Original Article

Prevalence and factors associated with behavioral disorders in children with chronic health conditions

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Abstract

Background Patients suffering from chronic health conditions are compelled to strive to adjust in their communities. As a result, changes in their physical and psychosocial states are likely to occur. Several studies have described the prevalence of behavioral disorders in such patients. Pediatric Symptom Checklist (PSC) is a screening tool to detect behavioral disorders in children with chronic illness.

Objective To determine the prevalence of and factors associated with behavioral disorders in children with chronic health conditions.

Methods A cross sectional study was conducted on 4 to 14 year-old-children with chronic diseases in out-patient clinic, Sanglah Hospital from October to December 2008. PSC-17 was used to screen the presence of behavioral disorders. Bivariate analysis and logistic regression were used for analysis.

Results One hundred and four children were included in this study. The prevalence of behavioral disorder based on PSC-17 score ≥ 15 was 37.5%. The study showed that duration of illness of more than 3 years had significant correlation with behavioral disorders, compared with the group of 3 month – 3 years duration of illness (OR 3.30, 95% CI 1.33 to 8.22, P = 0.010}.

Conclusions Prevalence of behavioral disorders in children with chronic health condition is 37.5%. The duration of illness contributes to the manifestation of behavioral disorders in children with chronic health conditions. **[Paediatr Indones. 2010;50:1-5]**.

Keywords: *behavioral disorder, chronic health conditions, prevalence*

Children suffering from chronic health conditions sometimes have permanent physical deficits which limit their abilities to adjust with their environment and might induce the development of behavioral disorders.[1] Risk factors such as a male, parents with psychosocial disorders, low socioeconomic status and unsupportive parents contribute to the development of the psychosocial problems.[2] There is evidence that health risk behaviors tend to cluster together with similar risk factors. Behavioral problems tend to exist along with increasing age include academic performance; adolescents attending vocational schools are more likely to engage in risk behaviors than those in more academically focused schools.[3] Some studies find link between socioeconomic status, duration of illnesses and the risk of behavioral problem to manifest,[3-4] while another study found no significant association.[5]

Thereis no local data on this special matter; this study is the first to evaluate the prevalence of behavioral disorders in children suffering from chronic health conditions and its associated risk factor using PSC-17 as screening tool.

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Methods

A cross-sectional study was conducted in the out-patient clinic, Department of Child Health, Medical School, Udayana University, Sanglah Hospital from August to December 2008. We included children aged 4 to 14 years old who were previously hospitalized due to chronic health conditions, or treated as an outpatient for at least 3 months for the same diagnosis without any history of hospitalization. We excluded children with psychiatric disorders (such as autism and personality disorder), cerebral palsy, or organic mental disorders; or if their parents refused to participate in the study.

Sample size was calculated based on hypothesis test for the estimation of population proportion in two population groups, with the level of confidence (α) of 0.05 and power of 90%. The 104 study subjects were recruited consecutively. Informed consent was obtained from the parents or guardians prior to the screening procedure.

A preliminary study of interobserver reliability of PSC scores was obtained by two different observers, who both filled the PSC-17 questionnaires from the same 19 parents. Pearson correlation (r) of the results was then computed. A good correlation was defined if r > 0.7, moderate 0.3 - 0.7, weak <0.3.[6] The hypothesis was done by using level of significance P <0.05 and confidence interval of 95%.

Gortmaker et al[4] defined chronic health condition as a condition that has been present for more than three months and can not be alleviated. In our study, after the patients with chronic health conditions were determined, they were then classified by age, sex, education levels (subject, father, mother), parent's occupation (father, mother), types and duration of illnesses. PSC-17 was then use to detect behavioral problems, and the subjects were categorized as having behavioral disorders when the total score is 15 or more.[7-8]

Each variable and its relationship to behavioral disorders were analyzed. Variables like age, sex, parent's occupation, and duration of illness were analyzed with chi-square test, while Spearman correlation were used to analyze education levels (children, parents). The types of illness were divided into 6 types, using Kendall's Tau-b as the analytic tool. Finally, logistic regression was used to analyze the relationship between variables that caused behavioral disorders. The result was considered significant if P < 0.05. This study was conducted according to the Declaration of Helsinki.

Table 1. Correlation of the PSC-17 results between two observers

PSC item	Total Item	Subjects	Correlation coefficient(r)	P
Internalizing	5	19	0.730	< 0.0001
Externalizing	7	19	0.851	< 0.0001
Attention	5	19	0.720	< 0.0001
Total	17	19	0.723	< 0.0001

Table 2. Characteristics of the subjects

Characteristics	Number (n = 104)	Percentage (%)
Sex		
Boy	61	58.7
Girl	43	41.3
Age		
4 years – 9 years old	76	73.1
Above 9 years old	28	26.9
Educational level (children)		
Pre-school	32	30.8
Kindergarten	12	11.5
Primary school	58	55.8
Junior high school	2	1.9
Paternal educational level		
Illiterate	3	2.9
Primary school	11	10.6
Junior high school	7	6.7
Senior high school	63	60.6
University/college	20	19.2
Maternal Educational level		
Illiterate	2	1.9
Primary school	12	11.5
Junior high school	15	14.4
Senior high school	60	57.7
University/college	15	14.4
Paternal occupation		
Unemployed	9	8.7
Employed	95	91.3
Maternal occupation		
Unemployed	47	45.2
Employed	57	54.8
Type of illness (based on organ system)		
Neurology	26	25.0
Hematology-oncology	28	26.9
Respirology	13	12.5
Cardiology	6	5.8
Nephrology	12	11.5
Others	19	18.3
Duration of illness		
3months-3 years	69	66.3
> 3 years	35	33.7

Results

In our preliminary study, the Pearson correlation (r) test used to assess the inter-observer reliability revealed a good correlation (r > 0.7) **(Table 1).**

There were 107 subjects, but three children were excluded because their parents refused to sign the informed consent. A total of 104 subjects were enrolled in this study during October to December 2008. The characteristics of the subjects were described in **Table 2.**

Manifestations of behavioral disorder were present in 39 (37.5%) subjects in which 31 subjects aged 4 to 9 years old. Bivariate analysis of variables age, sex, children educational level, parents' educational level, parents' occupation and types of illness showed no significant association to the presence of behavioral disorders in our subjects. In fact, the duration of

Table 3. Factors related to the occurrence of behavior disorders in children with chronic health condition

Variables	Total PSC		P	OR	95% CI	Total
	Score < 15	Score ≥ 15				
	N = 65 (62.5%)	N = 39 (37.5%)				104
Age, n (%)			0.254	0.58	0.23 to 1.48	
4 – 9 years	45 (59)	31 (41)				76
Sex, n(%)			0.959	0.98	0.44 to 2.19	
Boys	38 (62)	23 (38)				61
Type of illness (based on organ system			0.051			
Neurology	17	9				26
Hematology-oncology	22	5				28
Respirology	6	7				13
Cardiology	4	2				6
Nephrology	7	5				12
Others	8	11				19
Educational level (children)			0.050			
Pre-school	15	17				32
Kindergarten	8	4				12
Primary school	41 (71%)	17 (29%)				58
Junior high school	1	1				2
Paternal educational level			0.579			
Illiterate	0	3				3
Primary school	8	3				11
Junior high school	6	1				7
Senior high school	40 (63.5%)	23 (36.5%)				63
University/college	11	9				20
Maternal educational level			0.399			
Illiterate	1	1				2
Primary school	10	2				12
Junior high school	9	6				15
Senior high school	36 (60%)	24 (40%)				60
University/college	9	6				15
Paternal occupation			0.290	0.45	0.11 to 1.77	
Unemployed	4	5				9
Maternal occupation			0.799	1.11	0.50 to 2.47	
Unemployed	30 (64%)	17 (36%)				47
Duration of illness			0.037	2.42	1.05 to 5.59	
3 months - 3 years	48 (70%)	21 (30%)				69

Table 4. Multivariate analysis between child education and duration of illness, and the occurrence of behavioral disorder after adjustment of sex and age in children who suffered from chronic health condition

	B	S.E	Wald	df	P	Adjusted OR	95%CI
Child education	-0.499	0.258	3.751	1	0.053	0.61	0.37 to 1.01
Reference 1 (pre-school)							
Duration	1.195	0.465	6.592	1	0.010	3.30	1.33 to 8.22
Reference 1 (3 months - 3 years)							

SE = Standard Error

illness was the only variable that showed a significant relationship (OR 2.42, 95% CI 1.05 to 5.59, P = 0.037). See **Table 3**.

The same result appeared in the multivariate analysis (**Table 4**), in which duration of illness was the only variable associated with the presence of behavioral disorders (OR 3.30, 95% CI 1.33 to 8.22, P = 0.010).

Discussion

Several studies had explored misbehavioral problems that appeared in children treated with variety chronic health conditions.[3-5,9] In Indonesia, data regarding the presence of behavioral disorders in those children arenot available.[2]

In our study, 39 (37.5%) subjects who were treated at the out-patient clinic Sanglah Hospital with various chronic health conditions suffered from behavioral disorders based on the PSC-17 test. Our result was slightly less compared to the study by Silver et al[10] in New York, who used the Eyberg Child Behavior Inventory (ECBI) as screening tool. They found that among 356 subjects aged 5 to 8 years old suffering from chronic health conditions, 138 (38.8%) showed manifestations of conduct disorders. The study was based on a 2 year medical record which was taken retrospectively from inpatients and outpatients of two large urban medical centers. Meanwhile, our study used PSC as screening tool and only recruited subjects from outpatient clinic in a local government hospital. The difference could affect the results considerably.

The majority of chronic health conditions found in our study were neurological disorders (epilepsy) and hematology-oncology disorders (thalassemia, acute lymphoblastic leukemia, hemophilia A). The percentages were 25% and 26.9% respectively. This distribution pattern of chronic diseases is similar to a study by Pradhan et al[11] in India who found a majority of epilepsy and thalasemia in their patients.

Age and sex were not considered as cause of behavioral problems in our study, although the number of boy with behavioural disorder was higher than girls with the same disorder. We believed that a close family interaction and local social culture might play an important role on how parents taking care of their children. Gortmaker et al[4] showed no relationship between male gender and behavioral disorder due to chronic health condition. Nevertheless, being male could be considered as a substantial risk factor..

Being unemployed were a burden to both parents and can be considered as stressor that affect the harmony of parent-child relationship indirectly. This discrepant relationship can trigger the manifestation of behavioral disorder in children, especially children with chronic health conditions.[12] Our study supported the study by Hanson et al[13] who found no significant association between occupation of the parents and behavioral disorder incidence. But this needs further study since we did not include factors such as wages and income as was done in a research by Montes et al.[5]

We did not find a significant association between parents' educational level and behavioral disorder in the subjects. Soetjiningsih[14] acclaimed there are other factors that could strengthen the growth and psychosocial development i.e., parents-children harmonious relationship, positive support from parents on their children's independence effort, family and peer group support. These factors gave positive effects on behavioral disorder.[4]

The educational levels of the children did not show a significant relevance with the occurrence of behavioral disorders. Unlike the study by Suris et al[3], environmental and peer group support played an important role in the children's acceptance of their chronic health condition and self-esteem. Furthermore, repeating a grade which were not investigated in this study could become an indirect stressor. Gortmaker et al[4] showed that there was no association between being suspended from school and behavioral disorders. Further studies are needed. Children educational level is considered to be part of their behavioral disorder.

Finally, we used multivariate logistic regression to enter 2 covariates, child educational level and duration of illnesses into the model. It was found that child education level was not significantly associated with behavioral disorder (OR 0.61, 95% CI 0.37 to 1.01, P = 0.053}. However, the group with duration of illness longer than 3 years showed significant risk to have behavioral disorder compared to the group with duration of illness less than 3years (OR 3.30, 95% CI 1.33 to 8.22, P = 0.010) (**Table 4)**. Onset, duration of illness and the illness' chronology and prognosis are

the main factors affecting physical, intellectual and psychosocial development in children with chronic health condition.[2] The longer the duration or the worse the prognosis of an illness, the higher the risk of a child to have behavioral disorders.[14] Our result was also supported by a study done by Alati et al[15] who did a large study of asthmatic children who were treated for about 9 years with Child Behavior Checklist (CBCL) as screening tool. The result showed a relationship between duration of illness and increased incidence of internal behavioral disorder (introvert, depression, anxiety) with $P = 0.03$ among the boys and $P = 0.003$ among the girls.

There were some limitations of this study. The first was its inability to explain whether the behavioral disorder developed before, during or after therapy session ended. Second was PSC-17 questionnaire because PSC-17 was a brief screening test. Finally, since there was no local data regarding those variables, further studies are needed to investigate about the variables including local social culture that might be a stressor to behavioral disorders in children.

Acknowledgments

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