Study on the Nutrient analysis of Flaxseeds and its effect on Glycaemic Response

Urmila Vijayan P
Assistant Professor, Department of Home Science, Vimala College (Autonomous), Thrissur, Kerala, India

ABSTRACT

The consequences of having raised blood glucose levels have exhibited profound challenges in the health outcome of millions worldwide. Although there is an intense physiological impact of diabetes, it presents an elevated risk to a myriad of comorbidities like obesity, cardiovascular diseases, metabolic syndrome etc. Incorporation of dietary components high in fibre, antioxidants and functional foods can help improve glycemic responses. Flax seeds are high in fibre, polyunsaturated fatty acids (omega-3 fatty acids), alpha linoleic acid, flavones, minerals like phosphorus, calcium and magnesium. The present study attempts to evaluate the effect of flaxseed incorporated recipe on the glycemic responses of subjects with elevated blood sugar levels. The study also comprises an analysis of the mineral and fibre content of flax seeds available in the local supplies.

keywords: Glycemic response, fibre, functional food, flaxseeds

Corresponding author: urmila_vijayan7@yahoo.co.in
1. Introduction

The physiological impact of elevated glycemic responses is quite intense and an abundance of literature supporting the same is within easy reach. As per the International Diabetes Federation (2016), around 69.1 million people in India have diabetes mellitus and is found to possess second place to China in prevalence. Diabetes makes people vulnerable to many short and long term complications which increases morbidity and mortality [1]. Incidence of diabetes was found to increase due to sociocultural changes including urbanization, changes in dietary pattern and sedentary lifestyle [2].

Although several healthy interventions are recommended to prevent the consequences of high blood sugar levels, a pivotal role is played by the dietary pattern and food choices. Following an active lifestyle, a lower Body Mass Index and inclusion of foods high in fibre, antioxidants, phytochemicals and specific hypoglycemic properties had shown highly beneficial. Flaxseed is rich in omega-3, lignin’s and prebiotics [3].

Flaxseed is among the foods with highest levels of omega 3 fatty acid and also provides lignin (phytoestrogens) [4]. The fibre content of flaxseeds renders its hypoglycemic effect [5]. It was proven that supplementation of flaxseeds (after removal of fats) exhibited enhanced glycemic control and positive impact on lipid parameters of diabetic subjects [6].

2. Materials and Methods

Hundred subjects of 35-65 years were selected by purposive sampling technique from Amala Medical college, Thrissur, Kerala. An interventional cross-sectional research design was implemented. A well designed interview schedule was formulated to elicit the demographic details, anthropometric indices, medical history, and dietary pattern of the subjects. The study comprises a documentation of systematic investigations regarding the socio economic status, personal characteristics and assessment of health status of the subjects was performed. The relation between flaxseeds and glycemic response of the subjects were assessed by an intervention study was conducted in a micro sample (20 subjects). The samples were selected based on their fasting sugar levels (greater than 110 mg/ dl). A flaxseed incorporated recipe was developed for the supplementation study and the health benefits of the developed recipe were popularized in the community. The developed recipe was selected based on the Organoleptic evaluation of the panel members. Biochemical parameters like fasting and postprandial glucose levels of the supplemented subjects pre and post intervention were recorded.

An estimation of nutrients like iron, calcium, and fibre was also performed in the developed flaxseed powder. Estimation of iron was performed by Wong’s method (using the principle of colorimetry). Estimation of calcium was conducted by titration against the reagent standard potassium permanganate. Estimation of fibre performed, using crude fibre analysis AOAC method.

3. Results

3.1 Demographic details and Anthropometric data

Adaptation to the urban culture was found to be the among the key factors that promotes the occurrence of diabetes in countries with emerging economies [7]. Demographic data revealed that majority (76 per cent) of the subjects belonged to the urban locality. And most of them were involved in sedentary work and only 22 per cent of subjects followed the habit of doing exercise. Following an inactive lifestyle coupled with decreased insulin sensitivity (worsened by elevated adiposity), promotes impaired glycemic control along with elevated body weight [8].

Hypertension (57 per cent) and dyslipidemia (57 per cent) were the most prevalent medical conditions. Elevated blood sugar levels increase the chance of cardiovascular diseases, much greater among women [9]. The major symptoms of diabetes observed were weight loss, polyphagia, frequent urination and delayed wound healing.
An elevated Body Mass Index was observed to raise the risk of diabetes [10]. Forty per cent of the subjects had their Body Mass Index above normal levels.

Elevated body weight could affect the action of insulin by promoting the formation of cytokines by adipose tissue (which can trigger vulnerability), which confers a higher chance of developing diabetes [11]. Most frequently used food items by the respondents were cereals, fats and oils and whereas pulses, roots and tubers and other vegetables poultry, meat and products and green leafy were used moderately. A dietary pattern with more dairy products and non vegetarian foods promotes increase in sugar levels in comparison to a vegetarian regime along with sea food [2].

3.2 Nutrient analysis of Flaxseed powder

Roasted flaxseeds (until split) was ground after cooling and mixed with whole wheat flour to prepare chapattis for the intervention study.

According to USDA nutrient database, flaxseed (100 g) provides 27.3 gm dietary fibre, 0.255 gm calcium, and 0.00573 iron. The calcium, iron and fibre content in hundred gram of the developed flaxseed powder were estimated. The results showed that the developed flaxseed powder showed slight decrease in the values compared to the whole flaxseed values.

![Analysis Of Nutrients(gm)](image)

**Estimation of nutrients of the developed flaxseed powder**

*Figure 1*

Intervention study were performed in a selected micro sample (n=20) of subjects and were given ordinary chapattis in day one and flaxseed incorporated chapattis on day two. The fasting blood sugar level and post prandial glucose levels were recorded for both days and the results were compared. It was observed that the post prandial blood sugar values of the subjects after supplementing flaxseed incorporated chapatti were lower compared to the values recorded after supplementing ordinary chapattis.

Flaxseeds render protection from cardiovascular infirmities by its effect on abnormal heart rhythm and blood vessel relaxation [12].
Comparison of mean values of the intervention study (n=20)  

Figure 2

The results of the study were statistically analysed. The results of the study identified a decrease in postprandial blood sugar was observed after the supplementation of flaxseed incorporated recipe which shows the positive influence on blood sugar level by the developed flaxseed incorporated recipe.

Table 1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS</td>
<td>20</td>
<td>147.60</td>
<td>24.38</td>
<td>7.71</td>
</tr>
<tr>
<td>PPBS</td>
<td>20</td>
<td>230.80</td>
<td>29.85</td>
<td>9.44</td>
</tr>
</tbody>
</table>

Conclusion

Flaxseeds have functional properties exhibited by lignans and polyunsaturated fatty acids. Dietary interventions using flaxseed recipe was found to have a positive impact on glycemic response. Dietary choices with high fibre and antioxidant rich foods, along with an active lifestyle and awareness about the symptoms of diabetes can help in better management of the condition as well as a reduction in health risks associated.

References

https://doi.org/10.1152/ajpendo.2000.278.6.E985


