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PHARMACY INFOPEDIA
PRINT ISSN: 2394-6679 | E-ISSN: 2347-7881

Article

# Prescribing Trend of Antihypertensive Drugs in Sri Ganganagar District: A Retrospective Study

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## ABSTRACT

**Objective**: The choice of drug for the treatment of hypertension changes at short intervals. Drug utilization studies conducted at regular intervals help to guide the physician in prescribing drugs rationally. The present study was done to analyze the prescribing patterns of antihypertensive drugs in a North Indian hospital.

**Material & method:** A retrospective, cross sectional analysis of prescriptions of antihypertensive cases admitted in Medicine in-patient wards of civil hospital of Sri Ganganagar was conducted. All the prescription files with diagnosis of essential hypertension were analyzed. Prescriptions for hypertension with other co-morbid conditions were also included. Frequency and proportions of utilization of antihypertensive medications were charted and figured.

**Result**: During the study period, there were 435 prescriptions for essential hypertension. The most frequently prescribed antihypertensive medications were: monotherapy (42.06%), (57.94%) of patients were on multiple drug therapy, the most favored fixed drug combination being diuretics with angiotensin receptor blockers (31.74%).

**Conclusion:** The present study revealed that Angiotensin receptor blockers are the drugs of choice as monotherapy and as combination therapy for hypertensives. This pattern of prescription is also supported by the current JNC VIII guidelines for the treatment of hypertension.

**Keywords**: Hypertension, Prescription, Antihypertensive, Medications.

## INTRODUCTION

Hypertensive vascular disease is a common entity readily detectable, asymptomatic at times, easily treatable usually and often known to lead to lethal complications if left untreated. It is a clinical syndrome occurring in the general population, characterized by sustained elevation of blood pressure. According to the report of the joint national committee for detection, evaluation and treatment of high blood pressure, hypertension is defined as a clinical state where the systolic blood pressure is above 139mmHg and the diastolic blood pressure is above 89mmHg persistently (1). In the majority of cases, a specific underlying cause of hypertension is not known. Such patients are said to have essential hypertension (2). The purpose of treating essential hypertension is to prevent complications and to improve patient survival and the selection of the antihypertensives should be based on safety, efficacy and freedom from adverse effects. Accordingly, appropriate drug therapy can ensure immense therapeutic benefit in patients with essential hypertension with least adverse effects. The study of a prescription pattern is in fact, a part of medical audit involving monitoring and evaluation of various prescriptions of medical practitioners to ensure rationality in medical care (3). A prescription-based survey is considered to be one of the most

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PRINT ISSN: 2394-6679 | E-ISSN: 2347-7881

effective methods to assess and evaluate the prescribing attitude of physicians and dispensing practice of pharmacists(4).

## MATERIAL & METHOD

**Prescription collection:**

The present study was a retrospective, cross sectional analysis of antihypertensive prescriptions which included all prescriptions of hypertensive patients during 1 may to 30 may 2014 conducted in the Outpatient and inpatient department of general medicine, orthopedics, eye, emergency, psychiatry, general surgery, skin and dermatology at Civil hospital Sri Ganganagar Rajasthan. All the prescription files with diagnosis of essential hypertension (ICD-9CM: 401-405, WHO international code: A 26) were analyzed. This study was carried out after getting approval from the Institutional Ethics Committee of Seth G.L. Bihani S.D. College of Technical Education Institute of Pharmaceutical Sciences & Drug Research. Patients with any stage of hypertension with or without co-morbidities were included in the study. The patient's demographics, antihypertensive drugs prescribed were entered in a specially designed proforma. Antihypertensive drugs were grouped into seven categories, namely Angiotensin Converting Enzyme Inhibitors (ACEI), Angiotensin receptor blockers(ARB), Beta-blockers (BB), Calcium channel blockers(CCB), Diuretics, Alpha adrenergic blockers and Central sympatholytic drugs.

## RESULTS

A total of 435 prescriptions were monitored, of which 272 were male and 163 were female. The age group of the patients vary from 20 – 79 years. Among hypertensives, 183 (42.06%) patients were under monotherapy, 189(43.44%) patients were under two drug combination therapy, 57(13.10% )patients were under three drug combination therapy and only 6 (1.36% ) patients were under four drug combination therapy. In monotherapy, Angiotensin receptor blocker (Losartan) was most commonly prescribed (n=78; 42.62%) (Table 2, fig.1). In combination therapy, a two drug combination consisting of Angiotensin receptor blocker (Losartan) and diuretics (hydrochlorthiazide) were given to the majority of patients (n=60; 31.74%) (Table3, fig.2), a three drug combination of angiotensin receptor blocker (Losartan), calcium channel blocker (amlodipine) and β-blocker (Metoprolol) were given to the majority of patients (n=18; 31.75%) (Table no.4, fig.3) and a four drug combination of angiotensin receptor blocker(Losartan), calcium channel blockers (amlodipine), β-blocker (Metoprolol) and Thiazide (Hydrochlorothiazide) were given to only of patients (n=3) (Table No.5, fig. no.4).

Most of the Monotherapy of hypertension was prescribed in the age group of 50-59 year 25.13%(Table no 6 fig. 5), in the two drug combination therapy was prescribed in the age group of 60-69 year 28.57%(Table no.7 fig 5), in the three drug combination therapy was prescribed in the age group of 40-49 year 33.33%(Table no.8 fig 5). Monotherapy and combination therapy were used at rates of 42.06% and 57.93 % respectively. Hansson L 1996 also reported similar results and suggested that blood pressure could be adequately controlled with the help of combination therapy(5). Furthermore, combination therapy seems to be a rational approach to reduce the cardiovascular mortality(6). The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VI and JNC VII) reports that volume overload due to inadequate diuretic therapy is one of the commonest reasons for resistance to hypertensive treatments (7).

The present study also revealed that Angiotensin receptor blockers are the drugs of choice as monotherapy and as well as in combination therapy for hypertensives. This pattern of prescription writing following the JNC VIII guidelines which also recommends Angiotensin receptor blocker in monotherapy and as well as in combination therapy.

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PRINT ISSN: 2394-6679 | E-ISSN: 2347-7881

TABLE NO. 1 Types of Therapy Prescribed

| Drug Therapy | Male | Female | Total | P value | Odds ratio | RR |
|---|---|---|---|---|---|---|
| Monotherapy | 110(25.28%) | 73(16.78%) | 183(42.06%) | | | |
| Combination therapy | 162(37.24%) | 90(20.68%) | 252(57.93%) | $0.42^{ns}$ | 0.8371 | 0.9350 |

Table no. 2 Mono Therapy of Antihypertensive

| Drug | No. Of Patients | Male | Female | P value | Odds ratio | RR |
|---|---|---|---|---|---|---|
| Atenolol | 9 (4.91%) | 6(3.27%) | 3(1.63%) | | | |
| Metoprolol | 18(9.83%) | 13(7.10%) | 5(2.73%) | 0.9304 | 1.077 | 1.026 |
| Enalpril | 24(13.11%) | 7(3.82%) | 17(9.28%) | 0.0175 | 4.510 | 2.229 |
| Remipril | 15(8.19%) | 9(4.91%) | 6(3.27%) | 0.0568 | 0.2745 | 0.4861 |
| **Losartan** | **78(42.62%)** | **47(25.68%)** | **31(16.93%)** | **0.9852** | **0.9894** | **0.9957** |
| Telmisartan | 6(3.27%) | 5(2.73%) | 1(0.54%) | 0.2620 | 0.3032 | 0.7231 |
| Amlodipine | 24(13.11%) | 14(7.65%) | 10(5.46%) | 0.2557 | 3.571 | 1.429 |
| Nifedipine | 3(1.63%) | 3(1.63%) | 0 | 0.1588 | 0.1973 | 0.5833 |
| Hydrochlorthaizide | 3(1.63%) | 3(1.63%) | 0 | | | |
| Torasemide | 3(1.63%) | 3(1.63%) | 0 | | | |
| **Total** | **183 42.06%** | **110 25.28%** | **73 16.78%** | | | |

Table NO. 3 Two Drug Combination Therapy

| Drugs | No. Of patients | Male | Female | P value | odds ratio | RR |
|---|---|---|---|---|---|---|
| Amlodipine+Furosemide | 3(1.58%) | 0 | 3(1.58%) | | | |
| Amlodipine+ Metoprolol | 6(3.17%) | 4(2.11%) | 2(1.05%) | 0.0578 | 0.07937 | 0.000 |
| Losartan+Torasemide | 6(3.17%) | 5(2.64% | 1 (0.52%) | 0.5050 | 0.4000 | 0.8000 |
| Losartan+Enalpril | 6(3.17%) | 5(2.64% | 1 (0.52%) | 1.000 | 1.000 | 1.000 |
| Losartan+Metoprolol | 9(4.76%) | 7(3.70%) | 2 (1.05%) | 0.7921 | 1.429 | 1.071 |
| **Losartan+HCTZ** | **60(31.74%)** | **38(20.10)** | **22(11.64%)** | **0.3962** | **2.026** | **1.228** |
| Losartan+Remipril | 9(4.76%) | 5(2.64%) | 4 (2.11%) | 0.6534 | 1.382 | 1.140 |
| Furosemide+Spironolactone | 6(3.17%) | 2(1.05%) | 4(2.11%) | 0.3980 | 2.5 | 1.667 |
| Enalpril+Metoprolol | 3(1.58%) | 3(0.68%) | 0 | 0.0578 | 0.07937 | 0.3333 |
| Losartan+Amlodipine | 42(22.22%) | 26(13.75%) | 16(8.46%) | 0.1830 | 4.358 | 1.615 |
| Telmisartan+HCTZ | 6(3.17%) | 6(3.17%) | 0 | 0.0641 | 0.1235 | 0.6190 |
| Telmisartan+Amlodipine | 3(1.58%) | 0 | 3(1.58%) | 0.0027 | 91.00 | infinity |
| Remipril+Amlodipine | 3(1.58%) | 0 | 3(1.58%) | | | |
| Remipril+Lisinopril | 3(1.58%) | 0 | 3(1.58%) | | | |
| Remipril+Metoprolol | 18(9.52%) | 11(2.52% | 7(3.7% | 0.0497 | 0.09317 | 0.000 |
| Remipril+Furosemide | 3(1.58%) | 3(1.58%) | 0 | 0.1859 | 0.2190 | 0.6111 |
| Amlodipine+Atenolol | 3(1.58%) | 2(1.05%) | 1(0.52%) | 0.2733 | 4.200 | 1.500 |
| Total | **189** | **120** | **69** | | | |

Table No. 4 Three Drug Combination Therapy

| Drugs | No. Of patients | Male | Female | P value | Odds value | RR |
|---|---|---|---|---|---|---|
| Furosemide+Spironolactone+ | 3(5.26%) | 3(5.26%) | 0 | | | |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Telmisartan | | | | | | |
| Furosemide+Spironolactone+ Propanolol | 3(5.26%) | 3(5.26%) | 0 | | | |
| Amlodipine+Metoprolol+ Remipril | 3(5.26%) | 3(5.26%) | 0 | | | |
| Furosemide+Spironolactone+ Remipril | 3(5.26%) | 3(5.26%) | 0 | | | |
| Losartan+Hydrochlorthiazide+ Metoprolol | 9(15.78%) | 4(7.01%) | 5(8.77%) | 0.0910 | 8.556 | 2.250 |
| Losartan+Hydrochlorthiazide+ Amlodipine | 9(15.78%) | 4(7.01%) | 5(8.77%) | 1.0000 | 1.000 | 1.000 |
| Losartan+Hydrochlorthiazide+ Remipril | 3(5.26%) | 2(3.5%) | 1(1.75%) | 0.5050 | 0.4000 | 0.6667 |
| Amlodipine+Atenolol+ Enalpril | 6(10.52%) | 4(7.01%) | 2(3.50%) | 1.0000 | 1.000 | 1.000 |
| Losartan+Amlodipine+ Metoprolol | 18(31.57%) | 11(19.29%) | 7(12.28%) | 0.8077 | 1.273 | 1.091 |
| Total | 57 | 37 | 20 | | | |

Table no. 5 Four Drug Combination Therapy

| **Drugs** | **No. Of patients** | **Male** | **Female** | **P value** | **odds ratio** | **RR** |
|---|---|---|---|---|---|---|
| Nifedipine+Losartan+Hydrochlorthiazide+ Metoprolol | 3 (50%) | 3 (100%) | 0 | | | |
| Metoprolol+Losartan+Torasemide+ Spironolactone | 3 (50%) | 2 (33.33%) | 1 (16.66%) | 0.27 | 4.2 | 1.5 |
| | **total 6** | **total 5** | **total 1** | | | |

Table No. 6 Age Group Prescription Analysis of Antihypertensive Mono Therapy

| **Age group** | **Monotherapy** | | | **P value** | **Odds ratio** | **RR** |
|---|---|---|---|---|---|---|
| | **Male (n=110) (60.10%)** | **Female(n=73) (39.89%)** | **Total(n=183)** | | | |
| 20-29 | 2 (1.09%) | 3 (0.1.63%) | 5(2.73%) | | | |
| 30-39 | 18 (9.83%) | 13 (7.10%) | 31(16.93%) | 0.4506 | 0.4815 | 0.6889 |
| 40-49 | 21 ( 11.47%) | 16 (8.74%) | 38(20.76%) | 0.9135 | 1.055 | 1.023 |
| 50-59 | 25 (13.66%) | 21 (11.47%) | 46(25.13%) | 0.8263 | 1.103 | 1.044 |
| 60-69 | 29 (15.84%) | 10 (5.46%) | 39(21.31%) | 0.561 | 0.4105 | 0.7309 |
| 70-79 | 15 (8.19%) | 10 (5.46%) | 35(19.12%) | 0.2266 | 1.933 | 1.239 |

Table no. 7 Age Group Prescriptions Analysis Of Antihypertensive In Two Drug Combination Therapy.

| **Age group** | **Two Drug Combination** | | | **P value** | **Odds ratio** | **RR** |
|---|---|---|---|---|---|---|
| | **Male(n=120) (63.49%)** | **Female(n=69) (36.50%)** | **Total (n=189)** | | | |
| 20-29 | 0 | 0 | 0 | | | |

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PRINT ISSN: 2394-6679 | E-ISSN: 2347-7881

| | | | | | | |
|---|---|---|---|---|---|---|
| 30-39 | 6 (3.17%) | 0 | 6(3.17%) | | | |
| 40-49 | 21 (11.11%) | 9(4.76%) | 30(15.87%) | 0.1213 | 5.744 | 1.429 |
| 50-59 | 29 (15.34%) | 23(12.16%) | 52(27.51%) | 0.2032 | 1.851 | 1.255 |
| 60-69 | 35 (18.51%) | 19(10.05%) | 54(28.57%) | 0.3412 | 0.6845 | 0.8604 |
| 70-79 | 29 (15.34%) | 18(9.52%) | 47(24.86%) | 0.7460 | 1.143 | 1.050 |

Table No 8 Age Group Prescription Analysis of Antihypertensive Three Drug Combination Therapy

| Age group | Three Drug Combination | | | P value | Odds ratio | RR |
|---|---|---|---|---|---|---|
| | Male(n=37)(64.91%) | Female(n=20)(35.08%) | Total(n=57) | | | |
| 20-29 | 0 | 0 | 0 | | | |
| 30-39 | 0 | 0 | 0 | | | |
| 40-49 | 12(21.05%) | 7(12.28%) | 19(33.33%) | | | |
| 50-59 | 9(15.78%) | 8(14.03%) | 17(29.28%) | 0.5348 | 1.524 | 1.193 |
| 60-69 | 10(17.54%) | 5(8.77%) | 15(26.31%) | 0.4302 | 0.5625 | 0.7941 |
| 70-79 | 6(10.52%) | 0 | 6(10.52%) | 0.1052 | 0.1469 | 0.667 |

Fig. No. 1 Monotherapy of Hypertension

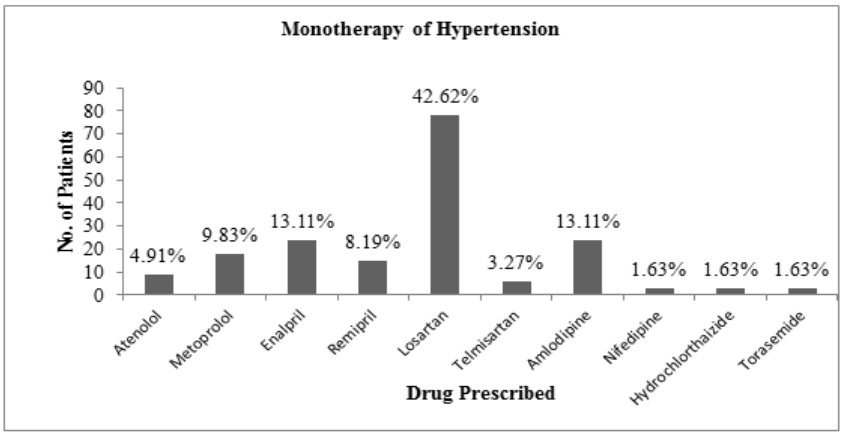


Fig. no. 2 Two Drug combination therapy

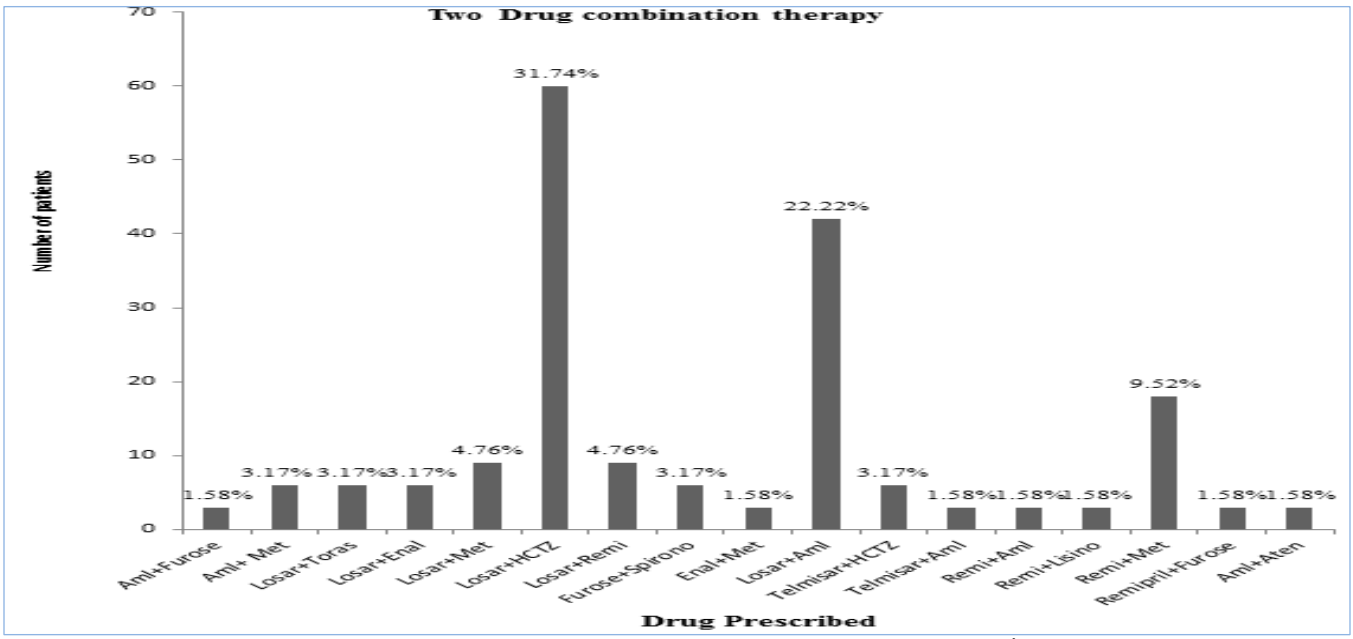

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Fig. 3 Three Drug Combination Therapy

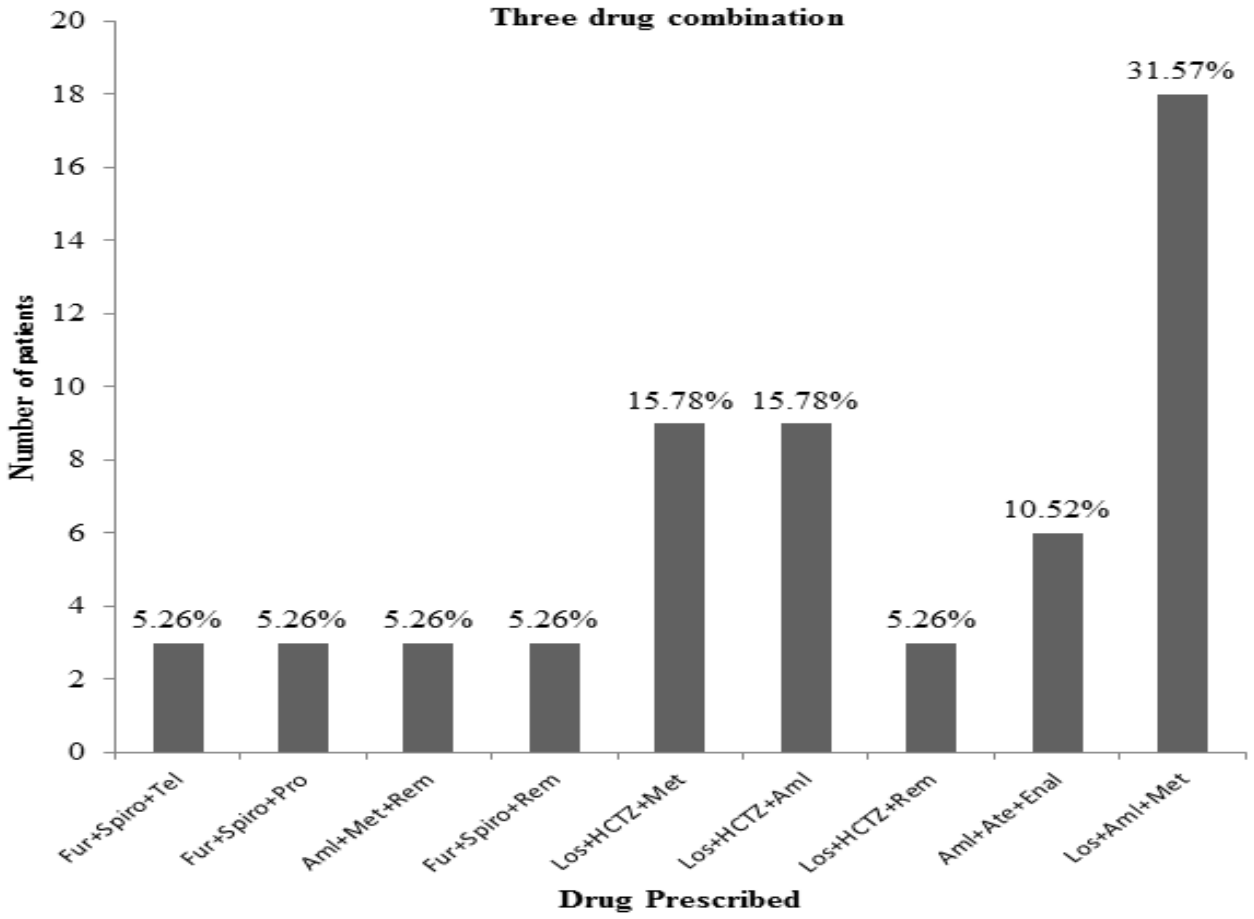
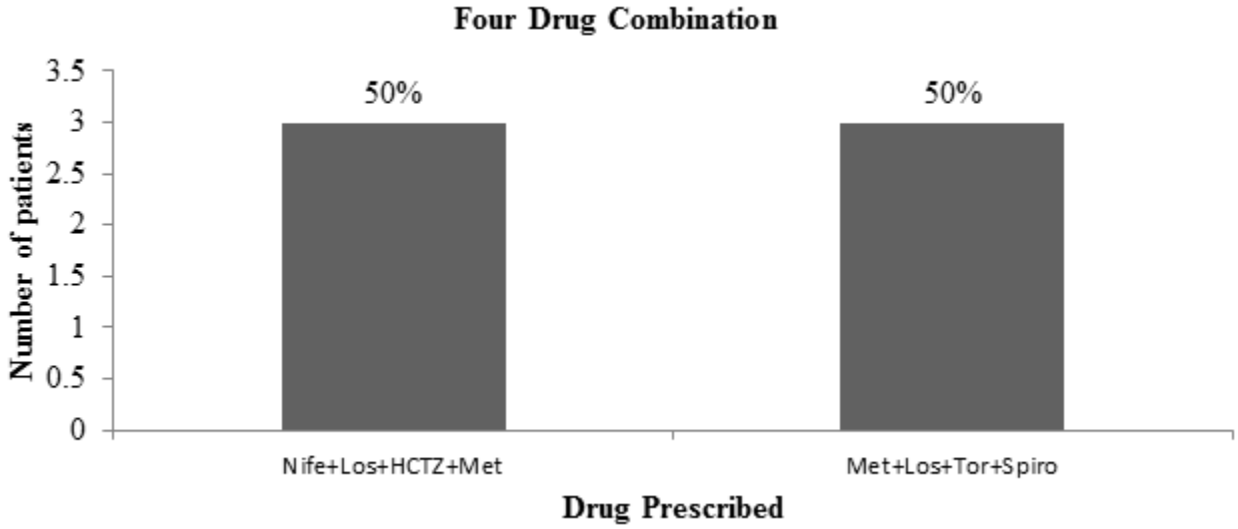



Fig. 4 Four Drug Combination Therapy



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PRINT ISSN: 2394-6679 | E-ISSN: 2347-7881

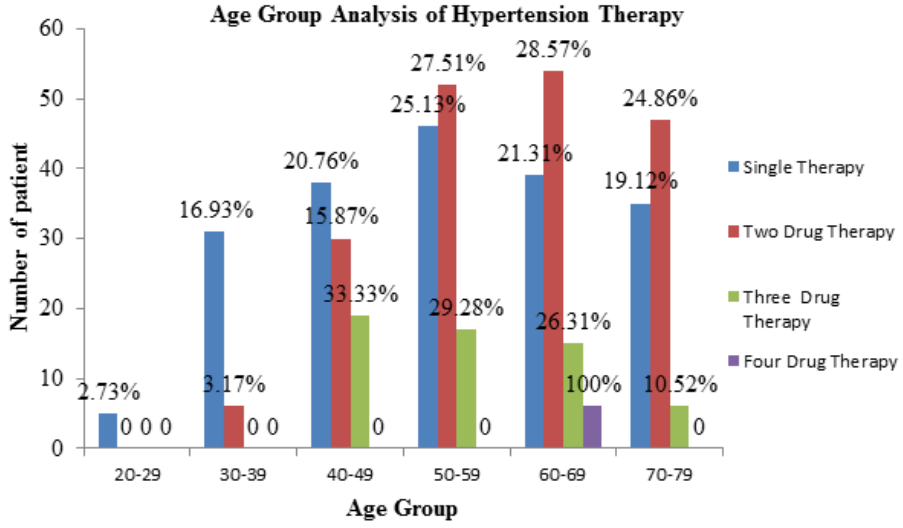


Fig 5 Age Group Analysis of Hypertension Therapy

## CONCLUSION

A prescription-based survey is considered to be one of the most effective methods to assess and evaluate the prescribing attitude of physicians and dispensing practice of pharmacists.

The present study observed the prescribing trends of physicians at Sriganganagar district and concludes that the combination drug therapy (57.93%) with Angiotensin receptor blockers was more common than single drug therapy. A combination of diuretics and angiotensin receptor blockers were the leading drug combination to be most commonly prescribed indicating that diuretics were used more often as component of multidrug therapy as the diuretics reduce volume load and resistance to antihypertensive treatment whereas Angiotensin receptor blockers reduce renovascular disorders and risk of developing diabetes in hypertensive patients. Furthermore combination therapy seems to be a rational approach to reduce the cardiovascular mortality. It can be concluded that the prescription pattern of physicians at Sriganganagar district follows the current JNC VIII guidelines for the treatment of hypertension and further follow up of these patients will bring out new insights for the treatment of hypertensives.

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