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Original Research Paper

Nephrology

ASSOCIATION BETWEEN EXCLUSIVE BREASTFEEDING AND PRIMARY ENURESIS IN CHILDREN

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ABSTRACT Exclusive breastfeeding had relationship with enuresis in which association is strongly associated with children's development. A case-control observational study was conducted in Muara Batang Gadis, North Sumatera in August 2016. The samples of study were children aged 6-14 years old. The International Association Child and Adolescent Psychiatry and Allied Professions (IACAPAP) questionnaire for the presence of primary enuresis and parents interview to determine exclusive breastfeeding**.** Data were analyzed with *Chi-square* test and logistic regression. The *P* value of <0.05 was considered significant. We had 100 participants, with mean age was 8.92 years (SD±2.42). In bivariate analysis, there was association between symptoms of enuresis with duration of exclusive breastfeeding, full breastfeeding duration, positive family history of enuresis, number of children, and birth order. Multivariate analysis showed that the duration of exclusive breastfeeding ≤6 months, enuresis history in family, and number of children >2 in a family were a risk factor of primary enuresis in children. There is a significant association between exclusive breastfeeding and primary enuresis in children.

KEYWORDS : Enuresis; Exclusive Breastfeeding; Development; Children

INTRODUCTION

Enuresis is a common disorder in childhood and adolescence which can often have a profound psychological and social impact on the affected children and their families, resulting in anxiety and even conflicts between members.[1] Currently, enuresis is defined by the International Children's Continence Society (ICCS) as a condition in which an intermittent urinary incontinence occurs during sleep in a child who has passed his or her fifth birthday.[2,3] Primary enuresis means that the child has been dry for less than 6 months (or not at all) while secondary enuresis means that a relapse after a dry period of at least 6 months has occurred.[4]

Studies indicate that the risk of having enuresis declines with increasing age and among individuals from lower socioeconomic levels.[1] Several factors have been demonstrated to be associated with primary enuresis such as central nervous system maturation disorder, genetic factor, urodynamic disorder, constipation, urinary tract infection (UTI), psychosocial factors, psychological problems, and sleeping disturbances.[5,6]

Central nervous system maturation disorder is referred as the most commonly accepted as main causes of primary enuresis.[5] Delayed maturation of the cortical mechanisms that allow voluntary control of the micturition reflex that causes enuresis.[7]

Duration of exclusive breastfeeding has been associated with enuresis because both have been reported to be strongly associated with childhood development.[8] World Health Organization (WHO) defined exclusive breastfeeding as 'the infant has received only breast milk from his/her mother or a wet nurse, or expressed breast milk, and no other liquids or solids with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines'.[9] WHO suggest that exclusive breastfeeding is given in first six month of life.[10] Although the relationship between enuresis and exclusive breastfeeding is still poorly documented in the literature, a possible association is speculated as both are strongly associated with children's development.[1]

Several studies have reported that breastfeeding has beneficial effects on neurodevelopment in children. Breastfeeding has been suggested to not only provide overall developmental and psychological advantages to the child but also enhance neuronal development. The mechanism that aligns improved development with breastfeeding has been related to the role that long-chain fatty acids have in brain development.[8]

Therefore, the main objective of this study was to evaluate whether there is an association between primary enuresis and duration of exclusive breastfeeding, total duration of breastfeeding and social factors.

METHODS

Study Design

A case-control observational study was conducted in Singkuang village, Muara Batang Gadis subdistrict, Mandailing Natal district, North Sumatera in August 2016. Subjects were children aged 6 to 14 years from Sekolah Dasar Negeri 385 and Sekolah Dasar Negeri 392 Singkuang. The exclusion criteria were subjects with unclear history of breastfeeding, neurological deficit, mental disorders, parents not understand with the given explanation, kidney and urinary tract disorders, use of diuretic medication, and secondary enuresis.

Samples size were calculated by using the sample formula for unpaired categorical analysis. Considering a 25% difference in the rate of breastfeeding between the two groups, test power of 90% and a level of significance of 5%, the sample size consisted of at least 41 subjects in each group. Data analysis was done with statistical software and the result will be presented in tables. This study was approved by the Health Research Ethical Committee, Medical School, Universitas Sumatera Utara.

Sample Recruitment

All children who fulfilled the inclusion criteria were enrolled in this study. Informed consent was approved by parents. Samples divided into two groups. The enuresis group (EG) consisted of children with

primary enuresis and control group (CG) consisted of healthy children from the same population. The matching criteria were age and sex.

The International Association Child and Adolescent Psychiatry and Allied Professions (IACAPAP) questionnaire was used for the presence of primary enuresis. Then, parents were interview to determine duration of exclusive breastfeeding and total duration of breastfeeding. At the end of the questionnaire and interview, patients and parents were all asked if they were extremely sure about the information they provided. If the answer was no, they were excluded from the study. Physical examination and dipstick urine test were performed to all subject. We also collected socio-demographic data of two groups.

Statistical Analysis

The data collected were entered, organized, and analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 18.0. Data were analyzed with statistical test using the chi-square to determine the association between primary enuresis and duration of exclusive breastfeeding, total duration of breastfeeding and social factors. Subsequently, a multivariate analysis was performed using logistic regression to calculate the odds ratio adjusted to the confidence interval of 95%. All factors associated with enuresis in the unadjusted analysis were included in the multivariate model, with $p < 0.05$ being considered as statistically significant differences.

RESULTS

The research was held at SD Negeri 385 and SD Negeri 392 Singkuang in Singkuang village, Muara Batang Gadis subdistrict, Mandailing Natal district. Table 1 shows the baseline characteristics of subject study. The total sample collected is 100 people. A total of 50 children in EG and 50 children in CG. The mean of sample age in this study was the same in both groups, 8.92 years with standard deviation 2.42 years. By sex, the number of male and female samples was the same in both groups. Each group consists of 23 men and 27 women. From physical examination, no samples were found with neurologic deficit, urinary tract, metabolic or mental disorders in this study. In addition, there is no history of use of drugs that affect diuresis in this study's sample.

Table 1 Demographic characteristics of subjects

Variable	Group		Total
	Enuresis	Control	
Age ± SD (year)	8,92 ± 2,42	8,92 ± 2,42	
Gender			
Male	23	23	46
Female	27	27	54
Marital status of the parents			
Married	40	44	84
Other conditions	10	6	16
Number of children			
One child	1	5	6
Two children	1	6	7
Three to four children	13	13	26
Five children or more	35	26	61
Birth order			
Oldest child	13	11	24
Middle child	27	20	47
Youngest child	9	14	23
Only child	1	5	6
Level education of mother			
Incomplete primary school	0	0	0
Primary school	31	21	52
Junior high school	8	10	18
Senior high school	9	12	21
College or above	2	7	9
Enuresis history of father			
Positive	24	8	32
Negative	26	42	68
Enuresis history of mother			
Positive	25	6	31
Negative	25	44	69

Most of the samples had 4 or more siblings, 35 (70%) in EG and 26 (52%) in CG. Most of the samples were the oldest or middle children in the family of 13 (26%) and 27 (54%) in EG and 11 (22%) and 20 (40%) in CG. The most education level of mothers of sample is primary school (31%) in EG and 21 (42%) in CG. The father's enuresis history was found to be 24 (48%) in EG and 8 (16%) in CG. The mother's enuresis history was found to be 25 (50%) in EG and 6 (12%) in CG.

Table 2 Durations of exclusive breastfeeding

Exclusive breastfeeding period	Group	
	Enuresis	Control
Not breastfed	10	4
1-3 months	10	6
4-5 months	19	6
6-7 months	7	27
7-12 months	2	5
> 13 months	2	2

Table 2 shows the time of exclusive breastfeeding on both groups. Based on the duration of exclusive breastfeeding in samples, at most EG is for 4-5 months at 19 (38%) while in CG for 6-7 months at 27 (54%). A total of 39 (74%) samples in EG and 16 (32%) in CG were exclusively breastfed for less than 6 months. In each group, 2 (4%) samples were obtained exclusively breastfed for more than 13 months.

Table 3 Total duration of breastfeeding

Total duration of breastfeeding	Enuresis		Control	
	N	%	N	%
≤ 12 months	18	36	8	16
> 12 months	32	64	42	84

Table 3 shows the total duration of breastfeeding. Based on the table, we found that 18 (36%) samples in enuresis group and 8 (16%) samples in the control group were breastfed for ≤ 12 months.

Table 4 Association between the symptom of enuresis and the independent variables

	Group		P
	Enuresis	Control	
Duration of exclusive breastfeeding			
< 6 months	39	16	< 0.001
≥ 6 months	11	34	
Total duration of breastfeeding			
≤ 12 months	18	8	0.023
> 12 months	32	42	
Family history of bedwetting			
Positive	30	12	< 0.001
Negative	20	38	
Number of children			
>2 children	48	39	0.007
≤ 2 children	2	11	
Birth order			
Youngest or only child	10	19	0.047
Middle child or oldest child	40	31	
Mother's level of education			
Low educational level	39	31	0.081
High educational level	11	19	

**Chi-square test*

Table 4 shows association between the symptom of enuresis and the independent variables. To know the relationship between the duration of exclusive breastfeeding and other factors with enuresis then Chi-square was tested. Based on these statistical tests, it was found that there was a statistically significant association between the duration of exclusive breastfeeding and family enuresis history with enuresis in each child with p value <0.001. There was also an association between the total duration of breastfeeding, the

number of children in the family and the order of birth of children in families with enuresis in children (*p* values of 0.023, 0.007, 0.047) respectively.

Table 5 Risk factor for enuresis in children

	Adjusted OR	95% CI		*P*
Duration of exclusive breastfeeding ≤ 6 months	5,930	2.031	17.318	0.001
Total duration of breastfeeding ≤ 12 months	2,126	0.627	7.206	0.226
Family history of bedwetting Positive	5,682	1.873	17.240	0.002
Number of children > 2 children	9,677	1.342	69.775	0.024
Birth order Middle child or oldest child	0,669	0.201	2.227	0.513
Mother's level of education Low educational level	2,834	0.925	8.688	0.068

*Logistic regression test

Logistic regression test was performed to assess the effect of risk factor on enuresis. As for the risk factors that are connected are duration of exclusive breastfeeding <6 months, total duration of breastfeeding ≤12 months, family history of bedwetting, number of children in family >2, the birth order of child in family (youngest or only child), and low educational level of mother.

Table 5 shows the risk factor for enuresis. The test results show that duration exclusive breastfeeding <6 months, positive history of bedwetting, and number of children >2 in the family are associated with primary enuresis in children (*p* value 0.001, 0.002, 0.024) respectively. These three related factors are risk factors for enuresis in children. Based on the results of statistical tests, it is known that the duration of exclusive breastfeeding <6 months increased the risk of enuresis in children by 5.93 times. Family enuresis history increased the risk of enuresis in children by 5,682 times and the number of children >2 in the family increased the risk of enuresis in children by 9,677 times.

DISCUSSION

Enuresis is one of the most common urinary system diseases in children and adolescents. However, because the disease is not fatal, a hereditary disease, and can heal spontaneously, so the family feels no need to get medical help .[11,12]

Penbegül, et al conducted a study of 4203 children and reported a prevalence of children with enuresis of 25.9%.[11] Karnicnik et al conducted a study in Slovenia and reported that the prevalence of children with enuresis of 12.8% and similar results were also obtained in a study conducted by Makrani et al in Iran that obtained an enuresis prevalence rate of 11.01%.[12,13]

Other studies have reported lower prevalence rates. Solanki et al reported his research on the prevalence of children with enuresis in Indian settlements. This study obtained the results of the prevalence of children with enuresis of 11.13% .[14] In Indonesia has conducted research on the prevalence of enuresis that is equal to 10.9%.[15]

In this study, a significant relationship between enuresis with exclusive breastfeeding duration in children is obtained. Children who get exclusive breastfeeding <6 months more at risk of enuresis 5,93 times than children who get exclusive breastfeeding ≥ 6 months. This is consistent with the results of research Oliveira, et al who received exclusive breastfeeding ≤ 3 months more at risk of enuresis 4.35 times than children who get exclusive breastfeeding > 3 months.[1] Sancak et al. reported that there was a significant difference in the age of spontaneous resolution of monosymptomatic enuresis (SMRE) of children who were breastfed for 5 months or less compared to those who were breastfed for more than 5 months where the result shows that children who breastfed >5 months achieve faster spontaneous resolution.[16]

The duration of breastfeeding contributed to the occurrence of enuresis. In this study, it was found that the total duration of breastfeeding ≤12 months was associated with the incidence of enuresis in children. Barone et al, reported a significant difference between children who received breast milk ≥3 months of enuresis, compared with the control group. In the group of children who got breast milk for 6 months experienced enuresis was 21%, while children did not get milk as much as 45% experienced enuresis.[8] In research conducted by Trisna, et al, 57% of children who get breast milk for 6 months or more do not experience enuresis.[15]

Several studies have reported that breastfeeding has a positive effect on neurologic development and cognitive function in children. The relationship between breastfeeding and cognitive development can explain that breast milk provides essential nutrients for the development of immature brain tissue faster and better. Breastfeeding components required in specific quantities during the first 2 years of life cannot be supplied in optimum amounts by formula or supplements[1,17]

The compositional superiority of breast milk over formula milk is mainly due to the presence of two long-chain polyunsaturated fatty acids, DHA and AA which are essential for brain development.[18,19]

Breast milk also contains growth factors and hormones which influence brain biochemistry and functional development, and are not found in formula milk.[19]

Family history of bedwetting is a genetic factor of enuresis. One study found that if both parents experienced enuresis, 77% of their children would have enuresis. If one parent has a history of enuresis, 44% of children will have enuresis and 15% of children will experience enuresis if both parents have no history of enuresis.[15] This study found 30% of enuresis-aged children, whose parents had a history of enuresis. Adrian et al. reported similar to this study.[15] Solanki et al. reported that 62% of enuresis children had a history of enuresis in parents.[14] While Penbegül et al. obtained a family history of 64.8% of children with enuresis. [11]

Oliveira et al reported that risk of enuresis was 12.69 times increased in children with a family history of enuresis than children with no family history.[1] While Trisna et al stated that children with a history of fathers or siblings with enuresis had significantly more enuresis, that is 5.3 and 23.3 times.[15] This study obtained children with a history of enuresis in families were more at risk of enuresis of 5.682 times than children without family history of enuresis.

The number of children in the family is related to the incidence of enuresis in children. Children who have ≥ 2 siblings or more at risk 9.677 times to experience enuresis. Oliveira et al. found an increased risk of enuresis of 1.56 times in children with ≥2 siblings or more.[1] While Penbegül et al reported that low socioeconomic rates and more siblings increased the risk of enuresis in children.[11] Barone, et al in his study found that the number of children in the family and family income affects the incidence of enuresis in children but not a risk factor.[8]

In his research results, Makrani, et al. stated that there is a significant relationship between the birth order and the low level of parental education with enuresis in children.[13] Oliveira et al. and others argue that enuresis is associated with low levels of parental education but is not related to the birth order of children in the family.[1] The opposite is found in this study. Enuresis deals with the birth order of children in the family but is not related to the level of parental education.

This research still has some weaknesses. First, the small number of samples results in different results from previous studies. Second, parental memories of exclusive breastfeeding duration and total breastmilk duration in children. There may be a bias in this regard

because of the long enough time interval between the feeding period and the time of the study. Further studies with larger sample and better design is needed regarding the relationship of exclusive breastfeeding with primary enuresis in children. In conclusion, there is a significant association between exclusive breastfeeding and primary enuresis in children. Primary enuresis also has an association with total duration of breastfeeding, family history of enuresis , the number of children in the family and the order of birth of children in families. Meanwhile duration exclusive breastfeeding <6 months, positive family enuresis history, and number of children >2 in the family are risk factors for primary enuresis in children.

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