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Analysis of Factor Related to Motor Delayed Development in Children 3-36 Months at Clinic Happy Kids Banjarmasin Year 2019

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ABSTRACT

Motor delay development disorder is one of the disorders that occur in children during the period of growth and development that causes children to have limited mobility so that they become less active and less confident compared to the other children. The purpose of this study was to determine factors associated with impaired gross motor development in children aged 3-36 months. This research method uses case control with descriptive analysis and multiple logistic regression using secondary data in Happy Kids growth and development clinic. The results of this study were that there was no relationship between ANC visit history with impaired gross motor development (p = 0.229), there was a relationship between pregnancy complication history (p = 0.040), LBW history (p = 0.026), PEM history (p = 0.011) and history of epilepsy seizures (p = 0.019) with impaired gross motor development. The final result of this study is PEM history (p = 0.009) is the dominant factor associated with impaired gross motor development.

Keywords: impaired gross motor development, history of ANC visits, history of pregnancy complications, history of LBW, history of PEM, history of epileptic seizures

INTRODUCTION

The gross motor development of the children begins to be seen from the age of 3 months when they had been moving both hands and conscious movements. At this age, gross motor development began to form and be directed. Gross motor development occurs because the maturity of the nervous system has formed. If the maturity of the nervous system occurs delay or does not develop then the gross motor development will be hampered. [1] The first three years of life is a critical period of development because at this time the foundations of the development of children are able to assist in the process of future life. One way to prevent the occurrence of motor delay development is by early detection of growth and development. [2]

In the United States, the motor delay development incidence rate in 2009 ranges from 12-16%, in Thailand as much as 24%, Argentina 22% and Indonesia 18%, while in East Java, the incidence of motor delay development disorder reaches 10.5. [3] The prevalence of children's developmental delays is 2.3% with complaints that have not been able to walk with an average age of 13 – 22 months with a male prevalence greater than female 1.25:1. [4]

Motor delay development disorder is very influential in the activities of children. In the long run, if not detected as early as possible, it will inhibit the activity and creativity of children that lead to unmaturity and the failure of children in adapting. [5] Antenatal care (ANC) or mother's visit during pregnancy is a preventive effort of the healthcare program for expectant

mothers to optimize pregnancy monitoring. The aim of the ANC is the expectant mothers and babies in the womb can be monitored. If there is an abnormality, it will be immediately given action to prevent death during pregnancy and childbirth. Pregnancy complications are the life-threatening circumstances of mothers and infants in the womb because of disturbances as a direct result of pregnancy or childbirth requiring immediate treatment. [6] Pregnancy complications are important in a child's motor delay development disorder. Complications in pregnant women, will affect the fetus so indirectly the fetus is traumatized, even cause death. [7]

Another factor affecting the development of the child is low birth weight (LBW). LBW is a condition of baby born weighing under 2500 gr. The weight of infants at birth is a description of the health and nutrition of babies during the womb. In South Kalimantan, the presentation of LBW in the year 2013 is 10.3%. [8] LBW has a higher risk of death when compared to children with normal birth. In addition, LBW also has the impact of psychology and neurology that will affect the motor delay development disorder in children. [9]

In addition, protein-energy malnutrition (PEM) is one of the children's indicators to determine protein-energy malnutrition (PEM). The achievement of the optimal growth is nutrients fulfilled. Foods that do not contain enough nutritional aspects can cause nutritional deficiencies that have an impact on the growth and development of children especially the brain. If at that time, the nutrient intake of children is not fulfilled properly, then the brain cells will be reduced by 15-20% which resulted in the delay of development of children in the Golden Age of children. [10]

In addition, other important factors that affect the development of gross motor in children are epileptic seizure. Epileptic seizure is a nerve disease marked by episodes of seizure that can be accompanied by loss of consciousness. This is due to the existence an imbalance of electric charge in the brain resulting muscle stiffness or repetitive beat in the muscles. [11] Seizure is also one of the concerns of motor development disorders in children. However, epileptic seizure causes most of the motor delay development disorder in a long period of time compared to other seizures. [12] Based on the explanation above, it is done research on the factors that affect motor delay development disorder in children aged 3-36 months in the clinic to grow and development children of Happy Kids.

MATERIALS & METHODS

The research begins with determining the case of motor delay development disorder in children aged 3-36 months and determines the control i.e. children aged 3-36 months who do not have a motor delay development disorder then traced retrospectively whether there is a risk factor seen from the ANC visit history, the history of pregnancy complications, a history of the children's protein-energy malnutrition (PEM), a history of low birth weight (LBW), and a history of epileptic seizure. This research was conducted at clinic Happy Kids in Banjarmasin in 2019.

The populations in this study are all children enrolled in clinic Happy Kids in the period of 2019. The sample of this study consisted of a group of cases and control groups with a comparison of 1:1. The case group is children those who have motor delay development disorder of 18 people (case) while the control group is healthy children, with immunization, as much as 18 people (control).

This research is to analyze the history factor of ANC visit, History of pregnancy complications, PEM history of children, LBW history of children, history of epileptic seizures on the children's motor delay development disorder. The tools or instruments to be used in this study are the clinical status of the patients. The data collected by using the visit history of ANC, history of complications, PEM history of

children, LBW history of children, history of epileptic seizures of motor delay development disorders in children.

RESULT

Table 1. Distribution of Variables at the clinic Happy Kids in 2019

Variable	Frequency (n)	Percentage (%)
ANC History		
High-risk (<4x visits)	2	5.5
No risk (>=4x visits)	34	94.5
History of Pregnancy Complications		
High-risk (with HOPC)	10	27.7
No risk (without HOPC)	26	72.3
LBW History		
High-risk (with LBW history)	16	44.5
No risk (without LBW history)	20	55.5
PEM History		
High-risk (with PEM history)	11	30.5
No risk (without PEM history)	25	69.5
History of epileptic seizures (HOES)		
High-risk (with HOES history)	6	16.6
No risk (without HOES history)	30	83.4

Table 2. Statistical Bivariate Analysis of Variables at the clinic Happy Kids in 2019

Independent Variables	Motor Delay Development Disorder				p-value	OR	95% CI
	Case		Control				
	n	%	n	%			
ANC History					0.229	-	-
High-risk (<4x visits)	2	11.1	0	0			
No risk (>=4x visits)	16	88.9	18	100			
History of Pregnancy Complications					0.040	4.375	1.027 – 18.629
High-risk (with HOPC)	10	55.6	4	22.2			
No risk (without HOPC)	8	44.4	14	77.8			
LBW History					0.026	6.400	1.124 – 36.437
High-risk (with LBW history)	8	44.4	2	11.1			
No risk (without LBW history)	10	55.6	16	88.9			
PEM History					0.011	8.000	1.049 – 45.407
High-risk (with PEM history)	9	50	2	11.1			
No risk (without PEM history)	9	50	16	88.9			
History of epileptic seizures (HOES)					0.019	2.500	1.613 – 3.875
High-risk (with HOES history)	6	33.3	0	0			
No risk (without HOES history)	12	66.7	18	100			

There is no relationship between the ANC visit history and the motor delay development disorder in the children (p >0.05). There is a relationship between the history of pregnancy complications with motor delay development disorder in children. The analysis based on the odds ratio (OR), which obtained at 4.375 (95% CI 1.027 – 18.629) means mothers with history of pregnancy complications have tendency of 4.375 at risk compared to mothers who do not have history of pregnancy complications. There is a relationship between LBW history and the motor delay development disorder in children. Ages 3-36 months at the clinic grow and development children Happy Kids. The analysis based on the odds ratio (OR), which is obtained at 6.400 (95% CI 1.124-36.437) means that children born with LBW have risk in 6.400 times greater having motor delay development disturbance than the children who do not have LBW history.

There is a relationship between the history of PEM with motor delay development disorder in children. Ages 3-36 months at the clinic grow and development children Happy Kids. The analysis based on the odds ratio (OR), which is obtained at 8.000 (95% CI 1.409-45.407) means children with PEM history having 8.000 times more risk to have motor development disorders than children who do not have history of PEM. There is a relationship between the history of epileptic seizures

with motor delay development disorders in children. Ages 3-36 months at the clinic grow and development children Happy Kids. The analysis is based on the odds ratio (OR), which is derived from 2.500 (95% CI 1.613 – 3.875) meaning that children who have history of epileptic seizures are at 2.500 times risk in motor delay development disorders than children who are born do not have a history of epileptic seizures.

Table 3. Statistical Multivariate Analysis of Variables at the clinic Happy Kids in 2019

Independent Variables	p-value	Exp.B	95% CI		Description
			Lower	Upper	
History of Pregnancy Complications	0.762	1.406	0.155	12.761	Not Fulfilled
LBW History	0.389	2.837	0.264	30.477	Not Fulfilled
PEM History	0.009	15.994	2.013	12.088	Fulfilled
History of epileptic seizures (HOES)	0.99	6728862910.786	0.00	-	Not Fulfilled

The PEM history variable obtained the least variable (p <0.05) which is 0.009 with Exp (B) of 15.994 means that children with PEM history have risk as much as 15.994 times against motor delay development disorders with convinced level (CI 95%) 2.013 – 12.088 because only one variable is eligible, it can be concluded that the PEM history is the most related factor dominant with motor delay development disorder in children aged 3-36 months at the clinic children's growth and development Happy Kids in 2019.

DISCUSSION

The visit of the ANC is not related to motor delay development disorders because motor delay in children cannot be detected during pregnancy. The purpose of the ANC is to obtain information during pregnancy, fetal growth and to detect fetal abnormalities as early as possible as well as to identify danger signs during pregnancy period. Gross motor is a part of motor development involving large group of muscles and includes several movements such as locomotor skills movement, non-locomotor and manipulative movements which besides performed by the presence of nerve cell maturity from the brain, also needed stimulation so the child is able to perform movement.

ANC conducted to reduce the pain and mortality rate of mothers and babies because it avoids the various risks that occur during pregnancy. ANC conducted routinely to monitor the fetus' growth in the womb, thereby able to reduce the risk of infant and maternal mortality and pain. In Indonesia, there has been no direct research relating between the mother ANC visit history and the motor delay development disorder in the born child. However, since the ANC is unable to detect the presence of motor delay development disorders such as abnormalities in the neuromusculoskeletal system (spastic, flaccid, athetoid or rigid), locomotor, non-locomotor, or manipulative movements in children during the womb, there is no correlation between the ANC visit and the motor delay development disorder in children.

Pregnancy complications are direct cause of criticalness in the mother and child. Cases that occur in pregnancy complications such as pre-eclampsia, eclampsia, infection, and bleeding that causes some impact such as high fever with the mother, blood pressure of pregnant women increased, proteinuria levels of the mother increased so that the nutrients delivered to the fetus is not optimal which results in cell growth especially baby nerve cells are not maximal and have an impact on long-term disruption in children if not treated as quickly as possible. [13]

Preeclampsia & Eclampsia are symptomatic trias of pregnant women marked with high blood pressure or hypertension, the presence of proteinuria content in the urinary, swelling of the extremities of the pregnant mother, sometimes accompanied by loss of consciousness and coma. The occurrence of

sudden blood pressure increases in pregnancy accompanied by spasm in blood vessels causing the flow of blood to the placenta sustaining disruption so that the occurrence of fetus growth disorder and asphyxia intrauterine accompanied by increased muscle tone on the uterine wall resulting in preterm birth. In addition to the preterm birth of the baby, there can also be a baby born with the condition of asphyxia due to the remodeling of spinal cord arteries causing vasoconstriction and the occurrence of failures that lead to blood flow decreased uteroplacental and the intra-uterine hypoxia. Then, if the fetus is deficient in oxygen resulted in n. vagus and n. simpathicus stimulated affect the decrease in heart rate that signifies baby in an asphyxia condition if not treated it will cause damage to the nerve cells in the brain due to the brain's lack of nutrients and oxygen. [14]

The occurrence of oxygen and nutrients deficiency in nerve cells result immature in the fetus, when the mother has pregnancy complications it effects the fetus born must obtain good nutritional intake so that the brain growth can be maximal and brain plasticity work. However, if it is no special handling conducted, then that immature nerve cells will not develop properly so that the process between the nerve cells and the brain is not optimal and eventually the child have some developmental disorders. [15]

Low birth weight (LBW) is a condition in which babies are born with a weight of <2500gr. Baby born with low weight due to the nutrients from mothers to the fetus are hampered because there are many factors that cause nutritional factors of mothers during pregnancy such as age of mothers during pregnancy, complications of mothers, infections and fetal factors such as malformations and other genetic diseases. [9] Baby born with low weight may experience brain structure abnormalities due to lack of nutrients obtained by baby during the womb so that the process of maturation of the nerve cells is not perfect. In addition, baby with low birth weight have a risk of inflammatory brain that will later inhibit the development of child nerve cells. [16]

Protein-energy malnutrition (PEM) is a condition the body has a deficiency in macronutrients which is a source of energy, including proteins. Protein is one of the macro substances that serves as a substance builder, preserving cells and metabolism as well as immunity is a protein. The proteins that enter the body will be digestible and transformed into amino acids precursor from the neurotransmitter and play an important role in the development of the child's brain. In addition, amino acids also play a role in the formation of ATP in the body that serves for muscle contraction. [17,18]

If the child has a lack of continuous energy and protein, causing nerve cell stimulation that helps the child's brain development will be impaired and child muscle contraction will occur maximally because of the neuromuscular junction in charge of delivering stimulation to the synapse vesicles not able to bind with an excitatory receiver that is postsynaptic membrane that later meet on mitochondria in the muscle fibers. Therefore, inability to deliver this stimulation then the child with an protein-energy malnutrition (PEM) will be prone to experience muscle weakness and muscle inadequacy to be traction so as to carry out daily activities using large muscle groups, the child will not be able to have an impact on motor delay disorder. [18]

Epilepsy occurs due to an imbalance of electric charge in the brain accompanied by inhibition of a low gamma aminobutyric acid (GABA) neurotransmitter. In addition, many factors that causes epileptic seizures such as slow excitation mechanisms, excessive synchronization mechanisms in brain cells, epileptogenic mechanisms in which there is a set of abnormal neurons inside the brain, causing the loss of excessive electrical charge, interictal switching mechanisms, neurochemical mechanisms, and immune mechanisms. [19]

Due to that imbalance, the stimulation input to the brain cannot be

processed physiologically into the muscles as a reaction to the body. Conversely, such stimulation inputs will produce an in-volunteer movement but it is repetitive in muscles causing the coordination of muscles to have interference, increased muscle tone. There is a disruption imbalance of the electric charge in the brain for certain parts of the brain e.g. the cortex, accompanied by repeated seizures causing the muscles to suffer interference that has an impact on the limitations of physical activity in children who are not given early treatment, will have an impact on motor delay development disorder.

From the results of the research, it can be concluded that the PEM is the most dominant factor associated with the incidence of motor delay development disorder in children aged 3-36 months in the children's growth and development clinic, Happy Kids Banjarmasin in 2019. The PEM of the children not only affects protein disorder and resulting in not maximal muscle contraction, but also affects the immaturity of the nervous system and musculoskeletal system due to the brain's macronutrient deficiency, children coordination is less likely due to lack of body nutrition, but also has an impact on child inactivity in a variety of movements such as locomotor, non-locomotor and manipulative movements that cause children to become less active, and tend to be passive and not even able to perform activities related to motor delay movements.

Babies with PEM history if not carried out exclusive treatment and continuous monitoring will impact in nutritional deficiencies either micro or macro that result in the PEM. If the nutrients needed by the body cannot meet the needs of the body, then what happens is the body trying to take nutrients from elsewhere in the body that causes the body to lack energy. While the child in the growing of development urgently requires energy as a mobilizer in conducting physical activities and the physiological activities of the body where the energy is needed to perform muscle oxidation and maintain muscle tone. If the body is incapable doing tissue oxidation and muscle tone, then the various failure processes in the body occur as the nerve cells are incapable doing regeneration, so that any incoming stimulation will not be delivered immediately. And decreased of muscle tone. If the muscle tone decreases, then the physical activity of the child associated with gross motor will also be hampered and delayed. If constantly occur, the muscles will shrink and the tissues around the muscles will undergo a contracture.

CONCLUSION

There is no relationship between the visit history of ANC with motor delay development disorder in children aged 3-36 months in the clinic grow and development children Happy Kids Banjarmasin in 2019. There is a relationship between the history of pregnancy complications with motor delay development disorder in children aged 3-36 months in the clinic grow and development children Happy Kids Banjarmasin in 2019. There is a relationship between LBW history and motor delay development disorder in children aged 3-36 months in clinic grow and development children Happy Kids Banjarmasin in 2019. There is a relationship between PEM history in children with motor delay development disorder in children aged 3-36 months in the clinic grow and development children Happy Kids Banjarmasin in 2019. There is a relationship between the history of seizures with motor delay development disorder in children aged 3-36 months in the clinic grow and development children Happy Kids Banjarmasin in 2019. PEM history is the most related factor in the motor delay development disorder in children in Happy Kids children's growth and development clinic in 2019.

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