Jurnal Psikiatri Surabaya | Volume 9 Nomor 2
Departemen Ilmu Kedokteran Jiwa
e-ISSN:2716-358X

ORIGINAL RESEARCH:

RISK FACTOR MILD MENTAL RETARDATION IN EXTRAORDINARY SCHOOL AT SURABAYA

Muhammad Helmi Imaduddin*, Nining Febriyana**, Yunias Setiawati**, Irwanto***

* Faculty of Medicine, Universitas Airlangga / Dr. Soetomo Hospital, Surabaya.
** Department of Psychiatry, Faculty of Medicine, Universitas Airlangga / Dr. Soetomo Hospital, Surabaya.
*** Department of Pediatrics, Faculty of Medicine, Universitas Airlangga / Dr. Soetomo Hospital, Surabaya.

ABSTRACT

Background: Children with mild mental retardation tend to have late language skills so that it affects aspects of speech and independence and can persist into adulthood. Knowing the risk factor of mental retardation is important because disability in children can be prevented by knowing the cause. **Objective:** This study aims to analyze risk factors for students with mild mental retardation in special schools in Surabaya in the academic year 2019-2020. **Methods:** This study was an observational analytic study with a case-control approach that took primary data in the form of a questionnaire on parents. Then the data is analyzed through univariate to display the characteristics of respondents and descriptive research variables and bivariate analysis with a chi-square test to determine the effect of risk factors on mental retardation. **Results:** In this study, there was a total of 100 samples after being excluded from 192 samples. Factors obtained by the length of neonatal stay in the hospital (p=0.010, OR=0.318, 95%CI=0.131-0.775), baby cries immediately at birth (p=0,000, OR=0.052, 95%CI=0,007-0,417), antenatal care (p=0.014, OR=0.107, 95%,CI=0.013-0.889), LBW (p=0.002, OR=0.820, 95%CI=0,72000,934), prematurity (p=0,007, OR=0,148, 95%CI=0,031-0,706), family income (p=0,000, OR=0.077, 95%CI=0.028-0.207), father's education (p=0.001, OR=5.310, 95%CI =1,913 14,745) affect mild mental retardation. **Conclusion:** Factors that influence mild mental retardation consist of perinatal factors (baby crying at birth) and environmental factors (family income and father's education).

Keywords: Developmental delay, Mild mental retardation, Risk factor

Corresponding author : Muhammad Helmi Imaduddin

Faculty of Medicine, Universitas Airlangga / Dr. Soetomo Hospital, Surabaya.

HP: 081917964884 | email: heellmi26@gmail.com

INTRODUCTION

Mild Mental Retardation is defined as a child with an IQ range of 69 until 50. Language skills tend to be late which affects the aspects of speech and independence and can settle into adulthood [1]. According to the 2017 Global Burden of Disease data, the prevalence of mental retardation in the world in 2007-2017 increased by 12.9% and still numbered 188,585 in 2017 [2]. According to Pendataaan Program Perlindungan Sosial (PPLS) in 2011, the number of children with mental retardation was 30,460 children out of a total of 130,572. This data is spread throughout Indonesia with the most provinces in Central Java, East Java, and West Java [3]. Based on etiology or direct causes, mental retardation can be divided into psychosocial or socio-cultural and biological causes [4]. Knowing the risk factors for mental retardation is important because disability in children can be prevented by knowing the cause.

This study aims to analyze the risk factors of students with mild mental retardation in special schools in Surabaya consisting of prenatal factors (maternal age during pregnancy, family history of mental retardation and history of maternal TT immunization), perinatal (consumption of herbal medicine, the length of neonatal stay in the hospital, history of childbirth, baby cries immediately at birth, maternal disease during pregnancy, antenatal care, alcohol consumption, addiction to narcotic drugs, TORCH infection during pregnancy, pregnancy complication, the psychological disorder of the mother during pregnancy, prematurity, LBW and being in a smoker's environment) dan environment (parents education, family income and stimulation of caregiver's every day according to age groups) with the hypotheses of prenatal, perinatal and environmental factors risking mild mental retardation. It is hoped that this research can add insight and knowledge about the mild mental retardation and risk factors faced so that it can prevent disease.

METHODS

This is observational analytic research with a case-control design. Data collection was carried out in case groups consisting of parents of students with mild mental retardation at Sasanti-Wiyata, Adhitama, Siswa Budhi, Karya Asih, Bakti Asih, AKW I, AKW II, Fajar Harapan, Among Asih, Karya Bakti, Putra Mandiri, Paedagogia, Optimal Extraordinary School and a control group consisting of parents of students with normal IQ at Mojo III Elementary School in Surabaya in July 2019 - February 2020. Determination of the number of samples using the purposive technique (fixed disease sampling) with a ratio of 1: 1 between case and control group.

The inclusion criteria in the case group in this study were parents of students with mild mental retardation in the Surabaya Extraordinary School and in the control group of parents of students with normal IQ in Surabaya Elementary School who were less than 18 years old and were willing to contribute to the study. While the exclusion criteria in this study were incomplete data on the history of pregnancy and IQ from students in the case and control groups.

The instrument in this study uses primary data in the form of a questionnaire containing risk factors for mild mental retardation with research variables consisting of maternal age during pregnancy, family history of mental retardation and history of maternal immunization, consumption of herbal medicine, the length of neonatal stay in the hospital, history of childbirth, baby cries immediately at birth, antenatal care, alcohol consumption, TORCH infection during pregnancy, maternal disease during pregnancy, prematurity, addiction to narcotic drugs, being in a smoker's environment, LBW, the psychological disorder of the mother during pregnancy and pregnancy complication, parents education, family income and stimulation of caregiver's every day according to age groups and secondary data in the form of IQ.

RESULT

The number of respondents in students with mild mental retardation in Surabaya was 121. 50 respondents were included in the inclusion criteria in this study. A total of 71 respondents were excluded, with details 33 having no data on IQ and 38 with incomplete pregnancy history. While the number of respondents in students with normal IQ in SD Surabaya was 70. After inclusion and exclusion criteria, 50 respondents were included in the study. A total of 20 respondents were excluded because they did not have a complete history of pregnancy.

The results of the study found that the average IQ in 50 students with mild mental retardation was 62, while in 50 students with a normal IQ was 119. The analysis in this study was done in a descriptive or univariate way to display the characteristics of respondents and bivariate analysis using crosstabs to find out the value p or significance of risk factors causing mild mental retardation with the chi-square test using

SPSS for Windows version 26. It is said to be significant or influential if the p-value <0.05.

Table 1. Characteristics of Respondents

Variable	Mental Retardation		Normal	
	Total	Percentage	Total	Percentage
Prenatal Factors				
1. Maternal age during pregnancy				
< 35 year	39	78%	43	86%
> 35 year	11	22%	7	14%
2. Family history of mental retardation				
None	45	90%	48	96%
Exist	5	10%	2	4%
3. History of maternal TT immunization				
Doing	46	92%	38	76%
Not doing	4	8%	12	24%
Perinatal Factors				
4. Consumption of herbal medicine				
Consuming	9	18%	11	22%
Not consuming	41	82%	39	88%
5. The length of neonatal stay in the hospital				
< 2 days	28	56%	40	80%
> 2 days	22	54%	10	20%
6. History of childbirth				
Spontaneous	40	80%	38	86%
Not spontaneous	10	10%	12	24%
Sectio Caesarea	6	6%	8	8%
Vacuum Extraction	3	3%	4	4%
Forceps	1	1%	-	-
7. Baby cries immediately at birth				
Crying immediately	36	72%	49	98%
Not crying immediately	14	38%	1	2%
8. Maternal disease during pregnancy				
There is a history of disease	1	2%	0	0%
There is no history of the disease	49	98%	50	100%
9. Antenatal care				
In accordance with the K1-K4	42	84%	49	98%
Not following the K1-K4	8	16%	1	2%
10. Alcohol consumption				
Yes	1	2%	0	0%
No	49	98%	50	100%
11. Addiction to narcotic drugs				
Yes	0	0%	0	0%
No	50	100%	50	100%
12. TORCH infection during pregnancy				
Yes	1	2%	4	8%
No	49	98%	46	92%
13. Pregnancy complication				
Yes	5	10%	4	8%
No	45	90%	46	92%
14. Psychological disorder of the mother during pregnancy				
Yes	24	48%	27	54%
No	26	52%	23	46%
15. Prematurity				
> 37 weeks	39	78%	48	96%
< 37 weeks	11	22%	2	4%
16. LBW				
> 2,5kg	40	80%	50	100%
< 2,5kg	10	20%	0	0%
17. Being in a smoker's environment				
Yes	9	18%	10	20%
No	41	82%	40	80%
Environmental factors				
18. Father's education				
Primary-	44	88%	29	58%

secondary education				
High education	6	12%	21	42%
19. Mother's education				
Primary-secondary education	43	86%	35	70%
High education	7	14%	15	30%
20. Family income				
Below average (UMR)	16	32%	43	86%
Above average (UMR)	34	68%	7	14%
21. Stimulation of caregiver's every day according to age groups				
Yes	45	90%	48	96%
No	5	10%	2	4%

Table 2. Research Analysis

Variable	OR	CI 95%		*p*	RR
		Lower limit	Upper limit		
Prenatal Factors					
1. Maternal age during pregnancy	0,577	0,204	1,636	0,298	1,571
2. Family history of mental retardation	0,375	0,069	2,031	0,240	2,500
3. History of maternal TT immunization	3,632	1,082	12,183	0,029	0,333
Perinatal factors					
4. Consumption of herbal medicine	1,285	0,480	3,437	0,617	0,818
5. The length of neonatal stay in the hospital	0,318	0,131	0,775	**0,010**	2,200
6. History of childbirth	1,263	0,489	3,264	0,629	0,833
7. Baby cries immediately at birth	0,052	0,007	0,417	**0,000**	**14,000**
8. Maternal disease during pregnancy	0,980	0,942	1,020	0,315	-
9. Antenatal care	0,107	0,013	0,892	**0,014**	8,000
10. Alcohol consumption	0,980	0,942	1,020	0,315	-
11. Addiction to narcotic drugs	-	-	-	-	-
12. TORCH infection during pregnancy	4,261	0,459	39,544	0,169	0,250
13. Pregnancy complication	0,468	0,110	1,987	0,295	2,000
14. Psychological disorder of the mother during pregnancy	1,272	0,580	2,790	0,548	0,889
15. Prematurity	0,148	0,031	0,706	**0,007**	5,500
16. LBW	0,820	0,720	0,934	**0,002**	-
17. Being in a smoker's environment	1,139	0,419	3,097	0,799	0,900
Environmental factors					
18. Father's education	5,310	1,913	14,745	**0,001**	0,286
19. Mother's education	2,663	0,967	7.170	0,053	0,467
20. Family income	0,077	0,028	0,207	**0,000**	4,857
21. Stimulation of caregiver's everyday according to age groups	0,375	0,069	2,031	0,240	0,938

Table 2 shows the length of neonatal stay in the hospital, antenatal care, prematurity, LBW, family income, and father's education factors are at risk of mild mental retardation with baby cries immediately at birth being the most influential factor.

DISCUSSION

1. Maternal age during pregnancy

The results of this study found that the mother's age at pregnancy was not at risk for mild mental retardation. In the data Indonesian Demographic and Health Survey 2012 by the Ministry of Health, the maternal age of the majority is 20-34 years with the number 11.045 which includes non-risky pregnancy. [5]. In a study conducted by Kusumawardani, Dharmayanyi and Hapsari (2014), 4T pregnancy (too old, too young, too close and too many) is influenced by factors of mothers who live in rural areas, have low education, come from a low economic level, do not want their pregnancy and difficulty access to health services [6].

The result shows no effect because not many pregnant women give birth at a risky age in Indonesia. The sample locations in urban areas, secondary to tertiary education, and easy access to health can also increase the level of knowledge of mothers about risky pregnancies so that prevention can be done.

A study conducted in Pakistan by Yaqoob et al., (2004) on a case-control of 40 children with mild mental retardation showed the same results with a value of p-value = 0.7286 [7]. Different results were found in the research of Purwiyanti, Soemanto and Dewi (2017) on children with mental retardation in Ponorogo, which stated that maternal age at pregnancy has a direct effect on the incidence of mental retardation with OR = 29.57.95% CI = 11.43-76.49, p <0.001 [8], but the factors regarding mild mental retardation have not been studied.

2. Family history of mental retardation

This study found that family history did not affect mild mental retardation. In a study conducted by Lakhan, 2015, it was stated that the same history of mental retardation in the family was associated with severe mental retardation, while not with mild mental retardation [9]. Based on the etiology, mild mental retardation is caused by sociocultural aspects, not from biological causes [4].

This study is similar to a study conducted by Coesteff, Cohen, and Weller (2008) which states that only 2 out of 23 samples have the same family history of mild mental retardation disorder (p>0.5) [10]. Purwiyanti, Soemanto, and Dewi, (2017) had different results in their research on risk factors for mental retardation, which stated that hereditary history directly affected mental retardation with OR=17.94, 95%CI=7.68-41.99,p<0.001 [8], but factors regarding mild mental retardation have not been studied.

3. History of maternal TT immunization

The results obtained in this study indicate that maternal TT immunization history is not at risk for mild mental retardation. The toxin in tetanus bacteria can inhibit synapse inhibitors in infected newborns that can also cause apnea, hypoxia, and seizures in periods of susceptible brain growth and development which can lead to intellectual disability [11]. According to the 2012 SKDI, 45 percent of mothers received two or more TT immunizations during the last pregnancy, with 60 percent of children at birth during the last 5 years receiving protection from tetanus during the neonatal period [5]. The high immunization rate in Indonesia causes the immunization history factor to not affect mild mental retardation.

The same results were obtained in a study conducted by Nemerimana, Chege, and Odhiambo (2018) which stated that neonatal infection had no effect on the incidence of mental retardation with p-value = 0.471 [12].

4. Consumption of herbal medicine

In this study, the consumption of herbal medicine did not have a risk of mild mental retardation. Ministry of Health, 2016 in the book Maternal and Child Health (KIA) prohibits drinking herbal medicine for pregnant women [13]. In the results of Indonesia's 2012 demographic and health survey published by the Ministry of Health, 2013 on 14,782 pregnant women, only 7 consumed herb to overcome complications in their pregnancy [5]. This shows that the factor of consumption of herb and herbal medicine has no effect on mild mental retardation due to the low consumption of herb in pregnant women and it is recommended not to be consumed by the government in antenatal services.

In a study conducted by Purnamawati and Ariawan (2012) showed the same results, as many as 77.4% of respondents said they never drank herbal medicine during pregnancy, only 22.6% of respondents had a history of consuming herbal medicine during pregnancy [14].

5. The length of neonatal stay in the hospital

The results obtained in this study indicate that the length of hospitalization for neonatal has a risk of mild mental retardation. Research conducted by Farhat and Rajab (2011) on 478 infants stated that babies who were treated for more than 48

hours had the risk of being hospitalized again because of the diseases they had, with the highest number of diseases, namely hyperbilirubinemia, sepsis and respiratory disorders [15]. Savioli et al., (2018) in their study stated that there was a relationship between infants who had sepsis or were suspected of having sepsis and children's developmental disorders with OR=1.48(95%CI=1.05-2.09) and OR=1.09(95%CI=1.01-1.18) [16]. It is caused by the activation of microglia in the brain which causes oxidative stress, blood-brain barrier dysfunction, and migration of leukocytes which can cause damage to brain cells [17].

Different results were found in research conducted by Nemerimana, Chege, and Odhiambo (2018) which stated that neonatal infection had no effect on the incidence of mental retardation with a value of p = 0.471 [12], however, mild mental retardation has not been studied.

6. History of childbirth

There was no influence between the history of childbirth and the incidence of mild mental retardation in this study. According to data from the Ministry of Health in the Indonesian demographic and health survey in 2012, the number of deliveries using c-section was 1878 out of 14,782 births or 3.3% [5]. This is in accordance with this research, out of 100 samples only 14 pregnant women performed a cesarean section, 5 with vacuum extraction and 1 with forceps.

The results of this study are in line with research conducted by Langridge et al., 2013 that there is no relationship between a history of labor using forceps (p=0.65), vacuum (p=0.79) or cesarean delivery (p=1.07) against the incidence of mild mental retardation [19]. Research conducted by Bilder et al., 2013 stated that forceps (p=0.91) and vacuum extraction (p=0.29) did not affect, but first cesarean section (p=<0.01) or repeated (p=0.04) affected increasing the incidence of mental retardation [20], however, the results of studies on mild mental retardation have not been studied. A high normal birth rate and other factors in the previous study like forceps, vacuum extraction, and cesarean delivery that do not affect are the reason for labor history do not affect mild mental retardation.

7. Baby cries immediately at birth

In this study, the baby cries immediately at birth are the most influential factors of causing mild mental retardation. Babies who cry immediately at birth indicate an active respiratory system which is influenced by physical stimulation factors, carbon dioxide accumulation as well as lack of oxygen and chest compressions [21]. If the baby does not cry immediately, it can lead to asphyxia or systemic hypoxia and decreased blood flow to the brain. Symptoms such as abnormal movement and muscle tone may be present, sometimes resulting in persistently low APGAR scores or a diagnosis of neonatal encephalopathy (hypoxic-ischemic encephalopathy) if it has caused severe brain damage.

In a study conducted by van Handel et al., 2007 on children 7-9 years, children with a history of moderate and severe neonatal encephalopathy have a lower IQ (p<0.001) with a mechanism of decreasing blood flow to the brain which will result in a decrease saturation of oxygen and glucose so that anaerobic metabolism will occur [23]. Lactate production will increase, resulting in increased oxidative stress which will cause microvascular damage, cerebral edema, and ischemia which leads to brain cell death. The sodium and potassium pumps also do not run, resulting in depolarization and influx of sodium, an increase in intracellular calcium which will result in various other mechanisms that lead to the death of brain cells [24]. Asphyxia that occurs in the hippocampus can result in decreased cognitive function [22].

Similar results were found in the research of Nemerimana, Chege, and Odhiambo (2018) on children 2-18 years in Kenya which stated that the low APGAR score which was assessed by crying or not the baby was born immediately (APGAR score<7/10) affected on the expected the incidence rate of mental retardation, especially severe compared to mild with OR = 4.41.95% CI = 1.44-13.46, p <0.007 [12].

8. Maternal disease during pregnancy

In this study, maternal disease during pregnancy did not affect mild mental retardation. In a systematic review written by Adane, Mishra, and Tooth (2016) on 10 articles, it is stated that diabetes that occurs in pregnancy has no relationship with the development of cognitive function in children [25]. Henrichs et al., 2010 in their research stated that the amount of TSH during pregnancy did not affect children's cognitive function [26].

Different results were found in a study by Huang et al., (2016) which states that pregnant women who have diabetes have an effect on the incidence of mental retardation with an OR value of 1.5 (1.08-1.23), p <0.001 [27], however, mild mental retardation have not been studied.

9. Antenatal care

In antenatal care, sexually transmitted diseases, preeclampsia, and HIV were screened and conditions such as premature babies and neonatal sepsis can be prevented. Other preventive measures such as tetanus toxoid immunization, iron supplementation to prevent iron anemia and folic acid can also be done [28]. A study conducted by Chavan and Rozatkar, 2014 states that mental retardation can be prevented by antenatal screening such as down syndrome, other genetic disorders, and defects in neural tubes [29]. Failure to do so increases the risk of a low birth weight baby, which can lead to mental retardation [30].

Antenatal care which aims at early detection and anticipation if there are complicating factors or complications, management to maintain the health and nutrition of pregnant women and clean and safe delivery preparation so that the baby is born healthy and does not occur abnormalities, including risk factors that can cause mild mental retardation. The indicator used to describe the access of pregnant women to antenatal care is K1 - K4 coverage with competent health workers. K1 is a pregnant woman's first contact with a health worker, it must be done as early as possible in the first trimester, before week 8. K4 is a pregnant woman with 4 or more contacts made at least 1 time in the 1st trimester (0-12), at least once in the first trimester. second trimester (> 12-24 weeks) and at least 2 times in the 3rd trimester (> 24 weeks until birth).

In a study conducted by Mantao and Suja (2018), it was stated that maternal adherence to antenatal care was lower in rural areas than in urban areas. Maternal education level has a significant effect on urban ANC compliance ($p<0.05$), while in rural areas, maternal education level is not related to ANC compliance ($p>0.05$) with the highest education level being SMP-SMA [31]. In this study, which is located in Surabaya, an urban area with an average high school level of maternal education, according to the study conducted, many pregnant women do not comply with antenatal care because of their lack of education, which has an impact on the incidence of mild mental retardation.

The results of this study are not following the research conducted by Nemerimana, Chege, and Odhiambo in 2018 in Kenya, Africa which stated that antenatal care has an influence on mental retardation with a value of $p = 0.256$ [12], but factors regarding mild mental retardation have not been studied.

10. Alcohol consumption

In this study, there was no effect between alcohol intoxication and mild mental retardation because only 1 in 100 pregnant women consumed alcohol. The prevalence of women who drink alcohol in Indonesia is only around 0.4% [32]. Alcohol consumption is regulated in UU RI Number 36 the year 2009 concerning health so it didn't cause non-communicable diseases that cover all phases of life, including consumption during pregnancy which is already prohibited in the KIA book. Negative stigma is the highest form of a consequence labeled for alcohol users in Indonesia because it is not in accordance with the norm [33].

11. Addiction to narcotic drugs

In this study, there were no pregnant women who consumed drugs that caused dependence during pregnancy. The prohibition on the use of drugs is stated in UU no. 5 the year 1997 concerning psychotropics and UU no. 22 the year 1997 concerning narcotics regarding law enforcement on drug users, dealers, and dealers in Indonesia. This is thought to be the cause of the absence of pregnant women who consume drugs in this study.

12. TORCH infection during pregnancy

The results obtained in this study show that infection during pregnancy is not a risk of mild mental retardation. Prevention of infection has been implemented in antenatal services included in the 10T, one of which is advising pregnant women to carry out routine and special laboratory tests and IEC according to the problem. The role of health workers in early detection of TORCH infection in pregnancy is considered good [34].

Different results were found in a study conducted by Bilder et al., 2013 which stated that congenital infection affects the incidence of mental retardation with an AOR value of 7.51, $p <.001$ [20], however, factors on mild mental retardation have not been studied.

13. Pregnancy complication

Pregnancy complications did not have an effect on mild mental retardation in this study. In antenatal care, blood booster tablets have been given since the beginning of pregnancy 1 tablet a day for at least 90 days, laboratory tests in the form of hemoglobin, measuring blood pressure that can prevent pregnancy complications in the form of anemia and

preeclampsia.

The results found by Nemerimana, Chege and Odhiambo 2018 did not show the same results, which stated that pregnancy complications were at risk of severe / very severe mental retardation with AOR values = 9.45, 95% CI = 1.23–113.29, *P* = 0.036 [12], however, factors on mild mental retardation have not been studied.

14. Psychological disorder of the mother during pregnancy

The results of a study that conducted psychological disorders during pregnancy did not affect mild mental retardation. Given the importance of improving the health of mothers and newborns, the government has launched the National Movement for Safe Pregnancy or Making Pregnancy Safer (MPS) as part of the Safe Motherhood program which aims to protect reproductive rights and human rights by reducing the burden of morbidity, disability and death related to unnecessary pregnancy and childbirth by ensuring that every birth must be desired, served by trained personnel and any complications must be obtained help. Domestic violence is also prohibited under UU no. 23 the year 2004 so did not cause stress on pregnancy.

This study is not in accordance with research conducted by Purwiyanti, Soemanto and Dewi (2017) which states that maternal stress during pregnancy is at risk of mental retardation with p-value <0.001, OR=35.85, 95%CI=13.76-93,39 [8], but factor on mild mental retardation have not been studied.

15. Prematurity

Prematurity affects mild mental retardation in this study. Olivieri et al.,2012 in their study stated that cognitive function in preterm infants is lower than full-term infants [35]. This can be caused by an increase in the incidence of infection that occurs in premature infants due to the body's function of reducing infection in cellular immunity that is not functioning properly or cannot withstand the adaptive immunity specific antigen can be produced [36]. Decreased connectivity and a less complex brain compared to term infants can lead to a lower IQ leading to progressively impaired maturity of cognitive function [37].

Corcoles-Parada et al.,2019 in a study with CT-Scan in children aged 8-16 years with a history of premature found that they have a thin cortical thickness in several areas of the cortex which can cause a low IQ. Also, the gray matter was found to have significant changes in fractional anisotropy and radial diffusivity (p <0.05) [38].

Invasive procedures at the NICU such as skin prick blood sampling, endotracheal suction, and intravenous cannula insertion are frequently performed in preterm and low birth weight neonates. The results of the study suggest that the procedure can increase the radial diffusion rate at age 7 years of age which is suspected of causing abnormal myelination reduction in the superior grisea substance and is associated with decreased IQ in these children. The relationship between the number of procedures performed, brain microstructure damage, and IQ is driven by two frontoparietal functions, namely for language and memory storage for work which has the same neural substrate [39].

In a study conducted by Volpe, 2009, state there are two possible combination mechanisms that damage the brain, namely trophic or maturational. The type of primary brain injury that occurs usually consists of periventricular leukomalacia, a typical form of grisea substantial injury to the brain which is often accompanied by neuronal or axonal disease and affects the grisea substance of the brain, thalamus, basal ganglia, cerebral cortex, brainstem, and cerebellum. This difference in neuronal/axonal concentration and periventricular leukomalacia can be referred to as encephalopathy due to prematurity which affects cognitive function [40].

The same results in this study were also found in a study conducted by Heuvelman et al.,2018 which examined the factor of gestational age in children with mental retardation without genetic factors in Sweden. The study stated that gestational age, especially prematurity, was associated with the incidence of mental retardation with a p-value <0.001 [41]. In a study conducted by Purwiyanti, Soemanto, and Dewi (2017) in Purwokerto also showed the same results where mental retardation was influenced by prematurity factors with a p-value <0.001 [8].

16. Low Birth Weight

In this study, factors of low birth weight affect mild mental retardation. Immaturity of respiratory organs, nervous system, brain damage in neonates (cerebral palsy, hydrocephalus, hypoxic-ischemic encephalopathy), and other complications of birth caused by low birth weight can also result in impaired cognitive function [42]. Reduced long-distance brain connectivity is also seen in the cortico-basal ganglia, especially in the prefrontal and limbic areas that affect neurobehavioral disorders such as hyperactivity or deficits in

cognitive function, especially executive function at school age. There was also a reduction in head circumference [43]. In a study conducted by Yaqoob et a.l, it was 2004 stated that head circumference at birth had an effect on mild mental retardation with a value of p = 0.28733 [7].

The total number and volume of the grisea substansia in the brain, the volume of the cerebellum and hippocampus, the total number of cells in the brain, the content of myelin, the thinning of the cortex with changes in gyrification and delayed myelination. Impaired brain connectivity is evidenced by deficits in neuron migration, reduced dendritic processes, and less efficient networking with long-distance connections [43].

The same result in this study was found in the research of Purwiyanti, Soemanto, and Dewi (2017) which states that mental retardation is directly influenced by low birth weight with OR = 32.02, CI95% = 12.46-82.26, p <0.001 [8]. A meta-analysis study conducted by Huang et al.,2016 showed that low birth weight has an effect on mental retardation with a value of p <0.001 OR = 2.03, and CI95% = 1.79-2.31[27].

17. Being in a smoker's environment

There is no effect between smoking and the incidence of mild mental retardation in this study. Smoking prohibition is also found on packs and is regulated in UU no. 81 the year 1999 concerning safeguarding cigarettes for health because it can cause fetal problems. The same results were found in a study conducted by Nemerimana, Chege, and Odhiambo (2018) that pregnant women who lived in smokers did not affect mental retardation with OR = 0.18; 95% CI: 0.06–0.55; p = 0.001[12].

18. Father's education

Risk factors for father's education affect mild mental retardation. This is per data conducted by the Ministry of Health, 2012 on the SDKI which states that 26% of married men have graduated from high school [5]. Following this study where the respondents in the case and control group mostly graduated from high school. The middle to lower economic level that most respondents, amounting to 2,008 out of 9,306 in the 2012 SDKI also affects the level of education. Where a high economy is also in line with the possibility of getting a better education as well. A bad environment such as high exposure to plumbum substances in a low economy can result in oxidative stress which damages cellular components, causing academic disruption in children [44].

Emerson, Graham, and Hatton (2006) stated that there is a relationship between parental education and family opinion that affects the development of the cognitive function of children [45]. Also, parental education influences the relationship between parents and children, including providing stimuli for child development, such as neurological, linguistic, socio-emotional, motor, and developmental functions. Permissive parenting was found mostly in mild mental retardation in RSUD Dr. Soetomo, where children should not be too freed but not always demanding. [46]. Therefore, parents with low education need special programs to study child development [47].

Different results were found in the study conducted by Yaqoob et al. (2004) in Pakistan, where the level of education of the father did not have a significant effect with p-value <0.1489 [7]. The different results were due to the higher education level in the control group studied than the case group, unlike this study where the education of fathers in the case group was lower than the control group.

19. Mother's education

The results obtained in this study indicate that parental education does not affect mild mental retardation. In this study, it was found that the average mother in high school education, following the minimum standards of compulsory education in Indonesia, UUD 45-chapter XIII, article 31, paragraph 1 concerning the national education system. This causes maternal education to not affect mild mental retardation.

However, the results of this study contradict the study conducted by Yaqoob et al. (2004) in Pakistan which stated that maternal education has an effect on mild mental retardation with a value of p <0.005 [7], due to the large number of mothers who are not in school and different countries where Pakistan is the second-highest dropout rate in the world [48].

20. Family income

The results obtained in this study also affect mild mental retardation. Income affects the education level of parents, increases the incidence of divorce, and status as a minority has a cumulative effect on children's health and disabilities. Children born to parents with low income are also more likely to be born prematurely, poor birth output, developmental disabilities, serious chronic illnesses with complications, poor access to health facilities, insufficient nutrition, possibly depressed parents toxic stress in children [49]. Low

socioeconomic factors are the root of various biological and environmental problems that can cause mild mental retardation.

In contrast to research conducted by Purwiyanti, Soemanto, and Dewi., 2017 which states that there is no relationship between family income and mental retardation with OR = 1.04, 95% CI = 0.52–2.10, but the effect of mild mental retardation has not been studied. [8]. In a study conducted by Lakhan, 2015 in India, parents with low socioeconomics tended to have a relationship with mild (p = 0.204), moderate (p = 0.652) and severe (p = 1.00) mentally retarded children, while children with mental retardation very heavy and borderline tend to be associated with higher economies [9].

21. Stimulation of caregiver's every day according to age groups

In the results of this study, stimulation factors for caregivers did not affect mild mental retardation. Screening regarding the development of children according to age is supervised by the Integrative Holistic Early Childhood Development Post at the age of 3 months-2 years every 3 months, at the age of 2-6 years every 6 months. The MCH booklet also includes a checklist of what children must fulfill according to their development. This clear instruction means that caregiver stimulation factors do not affect mild mental retardation.

22. Research Limitations

In the execution carried out in this study, the obstacles that were found by the researchers were the incomplete IQ and pregnancy data resulting in the number of samples being minimal.

CONCLUSION

The results in this study found no correlation between mild mental retardation and prenatal factors. Perinatal factors that consist of the length of neonatal stay in the hospital, baby cries immediately at birth, antenatal care, prematurity, LBW and environmental factors consisting of family income and father's education affect mild mental retardation.

REFERENCES

[1] Rustiadi M. Diagnosis Gangguan Jiwa, Rujukan Ringkas PPDGJ-III dan DSM-5. 2nd ed. Jakarta: Bagian Ilmu Kedokteran Jiwa FK-Unika Atmajaya; 2013. 120 p.

[2] James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 Diseases and Injuries for 195 countries and territories, 1990-2017: A systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018;392(10159):1789–858.

[3] Kementrian Kesehatan RI. Situasi Penyandang Disabilitas. Bul Jendela Data Inf Kesehat. 2014;Semester 2(1):1–5.

[4] Sularyo TS KM. Retardasi Mental. Sari Pediatr. 2000;2(3):170–7.

[5] Badan Pusat Statistik, Badan Kependudukan dan Keluarga Berencana Nasional, Kesehatan K. Survei Demografi dan Kesehatan Indonesia 2012. SDKI. 2013;16.

[6] H PS, Hapsari D, Dharmayanti I, Kusumawardani N. Faktor-Faktor Yang Berpengaruh Terhadap Risiko Kehamilan "4 Terlalu (4-T)" Pada Wanita Usia 10-59 Tahun (Analisis Riskesdas 2010). Media Penelit dan Pengemb Kesehat. 2015;24(3):143–52.

[7] Yaqoob M, Bashir A, Zaman S, Ferngren H, von Dobeln U, Gustavson KH. Mild intellectual disability in children in Lahore, Pakistan: Aetiology and risk factors. J Intellect Disabil Res. 2004;48(7):663–71.

[8] Purwiyanti RE, Soemanto R, Dewi YLR. Factors Affecting the Occurrence of Mental Disability in Ponorogo District, East Java. J Matern Child Heal. 2017;02(03):257–69.

[9] Lakhan R. Profile of Social, Environmental and Biological Correlates in Intellectual Disability in A Resource-Poor Setting in India. Indian J Psychol Med. 2015;37(3):311–6.

[10] Costeff H, Cohen BE, Weller LE. BIOLOGICAL FACTORS IN MILD MENTAL RETARDATION. Dev Med Child Neurol [Internet]. 2008 Nov 12;25(5):580–7. Available from: http://doi.wiley.com/10.1111/j.1469-8749.1983.tb13814.x

[11] Anlar B, Yalaz K, Dizme R. Long-Term Prognosis

After Neonatal Tetanus. Dev Med Child Neurol [Internet]. 2008 Nov 12;31(1):76–80. Available from: http://doi.wiley.com/10.1111/j.1469-8749.1989.tb08414.x

[12] Nemerimana M, Chege MN, Odhiambo EA. Risk Factors Associated with Severity of Nongenetic Intellectual Disability (Mental Retardation) among Children Aged 2-18 Years Attending Kenyatta National Hospital. Neurol Res Int. 2018;2018.

[13] Kemenkes RI. Buku Kesehatan. 2016;

[14] Purnamawati D, Ariawan I. Konsumsi Jamu Ibu Hamil sebagai Faktor Risiko Asfiksia Bayi Baru Lahir. Kesmas Natl Public Heal J. 2012;6(6):267.

[15] Farhat R, Rajab M. Length of postnatal hospital stay in healthy newborns and re-hospitalization following early discharge. N Am J Med Sci. 2011;3(3):146–51.

[16] Savioli K, Rouse C, Susi A, Gorman G, Hisle-Gorman E. Suspected or known neonatal sepsis and neurodevelopmental delay by 5 years. J Perinatol [Internet]. 2018;38(11):1573–80. Available from: http://dx.doi.org/10.1038/s41372-018-0217-5

[17] Michels M, Steckert A V., Quevedo J, Barichello T, Dal-Pizzol F. Mechanisms of long-term cognitive dysfunction of sepsis: from blood-borne leukocytes to glial cells. Intensive Care Med Exp [Internet]. 2015;3(1). Available from: http://dx.doi.org/10.1186/s40635-015-0066-x

[18] Rand KM, Austin NC, Inder TE, Bora S, Woodward LJ. Neonatal Infection and Later Neurodevelopmental Risk in the Very Preterm Infant. J Pediatr [Internet]. 2016;170:97–104. Available from: http://dx.doi.org/10.1016/j.jpeds.2015.11.017

[19] Langridge AT, Glasson EJ, Nassar N, Jacoby P, Pennell C, Hagan R, et al. Maternal Conditions and Perinatal Characteristics Associated with Autism Spectrum Disorder and Intellectual Disability. Baud O, editor. PLoS One [Internet]. 2013 Jan 7;8(1):e50963. Available from: https://dx.plos.org/10.1371/journal.pone.0050963

[20] Bilder DA, Pinborough-Zimmerman J, Bakian A V., Miller JS, Dorius JT, Nangle B, et al. Prenatal and perinatal factors associated with intellectual disability. Am J Intellect Dev Disabil. 2013;118(2):156–76.

[21] F. Gary Cunningham, Kenneth J. Leveno, Steven L. Bloom, Jodi S. Dashe, Barbara L. Hoffman, Brian M. Casey CYS. Williams Obstetrics. 24th Editi. New York : McGraw-Hill Education/Medical; 2014. 624 p.

[22] De Haan M, Wyatt JS, Roth S, Vargha-Khadem F, Gadian D, Mishkin M. Brain and cognitive-behavioural development after asphyxia at term birth. Dev Sci. 2006;9(4):350–8.

[23] Van Handel M, Swaab H, De Vries LS, Jongmans MJ. Long-term cognitive and behavioral consequences of neonatal encephalopathy following perinatal asphyxia: A review. Eur J Pediatr. 2007;166(7):645–54.

[24] Allen KA, Brandon DH. Hypoxic Ischemic Encephalopathy: Pathophysiology and Experimental Treatments. Newborn Infant Nurs Rev [Internet]. 2011;11(3):125–33. Available from: http://dx.doi.org/10.1053/j.nainr.2011.07.004

[25] Adane AA, Mishra GD, Tooth LR. Diabetes in Pregnancy and Childhood Cognitive Development: A Systematic Review. Pediatrics [Internet]. 2016;137(5). Available from: http://www.ncbi.nlm.nih.gov/pubmed/27244820

[26] Henrichs J, Bongers-Schokking JJ, Schenk JJ, Ghassabian A, Schmidt HG, Visser TJ, et al. Maternal Thyroid Function during Early Pregnancy and Cognitive Functioning in Early Childhood: The Generation R Study. J Clin Endocrinol Metab [Internet]. 2010 Sep;95(9):4227–34. Available from: https://academic.oup.com/jcem/article-lookup/doi/10.1210/jc.2010-0415

[27] Huang J, Zhu T, Qu Y, Mu D. Prenatal, perinatal and neonatal risk factors for intellectual disability: A systemic review and meta- Analysis. PLoS One. 2016;11(4):1–12.

[28] Ornella Lincetto, Seipati Mothebesoane-Anoh, Patricia Gomez SM. Antenatal care. Rev Infirm. 2012;(185):45–6.

[29] Chavan B, Rozatkar A. Intellectual disability in India: Charity to right based. Indian J Psychiatry. 2014;56(2):113–6.

[30] Zhou H, Wang A, Huang X, Guo S, Yang Y, Martin K, et al. Quality antenatal care protects against low birth weight in 42 poor counties of Western China. PLoS One. 2019;14(1):1–14.

[31] Mantao E, Dara M, Suja D, Masyarakat IK, Kedokteran F, Masyarakat K, et al. Tingkat pendidikan ibu dengan kepatuhan antenatal care pada perdesaan dan perkotaan di Indonesia. Beirita Kedokt Masy. 2018;34(5):8.

[32] Kementrian Kesehatan RI. Hasil Utama Riset

Kesehatan Dasar (RISKESDAS). 2018;44(8):1–200. Available from: http://arxiv.org/abs/1011.1669%0Ahttp://dx.doi.org/10.1088/1751-8113/44/8/085201%0Ahttp://stacks.iop.org/1751-8121/44/i=8/a=085201?key=crossref.abc74c979a75846b3de48a5587bf708f

[33] Teguh Pribadi E. Penyalahgunaan Alkohol di Indonesia: Analisis Determinan, SWOT, dan CARAT. J Heal Sci Prev. 2017;1(1):22–37.

[34] Puspitasari, Rizky Sagita, Febrina SH. Gambaran Peran Tenaga Kesehatan Terhadap Deteksi Dini Torch pada Hamiltonian di Puskesmas Sedayu 1 Bantul. Univ Alma Ata Yogyakarta. 2017;1–14.

[35] Olivieri I, Bova SM, Urgesi C, Ariaudo G, Perotto E, Fazzi E, et al. Outcome of extremely low birth weight infants: What's new in the third millennium? Neuropsychological profiles at four years. Early Hum Dev [Internet]. 2012;88(4):241–50. Available from: http://dx.doi.org/10.1016/j.earlhumdev.2011.08.012

[36] Collins A, Weitkamp JH, Wynn JL. Why are preterm newborns at increased risk of infection? Arch Dis Child Fetal Neonatal Ed. 2018;103(4):F391–4.

[37] Jessie R Maxwell, Tracylyn R Yellowhair, Akosua Y Oppong, Jenny E Camacho, Jean R Lowe, Lauren L Jantzie RKO. Cognitive development in preterm infants: multifaceted deficits reflect vulnerability of rigorous neurodevelopmental pathways. Minerva Pediatr [Internet]. 2017;69(4):298–313. Available from: https://pubmed.ncbi.nlm.nih.gov/28211648/

[38] Córcoles-Parada M, Giménez-Mateo R, Serrano-del-Pueblo V, López L, Pérez-Hernández E, Mansilla F, et al. Born Too Early and Too Small: Higher Order Cognitive Function and Brain at Risk at Ages 8–16. Front Psychol. 2019;10(September):1–14.

[39] Barker D, Rutter N. Exposure to invasive procedures in neonatal intensive care unit admissions. Arch Dis Child. 1995;72(1 SUPPL.):47–9.

[40] Volpe JJ. Brain injury in premature infants: a complex amalgam of destructive and developmental disturbances. Lancet Neurol [Internet]. 2009;8(1):110–24. Available from: http://dx.doi.org/10.1016/S1474-4422(08)70294-1

[41] Heuvelman H, Abel K, Wicks S, Gardner R, Johnstone E, Lee B, et al. Gestational age at birth and risk of intellectual disability without a common genetic cause. Eur J Epidemiol [Internet]. 2018;33(7):667–78. Available from: https://doi.org/10.1007/s10654-017-0340-1

[42] Gu H, Wang L, Liu L, Luo X, Wang J, Hou F, et al. A gradient relationship between low birth weight and IQ: A meta-analysis. Sci Rep. 2017;7(1):1–13.

[43] Miller SL, Huppi PS, Mallard C. The consequences of fetal growth restriction on brain structure and neurodevelopmental outcome. J Physiol. 2016;594(4):807–23.

[44] Setiawati Y, Wahyuhadi J, Mukono HJ, Warsiki E. The Effect of Plumbum , Zinc and Zinc Ratio on Plumbum in Children ' s Temperament. 2020;20(2):801–6.

[45] Emerson E, Graham H, Hatton C. The Measurement of Poverty and Socioeconomic Position in Research Involving People with Intellectual Disability. Int Rev Res Ment Retard. 2006;32(06):77–108.

[46] Diah C, Nining F, Suryawan A, Yunias S. GAMBARAN UMUM POLA ASUH PADA ANAK RETARDASI MENTAL DI RSUD DR. SOETOMO. 2019;1(2).

[47] Vilaseca RM, Rivero M, Bersabé RM, Cantero MJ, Navarro-Pardo E, Valls-Vidal C, et al. Demographic and parental factors associated with developmental outcomes in children with intellectual disabilities. Front Psychol. 2019;10(APR).

[48] UNICEF. Pakistan Education Statistics 2016-2017. 2008; Available from: https://www.slideshare.net/minhaaj/pakistan-education-plan-1382055

[49] Boat TF, Wu JT. Mental disorders and disabilities among low-income children. Mental Disorders and Disabilities Among Low-Income Children. 2015. 119 p.