
5	Health Officer's Role	1.81	0.092
6	Family's support	1.94	0.158

3.2 Multivariate Analysis

Multivariate analysis was only performed on treatment compliance variables and the role of health personnel because both had p value <0.25. The result of analysis by using Enter method can be seen in Table 8. Table 8 shows the variables most at risk for treatment response outcomes of patients with MDR TB were treatment compliance variables. The value of statistical test showed that the compliance variable treatment significantly risked the result of treatment response of MDR TB patients 17,930 times. Based on the results of the analysis can be made a logistics equation for the treatment response results of patients with MDR TB was found to be p = 0.10 or 10%. Thus, this means that MDR TB patients who do not get the role of health workers and disobedient treatment have a probability related to the results of treatment response of patients with MDR TB by 10%.

Table 8. Multivariate Analysis Results Risk Factors on Response Treatment Results of MDR TB Patients at RSU Labuang Baji Makassar City 2016 with Method Enter

Variable	B	SE	Wald	Sig	RR	95% CI	
						Lower	Upper
treatment compliance	2.886	0.790	13.351	0.000	17.930	3.812	84.334
role of health Officer	0.865	0.887	0.953	0.329	2.376	0.418	13.503
Constant	-5.906	2.080	8.065	0.005	0.003		

3.3 Overall Discussion

Another supporting study is a study conducted by Rifat et al [6] in Bangladesh showing that low / moderate educational risk 2.38 causes MDR cases of TB treated or treated in hospitals . Similar results in Georgia in 2015 showed that education rates were associated with TB treatment outcomes with a value of p <0.05 [11]. Another study conducted by Nagu et al (2015) in Tanzania to look at factors related to the incidence of TB resistance by 2015 indicates that patients with at-risk level are at risk (RR = 1.05; 95% CI: 0.57-1.93) of treatment outcomes [16] .A similar study was also conducted by Choi et al [10] with the result that Patients with low education levels had a risk of 1.40 times for adverse treatment outcomes (RR = 1.40; 95% CI: 1.27- 5.01).

These results of this study are similar to those in Central Java that show that low-income MDR TB patients are higher at 66.7% than those with high incomes [12]. And supported by research by Goswami et al [17] in Kolkata, India with MDR TB patients tended to be more in low- and moderate-income groups The study was supported by a study conducted by Kang et al [18] in South Korea that demonstrated that treatment adherence was a risk factor, in which MDR patients with non-adherent TB treatment had a 2.52-fold risk of successful treatment (OR = 2.52, 95 % CI: 0.86-7.40, p = 0.09). Similarly, studies that are also in South Korea conclude that treatment compliance may increase the chance of recovery in MDR TB patients [10].

A similar study conducted by Velayutham et al [7] in India shows that MDR TB patients who have comorbidity in the form of DM disease has a risk of 1.28 times against the result of negative sputum (OR = 1.28, 95% CI: 0.94-1.76, p value = 0.118). and supported by research by Choi et al. [10] in South Korea with DM disease having a risk of 2.52 times the value of adverse medical outcomes (RR = 2.52; 95% CI: 1.27-5.01). The study was also supported by Kirom (2011) in Konawe Southeast Sulawesi indicating that coexistence is a significant risk factor for TB patient conversion failure (OR = 9,12; 95% CI: 3,46 - 23,98).

This research is supported by research conducted Septia et al [19] in RSUD Arifin Ahmad with the result that there is a significant relationship between family support to the success of treatment (p = 0.036). Of course the success of treatment can not be separated from the result of good treatment response also [19].

4. CONCLUSION

In this work, factors related to treatment response result in MDR TB patient in RSU Labuang Baji Makassar was analyzed. The key results showed that that the significant risk factor is treatment compliance (RR = 4.25, 95% CI = 2.007 to 9.021; p = 0.000), while the insignificant factors are the level of education (RR = 1.04; 95% CI= 0.504 to 2.151), income level (RR = 1.13; 95% CI= 0.432 to 2.973) comorbidity history (RR =1.02; 95% CI=0.514 – 2.013), support from health centre staff (RR= 1.81, 95% CI= 0.969 – 3.385) and family support (RR= 1.94; 95% CI=0.986 – 3.821). multivariate analysis shows that treatment compliance is the most significant risk factor for the result of treatment response in patients with MDR TB (RR = 17.930).

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