PRIMARY CARE DIABETES

Glucofriendly couscous usage in diabetes

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Abstract

Couscous, a staple food of Northern Africa and the Middle East, is consumed across the world. Being carbohydrate – rich, it is often forbidden to persons with diabetes. Its social and cultural connotations, however, do not allow absolute avoidance of this dish in real life. This brief article explores various ways of preparing, serving and eating couscous, in a glucofriendly manner. The authors summarize available literature, and suggest culinary tips to reduce glycaemic index and glycaemic load of this foodstuff.

Keywords: Adherence, Biopsychosocial model, Culinary diabetology, Diet, Glycemic index, Glycemic load, Nutrition, patient- centered care

DOI: https://doi.org/10.47391/JPMA.24-62

Introduction

Couscous, prepared from durrum wheat is a staple food of the Maghreb, as well as some parts of West Africa and the Middle East.[1] This cereal preparation lends itself to multiple culinary uses, and occupies special place in culture as well. Couscous based dishes are integral to family meals, and form an important part of menus at festivities and religious occasions. The high carbohydrate content and glycaemic index of couscous, however, may lead to worsening of glycaemic control in persons with diabetes. The glycaemic load or calorific burden associated with couscous may be worsened by the use of liberal amounts of butter or olive oil for cooking, and raisins, honey or dates for garnishing.

A blanket prescription to stop taking couscous may not be accepted by the vast majority of persons with diabetes, and will not be respected by their family members. Lack of agreement with suggested dietary regimens may encourage lack of adherence to drug therapy as well.[2] Such culturally insensitive advice will also dampen the patient physician relationship, and create barriers to communication.

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Table-1: Method of preparation of couscous.

Savoury	Sweet
• With legumes	• With sugar
• With fish	• With raisins
• With minced meat	• With honey
• With meat	• With palm sugar
• With eggs	**Method of preparation**
	• Steaming
	• With butter
	• With olive oil

Keeping this in mind, we share pragmatic suggestions on ways to consume couscous in a gluco safe manner. These are similar to earlier publications on glucofriendly rice and plantain usage.[3,4]

Nutritional and culinary aspects

Couscous contains 120 calories per 100 gram, and is similar to other cereals in this regard. The glycaemic index of couscous various according to mode of preparation. Couscous is cooked by steaming or boiling. However, the side dishes, garnishes or relishes that are used with it may modify its glycaemic index. The quantity of couscous served (and consumed) has a direct effect on the glycaemic load as well.[1] Table 1 lists some methods of cooking used to prepare couscous.

Glucofriendly methods of using couscous

Simple modifications, done prior to during, or after cooking, can help allow persons with diabetes to consume couscous in a more glucofriendly manner (Table 2). The overarching aim is to reduce glycaemic load, by reducing portion size, and glycaemic index, by adding low glycaemic index accompaniments, while avoiding high glycaemic index garnishes. Couscous related advice must be patient centric and keeping in mind the current glycaemic control of the individual. However, even in poorly controlled patients, an optimistic statement like "We'll allow you to eat couscous once your sugars get better" is more appropriate than a rigid warning such as "Now that you have diabetes, you can never eat couscous: it is poison for you"

The following modifications in Couscous can help its use in a more glucofriendly manner.[5]

1. Food combinations with Couscous

Combination of couscous with foods rich in fibre, fat, protein and acetic acid shall delay the gastric emptying.

Table-2: Glucofriendly use of couscous.

AIM	Pre –preparation	During preparation	Post preparation
Reduce glycaemic load	Prepare less amount; Learn carbohydrate counting	Serve in small portion sizes	Consume limited number of spoon fills
Reduce glycaemic index	Choose hand pounded couscous / less refined varieties if available e.g., black couscous	Add legumes/vegetables/ white meat/ fish Do not add sugar/ honey Boil / steam rather than fry	Eat salad/meal /vegetables before and while consuming couscous.
		Use almonds or pistachio as garnish, rather than raisins/dates	Do not sprinkle sugar /honey on couscous

a. **Fibre:** This carbohydrate of plant origin, which is found in skin and pulp of fruits and vegetables, seeds, nuts, whole pulses and grains with husk is resistant to digestive enzymes. Thus, Fibre reaches intact to the large intestine, wherein the intestinal flora will act on it resulting in formation of SCFAs (short chain fatty acids) which are useful to the body. Food combinations of couscous with just ripe or under-ripe fruits would delay gastric emptying as starch of unripened fruits is not accessible to amylase enzyme and thus reaches the colon intact for the action of gut microbiota.

b. **Fat:** Fats also slow down the rate of gastric emptying, thereby reducing the pace of carbohydrate digestion in the intestine. Moreover, glucose levels are more stable in the presence of fats. The Liljeberg study highlighted the impact of olive oil in tomato sauce in lowering the glycaemic response of pasta. Similar results were reported with cheddar cheese which can attenuate the glycaemic response of potato, toast and pasta. Thus moderate use of oils rich in PUFA and MUFA and nuts such as almonds could be combined with couscous to reduce its glycaemic response.

c. **Protein:** Proteins not only delay gastric emptying, but interact with the starch thereby reducing the accessibility of digestive enzymes and also delay digestion coupled with augmented insulin secretion. Couscous in combination with about 25 grams of protein derived from both plant (soy, lentils, nuts) and animal (chicken, fish, egg) could reduce the glycaemic load of the meal.

d. **Acetic acid (vinegar):** Acidity works inversely proportional to the rate of gastric emptying. The addition of vinegar to food preparations made with couscous could reduce the glycaemic response.

2. Minimizing food processing of Couscous

Food undergoes multiple processing before the food reaches the plate. Food particle size is affected by processes such as pressing, milling and extrusion which in turn affect the rate of gastric emptying and glycaemic response. Thus, minimal processing of couscous would prove to be a glucofriendly option.

3. Cooking modifications for Couscous

Microwave cooking of couscous could lower the glycaemic response as it would results in a higher content of resistant starch. Also longer periods of cooking time has been associated with augmented glycaemic response. In addition, the amount of liquid used for cooking couscous shall affects the glycaemic load of the meal.

4. Storage of Couscous

The storage conditions including temperature affects the resistance of starch directly. Post cooking if couscous is cooled for a minimum of 12 hours (retrogradation), the starch will get dehydrated and loose water resulting in reorganization and formation of a crystalline structure known as resistance starch type 3 (RS3), delaying its breakdown Also, controlling the reheating temperature to below 130 degrees prevents conversion of resistance starch to non-resistance starch

5. Eating order of Couscous

Consumption of food groups such as protein, fibre and fat prior to consumption of couscous would lower post prandial blood glucose .

6. Circadian Rhythm and timing of eating couscous

Diurnal variations in glucose tolerance has been observed with peaks during day time (food consumption) and reduces during night (fasting). Therefore planning meals with couscous during day time and macronutrient (carbohydrate, protein and fat) modification of the night meal with increased intake of protein and healthy fats in comparison to carbohydrate-rich couscous would be advisable to improve the glycaemic response.

Summary

A culturally sensitive approach to the use of couscous, allowing limited consumption in persons with well-or fairly controlled diabetes, using culinary recipes designed to reduce glycaemic index, is required. This brief communication aims to stimulate debate and discussion in this regard.

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