EFFECT OF SYZYGIUM CUMINI IN TYPE 2 DIABETES MELLITUS BY ASSESSING GLYCOSYLATED HAEMOGLOBIN AND BLOOD GLUCOSE LEVELS: A DOUBLE BLIND RANDOMIZED CONTROLLED TRIAL

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ARTICLE INFO	ABSTRACT

Key Words

Type 2 diabetes, Homoeopathy, *Syzygium*

Background: Diabetes mellitus is a characterized by hyperglycemia do to insulin resistance, insulin action or both. Type 2 diabetes mellitus is a major health problem in day to day advance life. **Objective:** Ameliorating effect of Syzygium cumini by assessing glycosylated haemoglobin and blood glucose parameters in type 2 diabetes mellitus cases**. Materials and Methods**: Total 30 cases of type 2 diabetes mellitus patients were divided in to 2 groups: control and Syzygium groups. Subjects were instructed to take homoeopathy Syzygium 30 potency (number 40 sizes) was prescribed for these cases and follow up was every one month, three months, six months. Clinical data was assessed at baseline, 3months and 6 months which include an analysis of glycosylated haemoglobin and blood glucose levels. **Results:** Over a period of 6 months, there was a significant reduction in all the clinical parameters which includes blood glucose levels and glycosylated haemoglobin in test group with t test (P=0.001). i.e. *Syzygium cumini* showed significant effect compared to the control Group. Repeated measures ANOVA also showed significant difference (P = 0.0001). **Conclusion**: There is a significant mean reduction in glycosylated haemoglobin and blood glucose levels in type 2 diabetes mellitus base line, three months and six months homoeopathic treatment with *Syzygium cumini*.

INTRODUCTION

Diabetes mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Several distinct types of diabetes mellitus are caused by a complex interaction of genetics and environmental factors depending on the etiology of diabetes mellitus. Factors contributing to the hyperglycemia include reduced insulin secretion, decreased glucose utilization and increased glucose production. The metabolic dysregulation associated with diabetes mellitus causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden On the individual with diabetes and on the health care system. In the United States, diabetes mellitus is the leading cause of end stage renal disease, non traumatic lower extremity amputations and adult blindness. It also predisposes to cardiovascular diseases. With an increasing incidence worldwide diabetes mellitus will be the leading cause of morbidity and mortality for the for seeable future.[1-3] Type 2 diabetes mellitus clinical features are Polyuria, polydipsia, polyphagia, fatigue, genital itching, decrease wound healing. This can be diagnosed with help of random blood sugar, fasting blood sugar, post prandial blood sugar, urine test and glycosylated haemoglobin test. Type 2 diabetes mellitus complications are microvascular

8546

(retinopathy, nephropathy, neuropathy), skin and macro vascular complications (cardiac, cerebral).[4] The wood of the plant is water proof and leaves have a turpentine, pinkish, dark green with a yellow midrib when mature. Syzygium leaves are used for live stock plant has good nutritional values. Syzygium cumini plant start flowering from February to May, plant flowers are fragrant and small about six mille miters in diameter and fruits develop by April to July3 . Syzygium Cumini fruits are oblong dark grey colour and fruits are combination of sweet, sour and stringent in flavor. Cumini fruits single and round or oval to elliptic in shape, outer layer is dark brown and green in colour, mild layer light pink in colour, inner layer of the fruits white in colour. The plants fruit formation take place about 32 days after flowering.[5-11]

MATERIAL METHODS

Period of study: The clinical study was conducted on the cases available at Bharatesh Homoeopathic Medical College, Belagavi, K.A.

Sample Size: The sample consisted 30 cases of type 2 diabetes mellitus complaints visiting the Out Patient Department (OPD), In Patient Department (IPD) and peripheral centers Bharatesh Homoeopathic Medical College, Belagavi, K.A.

Type of study: These thirty cases were allocated by using double blind randomized method.

Inclusion Criteria: Patients of type 2 diabetes mellitus having stable Blood Sugar levels ≥ 7.0 mmol/l and age between 30 to 60 years.

Exclusion Criteria: Patients of type 2 diabetes mellitus and suffering from Chronic Systemic Diseases, Smokers, Chronic Alcoholic, Diagnosed with glucose-6-phosphte deficiency. Allergic to Herbal Medicines, Excluded those are unable to speak English and Hindi.

Investigations: Regular pathological investigations were done to evaluate the status of disease in patients. Fasting and post prandial blood glucose levels were measured on every follow up visit of the patients. Other investigations also done where indicated to patients.

Method: Out of 57 type 2 diabetes mellitus complaints were assessed as per the inclusion criteria, 47 were enrolled using double blind randomized method (figure 1). Diagnoses of the cases were made based on relevant clinical history and fasting blood sugar, post prandial

blood sugar values obtained during the first visit according to current medical diagnosis & treatment guidelines. The *Syzygium cumini* 30 potency was prescribed for the above cases for a period of study and placebos were administered in between if needed. The data were presented in standardized case record (SCR). Participates were allotted sequence by a using coin toss method and dividing the sample in to 2 groups. Randomized codes (L= lateral, M=Medial) were mentioned on the prescription of each participant by treating homoeopathy physician and were sent to homoeopathy pharmacist. The pharmacist was instructed to serve either medicine or placebo to the groups as per the mentioned codes on the prescription. The treating homoeopathy doctor was kept blinded from the code of allocation, strict confidentiality, throughout this study. The code was removed after the end of the trial. The 27 participants were found to be *Syzygium* group, 20 to placebo group. A total of 17 were dropouts and 30 were regular (test 17, control 13). Double blinding was checked early and also during the trial by asking the patient/participants in which group they believed they were doing trial.

Remedy Used: *Syzygium cumini* 30 potency brought from Homoeopathic Pharmacy, Belagavi, Karnataka, India. This *Syzygium cumini* 30 potency (number 40 size) were given twice daily (before food) for a period of study, served in identical amber coloured glass vials and placebo were administrated in between if needed. This was calculated from the study conducted by the council on mouse model where it was found that one drop/kg body weigh has therapeutic effect without any toxic effect. All patients also advised consulate their family physician regularly. Given special instructions to patients to take low calorie, high fiber diet with regular physical exercise and yoga. Also given strike instruction that avoids physical, mental stress, alcohol and tobacco. Any acute complaint arising during the follow up was prescribed the indicated remedy as the prerailies symptomatology suggested. During the 6 months trial, all data were measured and analyzed at entry, after three months and after 6 months of the study by the outcome assesses (blinded AD).

Study design: The duration of study cases registered from Bharatesh Homoeopathic Medical College, Belagavi, K.A. Follow up of the cases depend on severity of the signs and symptoms, preferably once in month and later on 3months once (Figure 1). Clearance was obtained from the Ethics committee of the institution.

8547

Consequently each patients was verbally explained about the study with the help of the patient information sheet and there after a written consent was obtained from them.

Follow up and symptomatic assessment: Each follow up was of first month, third month and sixth months according to the guidelines given in standardized case record follow up sheet where each symptom of the patients pertaining to type 2 diabetes mellitus complaints was graded according to the aggravation, amelioration, presence and absence. An estimation of Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) and glycosylated haemoglobin values for each case was done in the beginning before stating *Syzygium cumini* 30 potency (homoeopathic treatment). Over the period of time, when a patient came for consecutive follow up, Fasting Blood Sugar, Post Prandial blood sugar and glycosylated haemoglobin values of each patient were estimated again, minimum twice, which was after one month, third month and sixth month of homoeopathic treatment.

Statistical analysis: The collected data were analyzed by Mean, SD and ANOVA (analysis of variants).

Research Hypothesis: There is a significant decrease in Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) and glycosylated haemoglobin values in type 2 diabetes mellitus complaints during and after homoeopathic treatment with *Syzygium cumini* 30 potency.

Null Hypothesis: There is no significant decrease in Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) and glycosylated haemoglobin values in type 2 diabetes mellitus complaints during and after homoeopathic treatment with *Syzygium cumini* 30 potency.

RESULT

Among 30 Type 2 diabetes mellitus patients with mean ± SD, maximum cases were observed in age group of 30-40 years in 6 (20%) cases, 40-50 years in 8 (26.66%) cases, 50-60 years of age group had 16 (53.33%) cases (Table 1 – A) and patients were in the male 12 and 18 patients were females out of 30 cases. In clinical research *Syzygium cumini* 30 potency was prescribed to the

patients according to the totality of symptoms and similarity. The observations were made *Syzygium cumini* 30 potency is the most effective medicine for the clinical study. The study of 30 patients showed a ration of male to female subjects was 12 and 18 (Table 1- B). Baseline data for control group and test groups (*Syzygium cumini*) were analyzed on a subject wise basis which has been shown in Mean ± Standard deviation (SD) baseline control group, Fasting Blood Sugar 8.5± 0.27, *Syzygium cumini* group base line was 8.35± 0.33. P value showed that 0.2242. After 3 month in the control group base line was 8.32± 0.20 and *Syzygium cumini* group base line was 8.08± 0.10. P value showed after three month duration of the study was 0.0001.After six month duration in the control group base line was 7.99±0.04 and *Syzygium cumini* group was 5.25 ± 0.69. P value showed after six month was 0.0001 (Table 2). Thirty diagnosed cases of diabetes were studied for a period of six months, fasting blood sugar and post prandial blood sugar levels checked in every 3 month and 6 months (before, during and after the treatment) in mmol/L. The following observation was made in Mean ± SD baseline control group, fasting blood sugar was10.56± 0.28, *Syzygium cumini* group base line was 10.38± 0.82. P value showed that 0.4752. After 3month in the control group base line was 10.15± 0.24 and *Syzygium cumini* group base line was 10.48 ± 0.32. P value showed after three month duration the study 0.0001. After six months duration in the control group base line was 9.33 ± 0.46 and *Syzygium cumini* group was 7.28 ± 0.61. P value showed after six month was 0.0001 (Table 2). Repeated measures ANOVA was performed comparing data obtained at baseline, at three months and six months, which also revealed significant difference between the two groups, both in fasting blood sugar (F= 16.11,266.89); P = 0.001 and post prandial blood sugar (F =79.28,141.86), P = 0.001. Which denotes a significant reduction in all the clinical parameters which includes Fasting blood sugar and post Prandial blood sugar at baseline, three months and six months after homoeopathic administration with *Syzygium cumini* in type 2 diabetes mellitus (Table 2). The study was showed in mean ± SD base line control group glycosylated haemoglobin was 8.81± 0.48, *Syzygium cumini* group base line was 9.00± 0.17, P value showed that 0.1565.

Table 1: Baseline Characteristics.
Distribution of cases according to gender.

Gender	No. of Cases	Percentage (%)
30-40	6	20.00
40-50	8	26.66
50-60	16	53.33
Total	30	100

Distributions of cases according to age group.

Age Group	No. of Cases	Percentage (%)
Male	12	40
Female	18	60
Total	30	100

A)

B) Distributions of cases according to Blood Glucose/ Glycosylated Haemoglobin Levels.

Blood Glucose	No. of Cases	Percentage (%)
FBS	30	100
PPBS	30	100
HBA1C	30	100

F.B.S: Fasting Blood Sugar; PPBS: Post Prandial Blood Sugar

Table 2: Blood Sugar (mmol/L) changes in the two groups over different points in time.

Groups	Baseline	3 Months	6 Months	F value$^{¥}$	P value$^{¥}$
Fasting Blood Sugar (FBS)*					
Placebo (n=13)	8.5 ± 0.27	8.32 ± 0.24	7.99 ± 0.04	16.11	<0.001
Syzygium cumini **(n=17)**	8.35 ± 0.33	8.08 ± 0.10	5.25 ± 0.69	266.89	<0.001
P Value	0.2242 (NS)	0.001	0.001		
Post Prandial Blood Sugar (PPBS)*					
Placebo (n=13)	10.56 ± 0.26	10.15 ± 0.24	9.33 ± 0.46	79.28	<0.001
Syzygium cumini **(n=17)**	10.38 ± 0.82	10.48 ± 0.32	7.28 ± 0.61	141.86	<0.001
P Value	0.4752 (NS)	0.0001	0.0001		
Glycosylated Haemoglobin (HBA1C)*					
Placebo (n=13)	8.81 ± 0.48	8.64 ± 0.53	8.30 ± 0.48	2.50	<0.001
Syzygium cumini **(n=17)**	9.00 ± 0.17	7.57 ± 0.53	5.41 ± 0.44	198.42	<0.001
P Value	0.1565 (NS)	0.0001	0.0001		

$^{¥}$Repeated measures ANOVA was carried out with time as factor versus group for showing difference between the groups, *Independent t test was carried out for showing the difference between the groups at each time point. i.e. at 3 months and at 6 months.

After 3month in the control group base line was 8.64± 0.53 and *Syzygium cumini* group base line was 7.57 ± 0.53, P value showed after three month duration the study 0.0001. After six months duration in the control group base line was 8.30 ± 0.48 and *Syzygium cumini* group was 5.41 ± 0.44, P value showed after six month was 0.0001 and F value showed in glycosylated haemoglobin was 2.50,198.42 (Table 2).

DISCUSSION

Diabetes mellitus is a chronic condition, which known as hyperglycemia, due to an absolute or relative lack of insulin. Diabetes mellitus has emerged as a major health problem in developing countries. It was observed that there was a significant reduction in Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) and glycosylated haemoglobin values in base line, three months and six months of *Syzygium cumini*. Up to now *Syzygium cumini* has not been used widely in maintenance patients with type 2 diabetes mellitus. In this trial we examined a dentifrice form containing *Syzygium cumini* homoeopathy drug to evaluate its effects on type 2 diabetes mellitus. The results of this clinical study of *Syzygium cumini* study suggests that the Homoeopathy *Syzygium cumini* is sufficiently safe and effective in the treatment of diabetes mellitus (type two) as compared to the placebo group. This study demonstrates a significant reduction in the mean of Fasting Blood Sugar (FBS), Post Prandial Blood Sugar (PPBS) and glycosylated haemoglobin when comparing results of the *Syzygium cumini* with the placebo group. The diabetes mellitus cause serious complications to human body. It leads to acute complications as well as chronic complications (macrovascular). Therefore, it is suggested that more studies must be designed to find out the exact antidiabetic effects of Syzygium cumini on type 2 diabetes mellitus. The reviews concluded positive outcome in controlling in diabetes mellitus (type two) with allopathic drugs (antidiabetic). But Homoeopathic medicine *Syzygium cumini* was not prescribed in none of the reviews studies and constituent studies. The reviews also recommended that further pragmatic trails including clinical trials and observational studies been conducted.

CONCLUSION

The research shows that significant reduction in blood glucose levels with *Syzygium cumini*. *Abroma Augusta* plays an important role in the treatment of type 2 diabetes mellitus. There was no side effective during the treatment and it can be concluded that homoeopathic *Syzygium cumini* can be help the patient to take a new lease on life. During the study it was observed that in almost all the cases the homoeopathic medicine *Syzygium cumini* responded well and the patient not only got rid of the main complaints of type 2 diabetes mellitus but also got rid of the associated complaints with restoration of health. With the help of use of *Abroma Augusta* mother tincture even complication was reduced. Thus we can conclude that *Syzygium cumini* used with holistic approach is very effective in treating the cases of type 2 diabetes mellitus.

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