International Journal of Pharmacy and Pharmaceutical Sciences

Print ISSN: 2656-0097 | Online ISSN: 0975-1491 Vol 15, Issue 2, 2023

Original Article

A COMPARATIVE STUDY OF EFFICACY AND SAFETY OF AZILSARTAN 40MG AND TELMISARTAN 40MG IN STAGE I HYPERTENSIVE PATIENTS ATTENDING CARDIAC OPD AT TERTIARY CARE HOSPITAL

M. SNEHA MANJU, SWATHI MIRYALA*, PERAVALI ARPANA RACHEL, MAHESH KUMAR K., GOURELLY LATHA

Department of Pharmacology, Osmania Medical College Hyderabad, Telangana 500095, India
***Email: drswathi.namala@gmail.com**

Received: 18 Oct 2022, Revised and Accepted: 21 Dec 2022

ABSTRACT

Objective: To study the efficacy and safety profile of Telmisartan 40 mg and Azilsartan 40 mg in stage I systemic Hypertension among patients attending cardiac OPD in a tertiary care center.

Methods: An open-labeled comparative study was conducted in the Department of Cardiology, Osmania General Hospital, Hyderabad, for 24 mo. All patients with stage I systemic hypertension of either sex, aged 18-65 y, with blood pressures of >140/90 mmHg and/or diabetes mellitus attending the cardiac outpatient department at Osmania General Hospital. After initial screening, diagnosed cases of essential hypertension were randomly allocated to either group 1 (Tablet Azilsartan 40 mg or group 2 (Tablet Telmisartan 40 mg). The patients were advised to report for follow-up for review on the 4th, 8th, 12th, and 24th week.

Results: The mean decrease in the systolic blood pressure in both groups was statistically significant with a P value of<0.05 at the 8th week, 12th week, and the end of the 24th week. The mean decrease in diastolic blood pressure in both groups was statistically significant with a P value of 0.01 at the end of the 24th week. The difference between the SBP and DBP at various intervals is statistically significant with an Anova P value of<0.0000001.

Conclusion: Both drugs controlled blood pressure at similar proportions. However, the mean of SBP and DBP for the Azilsartan group was lower than the Telmisartan Group. Both drugs were tolerated well, and no significant adverse effects were noted during the study.

Keywords: Hypertension, Telmisartan, Azilsartan

DOI: https://dx.doi.org/10.22159/ijpps.2023v15i2.46637. Journal homepage: https://innovareacademics.in/journals/index.php/ijpps.

INTRODUCTION

The modern history of hypertension begins with understanding the cardiovascular system with the work of physician William Harvey (1578–1657), who described blood circulation in his book "De Motu Cordis. "The English clergyman Stephen Hales made the first published blood pressure measurement in 1733 [1, 2]. Hypertension is defined as either a sustained systolic blood pressure greater than 140 mm Hg or a sustained diastolic blood pressure greater than 90 mm Hg, according to the Joint National Committee (JNC VIII) on hypertension. Hypertension is one of the leading risk factors for ischemic heart disease, stroke, heart failure, and renal dysfunction [3]. According to WHO data, the overall prevalence of raised blood pressure in adults aged 25 and over was around 40% in 2008 [4]. According to Indian literature, the prevalence of Hypertension among Indians aged 25 and over is 29.8%. Significant differences in hypertension prevalence were noted between rural and urban parts [27.6% (23.2–32.0) and 33.8% (29.7–37.8); P=0.05] [5].

Thus, the management of hypertension should be targeted not only for BP control but also for the reduction of overall cardiovascular and renal morbidity and mortality; in these settings, the lack of medical success is one of the many reasons triggering the development of new antihypertensive agents [6]. Several antihypertensives are available, like ACE inhibitors and angiotensin II receptor blockers (ARB). Blockade of the renin-angiotensin system with ACE inhibitors has provided effective treatment of these conditions; however, some of the adverse effects of ACE inhibitors appear to be unrelated to angiotensin II blockade. For example, cough and angioedema are due to other effects of ACE inhibition, such as the degradation of bradykinins and prostaglandins [7]. In general, ARBs are well tolerated. None of the drugs reviewed has a specific, dose-dependent adverse effect. Because cough is seen as a class effect of ACE inhibitors, studies with ARBs have specifically addressed this concern. The frequency of cough is significantly lower in patients taking ARBs than in patients taking ACE inhibitors. Angiotensin receptor blockers (ARB) are more selective angiotensin blockers and have the potential for complete inhibition of angiotensin than ACE inhibitors.

Nowadays, ARBs are the most commonly used antihypertensive drugs. Azilsartan is a new ARB; it is potent and has a higher affinity for and slower dissociation from AT 1 receptor than other ARBs. Telmisartan is another ARB widely prescribed drug by practitioners, being an orally active nonpeptide angiotensin II antagonist that acts on the AT1 receptor subtype. It has the highest affinity for the AT1 receptor among commercially available ARBS and minimal affinity for the AT2 receptor. New studies suggest that Telmisartan may also have PPARγ agonistic properties that could potentially confer beneficial metabolic effects. Telmisartan does not inhibit the angiotensin-converting enzyme, other hormone receptors, or ion channels. Studies also suggest that Telmisartan is a partial agonist of PPARγ, an established target for antidiabetic drugs. This indicates that Telmisartan can improve carbohydrate and lipid metabolism and control insulin resistance without causing the side effects associated with full PPARγ activators [12, 13]. Telmisartan works by blocking the vasoconstrictor and aldosterone secretory effects of angiotensin II.

Hence this study was taken up to study the efficacy and safety profile of both drugs. Azilsartan is a selective blocker of angiotensin-1 (AT1) receptors that prevents angiotensin II binding, resulting in vasodilation and a decrease in the effects of aldosterone because of the presence of such receptors in the vascular smooth muscle and the adrenal gland [8, 9].

Azilsartan is a recently approved ARB and appears more efficacious in reducing BP than other ARBSs with a similar safety and tolerability profile. Many clinical trials have been conducted

comparing the efficacy of Azilsartan with other ARBs and ACE inhibitor Ramipril. Azilsartan has pleiotropic effects with antiproliferative effects within vascular-endothelial cells compared to other ARBs. Pleiotropic effects are attributable to Azilsartan's inverse agonistic properties. Azilsartan also suppresses angiotensin II-mediated plasminogen activator inhibitor type 1, causing increased collagen deposition, thus stabilizing atherosclerotic plaque. The trials have shown Azilsartan to be more effective in reducing the mean 24 h systolic BP compared to its counterparts. This study compares the efficacy and safety of newer ARB Azilsartan with Telmisartan [10, 11].

MATERIALS AND METHODS

An open-labeled comparative study was conducted in the Department of Cardiology, Osmania General Hospital, Hyderabad. It is the largest tertiary care center in Telangana, situated in the heart of Hyderabad, for 24 mo. Ethical committee clearance was obtained from the Institutional Ethical Committee, Osmania Medical College, Koti, Hyderabad bearing Ref. No. ECR/300/Inst/AP/2013/RR-16. All patients with stage I systemic hypertension of either sex, aged 18-65 y, with blood pressures of>140/90 mmHg and/or diabetes mellitus attending the cardiac outpatient department at Osmania General Hospital and meeting the inclusion criteria were enrolled in the study. Patients with a history of hypersensitivity or allergy to Azilsartan or Telmisartan, impaired kidney function test confirmed by serum creatinine level>2 mg/dl, impaired liver function test such as SGOT or SGPT>two times standard limit, asthma, pregnant and lactating women, those who have received other antihypertensive treatment, non-compliant patients, and those who are unwilling to give informed consent are excluded from the study. After the selection of patients, they were examined by the consultant physician to rule out Grade I Essential hypertension. Systolic and diastolic blood pressure was measured in the right arm, in a sitting posture, by the auscultatory method using a standard sphygmomanometer. The pressure at which the sounds are first heard is taken as the systolic pressure, and the pressure at which the sounds disappear is taken as the diastolic pressure. Two blood pressure recordings are taken at an interval of 15 min by the same physician. After initial screening, the demographic data, family history, past medical history, findings of physical examination, and clinical examination were recorded in the case report form. Diagnosed cases of essential hypertension were randomly allocated to either group 1 (to receive tablet Azilsartan 40 mg or group 2 (to receive tablet Telmisartan 40 mg).

Group A

50 patients with stage I hypertension in one group received Azilsartan 40 mg once daily for 24 w.

Group T

50 patients with stage I hypertension in one group received Telmisartan 40 mg once daily for 24 w.

All patients were instructed to take the tablet orally once a day in the morning with a glass of water. The patients were advised to report for follow-up for review on the 4th, 8th, 12th, and 24th week. On each visit, blood pressure was recorded. Blood sugar, urine analysis, renal function test, liver function test, and ECG were assessed before starting the treatment. The patients were instructed to report immediately if they developed any adverse effects such as postural dizziness, nasopharyngitis, etc.

Statistical methods

The data was entered and analyzed using Microsoft Excel 2010 and Epi Info 7.2.0. Descriptive and inferential statistical analyses were used in the present study. Results on continuous measurements were presented on mean±SD (Min-Max), and results on categorical measures were presented in Number (%). Significance was assessed at a 5% level of significance. ANOVA test was used to compare intra-group variables, and the Student t-test was used to compare inter-group variation for continuous variables. To compare categorical variables, the Chi-square test was used.

RESULTS AND DISCUSSION

The present study was conducted in the Department of Cardiology, Osmania General Hospital, Hyderabad, to evaluate the efficacy and safety profile of Telmisartan 40 mg and Azilsartan 40 mg in stage I Hypertension among patients attending cardiac OPD in a tertiary care center. The results of the study are as follows.

Table 1: Shows the age distribution

Age group	Group A	Percentage	Group T	Percentage
41-49 y	20	40	19	38
51-59 y	18	36	20	40
61-69years	12	24	11	22
Total	50	100	50	100
mean±SD	49.56±9.4 y		50.15±8.69 y	

In the study population, among the A group, 40% belonged to the age group of 41-49 y, followed by 51-59 y (36%) and 61-69 y (24%). Among the T group, 40% belonged to 51-59 y, followed by (38%) of 41-49 y, and 61-69 y (22%).

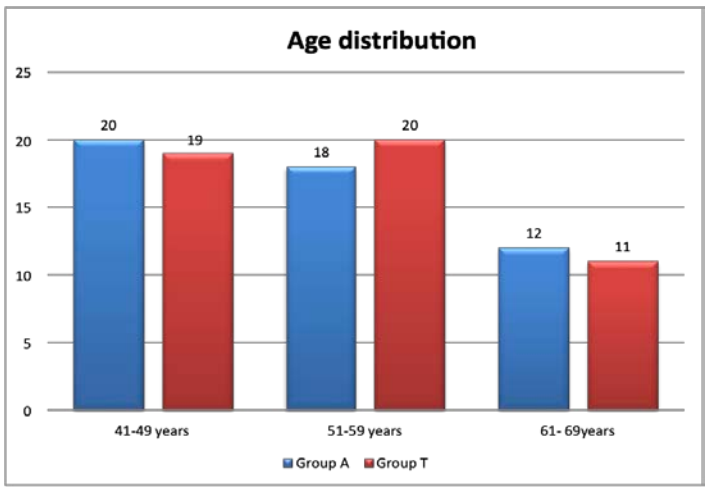

Fig. 1: Shows the age distribution

Table 2: Shows gender distribution

Gender	Group azilsartan	Percentage	Group telmisartan	Percentage
Males	31	62	40	80
Females	19	38	10	20
Total	50	100	50	100

In the study population, among the A group, 62% were males, and 38% were females. Among the T group, 80% were males, and 20% were females.

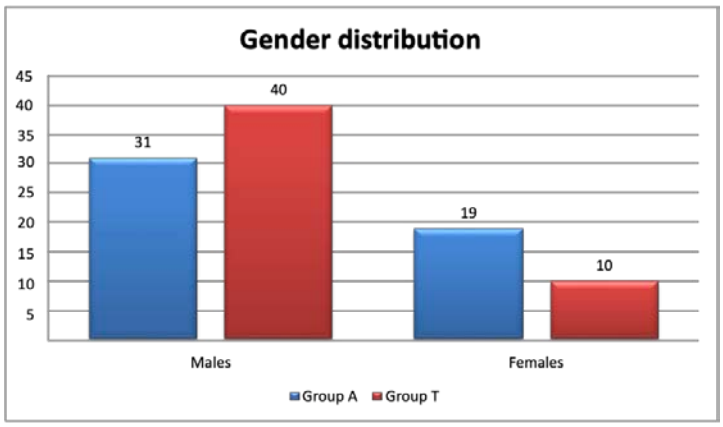

Fig. 2: Shows the gender distribution of the study population

Table 3: Shows the mean values of parameters

Parameter	Group azilsartan		Group telmisartan		P value
	Mean	Standard deviation	Mean	Standard deviation	
Height in cms	162.2	7.25	159.4	7.1	T=1.74, P=0.08
Weight in kgs	68.9	9.56	69.9	8.9	T=-0.48, P=0.6
BodyMass Index in kg/m^2	28.56	3.56	29.56	2.96	T=-1.36, P=0.17

In the study population, among the A group, the mean height was 162.2±7.25 cm. Among the T group, the mean height was 159.4±7.1 cm. No statistically significant difference was observed between the mean heights of both groups. In the study population, among the Azilsartan group, the mean weight was 68.9±9.56 kgs. Among the Telmisartan group, the mean weight was 69.9±8.9 kgs. No statistically significant difference was observed between the groups' mean weights. In the study population, the Azilsartan group, the mean BMI was 28.56 kg/m2. The Telmisartan group's mean BMI was 29.56±2.96 kg/m2. No statistically significant difference was observed between the mean BMI of the groups.

Table 4: Shows the mean blood pressure values

Baseline parameters	Group azilsartan		Group telmisartan	
	Mean	Standard deviation	Mean	Standard deviation
Systolic Blood pressure in mmHg	150.37	6.19	149.57	5.88
Diastolic Blood pressure in mmHg	92.37	3.15	92.20	2.92

Table 5: Shows the mean blood pressure values in 4th week

Blood pressure in 4th week	Group azilsartan		Group telmisartan	
	Mean	Standard deviation	Mean	Standard deviation
Systolic Blood pressure in mmHg	145.35	6.37	143.21	6.29
Diastolic Blood pressure in mmHg	90.53	3.31	90.51	3.21

In the study population, among the Azilsartan group, the mean systolic blood pressure in 4th week was 145.35±6.37 mm Hg. The mean diastolic blood pressure was 90.53±3.31 mm Hg. Among the Telmisartan group, the mean systolic blood pressure in 4th week was 143.21±6.29 mm Hg. The mean diastolic blood pressure was 90.51±3.21 mm Hg.

Table 6: Shows the mean blood pressure values in the 8th week

Blood pressure at 8th week	Group azilsartan		Group telmisartan	
	Mean	Standard deviation	Mean	Standard deviation
Systolic Blood pressure in mmHg	139.29	5.51	137	4.2
Diastolic Blood pressure in mmHg	85.50	2.41	86.06	3.21

In the study population, among the Azilsartan group, the mean systolic blood pressure in the 8th week was 139.29±5.51 mm Hg. The mean diastolic blood pressure was 85.50±2.41 mm Hg. Among the Telmisartan group, the mean systolic blood pressure in the 8th week was 137±4.2 mm Hg. The mean diastolic blood pressure was 86.06±3.21 mm Hg.

Table 7: Shows the mean blood pressure values in the 12th week

Blood pressure at 12th week	Group azilsartan		Group telmisartan	
	Mean	Standard deviation	Mean	Standard deviation
Systolic Blood pressure in mmHg	133.67	4.1	130.41	5.2
Diastolic Blood pressure in mmHg	82.53	2.67	83.21	4.21

In the study population, among the Azilsartan group, the mean systolic blood pressure in the 12th week was 133.67±4.1 mm Hg. The mean diastolic blood pressure was 82.53±2.67 mm Hg. Among the Telmisartan group, the mean systolic blood pressure in the 12th week was 13.41±5.2 mm Hg. The mean diastolic blood pressure was 83.21±4.21 mm Hg.

Table 8: Shows the mean blood pressure values in the 24th week

Blood pressure at 24th week	Group azilsartan		Group telmisartan	
	Mean	Standard deviation	Mean	Standard deviation
Systolic Blood pressure in mmHg	122	6.2	125	4.9
Diastolic Blood pressure in mmHg	79.01	2.1	81	5.21

In the study population, among the Azilsartan group, the mean systolic blood pressure in the 24th week was 122±6.2 mm Hg. The mean diastolic blood pressure was 79.01±2.1 mm Hg. Among the Telmisartan group, the mean systolic blood pressure in the 24th week was 125±4.9 mm Hg. The mean diastolic blood pressure was 81±5.21 mm Hg.

Table 9: Shows the mean blood pressure values at various intervals

S. No.	Parameter	Systolic blood pressure (mmHg)		P value
		Group azilsartan	Group telmisartan	
1.	Baseline	150.37±6.19	149.47±5.88	0.45
2.	4th week	145.35±6.37	143.21±6.29	0.09
3.	8th week	139.29±5.51	137±4.2	0.02** (Significant)
4.	12th week	133.67±4.1	130.41±5.2	0.007**(Significant)
5.	24th week	122±6.2	125±4.9	0.008** (Significant)

In the study population, among the Azilsartan group, the baseline means systolic blood pressure was 150.37±6.19, which decreased to 122±6.2 mm Hg at the end of the study period. Among group Telmisartan, the baseline means systolic blood pressure was 149.47±5.88 mmHg which decreased to 125±4.9 mm Hg at the end of the study period. The mean decrease in the systolic blood pressure in both groups was statistically significant, with a P value of<0.05 at the 8th week, the 12th week, and the end of the 24th week.

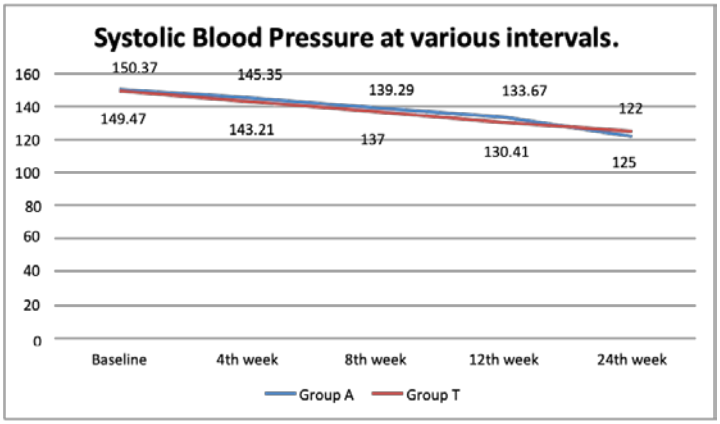

Fig. 3: Shows the systolic blood pressure at various intervals: At Baseline, 4th, 8th, 12th, and 24th weeks

Table 10: Shows the mean blood pressure values at various intervals

S. No.	Parameter	Systolic blood pressure (mmHg)			
		Group azilsartan	ANOVA P value	Group telmisartan	ANOVA P value
1.	Baseline	150.37±6.19	<0.0000001	149.47±5.88	<0.0000001**
2.	4thweek	145.35±6.37	(Highly significant)	143.21±6.29	(Highly significant)
3.	8thweek	139.29±5.51		137±4.2	
4.	12thweek	133.67±4.1		130.41±5.2	
5.	24thweek	122±6.2		125±4.9	

In the study population, among the Azilsartan group, the baseline means systolic blood pressure was 150.37±6.19, which decreased to 122±6.2 mm Hg at the end of the study period. The difference between the SBP at various intervals is statistically significant, with a P value of<0. 0000001. Among group Telmisartan, the baseline means systolic blood pressure was 149.47±5.88 mmHg which decreased to 125±4.9 mm Hg at the end of the study period. The difference between the SBP at various intervals is statistically significant, with a P value of<0.0000001.

Table 11: Shows the mean blood pressure values at various intervals

S. No.	Parameter	Diastolic blood pressure(mmHg)		P value
		Group azilsartan	Group telmisartan	
1.	Baseline	92.37±3.15	92.20±2.92	0.7
2.	4thweek	90.53±3.31	90.51±3.21	0.9
3.	8thweek	85.50±2.41	86.06±3.21	0.3
4.	12thweek	82.53±2.67	83.21±4.21	0.3
5.	24thweek	79±2.1	81±5.21	0.01*

In the study population, among the Azilsartan group, the baseline means diastolic blood pressure was 92.37±3.15, which decreased to 79±2.1 mm Hg at the end of the study period. Among group Telmisartan, the baseline means diastolic blood pressure was 92.20±2.92 mmHg which decreased to 81±5.21 mm Hg at the end of the study period. The mean decrease in diastolic blood pressure in both groups was statistically significant, with a P value of 0.01 at the end of the 24th week.

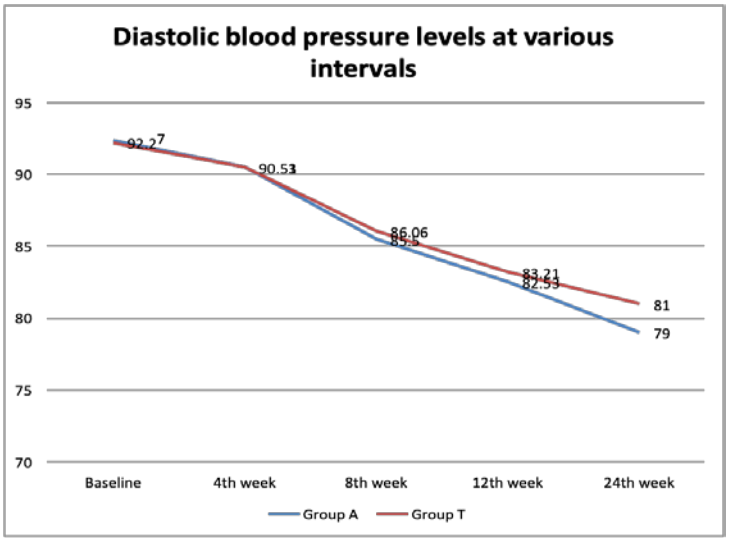

Fig. 4: Shows the diastolic blood pressure at various intervals: At Baseline, 4th, 8th, 12th, and 24th weeks

Table 12: Shows the mean blood pressure values at various intervals

S. No.	Parameter	Diastolic blood pressure (mmHg)			
		Group azilsartan	ANOVA P value	Group telmisartan	Anova P value
1.	Baseline	92.37±3.15	<0.0000001	92.20±2.92	<0.0000001**
2.	4th week	90.53±3.31	(Highly significant)	90.51±3.21	(Highly significant)
3.	8th week	85.50±2.41		86.06±3.21	
4.	12th week	82.53±2.67		83.21±4.21	
5.	24th week	79±2.1		81±5.21	

In the study population, among the Azilsartan group, the baseline means diastolic blood pressure was 92.37±3.15, which decreased to 79±2.1 mm Hg at the end of the study period. The difference between the DBP at various intervals is statistically significant, with a P value of<0.0000001. Among group Telmisartan, the baseline means diastolic blood pressure was 92.20±2.92 mmHg which decreased to 81±5.21 mm Hg at the end of the study period. The difference between the DBP at various intervals is statistically significant, with a P value of<0. 0000001. Shown in table 12

Table 13: Shows the adverse drug reactions/side effects

Adverse drug reactions	Group azilsartan	Percentage	Group telmisartan	Percentage
Present	6	12	7	14
Absent	42	88	43	86
Total	50	100	50	100

In the study population, among the Azilsartan group, 12% had experienced adverse effects of the drugs. Among the Telmisartan group, 14% had experienced adverse effects from the drugs.

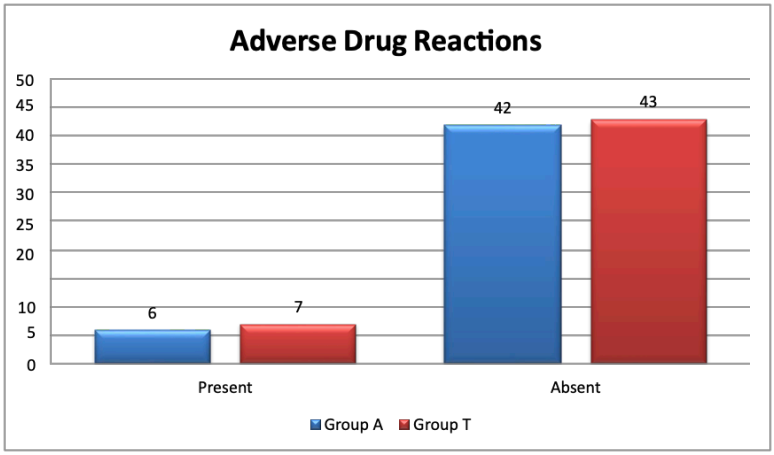

Fig. 5: Shows adverse drug reactions among the study population: In Group A and T

Table 14: Shows the types of adverse drug reactions/side effects

Adverse drug reactions/Side effects	Group azilsartan	Percentage	Group telmisartan	Percentage
Headache	2	33.33	1	14.28
Nausea	1	16.66	2	28.56
Fatigue	1	16.66	3	43.84
Dizziness	2	33.33	1	14.28
Total	6	100.00	7	100.00

In the study population, among the Azilsartan group, only 2 patients reported headache and dizziness, and nausea and fatigue were reported by one patient each. Among the Telmisartan group, 3 patients reported fatigue and 2 reported nausea. Headache and dizziness were reported by one patient each. Shown in table 14

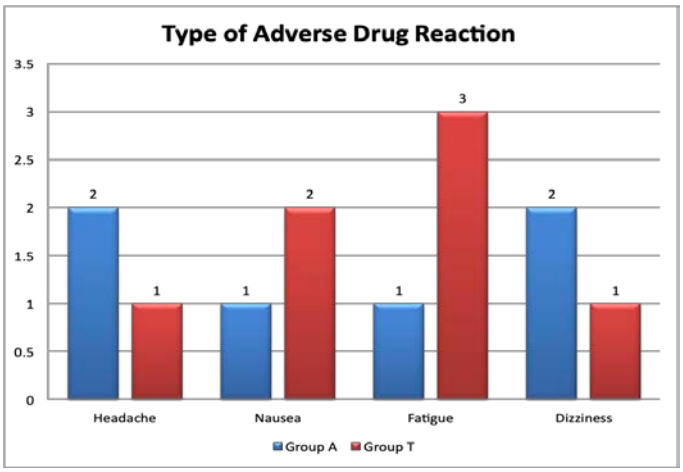

Fig. 6: Shows adverse drug reactions among the study population: Among Group A and T

CONCLUSION

The present study was conducted in the Department of Pharmacology, Osmania Medical College, Hyderabad, to evaluate the efficacy and safety profile of Telmisartan 40 mg and Azilsartan 40 mg in stage I Hypertension patients. Both drugs controlled blood pressure at similar proportions. However, the mean of SBP and DBP for the Azilsartan group was lower than the Telmisartan Group. Both drugs were tolerated well, and no significant adverse effects were noted during the study. Both drugs are equally safe and efficacious, but Azilsartan can be considered superior in terms of efficacy.

ACKNOWLEDGMENT

The authors thank Dr. N. KARUNA SREE, Professor and Head of the Department of Pharmacology, for expert advice. We are thankful to the Department of General Medicine, Osmania General Hospital, and the Department of Pharmacology, Osmania Medical College, for giving ethical approval for this study; special thanks to all the authors for their help in data collection, statistics, putting zeal in the study and are also thankful for all the patients who have participated in the study.

LIMITATIONS OF STUDY

It is an open-labeled comparative study, and hence results cannot be generalized to the entire population. The sample size is 100; with a larger sample size, the results would have been more accurate, and a long-term follow-up for one year will show the drug's long-term benefits and side effects.

FUNDING

No source of funding.

AUTHORS CONTRIBUTIONS

All authors have made significant contributions in writing, reviewing, editing, and submitting the manuscript.

CONFLICTS OF INTERESTS

Declared none

REFERENCES

1. Esunge PM. From blood pressure to hypertension: the history of research. J R Soc Med. 1991 Oct;84(10):621. doi: 10.1177/014107689108401019, PMID 1744849, PMCID PMC1295564.
2. Kotchen TA. Historical trends and milestones in hypertension research: a model of the process of translational research. Hypertension. 2011 Oct;58(4):522-38. doi: 10.1161/hypertensionaha.111.177766. PMID 21859967.
3. Centers for Disease Control and Prevention. High blood pressure facts Atlanta, GA. Centers for Disease Control and Prevention; 2011. Available from: http://www.cdc.gov/bloodpressure/facts.htm. [Last accessed on 24 Jul 2011]
4. Katherine T. Mills, Andrei Stefanescu, Jiang He. The global prevalence of hypertension. Nat Rev Nephrol. 2020 Apr;16(4):223-37. doi: 10.1038/s41581-019-0244-2.
5. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. J Hypertens. 2014 Jun;32(6):1170-7. doi: 10.1097/HJH.0000000000000146, PMID 24621804, PMCID PMC4011565.
6. National High Blood Pressure Education Program. The seventh report of the Joint National Committee on Prevention, detection, evaluation, and treatment of high blood pressure. Bethesda: National Heart Lung and Blood Institute. US; 2004 Aug. Available from: https://www.ncbi.nlm.nih.gov/books/NBK9630.
7. Bir Singh P, Singh S, Gill GK. Role of combination drug therapy for the management of hypertension with increasing age. Asian J Pharm Clin Res. 2021;14(10, Oct):53-8. doi: 10.22159/ajpcr.2021.v14i10.42431.
8. Sharma S, Kumar Singh S, Baranwal PK, Singh DK, Kale V. A cross-sectional study to estimate the prevalence of hypertension in urban field practice area of medical college in the metropolitan city of India. Asian J Pharm Clin Res. 2022;15(9):98-101. doi: 10.22159/ajpcr.2022.v15i9.45926.
9. Angeloni E. Azilsartan medoxomil in the management of hypertension: an evidence-based review of its place in therapy. Core Evid. 2016 Apr 5;11:1-10. doi: 10.2147/CE.S81776. PMID 27103882, PMCID PMC4829189.
10. Karen W, Finkel R, Panavelil TA. Lippincott illustrated reviews: pharmacology. 6th ed. Vol. 225. Philadelphia: Wolters Kluwer; 2015.
11. Pagani M. Ipertensione arteriosa, stress e betablocco [Arterial hypertension, stress, and beta-blockers]. Cardiologia. 1993 Dec;38(12);Suppl 1:435-42. PMID 7912651.
12. Barutçuoglu B, Parildar Z, Mutaf MI, Ozmen D, Alİoglu E, Habİf S. Effect of telmisartan on vascular endothelium in hypertensive and type 2 diabetic hypertensive patients. Turk J Med Sci. 2010;40(2):11. doi: 10.3906/sag-0807-11.
13. Boehringer Ingelheim Pharma. Drug prescribing information: Micardis; 1998.