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A review on the hypoglycemic effect of the leaf tea of *Averrhoa carambola*

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Abstract: Diabetes Mellitus is a disorder characterized by an abnormality in the metabolism of carbohydrates, lipids and proteins, considerably increasing blood glucose levels. The classification of DM is made according to etiological factors, being the most well-known type 1 DM, of autoimmune origin, and type 2 DM, a complex multifactorial disorder, caused by the combination of several factors and characterized by the peripheral resistance to insulin. Many species of plants have been used ethnopharmacologically or experimentally to treat the symptoms of diabetes mellitus, among them the leaves of *Averrhoa carambola*. *Averrhoa carambola*, a plant species popularly known as carambola, is probably native to Sri Lanka, although it has been cultivated for centuries in Southwest Asia and Malaysia, being introduced in Brazil in 1817, and its leaves used for producing teas, indicated in the treatment of diabetes mellitus. Diabetes is a global health emergency in the 21st century, since each year more people live with this condition, which can lead to complications and irreversible damage throughout life. So, this work has as its purpose to review the literature on the hypoglycemic effect of teas produced from leaves of *Averrhoa carambola*.

Keywords: *Averrhoa carambola*; Diabetes Mellitus; Hypoglycemic Effect

1. Introduction

Diabetes Mellitus is a disorder characterized by an abnormality in the metabolism of carbohydrates, lipids and proteins, considerably increasing blood glucose levels, being a disorder with a high

incidence in the population. (Rodrigues et al, 2010). According to World Health Organization (WHO), about 16 million Brazilians suffer from diabetes, a figure that grew 61.8% over the last 10

years with Brazil occupying 4th place in the ranking of countries with the highest number of cases.

The classification of DM is made according to etiological factors, being the most well-known type 1 DM, of autoimmune origin, in which the destruction of beta cells by the pancreas occurs, thus causing lack of insulin secretion, and type 2 DM, a complex multifactorial disorder, characterized by the peripheral resistance to insulin, related to sedentary lifestyle and obesity. (Rodrigues et al, 2010).

As diabetes mellitus is a disorder characterized by hyperglycemia resulting from defects in the secretion and /or its action, this hyperglycemia is manifested by symptoms such as weight loss, vision problems, polyuria, polydipsia, and damage/dysfunction/failure of

2. Results and Discussion

Some experiments were observed in the literature on the administration of Averrhoa carambola tea. Rodrigues et al (2010) used two groups (test and control) of diabetics listed in a basic health unit in the municipality of Lajeado, RS, each group containing 11 type 2 DM patients, with each individual respecting some criteria (no previous administration of tea, no renal problems, etc.). The test group used Averrhoa carambola tea during the experiment and the control group did not, and as a final result the authors compared the mean values of their glycemic levels, not observing variation between the glucose levels between the test group in relation to the control group.

Provasi et al (2001) used a phytotherapeutic (hydroalcoholic extract from leaves of Averrhoa carambola) for their experiment, using two species of rodents. Water + 1g/kg amylose or AM + lyophilized extract of carambola leaves was administered to 24-hour fasting mice, and after 30 minutes the animals were beheaded and the blood collected for serum glucose level. Amylose is degraded to glucose promotes a significant elevation of glycemia, but this hyperglycemic effect of amylose is inhibited by lyophilized extract of carambola leaves, therefore the results show that it has an antihyperglycemic effect.

various organs, eyes, kidneys and heart most commonly affected. (Gross et al., 2011).

Many species of plants have been used ethnopharmacologically or experimentally to treat the symptoms of diabetes mellitus, among them the leaves of Averrhoa carambola. (Oliveira et al, 1989 apud Negri, 2005). Averrhoa carambola, a plant species popularly known as carambola, is probably native to Sri Lanka, although it has been cultivated for centuries in Southwest Asia and Malaysia, having been introduced in Brazil in 1817. Its leaves are used for producing teas, indicated in the treatment of diabetes mellitus and widely used in folk medicine. (Gonçalves et al., 2005).

The objective of the present study is to conduct a literature review on the hypoglycemic effect of Averrhoa carambola leaves.

Gonçalves et al (2005) used a single dose of the crude lyophilized extract of Averrhoa carambola in rats to evaluate the hypoglycemic and antihyperglycemic effects in three experimental models of hyperglycemia in rats: type 1 diabetes, glucose intolerance and acute insulin resistance and induced obesity by sodium monoglutamate. Animals with experimental type 1 diabetes had symptoms such as polyuria and glycosuria. At the end of the experiment, the author observed that the extract did not correct the pathophysiological signs of diabetes (hyperglycemia, polyuria, glycosuria) and did not present hypoglycemic activity in normoglycemic and hyperglycemic rats through experimental models of type 1 diabetes, induced acute insulin resistance by DEX and induced obesity.

Ferreira et al (2008) performed an experiment using a hydroalcoholic extract from leaves of Averrhoa carambola in 15-hour fasting rats and others with access to food, separated into two groups (control and EHFC). The rats' blood was collected and some parameters were observed, among which EHFC group (using the extract) presented lower fasting blood glucose, citing some metabolic variables and amino acids that increased the hepatic glucose production. Thus, confirming the reputation of reducing blood glucose.

3. Materials and Methods

A literature review on experiments using tea or leaf extract of *Averrhoa carambola* was carried out between 2001 and 2010 to make a comparative analysis of the authors' results with the purpose of evaluating the hypoglycemic effect of *Averrhoa carambola*.

4. Conclusions

The review concluded that there was no change in glycemia in the experiment conducted on humans,

thus not getting a positive response on its hypoglycaemic effect. For the other three studies carried out on animals, one showed a positive result for antihyperglycaemic effect, another presented a positive result for hypoglycemic effect and the last, negative result for both effects. Therefore, the result is inconclusive and lacking further research.

Conflicts of Interest

The authors declare no conflict of interest

References and Notes

1. RODRIGUES, R. et al. Evaluation of glycemic profile of patients with diabetes mellitus type 2 with or without administration of *averrhoa carambola* infusion. **Scientia medica**, Porto alegre, v. 20, n. 2, p. 161-165, jul. 2010.
2. PROVASI, M. et al. Avaliação da toxicidade e do potencial antihiperlicemiante da *Averrhoa carambola* L. (Oxalidaceae). **Acta Scientiarum**, Maringá, v. 23, n. 3, p. 665-669, mai./set. 2018.
3. GONÇALVES, S. T. et al. Avaliação das atividades hipoglicemiante e anti-hiperglicemiante do extrato hidroalcolico das folhas da *Averrhoa carambola* L. (Oxalidaceae) em modelos experimentais de hiperglicemia. **Acta Sci. Health Sci.**, Maringá, v. 27, n. 1, p. 49-55, mai. 2005.
4. NEGRI, Giuseppina. Diabetes melito: plantas e princípios ativos naturais hipoglicemiantes. **Revista Brasileira de Ciências Farmacêuticas**, São Paulo, v. 41, n. 2, p. 121-142, abr./jun. 2005.
5. FERREIRA, E. B. et al. Hypoglycemic effect of the hydroalcoholic extract of leaves of *averrhoa carambola* l. (oxalidaceae). **Brazilian journal of pharmacognosy**, Cidade, v. 18, n. 3, p. 339-343, jul./set. 2008.
6. GROSS, J. L. et al. Diabetes Melito: Diagnóstico, Classificação e Avaliação do Controle Glicêmico. **Arq Bras Endocrinol Metab**, Porto Alegre, v. 46, n. 1, p. 16-26, fev. 2002.
7. Taxa de incidência de diabetes cresceu 61,8% nos últimos 10 anos. Available online: <https://portal.fiocruz.br/noticia/taxa-de-incidencia-de-diabetes-cresceu-618-nos-ultimos-10-anos> (accessed on 01/09/2018)