

Travel Guidance for People with Diabetes; A Narrative Review

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Abstract

Diabetes is a disease which occurs by lack of insulin production or its inappropriate function. Patients with diabetes who take insulin suffer from high blood sugar and face unique challenges while travelling as their schedules for insulin dosage and blood sugar regulation change. Therefore they need to organize carefully how they have to travel, instruments they should take, the actions they must accomplish and vigilances they have to regard.

Patients with diabetes have to prepare a list consisting of the type and dosage of medications they should take and tools they must carry which their doctor advice. Although there are general advices for all patients with diabetes, every single one needs specific observations according to his/her physic and health level. Patients with diabetes must gather information about the destination and draw a whole image of their trip in order to take the stress out as much as possible. Meanwhile, they should take all kinds of vaccinations according to their destination at least four weeks before travelling. Special diets and physical actions have to be considered as well and patients must match the taking of insulin with the destination time and also mind the direction of traveling (north, south, west or east).

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Introduction

Diabetes is a disease which the sugar of blood in patients is high. It is caused by a lack of insulin production or its performance deficiency. Insulin as a hormone, induces conversion of carbohydrate based nutrients such as starch to energy. It hasn't been revealed why this disease occurs so far but it is assumed that genetic backgrounds and environmental factors such as obesity and immobility have an impressive role [1, 2]. According to the WHO report in 2014, the worldwide prevalence of diabetes among people over 18 years old is 9%. This report also indicated that over 1.5 million people have died in 2012 because of diabetes [3, 4].

As the importance of diabetes and the increscent of the number of people with diabetes, numerous articles are published each year in order to guide the patients in various situations [5]. One of the most studied topics of medicine in the past decades has been health in travel, specifically traveling guidance for patients with diabetes in order to decline their issues [6, 7]. Travelling is always accompanied by novel and various experiences and disturbance of daily lifestyle especially long distance travel. New circumstances could be stressful and anguish and could even get people into trouble [8, 9]. People with special diseases such as diabetes, impact unique challenges with determining dosages of insulin and blood sugar regulation during a travel hence they should plan and decide carefully about their travel, tools they should take, the actions they must do and all kinds of attentions that are vital for their disease [10, 11]. Disease is not a prevention to travel, it only needs more care so that patients can experience an enjoyable travel just like the other family members and reduce the probable risks and dangers by suitable organizations.

In 1993, Gill & Redmond published a collection of advices based on British diabetes clinic advices for patients with diabetes who intended to experience air travel. In this study,

London to New York flight was considered as a west destination travel and Manchester to Singapore was considered as an east destination travel. The success percentage of these advices for studied people was few (37%). For 6% of passengers were unhelpful and 14% suffered from hypoglycemia. Based on the results, the authors found just a few simple advices for controlling the sugar of blood to be more useful such as matching the insulin taking shifts with the time of flight and scheduling the meals before and after the flight [12].

Driessen et al. 1999, evaluated metabolism disorder, infection complications and general health issues in people with insulin-dependent diabetes mellitus (IDDM) who traveled to tropical areas. Among the studied people, 68% dealt with metabolism disorder and in 36% of the cases, blood sugar had increased. Also, 3 of the passengers faced feverish illness that caused disorders in blood sugar regulation and 5 of the patients afflicted from insulin dosage regulation issues because of unusual situations in tropical areas [13].

Other studies on diabetes and road travel [14], air travel [12, 15 and 16] and sailing [17] that had considered time and distance have been accomplished. All studies consist of functional advices for patients with diabetes and prevents dangerous circumstances during the travel.

General Advices for Patients with Diabetes

1-Patients that take insulin and pills must carry sugar measurement devise with them and either they are travelling or staying at home in holidays they should check their blood sugar regularly. This is because immobility or disorder in meals (overeating or anorexia) could change blood sugar levels.

2-If you want to travel, carry your identity card for your disease with yourself (a card which describes your diabetes, the type of it, what kind of therapy you take, and numbers that could be called in case of emergency.)

3- Stresses while trips cause difficult situations. For example hurrying up to get to the train, bus or airport or sitting for long periods of time, which could drop the blood sugar intensively. So you have to check your blood sugar regularly.

4- If you have diabetes and you intend to travel, you should get 2 letters from your physician. The first is for passengers who intend to travel to abroad. This letter is to notify security agents that you have diabetes in order to let you carry special tools for taking insulin such as syringes, vials and even insulin pills. Some security agents in some countries are sensitive to drugs and having this letter along with you would be necessary. The second letter includes information about the person's diabetes, medicinal allergies and other useful information to notify physicians. To make sure, get copies of the letters.

5- A patient who takes insulin has to carry insulin, syringe, lancet and blood sugar checking tests more than he/she needs normally. Meanwhile he/she would have a bag full of sugar, biscuits, water, lemon juice and some sandwiches in order to eat any minute the blood sugar dropped. Other medicines should be carried with patient more than common usage as well.

6- If you are going to travel, carry your medication in two different places. Your bag could be robbed and this might be either stressful or drop your blood sugar.

7- If you suffer from moving (you may have nausea or want to vomit in vehicles) you should ask your physician to give you anti-nausea pills. If you vomit, the water of your body would be wasted and you can't eat so your blood sugar would drop.

8- During your travel you would rather have a bag with carbohydrates with you. Remember that the schedule will not progress as you have planned, flights would have delayed, there might be traffic and ... so keep in your mind to eat regularly in order to not drink sweat juices.

9- When you are in plane or train there is no need to order special food for patients with diabetes and you can eat as other passengers do.

10- Looking after your feet is necessary. In order to prevent clotting in your feet during long distance travels, walk for a short time. If you are in airplane twist your ankles or stretch your feet. If you are travelling by car stop for a while and walk.

11- You have to prepare appropriate shoes already. Comfortable leather shoes with 3 cm heels are suggested. Check your feet with mirror every day.

12- You would not go to the beach with naked feet and should prevent your skin from sun burning and wounds.

13- Consult with your physician about travelling to foreign countries. If the time difference between your home city and the destination is not remarkable there wouldn't be a problem. This is while in trips to the long east such as China and Malaysia as the day time is shorter, you may need less insulin and pills and in trips to Europe as the days are longer you may need more meals and nutrients and take more insulin. Furthermore, learn some important English sentences such as "I have diabetes" and "give me sugar please". These sentences would be helpful in emergency circumstances.

14- You must know the principles of insulin maintenance. Insulin both in vials and pens could be kept in the room temperature for a month. In trips to temperate regions, there is no need to keep insulin in full iced flasks. You just need to

keep insulin away from direct sunlight (behind car or room windows). Insulin also should not be kept in bus or plane's loading section.

15- You must recognize decayed insulin. In this case clear insulin that is known as regular turns in to turbid and milky type known as NPH insulin turns in to granular that sticks to the vessel (glass) wall. If vial is exposed to sun light it would turn into brown and corrupt. You would rather keep insulin that you are not taking in the refrigerator and keep insulin that you take in room temperature and make sure it would be valid for a month [12, 13, 15, 17-22].

Tools That You Should Carry

Prepare good conditions for carrying medication and medical equipment in order to prevent damages.

The most essential items that a person with diabetes must carry are:

- Insulin or other consumable medicine
- Insulin injection syringe
- Blood sugar measuring devise and extra batteries
- Blood sampling lancet
- Blood sugar and urine checking test pad
- Glocumeter and its special blade
- Medical alcohol and handkerchief
- Sweat food such as sugar, biscuits and juices

In your destination, insulin might not be available so carry more insulin and syringe than you need during your stay [13, 14, 20, 23].

Insulin Storing

Storing drugs is very important. Insulin could be kept in the room temperature for a month so in travels to temperate regions there is no need to keep insulin in refrigerator. Just take care to keep insulin away from direct sunlight and freezing because very high and low temperatures damage insulin. In hot regions insulin must be kept in cool places such as refrigerator or full iced flasks. Remember to prevent direct contact between ice and insulin. You might use a wet napkin for this.

Keep the blood sugar pads in room temperature because those that are cold might give you false answers (may show that your blood sugar is lower than the actual level).

Advices for Along the Travel

One of the most important tasks that people with diabetes must do is to check their blood sugar level. As common habits change in travel, you should check your blood sugar level more times and decrease the time between the checks.

Physical actions could decrease your blood sugar and on the other hand stress, immobility and sitting for long periods of time could raise it. So you should check it frequently.

In very cold regions the uptake of insulin is slower and in very hot regions the uptake of insulin would be much faster. Both could drop your blood sugar so check it frequently.

Remember in cold weather you might shake and this needs energy that is provided by carbohydrates so it can drop your blood sugar [12-14, 17].

Nutrition

Plenty of food which consist of carbohydrates should be carried in a bag that could be accessible easily. Remember that travelling is not always going on as you have planned. You might get stuck in traffic or other probable difficulties that might happen in the road, and also the flights or trains could delay so the more food you carry the less problem you would face.

In most countries tea, coffee and water are available. Avoid drinking sweet juices as possible except when your blood

sugar is dropped.

While traveling by train or plane you could utilize ordinary food and there is no need to use diabetic diet as these kinds of foods include fewer carbohydrates. Also, don't overuse salty foods.

Fruits, vegetables, beans, bran and potato have plenty of fibers, it is suggested that you use them instead of high cholesterol foods such as egg and animal originated fats. Also, use sugar free drinks.

Bread with bran is better than usual bread.

If you intent to use the destination diet, you must consult with your doctor or your nutrition expert about the amount and the way of eating them.

Exposing to the sunlight raises your blood sugar and follows with dehydration, so use sugar free drinks [24, 25, 26].

Taking Care of Feet

Before getting in plane and train you would rather walk for a few minutes. Try to be sited in a comfortable and relaxed seat.

In order to prevent clotting in your legs during the travel walk for a few minutes and while sitting, twist your ankles and fingers, and also stretch your feet. All these will be helpful to circulate blood in your legs.

If no problems were observed and blood circulation is normal, you may just check your feet daily.

Avoid walking with naked feet and use slippers in the beaches and also wear swimming socks if you want to swim..

If you feel that something is wrong with your feet and some disorder occurs in your feet blood circulation, in addition to the above remember to:

Use humidifier cream if your skin is dry, especially on your heels.

If your feet sweat a lot, dry them with napkin or cotton. After swimming dry your feet as well, especially between your fingers. Check your feet for any kind of wounds, inflations or color changing.

If any problem is indicated call your doctor. Any blister and scratch should be cleaned, sterilized and dressed.

In cold areas if you feel numb or your feet blood circulation is disturbed watch out for freezing.

Be careful with sun burning and use sunscreen in order to keep your skin from wounding.

Travel to Hot Regions

During travels to hot regions insulin should be stored in refrigerator. In these areas take advantage of ice flasks or ice bags. You just need to prevent insulin from getting in touch with ice directly; using a wet cotton or napkin would be useful. If you don't have these tools just cover the insulin with a wet napkin. Remember in hot regions insulin could be kept for even 6 months but it might lose its efficiency. By checking your blood sugar regularly you can find out about insulin efficiency.

In these regions, the uptake of insulin would be much faster so this could drop your blood sugar. Check your blood sugar frequently and never stay in the sunlight for a long period of time. Reposing in the beach for long durations, raises your blood sugar and causes dehydration, so drink sugar free juices a lot. Do not forget to use sunscreen while heading out as well [15, 31, 32, 33].

Travel to Cold Regions

In very cold weather, the uptake of insulin is much slower and the consumed energy for body shaking in this situation drops blood sugar.

Keep blood sugar test pads in room temperature because they might falsely show your blood sugar lower than its real level [14, 15, 34].

Travel to Other Countries

By traveling to countries located in the north or south of Iran (Saudi Arabia) hopefully no problems will occur. But during trips to the east or west, the time of taking insulin or pills must vary because of time changing, except of those countries that their time changing is lower than 4 hours compared Iran [12, 15, 35].

Remember that in eastern counties as days are shorter you need fewer carbohydrates and insulin on the other hand in western countries as days are longer you need more carbohydrates and insulin. Quantities of meals that airlines serve during the travel are enough but carry some snacks in case. You can keep your country's timing in order to find out whether the time of your meals is delayed [15, 12, 36].

Travel to the East (Asia: China, Japan, and Korea)

a. Patients that need one shut of insulin every day:

This person should take the usual dose in the day that travel is begun but as days are shorter in the destination, 2/3 of usual dose is recommended to be taken in the first morning. After 10 hours, blood sugar must be checked and if it is over 240 mg/dL he/she should take the rest of it. In the second morning the usual dose goes on.

b. Patient that needs two shuts (morning and evening) of insulin everyday:

This patient takes 2/3 of the usual morning dose for the first morning in the destination. In the evening she/he should take usual evening dose, and if in the evening the blood sugar is over 240 mg/dL the rest of the morning dose should be taken. On the day that the travel is begun and also on the second day the usual dose for morning and evening should be taken.

Travel to the West (Europe, Northern and Southern America)

a. Patients that need one shut of insulin every day:

This person should take usual doses in the day that travel is begun but as days are longer in the destination. About 18 hours after your morning dose, check your blood sugar. If it is over 240 mg/dL take 1/3 of your usual morning dose again. After this stage you should take doses as usual.

b. Patients who need two shuts (morning and evening) of insulin everyday:

This person should not change insulin taking time. This means that 10-12 hours after the last shut in his/her country, the second dose of insulin must be taken. After 6 hours these patients must check their blood sugar and if it is over 240 mg/dL take 1/3 of usual morning dose again.

Generally, patients who are treated with short effect insulin (crystal) 3 or more times a day must eat their meal on time and take insulin before and after the meal. It is clear that by traveling to the east, a meal would be excluded as the days are shorter. By traveling to the west a meal would be added as the days are longer and of course insulin taking must be matched with the meals.

Since utilizing moderate or long time effect insulin as extra dose might drop the blood sugar some doctors suggest change this insulin with the crystal one in travel.

It is suggested to all of the people with diabetes to consult with their medical team about treatment details. If you don't have blood sugar testing devise with you, you can take advantage of the following methods:

Diminish the injected insulin before the flight when you intend to travel to the east.

Eat an extra meal and inject crystal insulin before traveling to the west.

Most patients who are under treatment with anti-diabetic edible pills no particular problem has been observed. Sometimes when the days are longer they might need an extra pill and when the days are shorter the taking dose must be reduced. Overall if extra dose of insulin is taken or drugs derived from sulphonyurea such as Glibenclamide or Chlorpropamide are used, take care of blood sugar dropping.

In some countries such as USA and England the amount of blood sugar is reported as mmol/ L instead of mg/dL. For converting the unit, multiply the number to 18 [13, 15, 24, 38].

Getting Sick during the Travel

If an acute illness indicates blood sugar may raise. So it is necessary to test your blood sugar in this situation. If the sickness takes 1-2 days with vomiting and diarrhea you might need to change your treatment or extra medicine. In this case, check for ketones in urine (if you take insulin) if positive call your physician immediately [2, 26].

During the sickness, insulin or pills should not be interrupted. If you have no desire to eat or you vomit, try watery food such as soup, milk or fruit juice to prevent blood sugar from dropping and drink a lot (sugar free) in order to recover wasted water [24].

Traveling By Car

Driving is not forbidden for people with diabetes but in order to keep you and others safe it must be noticed that:

1. Your disease should be informed to those who are in charge when you take your driving license and car insurance.
2. Insulin dependent patients with diabetes are not allowed to drive taxis or heavily trucks.
3. Take care of blood sugar dropping during your drive.
4. Patients with diabetes are not allowed to drive in following situations:
 - Intense or repeatable dropping of blood sugar
 - Lack of blood sugar dropping alarms and warrants
 - Not capable to treat blood sugar dropping quickly or not being checked by physicians regularly
 - Eyesight damages caused by diabetes
 - Nerve damages caused by diabetes

In order to prevent blood sugar dropping during driving, these advices are suggested:

1. If you take insulin eat a meal before the drive and check your blood sugar as much as it is possible.
2. In long trips stop by every 2 hours and eat a snack.
3. Never drive unless your blood sugar is stable. This includes: physical overacting or exercising that drops your blood sugar or during the sunset that you return.
4. Never hurry.
5. Always carry food in your car such as sugar, biscuits or fruit juices.
6. Whenever you face blood sugar dropping symptoms stop and use quick uptaking sugars such as 3 tablets of glucose or 175cc fruit juice then take a long affected carbohydrate and avoid driving unless it gets to 6 mmol/L. also avoid driving between taking insulin and eating a meal.
7. Never drink alcohol before and during the drive. Alcohol not only disturbs the concentration but it causes intense blood sugar dropping in people with diabetes [39, 40, 41, 42].

Air Traveling

If you travel by plane try not to leave your insulin bag in the loading part and carry them with yourself because insulin

could freeze in the height. Insulin also should not be exposed to X radiation so let the agents check it directly. Walk for few minutes before getting on the plane. During the flight, simple stretching exercises, ankle twisting and shaking feet slowly could be extremely helpful [12, 15, 16, 24, 43, 44].

Sailing

Traveling ships usually serve various sea foods. Try to prepare a list of food that are served by the ship before the travel and organize your meals by consulting with your doctor. You would rather inform the ship's crew of your disease. Try to do aerobic exercises after eating extra meals [17].

Traveling By Walking

Never walk long distances when you are alone. Inform the others about the path, destination and your returning time in order to find you in emergency situations. Take first aid box and emergency kit of glucagon if you take insulin with you and teach your companies how to use it. Glucagon is used whenever blood sugar is dropped and the patient is unconscious. Protect your body from scratches, sun burning, mosquito bites, beating and blisters. If your physical activities are increased intensely consult with your doctor to diminish your drug dosage [45, 46].

Conclusion

Probable difficulties that might happen for a passenger with diabetes during a travel include carrying and storing insulin, Glycaemia controlling caused by disturbance of meals, variable diet, physical activities, stress and ketosis (in sailing) [34, 17]. Also, traveling might cause weather dependent diseases, traveling diarrhea, malaria and ... [47]. Except preventing of glycaemia fluctuations that are necessary, looking out of patients with diabetes in order to preserve them from catching other important diseases and carrying essential medications with them are critical [19]. Before taking any decision, consult with your doctor about your destination, diet and actions you must do and provide a list of types and dosage of your medications and tools you might need with the help of your doctor. Though general advices for all patients with diabetes are similar, every patient needs specific observations according to his/her physic and health level. Travel to places that you haven't been could be stressful. Remember, any kind of stress would raise your blood sugar. Gathering information about the destination and having a whole image of the travel can take much of the stress out. All kinds of vaccines according to your destination should be taken at least four weeks before the travel in order to get enough time to let the probable issues to indicate [14, 48, 49].

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