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A Study on Evaluation of Capability of ChatGPT in management of Drug Related Problems in treatments of Metabolic Disorders.

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ABSTRACT:

Introduction: The application of ChatGPT in managing drug-related problems offers a best approach to enhancing policies of healthcare support in decision-making. **Aim and Objective**s: The present study mainly involves in Evaluation of Capability of ChatGPT in management of Drug Related Problems and drug counselling among patients suffering with Metabolic Disorders. **Methodology**: The present study was a community based interventional study conducted for a period of 4 months from June 2024 to September 2024 among 109 patients suffering with metabolic disorders residing in yelahanka region of Bangalore, Karnataka, India. Cases related to metabolic disorders (Hypertension, Diabetes, Thyroid, PCOD) were taken from the population residing within Yelahanka, Bangalore, Karnataka, India. All the prescriptions were analyzed in detail for the identification of drug-related problems (drug interactions, medical errors, wrong dose, therapeutic duplications, drug misuse, wrong prescribing patterns) by using ChatGPT. The information related to adverse drug reactions was collected through patient personal interviews and medication history review and further analyzed by using the Naranjo scale and Hartwig scale which intern verified and confirmed by using ChatGPT to analyze and evaluate the capability of ChatGPT in the management of drug-related problems **Statistical Analysis:** Microsoft Excel was used for recording and analyzing the data of recruited subjects and by calculating mean, standard deviation, etc. Prism Graph Pad software version 10 will

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be used for Descriptive statistics, P value was calculated for the present study for statistical significance.

Conclusion: By leveraging and monitoring the natural language processing, ChatGPT provides real-time assistance in identifying potential drug interactions, suggesting therapeutic alternatives approaches, and offering drug dosage and dosing recommendations. It also aids both healthcare professionals as well as patients by delivering real clear, accessible information on patient drug safety, side effects, and medication adherence to treatment protocols. Furthermore, it contributes to patient education, improving understanding and medication compliance.

Keywords: ChatGPT, Drug Related Problems, Naranjo scale Prism Graph Pad software and Hartwig scale**.**

Introduction:

ChatGPT: A large language model developed by Open AI uses deep learning, a type of artificial intelligence, to generate human-like text based on the input it receives.

a) It belongs to the GPT (Generative Pre-Trained Transformer) family of models. [1,2]
b) It was developed by Open AI and is designed to generate human-like text and engage in conversations with users through chat interfaces. [1]
c) It answers questions, provides explanations, and creates written content logically and relevantly.
d) It has been trained on vast text data from the internet, allowing it to mimic human-like dialogues.
e) It was launched on November 30, 2022, by San Francisco.
f) It was created by Open AI, an AI research company, its CEO is Sam Altman.

Applications of ChatGPT in Healthcare Sector:

ChatGPT has significant potential in the healthcare sector, with various applications that can enhance patient care, streamline operations, and support medical professionals. Here are some key areas where ChatGPT can be applied [3,4].

- ❖ Patient Support and Education
- ❖ Medical Assistance
- ❖ Administrative Support:
- ❖ Research and Development
- ❖ Telemedicine Support
- ❖ Training and Education

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- Public Health and Outreach

Aim: The study on evaluation of capability of ChatGPT in management of Drug-related problems in treatments of metabolic disorders.

Objectives:

1. To assess the impact and outcomes of ChatGPT usage in the Management of drug-related problems in the treatments of metabolic disorders.
2. To evaluate the outcomes of ChatGPT usage in drug usage counseling in the promotion of rational drug usage among patients with metabolic disorders.

Methodology:

A Prospective, observational, and interventional study is carried out to analyze and evaluate the capability of ChatGPT in the management of metabolic disorders.

Method of Collection of Data:

The patients who are suffering from metabolic disorders (Hypertension, Diabetes, Thyroid, PCOD), residing within Yelahanka, Bangalore, Karnataka, India were considered for the present study.

Study Procedure:

Cases related to metabolic disorders (Hypertension, Diabetes, Thyroid, PCOD) were taken from the population residing within Yelahanka, Bangalore, Karnataka, India. All the prescriptions were analyzed in detail for the identification of drug-related problems (drug interactions, medical errors, wrong dose, therapeutic duplications, drug misuse, wrong prescribing patterns) by using ChatGPT. The information related to adverse drug reactions and drug reactions was collected through patient personal interviews and medication history review were analyzed by using the Naranjo scale and Hartwig scale which intern verified and confirmed by using ChatGPT to analyze and evaluate the capability of ChatGPT in the management of drug-related problems among patients who are suffering with metabolic disorders.

Study site:

Yelahanka population, the public who are residing in the Yelahanka region Pincode:560064, Bengaluru, Karnataka, India (Community-Based).

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Study duration:

The present study was conducted for a period of 4 months from June 2024 to September 2024.

Study design:

It is a community-based prospective, observational, and interventional study.

Sample size:

The estimated sample size ranges in between 100-150 for the present study.

Sample size calculation with sample size calculator:

This means 80 or more measurements/surveys are needed to have a confidence level of 95% that the real value is within ±5% of the measured/surveyed value.

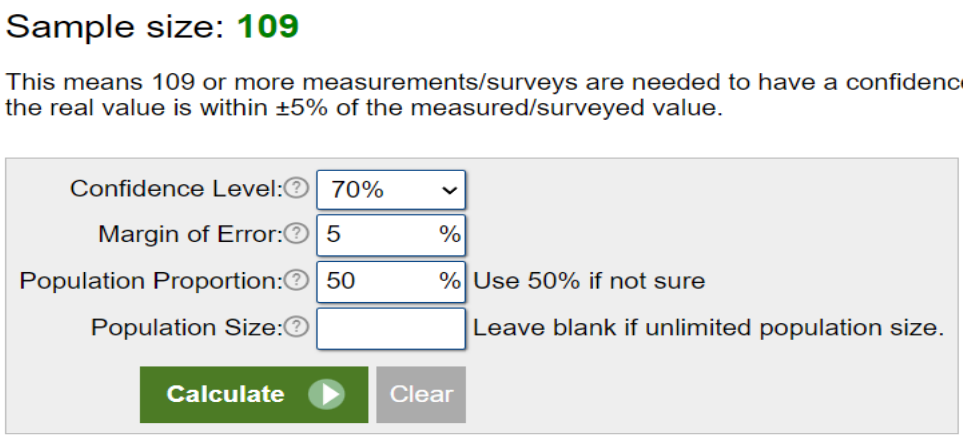

Fig No.1: Sample size calculation

The calculator provided on this page calculates the confidence interval for a proportion and uses the following equations:

Unlimited population:

$$CI = \hat{p} \pm z \times \sqrt{\frac{p(1-p)}{n}}$$

Finite population:

$$CI' = \hat{p} \pm z \times \sqrt{\frac{\hat{p}(1-\hat{p})}{n'} \times \frac{N-n'}{N-1}}$$

Where- **z** is z score, **p̂** is the population proportion, **n** and **n'** are sample size, **N** is the population size

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Sample size is a statistical concept that determines the number of observations or replicates. To carry out this calculation, set the margin of error, **ε**, or the maximum distance desired for the sample estimate to deviate from the true value. To do this, use the confidence interval equation above, but set the term to the right of the ± sign equal to the margin of error, and solve for the resulting equation for sample size, **n**.

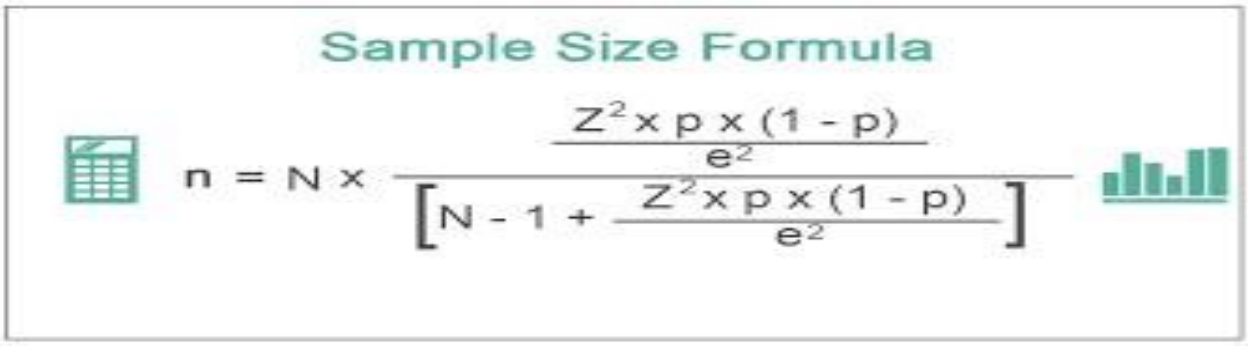

Fig No.2 Sample size formula

Study Criteria:

Inclusion Criteria:

1. Patient cases are collected between April 2023 to October 2023.
2. Patients who are willing to participate in the study.
3. Patients who are having Diabetes, Hypertension, and Thyroid Disorders.
4. Patients above 18 years, adults & geriatrics.

Exclusion Criteria:

1. Patients who are not willing to participate in the study.
2. Patients who are unable to fill out questionnaires (Psychiatric Patients).
3. Patients with breastfeeding, pregnancy and pediatrics.

Materials (Annexures) Used:

1. **Annexure I:** Patient informed consent form.
2. **Annexure II:** Pharmacist's Patient data documentation form.
3. **Annexure III:** Yellow form.
4. **Annexure IV:** ADRs Notification form.
5. **Annexures V**: CDSCO Form.
6. **Annexures VI:** Naranjo scale.
7. **Annexures VII:** Hartwig scale.

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8. **Annexures VIII:** Feedback form from patients

Statistical Analysis: Microsoft Excel is used for recording and analyzing the data of recruited subjects and by calculating mean, standard deviation, etc. Prism Graph Pad software version 10 will be used for Descriptive statistics, P value will be calculated for the present study for statistical significance.

Results and Discussion:

Distribution of Study Patients by Gender

A total of 109 patients were selected for the study, in which 49 patients were males remaining 60 patients were females

Table No.1Distribution of Study Patients by Gender

Status	**Total**	**Percentage**
No. of male patients	49	44.95
No. of female patients	60	55.05
Total no. of patients	**109**	**100**

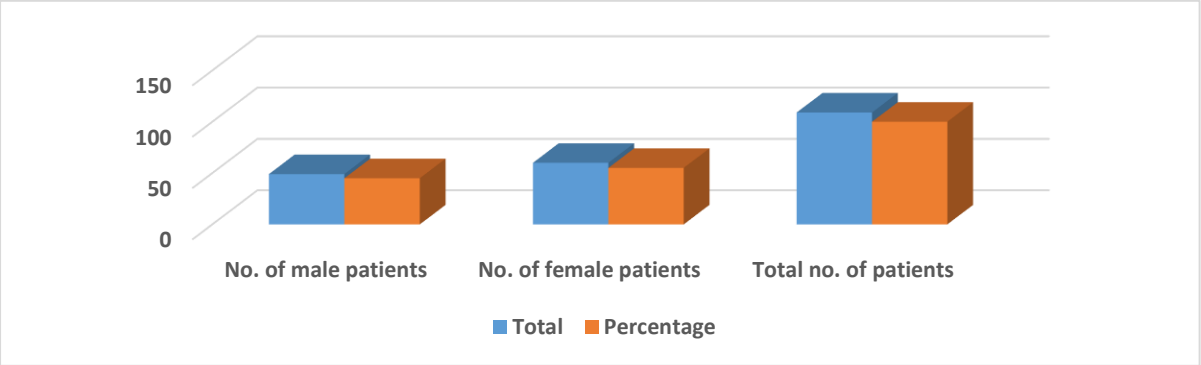

Fig No.3 Distribution of Study Patients by Gender

Distribution of study patients by literacy

A total of Illiterates 109 patients were selected for the study, in which 70 patients were Literates and 39 patients were.

Table 2. Distribution of study patients by literacy

Status	Total	Percentage
No. of literates	70	64.22

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No. of illiterates	39	35.78
Total	109	100

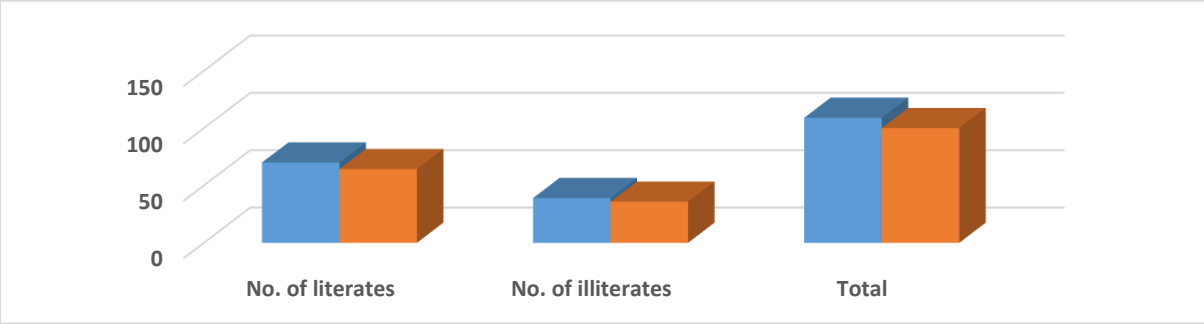

Fig No.4 Distribution of study patients by literacy

Distribution of Study Population by Personnel Behaviour

A total of 109 patients were selected for the study, in which 35 patients were alcoholic and 23 patients were having behaviour of smoking and 2 patients were having both Alcoholic+Smoking and 2 patients were having tobacco chewing behaviour.

Table No.3 Distribution of Study Population by Personnel Behaviour

Status	Total	Percentage
Alcoholic	35	32.11
Smoking	23	21.10
Tobacco Chewing	2	1.83
Alcoholic+Smoking	11	10.09

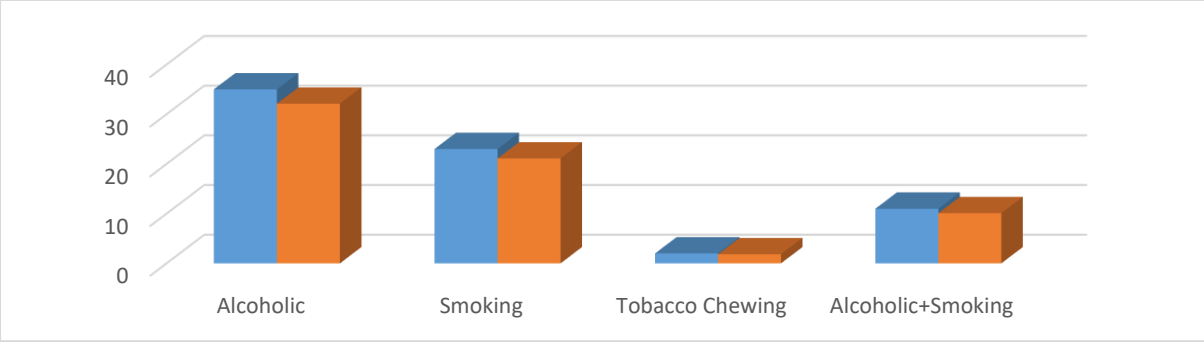

Fig No.5 Distribution of Study Population by Personnel Behaviour

Distribution of study patients by age

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In this current study total of 109 patients are enrolled. The age-wise patient population ranges from 5 patients in the age group of 10-20 years (4.58%), 21 patients in the age group of 21-30 years (19.266%), 18 patients in the age group of 31-40 years (16.51%), 19 patients were in the age group of 41-50 years (17.43%), 24 patients were in the age group of 51-60 years (22.01%), 16 patients were in the age group of 61-70 years (14.68%), 6 patients is in the age group of 71-80 years (5.50%).

Table No.4Distribution of study patients by age

Status	Number	Percentage
10-20	5	4.58
21-30	21	19.266
31-40	18	16.51
41-50	19	17.43
51-60	24	22.01
61-70	16	14.68
71-80	6	5.50
81-90	0	0
Total	109	100

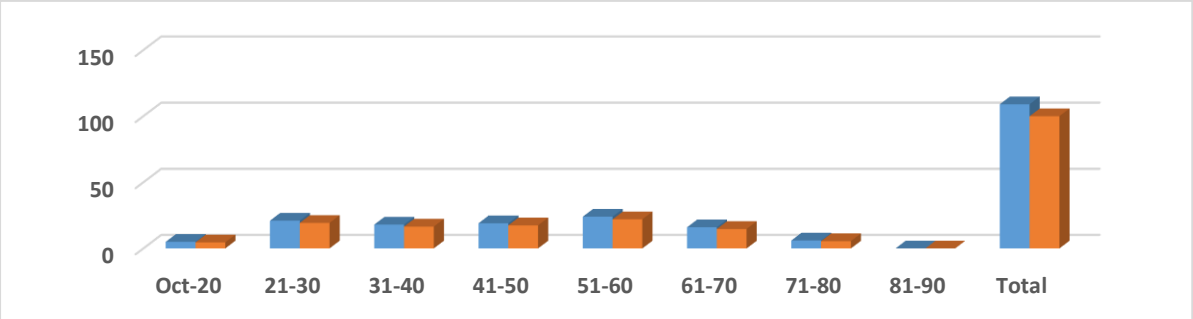

Fig No.6 Distribution of study patients by age

Distribution of study of male patients by age

In this current study total of 109 patients are enrolled. The male population is 49 The age-wise male Patients population ranges from, 4 Patients were in the age group of 21-30 years (3.67%), 10 patients were in the age group of 31-40 years (9.17 %), 12 patients were in the age group of 41-50 years (11.01 %), 12 Patients were in the age group of 51-60 years (11.01%), 8 patients were in the age group of 61-70 years (7.34%), 3 patients were in the age group of 71-80 years (2.75%).

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Table No.5 Distribution of study of male patients by age

Age in years	Number of patients	Percentage
10-20	00	00
21-30	04	3.67
31-40	10	9.17
41-50	12	11.01
51-60	12	11.01
61-70	8	7.34
71-80	3	2.75
81-90	00	0
Total	49 out of 109	44.95 out of 100

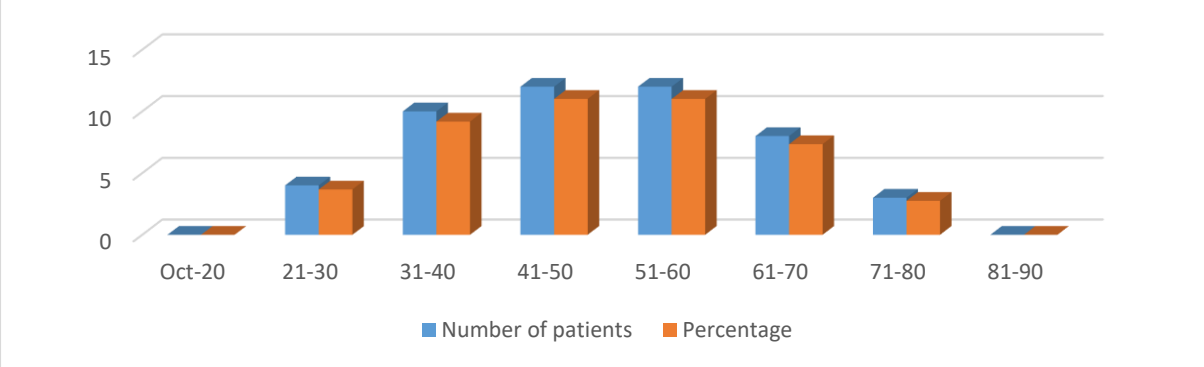

Fig No.7 Distribution of study of male patients by age

Distribution of study of female patients by age

In this study current total of 109 patients were enrolled. The female population is 60 The age-wise Female patients population ranges from 5 patients were in the age group of 10-20 years(4.59%), 19 Patients were in the age group of 21-30 years (17.34 %), 8 patients were in the age group of 31-40 years (7.34%), 8 patients were in the age group of 41-50 years (7.34%), 10 patients were in the age group of 51-60 years (9.17%), 8 patients were in the age group of 61-70 years (%), 2 patients were in the age group of 71-80 years (1.83%).

Table No.6 Distribution of study of female patients by age

Age	Number	Percentage
10-20	5	4.59
21-30	19	17.43

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31-40	8	7.34
41-50	8	7.34
51-60	10	9.17
61-70	8	7.34
71-80	2	1.83
81-90	0	00
Total	60 out of 109	48.05

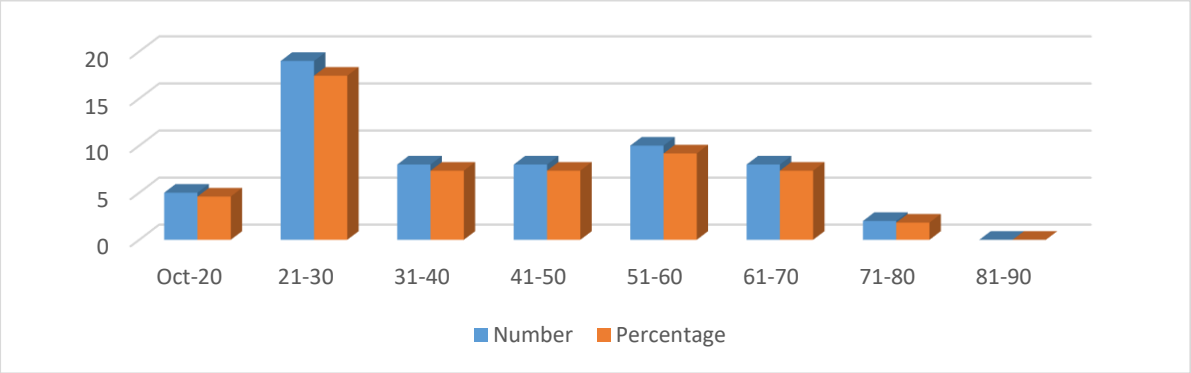

Fig No.8 Distribution of study of female patients by age

SURVEY POPULATION DISTRIBUTION BASED ON ALLERGIES

Table No.7 SURVEY POPULATION DISTRIBUTION BASED ON ALLERGIES

Status	Number	Percentage
No. of allergic patients	10	9.175
No. of non-allergic patients	99	90.825
TOTAL	109	100

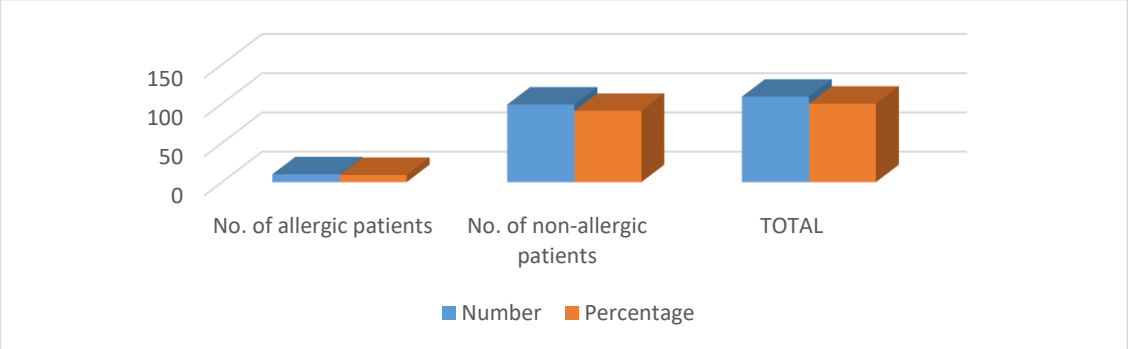

Fig No.9 SURVEY POPULATION DISTRIBUTION BASED ON ALLERGIES

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DISTRIBUTION OF PATIENTS ACCORDING TO THEIR CURRENT HEALTH STATUS.

Table No.8. Distribution of Patients according to their current health status

Type of disease/ disorder	No. of Patients	Percentage
T1DM	13	11.93
T2DM	34	31.19
HYPERTENSION	32	29.36
HYPOTENSION	0	0
PCOD	14	12.84
HYPERTHYROIDISM	6	5.50
HYPOTHYROIDISM	10	9.17
TOTAL	109	100

PATIENT MEDICAL CONDITION WITH COMORBIDITIES

Table No.9:- Patient medical condition with comorbidities

NAME OF DISEASE /DISORDERS	NUMBER(n)	PERCENTAGE (%)
T1DM	5	4.58
T2DM	7	6.42
HYPERTENSION	5	4.58
HYPOTENSION	0	0
PCOD	3	2.75
HYPERTHYROIDISM	2	1.83
HYPOTHYROIDISM	1	0.91
HTN+T2DM	12	11
HYPERTHYROID+HTN+T2DM	3	2.75
CONJUCTIVITIS+T2DM	1	0.91
HYPOTHYROID+T2DM	2	1.83
HYPOTHYROID+T1DM	3	2.75
HYPOTHYROIDISM+HTN+UTI	1	0.91
HYPOTHYROIDISM+HYPERCHOLESTREMIA	5	4.58
HYPERTHROID+HTN+T2DM+ANEMIA+UTI	1	0.91
HTN+T2DM+RTI	3	2.75

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T1DM+HTN	5	4.58
T2DM+FEVER	5	4.58
HTN+GASTROESOPHAGEAL REFLUX	5	4.58
HTN+GASTROESOPHAGEAL R EFLUX+ VOMITING	03	2.75
HTN+RETINOPATHY	1	0.91
HTN+LUMBAR SPONDYLOSIS	1	0.91
HTN+KNEE PAIN	2	1.83
HTN+HEADACHE	2	1.83
HTN+EXERTIONAL BREATHLESSNESS	0	0
T2DM+ANXIETY	4	3.66
T2DM+HEADACHE	2	1.83
T2DM+BACKPAIN	2	1.83
T2DM+DENGUE FEVER	1	0.91
T2DM+PARKINSONISM	0	0
T2DM+ACCELERATED HEADACHE	1	0.91
T2DM+WEAKNESS	3	2.75
T2DM+DEPRESSION	0	0
PCOD+GASTROINTESTINAL REFLUX	2	1.83
PCOD+VOMITONG+GI REFLUX	3	2.75
PCOD+T1DM	2	1.83
PCOD+HYPOTHYROID	2	1.83
PCOD+HYPERTHYROID	2	1.83
PCOD+DENGUE FEVER	1	0.91
PCOD+FEVER+VOMITING+NAUSEA	2	1.83
PCOD+WEAKNESS	4	3.66
PCOD+HYPERTENSION	0	0

PATIENT MEDICATION LIST

Table No.10:- Patient medication list

DRUG	**CLASS**	**INDICATIONS**
BECLOMETHASONE	GLUCOCORTICOIDS	

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BUDESONIDE	GLUCOCORTICOIDS	ASTHMA
FORMOTEROL	LONG ACTING β-AGONIST	
ALBUTEROL	BRONCODILATORS	
BUDESONIDE	GLUCOCORTICOIDS	COPD
CEFTRIAXONE	CEPHALOSPORINE ANTIBIOTICS	ANTIBIOTICS
NITROFURANTOIN	ANTIBIOTICS	
SULPHAMETHOXAZOLE & TRIMETHOPRIM	SULPHONAMIDE	
TRIMETHOPRIM		
AZITHROMYCIN	ANTIBIOTIC	
BROMOCRIPTINE	DOPAMINE D2 AGONIST	AMENORRHEA
CINNARIZINE	ANTIHISTAMINE	PERIPHERAL VERTIGO
CLONAZEPAM		
LIDOCAINE	LOCAL ANESTHETICS	HERNIA SURGERY
FERROUS SULPHATE	IRON SUPPLEMENT	ANEAMIA
VIT B6 VIT B12	NUTRACEUTICALS	
NITROGLYCERINE	NITRATES	CHEST PAIN
BUMETANIDE	LOOP DIURETICS	RENAL AGENESIS
ISONIAZID	ANTI TUBERCULOSIS AGENT	T.B
OFLAXACIN	FLUROQUINONES	SKIN INFECTION
AMITRIPTYLINE	TRICYCLIC ANTIDEPRESSANT	ANTI DEPRRESION
LEVODOPA	BETA - BLOCKER	PARKINSON DISEASE
ZINCOVIT	NEUTRACEUTICALS	WEAKNESS
VITAMIN SUPPLEMENT	NEUTRACEUTICALS	
ATENOLOL	BETA BLOCKERS	ARRTHYMIA
ATORVASTATIN	STATIN GROUP	HYPER CHOLESTREMIA
ROSUVASTATIN	STATIN GROUP	

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VERAPAMIL	CALCIUM CHANNEL BLOCKER	CORONARY ARTERY DISEASE
WARFERIN SODIUM	ANTICOAGULANT	STROKE
RITONAVIR	PROTEASE INHIBITORS	HEPATISIS
ROSIGLITAZONE	THIAZOLIDINEDOINES	HEART ATTACK
NITROGLYCERINE	NITRATES	
AMLODIPINE	CALCIUM CHANNEL BLOCKERS	DM WITH HYPERTENSION
HUMULIN	HORMONES	
PERINDROPRIL	STEROIDS	
FUROSEMIDE	LOOP DIURETIC	
PANTAPRAZOLE	PROTON PUMP INHIBITOR	GI IRRITATION
PARACETAMOL	ANAGESIC & ANTIPYRETIC	FEVER
AZITHROMYCIN	MACROLIDE ANTIBIOTICS	LOWER RTI
LEVOCETRIZINE	ANTI HISTAMINE	HYPERSENSITIVITY
CALCIUM +D3	VITAMIN D ANALOGUS	CKD
CIPROFLOXACIN	FLUROQUINALONES	EYE IRRITATION
METRONIDAZOLE	NITROIMIDAZOLE	DIARRHOEA
ORS SOLUTION	OTC	
ONDANSETRAL	SEROTONIN RECEPTOR ANTAGONIST	VOMITING
CLOMIPHENE	FERTILITY MEDICATION	PCOS
LETROZOLE	FERTILITY MEDICATION	PCOS
SPIRONOLACTONE	ANTI ANDROGEN	HYPERTENSION
METFORMIN	INSULIN SENSITIZER	DIABETICS
ORLISAT	LIPASE INHIBITOR	WEIGHT LOSS

ChatGPT APP

SYMPTOMATIC ASSESSMENT STUDY POPULATION THROUGH ChatGPT APP.

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Table No.11:- Symptomatic assessment of the study population through the CHATGPT app

Patient condition	Symptomatic Assessment done(n)	Symptomatic Assessment done (%)
T1DM	6	8.95
T2DM	12	17.91
HTN	14	20.89
PCOD	5	7.46
HYPOTHYROID	3	4.47
HYPERTHYROID	4	5.97
COMBINED DISORDERS	23	34.32
TOTAL	67	100

Total 67 patients Symptomatic Assessment was done during the study period. In which 14 patients were having HTN with symptomatic assessment percentage 20.89%, 6 patients were having Diabetic Mellitus Type 1 with symptomatic assessment percentage 8.95% ,12 patients assess with Diabetic mellitus Type 2 with symptomatic assessment percentage 17.91%,3 patients assess with hypothyroidism with symptomatic assessment percentage 4.47%,4 patients were having hyperthyroidism with symptomatic assessment percentage 5.97% as well as 23 patient having were the combined disorders with symptomatic assessment percentage 34.32% and 42 patients were not assess with symptomatic assessment in CHATGPT app due to the illiteracy, lack of enough time, not able to response the following questions asked by the particular application.

SEVERITY ASSESSMENT

Table No.12:- Severity assessment of the study population(n).

PATIENT CONDITION	MORE SEVERE(n)	LESS SEVERE (n)
T1DM	1	5
T2DM	2	10
HYPERTENSION	1	3
PCOD	0	5
HYPOTHYROID	0	3
HYPERTHYROID	0	4
COMBINE DISORDERS	4	19
TOTAL	8	49

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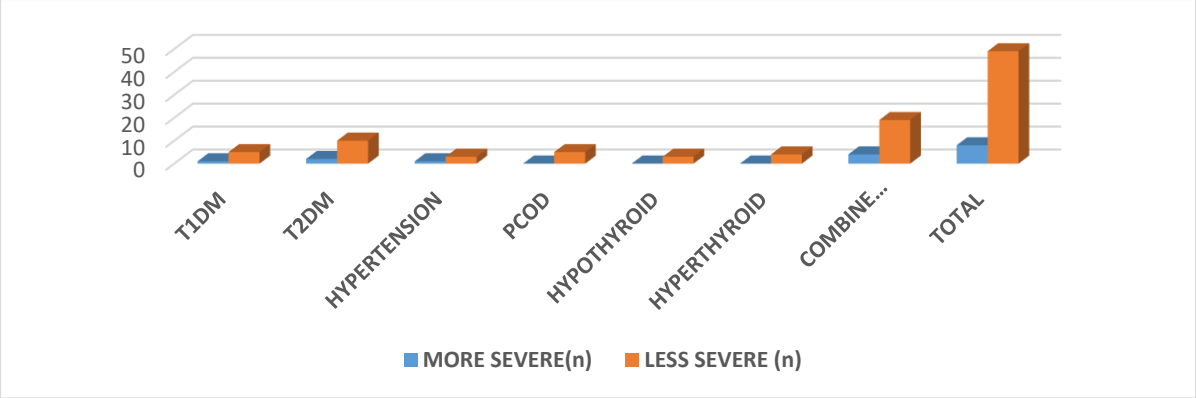

Fig No.10 Severity assessment of the study population (n)

Out of 109 patients, the severity assessment was divided into two groups as per the CHATGPT app i.e. more severe and less severe. Out of the total patients, 1 patient had more severe hypertension (HTN) and 3 patients had less severe HTN, 1 patients having more severe Diabetes Mellitus Type 1, 5 patients having less severe Diabetes Mellitus Type 1, 2 patients had more severe Diabetes mellitus Type 2 and 10 patients were having less severe Diabetes Mellitus Type 2 with severity assessment , 3 patients were having less severe hypothyroidism, 4 patient was having less severe hyperthyroidism and 4 patients were having more severe combine disorders due to their complications & comorbid conditions and 19 patients were having less severe combine disorders and 52 patients were not assessed with severity assessment in the following application due to the lack of time, illiteracy, not able to answer all the questions asked by the particular applications

Note:- The more seriously ill patients were reported right away to the appropriate doctor, who made the diagnosis, wrote the prescriptions, or conferred with the patient to arrange for an emergency check-up and hospital care.

Table No.13 Severity assessment of the study population (%).

Patient condition	More severe (%)	Less severe (%)
T1DM	12.5	10.204
T2DM	25	20.40
HYPERTENSION	12.5	6.122
PCOD	0	10.204
HYPOTHYROID	0	6.122
HYPERTHYROID	0	8.16

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COMBINED DISORDERS	50	38.77
TOTAL	100	100

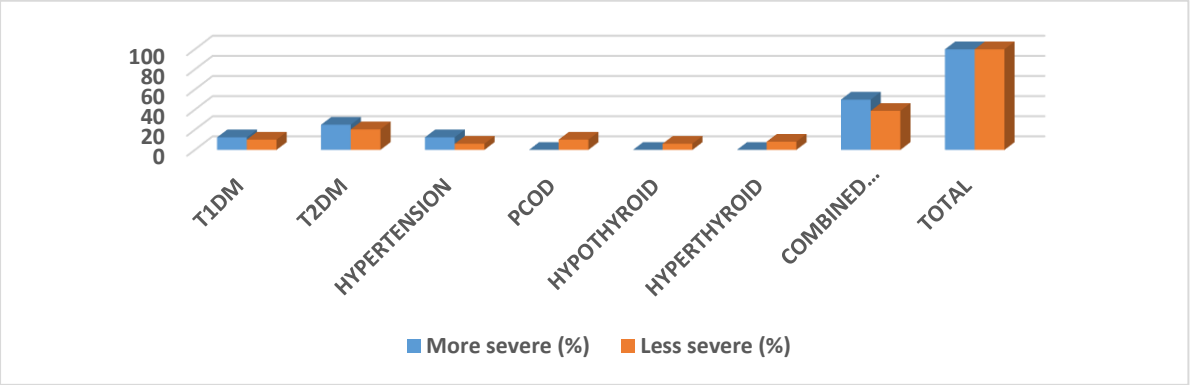

Fig. No.11 Severity assessment of the study population (%)

Out of 109 patients, the severity assessment was divided into two groups as per the CHATGPT app i.e. more severe and less severe. Out the total patients, 1 patient were having more severe hypertension (HTN) with severity assessment percentage 12.5% and 3 patients where having less severe HTN with severity assessment percentage 6.122%, 1 patient was having more severe Diabetes Mellitus Type 1 with severity assessment percentage 12.5%, 5 patient was having less severe Diabetes Mellitus Type 1 with severity assessment percentage 10.204%, 2 patients were having more severe Diabetes mellitus Type 2 with severity assessment percentage 25% and 10 patients were having less severe Diabetes Mellitus Type 2 with severity assessment percentage 20.40% , 3 patients were having less severe hypothyroidism with severity assessment percentage 6.122%, 4 patient was having less severe hyperthyroidism with Severity assessment percentage 8.16% and 4 patients were having more severe combine disorders due to their complications & comorbid conditions with severity assessment percentage 50% and 19 patients were having less severe combine disorders with severity assessment percentage 38.77% and 52 patients were not assessed with severity assessment in the following application due to the lack of time, illiteracy, not able to answer all the questions asked by the particular applications.

Note: - The more seriously ill patients were reported right away to the appropriate doctor, who made the diagnosis, wrote the prescriptions, or conferred with the patient to arrange for an emergency check-up and hospital care.

DISTRIBUTION OF EVENT BASED ON ADRS

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DETAILS OF ADRS ARE LISTED IN TABLE

Table No.14:- Distribution of ADR through ChatGPT app.

Details of ADR	NO OF ADR'S	PERCENTAGE (%)
Rash, tiredness, headache, fever	3	10.71
Sore throat, mild fever, weakness, swollen glands in neck	2	7.14
Itching, swelling, breathing difficulty	2	7.14
Flushing, edema, cold extremities	2	7.14
Dyskinesia, hypotension mild.	2	7.14
Dry mouth, fatigue, nasopharyngitis, mild CNS depression	2	7.14
Diarrhea, appetite loss, headache, nausea, vomiting.	2	7.14
Diarrhea, vomiting, abdominal pain, cough, fever.	2	7.14
Cough, UTI, dizziness, back pain, nasal congestion.	3	10.71
UTI, GI irritation, nausea, constipation, stomach pain.	2	7.14
Diarrhea, fever, vomiting, nausea, constipation	2	7.14
Chest pain, hypotension, dizziness	1	3.57
Headache, constipation, diarrhea, flatulence, abdominal pain.	2	7.14
Back pain, sinusitis, diarrhea, cough, pharyngitis.	1	3.57
TOTAL	28	100

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REPORTING OF ADRs

Outcomes of distribution

Majority 20 (71.43%) of the patients who experienced ADRs were recovered and 8(28.57%) were continuing with ADRs with zero fatality.

Table No.15:- Outcome of distribution

OUTCOME	NUMBER OF ADRS(n)	PERCENTAGE (%)
Recovered	20	71.43
Continuing	08	28.57
Fatal	0	0
Total	28	100

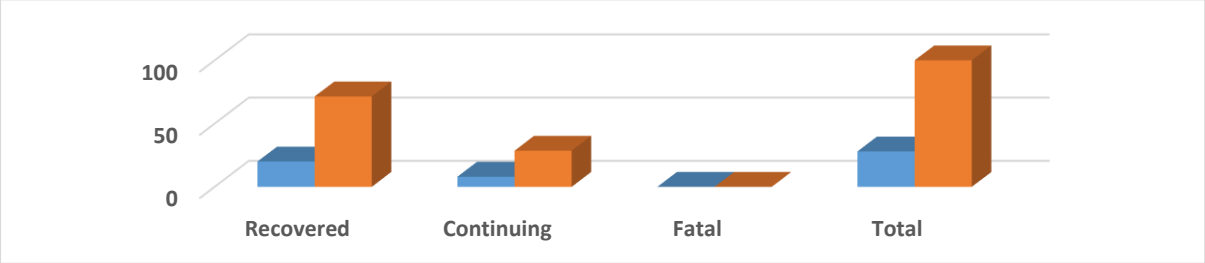

Fig. No.12 Outcome of distribution

SEVERITY OF ADRs

The reported ADRs were categorized Using Hart wig's severity scale. Maximum reported ADRs 24 were mild in nature where as remaining 2 ADRs were moderate in nature with zero serious and fatal.

Table No.15:- Severity of ADRs

SEVERITY	NUMBER OF ADRS	PERCENTAGE (%)
Mild Level 1	15	53.57
Level 2	9	32.14

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Moderate Level 3	2	7.14
Level 4a	1	3.57
Level 4b	1	3.57
Serious Level 5	00	00
Level 6	00	00
Level 7	00	00
TOTAL	28	100

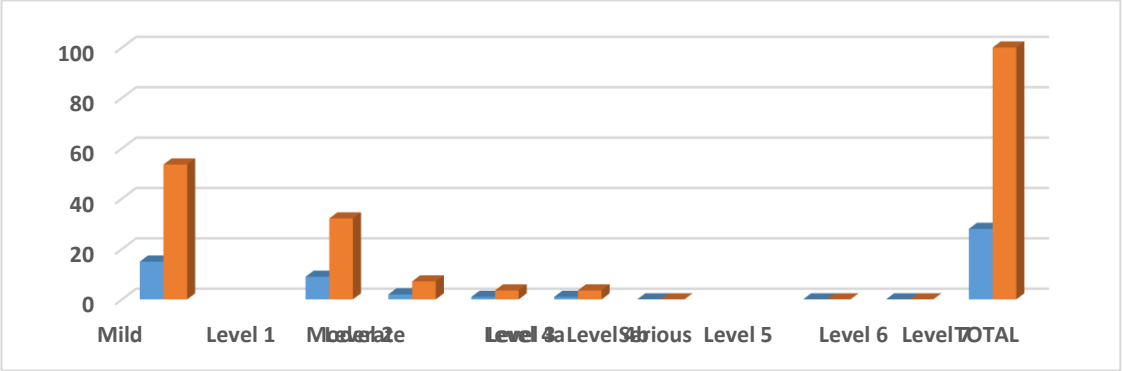

Fig No.13 Severity of ADRs

CAUSALITY ASSESSMENT OF ADRs

Causality assessment of ADRs was carried out using WHO probability scale and Naranjo algorithm. As per WHO probability scale, majority of ADRs 3(10.71%) were certain followed by 'Certain' 3(10.7%), 'Probable' 5 (17.86%), 20(71.3%) possible. 00 (00%) ADRs were 'Unlikely'00(00%) Conditional.

Table No.16:- Causality assessment of ADRs – WHO probability scale

PROBABILITY SCALE	NUMBER OF ADRS	PERCENTAGE (%)
Certain	3	10.71
Probable	5	17.86
Possible	20	71.43
Unlikely	00	00

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Conditional	00	00
Unasessable	00	00
Total	28	100

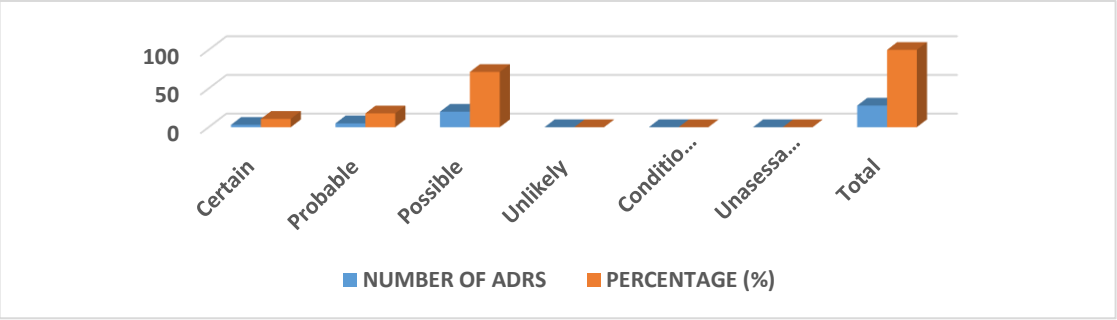

Fig No14:- Causality assessment of ADRs – WHO probability scale

Note: All ADRs identified through ChatGPT were compared and assessed by using WHO-UMC , Naranjo scale and harwig shielgel scales inorder to evaluate the capability of ChatGPT in ADR assessment.

Potential Drug-Drug Interactions

Out of 75 prescriptions analysed, 32 prescriptions comprised potential drug interactions. The studied prescription comprised 15(46.875%) moderate interactions, 00 major drug interactions and 6 (18.750%) minor drug interactions. Among them 5(15.625%) patients Drug-Drug interactions were monitoring and 6(18.750%) patients few Drug-Drug interactions were adjusted by dose

Table No.17:- Summary of potential drug-drug interactions

Parameters		**Number(n)**	**Percentage(%)**
Severity	Major	1	8.33
	Moderate	3	25
	Minor	7	58.33
Management	Monitoring	10	83.33
	Dose adjustment	4	33.33

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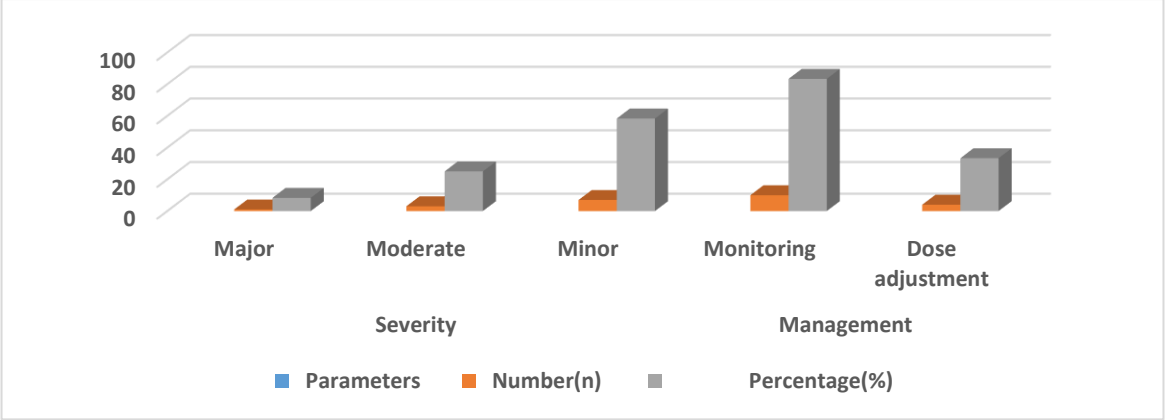

Fig No.15: Summary of potential drug-drug interactions

MEDICATION ERRORS

Table No.18:- Types of Medication Errors

Type of medication error	Number	Percentage %
Administration errors	04	**20**
Dispensing	06	**30**
Wrong dose prescription/wrong dose preparation	02	**10**
Prescribing	**08**	**40**
Other	**00**	00
Total	**20**	**100**

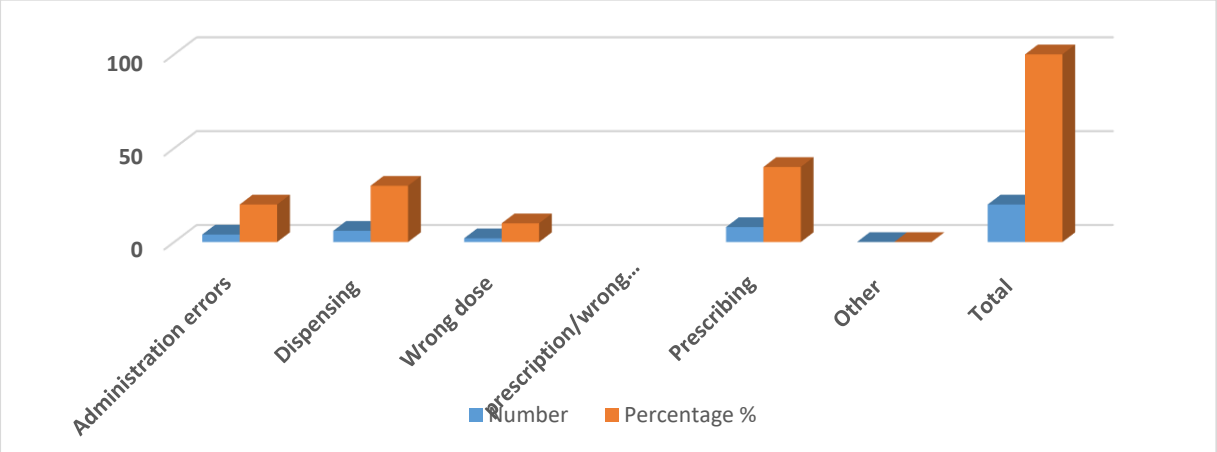

Fig No.16: Types of Medication Errors

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DRUG COUNSELING

Table No.19 DRUG COUNSELING

Patient counselling	Patient Considered		Patient Feedback					
	n	%	Positive		Negative		Neutral	
			n	%	n	%	n	%
T1DM	13	11.93	12	92.31	1	7.69	0	0
T2DM	34	31.19	32	94.12	1	2.94	1	2.94
HYPERTENSION	32	29.36	30	93.75	1	3.13	1	3.13
HYPOTENSION	0	0	0	0	0	0	0	0
PCOD	14	12.84	13	92.85	1	7.14	0	0
HYPERTHYROIDISM	6	5.50	5	83.33	1	16.66	0	0
HYPOTHYROIDISM	5	9.17	4	80	1	20	0	0
TOTAL	109	100	101	92.66	6	5.50	2	1.83

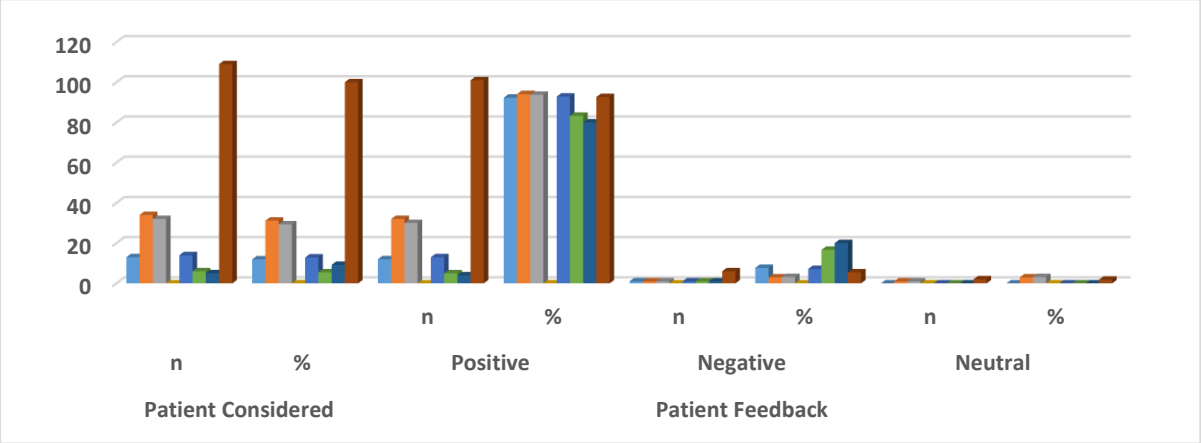

Fig No.17: Drug Counselling

Note: P- Value for the present study was 0.01 which states the present study is highly significant.

Conclusion: In conclusion, ChatGPT can serve as an important tool in the management of drug-related problems by providing healthcare professionals and patients with quick access to reliability of the information. It can also assist in suggesting alternative medications, and in identifying potential drug interactions, and offering guidance on drug dosage adjustments. ChatGPT can be highly helpful to educate patients on the safer usage of medications and in improvement of adherence towards treatment regimens, and in reduction of errors through clear explanations. However, it is essential to recognize its role as a supplementary resource rather than a replacement for professional medical advice. It's a

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revolution of science and technology and integration into clinical practice should be guided by all healthcare professionals, ensuring that decisions are made based on a combination of AI support and expert judgment to optimize desired patient therapeutic outcomes.

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