

**Clinical Pharmacist Intervention in Improving Clinical
Outcomes in Type 2 Diabetes Mellitus, Systemic
Hypertension and Dyslipidemia – A
Prospective Interventional
Randomized Controlled Clinical Trial Study.**

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Pharmacy

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SCHOOL OF PHARMACY

SATHYABAMA INSTITUTE OF SCIENCE & TECHNOLOGY

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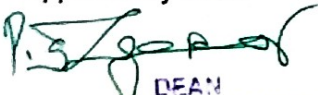
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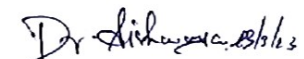
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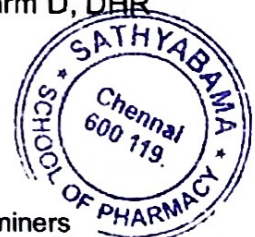
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Declaration

I do hereby declare that the work presented in the thesis entitled “ **Clinical pharmacist intervention in improving clinical outcomes in Type 2 Diabetes Mellitus, Systemic Hypertension and Dyslipidemia – A Prospective Interventional Randomized Controlled Clinical Trial Study**”, submitted by me to the **Sathyabama Institute of Science & Technology**, Chennai-600119 for the award of the degree of **Bachelor of Pharmacy (2019-2023)** by research is a original record of research work carried out by me under the supervision of **Dr. Aishwarya S, Pharm D, DHR Assistant Professor, Department of Pharmacy**. The contents of this dissertation, in full or in parts, have not been submitted to any other Institute or University for the award of any degree or diploma, membership, fellowship, associateship etc.. In keeping with the general practice in reporting scientific observation, due acknowledgement has been made whenever the work described is based on the findings of other investigators.

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ABSTRACT

Background: The global burden of type 2 diabetes mellitus is rapidly increasing, affecting individuals of all ages. The global burden of T2DM in people 20–79 years is further projected to increase to 629 million in 2045 compared to 425 million in 2017. **Methods:** A review of various published literatures was identified to evaluate the effectiveness of clinical pharmacist services reporting educational and/or psychological interventions for people with T2DM were implemented. We conducted searches using MEDLINE, EMBASE, CINAHL, PubMed and ASSIA databases between January 2007–2015. The Studies published in English were included. Two reviewers independently extracted data on participant and intervention characteristics. The quality of evidence was rated on predetermined criteria. Main outcomes included glycaemic control, blood pressure control and reduction in obesity levels.

Conclusion: It has been concluded that the diabetes prevention programmes can significantly reduce the progression to type 2 diabetes mellitus, hypertension and obesity with usual care. Those developing prevention programmes should adhere to the standard NICE guidelines to increase efficacy.

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LIST OF ABBREVIATION

MTM	-	Medication Therapy Management
CMRs	-	Comprehensive Medication Reviews
TMRs	-	Targeted Medication Review
CMS	-	Centers for Medicare and Medicaid Services
ADA	-	American Diabetic Association
LDL	-	Low-Density Lipoprotein
HDL	-	High-Density Lipoprotein
ADEs	-	Adverse Drug Events
MARS	-	Medication Adherence Rating Scale
KAP	-	Knowledge, Attitude and Practice

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INTRODUCTION

1.INTRODUCTION

1.1 TYPE 2 DIABETES MELLITUS

A core principle of quality patient-centered care is continual monitoring and evaluation to ensure that therapies are being utilized in an appropriate, safe, and effective manner [1]. In the United States (US), Medication Therapy Management (MTM) is a health service that can be performed by pharmacists to provide an informative and detailed review of a patient's medication regimen. MTM was first outlined in The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 [2]. Two common components of an MTM service are annual comprehensive medication reviews (CMRs) and quarterly targeted medication review (TMRs) [3,4].

In 2006, the Centers for Medicare and Medicaid Services (CMS) established the Medicare Part D program that requires MTM services to be offered to eligible beneficiaries [5]. The main goals of MTM services are the prevention of adverse drug events (ADEs), improved medication adherence, and patient education leading to appropriate medication use [2]. Since its inception, MTM has evolved from being directed toward acute medication education to helping manage medications for chronic conditions and the costs associated with them [6]. Previous studies on MTM interventions are consistent with the idea that positive outcomes are attributed to patient interaction about their medication regimen.

Such studies have found that MTM leads to lower hospital readmission, healthcare costs, medication issues, and improved medication adherence [6-9]. However, there is a need for evidence-based information on the effectiveness of MTM on the three most common chronic conditions in the US: type 2 diabetes mellitus, hypertension, and dyslipidemia.

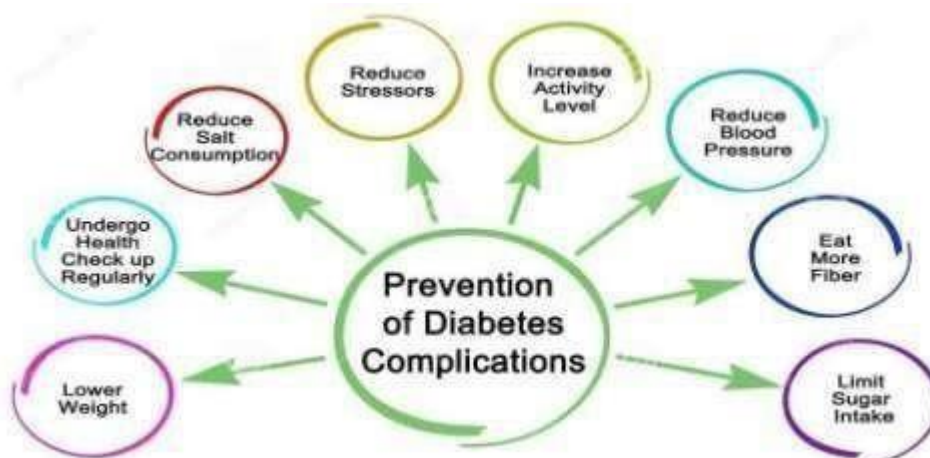


FIGURE 1.1: PREVENTION OF DIABETES COMPLICATION

Diabetes is highly prevalent in the US, affecting at least 30.3 million people or around 9.4% of the population [10]. Many medications for diabetes are effective at controlling blood glucose and HbA1c levels but their effect can be inadequate if not taken correctly. Pharmacists have a role in helping patients who take diabetes medications achieve their target goals, typically defined by the American Diabetic Association (ADA) as maintaining blood glucose levels between 70-130 mg/dL and HbA1c less than 7% [11,12]. Hypertension is defined as blood pressure $\geq 130/80$ mmHg and affects almost half of US adults (116 million), of which a majority do not have their blood pressure under control (92.1 million) [13]. Hypertension also adversely affects the kidneys, brain, and arterial blood vessels leading to major co-morbidities and complications [14].

1.2 : SYSTEMIC HYPERTENSION

Lifestyle changes can help lower blood pressure to an extent before pharmacological treatment has to be utilized. Dyslipidemia is considered an imbalance in total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides [15]. Dyslipidemia is more prevalent in adults over the age of 20, with 11.5 of US adults having a high serum total cholesterol (≥ 240 mg/dL) in 2018 [16]. Pharmacists are experts in medications and therefore have an important role helping

patients to optimize their medication regimens for these three common conditions through MTM services. Pharmacists are also trained to assess and determine the appropriateness of medications, alleviate barriers to adherence, and provide education regarding the medications, such as common adverse drug events (ADEs) and guidance on correct administration [17].

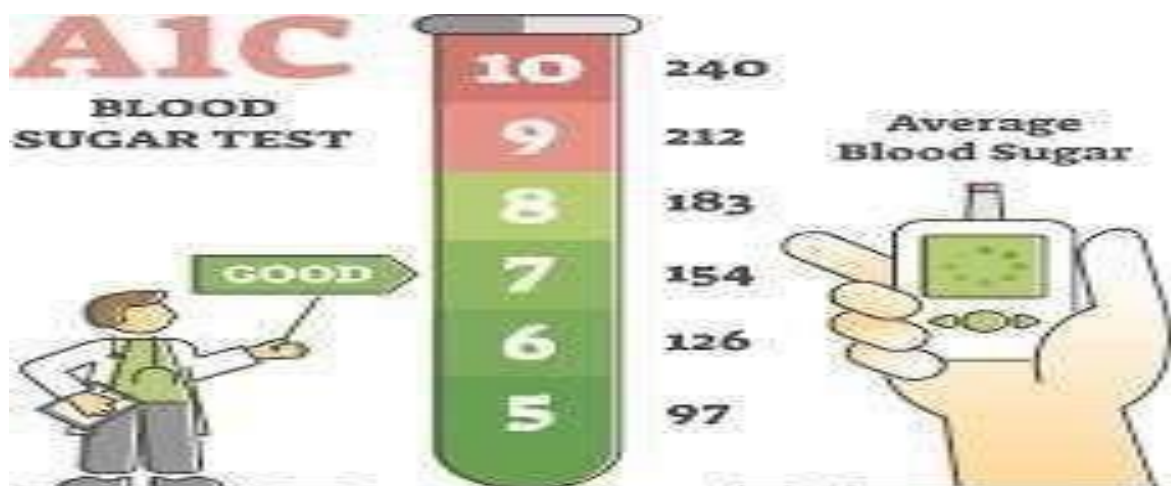


FIGURE 1.2 NORMAL BLOOD SUGAR LEVEL

The expected values for normal fasting blood glucose concentration are between 70 mg/dL (3.9 mmol/L) and 100 mg/dL (5.6 mmol/L). When fasting blood glucose is between 100 to 125 mg/dL (5.6 to 6.9 mmol/L) changes in lifestyle and monitoring glycemia are recommended. If fasting blood glucose is 126 mg/dL (7 mmol/L) or higher on two separate tests, diabetes is diagnosed. An individual with low fasting blood glucose concentration (hypoglycemia) - below 70 mg/dL (3.9 mmol/L)

Pharmacists therefore have an important role in MTM to identify and find solutions for various medication-related problems, including drug-drug and drug-disease interactions and monitoring for adjustments that need to be made such as renal and hepatic impairment.

The objective of this systematic review was to assess the impact of pharmacist provided MTM interventions when compared to no intervention on pre-defined clinical outcomes among outpatients with type 2 diabetes mellitus, hypertension, or dyslipidemia.

The relationship between decreasing cardiovascular disease risk factors and the improvement in cardiovascular disease outcomes is well established, and current guidelines recommend an aggressive reduction in these risks in order to prevent major cardiovascular accidents.¹ The pharmacist may play a relevant role in primary and secondary prevention of cardiovascular diseases. In addition to medication dispensing, the pharmacist can provide more direct interventions (eg, medication education and disease management), as a support to the physician's action, in order to improve medication adherence, to achieve the goals of desired therapeutic outcomes and to improve safe medication use and humanistic control.²

1.3 DYSLIPIDEMIA

The direct pharmacist's intervention in patients' care, in alternative to conventional approach, has proved to favorably affect therapeutic and safety outcomes in different diseases or conditions including diabetes, dyslipidaemia, arterial hypertension, obesity, asthma or chronic obstructive pulmonary disease, infective diseases (including influenza immunisation), psychiatric conditions and osteoporosis prevention.³⁻⁵ A recent overview of systematic reviews has documented a positive impact on patients' outcomes (blood pressure and haemoglobin A1c reduction) of clinical pharmacy services targeting specific cardiovascular conditions, such as hypertension or diabetes mellitus.⁶

Effects on humanistic outcomes such as patient adherence, patient satisfaction, patient knowledge and quality of life were variable and inconclusive across the various studies.

Given these premises, in the present review, we aim to update the reader on the current services that the pharmacist may provide in order to help manage the patients with cardiovascular disease or individuals at risk of cardiovascular disease.

We will also discuss the actual benefits of such interventions at the light of the current evidence from randomized or observational studies and the perspectives and potentials for the development of appropriate healthcare delivery models. The primary focus of this review will be the discussion of current evidence on the benefit provided by models based on a multidisciplinary approach, which is the most popular and best accepted by the medical community worldwide.

Given the large amount of available studies, with different levels of quality, and the heterogeneity of settings (hospital, outpatient clinic and community) and outcomes, we opted for showing results from large and well-conducted meta-analyses published in the literature in recent years.

1.4 CLINICAL PHARMACIST INTEVENTIONS

Pharmacy services provided to patients with cardiovascular disease may be roughly classified into three groups: activities directed at patients, activities directed at healthcare professionals and those provided within the frame of a multidisciplinary teamwork.^{7 8} A simplified list of most common services is provided .

- Patient education and counselling
- Drug safety management
- Informative activities directed at healthcare professionals
- Documenting adverse drug reactions occurring to the patients
- Monitoring patient's adherence to physician's prescription
- Direct intervention in a multidisciplinary team

- Collaborative medication management (including drug administration)
- Medication review and dose adjustment or titration
- Medication monitoring and reconciliation
- Definition and application of disease management pathways and protocols
- Detection, prevention or control of specific cardiovascular risk factors
- Monitoring patients' outcomes
- Post hospital discharge follow-up and home visits for critical patient

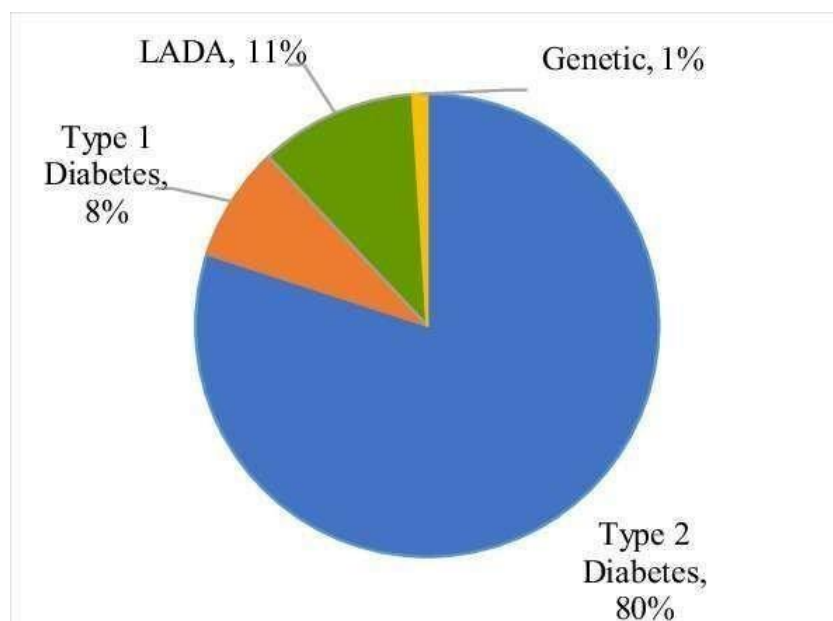


FIGURE 1.3 DEMOGRAPHIC CHART OF DIABETES PREVALENCE

Patient education and counselling about medication, diseases and non-pharmacological treatment (including indication on appropriate lifestyle) are traditional pharmacist's activities. These services are aimed at improving patient knowledge and at promoting the correct use of medicines, Favoring the adherence to treatment and preserving a healthy status.

The pharmacist also needs to assess possible issues related to drug safety in treated patients, providing specific advises and documenting such occurrences to the physician in charge of the patient. However, the most interesting and potentially successful and useful activities which a pharmacist may accomplish are those involving a direct intervention in a multidisciplinary team: the potentiality of such an approach will be addressed and discussed in detail in the present paper.

Team-based multidisciplinary services include medication review and drug therapy adjustments, in which the pharmacist has the autonomy to manage medicines according to predefined clinical protocols or collaborative agreements with the physician, and elaboration or refinement of a complete and reliable medication history and therapeutic reconciliation following hospital discharge and follow-up. Of particular interest is the development of structured programmes for detection, prevention or control of specific risk factors, including measurement of blood pressure, blood glucose and lipids, and provision of diagnostic tests with medical reporting, such as 12-lead resting ECG, 24 hour ambulatory blood pressure monitoring or 24 hour ECG Holter monitoring, through telemedicine tools, in connection with providers of medical reporting services.

In the current practice more complex interventions, such as for instance those focused on the application of clinical guidelines and dosage adjustment and titration are typically provided by hospital pharmacists, whereas community pharmacists are usually more concerned with improving patient knowledge and compliance, eventually by monitoring some patient's outcomes. The pharmacist working within a community pharmacy is also sometimes in charge of home visits of critical or frail patients under the supervision of a primary care outpatient clinic.

Effectiveness of the pharmacist's intervention in diverse cardiovascular conditions

In the last decade, several systematic reviews were conducted to measure the effect of indirect or direct pharmacist care of patients with cardiovascular diseases. We searched the literature for such publications, which included both randomized controlled and observational studies, performed in specific settings or pooling together interventions from different settings (community, outpatient clinic or hospital).

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

SR NOs	AUTHOR	YEAR	TITLE	CONCLUSION
1	Asmaa A. Al Haqan, Dalal M. Al-Taweel et al.	2017	Pharmacists' Attitudes and Role in Diabetes Management in Kuwait	Barriers to provision of pharmacy services to patients with diabetes should be addressed to enable optimum patient care delivery.
2	Asmaa A. Al Haqan, Dalal M. Al-Taweel et al.	2017	Pharmacists' Attitudes and Role in Diabetes Management in Kuwait	Barriers to provision of pharmacy services to patients with diabetes should be addressed to enable optimum patient care delivery.
3	Javedh Shareef, Jennifer Fernandes et al.	2016	Evolving role of clinical pharmacist in the management of diabetes mellitus	Patient education and counseling by the pharmacist for improving the medication adherence will further strengthen the remarkable role of pharmacist in the management of diabetes mellitus.
4	Nilay D. Solanki et al.	2016	Prescription audit in outpatient department of multispecialty hospital in western India: an observational study	A definite role of clinical pharmacist, in the process control by utilizing SPC during prescription audit.
5	Marie Smith	2009	Pharmacists' Role in Improving Diabetes Medication Management	Pharmacists in community and primary care settings can be a key resource working in an interdisciplinary model for improved medication management of patients with diabetes.

AIM AND OBJECTIVES

3.AIM :

The aim of the study is to assess the role of Counselling by clinical pharmacist in holistic management Type 2 Diabetes mellitus, Systemic Hypertension and dyslipidemia.

3.1 OBJECTIVES

- To compare the clinical and metabolic outcomes between the clinical pharmacist intervention group and the usual care group at the end of the trial.
- To assess patient satisfaction/understanding of their disease condition through MARS (Medication adherence rating scale) & KAP(Knowledge, Attitude and Practice) questionnaire
- To improve medication adherence through patient education in the intervention group.

3.2 HYPOTHESIS :

Clinical pharmacist intervention in the form of counselling and education of the patients significantly improves their medication adherence, clinical parameters, biochemical parameters and results in good disease control.

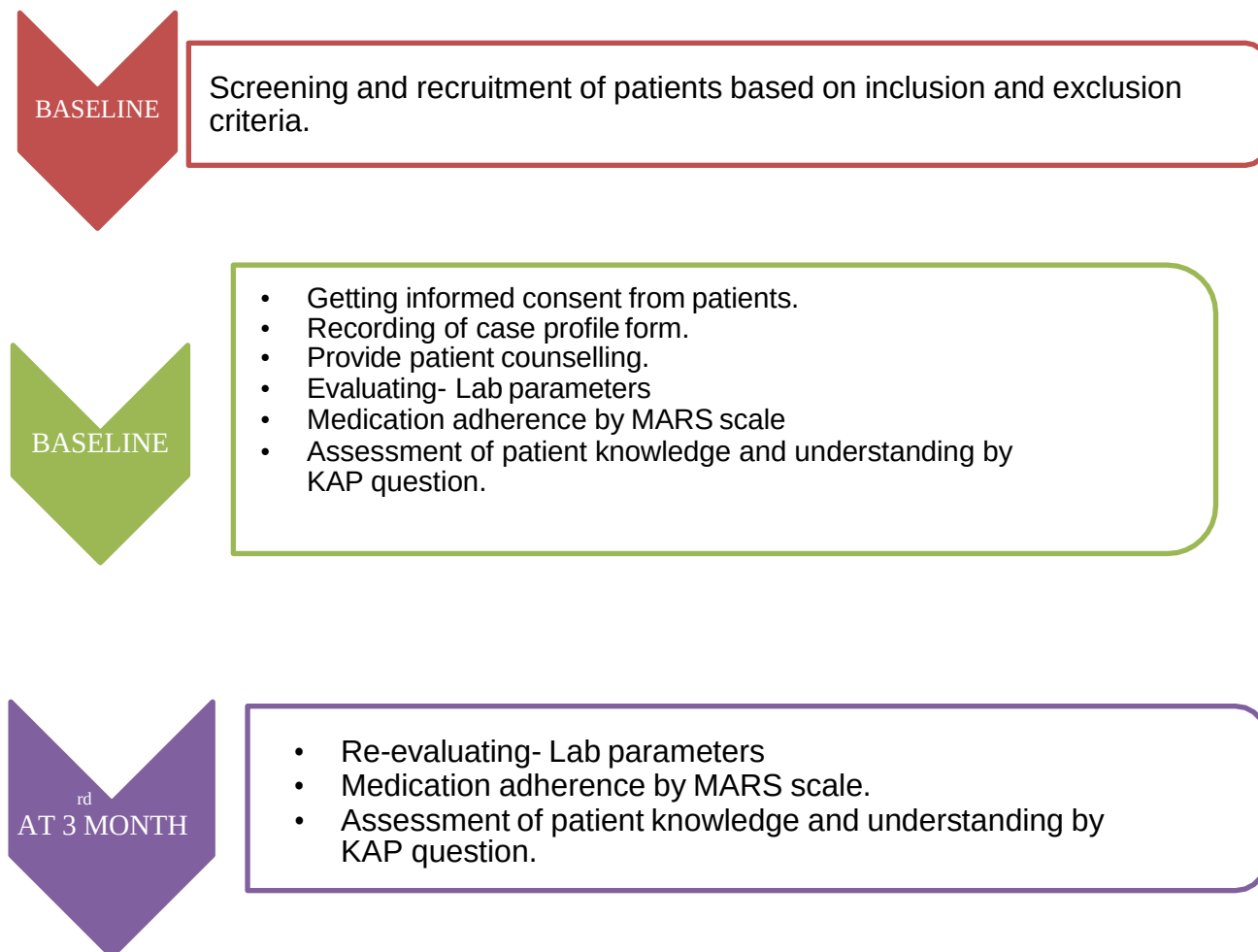
3.3. STUDY JUSTIFICATION:

- This study will help in determining and understanding clinical pharmacist's role in holistic management of a patient.
- In adjunct to conventional therapy, patient counseling is an important factor in the management of Diabetes mellitus, hypertension and dyslipidemia .
- Pharmacists have the capability to enhance outcomes and increase adherence of medication in T2 DM, HYPERTENSION and DYSLIPIDEMIA in patients.
- So the present study will focus on the impact of clinical pharmacist on holistic management of Diabetes mellitus, hypertension and dyslipidemia

EXPERIMENTAL WORK

4. PLAN OF WORK

4.1 FLOW CHART



4.2 STUDY DESIGN:

- A PROSPECTIVE INTERVENTIONAL RANDOMIZED CONTROLLED CLINICAL TRIAL

4.3 STUDY LOCATION :

- CHENGALPATTU , THIRUVALLUR

4.4 STUDY PERIOD :

- 3 MONTHS

SAMPLE SIZE :

- 150

4.5 SAMPLE SIZE CALCULATION

SAMPLE SIZE CALCULATION :

Intervention group – 75

Control (usual care) group – 75

$$d = \frac{u_2 - u_1}{\sigma}$$
$$n \geq \left(\frac{1+r}{r} \right) \frac{(z_{1-\alpha/2} + z_{1-\beta})^2}{d^2} + \frac{z_{1-\alpha/2}^2}{2(1+r)}$$

Alpha (α) : Type 1 error rate

Beta (β) : Type 2 error rate

d = Expected effected size.

r = Sample size ratio group 2 / group 1 { 1 : 1 = 1 }

Alpha (α) : 0.05

Beta (β) : 0.2

Effect Size (d) = 0.50 / 50 mg/dl

After Substituting in the formula :

Minimum sample size needed for group 1 : 64

Minimum sample size needed for group 2 : 64

n = 128 ~ 150

4.6 METHODOLOGY:

The study is conducted in the Community Medicine. Total study period is two months. First 150 patients of either Type 2 Diabetes mellitus and/or Hypertension and/or Dyslipidemia who attend the general medicine in community pharmacy and fulfilling the criteria are allotted alternatively to intervention group and control group. All the patients undergo clinical examination & biochemical investigations in two visits (first visit & second visit) as given in the proforma. Second visit will be three months after the first visit. All the patients will be asked the MARS & KAP questionnaire during both visits. Patients belonging to the intervention group will be given counselling by the clinical pharmacist regarding the disease awareness, medication advice, lifestyle modification. All the clinical parameters, biochemical parameters & questionnaire scores are compared between the two groups at the end of the study.

- For Intervention group - Conventional therapy + Clinical Pharmacist education regarding disease, diet and drugs.
- For control group - Conventional therapy

RESULT AND DISCUSSION

5. RESULT AND DISCUSSION

5.1 MEDICATION ADHERENCE RATING SCALE

TABLE 5.1 Medication Adherence Rating Scale

S.NO	QUESTIONS	BEFORE COUNSELING	AFTER COUNSELING
1	Do you ever forget to take your medication?	26%	65%
2	Are you careless at times about taking your medicine?	36%	68%
3	When you feel better ,do you sometimes stop taking your medicine?	39%	74%
4	Sometimes if you feel worse when you take the medicine,don you stop taking it?	26%	69%
5	I take my medication only when I sick.	46%	78%
6	It is unnatural for my mind and body to be controlled by medication	36%	69%
7	My thoughts are clear on medication.	42%	83%
8	By staying on medication, I can prevent getting sick.	36%	67%
9	I feel weird, like a zombie on medication.	52%	87%
10	Medication makes me feel tired and sluggish	53%	84%

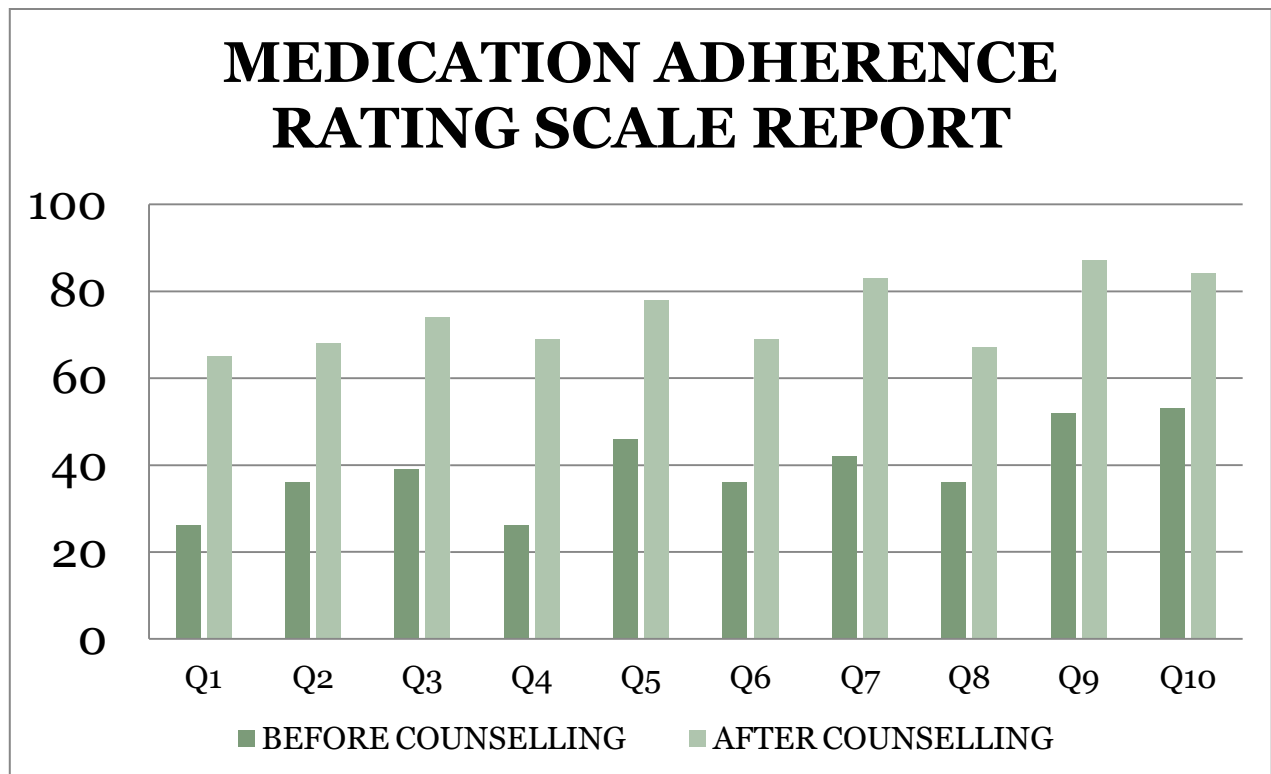


FIGURE:5.1 MEDICATION ADHERENCE RATING SCALE REPORT

COMPARISON BETWEEN BEFORE & AFTER COUNSELLING

According to medication adherence and reducing systolic and diastolic blood pressures.

According to the questions based on patient. Do you ever forget to take your medication? Patient percentage was before counselling 26% and after counselling 65%, by staying on medication I can prevent getting sick? Patient percentage was before counselling 36% and after counselling 67%.when you feel better to you sometimes stop taking your medication? patient percentage was before counselling 39% and after counselling was 74%, I take my medication only when I am sick? Patient percentage was before counselling 46 % and after counselling 78% my thoughts clear on medication. Patient percentage was before counselling 36 %and after counselling 69%.

The patient was clinically improved.

5.2 KNOWLEDGE RESULTS

TABLE 5.2 Knowledge Results

S.NO	QUESTIONS	BEFORE COUNSELING	AFTERCOUNSELING
1	Whether I am aware that diabetes is a disease?	39%	63
2	How many types of diabetes?	36%	74%
3	What is the level of blood sugar to diagnose?	40%	89%
4	Is the infection can lead to diabetes?	46%	87%
5	What are the various symptoms of diabetes?	53%	68%
6	What are the complications of diabetes?	49%	87%
7	What occur if diabetes is not treated?	39%	77%
8	Salt restriction diet is good for hypertension ?	44%	63%
9	Which diet is limited in diabetes, hypertension?	42%	69%
10	Is exercise having valuable role in diabetes and hypertension?	38%	77%

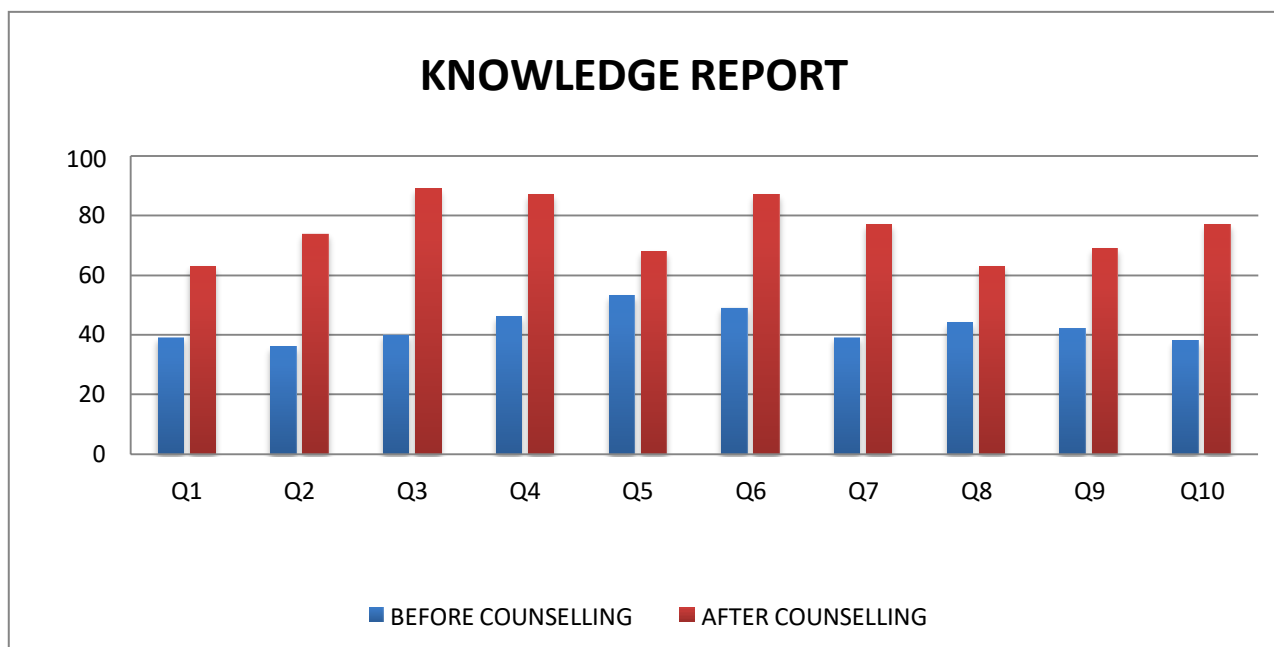


FIGURE:5.2 KNOWLEDGE REPORT

COMPARING BETWEEN BEFORE AND AFTER COUNSELLING

According to knowledge result,

According to the question based on patients How many type of diabetes patient was percentage before counselling 36% and after counselling 74% What are the various symptoms of diabetes patient was percentage before counselling 53 percentage and after counselling 68 percentage Which diet is limited in diabetes hypertension? Patient was percentage before counselling 42% after counselling 69% Salt restriction diet is good for hypertension the patient was percentage before counselling 44% after counselling 63 percentages exercise having valuable roll in diabetes and hypertension

. The patient percentage was before counselling 38% and after counselling 77%.

Patient was clinically improved.

5.3 ATTITUDE RESULTS

TABLE 5.3 Attitude Results

S.NO	QUESTIONS	BEFORE COUNSELING	AFTER COUNSELING
1	Should patient follow a controlled and planned diet to prevent diabetes?	56%	69%
2	Do you think estimation of blood sugar level is important?	43%	62%
3	Should we visit to physician regularly?	38%	77%
4	Do you think regular medication is important in diabetes?	41%	65%
5	Should we exercise regularly for healthy life?	39%	74%

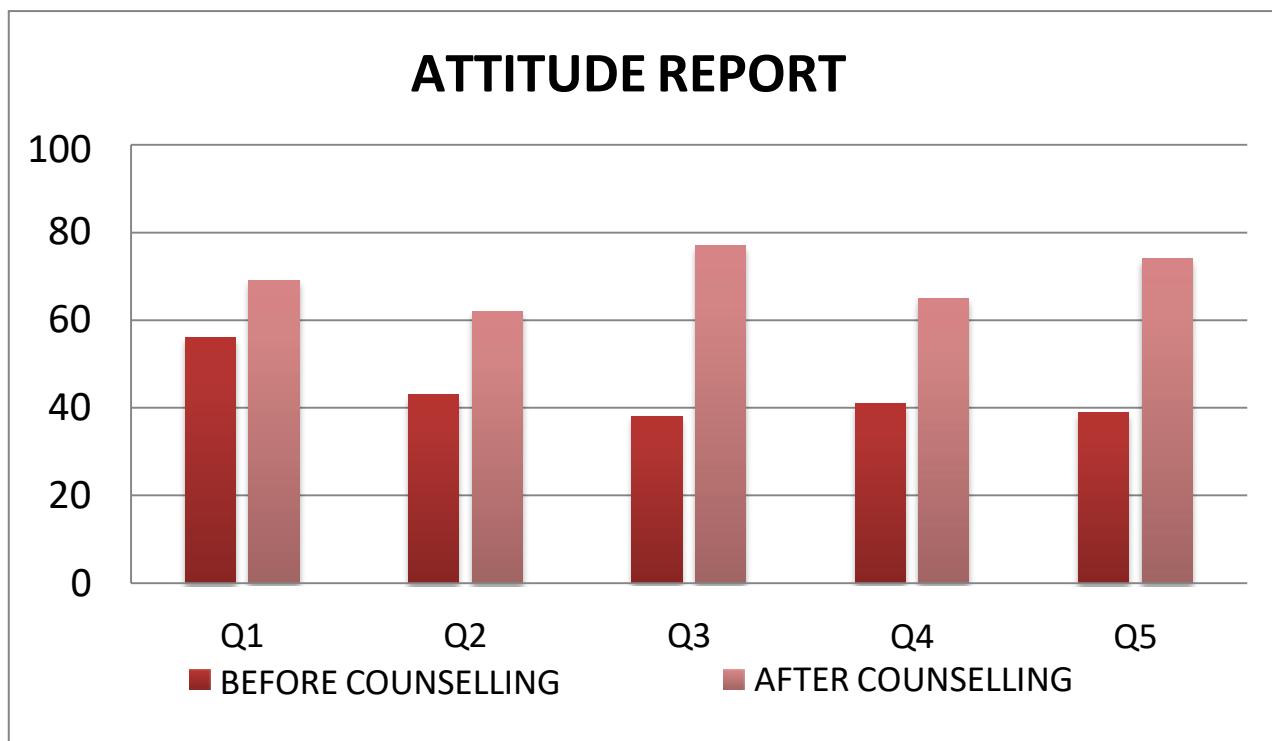


FIGURE:5.3 ATTITUDE REPORT

COMPARING BETWEEN BEFORE AND AFTER COUNSELLING

According to attitude results Question based controlled and plant diet to prevent diabetes the percentage rate after counselling was increased by 69%, visiting to physician regularly the patient was improved 77 % when compared after counselling patient had Patient was clinically improved74% based upon the healthy diet with regular exercise. Patient was clinically improved

5.4 PRACTICE TEST RESULTS

TABLE 5.4 Practice Test Results

S.NO	QUESTIONARES	BEFORE COUNSELING	AFTER COUNSELING
1	When was your blood pressure measured last?	32%	62%
2	When was your last consultation with your physician?	46%	77%
3	When did you have your last lipid profile checked?	55%	76%
4	When was your blood sugar level checked last?	39%	69%
5	When did you have gone for exercise last?	48%	82%

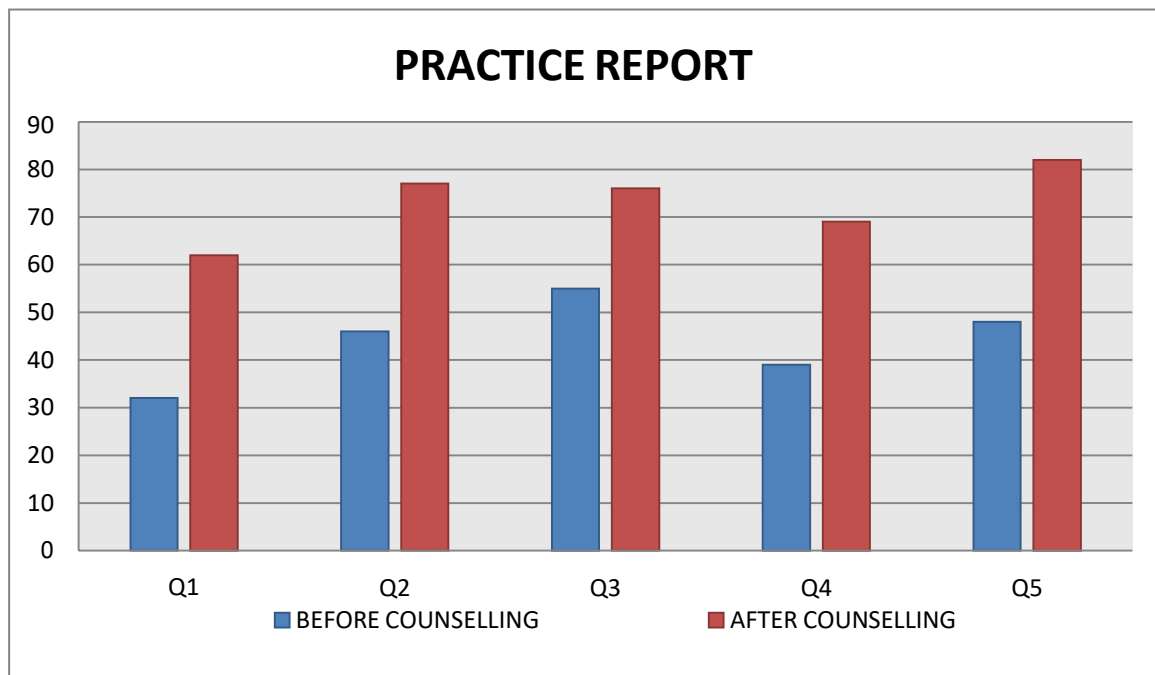


FIGURE:5.4PRACTICE REPORT

COMPARING BETWEEN BEFORE AND AFTER COUNSELLING

According to practice results,

According to question based on patients When was your blood pressure measured last? The patient was percentage before counselling 32 percentage and after counselling 62 percentage When was your blood sugar level checked last ? The patient was percentage before counselling 39 in percentage after counselling 69 in percentage When did you have gone for exercise last ? The patient was percentage before counselling 48% and after counselling 82% Patient was clinically improved.

5.5 DIABETIC LAB PROFILE

TABLE 5.5 Diabrtic lab profile

S.NO	PATIENT	FASTING BLOOD GLUCOSE		POSTPRANDIAL BLOOD GLUCOSE		RANDOM BLOOD GLUCOSE		HbA1c	
		NORMAL RANGE (70-100mg/Dl)		NORMAL RANGE (80-100mg/Dl)		NORMAL RANGE (70-100mg/Dl)		NORMAL RANGE (up to 6%)	
		1 st Month	3 rd Month	1 st Month	3 rd month	1 st Month	3 rd Month	1 st Month	3 rd Month
1	D1	150	110	130	111	160	123	9	6
2	D2	190	131	185	153	112	98	7	6
3	D3	153	123	160	121	159	107	8	6
4	D4	160	111	163	132	139	102	8	6
5	D5	185	143	189	136	150	110	9	7
6	D6	180	135	165	142	163	112	7	5
7	D7	186	151	175	112	198	123	7	5
8	D8	140	109	145	103	190	131	9	6
9	D9	200	160	203	163	153	123	7	6
10	D10	159	107	99	82	160	111	9	6
11	D11	150	124	105	94	185	143	8	6
12	D12	185	144	163	123	180	135	8	6
13	D13	160	120	176	124	186	151	7	6
14	D14	159	126	189	123	140	109	8	7
15	D15	139	99	199	126	200	160	9	6
16	D16	187	132	178	142	159	107	8	9
17	D17	163	124	154	120	150	124	7	6
18	D18	198	121	135	114	185	144	9	7
19	D19	175	112	178	120	160	120	8	6
20	D20	188	113	169	123	159	126	7	6
21	D21	220	170	188	141	139	99	9	7
22	D22	198	130	210	122	187	132	8	6
23	D23	188	113	232	160	163	124	7	6
24	D24	223	170	155	104	198	121	8	6
25	D25	210	155	143	112	175	112	9	7
26	D26	113	98	178	124	188	113	8	6
27	D27	247	190	156	102	188	123	7	6
28	D28	182	142	162	120	132	112	7	5
29	D29	133	99	190	132	202	126	8	6
30	D30	200	140	166	127	223	170	9	7

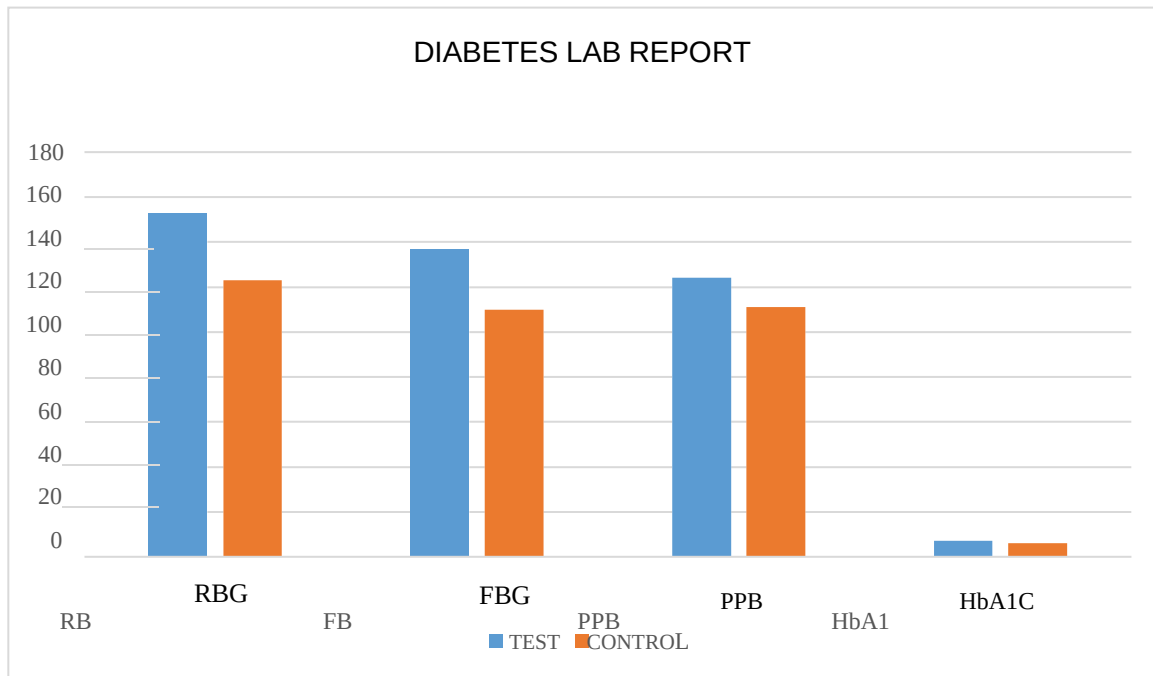


FIGURE:5.5Diabetes lab report

COMPARISON BETWEEN TEST & CONTROL PATIENTS

Comparison between test & control diabetes patients initially comparing the patients the rbg level of test patients have been improved after 3 months compared to control patients followed by, fbg level of test patients have been improved after 3 months compared to control patients followed by, the ppbs level of test patients have been improved after 3 months to control patients followed by, the hba1c level of test patients have been improved after 3 months compared to control patients .

5.6 HYPERTENSION LAB PROFILE

TABLE 5.6 Hypertension lab profile

S.NO	PATIENT	BLOOD PRESSURE		NA (SODIUM)		K (POTASSIUM)		AB (ALBAMIN)		SR.CR (SERUM CREATININE)	
		NORMAL RANGE (80-120mg/dl)		NORMAL RANGE (35-145)		NORMAL RANGE (3.5-5.0)		NORMAL RANGE (3.4-5.4g/dl)		NORMAL RANGE (0.7-1.4mg/dl)	
		1 st Month	3 rd Month	1 st Month	3 rd Month	1 st Month	3 rd Month	1 st Month	3 rd Month	1 st Month	3 rd Month
1	D1	160	110	168	112	5.1	4.1	4.9	3.5	2.4	0.7
2	D2	163	131	155	98	4.3	2.5	5.8	4.3	2.7	0.8
3	D3	189	123	148	85	6.2	2.4	6.2	3.7	1.8	0.8
4	D4	165	111	151	76	6.8	4.6	5.5	4.3	2.6	0.7
5	D5	175	143	160	92	6.9	5.3	6.7	3.5	1.8	1.1
6	D6	145	135	187	82	5.9	3.6	5.8	4.6	2.4	0.8
7	D7	203	151	199	48	4.9	3.2	6.7	3.8	1.8	1.2
8	D8	154	109	185	58	5.8	4.5	5.4	4.9	2.4	0.8
9	D9	105	160	171	96	6.2	3.5	6.4	3.8	1.4	1.1
10	D10	163	107	179	55	5.5	4.3	5.6	4.8	2.4	0.8
11	D11	176	124	189	98	6.7	3.3	6.5	4.1	1.5	1.1
12	D12	189	144	195	120	5.8	4.3	5.5	3.6	2.6	0.9
13	D13	199	120	120	56	6.7	3.5	6.4	3.5	1.5	0.9
14	D14	178	126	123	89	5.4	4.6	5.5	4.6	2.5	0.9
15	D15	154	99	132	110	6.4	3.4	6.5	5.3	1.5	0.9
16	D16	135	132	142	103	5.6	4.9	5.6	3.6	2.7	1.8
17	D17	178	124	132	102	6.5	3.8	5.6	3.9	1.9	1.1
18	D18	169	121	161	132	5.5	4.8	6.4	4.5	2.5	0.9
19	D19	188	112	123	98	6.4	3.7	5.6	3.5	1.5	1.1
20	D20	210	113	159	121	5.5	4.6	6.3	4.3	2.6	0.9
21	D21	232	170	129	114	6.5	3.8	5.6	3.8	1.5	1.1
22	D22	155	130	149	110	5.6	4.9	6.6	4.3	2.5	0.9
23	D23	143	113	189	120	5.6	3.5	5.3	3.7	1.7	1.1
24	D24	178	170	116	74	6.4	2.6	6.3	4.6	2.5	0.9
25	D25	189	155	159	117	5.6	4.3	6.3	4.3	1.9	1.2
26	D26	196	98	126	89	6.3	4.8	5.9	3.7	2.9	0.3
27	D27	184	190	89	87	5.6	3.8	4.2	3.8	2.6	1.4
28	D28	193	142	129	111	6.6	4.3	6.5	3.9	1.9	1.1
29	D29	168	99	199	140	5.3	3.6	4.3	3.9	1.6	1.1
30	D30	174	140	129	89	6.3	3.9	5.4	4.2	2.8	0.9

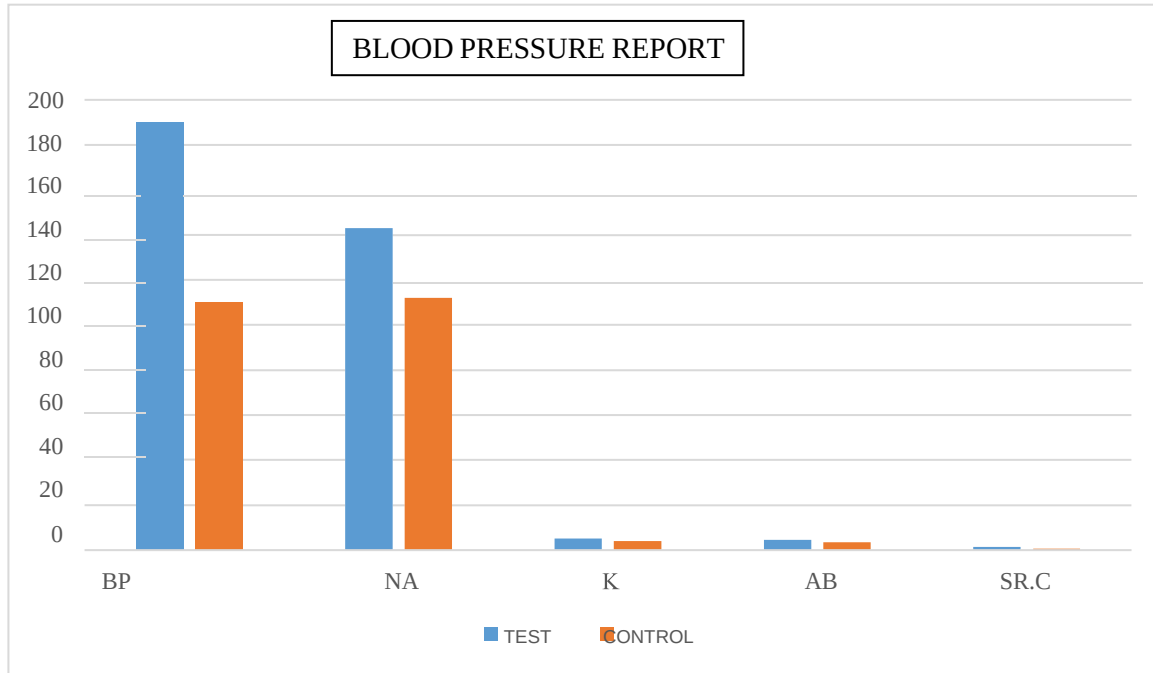


FIGURE:5.6 BLOOD PRESSURE REPORT

DIFFERENCE BETWEEN COUNSELLING & NON COUNSELLING PATIENTS

Comparison between test & control blood pressure patients initially comparing the patients the blood pressure level of test patients have been improved after 3 months compared to control patients followed by, na level of test patients have been improved after 3 months compared to control patients followed by, the k level of test patients have been improved after 3 months compared to control patients followed by, the ab level of test patients have been improved later 3 months compared to control patients followed by, the sr.cr level of test patient have been improved after 3 months compared to control patients

5.7 LIPID LAB PROFILE

TABLE 5.7 Lipid Lab Profile

S.NO	PATIENT	TOTAL CHOLESTEROL		HDL		LDL		VLDL		TG	
		NORMAL RANGE (<200mg/dl)		NORMAL RANGE (>40mg/dl)		NORMAL RANGE (<130mg/dl)		NORMAL RANGE (<40mg/dl)		NORMAL RANGE (<150mg/dl)	
		1 st MONTH	3 rd MONTH	1 st MONTH	3 rd MONTH	1 st MONTH	3 rd MONTH	1 st MONTH	3 rd MONTH	1 st MONTH	3 rd MONTH
1	D1	241	185	35	54	133	122	54	35	165	138
2	D2	230	195	35	54	141	125	51	35	162	131
3	D3	211	185	36	56	135	126	56	36	174	135
4	D4	247	189	38	58	145	123	58	38	175	136
5	D5	249	188	39	52	148	125	52	39	179	141
6	D6	210	197	40	57	147	124	57	40	155	135
7	D7	222	194	31	41	146	128	41	31	154	138
8	D8	232	181	32	45	148	127	45	32	151	134
9	D9	216	185	36	46	149	129	46	36	187	137
10	D10	212	184	31	48	150	126	48	31	178	139
11	D11	211	186	32	46	148	124	46	32	179	135
12	D12	221	188	36	47	141	127	44	36	180	134
13	D13	231	199	35	49	151	128	49	35	175	136
14	D14	248	195	34	50	142	126	50	34	175	134
15	D15	223	194	39	51	146	125	51	39	174	136
16	D16	242	195	38	52	145	124	52	38	176	138
17	D17	247	196	37	53	147	127	53	37	178	148
18	D18	249	197	38	54	148	129	54	32	179	149
19	D19	251	185	31	55	149	127	55	31	178	134
20	D20	241	184	36	45	135	126	45	36	168	145
21	D21	211	186	35	46	136	127	46	35	165	146
22	D22	201	196	34	47	139	128	47	34	180	147
23	D23	203	184	36	48	135	124	48	36	181	148
24	D24	202	189	32	41	134	126	41	32	175	149
25	D25	250	198	31	48	137	127	48	31	174	147
26	D26	214	184	36	47	136	126	47	36	176	147
27	D27	231	195	35	45	134	125	45	35	175	145
28	D28	251	187	34	42	132	124	42	34	174	146
29	D29	214	189	39	43	133	126	43	39	176	142
30	D30	213	198	34	46	135	127	46	34	179	143

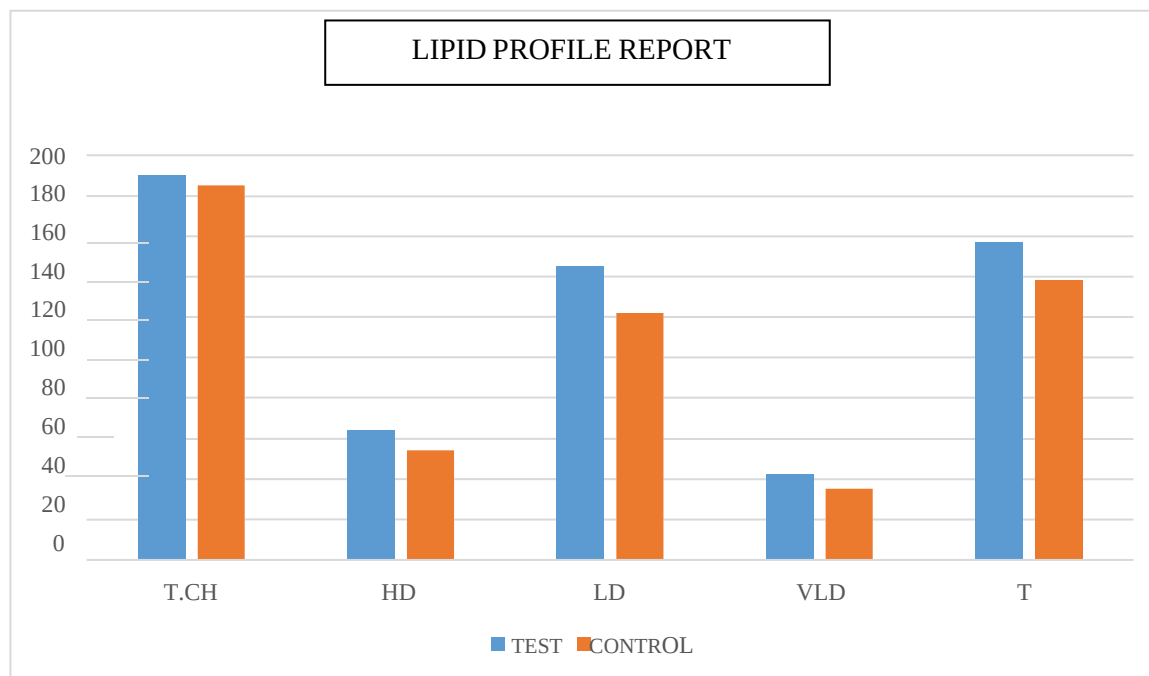


FIGURE 5.7 LIPID PROFILE REPORT

COMPARISON BETWEEN TEST & CONTROL PATIENTS

Comparison between test & control lipid profile patients initially comparing the patients the T.CHL level of test patients have been improved after 3 months compared to control patients followed by, HDL level of test patients have been improved after 3 months compared to control patients followed by, the LDL level of test patients have been improved after 3 months compared to control patients followed by, the VLDL level of test patients have been improved after 3 months compared to control patients followed by, the TG level of test patients have been improved after 3 months compared to control patients.

DISCUSSION

The findings of the present study indicate that clinical pharmacist delivered intervention services can improve clinical outcomes for patients with diabetes, hypertension, and dyslipidemia. These findings lend further evidence to the value of pharmacist provided services for patients with common chronic conditions. Future research could be conducted to help provide more targeted and definitive evidence for the value of clinical pharmacist services. The prevalence of hypertension and obesity in patients with T2DM are high throughout the world. Controlling hypertension and reducing obesity in these patients is important to limit the morbidity and costs for the health care systems derived from diabetic complications. Better understating of diabetic complications and comorbidities is important for determining the right treatment strategies to reduce diabetes mellitus, blood pressure and obesity levels in the patients.

Annexures

6. Annexure

6.1 ETHICAL LETTER



RIPON INDEPENDENT ETHICS COMMITTEE (NEC)
Address: 16/34, Veda Nagar, 2nd Stage, 4th Street, Chinnaya Nagar, Chennai - 600092, Tamil Nadu, India. Email: ripon.iec@gmail.com

Ethics committee reg no.: ECR/409/Indt/EN/2022

To, 31-oct-2022
Dr. S.AISHWARYA
Principal investigator
Assistant professor
No 2 12, Padmasabhan street, Nehru Nagar,
Vandaur, Chennai
600048

Dear Dr. S.AISHWARYA,

The Ripon independent ethics committee reviewed and discussed your study
(Application no: TMCA000023) on 31-OCT-2022, to conduct the study entitled,

Study Code: HWC/MSCD/PP/046/2022

Study Title:

CLINICAL PHARMACIST INTERVENTION IN IMPROVING CLINICAL OUTCOMES IN 2-
TYPES DIABETES MELLITUS , SYSTEMIC HYPERTENSION AND DYSLIPIDEMIA A
PROSPECTIVE INTERVENTIONAL RANDOMIZED CONTROLLED CLINICAL TRIAL STUDY

The following documents were reviewed and approved.

1. Study Protocol (Version 1.0) (Dated 26 SEP 2022)
2. Case Report form (Version 1.0) (Dated 26 SEP 2022)
3. Confidential Disclosure Agreement (Version 1.0) (26 SEP 2019)
4. CV of Investigator (Signed 09 SEP 2021)
5. Investigator Signature page (Dated 17 March 2022) (Signed 15 SEP 2022)
6. Informed Consent Document English (Version 1.0) (Dated 26 SEP 2022)
7. Informed Consent Document Tamil (Version 1.01) (Dated 26 SEP 2022)

RIEC
RIPON INDEPENDENT ETHICS COMMITTEE (RIEC)
Address: 16/34, Veda Nagar, 2nd Stage, 4th Street, Chinnaya Nagar, Chennai - 600092, Tamil Nadu, India. Email: ripon.iec@gmail.com

Ripon IEC expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and informed consent and asks to be provided a copy of the final report

The validity of this approval letter is one year and for studies which have not been initiated for one year from the approval date or whose duration is more than one year, an extension of approval shall be sought by the principal investigator/CRO from Ripon IEC.

The Ripon independent ethics committee is functioning in accordance with ICH GCP guidelines, ethical guidelines for biomedical and health research in human subjects and the New Drugs and Clinical Trial Rules 2019.

As Covid-19 infections is a potential risk, Ripon IEC propose that it is mandatory for the volunteers to get screened before enrolling them for the proposed clinical trial by the CRO in accordance with the prevailing screening and testing guidelines given by the state government and the regulatory authorities, results of which shall be declared to the ethics committee.

1



RIPON INDEPENDENT ETHICS COMMITTEE (RIEC)
Address: 16/34, Veda Nagar, 2nd Stage, 4th Street, Chinnaya Nagar, Chennai - 600092, Tamil Nadu, India.
Email: ripon.iec@gmail.com

the CRO shall also make necessary and appropriate arrangements for sanitization of the facility, equipment and every object and every person which can pose to be a carrier for SARS COV- 2 and contribute to Covid-19. The CRO shall disclose the schedule of testing and the results to the Ripon IEC timely. Ripon Independent Ethics Chennai.



Ripon Independent Ethics Committee

6.2 Patient case profile

NAME :

AGE/SEX :

ADDRESS :

PASHISTORY DRUG HISTORY FAMILY HISTORY

PERSONAL HISTORY INCLUDING SUBSTANCE ABUSE:

CLINICAL AND BIOCHEMICAL INVESTIGATIONS: (AT SCREENING & AT
END OF 3 MONTH)

1. LIPID PROFILE

2. FASTING BLOOD GLUCOSE

3. POSTPRANDIAL BLOOD GLUCOSE

5. HbA1C

6. BLOOD PRESSURE

7. HEIGHT, WEIGHT, BMI

8. WAIST HIP RATIO (WHR = WAIST CIRCUMFERENCE / HIP CIRCUMFERENCE)

9. BLOOD UREA & SERUM CREATININE

10. URINE PROTEIN OUTCOME OF THE PATIENT :

6.3 Patient Inform consent form(English)

Participant's name:

Phone number:

Address:

Title of the project: "Clinical pharmacist intervention in improving clinical outcomes in Type 2 Diabetes mellitus, Systemic Hypertension and Dyslipidemia - A prospective interventional randomized controlled clinical trial." The details of the study have been provided to me in writing and explained to me in my own language. I confirm that I have understood the above study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without the medical care that will normally be provided by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the above study.

Signature of participant

Signature of Witness:

Date:

Date:

6.4 Patient inform consent form (Tamil)

ஒப்புதல் படிவம்

பங்கேற்பாளரின் பெயர் :

தொலைபேசி எண் :

முகவரி:

திட்டத்தின் தலைப்பு : வகை 2 நீரிழிவு நோய், உயர் இரத்த அழுத்தம் மற்றும் டிஸ்லிபிடெமியா ஆகியவற்றில் மருத்துவ விளைவுகளை மேம்படுத்துவதில் மருத்துவ மருந்தாளர் தலையீடு - ஒரு வருங்கால தலையீடு சீரற்ற கட்டுப்பாட்டு மருத்துவ பரிசோதனை.

ஆய்வு பற்றிய விவரங்கள் எழுத்து வடிவில் எனக்கு வழங்கப்பட்டு, என் சொந்த மொழியில் எனக்கு விளக்கப்பட்டுள்ளன. மேலே உள்ள ஆய்வை புரிந்துகொண்டேன் என்றும் கேள்விகள் கேட்க எனக்கு வாய்ப்பு கிடைத்தது என்றும் உறுதிப்படுத்துகிறேன். இந்த ஆய்வில் எனது பங்கேற்பு தன்னார்வத்திலானது என் பதையும் எந்த காரணமும் கூறாமல் எந்த நேரத்திலும் விலகிக்கொள்ள எனக்கு சுதந்திரம் உள்ளது என்பதையும் நான் புரிந்துகொள்கிறேன். இந்த ஆய்வில் இருந்து எழும் எந்த தரவு அல்லது முடிவுகளின் பயன்பாட்டையும் கட்டுப்படுத்தாமல் இருக்க நான் ஒப்புக்கொள்கிறேன், இது போன்ற பயன்பாடு அறிவியல் நோக்கத்திற்காக (கள்) மட்டுமே. ஆய்வு பற்றிய விவரங்களைத் தரும் தகவல் தான் ஒன்று எனக்கு வழங்கப்பட்டுள்ளது. மேற்கண்ட ஆய்வில் பங்கேற்க நான் முழுமையாக ஒப்புக்கொள்கிறேன்.

பங்கேற்பாளரின் கையொப்பம் :

சாட்சியின் கையொப்பம்:

தேதி :

தேதி:

6.5 MEDICATION ADHERENCE RATING SCALE(MARS)

Medication Adherence Rating Scale (MARS)

Using the MARS tool, you and your patient can determine willingness and ability to take or medication every day.

	Yes	No
1. Do you ever forget to take your medication?	☐	☐
2. Are you careless at times about taking your medicine?	☐	☐
3. When you feel better, do you sometimes stop taking your medicine?	☐	☐
4. Sometimes if you feel worse when you take the medicine, do you stop taking it?	☐	☐
5. I take my medication only when I am sick.	☐	☐
6. It is unnatural for my mind and body to be controlled by medication.	☐	☐
7. My thoughts are clearer on medication.	☐	☐
8. By staying on medication, I can prevent getting sick.	☐	☐
9. I feel weird, like a 'zombie', on medication.	☐	☐
10. Medication makes me feel tired and sluggish.	☐	☐

6.6 KNOWLEDGE ATTITUDE AND PRACTICE QUESTIONNAIRE

QUESTIONNAIRE FOR KNOWLEDGE :

- 1.Whether I am aware that diabetes is a disease?
- 2.How many types of diabetes?
- 3.What is the level of blood sugar to diagnose diabetes?
4. Is the infection can lead to diabetes?
- 5.What are the various symptoms of diabetes?
- 6.Which is the most correct method of blood sugar estimaton ?
- 7.What occur if diabetes is not treated?
- 8.Which life style modifications help in diabetes,hypertension and dyslipidemia?
- 9.Which diet is limited in diabetes, hypertension?
- 10.Is exercise having valuable role in diabetes and hypertension?
- 11.Treatment drugs should be taken daily or only when you are feeling sick?
- 12 . What are the complications of diabetes?
- 13.What is blood pressure and what are its complications ?
- 14.what is dyslipidemia and what are its complications ?
- 15.Salt restriction diet is good for hypertension ?

ATTITUDE QUESTIONNAIRE :

- 1.Should patient follow a controlled and planned diet to prevent diabetes?
2. Do you think estimation of blood sugar level is important?
- 3.Should we visit to physician regularly?
- 4.Do you think regular medication is important in diabetes?
5. Should we exercise regularly for healthy life?

PRACTICE QUESTIONNAIRE

1. When was your blood pressure measured last?
2. When was your last consultation with your physician?
3. When did you have your last lipid profile checked?
4. When was your blood sugar level checked last?
5. When did you have gone for exercise last?

6.7 PAMPHLET:DIET CHART FOR METABOLIC DISORDER

FRUITS AND VEGETABLES



Fresh Fruits & Green Leafy Vegetables

They are filled with the goodness of antioxidants, fibre, vitamins & minerals

Fruit Juice Drinks & Canned Vegetables

High in calories, trans-fats and sugar



DAIRY



Skimmed Milk & Low-Fat Yogurt

Important source of calcium, vitamin D & protein

Whole Milk & Ice Cream

High fat & sugar content is harmful for diabetics



PROTEINS



Lean Proteins & Seafood

Beans & seeds are rich in iron, vitamins while grilled fish & chicken comprises of beneficial proteins



Pork & Red Meat

Rich in saturated fats, high in iodine - avoid them completely

FATS



Nuts, Seeds & Avocados

Loaded with fibre, vitamins, antioxidants & rich in Omega fatty acids

Cookies, Cakes & Fast Food

Raises blood cholesterol levels & high in sugar



OTHERS



Sprouts & Oats

Sprouts are high in Vitamin C & Fibre, while Oats are low in GI score and regulate sugar levels



Fried Foods & Processed Grains

Contains saturated fats & high on carbohydrates

REFERENCES

REFERENCES

1. Definition, diagnosis and classification of diabetes mellitus and its complications: Report of a WHO consultation.
2. Kaveeshwar SA, Cornwall J. The current state of diabetes mellitus in India. *AMJ* 2014; 7 (1); 45-48
3. Mangoud A. M, Ahmed M. Mandil et al. Audit of Diabetic care in A Saudi Primary Care Setting. *J Family Community Med.* 1999; 6(2): 59-66
4. CE George et al. Quality of Diabetic Care among Patients in a Tertiary Care Hospital in Bangalore, South India: A Cross-sectional Study. *Journal of Clinical and Diagnostic Research.* 2015; 9(7)
5. Chidambaram Dhandapani, Sumy Sony, K.S.G.Arul Kumaran. Role of Clinical Pharmacist in the Management of Type II Diabetes Mellitus and its Outcomes. *IJPTP.* 2014;5(3):977-983
5. Abdulla Shehab et al., A Clinical Audit on Diabetes Care in Patients with Type 2 Diabetes in AlAin, United Arab Emirates. *The Open Cardiovascular Medicine Journal*, 2012;6: 26-132
6. Carolin Elizabeth George. Quality of Diabetic Care among Patients in a Tertiary Care Hospital in Bangalore, South India: A Cross-sectional Study. *Journal of Clinical and Diagnostic Research.* 2015 Jul, Vol-9(7).
7. Asmaa A. Al Haqan, Dalal M. Al-Taweel et al. Pharmacists' Attitudes and Role in Diabetes Management in Kuwait. *Med Princ Pract* 2017;26:273–279.
8. Hendrani AD, Adesiyun T, Quispe R, et al. Dyslipidemia management in primary prevention of cardiovascular disease: Current guidelines and strategies. *World J Cardiol.* 2016;8(2):201-210. doi:10.4330/wjc.v8.i2.201
9. Zhang, FL., Xing, YQ., Wu, YH. et al. The prevalence, awareness, treatment, and control of dyslipidemia in northeast China: a population-based cross-sectional survey. *Lipids Health Dis* 16, 61 (2017). <https://doi.org/10.1186/s12944-017-0453-2>
10. Said AH, Chia YC. Awareness, knowledge and practice of dyslipidaemia management among postgraduate primary care trainees in Malaysia: a cross-sectional study. *BMJ Open.* 2017;7(3):e013573. Published 2017 Mar 1. doi:10.1136/bmjopen-2016-013573