CHAPTER 8

The Ramadan Nutrition Plan (RNP) for people with diabetes

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## CHAPTER 8

### INDEX

1. INTRODUCTION TO THE RAMADAN NUTRITION PLAN ........................................ 147
2. THE PRE-RAMADAN VISIT ............................................................................. 148
3. RISK AVOIDANCE DURING RAMADAN ..................................................... 149
4. HEALTH ISSUES DURING RAMADAN ......................................................... 149
5. WEIGHT MAINTENANCE AND WEIGHT REDUCTION DURING RAMADAN FASTING .......... 150
6. THE 10 PRINCIPLES OF THE RNP .............................................................. 151
7. THE RNP: A TRANSCULTURAL APPLICATION ......................................... 154

SUMMARY ........................................................................................................ 154

REFERENCES ................................................................................................. 155
WHAT IS KNOWN?

- Creating a plan for nutrition during Ramadan is essential to ensure safe and confident fasting.
- Ramadan Nutrition Plan (RNP) menus have been developed for several countries and help to provide contextualised nutrition advice and guidance for people with diabetes that seek to fast during Ramadan.

WHAT IS NEW?

- New RNP menus and meal examples have been developed for different countries.
- Greater evidence is available to provide more up to date nutrition advice to people with diabetes that are seeking to fast during Ramadan.

WHAT IS MISSING?

- More Healthcare professionals should contribute to the RNP at www.daralliance.org so that people around the world that are seeking to fast during Ramadan can receive contextualised guidance for nutrition and achieve safe fasting.
1. INTRODUCTION TO THE RAMADAN NUTRITION PLAN

The Ramadan Nutrition Plan (RNP) is a mobile and web-based application designed to help healthcare professionals (HCPs) individualise medical nutrition therapy (MNT) for people with diabetes who are observing Ramadan fasting [1]. The RNP provides a platform that includes the diabetes nutrition plan and education [2] and can be a useful resource for individuals with diabetes who do not have access to HCPs [1].

The role of MNT is vital when fasting during Ramadan, not only in achieving optimal diabetes control but also in helping overweight and obese individuals with type 2 diabetes (T2DM) in improving their lifestyle and losing weight [2-4]. In fact, Ramadan provides an ideal opportunity for individuals to channel the strength and discipline required to comply with MNT; this in turn helps them to maintain optimal glycaemic control beyond the month of Ramadan [5]. Structured MNT for Ramadan has been shown to improve fasting blood glucose levels, triglycerides, and the rate of self-monitoring blood glucose (SMBG) pre-dawn and pre-bed when compared to standard care in people with T2DM [6]. Moreover, structured MNT for Ramadan includes pre-Ramadan education and individualised energy and macronutrient prescriptions with the incorporation of a diabetes-specific formula of at least 1 serving/day during Suhoor or a snack (if needed) to improve the adequacy of nutrient intake [6].

The RNP is based on the principles of optimal MNT [7] and provides examples of meal plans for different countries and regions across the globe [1]. However, dietary recommendations should be individualised and tailored to an individual's lifestyle requirements, age, comorbidities, and other medical needs [2, 4, 6]. The RNP is a work in progress and would benefit from further contributions by HCPs of different nationalities, based on the structural framework provided in this chapter. This will lead to the production of a comprehensive global menu resource [1].

The main aims of MNT during Ramadan fasting are to ensure that:
1. Individuals with diabetes consume an adequate amount of calories, with balanced proportions of macronutrients, during the non-fasting period (i.e., sunset to dawn) to prevent hypoglycaemia during the fasting period.
2. Individuals with diabetes equally distribute their carbohydrate intake among meals to minimise postprandial hyperglycaemia.
3. Individuals with diabetes and HCPs give consideration to comorbidities such as hypertension and dyslipidaemia when formulating MNT plans.

The meal plan using the RNP framework has been adopted for use in many countries. When accessing the RNP website [1], the HCP can select their country of practice from the “Ramadan Nutrition Plan map” to gain country-specific MNT recommendations (website example shown in Figure 1). A Ramadan Nutrition plate and meal (example shown in Figure 3) for each country is also included to visualise the structured RNP meal plan.
FIGURE 1
Ramadan Nutrition Plan Map
Access the online version at www.daralliance.org and then click on your country in the online map to view a full nutrition plan (example map above). The nutrition plan should be printed and handed to individuals that are seeking to fast during Ramadan.

2. THE PRE-RAMADAN VISIT

The nutrition assessments should be part of a pre-Ramadan visit and scheduled around 6–8 weeks before the start of Ramadan. A pre-Ramadan visit provides an opportunity for HCPs to advise individuals with diabetes about the necessary dietary modifications that should be adopted when fasting during Ramadan [8]. It may also help those individuals who choose to fast for a few days during the 2 months preceding Ramadan (Sha’ban).

The main aims of a pre-Ramadan visit are to:
1. Provide individuals with diabetes with a modified nutrition plan that improves glycaemic control while fasting during Ramadan.
2. Provide individuals with MNT that may help overweight and obese people to successfully and safely lose weight during the Ramadan fast.
3. Adjust anti-diabetic medications in line with the individual changes in nutrition that can occur during the Ramadan fast [9].
4. Encourage proper and safe levels of exercise and physical activity while fasting during Ramadan.
5. Provide education to help individuals recognise the warning symptoms of dehydration, hypoglycaemia, and other possible acute complications.
6. Enforce the importance of blood glucose and body weight monitoring during Ramadan.
3. RISK AVOIDANCE DURING RAMADAN

For people with diabetes, there are potential risks associated with prolonged fasting. Therefore, it is crucial to increase the awareness of these risks to all people with diabetes seeking to participate in Ramadan fasting so that they can do so safely.

Many diabetes-related risks can be minimised through proper nutrition [6, 9, 10], including:

1. Hypoglycaemia, especially during the late period of fasting before iftar;
2. Severe hyperglycaemia after each of the main meals;
3. Dehydration, especially in countries with longer fasting hours and hot climates;
4. Significant weight gain due to an increased caloric intake and a reduction in physical activity;
5. Electrolyte imbalances;
6. Acute renal failure in individuals prone to severe dehydration, particularly the elderly and those with impaired kidney function.

4. HEALTH ISSUES DURING RAMADAN

When fasting during Ramadan, there is a dramatic change in dietary patterns in comparison to the other months of the year. Health issues can arise due to improper eating habits and reduced physical activity [11, 12].

Unhealthy nutrition habits that commonly develop during Ramadan include:
1. The consumption of unusually large meals at iftar (frequently containing more than 1500 calories), which may result in severe postprandial hyperglycaemia and weight gain.
2. The consumption of significant amounts of highly processed carbohydrates and sugar at iftar, or between iftar and suhoor, which may also cause severe hyperglycaemia.
3. Eating desserts loaded with sugar after iftar, which can lead to a prolonged period of postprandial hyperglycaemia.
4. The consumption of large portions and frequently eating snacks between the two main meals, which can again contribute to extended periods of hyperglycaemia.
5. Eating at fast speeds, which frequently leads to over-eating (satiety signals usually take around 30 minutes to reach the brain from the start of eating).
6. Skipping meals at suhoor or consuming meals for suhoor too early, which may result in hypoglycaemia before iftar, especially when fasting hours are longer than usual.
7. The consumption of large portions of high glycaemic index (GI) carbohydrates at suhoor, which can lead to postprandial hyperglycaemia [3, 12].
8. Eating fried foods too frequently, which is incredibly unhealthy particularly when trans-fat margarine or oils rich in saturated fat are consumed (e.g., palm oil and coconut oil).
9. Changing physical activity and sleeping patterns, which can affect metabolism and contribute to weight gain [13].
5. WEIGHT MAINTENANCE AND WEIGHT REDUCTION DURING RAMADAN FASTING

Weight gain during Ramadan should be avoided. People with T2DM who are overweight or obese may find that Ramadan provides a good opportunity to lose weight. Weight loss may significantly improve glycaemic control and may reduce cardiovascular disease (CVD) risk [14-16]. An optimal target is a modest and gradual weight reduction of 0.5–1 kg per week. To achieve weight loss or avoid weight gain, the intake of calories should be controlled and kept within a specified target based on height and gender [14, 16] (see Table 1). It is also recommended to proportionally distribute carbohydrate and total caloric intake between *Suhoor* and *Iftar* [6, 16], (see Table 2). The caloric target algorithm guides the HCPs in choosing the appropriate number of calories for an individual person with diabetes. On the RNP website, an algorithm provides guidance for selecting appropriate caloric targets for individuals and the subsequent effects of achieving those targets – i.e. weight maintenance or weight reduction [1] (see Figure 2).

| TABLE 1: CALORIC TARGETS FOR MEN AND WOMEN WHEN FASTING DURING RAMADAN |
|---------------------------|-------------------|-------------------|
| Weight Maintenance | Weight Reduction |
| **Men** | 1800 - 2200 kcal/day | 1800 kcal/day |
| **Women > 150 cm tall** | 1500 - 2000 kcal/day | 1500 kcal/day |
| **Women < 150 cm tall** | 1500 kcal/day | 1200 kcal/day |

| TABLE 2: CALORIE AND CARBOHYDRATE DISTRIBUTIONS FOR THE RAMADAN NUTRITION PLAN |
|---------------------------|------------------|------------------|
| Percentage of calories | Carbohydrate distributions |
| **Suhoor** | 30 – 40% | 3 - 5 exchanges |
| **Iftar Snack** | 10 – 20% | 1 - 2 exchanges |
| **Iftar Meal** (if necessary) | 40 – 50% | 3 - 6 exchanges |
| **Healthy Snack (if necessary)** | 10 – 20% | 1 - 2 exchanges |

1 Carbohydrate exchange = 15 g Carbohydrates
6. THE 10 PRINCIPLES OF THE RNP

Based on the goal of achieving optimal MNT during Ramadan, the principles of the RNP [2] is based on the following:

1. The consumption of an adequate amount of daily calories. Calories should be divided between Suhoor and Iftar and 1-2 healthy snacks can also be consumed if necessary (see Tables 1 and 2).
2. Meals should be well balanced, with total carbohydrates comprising around 40–50% and preferably of a low GI source; the protein content (legumes, pulses, fish, poultry, or lean meat) should comprise 20–30%; and fat should comprise 30-35% (with mono and polyunsaturated fats preferred) (see Table 3). Saturated fat should be limited to < 10% of the total daily caloric intake.
3. The “Ramadan plate” method should be used for designing meals (see Figure 3).
4. Sugar-heavy desserts should be avoided after Iftar and between meals. A moderate amount of healthy dessert is permitted — for example a piece of fruit.
5. Carbohydrates that are low on the GI should be selected, particularly those high in fibre (preferably whole grains). The consumption of carbohydrates from vegetables (cooked and raw), whole fruits, yogurt, milk and dairy products are encouraged. The consumption of carbohydrates from sugar and highly processed grains (wheat flour and starches like corn, white rice, and potatoes) should be avoided or minimised.
6. Maintaining an adequate level of hydration by drinking enough water and non-sweetened beverages at, or between, the two main meals is essential and should be encouraged (diet beverages may be consumed). Sugary drinks, syrups, canned juices, or fresh juices with added sugar should be avoided. The consumption of caffeinated drinks (coffee, tea as well as cola drinks) should be minimised as they act as diuretics which can lead to dehydration.
7. Take *Suhoor* as late as possible, especially when fasting for longer than 10 hours.
8. Consume an adequate amount of protein and fat at *Suhoor* as foods with higher levels of these macronutrients and lower levels of carbohydrates usually have a lower GI value than carbohydrate-rich foods. Foods such as these do not have an immediate effect on postprandial blood glucose. Foods rich in protein and good quality fat can better induce satiety than foods rich in carbohydrates [17].
9. *Iftar* should begin with plenty of water to overcome dehydration from fasting, and 1-3 small dried or fresh dates to raise blood glucose levels.
10. If needed, a healthier snack such as one piece of fruit, a handful of nuts, or vegetables may be consumed between meals. Generally, each snack should be 100–200 calories, but this may be higher depending on an individual's caloric requirements. Some individuals may have a snack (*Iftar snack*) to break their fast, followed by the Maghrib prayer, and then eat the *Iftar* meal later in the evening.

### TABLE 3: MACRONUTRIENT MEAL COMPOSITION

A meal should be complete and balanced in macronutrients [2, 4, 7]. The "Ramadan Plate Method" is advised as a guide in designing meals (Figure 3).

<table>
<thead>
<tr>
<th><strong>CARBOHYDRATES</strong></th>
<th><strong>Amount</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• The total daily intake of carbohydrates should be at least 130 g/day and ideally about 40-45% of total caloric intake.</td>
<td><strong>Recommended</strong></td>
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<tr>
<td>• Intake should be adjusted to meet the cultural setting and food preferences of each individual.</td>
<td><strong>Not recommended</strong></td>
</tr>
<tr>
<td>• Carbohydrates with a low glycaemic index and glycaemic load should be selected. These include whole grains, legumes, pulses, temperate fruits, green salad, and most vegetables.</td>
<td><strong>Recommended</strong></td>
</tr>
<tr>
<td>• High fibre foods such as unprocessed food, vegetables, fruits, seeds, pulses, and legumes should be consumed. It is recommended to consume about 20–35g/day (or 14g /1000 kcal). Fibre helps to provide satiety during <em>Iftar</em> and to delay hunger after <em>Suhoor</em>.</td>
<td><strong>Not recommended</strong></td>
</tr>
<tr>
<td><strong>PROTEIN</strong>^*^</td>
<td><strong>Amount</strong></td>
</tr>
<tr>
<td>• Protein intake should not be less than 1.2g/kg of adjusted body weight^*^ and usually accounts for 20–30% of the total caloric intake. Protein is essential as it enhances satiety and the sensation of fullness. Protein helps to maintain lean body mass [17].</td>
<td><strong>Recommended</strong></td>
</tr>
<tr>
<td>• Fish, skinless poultry, milk and dairy products, nuts, seeds, and legumes (beans) are recommended.</td>
<td><strong>Not recommended</strong></td>
</tr>
<tr>
<td>• Sources of protein with a high saturated fat content such as red meat (beef, lamb) and processed meats should be minimised as they increase the risk of CVD.</td>
<td><strong>Recommended</strong></td>
</tr>
<tr>
<td>• Although high-fat dairy products contain saturated fats, a study has shown, increasing dairy consumption to ≥3 servings/day compared with &lt; 3, while maintaining energy intake, servings/day does not affect HbA1c levels, body weight, body composition, lipid profile, or blood pressure in patients with T2DM [18].</td>
<td><strong>Not recommended</strong></td>
</tr>
</tbody>
</table>

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*^*^ Table continued on next page
CHAPTER 8  The Ramadan Nutrition Plan (RNP) for people with diabetes

TABLE 3: MACRONUTRIENT MEAL COMPOSITION

A meal should be complete and balanced in macronutrients [2, 4, 7]. The "Ramadan Plate Method" is advised as a guide in designing meals (Figure 3)

| Amount | • Fat intake should be between 30–35% of the total calorie intake. The type of fat is more important than the total amount of fat in reducing the risk of CVD.  
|        | • Limit saturated fat to < 7%. PUFA and MUFA should comprise the rest of the fat intake.  
|        | • Limit dietary cholesterol to < 300 mg/day or < 200 mg/day if LDL cholesterol > 2.6 mmol/L  

**FAT**

**Recommended**

• Consume fat from PUFA and MUFA (e.g., olive oil, vegetable oil, or blending oil (PUFA and Palm oil)). Oily fish (e.g. such as tuna, sardines, salmon, and mackerel) as a source of omega 3-fatty acids are also recommended.

**Not recommended**

• Minimise the intake of foods high in saturated fat, including red meat (beef and lamb), ghee and foods high in trans-fats (e.g., fast foods, cookies, some margarines).

PUFA: Polyunsaturated fats; MUFA: Monounsaturated fats; CVD: cardiovascular disease

^Adjusted body weight = Ideal body weight (IBW) + 0.25 (Current weight – IBW)

*Individuals with renal issues should receive individualised advice as their protein requirements may be untypical

This meal provides ~ 500 kcal/meal
(45% carbs (3-4 exchanges of carbohydrates), 20% protein and 35% fat)

*Each person may have different plate depending on the daily calorie target

Transcultural Ramadan Nutrition App. (Toolkit) (Algorithm 2), provides meal plans for four caloric levels and are available online at https://www.daralliance.org/daralliance/ to support nutrition needs for each patient with diabetes. These meal plans are designed for each country to provide a transcultural experience

FIGURE 3

Ramadan Nutrition Plate* (examples of Suhoor or Iftar Meals)
7. THE RNP: A TRANSCULTURAL APPLICATION

In the RNP, an algorithm and a toolkit provide meal plans for the four caloric targets (1200, 1500, 1800, and 2000 kcal/day) according to the individual needs. Meal plans have been tailored for different countries, providing a transcultural user experience. Example include countries like Egypt, Malaysia, Pakistan and China as shown at the end of this chapter. Other sample for other Muslim regions around the globe are also available online to support the nutrition needs of people with diabetes who are fasting during Ramadan [1].

The RNP is a work in progress, and HCPs of different nationalities are encouraged to contribute menus to the RNP at www.daralliance.org [1]. Healthy menus, based on the structure provided in this chapter, can be submitted online for review and, if accepted, will subsequently be posted on the RNP platform.

<table>
<thead>
<tr>
<th>SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The RNP is a web-based application designed to help HCPs individualise and implement MNT for people with diabetes that fast during Ramadan. It also helps individuals that may not have access to HCPs to construct a healthy eating plan.</td>
</tr>
<tr>
<td>• The RNP helps people with diabetes plan a daily caloric target that may help them maintain their body weight if they are lean or to lose weight if they are overweight or obese.</td>
</tr>
<tr>
<td>• The RNP helps people with diabetes to minimise the risks associated with Ramadan fasting, such as hypoglycaemia, hyperglycaemia, and dehydration.</td>
</tr>
<tr>
<td>• The RNP provides examples of meal plans within the target caloric levels based on individual needs and tailored for use in different countries.</td>
</tr>
<tr>
<td>• The RNP website is designed to capture menus from across the globe that match the framework and structure provided in this chapter.</td>
</tr>
</tbody>
</table>
REFERENCES

**FIGURE 4**  
Examples of Ramadan Meal plans from different countries*

<table>
<thead>
<tr>
<th>Target Daily Calories</th>
<th>Nutrients Composition and Lifestyle Recommendations</th>
<th>Calories and Carbohydrate Distributions</th>
<th>TOOL KIT SAMPLE RAMADAN NUTRITION PLAN FOR ASIA &amp; MIDDLE-EAST</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1500 kcal/day</strong></td>
<td><strong>Pakistan</strong></td>
<td><strong>Suhoor</strong></td>
<td><strong>150-240 kcal/meal</strong></td>
</tr>
</tbody>
</table>
| Weight maintenance for women < 150 cm tall and weight reduction for women > 150 cm tall | **Carbohydrates 40 - 50%**  
  - Recommend low GI, GL, whole grains and high fibre | **450-600 kcal/meal**  
  - Omelette, 2 egg  
  - Roti (wholemeal), 1 small  
  - Milk/Lassi, 1 glass  
  - Salad (tomatoes/onions), 1 small bowl  
  - Water, 2 glasses (500kcal; CHO exchange = 3) | **540-720 kcal/meal**  
  - Beans (foul), Ful: 1.5 cups  
  - Yoghurt; 1 tub.  
  - Cheese, 2 oz/ 2 slices  
  - Small olives, 5 and Salads (cucumber/ tomatoes) with 1 egg  
  - Whole grain bread, 2 thin slices  
  - Water/ Unsweetened drink (670kcal; CHO exchange = 5) |
| **1800 kcal/day**     | **Egypt**                                           | **Iftar Snack**                         | **150-300 kcal/meal**                                       |
| Weight maintenance for women > 150 cm tall and weight reduction for men | **Protein 20 - 30%**  
  - Recommend lean meat, legumes, pulses and vegetable protein | **150-240 kcal/meal**  
  - Fruit, 1 piece @ dates, 1-3 small pieces  
  - Water/unsweetened drinks, 2 glasses (60kcal; CHO exchange = 1) | **150-300 kcal/meal**  
  - Fruit, 1 piece @ dates, 1-3 small pieces  
  - Water/unsweetened drinks, 2 glasses (60kcal; CHO exchange = 1) |
| **2000 kcal/day**     | **Weight maintenance for women > 150 cm tall and for men** | **Iftar Meal**                          | **500-750 kcal/meal**                                       |
| Healthy Snack 10-20% (1-2 CHO exchange) | **Fat < 25%**  
  - Recommend SFA < 7% and choose less fat cooking methods (grilled, baked and steamed) | **620-900 kcal/meal**  
  - Salad (Tomatoes, cucumber, greens peas with lemon/vinegar dressing) 1 medium bowl  
  - Soup (grilled/broiled chicken/lentil/meat), 4 oz  
  - Cooked vegetables, 1 cup  
  - Cooked rice (brown rice), 1 cup  
  - Dessert: 1 small piece  
  - Water/unsweetened drinks, 2 glasses (825 kcal CHO exchange = 5) | **40 – 50%** (3-5.5 CHO exchange) |

*For a complete Ramadan Meal Plan and Ramadan Plates for other Muslim regions from around the globe Visit website for further details www.daralliance.org

CHO, carbohydrate; GI, glycaemic index; GL, glycaemic load; SFA, saturated fatty acids; tbsp, tablespoon

1 CHO exchange = 15 g CHO
### FIGURE 4
Examples of Ramadan Meal plans from different countries*

<table>
<thead>
<tr>
<th>Target Daily Calories</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>1200 kcal/day</strong></td>
<td>Carbohydrates 40 - 50%</td>
<td>300-480 kcal/meal</td>
<td>1200 kcal/day Malaysia</td>
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<tr>
<td>Weight reduction for</td>
<td>• Recommend low GI, GL, whole grains and high fibre</td>
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<td>600-800 kcal/meal</td>
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<td>woman &lt; 150 cm height</td>
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<td>Malaysia</td>
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<td>Iftar Snack 10-20% (3-5.5 CHO exchanges)</td>
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<td>Suhoor 30-40% (3-5.5 CHO exchanges)</td>
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<td><strong>1500 kcal/day</strong></td>
<td>Protein 20 - 30%</td>
<td>120-240 kcal/meal</td>
<td>2000 kcal/day China</td>
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<td>Weight maintenance for</td>
<td>• Recommend lean meat, legumes, pulses and</td>
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<td><strong>1800 kcal/day</strong></td>
<td>Fat &lt; 35%</td>
<td>480-600 kcal/meal</td>
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<td>Weight maintenance for</td>
<td>• Choose less fat cooking methods (grilled, baked</td>
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<td><strong>2000 kcal/day</strong></td>
<td>Lifestyle Recommendations</td>
<td>120-240 kcal/meal</td>
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<tr>
<td>Weight maintenance for</td>
<td>• Begin Iftar with plenty of water to overcome</td>
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<tr>
<td>women &gt; 150 cm tall</td>
<td>dehydration from fasting</td>
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<td>and for men</td>
<td>• Keep physically active</td>
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<td>• Do not sleep for longer than usual</td>
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<td>Healthy Snack 10-20% (1-2 CHO exchanges)</td>
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CHO, carbohydrate; GI, glycaemic index; GL, glycaemic load; SFA, saturated fatty acids; tbsp, tablespoon
1 CHO exchange = 15 g CHO