Health Benefits of Chia Seeds' Dietary Consumption

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Abstract

Chia seeds have recently attained great popularity due to its nutritional composition, functional properties and particularly the possible therapeutic effects of its ingestion. The studies which included chia seeds’ supplementation in diets reported several benefits, such as, anti-carcinogenic, anti-inflammatory, anti-obesity (reduction of visceral fat), antioxidant and anti-radical activities, control of dyslipidemia thanks to low-density lipoprotein (LDL) and triglycerides contents reduction and also high-density lipoprotein (HDL) and α-linolenic acid (ALA) levels increase. Furthermore its consumption reduced postprandial glucose levels and improved insulin tolerance. They also can protect the cardiovascular system due to changes in blood lipids and hepatic enzymes activities. Moreover they may help improve hepatic and skeletal muscle function, they may be used for treating skin problems, can be ingested by celiac patients and help control diabetes and hypertension.

Keywords: Health Benefits; Chia Seeds; α-Linolenic Acid (ALA)

Introduction

Currently consumers shift their dietary habits towards healthier food options, especially those which convey an adequate intake of nutrients and present therapeutic effects. This leads to the consumption of products which were abundant and consumed in the past and nowadays are becoming more popular and appreciated. That is the case of seeds, particularly, Salvia hispanica L. seeds (commonly known as chia) which have been incorporated in diets and attained great popularity due to its health benefits and functional properties. Moreover its approval as a Novel Food by the European Parliament allowed its incorporation in several food products, making them available everywhere [1].

Regarding its nutritional aspects, chia seeds are a great source of fat, particularly polyunsaturated fatty acids such as α-linolenic (ALA, n-3, more than 60%, which can be converted into eicosapentaenoic and docosahexaenoic acids, both essential fatty acids to the organism) and linoleic (LA, n-6, almost 20%) acids, presenting a very low n-6/n-3 ratio (around 0.30). They also present high levels of protein (between 16 to 26%, mainly prolamins, glutelins, globulins, albumins) with nine essential amino acids in appreciable amounts (glutamic acid is the most abundant). The carbohydrate content ranges from 23 to 41%. The dietary fibre includes cellulose, hemicellulose, lignin, pectin, gums, mucilage and other polysaccharides and oligosaccharides, with a content of 85% of insoluble fibre. Furthermore they are rich in vitamins (predominantly from complex B [thiamine, riboflavin, niacin and folic acid] and also C and E) and minerals (such as calcium, phosphorus, potassium, magnesium, iron, zinc and selenium). Additionally, the absence of gluten makes them appropriate for celiac patients, being also a source of bioactive compounds with antioxidant activity: chlorogenic and caffeic acids, quercetin, kaempferol, phytosterols, carotenoids, tocopherols and phenolic compounds. They are also free of mycotoxins and have metal levels within safe limits. Nevertheless their composition is dependent on the climate and cultivation region of the plant. The emulsifying properties are another relevant characteristic of chia seeds since they allow the formation of a polysaccharide gel, functioning as a stabilizer and thickening agent useful in the food processing industry. Besides their by-products, such is the case of the oil and the flour, are both industrially added to numerous products [1-3].
Based on the described composition, chia seeds have been related to different therapeutic effects, namely anti-inflammatory and anti-diabetic activities as well as positive effects on cardiovascular diseases and hypertension (consult table 1). In this work, a review is made on the human health benefits proportionated by chia seeds’ ingestion in order to provide an overall, yet comprehensive view, about this grain consumption effects.

**Health benefits of chia seeds ingestion**

Some of the beneficial effects in health of chia seeds reported in literature are summarized in table 1.

<table>
<thead>
<tr>
<th>Effects on health and therapeutic value</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-carcinogenic due to anti-proliferative and apoptotic activities</td>
<td>[4-6]</td>
</tr>
<tr>
<td>Immunostimulant and anti-inflammatory</td>
<td>[7,8]</td>
</tr>
<tr>
<td>Antioxidant activity and antiradical activity</td>
<td>[9-13]</td>
</tr>
<tr>
<td>After chia hydrolysis, low molecular weight peptides with antioxidant activity are produced, enabling damaged tissue repairment</td>
<td>[11,12]</td>
</tr>
<tr>
<td>Anti-obesity activity</td>
<td>[14,15]</td>
</tr>
<tr>
<td>Control of dyslipidemia</td>
<td>[16,17]</td>
</tr>
<tr>
<td>Potential to reduce LDL and increase HDL cholesterol</td>
<td>[5,18,19]</td>
</tr>
<tr>
<td>Reduction in triglycerides content</td>
<td>[7,19,20]</td>
</tr>
<tr>
<td>Increased plasma ALA and decreased n-6/n-3 fatty acid ratio</td>
<td>[16,20-23]</td>
</tr>
<tr>
<td>Reduction of visceral fat or improvements in its deposition</td>
<td>[14,15,19,24,25]</td>
</tr>
<tr>
<td>Reduction of postprandial glucose levels</td>
<td>[26-28]</td>
</tr>
<tr>
<td>Improvements in hepatic function</td>
<td>[14,19,24]</td>
</tr>
<tr>
<td>In vivo improvement of skeletal muscle stamina and function</td>
<td>[17,29]</td>
</tr>
<tr>
<td>Skin disorders treatment in integumentary system</td>
<td>[5,30,31]</td>
</tr>
<tr>
<td>Celiac disease appropriate</td>
<td>[32]</td>
</tr>
<tr>
<td>Control of diabetes</td>
<td>[1,25]</td>
</tr>
<tr>
<td>Improvement in glucose and insulin tolerance</td>
<td>[24,33]</td>
</tr>
<tr>
<td>Protection of the cardiovascular system</td>
<td>[5,34]</td>
</tr>
<tr>
<td>Hypotensive effect and control of hypertension</td>
<td>[5,7,32,35]</td>
</tr>
<tr>
<td>Changes in blood lipids and hepatic enzymes activities improve cardiovascular health</td>
<td>[15,24,25]</td>
</tr>
<tr>
<td>Reduction in thiobarbituric acid reactive substances and carbonyl groups levels</td>
<td>[25,33]</td>
</tr>
</tbody>
</table>

*Table 1: Possible benefits of chia seed consumption categorized by the caused effects on health and its therapeutic value on various conditions.*

**Conclusions**

In general, the results reported in literature describe beneficial results regarding human health improvement, highlighting that the interest which arose behind this seed is valid and chia seeds are an interesting alternative to include in diets. Nevertheless there is still a need for further research in order to confirm results by scientific investigation and take more conclusive interpretations upon the consequences of its intake.

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