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

Neena Srivastava1, Poonam Sahu1, Monisha Banerjee2
1Department of Physiology, King George’s Medical University, Lucknow, India
2Department of Zoology, University of Lucknow, India

Corresponding Author: Neena Srivastava, Department of Physiology, King George’s Medical University, Lucknow, UP, 226003, India.

Received date: February 03, 2021; Accepted date: March 01, 2021; Published date: March 05, 2021

Citation: N Srivastava, P Sahu, M Banerjee. (2021) Nutraceutical Potential of pumpkin (Cucurbita sp.) powder, seed, extracts, and oil on diabetes; Mini Review J. Endo and Dis; 5(1): DOI:10.31579/2640-1045/063

Copyright: © 2021, Neena Srivastava, This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

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 (Cucurbitaceous) 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.) seedpowder, 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 mostly 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 various of phytosterins 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 antihyperglycaemic 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].

| Tittle of study                                      | Population of study | Administ ration 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. | Bayat et al., 2016 |
| 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 antihyperglycaemic profile, managing thereby blood glucose of normal, mild and severely diabetic models. | Kushawa ha et al., 2017 |
| Antidiabetic effects of pumpkin (cucurbitmoschatadurch) flesh and seeds extracts in streptozotocin induced mice. | Animal study (Malemice) | Extracted pumpkin flesh and seed | Antidiabetic | Pumpkin flesh and seed extracts 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 (Type2 Diabetes patients) | Cucurbita ficifolia and Probiotic Yogurt | Lipid profile, glycaemic control | C. ficifolia significantly decreased LDL-C, glyceamic 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 (malemice) | 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 pepoL.) 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. | Sedighehet 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.

**References**

1. Wild S, Roglic G, Green A, Sicree R, King H. (2004) Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes care. 27(5):1047-1053.
2. Teugwa CM, Boudjeko T, Tchinda BT, Mejiato PC, Zoufou D. (2013) Anti-hyperglycaemic globulins from selected Cucurbitaceae seeds used as antidiabetic medicinal plants in Africa. BMC Complement Altern Med. 13:63.
3. Yadav M, Jain S, Tomar R, Prasad GB, Yadav H. (2010) Medicinal and biological potential of pumpkin: an updated review. Nutrition research reviews. 23(2):184-190.
4. Lestari B, Meiyanto E. (2018) A review: the emerging nutraceutical potential of pumpkin seeds. Indonesian Journal of Cancer Chemoprevention. 9(2):92-101.
5. Abd-elnoor EV. (2019) Hypoglycemic and hypolipidemic effects of pumpkin seeds powder and oil on alloxan-induced diabetic in rats. Egyptian Journal of Food Science. 47(2):255-269.
6. Mahmoodpoor A, Medghalchi M, Nazemiyeh H, Asgharian P, Shadvar K, Hamishehkar H. (2018) Effect of Cucurbita maxima on control of blood glucose in diabetic critically ill patients. Advanced pharmaceutical bulletin. 8(2):347.
7. Kushawaha DK, Yadav M, Chatterji S, Srivastava AK, Watal G. (2017) Evidence based study of antidiabetic potential of C. maxima seeds–In vivo. Journal of traditional and complementary medicine. 7(4):466-470.
8. Marbun NO, Sitorus PA, Sinaga SM. (2018) Antidiabetic effects of pumpkin (Cucurbita moschadurich) flesh and seeds extracts in streptozotocin induced mice. Asian J Pharm Clin Res. 11(2):2018.
9. Bayat A, Azizi-Soleiman F, Heidari-Beni M, Feizi A, Iraj B, Ghasvand R, Askari G. (2016) Effect of cucurbita ficifolia and probiotic yogurt consumption on blood glucose, lipid profile, and inflammatory marker in type 2 diabetes. International Journal of Preventive Medicine. 7.
10. Sedighheh A, Jama MS, Mahbubeh S, SomayehK, Mahmoud RK, Azadeh A and Fatemeh S. (2011) Hypoglycaemic and hypolipidemic effects of pumpkin (Cucurbita pepo L.) on alloxan-induced diabetic rats. African Journal of Pharmacy and Pharmacology 5(23), 2620- 2626.