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生命・愛心・卓越・創新

Hyperglycaemia during Chemotherapy for Acute Lymphoblastic Leukaemia among Taiwanese Children

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BACKGROUNDS

Hyperglycaemia is a common occurrence during the treatment for paediatric acute lymphoblastic leukaemia (ALL). Emergence of new evidence exhibits conflicting results. The incidence of hyperglycaemia during chemotherapy has not been well described in the Asian population.

OBJECTIVES

The aim of study is to delineate the characteristics of paediatric patients at risk for hyperglycaemia during chemotherapy.

METHODS

This retrospective study involved chart review of consecutive patients aged younger than 18 years with diagnosis of ALL in a medical centre in Taiwan in 1997-2008. Hyperglycaemia was defined by random plasma glucose levels 200 mg/dL or fasting glucose levels 126 mg/dL at least two separate samplings. Risk factors for hyperglycaemia were described with crude and adjusted odds ratios (OR) with 95% confidence intervals (CI) in the univariate and multivariate regression analysis.

RESULTS

Table 1. Demographic and clinical characteristics of the study population

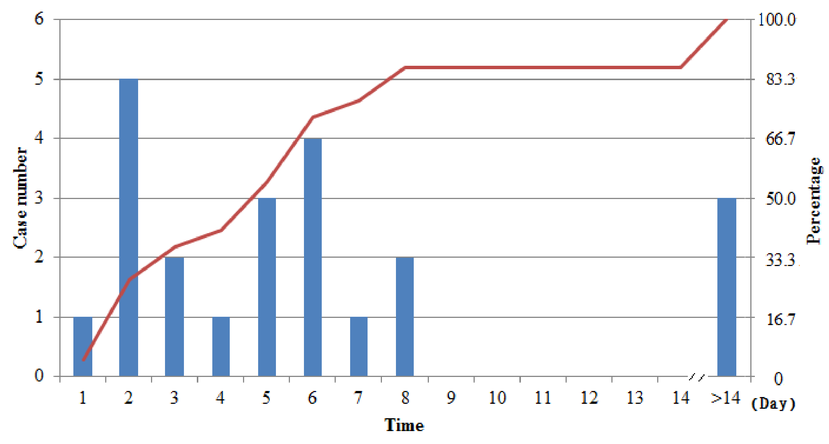
Variables	Total	Hyperglycemia		
	N (%)	Yes, N (%)	No, N (%)	p-value
Gender				
Male	76 (57.1)	11 (14.5)	65 (85.5)	0.459
Female	57 (42.9)	11 (19.3)	46 (80.7)	
Age				
2- 9 years	93 (69.9)	4 (4.3)	89 (95.7)	<0.001
10-18 years	40 (30.1)	18 (45.0)	22 (55.0)	
BMI status				
Normal	106 (79.7)	14 (13.2)	92 (86.8)	0.03
Overweight	12 (9.0)	2 (16.7)	10 (83.3)	
Obese	15 (11.3)	6 (40.0)	9 (60.0)	
Family history of diabetes				
No	120 (90.2)	19 (15.8)	101 (84.2)	0.50
Yes	13 (9.8)	3 (23.1)	10 (76.9)	
Fasting glucose				
< 100 mg/dL	110 (82.7)	11 (10.0)	99 (90.0)	<0.001
≥ 100 mg/dL	23 (17.3)	11 (47.8)	12 (52.2)	
White blood cells/mm				
< 50 X 10^3	94 (70.7)	17 (18.1)	77 (81.9)	0.46
≥ 50 X 10^3	39 (29.3)	5 (12.8)	34 (87.2)	
C-reactive protein*				
< 20 mg/dL	73 (54.9)	14 (19.2)	59 (80.8)	0.24
≥ 20 mg/dL	58 (43.6)	7 (12.1)	51 (87.9)	
Immunotype				
B-cell	112 (84.2)	19 (17.0)	93 (83.0)	0.76
T-cell	21 (15.8)	3 (14.3)	18 (85.7)	
Risk group				
Standard risk	50 (37.6)	2 (4.0)	48 (96.0)	0.002
High risk	42 (31.6)	13 (31.0)	29 (69.0)	
Very high risk	41 (30.8)	7 (17.1)	34 (82.9)	
Treatment protocol				
TPOG-ALL-93/97	49 (36.8)	4 (8.2)	45 (91.8)	0.05
TPOG-ALL-2002	84 (63.2)	18 (21.4)	66 (78.6)	
Leukemia relapse				
Yes	29 (21.8)	5 (17.2)	24 (82.8)	0.91
No	104 (78.2)	17 (16.3)	87 (83.7)	
Mean number of infective episodes per person (±SD)	7.58 (±6.49)	5.09 (±4.93)	8.08 (±6.66)	0.52

*There were 2 missing values that were excluded from the denominator.

Table 2.Risk factors of hyperglycemia during chemotherapy for pediatric acute lymphoblastic leukemia

	Univariate		Multivariate	
	Crude OR	(95% CI)	Adjusted OR	(95% CI)
Age				
2- 9 years	1.00		1.00	
10-18 years	18.21***	(5.60-59.22)	10.88**	(2.40-49.37)
BMI status				
Normal	1.00		1.00	
Overweight	1.31	(0.26-6.63)	1.62	(0.21-12.50)
Obesity	4.38*	(1.35-14.20)	4.00	(0.79-20.17)
Fasting glucose				
< 100 mg/dL	1.00		1.00	
≥ 100 mg/dL	8.25***	(2.95-23.07)	5.70**	(1.63-19.93)
Risk group				
Standard risk	1.00		1.00	
High risk	10.76**	(2.26-51.12)	1.89	(0.25-14.30)
Very high risk	4.94	(0.97-25.26)	0.86	(0.11-7.00)

*p < 0.05; **p < 0.01; ***p < 0.001.
OR indicates odds ratio; CI, confidence interval.
Adjustment was made for all possible contributing factors in the multivariate logistic regression analysis using occurrence of hyperglycemia as the dependent variable.



A total of 133 patients were included for analysis. Overall, 22 (16.5%) patients experienced hyperglycemia during ALL treatment. Most hyperglycemic episodes occurred within the first 8 days after prednisolone use. Age older than 10 years was the most important predictor of hyperglycemia (adjusted OR = 10.88, 95% CI 2.40-49.37). Patients with fasting glucose concentration ≥ 100 mg/dL were also 5.7 (95% CI 1.63-19.93) fold likely to develop hyperglycemia, while the predictive significance of obesity was attenuated after adjustment.

CONCLUSIONS

Age and fasting glucose have the highest predictive value on subsequent occurrence of hyperglycaemia during chemotherapy. Cautions in clinical care should be given to those patients at high risk for hyperglycaemia, particularly in obese adolescents.

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