

Nutraceutical Potential of pumpkin (*Cucurbita* sp.) powder, seed, extracts, and oil on diabetes; Mini Review

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Abstract

Diabetes has become a global pandemic which imparts a financial burden on the patients as well as on healthcare system. Researches all over the world have shown that more than 200 plants, possess antidiabetic properties. Members of cucurbit family are the most important one. Experimental studies in animal and human models have depicted the hypoglycemic effect of cucurbit family. These studies also stated that cucurbit promote regeneration of beta-cells of pancreas. The selected pumpkin (*Cucurbitaceae*) seeds were also shown to contain globulins with significant anti hyperglycaemic activity. Administering pumpkin seed powder and seed oil can reduce the side effects of diabetes; improve insulin levels and diabetic's health status. Pumpkin seeds are generally regarded as waste, recently gained significant attention due to their nutritional value and health benefits. Due to the emerging different active components with nutraceutical properties of pumpkin (*Cucurbita* sp.) powder, seed, extracts, and oil. The aim of this analysis is to recognize the nutraceutical potential of pumpkin (*Cucurbita* sp.) seed powder, extracts, and oil on diabetic patients. The component of pumpkin seed is easily available, palatable and cost-effective therapy.

Keywords: diabetes; traditional medicine; hypoglycemic; pumpkin; nutraceutical.

Introduction

Diabetes mellitus (DM) is a metabolic disorder characterized either by insulin deficiency or insulin resistance due to a high level of blood glucose. The prevalence of T2DM is increasing exponentially every year. The number of diabetics is estimated to grow to 380 million by 2030. Therefore, diabetes needs a special attention [1].

There is an elevated risk of Coronary artery disease (CAD), cerebrovascular accidents (CVA) as well as peripheral artery disease and neuropathies in diabetic patients. The adult-onset T2DM usually starts after 30 years of age most commonly between 50-60 years which progresses slowly. Diabetes contributes in the list of five top risk factors for cardiovascular deaths along with hypertension and obesity all over the world [2].

The rapid pace of life, encouraging high-calorie food intake along with poor physical activity, has resulted in significant social problems with obesity and diabetes. Obesity and diabetes have been recognized by the World Health Organization (WHO) as epidemic diseases of the 21st century.

Pumpkin seeds and pumpkin seed oil are filled with unsaturated fatty acids, especially omega3. These seeds are rich in phytosterols, polyunsaturated fatty acids, and trace elements like magnesium, iron and zinc. Pumpkin seeds are also rich in antioxidant and vitamins such as carotenoids and tocopherol. Pumpkin has many health benefits, including anti-diabetic,

anti-carcinogenic, antioxidant and anti-microbial ability [3]. Pumpkin research has been gradually growing over the last decade, concentrating in particular on its health benefits [4].

Discussion

A study conducted by Asteer V. Abd-Elnoor, [2019] done the nutritional evaluation of pumpkin seed and the effect of addition of pumpkin seeds powder and oil on blood level of glucose and fat in diabetic rats. The results showed that pumpkin seeds are rich in carbohydrates, protein, crude fiber and crude oil, many unsaturated fatty acids, especially linoleic and oleic acids. It is also a rich source of antioxidants. Pumpkin seeds powder and oil can be considered as one of foods for controlling lipid profile and blood sugar level in experimental diabetic rats [5].

Mahmoodpoor et al. [2018] stated about beneficial effects of *Cucurbita maxima* in controlling blood sugar level in critically ill diabetes patients [6].

Kushawaha et al. [2017] concluded in their experimental studies that aqueous seed extract of *Cucurbita maxima* has tremendous hypoglycaemic effect and this could be explored further for preparing new antidiabetic agent [7].

Marbun et al., [2017] also observed that both pumpkin flesh and seeds extracts have a variety of phytoconstituents which significantly reduce the blood sugar level [8].

Bayat et al., [2016] did interventions with Cucurbita ficifolia plus probiotic yogurt and observed beneficial effects on lipid profile, blood sugar levels, and C-reactive protein [9].

Teugwa et al., [2013] concluded that there are highest number of globulins in Citrullus lanatus and Cucurbita moschata which has significant anti-hyperglycaemic effects [2].

Sedigheh et al. [2011] observed in their study the effect of pumpkin (Cucurbita pepo L.) powder in controlling lipid and glucose level in diabetic rats. They also observed a significant increase in C-reactive protein (CRP) which is responsible in controlling inflammatory conditions like diabetes. With the effect of low doses of pumpkin powder in these diabetic rats the insulin was decreased as compared to the normal control group ($p < 0.05$) [10].

Title of study	Population of study	Administration of:	Biological activity	Result/conclusion	References
Hypoglycaemic and Hypolipidemic Effects of Pumpkin Seeds Powder and Oil on Alloxan- induced Diabetic in Rats	Animal study (Diabetic Rats)	Pumpkin Seeds Powder and Oil	Hypoglycaemic and Hypolipidemic	The administration of pumpkin seeds powder and seed oil can lower the side effects of diabetes; improve the insulin levels of diabetic rats.	Asteeer V. Abd-Elnoor, 2019
Effect of Cucurbita Maxima on Control of Blood Glucose in Diabetic Critically Ill Patients	Human study (Diabetic Critically ill Patients)	Cucurbita Maxima powder	Hypoglycaemic	Cucurbita Maxima may decrease high blood sugar level effectively in diabetic critically ill patients.	Mahmoodpoor et al., 2018
Evidence based study of antidiabetic potential of C. Maxima seeds – In vivo	Animal study (Mild diabetic rats)	Cucurbita maxima seed extract	Hypoglycaemic and antidiabetic effect	C. maxima seeds have high hypoglycaemic as well as antihyperglycemic profile, managing thereby blood glucose of normal, mild and severely diabetic models.	Kushawa ha et al., 2017
Antidiabetic effects of pumpkin (cucurbitamoschata) flesh and seeds extracts in streptozotocin induced mice.	Animal study (Male mice)	Extracted pumpkin flesh and seed	Antidiabetic	Pumpkin flesh and seed extract contain a variety of phytoconstituents which showed a significant reduction of the blood glucose.	Marbun et al., 2017
Effect of Cucurbita ficifolia and Probiotic Yogurt Consumption on Blood Glucose, Lipid Profile, and Inflammatory Marker in Type 2 Diabetes	Human study (Type 2 Diabetes patients)	Cucurbita ficifolia and Probiotic Yogurt	Lipid profile, glycaemic control	C. ficifolia significantly decreased LDL-C, glycemic control, hs CRP, and blood pressure. The effects were related to C. Ficifolia plus probiotic yogurt.	Bayat et al., 2016
Anti-hyperglycaemic globulins from selected Cucurbitaceae seeds used as antidiabetic medicinal plants in Africa	Animal study (male mice)	Cucurbita seed (proteins extracted, globulins)	Hypoglycaemic	The oral glucose tolerance test showed that the globulins of the seeds of all species caused significant drop in blood sugar.	Teugwa et al., 2013
Hypoglycaemic and hypolipidemic effects of pumpkin (Cucurbita pepo L.) On alloxan-induced diabetic rats	Animal study (Male Diabetic Rats)	Pumpkin powder	Hypoglycaemic and hypolipidemic effects	Low dose pumpkin significantly decreased glucose, triglycerides, LDL and CRP as compared to diabetic group and high dose pumpkin decreased cholesterol.	Sedigheh et al., 2011

Table 1: Summary of Hypoglycaemic and Hypolipidemic effects of pumpkin on diabetes

Conclusion

The above research reviews concluded that the seeds of pumpkin are of medicinal importance and therapeutic significance. The analysis of nutrient composition of pumpkin seeds showed that these seeds are highly nutritious and provide many essential nutrients for health.

Administering pumpkin seed powder and seed oil can lower the side effects of diabetes and enhance insulin level. Most of the researches were performed on animals and very few human studies are available. Therefore, more nutraceutical studies should be encouraged.

Pumpkin is a naturally available food and is cost effective. Intake of Pumpkin (Cucurbita sp.) powder, seed and oil etc in day today life regularly may enhance the health of people in a cost-effective manner and

could be an alternative therapy or adjunct for the treatment of diabetes mellitus.

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