Fating Ramadan & Type 1 Diabetes in children & Adolescents

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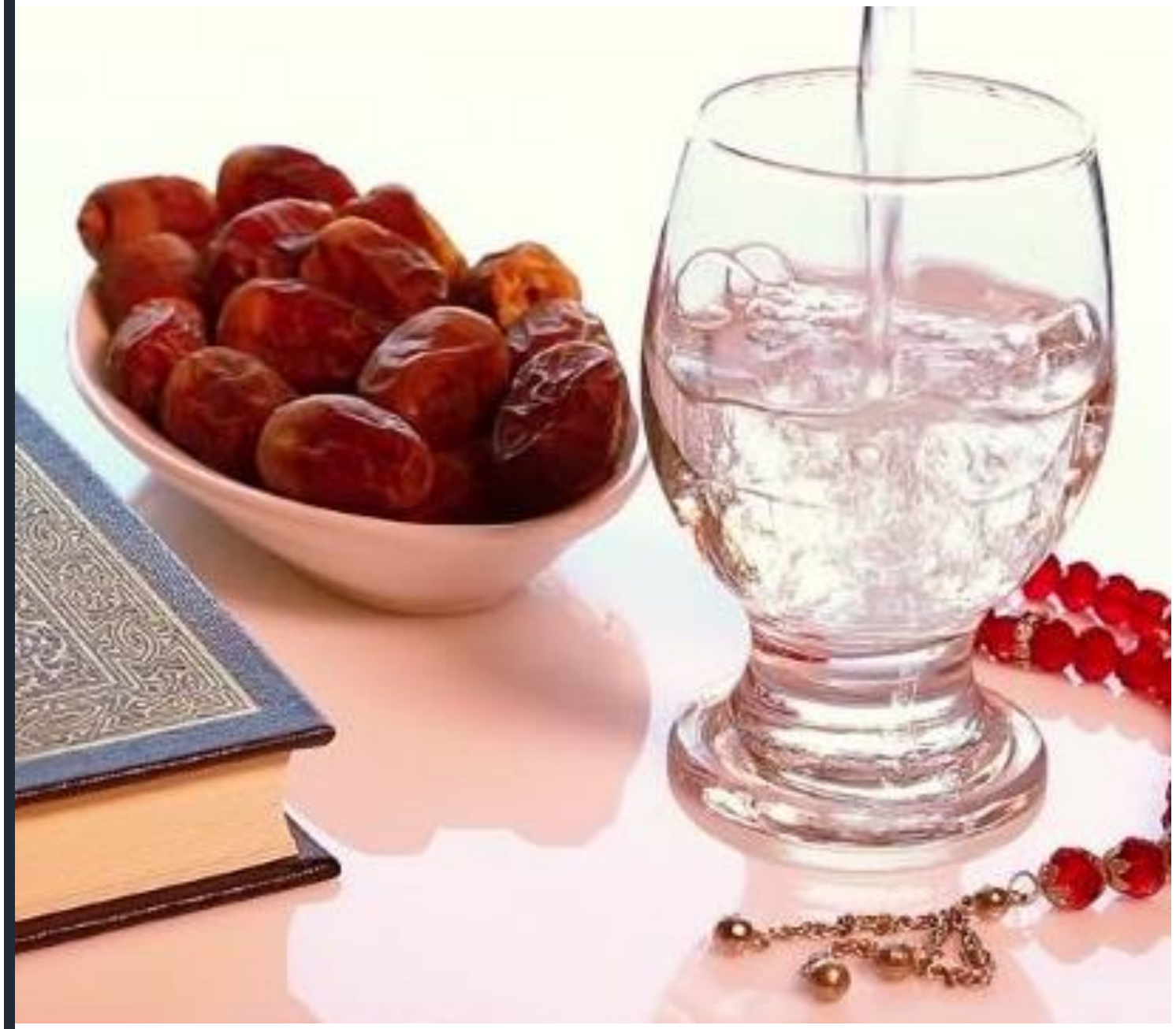


Outlines

- Introduction.
- Fasting Ramadan as a holy month.
- Risks associated with fasting in T1DM.
- High Risk Type 1 patients.
- Management issues for safe fasting.
- Usage of diabetes technology as a good tool for safe fasting Ramadan.
- Results of local study of using FGMS for children during fasting.
- Recommendations.

يَا أَيُّهَا الَّذِينَ آمَنُوا كُتِبَ عَلَيْكُمُ الصِّيَامُ كَمَا كُتِبَ عَلَى الَّذِينَ مِن قَبْلِكُمْ لَعَلَّكُمْ تَتَّقُونَ (183)

“ O you who believe! Fasting has been prescribed to you as it was prescribed to those before you so that you attain Taqwa (self restraint , God Awareness)”

Fasting Ramadan

- Ramadan, the ninth month of Islamic Lunar Hijri Calendar, is marked by religious ritual of As-Saum .
- Fasting is obligatory for all pubertal muslims.
- Fasting starts from early dawn (Suhur) till sunset (Iftar).
- Fasting lasts 14 - 18 hours depending on the geographical location.
- Fasting for detoxification, or “doing a cleanse” is a growing dietary practice

- Safety first is the best practice, and this is recognized in most spiritual communities.
- While most of recommendations for patients on insulin therapy not to fast for their own safety.
- Fasting may not be out of the question, individualized “case by case” decision should be the rule “not generalizations” depending on many factors will be explained in this presentation !!.

“Exceptions” from fasting Ramadan

- Acute / chronic illness.
- Mental subnormal.
- Pre-pubertal children.
- Travelers.
- Menses.
- Elderly.
- Pregnant or lactating mother (if she worried on herself or her baby).

Major hazards might happen during fasting !!

- Hypoglycemia attacks especially those with hypoglycemia unawareness with possible serious complications “seizure/coma & death) .
- Hyperglycemia attacks with possible Diabetic ketoacidosis.
- Worsening of glycemic control owing to reduction of insulin doses and over eating during nights.
- Dehydration & thrombosis.
- Increase rate of admissions to the hospitals.

Is it safe for those with Type 1 diabetes to fast?

If so, what are the best practices to follow while participating in a fast?

Diabetes and Ramadan

To fast or not to fast?

Essential management issues for safe fasting !!

- Patients individualization (Not every one is the same “low risk Vs high risks).
  - If well-controlled diabetes, there’s less of a health risk from fasting.
  - If patient has a wild blood sugar fluctuations “example: from 400 mg/dl one day to 50 mg/dl another day).
- Healthy & balanced diet in Ramadan.
- Night exercise including Taraweeh prayers.
- Frequent monitoring of glucose readings (SMBG Vs CGMS).
- Basal / Bolus intensive insulin therapy / sensor augmented smart pump users is highly recommended.
- Dose adjustments for fasting Ramadan.

Individualization is the rule of thumb of whether or not allowed to fast !!

Individualization

- Patients with type 1 diabetes can be stratified into two categories based on their level of risk associated with fasting.
- The recommended ruling for persons in high risk category are prohibited from fasting to prevent harming themselves based on the certainty or the preponderance of probability that harm will occur.
- The recommended ruling for those in low risk category that they should fast.

High risk group "NO fasting"

- Severe hypoglycemia within the last 3 months prior to Ramadan
- History of recurrent hypoglycemia.
- Hypoglycemia unawareness.
- Sustained poor glycemic control (HbA1c > 10 %).
- Diabetic keto-acidosis within the previous 3 months.
- Brittle type 1 diabetes mellitus.
- Performing intense physical labor.
- Pregnant ladies / adolescent.
- Advanced diabetic retinopathy
- Diabetic nephropathy and renal insufficiency.

Low risk group “Allow fasting”

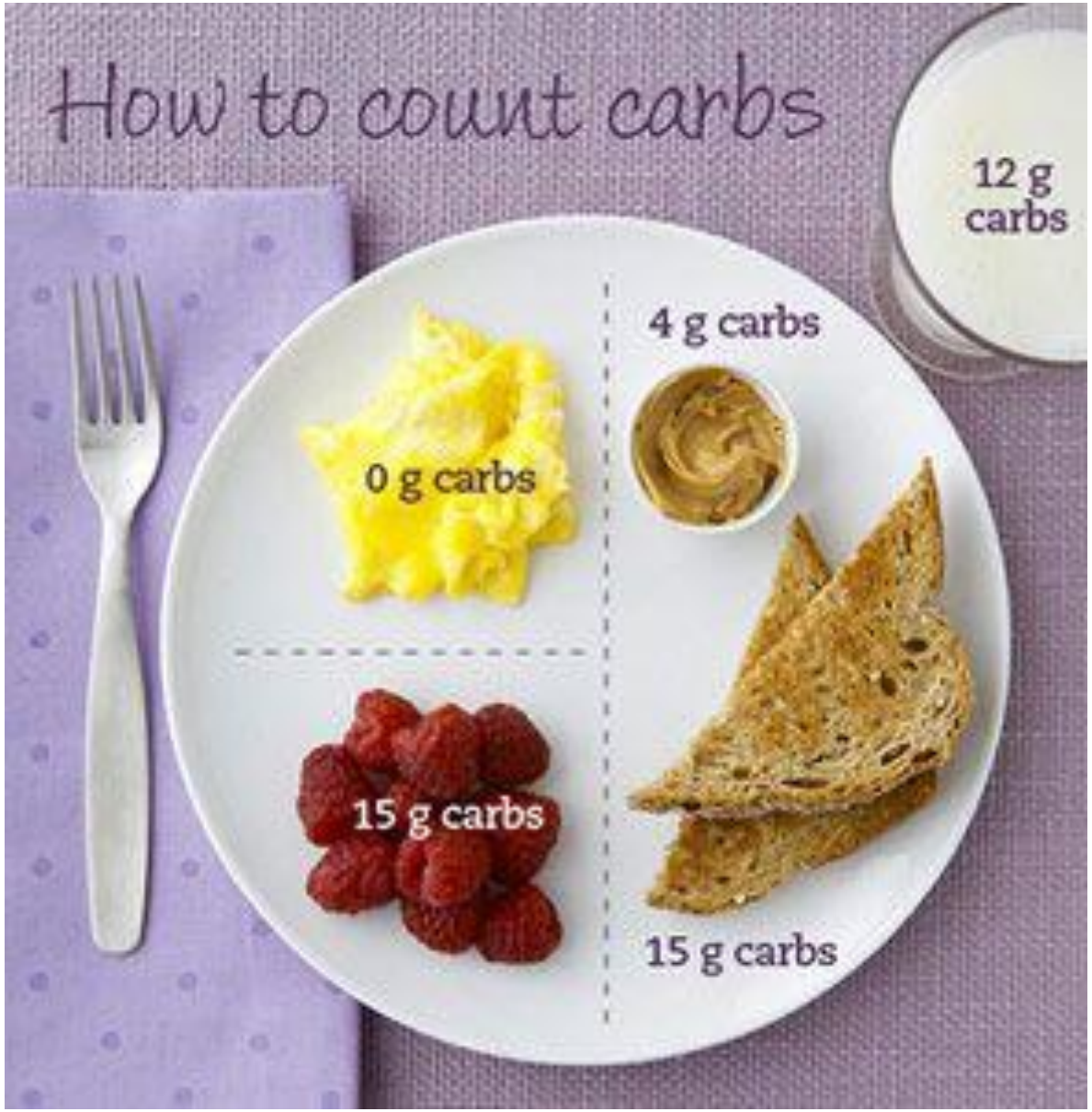
- Well controlled with basal bolus insulin therapy .
- Those using diabetes technology tools & otherwise healthy.
- Absence of previously mentioned factors in high risk group.

Nutrition

- During Ramadan, diet should be healthy & balanced diet.
- Avoid large amounts of foods rich in simple carbohydrate and fat, especially at the sunset meal, because of the delay in digestion and absorption.
- Ingestion of foods containing “complex” carbohydrates may be advisable at the Suhoor meal, which should be eaten as late as possible before “Fajer Azan”.
- Fluid intake be increased during non fasting hours.

CARBOHYDRATE COUNTING

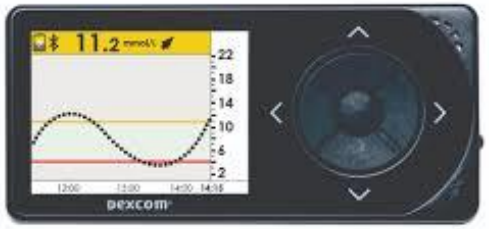
- It is essential to be good in carbohydrate counting in order to avoid under or over dose.
- Dieticians are experts in calculating most of Ramadan items.
- Always need to consult dietician prior and during fasting.
- Carbohydrates tend to be the largest factor accounting for changes in blood glucose during night hours after breaking the fast.



Exercise

- Normal physical activity may be maintained at night.
- Excessive physical activity may lead to higher risk of hypoglycemia and should be avoided.
- Taraweeh prayers should be considered part of the daily exercise program.

Frequent self monitoring (SMBG Vs CGMS)



Frequent self monitoring (SMBG Vs CGMS) is essential for safe fasting !!

- Some patients with diabetes may think that checking their blood glucose during fasting hours breaks the fast, but that’s not the case!
- In fact, recommendations for checking it more often than usual during fasting so you can make sure you stay within a reasonable level.
- “Regularly monitoring blood glucose during fasting is key to avoiding health emergencies”.
- Although hypoglycemia is a greater concern while fasting, still hyperglycemia or DKA, could happen.
- Patients who use continuous glucose monitoring device are able to check their blood glucose more often, leading to less chance of out-of-control numbers.

Frequent self monitoring (SMBG Vs CGMS) is essential for safe fasting !!

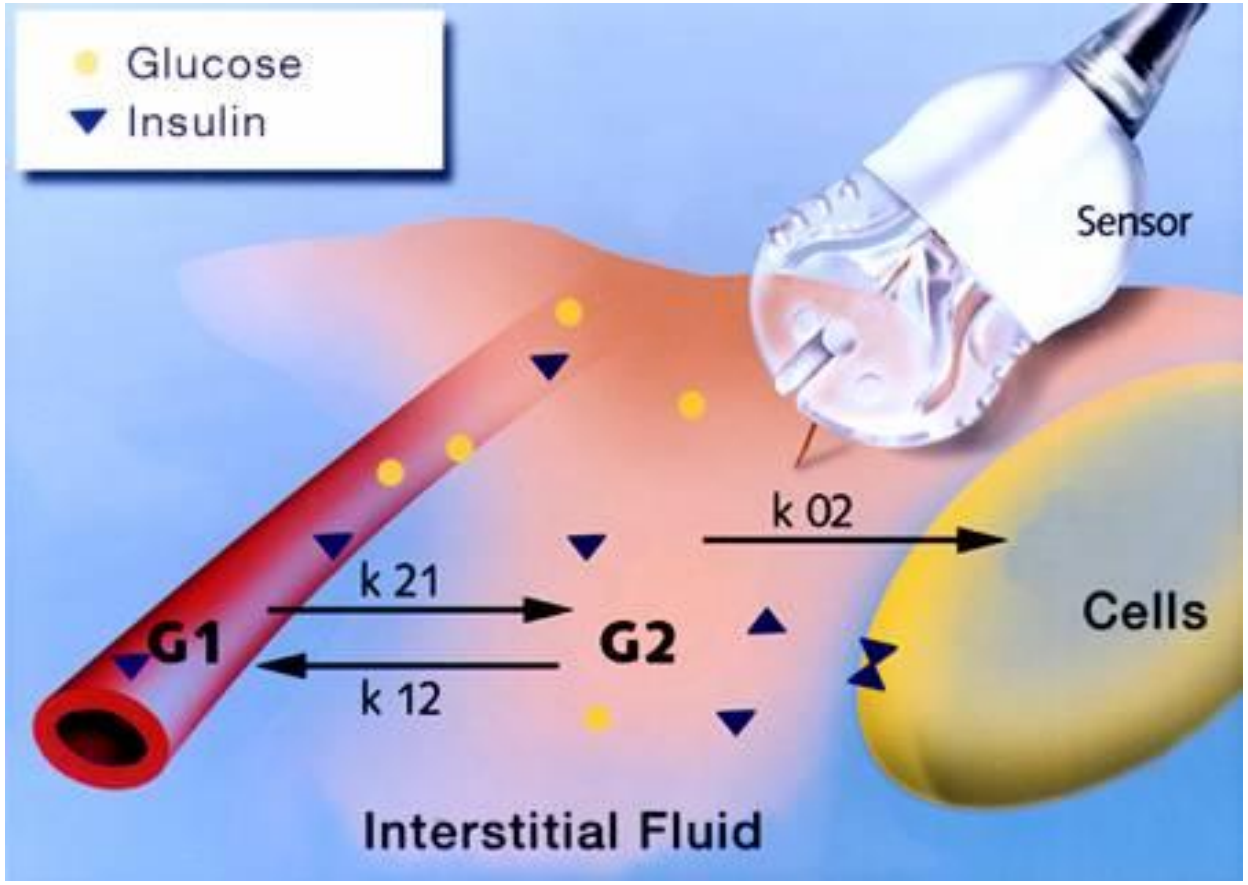
- CGMS / FGMS is superior to SMBG.
  - Lows & Highs alarms and continuous monitoring of glucose reading will prevent most of fasting – related diabetes complications.
  - Widely available world –wide.
  - Will help most of patients on insulin to have safe – fasting.
- Those on SMBG the following is recommended for safe – fast:
  - At the last two hours prior to sunset.
  - 2-3 hours post Iftar “breaking the fast”.
  - 2-3 hours post suhoor “pre-dawn meal”.
  - Every 2 -3 hours during the fast for those on Insulin.
  - Any time the patient feels there is possibility of hypoglycemia.

Diabetes Technology has A huge impact to help IDDM patients to normalize their life style !!

Non- invasive Glucose Monitoring

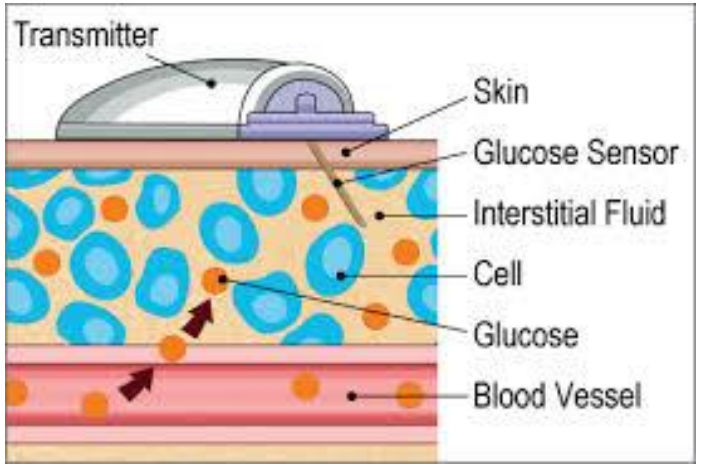
- Non invasive sensors ,use a plastic needle containing a sensor inserted into the subcutaneous.
- Enzymatic sensors using Glucose Oxidase are the currently used sensing systems.
- Various types/ various companies
- They are replaced every 7-10 days.
- FGMS (free style – Libre) by Abbott , not continuous but has advantages of 14 days sensor and no calibration, with cheapest price among all other non invasive sensors.

Interstitial Fluid Glucose Measurement



Interstitial fluid glucose (G2) is almost always comparable with blood glucose (G1)

Availability of various CGMS



Abbott Freestyle Navigator®

CGMS technology & safe fasting Ramadan ?

- Non invasive technology could provide consequence better glycemic control by continuous observation of glucose reading by participants and parents.

- Non invasive technology could help diabetic patients to fast in a safer manner, as it has the capability to show changes in glucose levels at any time throughout the day and night.

Flash glucose monitoring system may benefit children and adolescents with type 1 diabetes during fasting at Ramadan

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Flash glucose monitoring system may benefit children and adolescents with type 1 diabetes during fasting at Ramadan

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ABSTRACT

الأهداف: ملاحظة وتقييم فوائد استخدام جهاز قياس السكر المنتظم فري ستايل لبري (FGMS) للاطفال واليافعين المصابين بالنوع الأول من مرض السكري أثناء صيام شهر رمضان المبارك.

الطريقة: هذه دراسة وصفية تشمل 51 مشارك يزورون عيادة السكري للاطفال في مستشفى جامعة الملك عبد العزيز بجدة، المملكة العربية السعودية في الفترة الممتده من 5 يونيو وحتى 6 يوليو 2016. تم تعريف نقص السكر في الدم كقيم الجلوكوز أقل من 70 ملغ / ديسيلتر، بينما ارتفاع السكر في الدم كقيم الجلوكوز اكثر من 150 ملغ/دل لجميع المشاركين على أساس بروتوكول معهدنا.

النتائج: تمكن المشاركون في البحث من صيام مايقارب 67.0% من المجموع الافتراضي لايام الصيام المسجلة خلال هذه الدراسة مقابل مايقارب 33% من أيام الافطار وكان ذلك إما بسبب انخفاض مستوى السكر (15.4%) أو اسباب اخرى لا علاقة لها بمرض السكري (17.6 %). لم تتواجد اي حالة خطيرة تصاحب شدة الانخفاض. متوسط حالات ارتفاع نسبة السكر (1.29) في أوقات الصيام يعتبر اكثر حدوثاً بالمقارنة مع متوسط الانخفاض أوقاته (0.7) كما لم يلاحظ وجود أي حالات لمرض الحماض السكري الكيتوني خلال فترة الدراسة. في الختام متوسط التحليل التراكمي للسكر قبيل حلول الشهر الكريم بالمقارنة مع متوسطه بعده 8.16% ± 1.64 إلى 8.2 % ± 1.63).

الخاتمة: ساعد استخدام جهاز قياس السكر المنتظم للاطفال واليافعين المصابين بالنوع الاول من السكري في تحقيق رغبتهم لصيام الشهر الفضيل دون حدوث أي مضاعفات قد تضر صحتهم اضافة إلى التعليم النوعي وتنظيم مستوى السكر قبيل رمضان إلى جهاز قياس السكر المنتظم يؤدي إلى نتائج افضل.

Objectives: To assess the benefit of using the flash glucose monitoring system (FGMS) in children and adolescents with type 1 diabetes mellitus (T1DM) during Ramadan fasting.

Methods: A prospective pilot study of 51 participants visited the pediatric diabetes clinic at King Abdulaziz University Hospital, Jeddah, Kingdom of Saudi Arabia from between June until and July 2016. The FreeStyle® Libre™ FGMS (Abbott Diabetes Care, Alameda, CA, USA) was used. Hypoglycemia was defined as glucose values of less than 70 mg/dL, while hyperglycemia as glucose values of more than 150 mg/dL for all participants based on our institute's protocol.

Results: Participants were able to fast for 67.0% of the total days eligible for fasting, whereas they did not fast on 33% of the days due to either hypoglycemia (15.4%) or non-diabetes-related reasons (17.6 %). None of the participants developed severe hypoglycemia. The mean number of hyperglycemic episodes during fasting hours was 1.29, per day, which was higher than that of hypoglycemic episodes (0.7). None of the participants developed diabetic ketoacidosis (DKA). Glycemic control with mean of estimated hemoglobin A1C reading during Ramadan (8.16 ± 1.64% [pre study]) to 8.2 ± 1.63% [post study] p=0.932.

Conclusions: Children and adolescents with T1DM who use the FGMS could fast without the risk of life-threatening episodes of severe hypoglycemia (namely seizure, coma), or DKA during Ramadan. Adequate education and good glycemic control prior to Ramadan are important strategies in combination with the use of an FGMS to achieve better outcome.

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OBJECTIVE:

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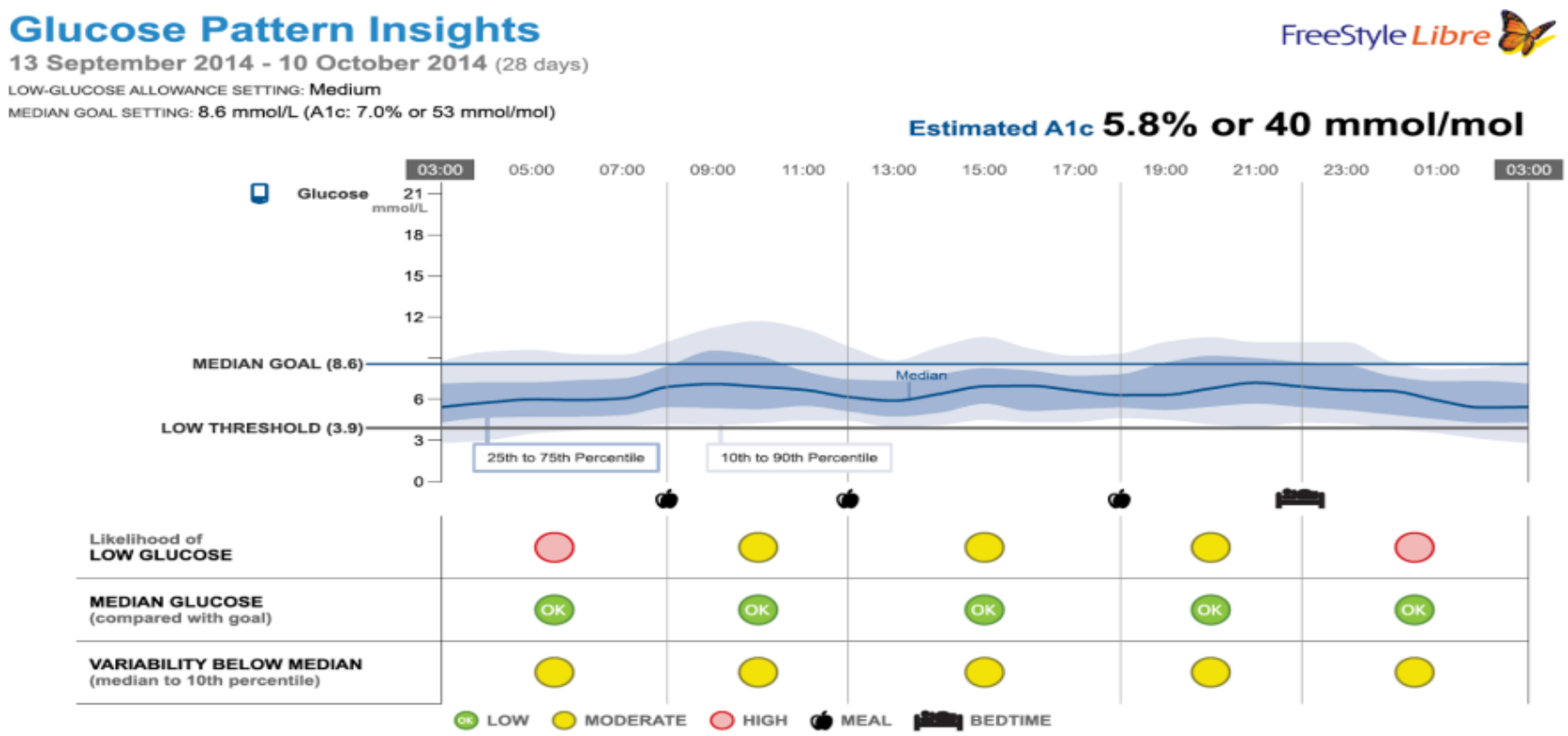

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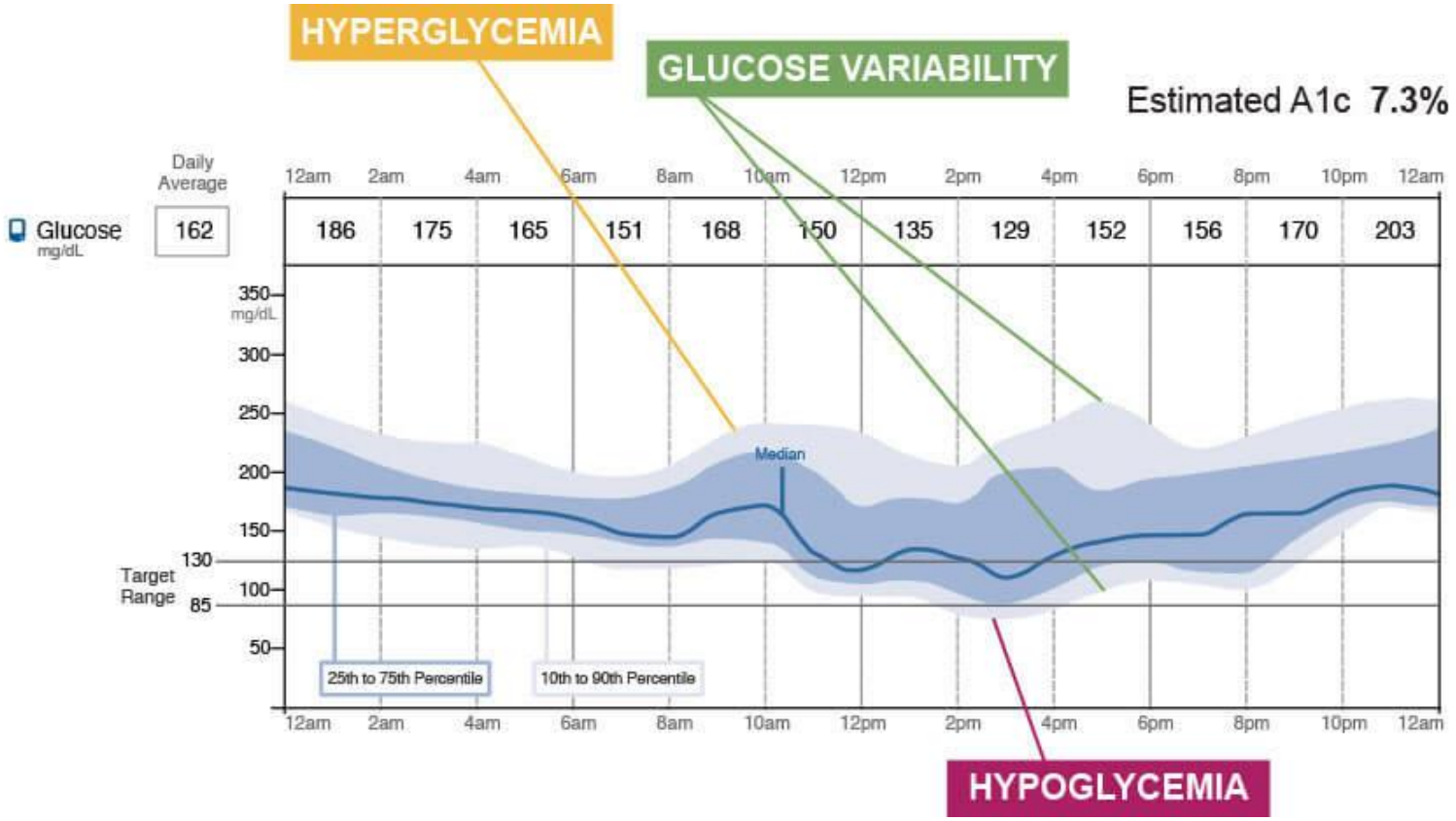
Glucose readings the day representing its variability among the accepted target range :



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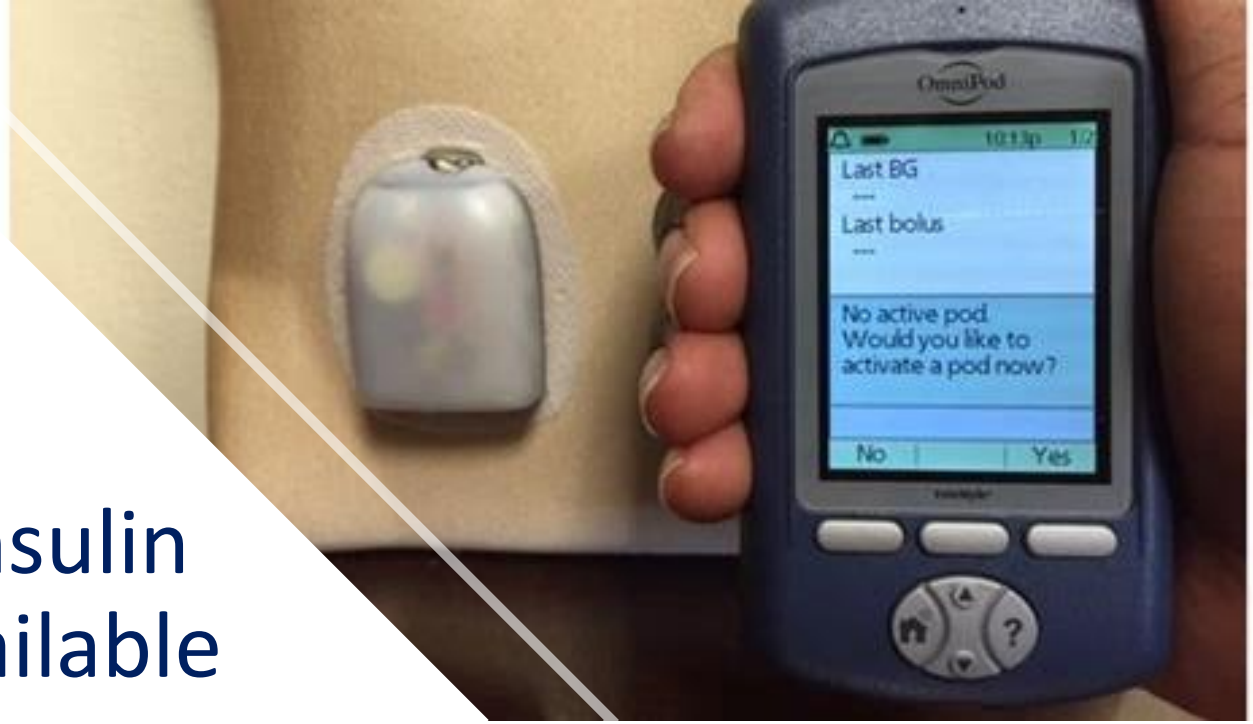
- None of the participants developed severe hypoglycemia.
- The mean number of hyperglycemic episodes during fasting hours was 1.29, per day, which was higher than that of hypoglycemic episodes (0.7).
- None of the participants developed diabetic ketoacidosis (DKA).
- The Glycemic control with mean of estimated hemoglobin A1C reading during Ramadan (8.16 ± 1.64% [pre study]) to 8.2 ± 1.63% [post study]

Insulin Pump Technology & Ramadan

Various insulin pumps available



‘SMARTGUARD™ TECHNOLOGY PROVIDES ADVANCED PROTECTION AGAINST HYPOGLYCEMIA (AUTO SUSPENSION & AUTO-RESUME OF INSULIN)

Bionic Pancreas
Dual Chamber pump (Glucagon and Insulin Reservoir)

http://sites.bu.edu/bionicpancreas/about-us/the-bionic-pancreas-ilet/

Medtronic's 670G

- "hybrid-closed loop" system with Enlite 3 CGM sensor
- Software automatically increases/decreases insulin delivery to target a blood glucose of 120 mg/dl
- Auto-basal mode.
- Notify - exercise

Basal – Bolus insulin therapy as alternative method for diabetes management during fasting

- Basal-bolus regimen is the preferred protocol for management
  - safer, with fewer episodes of hyper-and hypoglycemia.
- It is unlikely that other regimens, including one or two injections of intermediate-,long-acting, or premixed insulin, would provide adequate insulin therapy.
- Dose adjustment is essential for months of fasting.
- Individualized different regimen, depending on age& life style.
- In general basal insulin (once daily dose) will be reduced by 15-30 % to avoid hypoglycemia during fasting.
- It is a must to make late suhoor or pre –dawn meal.

Basal – Bolus insulin therapy as alternative method for diabetes management during fasting

- Bolus doses will depend on carbohydrate counting much better than fixed boluses.
- Number of Bolus insulin will depend on number of meals.
- Suhoor dose will be lowest CHO: insulin ratio by 20 - 40 % than breakfast dose or after Taraweeh meal dose.
- During the day, correction dose should be given if blood glucose readings exceed 250 mg/dl to prevent formation of ketones or they should break their fast.
- For patients who use insulin pumps, basal rates should be reduced to prevent hypoglycemia; other aspects of the insulin regimen, such as correction boluses, should remain the same.
- Typical adjustment includes reduction of the basal rate by 20%-40% in the last 3-4 hours of fasting and then increasing the basal rate by 0%-30% after the sunset meal.

Summery

- Despite most of recommendations to not allow patients with type 1 diabetes to fast but individualization is the rule of thumb.
- Patients with uncontrolled diabetes face possible major metabolic risks including hypoglycemia, hyperglycemia with or without the risk of impending ketosis, dehydration, and thrombosis.
- The strategies to ensure safety of diabetics who are planning to fast include Ramadan-focused patient education, pre-Ramadan medical assessment, following a healthy diet and physical activity pattern,
- Physician-recommended modifications in medication protocol and therapeutic recommendations and checking blood glucose as and when required.
- Diabetes technology should be widely applied to most if not all patients with diabetes in order to have more safety to fast.

Thank you