Review Article

Evaluate the effect of oat-beta glucan in controlling blood glucose levels among type 2 diabetic individuals

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ABSTRACT

Diabetes mellitus (DM) is a metabolic disorder characterized by inappropriate hyperglycemia due to deficiency in producing insulin or inefficient action of this hormone. Patients with DM are frequently afflicted with ischemic vascular disease, wound healing defect, vascular alterations, myocardial infarction, nephropathies, retinopathies and neuropathies. The uses of hypoglycemic agents or insulin are the common conventional treatments of diabetes. However, the frequent use of such expensive medications increased the financial burden upon patients. Low glycaemic food consumption is a very fruitful alternative in controlling diabetes. Foods that are rich in fiber are on the top of the glycaemic index and the potential component is beta glucan. The evidence of consuming oat beta-glucan to enhance glycaemia and insulin levels is not well established. So, the objective of this overview review is to evaluate the effect of oat-beta glucan in controlling blood glucose levels among type 2 diabetic individuals.

Keywords: Oat beta-glucan and type 2 diabetes, Beta glucan and diabetes, Oat beta glucan and blood glucose

INTRODUCTION

Diabetes mellitus (DM) is a metabolic disorder characterized by inappropriate hyperglycemia due to deficiency in producing insulin or inefficient action of this hormone. Patients with DM are frequently afflicted with ischemic vascular disease, wound healing defect, vascular alterations, myocardial infarction, nephropathies, retinopathies and neuropathies. The prevalence has been increasing steadily all over the world and estimated that 5% of all deaths worldwide are resulted from diabetes complications. The uses of hypoglycemic agents or insulin are the common conventional treatments of diabetes.⁷ According to Andrade et al 2015; the frequent use of such expensive medications increased the financial burden upon patients. As a result, various studies have been done investigating non-pharmacological form of treatments such as physical activity and functional food to reduce the side effect of diabetes.³ Low glycaemic food consumption is a very fruitful alternative in controlling diabetes.⁴ Foods that are rich in fiber are on the top of the glycaemic index and the potential component is beta glucan. Beta glucans comprise a group of non-starch polysaccharides naturally occurring in the cell walls of grains like oats, rye, barley, mushroom and yeast.⁵ Recent studies have reported that beta-glucans could reduce hyperglycemia, hyperlipidemia, and hypertension.⁶,⁷ Studies have suggested that food products containing beta-glucans could reduce hyperglycemia.²⁴ Reyna et al 2003, suggested that the fiber build a barrier to prevent nutrients including glucose from being absorbed in the small intestine and consequently reducing insulinemia, glycaemia and cholesterol levels.⁸ Studies that have been examining the
impacts of beta glucans in people who are more likely to develop metabolic syndrome are frequent, however, the evidence of consuming oat beta-glucan to enhance glycaemia and insulin levels are not well established. So, the objective of this overview review is to evaluate the effect of oat-beta glucan in controlling blood glucose levels among type 2 diabetic individuals.

**Study design**

**Strategy of the research:** In December 2015 I directed an electronic search on the EBSCO host database, PubMed and ScienceDirect using the keywords oat beta-glucan and type 2 diabetes, beta glucan and diabetes, oat beta glucan and blood glucose.

**Study selection**

All studies that were selected had met the following criteria:

1. Only studies that investigated the effect of oat-beta glucan on type 2 diabetics were included.
2. Studies that were on humans only.
3. Randomized Controlled Trials.
4. Have control group.
5. The least dose was 3g of oat beta glucan.

However, there were no restrictions whether the doses were taken in the form of diet or in its pure form.

**RESULTS**

Table 1: Summary of the selected studies.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Control group</th>
<th>Number of participants</th>
<th>Average age of participants</th>
<th>Period of experiment</th>
<th>Dose of beta-glucan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cugnet-Anceau et al</td>
<td>2010</td>
<td>Yes</td>
<td>53 CG:24 EC:29</td>
<td>62 years old</td>
<td>Pre-experiment: 3 weeks to the two groups for adaptation of consuming soups without oat beta-glucan. The period of experiment period: 8 weeks of consuming soup with OBG (experiment group). 8 weeks consuming soup without OBG (Control Group).</td>
<td>3.5 g in form of soup per day</td>
</tr>
<tr>
<td>AL Jenkins et al</td>
<td>2002</td>
<td>Yes</td>
<td>16 males CG:8 EG:8</td>
<td>50 years old</td>
<td>4 weeks</td>
<td>7.3g in form of breakfast cereal, 50g of cereals containing 6.2g of oat beta glucan and 3.7 g in 50 g of oat bread.</td>
</tr>
<tr>
<td>Reyna et al.</td>
<td>2003</td>
<td>Yes</td>
<td>16 men</td>
<td>50 years old</td>
<td>4 weeks</td>
<td>4.6 or 8g in form of breakfast cereals</td>
</tr>
</tbody>
</table>

From searching PubMed database, there were 151 articles investigated the effect of beta-glucan and only 3 studies had met the criteria of this review (Figure 1). The rest of the articles in the PubMed database (148) were excluded because they were mixed between animal studies, vivo or vitro and topics that were not within the focus of this review. The search in EBSCO host yielded 502 articles, but none of them had met the criteria. In ScienceDirect database, there were 635 research investigated the effect of beta glucan and other types of fibers on diabetes and other metabolic and cardiovascular diseases, however, none of these investigations were on the effect of oat beta glucan on human type 2 diabetics. So, the total studies that were included in this review were 3 articles. The average age in all studies was 55 years old. The number of volunteers was varied from 21 to 53. The minimal dose was 3.5 g/per person/per day while the highest dose was 10g. All the doses were in a form of diet and none of them were in its pure shape (eg. capsules or tablets). The most recent RCT study that was investigating the effect of oat-beta glucan on the level of blood glucose among diabetics was done in 2010. The highest dose was 10g while the lowest was 3.5g. The longest period of time for examining the effect of oat beta glucan was for 2 months while the shortest period was for 3 days. The most assessed parameters were glycaemia, insulin level in blood, triglycerides, plasma glucose, HDL-Cholesterol, LDL-Cholesterol, total cholesterol, HbA1c, BMI and palatability (Table 1).
**CONCLUSION**

Based on the results of these three studies and based on the systematic review, oat beta glucan has positive and potential effects in reducing blood glucose among type 2 diabetics. Moreover, there are efficient effects of oat beta glucan in reducing cardio-metabolic risk factors such as cholesterol. However, there is a need for more investigation for long-term effect of oat beta glucan and to be more specific, extracted capsules of oat beta glucan should be among these investigations.

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**Conflict of interest:** None declared  
**Ethical approval:** The study was approved by the Institutional Ethics Committee

**REFERENCES**


