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Original Article

A Comparative Study of Allopathy and Ayurveda Medicines in the Treatment of Type 2 Diabetes Mellitus and its Clinical Impact

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ABSTRACT

Background: Type 2 Diabetes Mellitus (T2DM) is a complex disorder that has major health and economic consequences. Human beings have been using the herbal and allopathic systems of medicine since a long time to cure, treat, diagnose and prevent various disease and ailments. One such example is T2DM. In Ayurveda, the corresponding term for Diabetes is "*Madhumeha*" Unlike the ayurvedic system; the allopathic method is more scientifically proven, regulated and developed since decades. **Aim:** This work comparatively analyzes the Allopathic and Ayurveda treatment in T2DM patients. **Materials and Methods:** A Prospective Longitudinal Study was conducted in 2 tertiary care teaching hospitals that enrolled 100 patients each in Allopathy and Ayurveda groups. **Results:** Out of 200 patients, male patients were higher in number. The prevalence was higher in the 50 – 60 years age group which has been a greater risk factor for developing diabetes. We have used the Kuppuswamy Scale for the socio-economic categorization in this study and found Lower Middle-class patients were higher in the Allopathy study group and Upper Lower-class patients were dominant in the Ayurveda study group. **Conclusion:** Better glycemic control was achieved with the Allopathy group over Ayurveda group (*p* Value: 0.0468*). Random Blood Sugar levels were reduced in the allopathy group which was statistically significant (*p* Value: 0.0308*) compared to the Ayurveda group.

Keywords: Allopathy, Ayurveda, Clinical Impact, Comparative study, Diabetes Mellitus.

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INTRODUCTION

Diabetes is one of the largest global health emergencies affecting about 537 million adults worldwide. This number has been anticipated to surge up to 643 million by 2030 and 783 million by 2045. Over 3 in 4 adults with diabetes live in low and middle-income countries.[1] India ranked second in the world for diabetes prevalence and is also the host of the two prevailing systems of medicine: Ayurveda and Allopathy.[2] Globally, diabetes affects people of all ages and their families, while also putting significant economic strain on national economies and healthcare systems.[3] Diabetes risk factors include ethnicity, age, obesity and physical inactivity, an unhealthy diet, and behavioral habits, as well as genetics and family history.[4] It has also been estimated that about 57% of diabetic adults in India, i.e., nearly 43.9 million people, are undiagnosed.[5] Though some of the population is diagnosed with this endocrine disorder, those patients don't know which treatment they should prefer and which is better as there are numerous varieties of treatments available for diabetes such as Allopathy, Ayurveda, Siddha, Naturopathy, Unani and so on.[6,7] Amongst them, Allopathy and Ayurveda is preferred by majority of the population.

Allopathic treatment modalities for diabetes have their own side effects and adverse effects, such as hypoglycemia, nausea, vomiting, electrolyte imbalance, abdominal bloating, discomfort, headache, weight gain, lactic acidosis, anemia, dyspepsia, dizziness, and joint pain, whereas traditional Ayurvedic treatments have fewer side effects.[8] Further, the complexity, side effects, and high cost of treatment associated with allopathic medicines have led both health care practitioners and majority of the world's populations to seek alternative therapies. Controlling blood sugar, blood pressure, and blood lipid levels can help to prevent or delay the onset of diabetes complications. Diet, exercise, and lifestyle changes are all important factors in the successful management of Type 2 Diabetes Mellitus (T2DM).[8]

Diabetes prevention and management has been a challenge in India due to numerous obstacles such as a lack of surveillance data, multicentered studies, awareness regarding diabetes and

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its risk factors and complications, access to health care services, access to affordable medicines, and so on.[5] This study aims to compare ayurvedic and allopathic therapeutic approaches in the management of T2DM, as well as the clinical impact in terms of effectiveness, in order to provide a better understanding. Also, the demographic, socio-economic and regional criteria have been compared between both the medicinal systems in this study to correlate the risk factors and incidence of diabetes.

MATERIALS AND METHODS

Study Design and Duration

This was a Prospective Longitudinal Study conducted for a period of 12 months.

Study Setting

This study was conducted in Parul Sevashram Hospital and Parul Ayurved Hospital located in Waghodia which is 20 km away from Vadodara city, Gujarat. The hospital is 750 bed teaching and referral hospital which provides general out patient, inpatient and emergency services in Waghodia and neighboring regions. Diabetes Mellitus ambulatory clinic, one of the specialty units of Medicine department is providing medical services to hundreds of Diabetes patients.

Sample size

The estimated number of subjects for this study was 200 with 95% confidence interval.100 diabetic patients from each; Ayurveda and Allopathy group were enrolled.

Preparation of Data Collection Tool

A suitable data collection tool was developed by referring to research articles from the scientific literature and the same was approved by the Doctoral Research Committee (DRC). The data included in the form was regarding demographic details of patients, Random blood Sugar (RBS) and Glycated Hemoglobin (HbA_{1c}) values.

Study Procedure

All the Blood collections were done in Parul Central Laboratory using EDTA blood for HbA_{1c} and Fluoride plasma for RBS sample collection. Quantitative Estimation was done using Boronate Affinity Chromatography (BAC) and Glucose Oxidase Method (GOD) for HbA1c and RBS respectively which will show unbiasedness towards all the participants and their blood test results.

Ethical Statement

The study protocol was submitted to the institutional human ethics committee and the same was approved prior to the data collection (PUIECHR/PIMSR/00/081734/3205)

Methodology

The OPD and in-patients were initially screened for inclusion criteria and the patients satisfying the study criteria were enrolled in the study after obtaining informed consent form.

Inclusion Criteria

- Patients of either gender.
- All the middle aged (30-55) and older people (56-80).
- Patients who are newly diagnosed with T2DM or already on medications.
- T2DM patients with the complications of obesity and/or hypertension.
- Diabetes patients only on individual therapy either on allopathy or ayurveda.

Exclusion Criteria

- All the nursing mothers.
- Patients with gestational diabetes.
- Patients in coma stage.
- Patients with any other complications except mentioned above in Inclusion criteria.
- Patients on both the therapy.

Informed Consent Process

Patients were provided with the Informed Consent Form and Patient Information Sheet. Also, expected benefits and outcomes of the study were explained to them. A group of 100 patients were enrolled in each study site (Allopathy and Ayurveda).

Sample Collection

The laboratory technician collected the patient's blood sample which was sent to the laboratory for measurement of blood glucose level (RBS, HbA_{1c}). The prepared reports were cross verified by the laboratory in charge and issued to the patients. After collecting all the relevant patient data, comparative results were analyzed for both systems of medicine.

Data Analysis

Data analyses were performed using Graph Pad Prisms software (Version 5.01) and Microsoft Excel (version, 2019). Data were interpreted using the descriptive statistics and the results were represented as percentage of the correlation of the different parameters. The p-value less than 0.05 was considered as statistically significant at 95% confidence interval. The quantitative data were calculated in terms of mean and standard deviation. The findings were presented with aids of table and graphs.

Table 1: Demographic categorization of patient data according to system of medicine.

Variables	Category	Total Number of participants	Percentage (%)	System of medicine	
				Allopathy	Ayurveda
Age	30 - 40	19	9.5	08	11
	41-50	47	23.5	23	24
	51-60	68	34	35	33
	61 - 70	58	29	29	29
	71 - 80	08	4	5	03
Gender	Male	123	61.5	67	56
	Female	77	38.5	33	44
Residence	Rural	74	37	22	52
	Urban	126	63	78	48
Socio Economic status	Upper (I)	19	9.5	10	9
	Upper Middle (II)	24	12	15	9
	Lower Middle (III)	76	38	24	52
	Upper Lower (IV)	51	25.5	36	15
	Lower (V)	30	15	15	15

RESULTS

Demographic Categorization

The demographic categorization of the enrolled patients was done with respect to age, gender, residence and socioeconomic status and associated system of medicine (Table 1). Majority of the patients (34%) belong to the age category of 51-60 years. The study included 123 male patients and 77 female patients giving a total of 200 patients from both the study sites where 74 participants were from rural and 126 were from urban population. Most of them (38%) were from lower middle class according to Kuppuswamy scale for grading of socio-economic class.

Comparison of HbA1c in Allopathy and Ayurveda Study Groups

100 participants from each study group were enrolled and the comparison between Allopathy and Ayurveda was done with respect to HbA1c levels (Table 2). In Allopathy, the lowest and highest values were 4.5 and 15 respectively while the Ayurvedic study group had lowest value of 5.6 and highest value of 14.6. The average of blood glucose levels were obtained in Allopathy and Ayurveda study groups and were found as 92.36 and 108.63 respectively. The two tailed probability *p* value is 0.0468.

A difference was sort between Allopathy and Ayurveda for HbA1c. It was seen that the Allopathy group had better control over the Ayurveda group and also statistically significant.

Table 2: Comparison of HBA1c in allopathy and ayurveda study groups.

Variables	Allopathy	Ayurveda
Sample size	100	100
Lowest value (%)	4.5	5.6
Highest value (%)	15.0	14.60
Median	7.1	8.0
95% CI for median	6.9 to 7.81	7.7 to 8.2
Average	92.36	108.63
Mann-Whitney test: Two - tailed probability *p* value: 0.0468*		

Table 3: Comparison of RBS in Allopathy and Ayurveda study groups.

Variables	Allopathy	Ayurveda
Sample size	100	100
Lowest value (mg/dL)	92.0	71.0
Highest value (mg/dL)	522.0	781.0
Arithmetic mean	178.4	207.8
95% CI for mean	162.7 to 194.0	186.0 to 229.6
Standard deviation	78.8	109.8
Two - tailed probability *p* value: 0.0308*		

Comparison of RBS in Allopathy and Ayurveda Study Groups

Random Blood Sugar (RBS) were tested in all the study participants from both study groups (Table 3). Lowest values of 92 and 71 were obtained while highest values of 522 and 781 were observed with standard deviation of 78.8 and 109.8 in Allopathy

and Ayurveda respectively. The *p*-value obtained for this study was 0.0308.

There was a difference between Allopathy and Ayurveda for RBS. It was seen that the Allopathy group had better control over the Ayurveda group and they are statistically significant.

DISCUSSION

Diabetes is a major health issue causing elevated blood glucose levels due to insulin deficiency as well as the development of glucose intolerance in diabetics. Its impact is mainly caused by rapid industrialization, poor dietary habits, and a sedentary life style. Obesity, risk of stroke, and cardiovascular diseases all seem to be major conditions that diabetic patients encounter as the disease develops. To manage T2DM in diverse populations, sensitive and evidence-based interventions must be established, reviewed, and incorporated. This study aims to compare two systems of medicine i.e., Allopathy and Ayurveda. Study sites were selected accordingly, for information regarding the treatments and enrollment of participants suffering from diabetes mellitus and their blood sugar levels were recorded. We designed this comparative study based on the clinical outcomes and effectiveness of both the systems of medicine.

Nordstrom, Anna *et al*. published a research article saying prevalence of T2DM is seen more in men than women.[6] Same was observed in our study as 61.5% were male and 38.5% were females.

For the regional view, it was rural and urban. Out of 200 participants, 74(37%) were from rural population and 126(63%) were from urban population. In rural, out of 74 patients,22 had been following allopathy and others followed ayurveda system of medicine but it was opposite in case of urban population where 78 people were following allopathy and 48 were following ayurveda therapy. It has been observed that rural population believes in Ayurveda treatment while urban population believed more in allopathy therapies. Similar thing was explained by Pandey *et al*.[9] and he wrote that around 70% of Indian rural population prefers traditional ayurvedic medicines over other systems of medicine. Along with this most of the people also rely on allopathic medicines in which metformin is widely used.[10,11]

All the participants were divided in 5 different groups named Upper (I), Upper Middle (II), Lower Middle (III), Upper Lower (IV), Lower (V) according to Kuppuswamy Scale for grading socioeconomic class based on their education, family income and social wellbeing.[12] Majority of the participants belonged to the lower middle class (*n*=76, 38%). Following that, 51(25.5%) were from upper lower, 30(15%) were from lower, 24(12%) were from upper middle and 19(9.5%) were from upper class. It was observed that Allopathy therapy was followed by majority of upper lower-class participants and Ayurveda was followed majorly by lower middle-class participants.

Diagnostic laboratory parameters such as RBS, HbA1c were recorded for all the patients, where highest and lowest RBS of 522.0mg/dL, 92.0mg/dL and 781.0mg/dL, 71.0mg/dL were found in allopathy and ayurveda candidates respectively with *p* value of 0.0308. For HbA_{1c} the highest and lowest values were 15.0%, 4.5% and 14.6%, 5.6% respectively in allopathy and ayurveda therapies (*p* value - 0.0468). The significant difference can be seen in both the therapies in view of clinical impact and effectiveness of the therapies.

Limitations of the study

Fasting Blood Sugar (FBS) is suggested as the best and the most common test with the cut off points < 126 mg/dl. However, there are some issues about using FBS such as keeping the patients fast for about 8 hr and not being applicable in the afternoon.

In addition, another limitation of our study was, we did not use multiple RBS and HbA1c test, which have more accuracy, any complicated test could increase the percentage of missing data; therefore, we relied on the result of single values.

CONCLUSION

Significant improvement in clinical outcome was observed in Allopathic treatment compared to traditional Ayurvedic treatment as better glycemic control was seen in the allopathy treatment. Although there are some advantages and disadvantages in both the systems of medicine, Allopathy was found to be more beneficial in treatment of T2DM as compared to Ayurveda.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

T2DM: Type 2 Diabetes Mellitus; **RBS:** Random Blood Sugar; **HbA1c:** Glycated Hemoglobin, **EDTA:** Ethylenediamine tetraacetic acid; **BAC:** Boronate Affinity Chromatography; **GOD:** Glucose Oxidase Method.

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