Management of Diabetes during Fasting and Feasting in India

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Abstract
Fasting and feasting are integral part of many religions and cultures. As the amount of food and fluid intake are markedly altered during these phases, patients with diabetes are prone to higher risk of complications. Even though several guidelines for fasting and feasting are available; Indian specific recommendations are the need of the hour, because of the distinct dietary habits and the diet content (high carbohydrate) of Indians. To fill this void, the current guidelines have been developed by experts from India who extensively reviewed the literature, shared their practical knowledge and ultimately arrived at a consensus.

Introduction
Fasting and feasting are the common practices observed by people as a regimen for traditional or cultural reasons. People observe fasting or feasting depending on the religion and festival in context. Literature suggests that medically supervised fasting for 7–21 days is efficacious in treatment of several diseases however, erratic eating pattern and disrupted daily fasting and feasting cycle may have an impact on the progression of metabolic diseases in India.

The International Diabetes Federation (IDF) in their current report states that approximately 73 million people with diabetes are living in India. Data from multi-country studies, including India, report that around 79–94% of Muslims with type 2 diabetes mellitus (T2DM) undergo fasting during Ramadan for at least 15 days. It is evident that many people with diabetes observe fasting or feasting during various festivals in India, hence management of diabetes during these phases becomes extremely important. Importantly to the best of our knowledge there is no consensus statement available on the management of diabetes during fasting and feasting in Indian population. This consensus will highlight the evidence-based management strategies for control of diabetes and its associated complications during fasting and feasting in Indian population.

Methodology
An extensive systematic review of literature has been initiated in several search engines including PubMed, Google Scholar, and Cochrane library databases in order to find out the best possible evidence and quality studies for management of diabetes during fasting and feasting. In the process of literature search, various MeSH keywords including fasting, feasting, hypoglycaemia, hyperglycaemia, Ramadan, diabetes, etc. have been used. Existing guidelines, meta-analyses, systematic reviews, randomized controlled trials (RCTs), non-RCTs, and key articles related to diabetes management were reviewed.

Types of fasting
Hindu fasts and feasts
There are several types of fasting observed by the Hindu religion; for example women observe day-long fast during annual Karva Chauth and Guru Purnima to pray for long life for their husbands, monthly fasts during Ekalashi, Purnima, and Pradosha, and longer fasts during the Navratras (9 days) twice a year etc. Moreover, fasting may be “nirahara” – without food; “phalahara” – where fruit and milk are allowed and “alpahara” – when broken rice and the likes are allowed. Alike fasting, feasting is also marked by the Hindu religion where during various festivals including Diwali, Pongal, Dussehra, Holi etc.; people consume high amount of carbohydrates from sweets prepared from sugar, jaggery, rice flour and ghee.

Islamic fasts and feasts
Islamic fast, also known as Sawn, is abstaining from eating and drinking during daylight hours. During Ramadan, all Muslims desist from both eating and drinking from dawn to sunset and refrain from smoking, taking oral medications, and sexual activities. Followers consume a high calorie food at iftar (evening meal after breaking the fast), and at suhur (meal consumed early in the morning). Similarly, during Eid-ul-Fitr, the festival of breaking the fast after Ramadan, Muslims celebrate with eating and drinking.

Jain fasts and feasts
Jain people do fast at special times during festivals and on holy days. In Jainism, “Paryushan” is the most observed festival during monsoon, which lasts eight days in Svetambara Jains and ten days in Digambar Jains.
Table 1: Risk Stratification of patients with diabetes during fasting

<table>
<thead>
<tr>
<th>Very high risk</th>
<th>High risk</th>
<th>Moderate risk</th>
<th>Low risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>o Severe hypoglycemia / ketoacidosis / hyperosmolar hyperglycaemic coma within last 3 months prior to Ramadan</td>
<td>o Moderate hypoglycemia (Average blood glucose 150-300mg/dL)</td>
<td>o Well controlled patients (HbA1c &lt;7.5%) treated with short-acting insulin secretagogues and modern sulphonylureas</td>
<td>o Well controlled patients (HbA1c &lt;7%) treated with diet alone, metformin, or a thiazolidinedione who are otherwise healthy</td>
</tr>
<tr>
<td>o History of recurrent hypoglycemia</td>
<td>o Renal insufficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Hypoglycemia unawareness</td>
<td>o People living alone that are treated with multiple insulin injections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Sustained poor glycemic control</td>
<td>o Old age with ill health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Patients on dialysis</td>
<td>o Patients with macro and microvascular complications that present additional risk factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Patients who perform intense physical labor</td>
<td>o Well controlled patients (HbA1c &lt;7%) treated with diet alone, metformin, or a thiazolidinedione who are otherwise healthy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Acute illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Gestational diabetes mellitus treated with insulin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Type 1 diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Patients with the following conditions should refrain from fasting:
- Pregnant and lactating women;
- Type 1 diabetes;
- Acute peptic ulcer;
- Cancer;
- Severe bronchial asthma, pulmonary tuberculosis;
- Overt cardiovascular diseases- recent MI, sustained angina;
- Hepatic dysfunction

Adapted from: South Asian Consensus Guideline, ADA 2005, IDF 2016, and IGDR 2015

Fig. 1: Factors responsible for the development of diabetes associated complications during fasting

Fig. 2: List of complications associated with diabetes along with their symptoms

Furthermore, Digambar Jains do not take food and/or water (boiled) more than once in a day, and Shwetambar Jains take only boiled water during their fast days. In addition, most Jains observe “Ratri Bhojan Tyag,” where they abstain from food and water after sunset. During Diwali, New Year day, Mahavir Jayanti, and other festivals they offer Prasad made from ghee, sugar, jaggery, and mark their feasting.

Buddhist fasts and feasts

Many people follow Buddhism in China and India. Vassa or Buddhist Lent is the fast and feast observed by Buddhists for three lunar months every year in the rainy season. During this time they follow fast for 12 hour period (from noon to midnight) and a feast for 12 hours period (from midnight to noon).

Fasts and feasts in other religions

Apart from discussed religions, India is the home for several other religious people including Christians, Sikhs, Parsis etc. They also celebrate various festivals and observe fasting and feasting. Literature advocates that Greek Orthodox Christians undergo fast for a total of 180 to 200 days in each year. Nativity Fast (40 days before Christmas), Lent (48 days before Easter), and the Assumption (15 days in August) are the main fasting periods.

However, Parsis don’t have fasts on their calendar but, have feasts and most of their diet is rich in non-vegetarian food.

Diabetes, fasting and feasting

Risk population

It is important to stratify patients into different risk categories according to their comorbid status, continued medication, health status etc. (Table 1, Figure 1).

Challenges

- Hypoglycaemia, hypoglycaemia, dehydration, diabetic ketoacidosis (DKA), microvascular and macrovascular problems may create challenges,
- Taking insulin and other OADs without any dose adjustment during fasting period increases the risk of complications,
- In spite of ill health, some people do fast
- During fasting, alteration of physical and mental health, especially in elder and comorbid patients with diabetes, places them at great risk of complications,
- Due to irregular food habit some patients may miss their usual medication dose
- Poor monitoring of diabetes complications, and blood sugar, specifically in rural areas pose a significant risk.
The South Asian Consensus Guideline on insulin use during Ramadan advocates that once-or-twice daily injections of intermediate or long-acting insulin along with pre-meal rapid-acting insulin can be safely used in patients during fasting. This group of patients should be made aware of the associated potential risks and be monitored closely.

Management of T2DM

Non-pharmacological management

Fasting is considered as an element of lifestyle modification (LSM), and LSM itself is a management strategy for T2DM patients. Physical activity and Yoga can be performed to lose body weight and to control the emotions; however, excessive and aggressive physical activity should be avoided during prolonged fasting periods.

Nutrition plan

A food-plate comprising all foods for diabetes individuals during fasting is depicted in Figure 4. The pre-fast meal should be composed of complex carbohydrates with low glycaemic index and proteins such that it can provide enough “slow-release” calories to take care of the fasting period; unprocessed cereals, fruits, nuts, and lentils can be used in the pre-fast meals. In contrast, post-fast meal should be composed of simple carbohydrates like bread, cereals, rice,
Mango, pasta, and artificial syrups. Adequate water and fluids must be taken prior to the fast especially in cases where fluid intake will be restricted throughout the day.

**Pharmacological management**

The details of dose adjustment of medications are provided in Table 3.

**Metformin**

Metformin can be safely used during fasting periods due to minimal chances of hypoglycaemia. However, patients who are taking metformin during lunch time should omit the dose during day fasting; morning dose can be taken as usual but, a larger dose should be taken after breaking the fast to avoid hyperglycaemia.

**Sulfonylureas**

Sulfonylureas (SUs), are widely used after metformin in patients with T2DM in India. The main concern with their use is hypoglycaemia and this might be due to their glucose-independent insulin secretory action. However, this is not the class effect and differs with agents due to variations in their individual pharmacokinetic and pharmacodynamic properties.

Glibenclamide, gliclazide, glipizide, and glimepiride are the various SUs used in India for the management of T2DM. Evidence advocates that gliclazide, among all the SUs, is associated with good glycaemic control with lesser hypoglycaemia. This might be due to its lesser pancreatic overstimulation action and restoration of the early insulin peak in response to glucose stimulation and higher reversibility of binding with receptors present in beta-cell. Moreover, a meta-analysis of RCTs did not find any significant difference in the incidence of symptomatic hypoglycaemic events between DPP-4 inhibitor and gliclazide (5.6% versus 7.2%, risk ratio 1.12, 95% CI 0.73-1.73, p=0.61) in patients during fasting. A systematic review and network meta-analysis of RCTs reports that gliclazide compared to other SUs is associated with lower risk of all-cause and cardiovascular-related mortality in patients with T2DM (Table 4). Thus, gliclazide pertaining to its efficacy in glycaemic control, lower risk of hypoglycaemia, less risk of CV complication and death, along with lower cost might be an suitable alternative and can be used in the diet.

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**Fig. 3:** Patient flow chart for assessment, risk stratification, education and physician decision before prolonged fasting

**Fig. 4:** The nutrition plan (food plate) for patients with diabetes during the fasting period. The plate demonstrates the individual daily caloric intake, percentage of carbohydrate, fat and proteins that can meet the cultural setting and food preference of each individual.

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*Adapted from: Hassenein M, 2017

*Adapted from: Sadikot S, 2017*
### Table 3: Approach to adjustment or modification of continued antidiabetic medications in patients with diabetes during fasting period (IDF 2016, Sadikot S 2017, Kalra S 2015, Jhiulka S 2017, and Latt TS & Kalra S 2012)

<table>
<thead>
<tr>
<th>Anti-diabetic agents</th>
<th>Muslim fast</th>
<th>Hindu fast</th>
<th>Jain fast</th>
<th>Low-risk</th>
<th>Buddhist fast</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ramadan</td>
<td>Karva chaith</td>
<td>Somvaar, Mangalvaar</td>
<td>Tiwihar upavas, Upavas, Bela (Chhath), Tela (Ashtham)</td>
<td>Byasana, Ekasana, Ratri Bhoojan Tyag (Vaasa)</td>
</tr>
<tr>
<td>Metformin</td>
<td>Once daily: take at iftar</td>
<td>Once daily: take at night</td>
<td>Once daily: take at night</td>
<td>Once daily: take at night</td>
<td>Once daily: take at night</td>
</tr>
<tr>
<td></td>
<td>Twice daily: take at iftar &amp; suhur</td>
<td>Twice daily: take at morning and night</td>
<td>Twice daily: take at morning and night</td>
<td>Twice daily: take at morning and night</td>
<td>Twice daily: take at morning</td>
</tr>
<tr>
<td></td>
<td>Thrice daily: take 2/3rd of the total daily dose at the iftar and 1/3rd at the suhur</td>
<td>Thrice daily: omit the lunch dose and follow above</td>
<td>Thrice daily: omit the morning dose and follow above</td>
<td>Omit the therapy on the day of fast</td>
<td>Omit the therapy on the day of fast</td>
</tr>
<tr>
<td>Sulfonylureas*</td>
<td>Once daily: take at iftar</td>
<td>Once daily: take at morning and night</td>
<td>Once daily: take at morning and night</td>
<td>Once daily: take at morning and night</td>
<td>Omit the therapy on the day of fast</td>
</tr>
<tr>
<td></td>
<td>Twice daily: take ½ of usual evening dose with the suhur and the usual morning dose with the iftar</td>
<td>Twice daily: omit the morning dose in absence of breakfast</td>
<td>Twice daily: omit the morning dose</td>
<td>Omit the therapy on the day of fast</td>
<td>No change required</td>
</tr>
<tr>
<td></td>
<td>No dose adjustments is required</td>
<td>No change, take at dinner</td>
<td>No change, take at dinner</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>No dose adjustments is required</td>
<td>No change, take at dinner</td>
<td>No change, take at dinner</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>No dose adjustment is required and the dose be taken with iftar</td>
<td>No change, take at dinner</td>
<td>No change, take at dinner</td>
<td>No change</td>
<td>Taken at night</td>
</tr>
<tr>
<td>SGLT-2 inhibitors†</td>
<td>The dose should be titrated 6 weeks prior to Ramadan and no dose adjustment is required</td>
<td>The dose should be titrated prior to Navratri</td>
<td>The dose should be titrated prior to Navratri</td>
<td>Omit the therapy on the day of fast</td>
<td>Evening dose avoided, or taken in half dose</td>
</tr>
<tr>
<td></td>
<td>No dose adjustments is required</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>Reduce the dose to 1/3rd of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>Omit the therapy on the day of fast</td>
<td>No change</td>
</tr>
<tr>
<td>Pioglitazone</td>
<td>No dose adjustments is required</td>
<td>Reduce the dose</td>
<td>Reduce the dose</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>No dose adjustments is required</td>
<td>No change, or 2/3rd take at dinner</td>
<td>No change, or 2/3rd take at dinner</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>AGIs</td>
<td>No dose adjustments is required</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>GLP-1 analogues</td>
<td>The dose should be titrated 6 weeks prior to Ramadan and no dose adjustment is required</td>
<td>The dose should be titrated prior to Navratri</td>
<td>The dose should be titrated prior to Navratri</td>
<td>Once weekly: Dose: No change (postpone due dose till the completion of fasting)</td>
<td>No change</td>
</tr>
<tr>
<td></td>
<td>Need no change or may reduce the dose to 2/3rd</td>
<td>No change</td>
<td>No change</td>
<td>Omit the therapy on the day of fast</td>
<td>No change</td>
</tr>
<tr>
<td>Long-acting insulin</td>
<td>Once-daily: 1 dose by 15–30% and take at iftar</td>
<td>Need no change or may reduce the dose to 2/3rd</td>
<td>Need no change or may reduce the dose to 2/3rd</td>
<td>25% reduction in dose</td>
<td>10-20% reduction in dose</td>
</tr>
<tr>
<td></td>
<td>Twice daily: Take usual morning dose at iftar &amp; i evening dose by 50% and take at suhur</td>
<td>Need no change or may reduce the dose to 2/3rd</td>
<td>Need no change or may reduce the dose to 2/3rd</td>
<td>1 bolus</td>
<td>2 bolus</td>
</tr>
<tr>
<td></td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>1 bolus</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
</tr>
<tr>
<td>Short-acting insulin</td>
<td>Take normal dose at iftar and lunch dose at dinner</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>1 bolus</td>
<td>2 bolus</td>
</tr>
<tr>
<td></td>
<td>suhur dose by 50%</td>
<td>30:70 or 25:75; reduce the dose to 2/3rd</td>
<td>30:70 or 25:75; reduce the dose to 2/3rd</td>
<td>1 bolus</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
</tr>
<tr>
<td></td>
<td>Omit the afternoon dose and adjust iftar and suhur doses</td>
<td>50:50; reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>50:50; reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
<td>2 bolus</td>
<td>Reduce the dose to 1/2 of the total daily dose at iftar and 1/3 of the total daily dose at suhur</td>
</tr>
<tr>
<td>Premixed insulin</td>
<td>30:70 or 25:75; reduce the dose to 2/3rd; prefer the dose at 30:70 or 25:75</td>
<td>30:70 or 25:75; reduce the dose to 2/3rd; prefer the dose at 30:70 or 25:75</td>
<td>30:70 or 25:75; reduce the dose to 2/3rd; prefer the dose at 30:70 or 25:75</td>
<td>30:70 at night or 50:50 at day</td>
<td>50:50 once daily</td>
</tr>
<tr>
<td></td>
<td>Omit the therapy on the day of fast</td>
<td>Omit the therapy on the day of fast</td>
<td>Omit the therapy on the day of fast</td>
<td>Omit the therapy on the day of fast</td>
<td>Can be given once daily, before the main meal of the 24 hour period</td>
</tr>
</tbody>
</table>

AGIs, alpha-glucosidase inhibitors; DPP-4, dipeptidyl peptidase-4; SGLT-2, sodium-glucose co-transporter-2; *Gliclazide and glibenpiride should be preferred among all other sulphonylureas † Elderly patients, patients with renal impairment, hypotensive individuals, those at risk of dehydration or those taking diuretics should not be treated with SGLT2 inhibitors.

safely during fasting periods in Indian patients. Moreover, glibenclamide should be avoided and other SUs can be used with caution during the fasting period. They can be safely used during fasting period due to the reduced risk of hypoglycaemia, as they work by increasing insulin secretion in a glucose-dependent manner. However,
Table 4: Studies investigating efficacy and safety of antidiabetic agents during fasting

<table>
<thead>
<tr>
<th>Author et al.</th>
<th>N</th>
<th>Intervention</th>
<th>Outcomes/conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Randomized clinical trials</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azar S T et al. 2016</td>
<td>343</td>
<td>Liraglutide vs sulphonylureas (gliclazide, glimepiride, glipizide, glibenclamide): outcomes</td>
<td>• Similar i in fructosamine levels were observed for both groups during Ramadan: (liraglutide, −12.8 μmol/L; sulphonylurea, −16.4 μmol/L; p = 0.43)</td>
</tr>
<tr>
<td>Hassanein M 2014</td>
<td>557</td>
<td>Vildagliptin (A) vs gliclazide (B) + metformin/Hypoglycemic events</td>
<td>• Confirmed hypoglycemia (A vs B): 3.0% vs 7.0%(p =0.039)</td>
</tr>
<tr>
<td>Malha LP 2014</td>
<td>69</td>
<td>Vildagliptin vs sulphonylureas (Glimepiride/ gliclazide): hypoglycemia event</td>
<td>• Adjusted mean change pre- to post-Ramadan in HbA1c (A vs B): 0.05%±0.04% vs −0.03%±0.04% (p =0.165).</td>
</tr>
<tr>
<td>Al Sifri S 2011</td>
<td>1066</td>
<td>Sitagliptin vs sulphonylureas (gliclazide/ glimepiride/ glibenclamide): overall incidence of symptomatic hypoglycaemia</td>
<td>• Risk of symptomatic hypoglycaemia: Sitagliptin, 6.7%; glimepiride, 6.6%; glibenclamide, 12.4%; gliclazide, 19.7%</td>
</tr>
<tr>
<td><strong>Observational studies</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shete A et al. 2013</td>
<td>97</td>
<td>Vildagliptin vs sulphonylureas (Glimepiride/ gliclazide/ glibenclamide/ glipizide)</td>
<td>• Symptomatic hypoglycaemia drug wise: glibenclamide, 25.6%; glimepiride, 16.8%; gliclazide, 14.0%</td>
</tr>
<tr>
<td>Aravind SR 2012</td>
<td>1378</td>
<td>Glimepiride/ gliclazide/ glibenclamide s metformin: overall incidence of symptomatic hypoglycaemia</td>
<td>• Symptomatic hypoglycaemia country wise: Israel, 40%; Malaysia, 24%; UAE, 18%; India, 13%;Saudi Arabia, 10%</td>
</tr>
<tr>
<td>Zargar AH 2010</td>
<td>136</td>
<td>Gliclazide MR 60 mg monotherapy, switched to evening administration of the same dose during Ramadan</td>
<td>• Mean FPG by 0.01 mmol/l (p = 0.3) with evening medication by the end of the fast.</td>
</tr>
<tr>
<td>Sari et al, 2004</td>
<td>40</td>
<td>Repaglinide vs sulphonylureas (glimepiride &amp; gliclazide): outcomes</td>
<td>• Only 1 hypoglycemic event reported in glimepiride patient</td>
</tr>
</tbody>
</table>

1, decrease/reduction; ↑, increase/elevated; BL, baseline; FPG, fasting plasma glucose; HbA1c, glycated haemoglobin; HDL, high density lipoprotein; UAE, United Arab Emirates

Table 4: Studies investigating efficacy and safety of antidiabetic agents during fasting

precautions should be taken when they are used in combination with SUs. Vildagliptin and sitagliptin are the mostly used DPP-4 inhibitors in the studies during the fasting period (Table 4). Al Sifri et al. compared the substitution of sitagliptin with SU with continuation of SUs during the Ramadan fasting and found that sitagliptin is associated with less hypoglycaemic episodes compared to SUs but similar hypoglycaemic episodes as gliclazide. The STEADFAST study compared vildagliptin and gliclazide treatment during Ramadan period and did not find any significant difference between two treatments in terms of hypoglycaemic episodes. The observational studies such as VECTOR, VERDI, and VIRTUE also reported higher efficacy and safety of vildagliptin during fasting period; however, gliclazide having similar efficacy and safety as vildagliptin might stand as an alternative option for Indian patients due to its lower cost.

**SGLT2 inhibitors**

They can be safely used in the treatment of T2DM during fasting due to low risk of hypoglycaemia; however, fasting for long period without taking fluids may aggravate risk of hypotension and dehydration associated with these agents. Their usage should be restricted in patients at high risk of complications including elderly patients, patients with renal impairment, hypotensive individuals, and those at risk of dehydration or taking diuretics. Thiazolidinedione

Thiazolidinedione (pioglitazone) may be used during fasting period due to the low risk of hypoglycaemia; however, weight gain is a concern in overweight and obese patients when it is used during fasting. Alpha-glucosidase inhibitors

There are no RCTs available.
which studied the outcomes of alpha-glucosidase inhibitors (AGIs) during the fasting period. Acarbose, miglitol, and voglibose can be safely used without any dose adjustment during the fasting period. However, ineffectiveness as monotherapy and concerns regarding the GI side effects reduces their applicability in T2DM patients during the fasting period. Glucagon-like peptide-1 receptor agonists

Liraglutide, exenatide, albiglutide, lixisenatide, and dulaglutide constitute the family of glucagon-like peptide (GLP)-1 receptor agonists. The important association associated with these agents is weight loss and low risk of hypoglycaemia; thus, they are chosen over other agents especially in overweight and obese patients during the fasting period. Several trials (Table 4) have been published including the Treat 4 Ramadan trial and LIRA-Ramadan trial that investigated the efficacy and safety of liraglutide during fasting period, and did not found any significant difference between liraglutide and SU concluded that both agents can be safely used during fasting. GI upset was common with the usage of liraglutide. Furthermore, some patients don’t prefer these injectable agents due to their religious views.

Insulins

Many T2DM patients use insulin as a treatment option however the higher risk of hypoglycaemia and multiple injections reduces its usage in T2DM patients especially during the fasting period. Insulin analogues (basal, prandial and premix) are generally recommended over regular insulin preparations during the fasting period. Elderly patients, who wish to fast for a prolonged period, are at increased risk of hypoglycaemia, hyperglycaemia and metabolic decompensation including hyperosmolar coma, DKA, dehydration and thrombosis. It is mandatory to examine the functional capacity, cognition, mental health, and comorbidities in elderly people with diabetes during the pre-fast period in order to reduce the complications. Moreover, SGLT-2 inhibitors should not be used in this group of patients due to the risk of dehydration and volume contraction.

Conclusion

The panel concludes that appropriate lifestyle modifications including physical activity, nutrition plan, pre-fast counselling and structured diabetes education plan along with proper treatment dose adjustment or modification are important to ensure a safe fasting or feasting period. Patients who are using insulin should be widely used in Indian population during the fasting period. Moreover, owing to its low cost, gliclazide can be used during fasting because of their weight loss effect and low risk of hypoglycaemia, however, high cost, GI side effects, and injectable nature reduces their applicability, especially during fasting.

Insulin requires dose modification during the fasting period. Patients who are using insulin should be strictly monitored for hypoglycaemic complications.

References


Executive summary

- A structured diabetes education should be planned for patients with diabetes along with their family members in order to observe a safe fasting.
- Patient with diabetes should break their fast if the blood glucose level is <70 mg/dL (3.9 mmol/L) or >300 mg/dL (16.7 mmol/L) when complications develop.
- Patients with stable T2DM can undergo fasting safely; however, their frequency and dose of medications need to be adjusted or modified.
- Metformin can be safely used during fasting, however, some dose modification might be required.
- Hypoglycaemia is the major concern associated with SUs. However, gliclazide in this class has lowest risk of hypoglycaemia and CV complications with higher glycaemic efficacy. Moreover, owing to its low cost, gliclazide can be widely used in Indian population during the fasting period.
- DPP-4 inhibitors like vildagliptin and sitagliptin can be used during fasting; however, higher cost might restrict their use in Indian population.
- The SGLT-2 inhibitors should be cautiously used in elderly and frail patients due to their volume contraction, infection and dehydration effects.
- Thiazolidinedione and alpha-glucosidase inhibitors can be safely used; however weight gain and GI upset are the respective complications that indicate treatment individualization.
- GLP-1 receptor analogues can be used safely during fasting because of their weight loss effect and low risk of hypoglycaemia, however, high cost, GI side effects, and injectable nature reduces their applicability, especially during fasting.
- Insulin requires dose modification during the fasting period. Patients who are using insulin should be strictly monitored for hypoglycaemic complications.


