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Original Research Article

Effect of Aloe Vera Juice on Glucose Level among Diabetics in a Selected Old Age Home at Mangalore

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ABSTRACT

Background & Objectives: Diabetes mellitus is a global issue nowadays as the disease proportion and economic burden of its treatment is increasing day by day. In India the average monthly expense for a diabetic is between Rs 3000 to Rs 8000. This makes us to think about an alternate way to treat this kind of conditions. It is assumed that the anti oxidant properties of *Aloe Vera* help to control the hyperglycemia among diabetics, hence the study was aimed to find out the effect of *Aloe Vera* juice on glucose level among diabetics.

Methods: A quasi experimental study design was used. The sample comprised of 50 diabetic subjects of age group between 40-65 years irrespective of gender. The subjects were selected by purposive sampling technique and were allocated in to experimental and control group by lottery method. 20 ml of *Aloe Vera* juice twice daily in an empty stomach for 30 days was administered to the experimental group, where as the control group were only on their routine oral hypoglycemic agents. During the course of time, the PPBS values before the intervention, at 2nd and at 4th week were assessed and recorded.

Results: The paired "t" test was used to compare the effect of *Aloe Vera* juice on blood glucose level within the groups. The t calculated value is (t cal = 2.998 and 2.76) greater than the t table value[t (24,0.05)= 2.02] and the corresponding p values were[(0.007 and <0.001) < 0.05] which shows that there is a difference in blood glucose level before and after the intervention of *Aloe Vera* at 5 % level of significance.

Conclusion: Findings of the study revealed that the administration of aloe vera juice helped in controlling the blood sugar level among Diabetics. Hence *Aloe Vera* can be used as an adjuvant therapy in treating patients with Diabetes.

Key Words: *Aloe Vera*, Diabetics, Effect of *Aloe Vera* on blood glucose, Blood glucose levels.

INTRODUCTION

The latest global figures on diabetes, released by the International Diabetes Federation (IDF) shows that, India is presently with 62 million diabetics stands second after China (92.3 million diabetics), which showed nearly 2 million increases from the previous year. [1] Diabetes is one among those categories of diseases which is mainly due to the changing health habits of the people. Unhealthy food habits, Obesity, age, heredity, lack of exercise, smoking and alcoholism are considered as the risk factors of diabetes. According to the statistics there are more numbers of Asians with diabetics due to the rapid change in lifestyle which leads to obesity. The obesity among children is increasing day by day and obese people are prone to be diabetics soon. Thus, they are forced to lead their life with early

diabetes. [2] Treating diabetes is a major concern among diabetics due to the increasing cost of medications, frequent monitoring of blood glucose level and follow up. The estimated global economic cost of diabetes is 612 billion USD to USD 1099 billion (IDF atlas 2014). [3,4] As we keep on treating Diabetes only with the help of medicines; it turns to be a chronic metabolic disease with micro and macro vascular complications. In addition to it, the adverse effects of anti diabetic drugs also make the life miserable. Thus, it is high time to think of the harmless alternative therapies as an adjunct therapy to treat the diabetes mellitus.

The economic burden and adverse health effects of antidiabetic drug therapy warns us to look behind the ancient times and to pay a little more attention to use the herbal products and other alternative therapy as main stream one. *Aloe Vera* (*Aloe Barbadensis* belongs to *Liliaceae* family) leaf gel is one among this which can produce a positive effect on blood glucose level in adult with type II diabetes [5] Most of the studies on the *Aloe Vera* effect on glycemic level were animal trials [6-10] and other human studies have lacked comparative groups and many had used only very small sample size. [11-14] Hence the present study was aimed to find the effect of Aloe Vera juice on glucose level among diabetics.

AIMS AND OBJECTIVES OF THE STUDY

1. To assess the blood glucose level among the diabetics in a selected old age home.
2. To find the effectiveness of *Aloe Vera* juice on blood glucose level among the diabetics.
3. To find the association between baseline blood glucose level and the selected demographic variables

MATERIALS AND METHODS

Research design and settings

An evaluative approach and pretest posttest control group design (Quasi Experimental) was adopted for the study. The study was conducted in a selected old age home named St. Joseph's Prashanth Nivas, Jeppu, at Mangalore between 2014 August to 2016 July. The researchers opted this place as research setting in terms of availability of samples, feasibility of conducting study and the homogeneity of characteristics among the study subjects.

Sampling techniques and sample size

Purposive sampling was used in this study to select 50 type II diabetic subjects and they were allocated experimental and control group (25 diabetic subjects in each) who met the inclusion criteria. Subjects with; Age ranges from 40 to 65 years irrespective of their gender residing in a selected old age home at Mangalore and Diabetics treated with oral hypoglycemic agents are included in the study. Diabetics with liver and kidney diseases and Subjects who are allergic to Liliaceae (the lily family) were excluded from the study.

Data collection instruments

The baseline data of the subjects were collected by using demographic questionnaire comprises of 12 items which include age, gender, education, previous occupation, duration of illness, duration of old age home stay, diet pattern, frequency of diet intake, frequency of drug intake, physical exercise, habits, BMI and so on. The demographic proforma was given to 09 experts from various departments like Medicine, Nursing and Education to assess the content validity and correction were incorporated before finalizing the tool.

Blood glucose level (PPBS) was assessed prior to intervention, at 2 weeks and at 4 weeks respectively by Accu-Chek glucometer throughout the study. Pretesting of the glucometer has been checked by assessing the blood glucose level (PPBS) of five subjects twice with an interval of 5 minutes and the investigators observed no variations in the results.

Protection of Human Subjects

The research proposal was submitted and presented to the institutional and university ethics committee of Nitte University Mangalore for ethical consideration and obtained it.

Permission was obtained from the concerned authority of St. Joseph's Prashanth Nivas old age home, Jeppu, Mangalore.

Informed consent was obtained from the study subjects after a clear explanation about the study details in their local language and confidentiality of keeping their personal details was assured to them.

Pilot study was conducted in an old age home at Jeppu, Mangalore earlier to find the feasibility of the study.

Data collection procedure

Data collection period was from 1st November to 30th December 2015. A total of 50 type II diabetic subjects who were already on oral hypoglycemic agents were selected by using purposive sampling and allocated in to experimental and control group by lottery method. Baseline information was gathered by using demographic questionnaire. The pretest blood glucose levels were assessed and recorded by Accu-Chek glucometer. The experimental group was administered with 20 ml of *Aloe Vera* juice twice daily in empty stomach for 30 days apartment from the oral hypoglycemic therapy under researcher's supervision and the control received only the routine treatment. Blood sugar levels (PPBS) were monitored prior to intervention (baseline), 2nd week and 4th week for both the control and the experimental groups of study period.

Analysis

Data were analyzed by using descriptive statistics and inferential statistics on the basis of objectives and hypothesis. Demographic data of the subjects were analyzed by using frequency and percentage. The level of blood glucose among subjects were analyzed by using descriptive statistics and expressed in terms range, mean and standard deviation. Effectiveness of *Aloe Vera* juice on blood glucose level at varied intervals was analyzed by "paired t" test. Effectiveness of *Aloe Vera* juice on blood glucose level between the control and experimental group were expressed by using "independent t" test. Association of baseline blood glucose level and demographic variables were analyzed by using chi square and fisher's exact test.

RESULTS

1. Description of Baseline Information of the Subjects

The data obtained through the demographic questionnaire were analysed by descriptive statistics. The subject characteristics were summarized in using frequency and percentage. Out of fifty subject's majority of them were females (74%). Only 18% of the subjects were graduated, Duration of illness was less than 5 years in majority of the subjects. All of them consumed hypoglycemic drugs regularly. Most of them (76%) were not doing exercises regularly. Almost all subjects (96%) were not having any habits like alcohol consumption and smoking. More than half (52%) of the subjects were overweight and obese.

2. Distribution of Blood Sugar Levels among the Subjects

Blood sugar levels among experimental and control group were done by using mean and standard deviation. The range of baseline PPBS in the experimental group was 141-466 whereas PPBS range at 4th week was 84-380. The mean score of baseline PPBS value was 205.68 in experimental group whereas at the end of 4th week this score was significantly lowered to 166.88; same time there was no much variation in the control group's mean blood sugar value (figure 1).

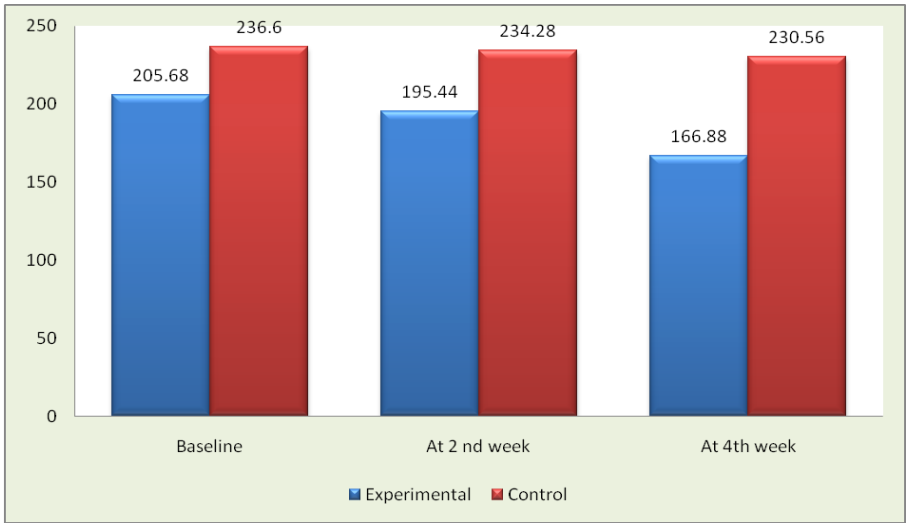

Figure 1: Multiple bar diagram depicting the difference in blood glucose level between the groups n = 50

The above bar diagram shows that the baseline mean glucose level experimental group was 205.68 mg/dl which is gradually decreased to 166. 88 mg/dl by the end of the intervention where as there was no significant change in mean glucose level among control subjects throughout the study.

3. Effect of *Aloe Vera* Juice on Blood Glucose Levels

3.1 Effect of *Aloe Vera* Juice on blood glucose levels at varied intervals

In order to find the significant difference between glucose level before and after the intervention, paired "t" test was used. To test the significance, following hypothesis was stated. **H_1**-There will be a significant difference between the mean pre test and post test score of glucose level among patients with Diabetes Mellitus.

The present study revealed that there was a significant reduction in PPBS level from baseline to post intervention (at 4^{th} week). The mean glucose level at baseline in experimental group was 205.6 and it was reduced to 166.88 at 4^{th} week whereas in control group the change was negligible. It shows the positive effect of intervention. In addition, when compared the mean difference of experimental group between baseline and at 4^{th} week by using paired "t" test, the "p" value was found to be 0.007 which is less than 0.05. Hence there is a significant difference at 5% level of significance. At the same time the control group did not show any significance at 5%level. This clearly states that there is a positive effect of Aloe Vera juice on blood glucose level among diabetics which is depicted in table 1

Table 1: Difference in blood glucose levels at varied intervals within the subjects

Intervals	Experimental Group n =25			Control Group n =25		
	Mean difference	"t" value	P value	Mean difference	"t" value	P value
Baseline – 2^{nd} week	1.02	0.839	0.410	2.32	0.404	0.690
2^{nd} week – 4^{th} week	2.85	4.316	**<0.001***	3.72	0.474	0.640
Baseline – 4^{th} week	3.88	2.967	**0.007***	6.04	0.695	0.494

$t_{(24, 0.05)} = 2.02$

The above table shows that the calculated t value (t_{cal}=4.316 &2.967) is greater than $t_{(24,0.05)} = 2.02$ in experimental group between 2^{nd} -4^{th} week and baseline-4^{th} week and also the p values were < 0.05 and the 'p' > 0.05 in control group at different intervals, so it is concluded that there is no difference in PPBS within subjects at 5% level of significance. So the research hypothesis (H_1) is accepted at 5 % level of significance.

3.2 Comparison of blood sugar levels between the experimental and control groups.

The blood glucose level between the experimental and control group were compared at varied intervals by using independent "t" test. To test the significance following hypothesis was stated:

H_2 – There will be a significant difference in the blood glucose level between experimental and control group. The present study has shown that the t_{cal} (2.113 & 3.568) is greater than t table value 2.06 at 2nd week and at 4th week. Also the 'p' values are <0.05. Hence the research hypothesis H_2 is accepted at 5%level of significance and it is concluded that there is a significant difference in blood glucose level between experimental and control group at 2nd week and at 4th week. (Table2)

Table 2: Comparison of blood glucose levels between the experimental and control group

Group with interval n=50		Mean	S. D	"t" Value	"p" Value
Baseline	Experimental (n =25)	205.68	83.88	1.351	0.183
	Control (n =25)	236.60	77.84		
At 2nd week	Experimental (n =25)	195.44	56.70	2.113	0.04*
	Control (n =25)	234.28	72.17		
At 4th week	Experimental (n =25)	166.88	64.01	3.568	0.001*
	Control (n =25)	230.56	62.17		

$t_{(49, 0.05)} = 2.06$

From the above table, it is clear that "t" calculated valued at 2nd week and 4th week are more the "t" table value and the corresponding "p" values also significant, So the research hypothesis (H_2) is accepted at 5 % level of significance.

4. Association between the baseline glucose levels and selected demographic variables

Association between baseline blood glucose level and demographic variables were analyzed by using chi-square test and fisher's exact test.

To test the association, following hypothesis was stated, **H_3**–There will be significant association between pre test glucose level and the selected demographic variables. The findings suggested that none of the variables have significant association with baseline glucose level. The "p" value was >0.05 (at 5% level of significance) for all the variables which clearly explains that there is no significant association between baseline blood glucose level and demographic variables

DISCUSSION AND CONCLUSION

The present study revealed that there was a significant reduction in blood glucose level from baseline to post intervention (at 4th week) in experimental group which was analyzed by using "paired t test" and "independent t test"(between groups). This clearly states that there is a positive effect of *Aloe Vera* juice on blood glucose level among diabetics. This findings is supported by many other researchers; a level one meta analysis evidence conducted by Minh Q. Ngo(2010) [5] in which five out of seven human studies revealed that there was an effect of oral *Aloe Vera* in reducing blood glucose levels. Another study done by Yongchaiyudha et al [15] selected samples with age 30-60 years that are diagnosed with diabetes. The experimental group was given with one teaspoon of *Aloe Vera* juice twice daily for 42 days. At the intervention researcher could found difference in mean of blood glucose level which explained the effectiveness of aloe on blood glucose level among diabetes.

Present study finding indicates that the *Aloe Vera* has got a positive effect in reducing blood glucose level among diabetics which is very affordable and feasible measure for general public also it is noticed that as the duration of administration increases greater the effectiveness even though in present study the duration of administration of *Aloe Vera* juice was limited to four weeks. No adverse effects and allergic reactions were noted during the administration of *Aloe Vera.*

In contrary to literature [16] present study could not elicit any association between blood glucose level and demographic characteristics which is assumed due to the small sample size and the subject's similar practices within a specific setting like old age home. The generalizability of the finding of the present study is limited due to small sample size also the *Aloe Vera* juice was given to the diabetic subjects along with the routine hypoglycemic agents which could not stop during the interventional period there for an effective control over extraneous effect could not be elicited.

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