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Original Article

Identification of enuresis risk factors among primary school children in Makassar

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Abstract

Background Enuresis is a common problem among children and adolescents which may lead to important psychosocial disturbances. Several factors have been associated with the occurrence of enuresis, including genetic, family history and socioeconomic level. Not many population-based studies have been published rgarding this matter.

Objectives To establish the prevalence of enuresis among school children and to identify the risk factors associated with this disorder.

Methods A cross sectional population-based study was conducted from April to October 2007 in 600 children aged 6-14 years. Identification of enuresis risk factors were collected from students randomly chosen from six primary schools located in different regions of Makassar. Data were collected via a questionnaire completed by the parents. Study population were grade I to grade VI of primary school students in Makassar which were chosen from high economic level schools group (SD I) and low economical level schools group (SD II).

Results The overall prevalence of enuresis was 10.8%. Bivariate analyses show relationships between the occurrence of enuresis and maternal and paternal educational level, family's socioeconomic status, family history of enuresis, and history of use of diaper. On logistic regression analysis, statistically significant relationships were found between enuresis and mother's educational level, family's socioeconomic status, family history of enuresis, and history of use of diaper.

Conclusions Enuresis is a common problem among school children in Makassar and associated with several factors, including mother's educational level, family socioeconomic status, family history of enuresis and use of diaper **[Paediatr Indones 2008;48:204-8]**.

Keywords*: enuresis, school children, risk factors.*

Enuresis is an unconscious urine releasing of a child at age where the child should have had reach urinating controlling stage.[1,2] Enuresis can happen during nocturnal sleep, which is called "nocturnal enuresis", or when children are awake at daylight, which is called "diurnal enuresis"; nocturnal enuresis is more often (80%) than diurnal enuresis.[1,2] Voluntarily urinating control is one of the growth and development phases which normally should be reached at a certain age. Children of two years of age commonly have had urinating control at daylight when they were awake, whereas urinating control during nocturnal sleep generally reached at age four years. Enuresis is referred as when urine releasing is still happens involuntarily in children at the age when normally the children themselves should have urinating control ability.[3]

Study by Hansakunachai *et al*[4] shows that the prevalence of enuresis obtained from several studies in Europe is 9%-19% in children of five years old, 7%-22% in children of seven years old, 5%-13% in 9 years old, and 1%-2% in 16 years old. Whereas, their own study in Thailand resulted a prevalence of enuresis of 10%,

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5.3%, 3%, and 1.2% each for 5, 7, 10, and 12 years old, respectively.[4] Several studies of enuresis have been done it Indonesia. Umboh and Wibisono[5] performed a cross-sectional study at North Sulawesi and found that the prevalence of enuresis in 997 elementary school students was 7.98%. They also found that enuresis more often happened in boys but there was no significant association with the parents' education level.[6]

Enuresis is one of the commonly found child health problems and have a potential to cause psychosocial burden to the children, parents, and their family. Kanaheswari[6] reported 74% responder have admitted that enuresis is a burden to the children and parents psychological state. Buttler *et al*[7] found that children with enuresis tend to have less self esteem and the parents tend to be worry especially when the enuresis persisted onto early adult age. It can be concluded that the results of studies concerning enuresis varies. This is probably because the differences of approach of the of risk factors on every study population. The impact of enuresis is quite serious on the children, the parents and their family, hence it needs a special concern. Investigation on incidence of enuresis is needed to be done, especially on risk factors of enuresis in children. If the risk factors is known, prevention and/or early adequate treatment can be strived. Studyes had been performed at North Sulawesi with an approach of the risk factors were parent's education, the birth sequence of the child in the family, and sex, using bivariate analysis with population that were enrolled from one sub district. Whereas, in this study we add other risk factors, such as : socioeconomic status of the family, the number of children in the family, enuresis history in the family, and the history of diaper using. This study used multivariate analysis with a more heterogeneous population that comes from several sub districts.

Methods

This study is an observational study with a cross sectional approach to obtain the incidence and identify factors related to enuresis on elementary school students at Makassar. The study was conducted at Makassar since April 2007 to October 2007. Subjects were first grade to sixth grade pupils of elementary school at Makassar, where the schools were divided in two groups; schools which were characterized as high economical status schools group (SD I) and low economical status schools group (SD II), as determined by Provincial Educational Authority of Makassar.

The inclusion criteria were elementary school students aged 6–14 years whose parents gave informed consent. We excluded children who suffered urinary tract infection, had spine and extragenital malformation, or suffered from constipation. We also excluded students who had the questionnaire filled incompletely.

Results

There were 600 subjects enrolled in this study, coming from six elementary schools at Makassar, consisted of 300 students from SD I and 300 from SD II. Out of the total of 600 students, enuresis was found in 65 (10.8%). The mean age on the enuresis group was 8.6 years (range 6.0 to 12.6), while on the non-enuresis group the mean age was 9.7 years (range 6.0 to 14.0). Subjects characteristics of enuresis and non-enuresis group are shown in **Table 1**. Table 1 also indicates the results of statistical analysis and calculations of crude odds ratio between each risk factors and the occurrence of enuresis.

Identification of enuresis risk factors

The results of logistic double regression analysis showed that only 4 variables indeed are risk factors of enuresis, these are mother's education level, socioeconomic level of the family, history of enuresis and history of using diaper. *Odds Ratio* for each variable is an *Adjusted Odds Ratio* (AOR), which means children, who have those risk factors, will have the possibility of suffering enuresis equal to the AOR value as described in **Table 2** after controlling other factors.

Based on the result of logistic double regression analysis with *confidence interval* (CI) 95% for each of the above enuresis risk factors, we obtained a regression model as follows:

$$\lambda_n = \frac{\rho_{en}}{1 - \rho_{en}} = -8{,}521 + 0{,}642\ (ME) + 0{,}827\ (FS) + 1{,}783\ (FH) + 1{,}779\ (DU)$$

Thereby, the probability of enuresis is as follows:

$$\rho en = \frac{1}{1 + e^{-\left[-8{,}521 + 0{,}642(ME) + 0{,}827(FS) + 1{,}783(FH) + 1{,}779(DU)\right]}}$$

Note : λn = natural logarithm
ρen = enuresis probability
e = natural number (2,718)
ME = mother educational level
FH = family's history of enuresis
DU = diaper use
FS = family socioeconomic status

Table 1. The characteristics of enuresis group and non-enuresis group

Variable	Enuresis		P Value	Crude Odds ratio (95%CI)
	Yes n = 65	No n = 535)		
Sex				
Male	33 (12%)	243 (88%)	0.414	0.8 (0.5; 1.4)
Female	32 (10%)	292 (90%)		
Age (Years)				
Range	6.0 –12.6	6.0 – 14.0		
Mean (SD)	8.6 (1.6)	9.7 (1.7)		
Mother's Education				
High	29 (8%)	351 (92%)	0.001	0.8 (0.5; 1.4)
Low	36 (16%)	184 (84%)		
Father's Education				
High	29 (8%)	324 (92%)	0.014	0.8 (0.5; 1.4)
Low	36 (15%)	211 (85%		
Socioeconomic status				
High	21 (7%)	294 (93%)	0.001	2.6 (1.5; 4.4),
Low	44 (15%)	241 (85%)		
Number of Children				
≤ 2	24 (12%)	170 (88%)	0.402	0.8 (0.5; 1.4)
3 or more	41 (10%)	365 (90%)		
Enuresis history				
Yes	29 (33%)	60 (67%)	<0.001	6.4 (3.7; 11.1)
No	36 (7%)	475 (93%)		
History of Diaper Use				
Short time / never	55 (10%)	512 (90%)	<0.001	4.0 (CI 1.8; 8.9)
Long time	10 (30%)	23 (70%)		

Table 2. The results of logistic double regression analysis to enuresis occurrence

No.	Variable	b	S.E.	df	Exp (B)
1	Mother's educational level (ME)	0.642	0.358	1	1.900
2	Family's socioeconomic status (FS)	0.827	0.385	1	2.286
3	Family's history of enuresis (FH)	1.783	0.298	1	5,947
4	Diaper use (DU)	1.779	0.474	1	5.923
5	Constant (a)	-8.521	1.007	1	-

b : Regression coefficient S.E.: Standard Error ; Exp (B) : Adjusted Odds Ratio

Discussion

In this study, there were 65 (10.8%) children suffering enuresis. This prevalence value is higher compared to the study performed at North Sulawesi by Umboh and Wibisono[5] which yielded a prevalence of 7.98%. This difference was probably due to the difference in population. In Umboh and Wibisono's study, the population only came from 1 sub district, while in this study, the population came from 6 sub districts and from schools with different socioeconomic groups. Study by Gur *et al*[8] obtained a higher prevalence (12.4%). This was probably due to bigger number of samples and the enuresis being studied in this study was nocturnal as well as diurnal enuresis.

When the children were divided into enuresis and non-enuresis group, the mean age of enuresis group was 8.6 years (deviation standard 1.6) with age range from 6.0 – 12.6 years. These values were lower compared to non-enuresis group where the mean age was 9.7 years (deviation standard 1.7) with age range from 6.0 – 14.0 years.

Enuresis prevalence on boys (50.8%) is higher than on girls (49.2%) with comparison 1.03:1. This comparison is nearly the same as the one Umboh and Wibisono[5] obtained (55%: 45% = 1.2:1) on their study but, by using bivariate analysis statistical test, there was no significant difference between boys and girls. This can be inferred that both gender have the same probability to suffer enuresis.

This study found that enuresis occurred more often on children with mothers' and fathers' low education level, which were 16.4% and 14.6%, respectively. The statistical test result showed a very significant difference (P=0.001) in respect to the enuresis occurrence between mother's high education level and mother's low education level, as well as fathers' education level (P= 0.014). Expressed by *crude odds ratio* (COR) value = 2.4 (95% CI 1.4;3.9), Whereas, on fathers' education level, the COR value = 1.9 (95% CI 1.1;3.2. These results were different from the ones Umboh and Wibisono[5] obtained for mothers' low education level and high education level (9.94% and 7.07% each, respectively), while on fathers' low education level and high education level (7.81% and 8.04%, respectively), by statistical test, both showed no significant difference. These were probably due to the difference in number and homogeneity of the samples. Fathers' and mothers' low education level probably due to the lack of knowledge about adequate toilet training. After performing a statistic test, continuing with logistic double regression analysis (multivariate analysis), mothers' education level was still a risk factor of enuresis occurrence with AOR value = 1.9. These probably because of the influence of mothers' education level were more dominant than of fathers', probably because the social contact of mothers to their children is more frequent than fathers. Therefore, when the risk factor of fathers' education level is combined with other risk factors, the influence is minimized.

The frequency of enuresis occurrence on family with high socioeconomic level was 21 (6.7%) and on family with low socioeconomic level were 44 (15.4%). The statistical test result showed a very significant difference (P=0.001) in respect to the frequency of enuresis occurrence between family with high socioeconomic level and family with low socioeconomic level. Expressed by COR value = 2.6 (95% CI 1.5; 4.4). This is in parallel to the study by Gur *et al*[8] (14.3%) for family's low socioeconomic level and there is significant difference. These probably because of the influence of family's low socioeconomic level will affect psychological condition (causing stress) on children so that, in turn, it affect functional maturity development of Central Nervous System.

After performing a statistic test, continuing with multivariate analysis, it turns out that socioeconomic level remained as a risk factor of enuresis with AOR value = 2.3.

The number of children in a family is also a risk factor of enuresis that is for family with small number of children (12.4%) and family with big number of children (10.1%). But in this study there was no significant difference (P=0.402). These results were in contrast to the results obtained by Gur *et al*[8], where in family with small number of children (10.9%) and family with big number of children (16.0%), showed a significant difference. Another study by Kanaheswari[6] shows that there is no difference between families with small number of children (8.0%) and families with big number children (6.3%). These was probably because of the difference in samples size, enuresis criteria (nocturnal as well as diurnal enuresis), and number of children.

The frequency of enuresis occurrence on children with no family history of enuresis was 36 (7.0%) and on children with family history of enuresis were 29 (32.6%). There was a very significant difference (P= 0.000) in respect to the frequency of enuresis occurrence between the existence of family history of enuresis and no family history of enuresis. Expressed by COR value = 6.4 (95% CI 3.7; 11.1). These results are nearly the same as other studies abroad.[3,4,9-11] Identification of genes which was correlated to enuresis hereditarily has been obtained through several studies. Those studies showed that if both parents had suffered enuresis, 70% of their child will either have enuresis. While if only one parent had suffered enuresis, 40% of their child will have enuresis. In monozygotic twins, the enuresis occurrence rate on both children was 68%. When performing a statistic test, continuing with multivariate analysis, enuresis history remained as a risk factor of enuresis occurrence with AOR value = 5.9.

The frequency of enuresis occurrence on children with history of short term diaper use / no diaper use was 55(9.7%) and on children with history of long term diaper using were 10 (30.3%). The statistical test result showed a very significant difference (P=0.000). Expressed by COR value = 4.0 (95% CI 1.8;8.9). When it was continued with multivariate analysis, history of diaper using remained as a risk factor of enuresis occurrence with AOR value = 5.9. This was because by using diaper, children were not accustomed to urinate in the toilet, hence the detrussor muscle was not trained to contraction and relaxation. Hansakunachai *et al*[4] obtained results of 39% and showed no significant difference between the present of diaper history or not. This is probably because the difference in number and homogeneity of samples.

On bivariate analysis, there were 5 variables observed as risk factors which have significant relation to enuresis occurrence, those are mothers education level, fathers education level, family's socioeconomic level, history of enuresis in the family, and history of diaper using. While in multivariate analysis, it was found that only mother's education level, family's socioeconomic level, history of enuresis in the family, and history of diaper using that have a significant relation to the occurrence of enuresis.

If it was entered into logistic regression equation, the value was only 3%, which means the probability of having enuresis was 3%. This probably because there were still other unknown causes which have a bigger influence to cause enuresis, so that it is still needed to do more studies in future.

The weakness of this study is the samples were not checked directly, that is by only using questionnaire filled by students' parents after being given explanation from the studyer, so that the recall of study bias easily happened.

References

1. Norgard JP, van Gool JD, Hjalmas K, Djurhuus JC, Hellstrom, AL. Standardization and definitions in lower urinary tract dysfunction in children. British J. of Urol. 1998;81 Suppl 3:1–16.
2. Gumus B, Vurgun N, Lekili M, Iscan A, Muezzinoglu T, Buyuksu C. Prevalence of nocturnal enuresis and accompanying factors in children aged 7–11 years in Turkey. Acta Paediatr. 1999;88:1369-72.
3. Cossio SE. Enuresis. South Med. J 2002;95 Suppl 2:183-7.
4. Hansakunachai T, Ruangdaraganon N, Udomsubpayakul U, Sombuntham T, Kotchabhakdi N. Epidemiology of enuresis among school-age children in Thailand. J. Dev. Behav. Pediatr 2005;26:356–60.
5. Umboh A, Wibisono JS. Enuresis nokturnal pada anak sekolah dasar di Kecamatan Malalayang, Manado. Maj. Kedokt. Indon. 2002;52 Suppl 3:97-101.
6. Kanaheswari Y. Epidemiology of childhood nocturnal enuresis in Malaysia. J. Pediatr. Child Health 2003;39:118-23.
7. Butler RJ, Golding J, Northstone K. The ALSPAC Study Team. Nocturnal enuresis at 7.5 years old: prevalence and analysis of clinical signs. B.J.U. International 2005;96:404-10.
8. Gur E, Turhan P, Can G, Akkus S, Sever L, Guzeloz S, Cifcili S, Arvas, A. Enuresis: Prevalence, risk factors and urinary pathology among school children in Istanbul, Turkey. Pediatrics International 2004;46:58-63.
9. Cendron M. Primary nocturnal enuresis : current concepts. American Family Physician 1999;59 Suppl 5:341-45.
10. Chiozza ML, Bernardinelli L, Caione P, Del Gado R, Ferrara P, Giorgi PL, Montomoli C, Rottoli A, Vertucci P. An Italian epidemiological multicentre study of nocturnal enuresis. British J of Urol 1998;81 Suppl 3:86–9.
11. Hollmann E, von Gontard A, Eiberg H, Rittig S, Lehmkuhl G. Molecular genetic, clinical and psychiatric associations in nocturnal enuresis. British J of Urol 1998;81 Suppl 3:37-9.