Age-Related Trends of Blood Glucose, Hyperglycemia, and Type 2 Diabetes in Youth-Prescribed Second-Generation Antipsychotic Medications

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BACKGROUND

- While hyperglycemia and type 2 diabetes mellitus (T2DM) are common adverse drug events (ADEs) of second-generation antipsychotics (SGA) in adults, the incidence is significantly lower in children. Yet a similar universal monitoring schedule is recommended for both children and adults.
- Limited evidence exists on blood glucose (BG) monitoring rates and the monitoring results in youth on SGA from childhood to young adulthood and its association with age.

OBJECTIVE

This study aimed to describe the age-related trends of blood glucose monitoring and monitoring results among SGA recipients aged 10 to 25.

METHODS

Population

- Individuals aged 10 to 25 and prescribed SGA were identified from the TriNetX Electronic Medical Record (EMR) data from 2009 to 2018.
- Patients diagnosed with Type 1 diabetes were excluded from the analysis.

Design

- A trend analysis of the BG monitoring and monitoring positive rates by age was conducted.

Three outcomes

- BG monitoring rate: calculated as the number of SGA recipients who received blood tests for the HbA1C, fasting glucose, and random glucose divided by the total number of SGA recipients in each age group (e.g.,10).
- Positive BG monitoring rate: calculated as the number of SGA recipients identified with hyperglycemia divided by the total number of SGA recipients who received BG monitoring in the age group.
- T2DM diagnosis rate: calculated as the number of SGA recipients diagnosed with T2DM divided by the total number of SGA recipients undergoing BG monitoring in each age group.

Statistical analysis

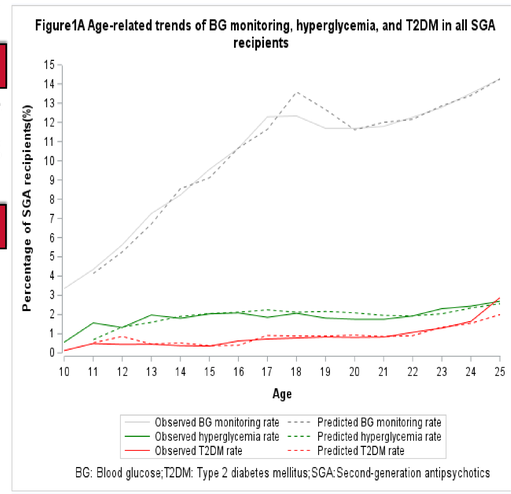
- The temporal trends of three outcome rates were examined using the Autoregressive Integrated Moving Average (ARIMA) model.
- The best-fitted model was selected using the white noise residual test and Schwarz information criterion.

Software: SAS 9.4

RESULTS

- 61,774 SGA recipients aged 10 to 25 during the study period
- 12,197 (19.94%) received at least one BG monitoring
  - 1,825 (14.96%) had at least one BG measure higher than the normal range
  - 779 (6.39%) received a diagnosis of T2DM
- Despite a threefold increase (5% to 15%) in BG monitoring rates among SGA recipients aged 10 to 25, the proportion of patients identified with hyperglycemia or diagnosed with T2DM remained relatively stable (1-2%) with increasing age (**Figure 1**).

Figure 1.Age-related trends of monitoring and positive monitoring rates



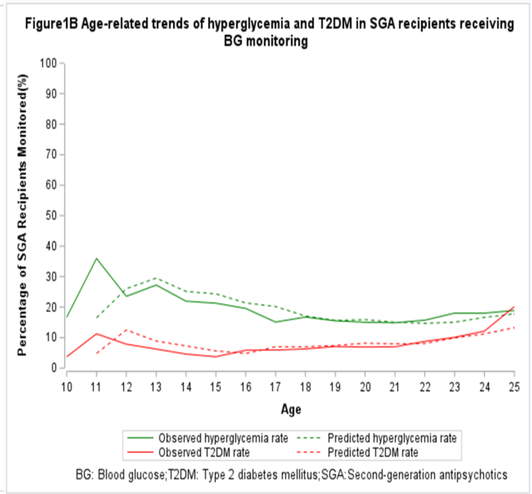


Table 1.Age-related trends of monitoring and positive monitoring rates

Dependent variable	Model	Slope	95%CI	P-value
BG monitoring rate	ARIMA(1,1,0)	0.60	0.17 - 1.04	0.0173
Rate of hyperglycemia among SGA recipients receiving BG monitoring	ARIMA(1,1,0)	-0.50	-0.97 - -0.03	0.0575
T2DM diagnosis rate among SGA recipients receiving BG monitoring	ARIMA(1,1,0)	0.02	-0.66 - 0.71	0.9469
Rate of Hyperglycemia among SGA recipients	ARIMA(1,1,0)	-0.38	-0.89 - 0.12	0.1613
T2DM diagnosis rate among SGA recipients	ARIMA(1,1,0)	0.84	0.31 - 1.37	0.0081

RESULTS

- The ARIMA (1,1,0) model, identified as the best fit, revealed that a one-year older age is associated with a 0.60 (95%CI: 0.17 -1.04) increase in BG monitoring rates and hyperglycemia detection rates decreased (Slope = -0.50 [95%CI: -0.97 - -0.03]) while T2DM diagnosis rates increased (Slope = 0.02 [95%CI: -0.66 - 0.71]) from childhood to adulthood (**Table 1**).

DISCUSSION

- Although BG monitoring became more frequent with increasing age, the BG monitoring rates in all age groups (< 15%) were far from the universal monitoring recommendation of practice guidelines.
- The low monitoring positive rate and T2DM diagnosis rate suggest that the risk of having SGA-associated hyperglycemia is lower for children, and the risk increases slightly when entering young adulthood.
- Our study is the first that demonstrates age-specific variation in blood glucose monitoring and the screening positive rates in childhood, adolescence, and the transition to young adulthood in a large cohort prescribed SGA. The finding adds to the literature and provides new evidence to support the relatively low risk of having abnormal blood glucose and T2DM in youth taking SGA.

LIMITATION

- The monitoring rate and screening positive rates may be underestimated due to lost follow-up or not sharing testing results between PCP and psychiatrist.
- The group-level analysis could not examine specific medical factors influencing the monitoring rate, such as diagnostic category, number of psychiatric comorbidities, SGA type and dose, and comedications.

CONCLUSIONS

- The BG monitoring rate among SGA recipients significantly increased from childhood to young adulthood, while the detection rate of hyperglycemia or T2DM in this group remained low despite of increasing age.
- Monitoring high-risk youth may be a more efficient strategy than the universal monitoring practice recommended by the current guidelines.

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