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Original Article

Impact of Structured Medication Therapy Management on Type 2 Diabetes Mellitus and Hypertension as Associated Co-Morbidity

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Abstract

Background: Effective management strategies using pharmacological and lifestyle interventions can improve patient outcomes among those with hypertension and type 2 diabetes mellitus (T2DM). Objective: To understand the efficacy of an integrated intervention strategy to enhance clinical outcomes in hypertension and T2DM patients following 24 follow-ups. **Methods:** RCT of 96 participants was utilized with intervention and control groups. A combination of pharmacological adjustment, lifestyle modification, and patient education was given to the intervention group, and standard care was given to the control group. The primary outcome measures were the systolic blood pressure (SBP), diastolic blood pressure (DBP), random blood sugar (RBS) and glycated haemoglobin (HbA1c). Paired t-tests and ANOVA were performed to do statistical analysis. **Results:** The reduction of SBP (mean reduction of 20.36 mmHg) DBP (mean reduction of 7.17 mmHg), RBS (mean reduction of 44.26 mg/dL) and HbA1c (mean decrease of 0.89%, $p < 0.001$) was found in the intervention group, being reduced significantly compared to that in the control group. Although the improved age and sex balance ensured the reliability and generalizability of the findings, the improvements were consistent at all levels of severity. **Conclusion:** Integrated intervention strategy produced an effect on blood pressure, glycemic control, and clinical events that were greater than with standard care. These findings have important implications for the multidimensional treatment approaches to manage hypertension and T2DM. Finally, the study serves to lay the foundation for future research on integrated models to optimize patient outcomes and health care efficiency.

Keywords: *Hypertension; Medication Therapy Management; Patient Outcomes; Quality of Life; Type 2 Diabetes Mellitus*

Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic state of insulin resistance coupled with defective insulin secretion that leads to hyperglycemia (Liu *et al*., 2020). This condition contributes to the global disease burden, with its prevalence increasing over the past two decades due to rapid urbanization, physical inactivity, and changes in nutrition (Chung *et al., 2020).* According to the IDF's estimation, diabetics globally are likely to rise from 537 million in 2021 to 783 million by 2045, and over 90% of all global diabetes is T2DM (Sun *et al*., 2021). India is the existing peak diabetes belt of nations, with a concentrated 101 million individuals with diabetes in the year 2023 (Kumar *et al*., 2023). The onset of T2DM is a complex process influenced by multiple determinants, including environmental, genetic, and lifestyle factors (Kolb & Martin, 2017). Resistance to insulin peripherally in muscle and fat tissue and progressive loss of pancreatic β-cells result in hyperglycemia. Central risk determinants are lack of physical exercise, poor diet, psychosocial stress, socioeconomic determinants, and obesity. Ethnic and

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genetic susceptibility have been found through studies to be the strongest determinants of diabetes, and South Asian populations are more insulin resistant and are at higher risk of developing diabetes at lower body mass index (BMI) levels than Western communities (Vijayakumar *et al*., 2018).

T2DM is one of the top causes of microvascular (retinopathy, nephropathy, neuropathy) and macrovascular (cardiovascular disease, stroke) complications with high morbidity and mortality worldwide (Harding *et al*. 2018). Epidemiological transition has accelerated the emergence of diabetes in India, particularly in the urban community, due to changes in lifestyle leading to an epidemic in the younger population. The ICMR–INDIAB study also showed that diabetes rates are increasing in rural populations, highlighting the urgent need for rigorous interventions (Ranasinghe *et al*., 2021). The best evidence for T2DM practice includes drug therapy plus lifestyle modification plus patient self-management. Nutrition, access to health care, and culture affect Indian diabetic patients' drug compliance and QoL. Results have indicated culturally specific interventions, such as traditional food modification, yoga, and community intervention, to enhance diabetes self-care and QoL (Mishra *et al*., 2021). Because of the high healthcare system and disease burden of T2DM, new and culturally modified strategies need to be employed to achieve optimal diabetes control and prevention of complications. Policy interventions for such a condition, community interventions, and evidence-based interventions can improve the health and QoL of T2DM patients (Caballero, 2018).

Hypertension, or high blood pressure, is a chronic medical condition of consistently elevated arterial blood pressure that makes the patient prone to cardiovascular disease, stroke, and renal failure (Singaraju *et al*., 2019). Hypertension is a public health issue worldwide and has been referred to as a "silent killer" since it normally does not manifest with symptoms or signs at the onset. The study was conducted by Ralapanawa and colleagues in 2018. According to the World Health Organization (WHO), in 2021 there was an estimated total of 1.28 billion hypertensive adults worldwide, where only 42% were treated and diagnosed appropriately (Zhou *et al*., 2021). India is also facing an increasing epidemic of hypertension involving an estimated total of about 220 million adults in 2023 due to urbanization, lifestyle changes, food habits at the time of eating, and increased levels of stress (Gupta *et al*., 2023). Hypertension is a result of interaction among genetic, environmental, and life determinants in a multifactorial way (Zappa *et al*., 2024). It is mainly divided into primary (essential) hypertension, which happens in more than 90% of cases and has no known cause, and secondary hypertension, which is caused by other diseases like kidney or hormone problems. The most severe risk factors are obesity, excess salt consumption, physical inactivity, alcohol consumption, smoking, stress, and family history. Indians and South Asians have also been reported to be at risk for the complication of hypertension since they are prone and have poor levels of awareness and treatment (Al-Jawaldeh & Abbass, 2022).

Hypertension is an international cardiovascular disease (CVD), stroke, and chronic kidney disease (CKD) risk factor and an important cause of morbidity and mortality worldwide. Hypertension grew in India, particularly in urban areas, with physical inactivity and nutrition transition, and thus contributed more to the youth population (Oparil, 2018). The India Hypertension Control Initiative (IHCI) promotes mass treatment and screening at an early stage since studies have established that nearly 50% of the Indian hypertensive population remains undiagnosed. Rural communities are also experiencing a growing prevalence, and therefore, some awareness and access to care need to be provided (Kaur *et al*., 2022).

Management and Quality of Life Issues

Severe high blood pressure should be controlled at a global level, e.g., with medications, lifestyle adjustments, and patient care. Dietary modification (e.g., the DASH diet), exercise, low tension, and blood pressure monitoring following care are useful (Chow, Chow & Gupta, 2019). Cultural determinants of indigenous culture and access to health care influence QoL and adherence in India. Evidence suggests that incorporating community-based interventions, Ayurveda, and yoga into regular medical management can improve patient outcomes and management of hypertension. (Bheenaveni 2016). Since the prevalence and impact on the patient and the health-care system are increasing, fresh and ethically valid interventions have to be fostered in due time. Building better health-care facilities, raising

awareness, and using proven methods from lifestyle changes are important steps to manage hypertension and related health issues (Treciokiene *et al., 2017).*

The coexistence of these conditions presents a compounded challenge for healthcare providers, requiring complex medication regimens that can be difficult for patients to manage effectively. Medication Therapy Management (MTM) aims to optimize therapeutic outcomes by ensuring that medications are used appropriately and effectively. Medication Therapy Management, or MTM, is an integrated, patient-centered service whose goal is to optimize the utilization of medications and the patient outcome, particularly for those with chronic diseases (Ferreri, Hughes & Snyder, 2020). MTM care is more than checking medication but rather a series of individualized step-by-step interventions that take into account a broad range of variables, from patient and caregiver education and care planning on an individual level through to frequent follow-ups assessing medication effectiveness as well as safety. Bringing MTM into the management of long-term diseases is particularly important for conditions like Type 2 Diabetes Mellitus (T2DM) and Hypertension (HTN), which often occur together and require occasional medication. MTM interventions conducted effectively will assist with better medication compliance, medication side effect reduction, and overall quality of life improvement (Li *et al*., 2023). The rising incidence of T2DM and HTN is a public health condition that must be managed by highly structured and evidence-based programs to maximize care for the patient. Non-adherence to medication and partial control of the disease tend to result in catastrophic complications like cardiovascular diseases, renal failure, and neuropathy. Unstructured management contrasts with existing practice, which primarily focuses on disease-care treatment rather than patient-oriented care. MTM use addresses this gap by providing healthcare practitioners with a comprehensive system that enhances medication safety and therapeutic effectiveness through patient integration (Axon et al., 2021).

This research utilizes an RCT with pre- and post-test to establish the effect of MTM interventions in HTN and T2DM patients. The research will last for six months with 96 patients split into two equal groups: an intervention group (48 patients) receiving structured MTM services and a control group (48 patients) receiving regular treatment without MTM interventions. The control group includes T2DM and HTN patients but without any MTM interventions. They receive their usual prescribed treatment without any additional adherence interventions, lifestyle modifications, or official follow-ups. The purpose is to compare their natural patterns of adherence, drug efficacy, and global health outcomes with the intervention groups. The intervention group is further stratified by HTN and T2DM severity. MTM interventions among this population of patients include lifestyle modification, medication optimization, and adherence for optimized disease control. All MTM interventions will be standardized; for instance, intensive review of medication, care plan development to individualize patient education, and frequent follow-up monitoring progress and intervening as required (Viswanathan *et al*., 2015). Clinical markers such as glucose, systolic blood pressure, and HbA1c will be the primary outcome measures. Medication adherence will be measured by standardized instruments, such as the Morisky Medication Adherence Scale (MMAS), and quality of life will be measured by the Diabetes Quality of Life (DQOL) and EuroQol-5D (EQ-5D) questionnaires (Moon, 2018).

MTM model comprises some of the following elements

Medication Management: Proper use of antidiabetic (e.g., Insulin therapy, Metformin, SGLT2 inhibitors) and antihypertensive drugs (ACE inhibitors, ARBs). Lifestyle Changes: Compliance with dietary regimens such as the DASH diet, decreased sodium intake, promotion of exercise (150 min/week), smoking cessation, and moderate alcohol consumption. Adherence: Optimizing the regimen involves using fixed combination therapy, providing patient education about medications, and utilizing technology such as cellular phone reminders and pillboxes. Monitoring & Follow-up: Self-measurement of blood glucose, HbA1c value (<7%), and blood pressure (<130/80 mmHg) for avoiding complications. The study on Structured Medication Therapy Management (MTM) for Type 2 Diabetes and Hypertension is important because the prevalence of these chronic diseases is on the rise. This work is carried out to evaluate the impact of a structured Medication Therapy Management (MTM) program among patients with type 2 Diabetes Mellitus and Hypertension as associated comorbidity and the study

involves the various objectives to assess the effectiveness of structured MTM in improving glycemic control and blood pressure in patients with type 2 Diabetes Mellitus and Hypertension as associated comorbidity, to assess the impact of structured MTM on medication adherence and quality of life over time in patients with type 2 Diabetes Mellitus and Hypertension as associated comorbidity, and to evaluate the improvement in patient knowledge about their medications, disease management, and lifestyle modifications following MTM intervention by using MKQ (medication knowledge questionnaires). Patients' awareness about pharmaceutical use, patient counselling and education are necessary (Taher & Ibrahim 2023). MTM has the potential to maximize medication use, improve patient compliance, and minimize complications, offering lessons for future practice in other similar healthcare facilities and enhancing patient outcomes.

Materials and Methods

It is a Randomized Control Trial (RCT) conducted over a period of 6 months, involving patients diagnosed with type 2 diabetes mellitus (T2DM) and hypertension as associated comorbidities. Patients were selected from the outpatient and inpatient units of the General Medicine department at Santhiram Medical College and General Hospital, Nandyal, Andhra Pradesh, India. The sample size was planned for 96 subjects, with 48 in the intervention group and 48 in the control group. Both groups were again divided into 8 subgroups depending on the severity of T2DM and hypertension, with 6 patients in each subgroup.

Description of Sample size Calculation

Total Sample Size (n): $n = ((Z_{a/2} + Z_{\beta/2})^2 \times 2 \times \sigma^2) / \delta^2$

where:
$\mathbf{Z_{a/2}}$ = Z-value for the desired confidence level
$\mathbf{Z_{\beta/2}}$ = Z-value for the desired power
$\boldsymbol{\sigma^2}$ = Variance of the outcome measure
$\boldsymbol{\delta}$ = Minimum expected effect size
Number of Samples in Each Group: n group = N / 2
Total Sample across subgroups: n total = 8 × 6 × 2 = 96

The intervention arm was stratified according to disease severity and associated MTM approaches as below

Severe T2DM with Mild HTN: MTM-1, Severe T2DM with Moderate HTN: MTM-2, Severe T2DM with Severe HTN: MTM-3, Moderate T2DM with Mild HTN: MTM-4, Moderate T2DM with Moderate HTN: MTM-5, Severe HTN with Mild T2DM: MTM-6, Severe HTN with Moderate T2DM: MTM-7, and Moderate HTN with Mild T2DM: MTM-8.

MTM intervention was given through a structured Medication Therapy Management (MTM) system that addressed both the severity of T2DM and hypertension, including medication reviews, personalized care plans, patient education, and follow-up. Usual care was given without the formal MTM intervention to the control group. Patients were interviewed based on case sheets, prescriptions, and laboratory test reports. The clinical outcomes were changes in blood glucose levels, blood pressure readings, and HbA1c levels. The quality of life and quality of adherence to medication were examined using the Diabetes Quality of Life (DQOL) (Almeida *et al* 2024) and EQ-5D instruments (Balestroni & Bertolotti, 2012); medication adherence was evaluated by the Morisky Medication Adherence Scale (MMAS). The inclusion criteria were individuals aged 25 years or older who are diagnosed with both T2DM and hypertension, who are on continuous therapeutic intervention, and who are willing to give written informed consent. Excluded were people presenting with just one of the conditions (T2DM or hypertension), with mild T2DM and mild hypertension, people with type 1 DM, pregnant or lactating women, and individuals unwilling to participate or to sign the informed consent documentation.

(Marupuru *et al*. 2022) A comparative analysis of the statistical methods was conducted using T-tests and ANOVA for continuous variables.

Ethical Consideration

The study has been approved by the Institutional Ethics Committee (IEC) of Santhiram Medical College and General Hospital, Nandyal, Andhra Pradesh, India with the Certificate of Approval (Ref. Number IEC/SRMC/SRCP/RESEARCH/021/2024), dated 27th September, 2024.

Results

The age and sex distribution of the study population was balanced with respect to different age groups and gender. The study's design was evenly balanced with respect to gender: 48 males and 48 females were included in the total sample of 96 patients. The largest age group was 41–45 years, accounting for 22.9% of the total sample (14 males and 8 females), followed by the 51–55 age group at 19.7% (6 males and 13 females). The age groups of 46–50 and 61–65 years had relatively balanced distributions, with male and female counts remaining close. The 71–75 age group had the lowest representation, with only two females and no male participants. This balanced distribution across age and gender enhances the generalizability of the study findings by reducing potential gender- and age-related biases. The higher representation of middle-aged participants (41–55 years) aligns with the typical demographic pattern for type 2 diabetes mellitus (T2DM) and hypertension, which are more prevalent in this age range. The equal distribution of male and female participants strengthens the study's internal validity, allowing for meaningful subgroup analysis based on gender and age (Table 1 and Figure 1).

Table 1: Age distribution of patients

Age Distribution among patients				
Age Range (years)	**Male**	**Female**	**Cases**	**Percentage %**
35-40	4	6	10	10.4%
41-45	14	8	22	22.9%
46-50	11	6	17	17.7%
51-55	6	13	19	19.7%
56-60	3	6	9	9.3%
61-65	8	6	14	14.5%
66-70	2	1	3	3.1%
71-75	0	2	2	2%
Total		48	48	48=48=96 =100%

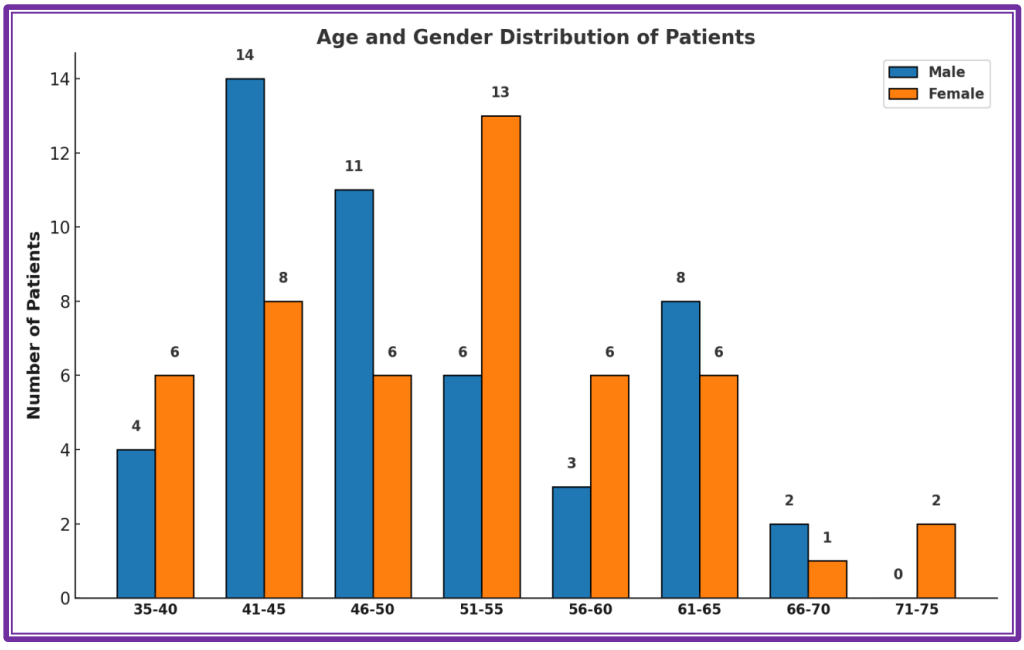

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Figure 1: *Age and gender distribution of patients*

The comparison of how cases are spread out in different categories between the control and

intervention groups shows that both groups have the same number of cases in each category. Both groups recorded the highest number of cases in the "Severe T2DM with Mild HTN" and "Moderate HTN with Mild T2DM" categories, each accounting for 9 cases. The least number of cases (3 each) were reported in the "Severe T2DM with Severe HTN" and "Severe HTN with Moderate T2DM" categories. This balance in case distribution indicates that the study sample was well-matched, minimizing the influence of baseline disparities on clinical outcomes. Furthermore, the clinical outcomes varied based on the age and gender of the patients. A nearly equal gender distribution was observed, with 48 males and 48 females participating in the study. The age and gender distribution is balanced to make the assessment of the intervention's impact secure. The even spread of different severity levels and demographic factors strengthens the trust in the improvements seen in health results, indicating that the intervention successfully helped manage hypertension and type 2 diabetes mellitus (Table 2 and Figure 2).

Table 2: Category wise distribution of control group and intervention

MTM Code	Category	Number of Cases Control Group	Number of Cases Intervention Group
MTM-1	Severe T2DM with Mild HTN	9	9
MTM-2	Severe T2DM with moderate HTN	6	6
MTM-3	Severe T2DM with Severe HTN	3	3
MTM-4	Moderate T2DM with Mild HTN	9	9
MTM-5	Moderate T2DM with moderate HTN	5	5
MTM-6	Severe HTN with Mild T2DM	4	4
MTM-7	Severe HTN with Moderate T2DM	3	3
MTM-8	Moderate HTN with Mild T2DM	9	9

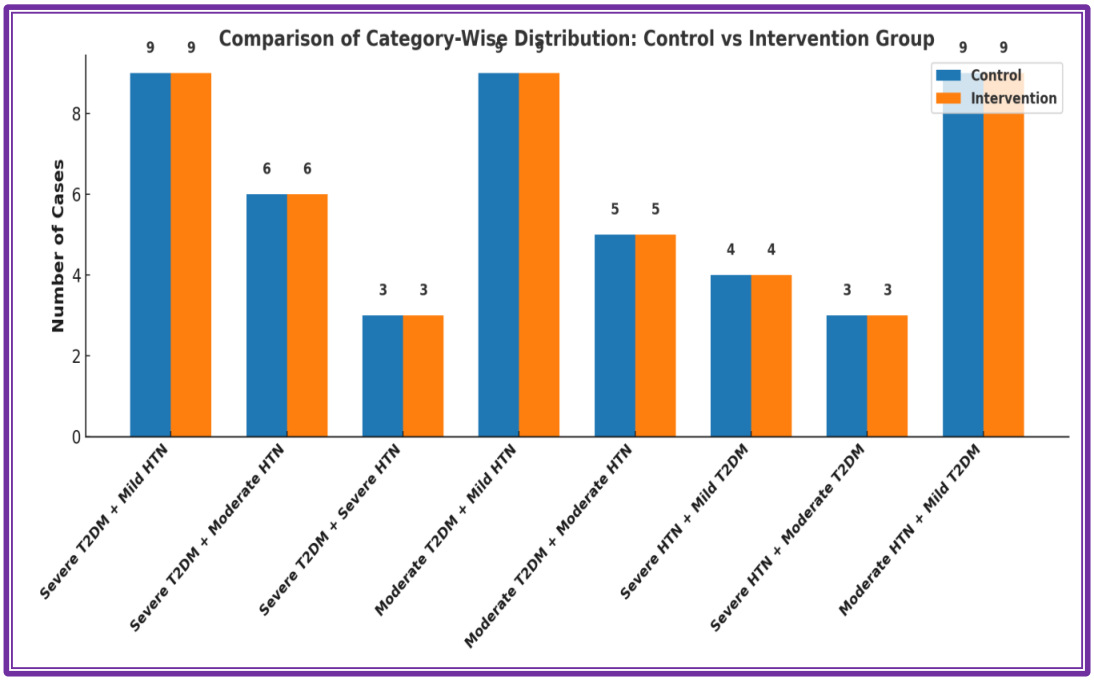

Figure 2: *Category wise distribution of patients in control and intervention groups*

In this present study, the intervention strategy improved blood pressure control in the patients with hypertension over 24 follow-ups. Table 3 and Table 4 indicate that the free group had more decreases in SBP and DBP compared to the control group. Mean SBP of the intervention group was reduced from 152.40 mmHg down to 132.04 mmHg (mean reduction of 20.36 mmHg), and that of the control group was reduced from 154.79 mmHg to 144.04 mmHg (mean reduction of 10.75 mmHg). Similarly, the intervention group's DBP reduced from 91.17 mmHg to 82.67 mmHg (mean reduction of 8.5 mmHg), while the control group's DBP decreased from 90.73 mmHg to 85.65 mmHg (mean reduction of 5.08 mmHg). The p-values for both SBP and DBP reductions were statistically significant ($p < 0.001$), confirming the effectiveness of the intervention in improving blood pressure levels.

Table 3: Hypertension Parameters of Blood Pressure (BP) among control group

Blood Pressure Parameters of Control Group Responses Near to Normal Range as Outcome								
Parameters of Systolic BP					Parameters of Diastolic BP			
Case Code	Base line A	Follow up B	Outcome in units (mmHg) (A-B)	Outcome in Percentage (%)	Base line C	Follow up D	Outcome in units (mmHg) (C-D)	Outcome in Percentage (%)
C-01	139	125	14	10.07	81	78	3	3.70
C-02	153	141	9	5.88	95	87	8	8.16
C-03	132	121	11	8.33	82	76	6	7.32
C-04	147	137	10	6.80	82	76	6	7.32
C-05	136	128	8	5.88	86	80	6	6.98
C-06	183	171	12	6.55	94	90	4	4.25
C-07	189	176	13	6.87	97	92	5	5.26
C-08	137	128	9	6.57	81	79	2	2.47
C-09	148	135	13	8.78	91	87	4	4.39
C-10	155	147	8	5.16	87	83	4	4.59
C-11	182	169	13	7.14	98	91	7	7.14
C-12	135	123	12	8.89	87	82	5	5.75
C-13	189	178	11	5.82	97	93	4	4.12
C-14	133	124	9	6.77	87	83	4	4.60
C-15	188	173	15	7.97	101	96	5	4.95
C-16	154	142	12	7.79	84	81	3	3.57
C-17	137	129	8	5.24	79	78	1	1.27
C-18	189	176	13	6.87	97	92	5	5.26
C-19	158	144	14	8.86	91	87	4	4.39
C-20	164	153	11	6.70	89	85	4	4.49
C-21	131	124	7	5.34	83	78	5	6.02
C-22	135	127	8	5.93	81	80	1	1.23
C-23	152	143	9	5.92	97	88	9	9.89
C-24	136	129	7	5.15	82	77	5	6.10
C-25	136	130	6	4.41	84	83	1	1.19
C-26	172	159	13	7.55	95	89	6	6.31
C-27	138	128	10	7.24	89	81	8	8.98
C-28	187	177	10	5.34	106	98	8	7.54
C-29	162	149	13	8.02	97	89	8	8.24
C-30	134	126	8	5.97	87	78	9	10.34
C-31	135	125	12	8.89	87	81	6	6.90
C-32	160	148	12	7.5	97	87	10	10.30
C-33	156	144	12	7.69	94	88	6	6.38
C-34	149	139	10	6.71	92	87	5	5.43
C-35	138	125	13	9.42	85	80	5	5.88
C-36	182	170	12	6.59	93	89	4	4.30
C-37	149	138	11	7.38	92	89	3	3.26
C-38	193	181	12	6.21	101	85	16	15.84
C-39	139	128	11	7.91	87	83	4	4.60
C-40	137	124	13	9.49	85	81	4	4.71
C-41	169	159	10	5.91	98	94	4	4.08
C-42	136	127	9	6.62	82	81	1	1.22
C-43	148	139	9	6.08	93	92	1	1.07
C-44	148	131	17	11.48	91	88	3	3.29
C-45	152	144	8	5.26	94	88	6	6.38
C-46	170	162	8	4.70	97	94	3	3.09
C-47	152	143	9	5.92	98	93	5	5.10
C-48	186	177	9	4.83	102	94	8	7.92

Table 4: Hypertension parameters of Blood Pressure (BP) among intervention group

Blood Pressure Parameters of Intervention Group Responses Near to Normal Range as Outcome								
Parameters of Systolic BP					Parameters of Diastolic BP			
Case code	Base line E	Follow up F	Outcome in units (mmHg) (E-F)	Outcome in Percentage (%)	Base line G	Follow up H	Outcome in units (mmHg)	Outcome in Percentage (%)
I-01	135	118	17	12.59	85	78	7	8.24
I-02	145	121	24	16.55	89	80	9	10.11
I-03	140	199	21	15.00	96	80	16	16.67
I-04	189	161	28	14.81	98	85	13	13.26
I-05	138	121	17	12.32	86	78	8	9.30
I-06	158	139	19	12.02	97	89	8	8.24
I-07	186	156	30	16.12	95	89	6	6.31
I-08	193	152	41	21.24	111	91	20	18.01
I-09	135	118	17	12.59	85	79	6	7.06
I-10	149	130	19	12.75	99	87	12	12.12
I-11	137	120	17	12.41	86	79	7	8.14
I-12	134	118	16	11.94	80	78	2	2.50
I-13	146	125	21	14.38	92	81	11	11.96
I-14	188	154	34	18.08	98	88	10	10.20
I-15	156	134	22	14.10	87	86	1	1.14
I-16	137	119	18	13.14	85	75	10	11.76
I-17	150	137	13	8.66	84	82	2	2.38
I-18	167	146	21	12.57	84	82	2	2.38
I-19	140	121	19	13.57	83	79	4	4.82
I-20	149	128	21	14.09	95	85	10	10.53
I-21	188	163	25	13.29	103	89	14	13.59
I-22	138	124	14	10.14	91	82	9	9.89
I-23	132	118	14	10.61	85	80	5	5.88
I-24	138	120	18	13.04	85	80	5	5.88
I-25	187	165	22	11.73	95	87	8	8.42
I-26	147	126	21	14.29	97	81	16	16.49
I-27	134	119	15	11.19	86	80	6	6.98
I-28	145	124	21	14.48	86	78	8	9.30
I-29	130	118	12	9.23	85	78	7	8.23
I-30	138	121	17	12.31	85	79	6	7.05
I-31	132	116	16	12.12	82	78	4	4.87
I-32	141	122	19	13.47	91	82	9	9.89
I-33	149	128	21	14.09	98	83	15	15.30
I-34	142	123	19	13.38	90	81	9	10.00
I-35	136	118	18	13.23	82	78	4	4.87
I-36	134	118	16	11.94	88	80	8	9.09
I-37	182	147	35	19.23	100	88	12	12.00
I-38	160	144	16	16.00	84	84	0	0.00
I-39	148	128	20	13.51	92	83	9	9.78
I-40	153	134	19	12.41	91	83	8	8.79
I-41	147	131	16	10.88	88	83	5	5.68
I-42	142	120	22	15.49	94	81	13	13.82
I-43	145	134	11	7.58	91	83	8	8.79
I-44	201	168	33	16.41	108	93	15	13.88
I-45	186	163	23	12.36	102	89	13	12.74
I-46	136	122	14	10.29	87	80	7	8.04
I-47	186	163	23	12.36	101	92	9	8.91
I-48	146	124	22	15.06	94	84	10	10.63

The balanced distribution of cases between the control and intervention groups across varying severity levels, as shown in Table 2, ensured that baseline disparities did not influence the outcomes. Additionally, Figure 3 illustrates the greater reduction in blood pressure in the intervention group compared to the control group, reinforcing the clinical significance of the intervention strategy. The structured approach of combining pharmacological adjustments with lifestyle modifications and patient education likely contributed to these improvements. The observed reductions align with findings from

previous studies, which have reported that integrated management strategies result in better blood pressure control. The consistent improvements across different severity levels highlight the potential of the intervention strategy to improve hypertension management outcomes comprehensively. These findings confirm the hypothesis that the intervention strategy would lead to superior hypertension control compared to standard care.

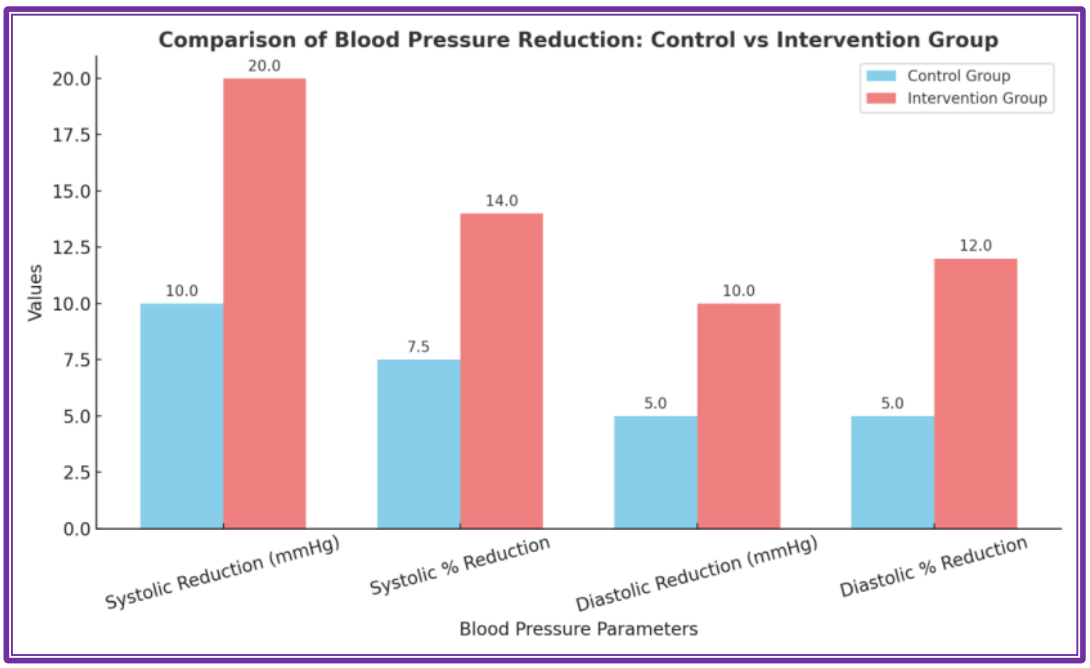

Figure 3: *Comparison of blood pressure: control and intervention groups*

This table presents the results of the paired t-test comparing baseline and follow-up values within each group (control and intervention). The analysis evaluates whether there is a significant reduction in systolic blood pressure (SBP), diastolic blood pressure (DBP), random blood sugar (RBS), and glycated hemoglobin (HbA1c) after 24 follow-ups.

Mean ± SD values are reported for baseline and follow-up measurements.

t-Stat represents the computed t-value, with ***t-Critical (Two-Tailed)*** showing the threshold for statistical significance at a 95% confidence level.

p-value (Two-Tailed) indicates the probability of observing the difference under the null hypothesis ($p < 0.05$ is considered statistically significant).

The Reduced column, ↓, denotes whether there is a significant reduction in the measured parameters post-intervention. Results suggest that SBP, DBP (Table 3, Table 4, and Figure 3), RBS, and HbA1c (Table 5, Table 6, Table 7, and Table 8) of both the control and intervention groups decreased significantly ($p < 0.05$) after 24 weeks, with the intervention group having a greater decrease. The comparison between the control and intervention groups shows more improvement in random blood sugar (RBS) and glycated hemoglobin (HbA1c). The RBS in the intervention group decreased from 195.69 mg/dL to 168.83 mg/dL, and from 194.44 mg/dL to 182.75 mg/dL in the control group. This improvement was statistically significant ($p = 0.0221$), as the intervention strategy had a higher effectiveness in managing blood glucose levels. The same was observed for the HbA1c levels, which are the markers of long-term glycemic control and revealed a larger decrease in the intervention group (7.79% to 7.15%) compared to the control group (7.86% to 7.57%); the p-value for statistical difference was 0.0087 (Table 9, Table 10, Figure 4, and Figure 5). Thus, the greater reduction in both RBS and HbA1c in the intervention group suggests that the intervention had led to better long-term metabolic control and better glucose regulation. Thus, it means that the intervention strategy, most probably a combination of medication adjustment, lifestyle modification, and patient education, was either more effective or at least as successful as the standard control approach in improving glycemic control.

Table 5: Type-2 Diabetes mellitus parameters of Random Blood Sugar (RBS) among control group

Type-2 Diabetes Mellitus Parameters Random Blood Sugar (RBS) of Control Group						
Case Code	**Base Line I**	**Follow Up J**	**Outcome in units (mg/dl) (I-J)**	**Outcome in Percentage (%)**	**Severity level Reference Range of RBS**	**Post Follow-up shift in Severity level Condition**
C-01	187	173	14	7.48	150-199	*Mild To Mild*
C-02	178	163	15	8.42	150-199	*Mild To Mild*
C-03	232	218	14	6.03	200-299	*Moderate To Moderate*
C-04	167	159	8	4.19	150-199	*Mild To Mild*
C-05	236	224	12	5.08	200-299	*Moderate To Moderate*
C-06	243	228	15	6.17	200-299	*Moderate To Moderate*
C-07	192	183	9	4.68	150-199	*Mild To Mild*
C-08	185	177	8	4.32	150-199	*Mild To Mild*
C-09	168	159	9	5.35	150-199	*Mild To Mild*
C-10	234	218	16	6.83	200-299	*Moderate To Moderate*
C-11	175	166	9	5.14	150-199	*Mild To Mild*
C-12	243	231	12	4.93	200-299	*Moderate To Moderate*
C-13	157	148	9	5.73	150-199	Mild To Normal
C-14	177	164	13	7.34	150-199	*Mild To Mild*
C-15	177	162	15	8.47	150-199	*Mild To Mild*
C-16	232	220	12	5.17	200-299	*Moderate To Moderate*
C-17	232	217	15	6.46	200-299	*Moderate To Moderate*
C-18	243	231	12	4.93	200-299	*Moderate To Moderate*
C-19	165	153	12	7.27	150-199	*Mild To Mild*
C-20	241	227	14	5.80	200-299	*Moderate To Moderate*
C-21	164	152	12	7.31	150-199	*Mild To Mild*
C-22	242	226	16	6.61	200-299	*Moderate To Moderate*
C-23	164	158	6	3.65	150-199	*Mild To Mild*
C-24	179	170	9	5.02	150-199	*Mild To Mild*
C-25	177	169	8	4.51	150-199	*Mild To Mild*
C-26	165	155	10	6.06	150-199	*Mild To Mild*
C-27	242	230	12	4.95	200-299	*Moderate To Moderate*
C-28	164	153	11	6.70	150-199	*Mild To Mild*
C-29	253	236	17	6.71	200-299	*Moderate To Moderate*
C-30	170	156	14	8.23	150-199	*Mild To Mild*
C-31	197	183	14	7.10	150-199	*Mild To Mild*
C-32	186	153	33	17.74	150-199	*Mild To Mild*
C-33	192	178	14	7.29	150-199	*Mild To Mild*
C-34	162	154	8	4.93	150-199	*Mild To Mild*
C-35	210	198	12	5.71	200-299	Moderate To Mild
C-36	226	212	14	6.19	200-299	*Moderate To Moderate*
C-37	180	169	11	6.11	150-199	*Mild To Mild*
C-38	172	158	14	8.13	150-199	*Mild To Mild*
C-39	172	163	9	5.23	150-199	*Mild To Mild*
C-40	168	157	11	6.54	150-199	*Mild To Mild*
C-41	178	170	8	4.49	150-199	*Mild To Mild*
C-42	226	214	12	5.30	200-299	*Moderate To Moderate*
C-43	172	165	7	4.06	150-199	*Mild To Mild*
C-44	174	168	6	3.44	150-199	*Mild To Mild*
C-45	224	217	7	3.12	200-299	*Moderate To Moderate*
C-46	182	174	8	4.39	150-199	*Mild To Mild*
C-47	166	158	8	4.81	150-199	*Mild To Mild*
C-48	162	155	7	4.32	150-199	*Mild To Mild*

Table 6: Type-2 Diabetes mellitus parameters of Random Blood Sugar (RBS) among intervention group

Type-2 Diabetes Mellitus Parameters Random Blood Sugar (RBS) of Intervention Group						
Case Code	**Base Line K**	**Follow Up L**	**Outcome in units (mg/dl) (K-L)**	**Outcome in Percentage (%)**	**Severity level Reference Range of RBS**	**Post Follow-up shift in Severity level Condition**
I-01	178	156	22	12.35	150-199	Mild To Mild
I-02	243	198	45	18.51	200-299	Moderate To Mild
I-03	172	153	19	11.04	150-199	Mild To Mild
I-04	190	161	29	15.26	150-199	Mild To Mild
I-05	190	164	26	13.68	150-199	Mild To Mild
I-06	193	161	32	16.58	150-199	Mild To Mild
I-07	179	156	23	12.84	150-199	Mild To Mild
I-08	155	134	21	13.54	150-199	Mild To Normal
I-09	156	142	14	8.97	150-199	Mild To Normal
I-10	160	146	14	8.75	150-199	Mild To Normal
I-11	195	173	22	11.28	150-199	Mild To Mild
I-12	184	166	18	9.78	150-199	Mild To Mild
I-13	285	196	89	31.22	200-299	Moderate To Mild
I-14	180	159	21	11.66	150-199	Mild To Mild
I-15	234	198	26	11.11	200-299	Moderate To Mild
I-16	265	224	41	15.47	200-299	Moderate To Moderate
I-17	158	139	19	12.02	150-199	Mild To Normal
I-18	157	145	12	7.64	150-199	Mild To Normal
I-19	360	264	96	26.66	>300	Severe To Moderate
I-20	167	146	21	12.57	150-199	Mild To Normal
I-21	203	181	22	10.83	200-299	Moderate To Mild
I-22	232	195	37	15.94	200-299	Moderate To Mild
I-23	166	144	22	13.25	150-199	Mild To Normal
I-24	279	232	47	16.84	200-299	Moderate To Moderate
I-25	282	221	61	21.63	200-299	Moderate To Moderate
I-26	176	155	21	11.93	150-199	Mild To Mild
I-27	171	153	18	10.52	150-199	Mild To Mild
I-28	161	148	13	8.07	150-199	Mild To Normal
I-29	171	156	15	8.77	150-199	Mild To Mild
I-30	241	197	44	18.25	200-299	Moderate To Mild
I-31	210	193	17	8.09	200-299	Moderate To Mild
I-32	234	201	33	14.10	200-299	Moderate To Moderate
I-33	174	157	17	9.77	150-199	Mild To Mild
I-34	167	146	21	12.57	150-199	Mild To Normal
I-35	197	174	23	11.67	150-199	Mild To Mild
I-36	186	165	21	11.29	150-199	Mild To Mild
I-37	238	208	30	12.60	200-299	Moderate To Moderate
I-38	170	152	18	10.58	150-199	Mild To Mild
I-39	158	143	15	9.49	150-199	Mild To Normal
I-40	158	141	17	10.75	150-199	Mild To Normal
I-41	243	213	30	12.34	200-299	Moderate To Moderate
I-42	199	164	35	17.58	150-199	Mild To Mild
I-43	157	142	15	9.55	150-199	Mild To Normal
I-44	160	151	9	5.62	150-199	Mild To Mild
I-45	160	141	19	11.87	150-199	Mild To Normal
I-46	172	149	23	13.37	150-199	Mild To Normal
I-47	162	154	8	4.93	150-199	Mild To Mild
I-48	165	147	18	10.90	150-199	Mild To Normal

Table 7: Type-2 diabetes mellitus parameters of HbA1C among control group

Type-2 Diabetes Mellitus Parameters (HbA1C) of Control Group						
Case Code	**Base Line M**	**Follow Up N**	**Outcome in units (%) (M-N)**	**Outcome in Percentage (%)**	**Severity level Reference Range of HbA1C**	**Post Follow-up shift in Severity level Condition**
C-01	7.4	7.1	0.3	4.05	7.1-8.0	Moderate To Moderate
C-02	7.8	7.5	0.3	3.84	7.1-8.0	Moderate To Moderate
C-03	8.5	8.3	0.2	2.35	>8.0	Severe To Severe
C-04	6.6	6.5	0.1	1.51	6.5-7.0	Mild To Mild
C-05	8.5	8.4	0.1	1.17	>8.0	Severe To Severe
C-06	8.8	8.5	0.3	3.40	>8.0	Severe To Severe
C-07	7.8	7.6	0.2	2.56	7.1-8.0	Moderate To Moderate
C-08	7.7	7.5	0.2	2.59	7.1-8.0	Moderate To Moderate
C-09	6.7	6.5	0.2	2.98	6.5-7.0	Mild To Mild
C-10	8.8	8.4	0.4	4.54	>8.0	Severe To Severe
C-11	7.6	7.3	0.3	3.94	7.1-8.0	Moderate To Moderate
C-12	8.8	8.4	0.4	4.54	>8.0	Severe To Severe
C-13	6.7	6.5	0.2	2.98	6.5-7.0	Mild To Mild
C-14	7.5	7.3	0.2	2.66	7.1-8.0	Moderate To Moderate
C-15	7.5	7.3	0.2	2.66	7.1-8.0	Moderate To Moderate
C-16	8.5	8.3	0.2	2.35	>8.0	Severe To Severe
C-17	8.7	8.4	0.3	3.44	>8.0	Severe To Severe
C-18	8.9	8.5	0.4	4.49	>8.0	Severe To Severe
C-19	6.8	6.6	0.2	2.94	6.5-7.0	Mild To Mild
C-20	8.7	8.5	0.2	2.29	>8.0	Severe To Severe
C-21	7.7	7.4	0.3	3.89	7.1-8.0	Moderate To Moderate
C-22	8.9	8.6	0.3	3.37	>8.0	Severe To Severe
C-23	6.8	6.5	0.3	4.41	6.5-7.0	Mild To Mild
C-24	7.3	6.9	0.4	5.47	7.1-8.0	Moderate To Mild
C-25	7.8	7.4	0.4	5.12	7.1-8.0	Moderate To Moderate
C-26	7.0	6.7	0.3	4.28	6.5-7.0	Mild To Mild
C-27	9.7	9.4	0.3	3.09	>8.0	Severe To Severe
C-28	6.7	6.5	0.2	2.98	6.5-7.0	Mild To Mild
C-29	9.1	8.7	0.4	4.39	>8.0	Severe To Severe
C-30	7.5	7.1	0.4	5.33	7.1-8.0	Moderate To Moderate
C-31	8.5	8.1	0.4	4.70	>8.0	Severe To Severe
C-32	6.9	6.6	0.3	4.34	6.5-7.0	Mild To Mild
C-33	8.2	7.8	0.4	4.87	>8.0	Severe To Moderate
C-34	6.7	6.5	0.2	2.98	6.5-7.0	Mild To Mild
C-35	8.7	8.5	0.2	2.29	>8.0	Severe To Severe
C-36	9.1	8.8	0.3	3.29	>8.0	Severe To Severe
C-37	7.9	7.5	0.4	5.06	7.1-8.0	Moderate To Moderate
C-38	7.6	7.4	0.2	2.63	7.1-8.0	Moderate To Moderate
C-39	7.6	7.4	0.2	2.63	7.1-8.0	Moderate To Moderate
C-40	7.4	7.1	0.3	4.05	7.1-8.0	Moderate To Moderate
C-41	7.8	7.4	0.4	5.12	7.1-8.0	Moderate To Moderate
C-42	9.2	8.7	0.5	5.43	>8.0	Severe To Severe
C-43	7.4	6.9	0.5	6.75	7.1-8.0	Moderate To Mild
C-44	6.8	6.5	0.3	4.41	6.5-7.0	Mild To Mild
C-45	9.1	8.9	0.2	2.19	>8.0	Severe To Severe
C-46	7.9	7.6	0.3	3.79	7.1-8.0	Moderate To Moderate
C-47	6.7	6.5	0.2	2.98	6.5-7.0	Mild To Mild
C-48	6.9	6.6	0.3	4.34	6.5-7.0	Mild To Mild

Table 8: Type-2 diabetes mellitus parameters of HbA1C among intervention group

Type-2 Diabetes Mellitus Parameters (HbA1C) of Intervention Group						
Case Code	**Base Line O**	**Follow Up P**	**Outcome in units (%) (O-P)**	**Outcome in Percentage (%)**	**Severity level Reference Range of HbA1C**	**Post Follow-up shift in Severity level Condition**
I-01	7.3	6.6	0.7	9.58	7.1-8.0	Moderate To Mild
I-02	8.7	8.1	0.6	6.89	>8.0	Severe To Severe
I-03	7.6	6.8	0.8	10.52	7.1-8.0	Moderate To Mild
I-04	7.8	7.1	0.7	8.97	7.1-8.0	Moderate To Moderate
I-05	7.8	6.9	0.9	11.53	7.1-8.0	Moderate To Mild
I-06	8.5	7.8	0.7	8.23	>8.0	Severe to Moderate
I-07	7.8	7.1	0.7	8.97	7.1-8.0	Moderate To Moderate
I-08	6.8	6.4	0.4	5.88	6.5-7.0	Mild To Mild
I-09	7.2	6.5	0.7	9.72	7.1-8.0	Moderate To Mild
I-10	6.7	6.3	0.4	5.97	6.5-7.0	Mild To Mild
I-11	8.3	7.7	0.6	3.61	>8.0	Severe To Moderate
I-12	8.1	7.5	0.6	7.40	>8.0	Severe To Moderate
I-13	8.2	7.6	0.6	7.31	>8.0	Severe To Moderate
I-14	7.8	7.1	0.7	8.97	7.1-8.0	Moderate To Moderate
I-15	8.9	8.0	0.9	10.11	>8.0	Severe To Severe
I-16	10.2	8.8	1.4	13.72	>8.0	Severe To Severe
I-17	6.7	6.4	0.3	4.47	6.5-7.0	Mild To Mild
I-18	6.7	6.4	0.3	4.47	6.5-7.0	Mild To Mild
I-19	9.8	8.5	1.3	13.26	>8.0	Severe To Severe
I-20	6.8	6.4	0.4	5.88	6.5-7.0	Mild To Mild
I-21	8.2	7.4	0.8	9.75	>8.0	Severe To Moderate
I-22	8.8	8.2	0.6	6.81	>8.0	Severe To Severe
I-23	7.5	6.9	0.6	8.00	7.1-8.0	Moderate To Mild
I-24	8.8	7.9	0.9	10.22	>8.0	Severe To Moderate
I-25	9.2	8.3	0.9	9.78	>8.0	Severe To Severe
I-26	7.8	7.1	0.7	8.97	7.1-8.0	Moderate To Moderate
I-27	7.3	6.5	0.8	10.95	7.1-8.0	Moderate To Mild
I-28	7.3	6.4	0.9	12.32	7.1-8.0	Moderate To Mild
I-29	7.6	6.9	0.7	9.21	7.1-8.0	Moderate To Mild
I-30	8.9	8.3	0.6	6.74	>8.0	Severe To Severe
I-31	8.7	8.1	0.6	6.89	>8.0	Severe To Severe
I-32	8.8	8.0	0.8	9.09	>8.0	Severe To Severe
I-33	7.3	6.7	0.6	8.21	7.1-8.0	Moderate To Mild
I-34	6.8	6.5	0.3	4.41	6.5-7.0	Mild To Mild
I-35	8.5	7.7	0.8	9.41	>8.0	Severe To Moderate
I-36	7.2	6.7	0.5	6.94	7.1-8.0	Moderate To Mild
I-37	8.6	7.9	0.7	8.13	>8.0	Severe To Moderate
I-38	7.6	7.0	0.6	7.89	7.1-8.0	Moderate To Moderate
I-39	6.8	6.5	0.3	4.11	6.5-7.0	Mild To Mild
I-40	6.7	6.5	0.2	2.98	6.5-7.0	Mild To Mild
I-41	8.4	7.6	0.8	9.52	>8.0	Severe To Moderate
I-42	7.5	6.6	0.9	12.00	7.1-8.0	Moderate To Mild
I-43	6.6	6.4	0.2	3.03	6.5-7.0	Mild To Mild
I-44	6.6	6.3	0.3	4.54	6.5-7.0	Mild To Mild
I-45	6.9	6.4	0.5	7.24	6.5-7.0	Mild To Mild
I-46	7.8	7.1	0.7	8.97	7.1-8.0	Moderate To Moderate
I-47	6.8	6.5	0.3	4.11	6.5-7.0	Mild To Mild
I-48	7.0	6.6	0.4	5.71	7.1-8.0	Moderate To Mild

Table 9: Comparison of ANOVA for HTN and T2DM between control and intervention groups

Measure	Group	Mean ± SD	*F*-Stat	*p*-value	Conclusion
Systolic BP	Intervention	132.04 ± 15.90	11.31	0.0011	Significant
Systolic BP	Control	144.04 ± 18.93			
Diastolic BP	Intervention	82.67 ± 4.26	8.15	0.0053	Significant
Diastolic BP	Control	85.65 ± 5.85			
RBS	Intervention	168.83 ± 29.29	5.42	0.0221	Significant
RBS	Control	182.75 ± 29.33			
HbA1c	Intervention	7.15 ± 0.71	7.17	0.0087	Significant
HbA1c	Control	7.57 ± 0.83			

Table 10: Paired t-Test for HTN and T2DM Within-Group Comparison (Before and After MTM Intervention)

BP Type	Group	Baseline Mean ± SD	Post-Intervention Mean ± SD	*t*-Stat	*t*-Critical (Two-Tailed)	p-value (Two-Tailed)	Conclusion
Systolic	Control	154.79 ± 19.66	144.04 ± 18.93	31.46	2.0117	3.17E-33	Significant
Systolic	Intervention	152.40 ± 20.36	132.04 ± 15.90	23.11	2.0117	2.59E-27	Significant
Diastolic	Control	90.73 ± 6.75	85.65 ± 5.85	12.71	2.0117	8.07E-17	Significant
Diastolic	Intervention	91.17 ± 7.17	82.67 ± 4.26	13.82	2.0117	3.63E-18	Significant
RBS	Control	194.44 ± 30.60	182.75 ± 29.33	18.61	2.0117	2.56E-23	Significant
RBS	Intervention	195.69 ± 44.26	168.83 ± 29.29	10.63	2.0117	4.35E-14	Significant
HbA1c	Control	7.86 ± 0.86	7.57 ± 0.83	17.46	2.0117	3.54E-22	Significant
HbA1c	Intervention	7.79 ± 0.89	7.15 ± 0.71	16.24	2.0117	6.68E-21	Significant

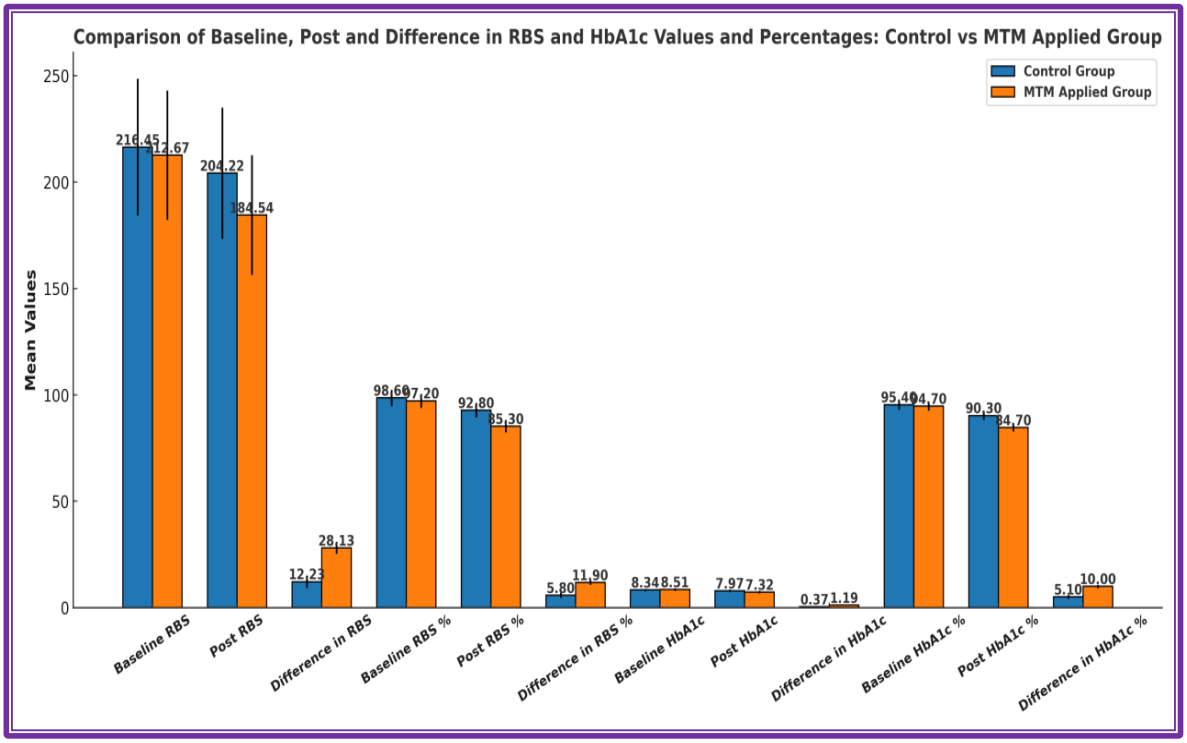

Figure 4: *Comparison of RBS and HbA1c values and percentages between the control and MTM applied intervention groups*

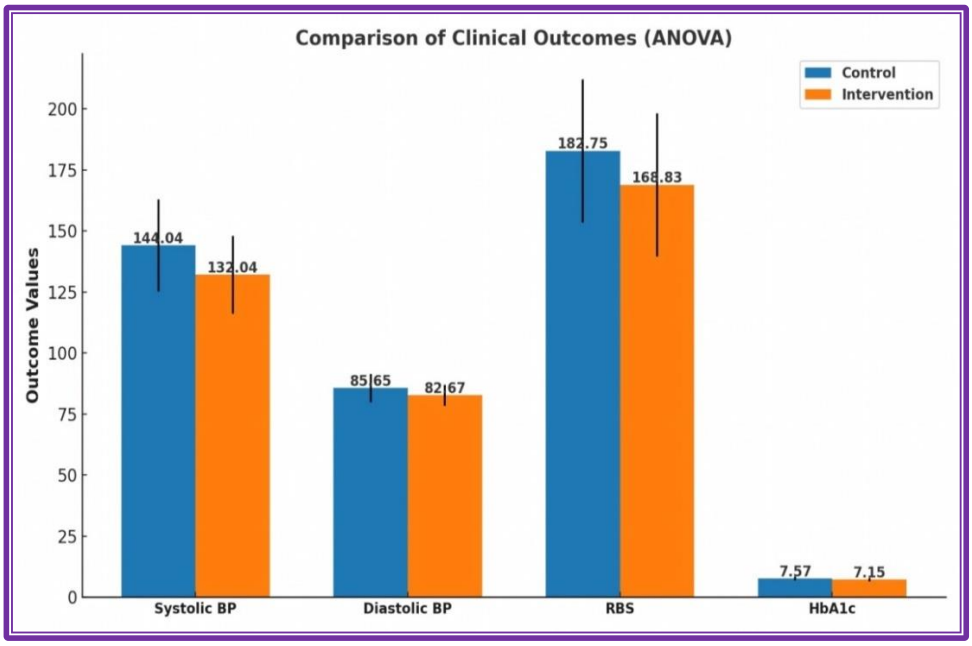

Figure 5: *Clinical outcomes of Random Blood Sugar (RBS) and Glycated Haemoglobin (Hba1c) levels comparison of the Control and Intervention groups*

Discussion

The current study found that there were significant improvements in important health measurements, such as systolic blood pressure (SBP), diastolic blood pressure (DBP), random blood sugar (RBS), and glycated hemoglobin (HbA1c) levels after 24 follow-ups (Dey et al., 2022). As shown in Table 9, the group that received the intervention had greater decreases in SBP (average drop of 20.36 mmHg), DBP (average drop of 8.5 mmHg), RBS (average drop of 26.86 mg/dL), and HbA1c (average drop of 0.64%) compared to the control group, with significant p-values that prove the intervention was effective. The results matched earlier studies that found that using both medication and lifestyle changes helps manage high blood pressure and type 2 diabetes. An example of such consistency came from a randomized controlled trial of lifestyle interventions along with antihypertensive therapy, reported by (Kelley, Kelley, & Stauffer (2022), where similar reduced SBP and DBP were observed (Kelley *et al*., 2022). However, results from the intervention group showed a positive correlation of reduction in the RBS and HbA1c levels with Li *et al*., (2022) results, which included beneficent glycemic control following structured Medication Therapy Management (MTM) interventional programs (Li *et al*., 2022). The present study, however, showed a greater decrease in RBS and HbA1c, suggesting that the intervention strategy might have been more targeted therapeutic measures, with apparent reduction of RBS, rather than an overall poor success of the intervention (Evans, Welsh & Seibold, 2022). The results supported the hypothesis that the Medication Therapy Management (MTM) interventional strategy would produce superior clinical outcomes compared to the control group, as all outcome measures showed statistically significant improvements in the intervention group (Deng *et al., 2023).* This finding gave promise to using integrated treatment of pharmacologic adjustment, patient education, and lifestyle modification to improve the clinical outcomes for patients with hypertension and T2DM (Yamane *et al*., 2020).

The pharmacist-led MTM significantly improved medication adherence, patient education, and overall treatment satisfaction, contributing to better blood pressure control and glycemic outcomes, mirroring the improvements observed in the current study's intervention group (Asif *et al*., 2025). Similarly, the synergistic benefit of home blood pressure monitoring (HBPM) as a complementary strategy to MTM allows for more precise medication adjustments and improved patient compliance, which is instrumental in sustaining long-term blood pressure control (Wang & Yang, 2025). Nutritional strategies were also implicated as critical modulators in blood pressure dynamics through increased intake of fruits, vegetables, ands, which mitigated the hypertensive impact of elevated serum uric acid, suggesting that tailored dietary recommendations within MTM frameworks can further enhance outcomes in

hypertensive diabetics (Shin & Chang, 2025). Additionally, new technologies and personalized medicine in treating high blood pressure indicate that future MTM programs could improve by including telehealth and tailored genetic information to better match patients' health needs. Overall, these findings highlight how powerful MTM can be when it is part of a complete, patient-focused approach that includes lifestyle changes, diet, digital tools, and medication strategies to improve the management of hypertension and T2DM.

Conclusion

Substantial evidence was provided by this study demonstrating the effectiveness of the Medication Therapy Management (MTM) interventional strategy at improving clinical outcomes in the patients with hypertension and with type 2 diabetes mellitus (T2DM). Statistically significant reductions in systolic blood pressure (SBP), diastolic blood pressure (DBP), random blood sugar (RBS), and glycated hemoglobin (HbA1c) in the MTM intervention group, compared to the control group, demonstrated the effectiveness of the intervention. This investigation ensured that the findings were reliable and generalizable since the age and gender properties of the subjects were balanced, with equal case severity levels in the control and intervention groups. The study emphasized that when pharmacological adjustments, lifestyle modifications, and patient education were all integrated into the structured treatment plan, then it could be more effective for the management of hypertension and T2DM. This is important in that these findings suggest there may be a way to use a comprehensive intervention model across the board to have both short- and long-term clinical outcomes, both in terms of patient management and quality of life. The results were supportive of the hypothesis that the intervention strategy would lead to superior clinical outcomes than standard care. The Medication Therapy Management (MTM) structure provided in this study lays the foundation for additional research using this framework to be adapted and tested in larger, more typical populations. Furthermore, the observed non-selective improvements across different severity levels and different demographic groups indicate that this integrated approach can be tailored to deal with all patient subgroups. The outcomes of this study were positive and attested to the value of a multidimensional treatment strategy, from which healthcare providers can learn to better manage hypertension and T2DM. Future studies should enrich the MTM intervention model, check its practicability in other healthcare environments, and assess the long-term impact on the patient outcomes and the healthcare costs.

Conflict of Interest

The authors declare that they have no competing interests.

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