African Journal of Biotechnology Vol. 6 (8), pp. 1028-1030, 16 April 2007
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2007 Academic Journals

Short Communication

Prevention of the onset of hyperglycaemia by extracts of *Aloe barbadensis* in rabbits treated with alloxan

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Accepted 25 January, 2007

The ability of a home-made aqueous extract of *Aloe barbadensis* to prevent the onset of alloxan-induced hyperglycaemia was examined and compared with that of a factory-produced gel. Three groups of animals were administered 200 mg/kg body weight of alloxan intraperitoneally. A fourth group of animals was left uninjected. Animals in group 2 also received a uniform administration of 1 mg/ml twice daily oral intake of Aloe gel (the home-made extract) commenced at the same time the alloxan was administered and continued thereafter for the next six days. Animals in group 3 were administered the factory-produced extract in a similar way as was done for animals in group 2. Plasma glucose levels at the end of the experiment were 142.50±6.28, 82.50±2.72, 88.17±1.92 and 94.17±1.51mg/dl for animals in groups 1, 2, 3 and 4, respectively. Alloxan administration possibly resulted in an increase of 51% in the plasma glucose level of animals in group 1 relative to animals in group 4 ($p<0.05$). The results suggest that both the home-made and the factory-produced extracts prevented the onset of hyperglycaemia with the home-made extract appearing to be more potent.

Key words: *Aloe barbadensis*, alloxan, fasting plasma glucose, hyperglycaemia.

INTRODUCTION

Aloe barbadensis has been documented to ameliorate the diabetic condition in human and experimental subjects (Ghannam, 1986; Ajabnoor, 1990; Koo, 1994; Okyar et al, 2001). Other health benefits of this much publicized "miracle plant" (Gjerstad and Riner, 1968) have been clearly highlighted by the scientific community and the practitioners of alternative and herbal medicine (Winters et al, 1981; Danhof and McAnally, 1983; Bland, 1985; Danhof, 1987; Pittman, 1992).

Aloe gel and other products form the plant are produced industrially for commercial purposes and there is a large and ready market for these. However the plant is also increasingly being homegrown and individuals prepare home remedies from it to treat various ailments. Many individuals also use Aloe as a prophylactic. It is taken routinely without any visible sign of disease for the purpose of general well being.

In this study, the inhibitory effects of a home-made extract and a factory-produced one on the onset of hyperglycaemia in rabbits treated with alloxan were compared in order to ascertain whether Aloe prevents hyperglycaemia when it is administered simultaneously with the hyperglycaemic agent. This study also aims at comparing the effectiveness of the much publicized and often expensive industrially made Aloe products with that of home-made preparations by individuals. This will give a clue as to whether Aloe could be used for preventive therapy and not just for curative purposes as is mostly the case at present and will also provide a basis for the justification or otherwise for encouragement to individuals to personally prepare and use Aloe.

MATERIALS AND METHODS

Chemicals

Alloxan was obtained form Sigma Chemical Company St. Louis,

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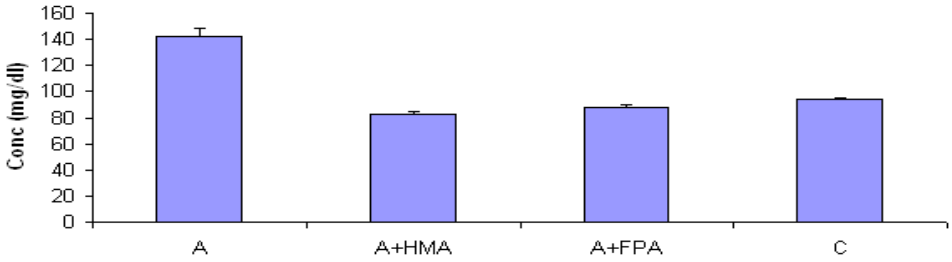

Figure 1. Fasting plasma glucose levels of rabbits treated with alloxan and extracts of aloe. A = Alloxan; A+HMA = alloxan + home-made aloe; A+FPA = alloxan + factory-produced aloe; and C = control.

USA. Glucose oxidase, peroxidase and 4-aminophenazone were obtained from Biotech Laboratories, Surrey, UK. All other reagents were of analytical grade.

Animals and tratement

Male albino rabbits (1.0 - 1.5 kg) were obtained form the Agricultural Farm, University of Ibadan, Nigeria. The animals were housed under standardized environmental conditions and were fed standard diet and water *ad libitum*. The animals were randomly divided into four groups of six animals each. Animals in group 1 received an intraperitoneal administration of 200 mg/kg body weight alloxan. Animals in groups 2 and 3 received the same dose of alloxan and a twice-daily oral intake of the home-made and the industrially-prepared Aloe, respectively, commencing from the time the alloxan was administered and thereafter throughout the duration of the experiment (7 days). Animals in group 4 did not receive any special treatment.

Preparation of extract

The home-made extract was prepared as described previously (Akinmoladun and Akinloye, 2004). The whole gel was used. This was made to a concentration of 50% i.e. 1 g/ml (w/v) and this dose was administered twice daily to animals in group 2. The factory-produced extract was obtained from Forever Living Products, USA and was labeled as 100% Aloe vera gel containing 3% sodium, 4% total carbohydrate, 0% total fat, sugars and protein with unspecified amounts of the following additives and preservatives: sorbitol, ascorbic acid, citric acid, potassium sorbate, sodium benzoate, xanthan gum and tocopherol.

Preparation of plasma

Blood was collected form the dorsal veins of the ear lobes of the animals into tubes containing EDTA (Akinmoladun and Akinloye, 2004). Plasma was prepared by centrifugation for 10 min at 3000 g using an MSE bench centrifuge. The supernatant obtained was used for the estimation of the concentration of glucose.

Glucose assay

Portions of the plasma were assayed for glucose by the glucose oxidase method of Trinder (1969).

Statistical analysis

The results were expressed as means ± SEM. The significance between means was determined using the student's t-test and $P<0.05$ was considered to represent significant differences between means.

RESULTS AND DISCUSSION

Alloxan administration seemed to have led to an increase of 51% in the plasma glucose level of rabbits in group 1 relative to the control (group 4) ($P<0.05$) since there were no other factors that could have been responsible. Both the home-made and industrially-prepared gels prevented the onset of hyperglycaemia as could be seen by a comparison of the fasting plasma glucose (FPG) concentrations of animals in group 2 (alloxan + home-made Aloe) and group 3 (alloxan + industrially-prepared Aloe) with that of animals in group 1 (alloxan only) (Figure 1).

Plasma glucose levels for animals in group 2 and 3 were lower than that for the control (group 4). However, while the difference between plasma glucose levels for animals in group 4 (94.17±1.5 1mg/dl) and animals in group 3 (88.17±1.92 mg/dl) was not significant ($p>0.05$); that between the animals in group 4 and those in group 2 (82.50±2.72 mg/dl) was significant ($p<0.05$) (Figure 1). This probably suggests that the use of the home-made preparation portends the risk of hypoglycaemia, especially in a normoglycaemic subject. It may be stated therefore that although the difference in the plasma glucose levels of animals in groups 2 and 3 was not statistically significant ($P>0.05$), the blood glucose-lowering action of the home-made extract seemed to be more pronounced than that of the factory-produced one, more so when the concentration of the home-made extract was just half of that of the factory produced one.

The hypoglycaemic action of the extracts of *A. barbadensis* was established by this study as has been demonstrated by other workers (Ajabnoor, 1990; Koo, 1994; Akinmoladun and Akinloye, 2004). Much emphasis has been on the curative and ameliorative effect of *A. barbadensis* on hyperglycaemia and diabetes. Findings from the present work suggest that Aloe may be able to prevent these diseased states. Since the simultaneous administration of *A. barbadensis* and the hyperglycaemic

agent inhibited hyperglycaemia, it is reasonable to postulate that pre-treatment with *A. barbadensis* before alloxan administration will also produce a similar effect. This therefore encourages the prophylactic use of the plant.

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