

Prevalence of and Risk Factors for Nonadherence to Insulin among Paediatric Type 1 Diabetes Patients in Singapore

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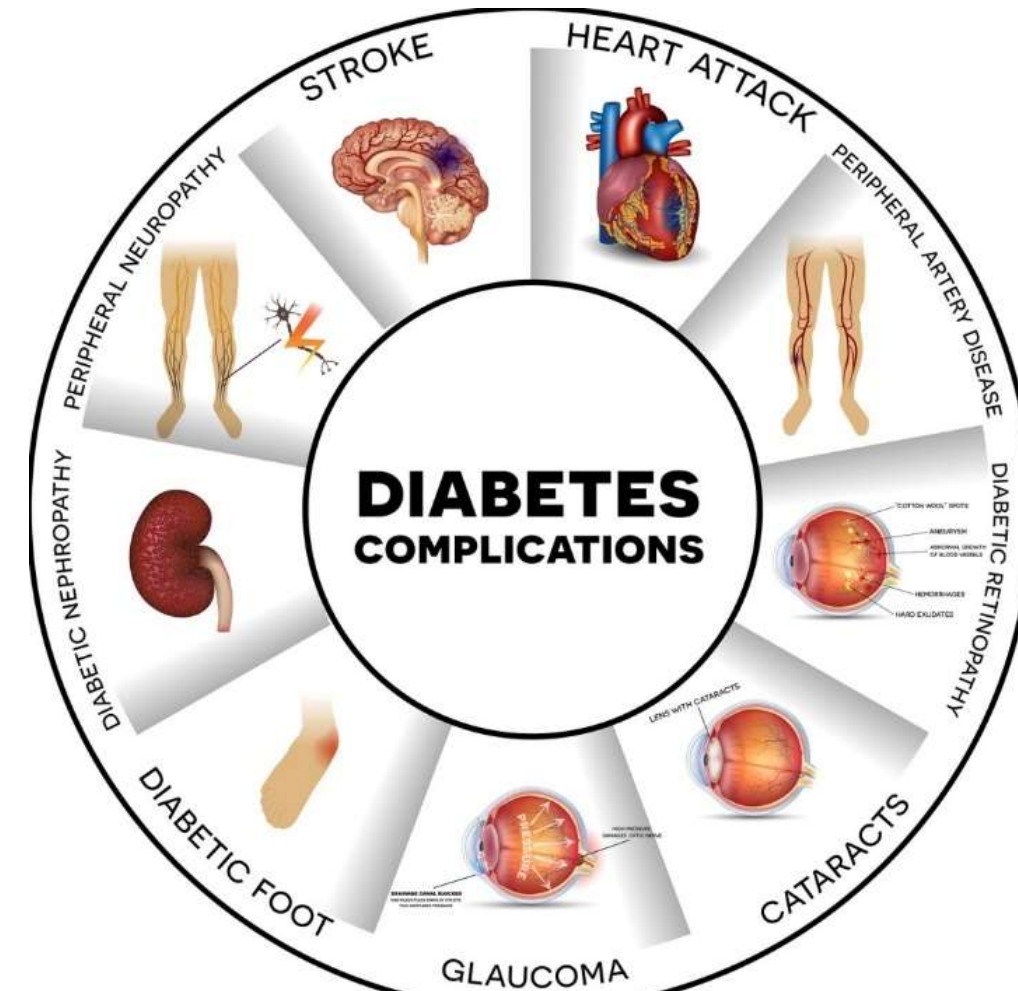
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Introduction

- Nonadherence to insulin therapy is a significant problem worldwide, which is associated with poor health outcomes among patients with type 1 diabetes (T1D).
- It is important to identify the risk factors related to nonadherence to target those at higher risk of diabetic complications.
- In Singapore, there is a knowledge gap in understanding the risk factors for insulin nonadherence in paediatric patients with T1D.



Objectives

- To assess the prevalence of nonadherence to insulin therapy among paediatric patients with T1D in Singapore.
- To identify the associated risk factors for insulin nonadherence in this group of patients.

Methods

- This is a single centre, retrospective longitudinal study in KK Women's and Children's Hospital, Singapore.

Inclusion criteria	<ul style="list-style-type: none"> • Singapore citizens with T1DM aged ≤18 years old • ≥1 year of insulin prescription between 1st January 2012 – 31st December 2016
Exclusion criteria	<ul style="list-style-type: none"> • Insulin pump users • Follow up at other healthcare institutions
Study outcomes	<p>Primary outcomes:</p> <ul style="list-style-type: none"> • Prevalence of nonadherence measured by medication possession ratio (MPR) • Nonadherence defined as MPR < 100% <p>Secondary outcomes:</p> <ul style="list-style-type: none"> • Factors associated with nonadherence
Statistical analysis	<ul style="list-style-type: none"> • Mann Whitney U test, t-test, χ^2 test to compare medians, means and proportions, respectively • Logistic regression to assess factors associated with nonadherence

Results

- A total of 210 patients were included in the study.
- Those in the nonadherent group were older and had a longer duration of follow up and diabetes since diagnosis. Gender, race, financial class and number of concurrent medications were comparable between the nonadherent and adherent groups (Refer Table 1).
- Prevalence of insulin nonadherence:

MPR < 100% 35.7% (95% CI = 29.2% – 42.6%)

Sensitivity analyses performed for varying definitions of MPR:

MPR < 95% 26.2% (95% CI = 20.4% – 32.7%)

MPR < 80% 12.4% (95% CI = 8.3% – 17.6%)

Results

Table 1: Baseline characteristics of study cohort

	Adherent MPR = 100% (n = 137)	Nonadherent MPR < 100% (n = 73)	p value
Age (years), median (IQR)	11 (8 – 13.5)	13 (10 – 16)	< 0.001
Male gender, n (%)	65 (47.4)	39 (53.4)	0.409
Chinese race, n (%)	98 (71.5)	45 (61.6)	0.143
Financial class receiving government subsidy, n (%)	115 (83.9)	63 (86.3)	0.650
Diabetes diagnosis duration (years), median (IQR)	1 (0 – 5)	4 (1 – 7.5)	< 0.001
Number of concurrent medications, mean (SD)	0.36 (0.793)	0.45 (0.800)	0.414
Number of daily injections, mean (SD)	4.4 (0.827)	4.4 (0.682)	0.970
Duration of follow up (days), median (IQR)	3.77 (2.56 – 4.75)	3.17 (1.85 – 4.51)	0.007
Baseline HbA1c (%), median (IQR)	9.6 (7.8 – 12.4)	9.9 (8.2 – 12.5)	0.656

- An increase in age and diabetes duration was associated with 22% (p = 0.002) and 12.6% (p = 0.024) increased risk of nonadherence, respectively (Refer Table 2).
- Patients of Chinese descent were 56% (p = 0.026) less likely to be nonadherent vs. other ethnicities.
- When nonadherence was defined at MPR < 95% and MPR < 80%, an increase in age and duration of diabetes were associated with 22.9% (p = 0.001) and 27.3% (p = 0.017) increase in risk of nonadherence, respectively.

Table 2: Factors associated with nonadherence defined as MPR < 100 %

	Odds Ratio	95% CI	p value
Age (years)	1.220	1.077 – 1.381	0.002
Gender			
Female	Reference		
Male	1.727	0.864 – 3.451	0.122
Race			
Non-Chinese	Reference		
Chinese	0.432	0.206 – 0.904	0.026
Financial class			
Receiving government subsidy	Reference		
Not receiving government subsidy	0.829	0.300 – 2.292	0.718
Diabetes diagnosis duration (years)	1.126	1.106 – 1.249	0.024
Number of concurrent medications	1.018	0.657 – 1.578	0.935
Number of daily injections	1.005	0.666 – 1.516	0.981

Discussion

- No gold standard exist for MPR definition of nonadherence - varying thresholds exist depending on disease. As absolute adherence to insulin therapy is important in T1D, nonadherence was defined as MPR < 100% in this study.
- Those who had diabetes for a longer duration were more likely to be nonadherent to insulin therapy, likely due to the fatigue from care of a chronic, lifelong condition.
- Patient reported measures in conjunction with pharmacy refill records may provide complimentary and holistic view of nonadherence behaviors

Conclusion

- More than one-third of the paediatric patients with T1D in Singapore were nonadherent to insulin therapy.
- This signifies a need to design targeted interventions based on the risk factors identified in this study.

References

1. Maahs DM et al. *Endocrinol Metab Clin North Am.* 2010;39(3):481-97.
2. Peterson AM et al. *Value Health.* 2007;10(1):3-12.
3. Gellad WF et al. *Pharmacoepidemiol Drug Saf.* 2017;26(12):1437-41.
4. Clifford S et al. *J Manag Care Pharm.* 2014;20(7):650-1.
5. Borus JS, et al. *Curr Opin Pediatr.* 2010;22(4):405.