*ejpmr, 2017,4(9), 42-45.*

**SJIF Impact Factor 4.161**

**EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH**

www.ejpmr.com

Case Report

ISSN 2394-3211

EJPMR

# DOES PUMPKIN AFFECT GLYCEMIC CONTROL IN DIABETIC PATIENT. CASE REPORT AND LITERATURE REVIEW

***Dr. Badi Alenazi, Dr. Asma Deeb, Amal Alrowaili, Abeer Alkhaldi and Muneerah alanazi**

***Corresponding Author: Dr. Badi Alenazi**
Al Yamamah Hospital, Riyadh.
Mail ID: badi1300@gmail.com

**Article Received on 28/06/2017** **Article Revised on 18/07/2017** **Article Accepted on 08/08/2017**

## ABSTRACT

Pumpkin was reported to have hypoglycemic effect. It has been used in asia as traditional treatment for diabetes mellitus. Here we report 12 year old Saudi who is diagnosed as diabetes mellitus type 1. The pumpkin was fed once or twice daily. His blood HBA1C dropped from 10.8% to 8.5% within 2 months of onset of pumpkin introduction. Studies in our detailed literature review showed that pumpkin extract has positive effects on glycemic control and pancreatic β cells; however, most of the studies were done on animals and human study are needed in this field.

**KEYWARDS:** Pumpkin, diabetes mellitus. Cucurbita ficifolia, Trigonelline.

## INTRODUCTION

diabetes mellitus is a metabolic disorder characterized by chronic hyperglycemia due to defects in insulin secretion, insulin action, or both. Diabetes can be classified into two broad categories (type 1 diabetes, which is characterized by an absolute deficiency of insulin secretion; or type 2 diabetes, which results from a combination of resistance to insulin action and an inadequate compensatory insulin secretory response.

For many years, Cucurbita ficifolia (Cucurbitaceae) known as pumpkin was used for management of diabetes mellitus as traditional therapy in Asia.[1] however, the mechanisms of antidiabetic action of this plant are unknown.[2]

We presented a case report of diabetic child who had mild improvement in glycemic control within two months of pumpkin intake.

## CASE REPORT

A 12 year old Saudi boy who is known case as diabetes mellitus type one for one year. He was presented initially with history of polyuria and polydepsaia and weight loss. His initial HbA1C was 14 .4 upon admission. He was on multiple daily injection (basal/bolus regimen) at total daily dose of 1 unit /Kg/day. He was followed up regularly in diabetes clinic. During follow up no noticed improvement in spite of good compliance. He was a product of term pregnancy and delivered by normal spontaneous vaginal delivery. There was no consanguinity between parents.

Vaccination was up to date. Developmental parameters were appropriate for age. He was on family diet and not on strict diabetic diet with average appetite.

On examination he was not dysmorphic, weight, height, were at 25, 25 percentile respectively. Examination of chest and cardiovascular system were normal. There was no hepatosplenomegaly, no skin changes. Child had normal muscle tone and power. No goiter and injection site were not hypertrophied nor atrophied.

Investigations showed Hemoglobin 13.6g dl, white blood cell (WBC) 8.9 $x10^3/\mu L$, Serum urea and electrolytes, Liver function and Bone profile were normal. Celiac disease profile was negative. Thyroid function test was within normal range. Glutamic acid decarboxylase antibodies were positive.

In october and november 2016 The family began to feed him about 200 gram of pumpkin on daily basis up on what they heard from the media. Raw pumpkin is placed in the blender and administered before meals once or twice daily. Every outpatient visit, Random blood sugar and HBA1c have to be done prior to appointment. The home blood glucose was monitored daily for two months and we asked patient family to register quantity of pumpkin consumed in meals for one month. By comparing rates of blood sugar and HBA1c before and after eating pumpkin. A mild improvement was noticed after pumpkin introduction as shown in Table 1.

However, in February 2017. The child stopped eating pumpkin. The last HbA1c was 11.3%. it done on 10 may 2017.

**Table 1: home glucose reading and HBA1c before and after pumpkin introduction.**

| | 14-3-2016 admission | 28-3-2016 outpatient visit Before pumpkin | 18-4-2016 outpatient visit Before pumpkin | 22-8-2016 outpatient visit Before pumpkin | 12-12-2016 outpatient visit 2 months after pumpkin |
|---|---|---|---|---|---|
| HbA1c | 14.4 | 12 | 11.7 | 10.8 | 8.5 |
| Random blood sugar (hospital lab) | 343 mg /dl | 234 mg /dl | 345 mg /dl | 198 mg /dl | 117 mg /dl |
| Average home Prebreakfast Blood glucose | 265mg/dl | 278 mg /dl | 329 mg /dl | 206 mg /dl | 85 mg /dl |
| Average home Pre lunch Blood glucose | 128mg/dl | 308 mg /dl | 109 mg /dl | 188 mg /dl | 123 mg /dl |
| Average home Pre dinner Blood glucose | 480 mg /dl | 132 mg /dl | 87 mg /dl | 112 mg /dl | 166 mg /dl |

## DISCUSSION

Cucurbita ficifolia contain water (94%), fiber (3%), vitamin B1 (0.03mg), calcium (17 mg), iron (0.6 mg), and vitamin C (7 mg).[3] The chemicals within pumpkins, which have *hypoglycemic* properties include polysaccharides from the fruit pulp, oil from ungerminated seeds and protein from germinated seeds.[4,5,6]

Alloxan is an oxygenated pyrimidine derivative, which is a toxic glucose analog and selectively destroys pancreatic insulin-producing cells when administered to animal species As a consequence, IDDM (Alloxan Diabetes) is induced with resultant characteristics similar to type 1 diabetes in humans.[7]

Yongjun Zhang et al. conducted a study to examine the impact of the polysaccharide (PCE-CC) extracted from the pumpkin on diabetic rabbits. The notion behind this study was to observe the efficiency of PCE-CC on reducing Blood Glucose (BG), Triglyceride (TG), Total Cholesterol (TC) and Glycosylated Hemoglobin (HbA1c) in diabetic rabbits. In addition, they also wanted to examine the PCE-CC's impact on the pancreas islet cells. The subjects were rabbits female and male, the rabbits were divided into 4 groups 6 rabbits each. The first group was healthy rabbits and the rest of them were injected with alloxan. The findings showed that the PCE-CC had effective results on diabetic rabbits. The group who was consuming PCE-CC had the most significant decrease in the BG, TG, TC and HbA1c levels compared to the negative group (diabetic), which had increased in the BG, TG, TC and HbA1C levels. Moreover, The impaired Pancreas in the alloxan-induced diabetic rabbits was restored after consuming PCE-CC doses, which concludes that islet cells could be regenerated due to the PCE-CC consumption. Also, the PCE-CC group had increased in body weight in contrast to the negative group.[8]

Shuang Wang et al. conducted a study to test the polysaccharide (PPs) impact on Blood Glucose (BG), fasting serum insulin and hepatic glycogen and islet cells. The subjects were male normal and alloxan-induced diabetic mice, separated to 10 groups 5 mice each. The results showed that the PPs had significant lowering effects on BG in mice. Moreover, the researchers observed the significant increase of liver-glycogen and insulin level in alloxan-induced mice that consumed PPs. Finally, researchers believe PPs could regenerate pancreatic islet cells.[9]

Hui Jin et al. conducted a study to examine the antidiabetic extraction from the pumpkin on mice. The purpose of the study was to extract the polysaccharides (PCE) from pumpkin powder then other chemicals were extracted and purified. After extracting polysaccharides from pumpkin powder, researchers purified PCE and yield seven effective components (PCE- A, PCE-B, PCE-C, PCE-D, PCE-E, PCE-F and PCE-G) in order to inject them in the subjects. The mice were young adult (male and female) normal and alloxan-induced diabetic, they were separated in 20 groups, 10 mice in each. The blood test was measured before and 4, 7 and 11 hours after the injections. The finding showed that PCE with dose 200mg/kg BW had significant effects on BG in normal and diabetic mice. Moreover, PCE-C and PCE-F both had an effective impact on BG level in both normal and diabetic mice after 7 hours, however, the PCE-F kept the low BG level after 11 hours.[10]

Orie YOSHINARI et al. experimented the impact of pumpkin components especially Trigonelline (TRG) and Nicotinic Acid (NA) on non-obese type 2 diabetic (T2DM) rats. The researchers did two experiments, one for pumpkin paste effects, and the other one was for TRG and NA effects. They tested the subject's glucose tolerance, insulin resistance and the hemoglobin A1c, insulin, fasting glucose and adipocytokine levels. The subjects were male rats. They were divided into two groups and five each in the first experiment, the second they were three groups and six each. The finding showed that pumpkin paste, TRG and NA had significant effects on glucose tolerance in T2D rats and reduced HbA1c levels. However, the TRG had more effective results than NA. Moreover, both TRG and NA had positive

effects on triglyceride. They concluded that TRG and NA might have decreased the development of diabetic in rats.[11]

R. Sharmin et al. conducted a study to examine the impact of cucumber, white pumpkin, and ridge gourd extractson Fasting Blood Glucose (FBG) and Lipid Profile in diabetic rats. The subjects were female rats divided into 6 groups, 5 of them were Alloxan induced diabetic rats. The results showed that the cucumber, white pumpkin, and ridge gourd extractions had positive effects on FBG. The cucumber extraction had the most significant effect on lowering blood sugar than the white pumpkin. On the other hand, white pumpkin extraction had the most significant effects on both total cholesterol (TC) and serum triglyceride (TG). Moreover, the cucumber extraction reduced the serum low-density lipoprotein (LDL) efficiently first, then the pumpkin extraction reduced it too. In conclusion, the researchers believe that the cucumber, white pumpkin, and ridge gourd extraction have a positive impact on FBG and Lipid Profile. Also, they suggested adding these extractions as natural treatments alongside the diabetes treatment.[12]

Mohamed Makni et al. conducted a study to examine the effects of flax seeds and pumpkin seeds on Alloxan induced diabetes rats. The researchers tested the blood glucose, insulin level and the Pancreases tissues. The subjects were male rats divided into 3 groups. The results showed that the rats which were fed the flax and pumpkin seed mixture diet (DMS) had an excellent decrease in blood glucose compared to the rats fed the regular diet (DD). Moreover, the observation of the Pancreatic tissues showed that the DMS tissues were regenerated and were similar to the normal tissues. In conclusion, the flax and pumpkin seeds have significant effects on Pancreatic tissues, in addition to reducing blood glucose in rats (3).

Zhiguo Jiang and Qizhen Du conducted a study to understand the effects of Tetrasaccharide Glyceroglycolipids from the pumpkin on decreasing blood glucose. The subjects were mice divided into 5 groups. They extracted QGMG-2 and QGMG-3 from Tetrasaccharide Glyceroglycolipids then they injected them in Streptozotocin- and high fat diet-induced diabetic mice. The results revealed that both QGMG-2 and QGMG-3 had an impact on lowering blood glucose. However, QCMG-3 had a stronger impact on blood glucose due to its chemical structure.[13]

LI QUANHONG et al. conducted a study to observe the impact of the protein-bound polysaccharide (PBPP) obtained by water extraction from pumpkin fruits on Alloxan-induced diabetic rats. The subjects were divided into 5 groups. The finding presented that the PBPP had a major impact on lowering blood glucose. Moreover, this study showed that having big doses of PBPP is more effective.[14]

ZHU Hong-Yan et al. conducted a study to observe the polysaccharides (PP) mechanism in protecting Pancreatic islet cells from Streptozotocin (STZ). The researchers removed the pancreas of the rats then they filtered the islet cells and divide them into six groups. The groups were a control group, negative group, positive group and the rest were induced with (STZ) and treated with different doses from PP. The results showed that STZ toxicity could eliminate islet cell, however, the PP could mostly protect the islet cell from these damage.[15]

## IN CONCLUSION

Our case case demonstrate mild positive impact on glycemic control over 2 months of eating daily pumpkin. however, Studies showed that pumpkin extract has positive effects on glycemic control and pancreatic β cells; however, most of the studies were done on animals. Due to the limited number of available studies, more research, especially human study, are needed in this field.

## REFERENCES

1. Liu Y, Jin H, Xu ZQ, Nan WK, Wang T, Cheng YY. [Effects of pumpkin polysaccharides on blood glucose and blood lipids in diabetic rats]. Zhongguo Ying Yong Sheng Li Xue Za Zhi, 2006; 22(3): 358–61.
2. Acosta-Patino JL, Jimenez-Balderas E, Juarez-Oropeza MA, Diaz Zagoya JC. Hypoglycemic action of Cucurbita ficifolia on Type 2 diabetic patients with moderately high blood glucose levels. J Ethnopharmacol, 2001; 77(1): 99–101.
3. Makni M, Fetoui H, Gargouri NK, Garoui el M, Zeghal N. Antidiabetic effect of flax and pumpkin seed mixture powder: effect on hyperlipidemia and antioxidant status in alloxan diabetic rats. J Diabetes Complications, 2011; 25(5): 339–45.
4. Xiong, X. M. Study on extraction and separation of effective composition of pumpkin polysaccharide and its glucatonic effect. *Chin. Tradit. Patent Med.*, 2000; 22(8): 563–565.
5. Zhang, Y. J. and Yao, H. Y. Composition analysis of pumpkin polysaccharide and its glucatonic effect. *J. Wuxi Univ. Light Ind.*, 2002a; 21(2): 173–175.
6. Zhang, Y. J. and Yao, H. Y. Revealing the effective ingredient in pumpkin for reducing blood sugar. *J. Chin. Cereals and Oils Assoc.*, 2002b; 17(4): 59–62.
7. Gary G. Adams, Shahwar Imran, Sheng Wang, Abubaker Mohammad, M. Samil Kok, David A. Gray, Guy A. Channell and Stephen E. Harding The Hypoglycemic Effect of Pumpkin Seeds, Trigonelline (TRG), Nicotinic Acid (NA) and D-Chiro-inositol (DCI) in Controlling Glycemic Levels in Diabetes Mellitus. Critical Reviews In Food Science And Nutrition, 2014; 54: 10.
8. Zhang Y, Chen P, Zhang Y, Jin H, Zhu L, Li J, et al. Effects of polysaccharide from pumpkin on biochemical indicator and pancreatic tissue of the diabetic rabbits. International Journal of Biological Macromolecules, Oct 1, 2013; 62: 574–81.

9. Wang S, Lu A, Zhang L, Shen M, Xu T, Zhan W, et al. Extraction and purification of pumpkin polysaccharides and their hypoglycemic effect. International Journal of Biological Macromolecules, Jan 30, 2017; 98: 182–7.
10. Jin H, Zhang Y-J, Jiang J-X, Zhu L-Y, Chen P, Li J, et al. Studies on the extraction of pumpkin components and their biological effects on blood glucose of diabetic mice. Journal of Food and Drug Analysis, June 2, 2013; 21(2): 184–9.
11. Yoshinari O, Sato H, Igarashi K. Anti-Diabetic Effects of Pumpkin and Its Components, Trigonelline and Nicotinic Acid, on Goto-Kakizaki Rats. Bioscience, Biotechnology and Biochemistry, May 7, 2009; 73(5): 1033–41.
12. Sharmin R, Khan MRI, Akhtar MA, Alim A, Islam MA, Anisuzzaman ASM, et al. Hypoglycemic and Hypolipidemic Effects of Cucumber, White Pumpkin and Ridge Gourd in Alloxan Induced Diabetic Rats. Journal of Scientific Research, Dec 20, 2012; 5(1).
13. Jiang Z, Du Q. Glucose-lowering activity of novel tetrasaccharideglyceroglycolipids from the fruits of Cucurbita moschata. Bioorganic & Medicinal Chemistry Letters, Dec 10, 2010; 21(3): 1001–3.
14. Quanhong L, Caili F, Yukui R, Guanghui H, Tongyi C. Effects of Protein-Bound Polysaccharide Isolated from Pumpkin on Insulin in Diabetic Rats. Plant Foods for Human Nutrition, 2005; 60(1): 13–6.
15. Zhu H-Y, Chen G-T, Meng G-L, Xu J-L. Characterization of pumpkin polysaccharides and protective effects on streptozotocin-damaged islet cells. Chinese Journal of Natural Medicines, Mar 20, 2015; 13(3): 199–207.