Understanding new onset type 1 diabetes in children under 15 years: an overview from 4 Algerian centers in 2023

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BACKGROUND

- In Algeria, type 1 diabetes (T1DM) in individuals under 15 years of age has one of the highest incidences in the MENA region[1] and ranks seventh globally[2] with a global annual increase of 3%[3].
- The rise in T1DM is linked to urbanization and lifestyle changes[4].
- Diabetic ketoacidosis is a common and life-threatening complication[5].
- Since 2020, no specific studies have documented the clinical presentation of T1DM in pediatric patients in Algeria.

OBJECTIVE

To provide recent epidemiological data on new T1DM cases in pediatric patients in Algiers, focusing on circumstances of diagnosis and associated complications.

METHODS

- This was a retrospective and multicenter study conducted in 2024, using patient records from 2023.
- **Population:** 100 patients under 15 years old diagnosed with T1DM in 2023.
- **Inclusion Criteria:** T1DM diagnosis confirmed by biological tests and symptoms (polyuria, polydipsia).
- **Centers:** 4 hospitals in Algiers.
- **Patient Data:** Sex, age, family diabetes history, complications, season of diagnosis, diagnostic delay, discovery circumstances, glycemia and HbA1c levels at diagnosis.

Figure 1: Study design

This was an multicentric and retrospective study conducted in Algeria.

Patients under 15 years old with T1DM were targeted by this study.

Data were collected from patient records and analyzed based on patient characteristics and clinical presentations.

RESULTS

Epidemiological profile of the study population: The incidence of type 1 diabetes was 9.4 per 100 000 children (sex ratio: 0.85), with an average diagnosis age of 9.17 years. Complications included ketosis and ketoacidosis (83%), while no significant prevalence of gestational diabetes was found among mothers (Figure 2).

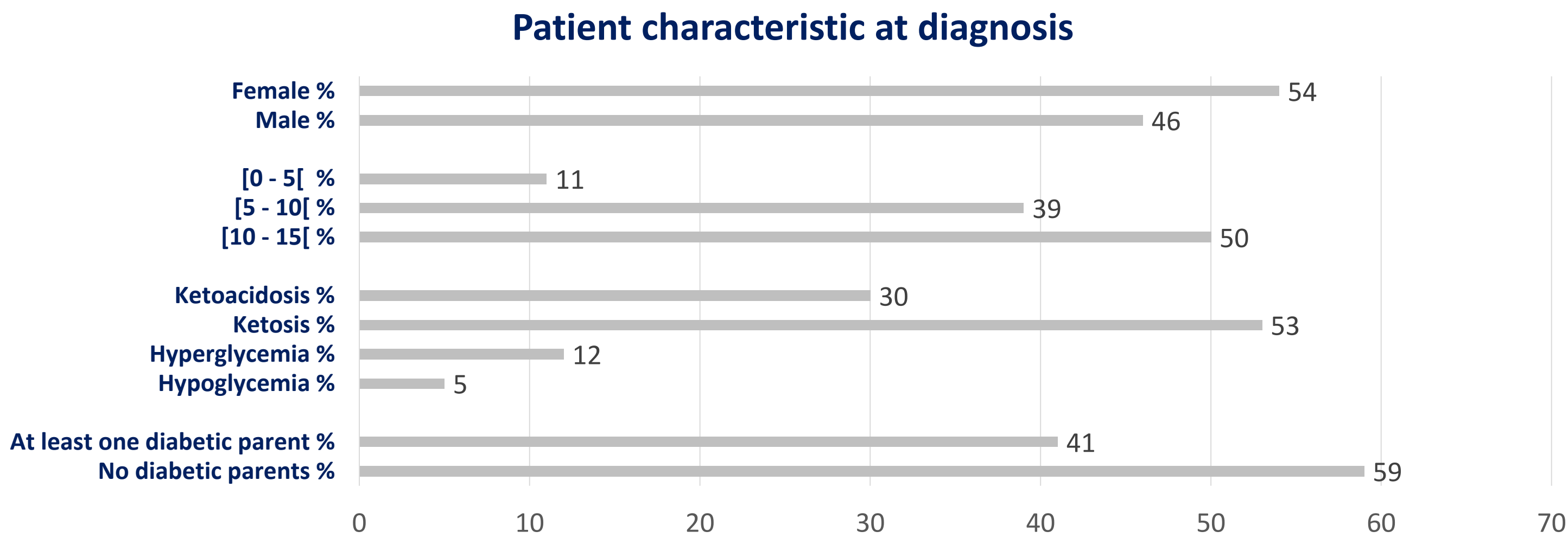## POSTER HIGHLIGHTS

Figure 2: Patient characteristic

Patient characteristic at diagnosis

- Female % : 54
- Male % : 46
- [0 - 5[% : 11
- [5 - 10[% : 39
- [10 - 15[% : 50
- Ketoacidosis % : 30
- Ketosis % : 53
- Hyperglycemia % : 12
- Hypoglycemia % : 5
- At least one diabetic parent % : 41
- No diabetic parents % : 59

Figure 3: Diagnosis by Season and Context

Season of diagnosis

- Winter: 31%
- Spring: 21%
- Autumn: 24%
- Summer: 19%
- Indeterminate: 5%

Circumstances of diagnosis

- Polyuria-polydipsia syndrome 35%
- Other 15%
- Incidental discovery 23%
- Referred by a general practitioner 27%
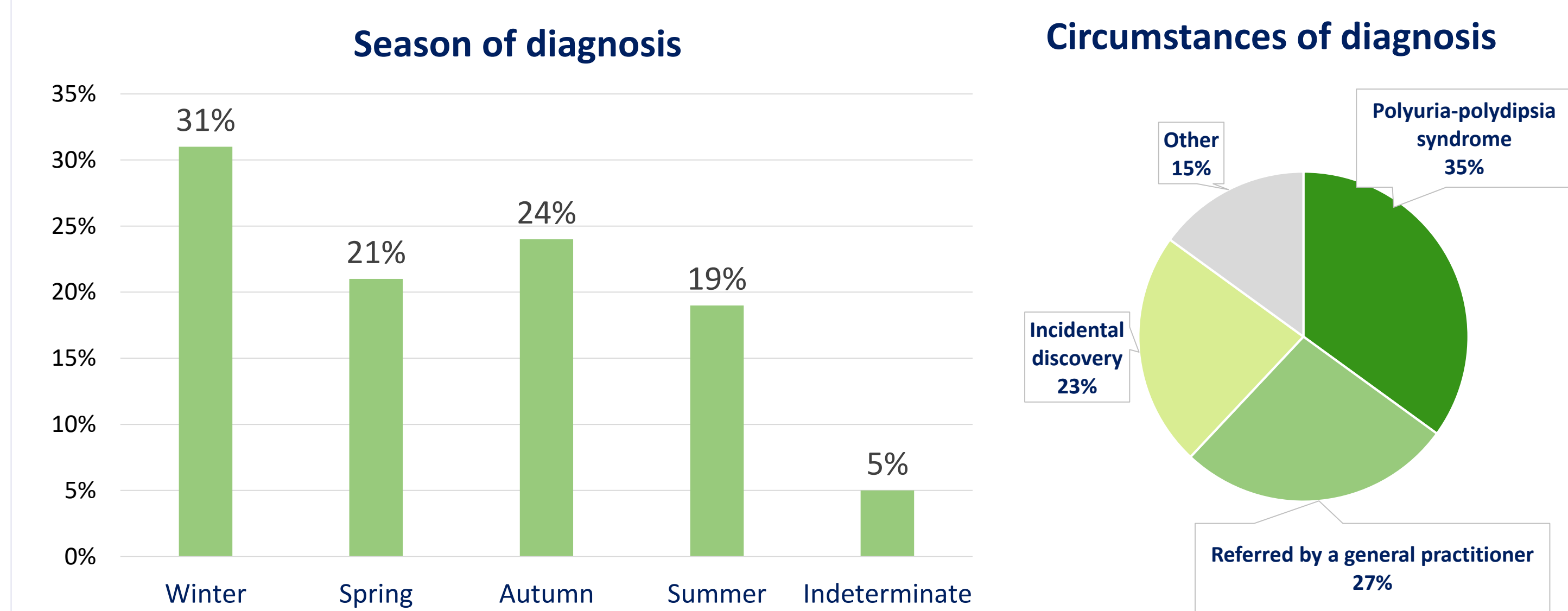
Figure 4: Glycemia and HbA1c by Sex and Age at Diagnosis

Glycemia by Sex

	Sample size	Mean μ	Min	Max	Q1	Median	Q3
Male	29	4	2,2	6,6	2,8	3,6	5
Female	28	4,1	1,9	7,4	2,4	4,3	5,6

Glycemia by Age

	Sample size	Mean μ	Min	Max	Q1	Median	Q3
[0 - 5[	1						
[5 - 10]	30	5,9	2,02	7,4	2,6	4	5
[10 - 15[	26	4,1	1,9		2,5	3,6	5,2

The p-value indicates no significant difference between sexes (P > 0.05), while significant differences are detected among age groups (P < 0.05).

HbA1c by Sex

	Sample size	Mean μ	Min	Max	Q1	Median	Q3
Male	25	11,9	1,8	12,3	8	9,6	12
Female	25		9	15,3	10,4	11,4	13,3

HbA1c by Age

	Sample size	Mean μ	Min	Max	Q1	Median	Q3
[0 - 5[	1	12	1,76	0	0	0	0
[5 - 10]	22	9,6		13,7	8,6	10,9	12
[10 - 15[	27	11	8,2	15,3	9	10,3	12,3

The p-value indicates no significant difference between sexes (P > 0.05), while significant differences are detected among age groups (P < 0.05).
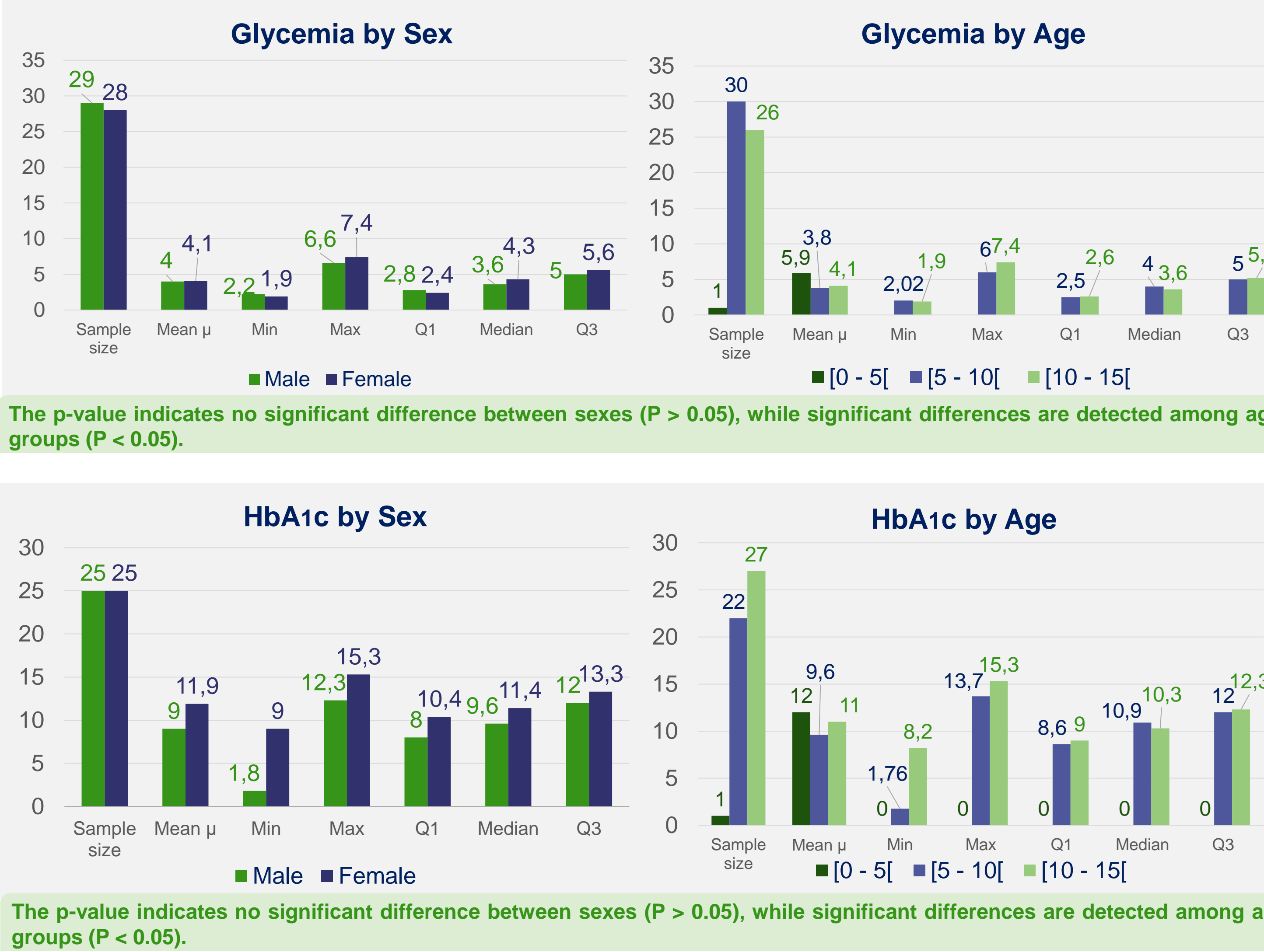
Table 1: Risk Factors for DKA at Diagnosis

Impact of Sex, Age Range, Family History, and Time to Diagnosis on the Risk of Diabetic Ketoacidosis (DKA)[2]

Studied Factors	Modalities	RR (Relative Risk)	95% CI for RR (Confidence Interval)	P-value	Conclusion
Sex	Male Female	RR=1,47	[0,78-2,76]	0,22	Non-significant Difference
Age range	[0 - 5[[5 - 10[[10 - 15[	RR=1,25 RR=0,67 RR=1,3	[0,53-2,9] [0,34-1,31] [0,71-2,4]	0,625 0,228 0,383	Non-significant Difference
Family History	Presence Absence	RR=0,91	[0,5-1,66]	0,756	Non-significant Difference
Time to Diagnosis	<15 Days >15 Days	RR=0,32	[0,15-0,67]	0,0008	Significant Difference

According to the p-value < 0.05, there is a significant association between the time to diagnosis and DKA: A delay of more than 15 days after the onset of the first symptoms is associated with an increased risk of DKA.

REFERENCES:
1-Patterson, C. et al. (2019)/ 2-Diabetes Atlas, 2022/ 3-Karvonen,M. (2006)/ 4-Lancet. 2016 / 5-Sophie, G et al. 2020.

RESULTS (continued)

Diagnosis by Season and Context: The incidence increased during winter, with 35% of diagnoses resulting from polyuria-polydipsia and 27% from referrals by general practitioners (Figure 3).

Common symptoms at diagnosis: Included polyuria-polydipsia syndrome (76%), weight loss (52%), asthenia (19%), and abdominal pain (9%).

Glycemia and HbA1c Levels by Sex and Age Groups : Among 57 patients, the average blood glucose level was 4.1 g/L (boys: 4 g/L, girls: 4.1 g/L). While the average HbA1c among 50 patients with data, was 10.4% (boys: 9%, girls: 11.9%) (Figure 4).

the association between risk factors and diabetic ketoacidosis at diagnosis: Statistical analysis showed a significant association was found with time to diagnosis and DKA at diagnosis for diagnoses made within 15 days (Table 1).

DISCUSSION

- The highest incidence was observed in children aged 10-14 years, potentially due to increased awareness or changing disease dynamics.
- Diagnoses significantly increased during winter, suggesting environmental influences.
- Complications like ketoacidosis and ketosis were prevalent at diagnosis highlighting the importance of awareness and early screening.
- Significant differences across age groups highlight the need for tailored management strategies.

Study Perspectives: Future research may extend the observation period, include additional hospitals, and evaluate factors such as birth weight, positive autoantibody levels, and C-peptide levels. These enhancements will provide a clearer understanding of the risk factors and trends associated with pediatric T1DM.

CONCLUSIONS

This study underscores the critical importance of prevention strategies and early screening to enhance management of T1DM. Delayed diagnosis significantly increases complication risks.

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