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A comparative study of efficacy and safety in stage I hypertensive patients visiting the cardiac OPD at a tertiary care hospital

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Abstract

To investigate the efficacy and safety of Azilsartan 40 mg and Olmesartan 40 mg in patients with stage I systemic hypertension undergoing cardiac OPD at a tertiary care facility. A 6-month open-label comparison study was undertaken in the Department of Cardiology at Acsr Government Medical College and Hospital. All patients visiting the cardiac outpatient clinic at Acsr Government Medical College who have stage I systemic hypertension of any sex, aged 20-65, with blood pressures >140/90 mmHg, or glucose intolerance. Diagnoses for essential hypertension were made, and patients were randomised to receive either group 1 (40 mg of Azilsartan) or group 2 (40 mg of Olmesartan) after the initial screening. The individuals receiving care were instructed to come back for a fourth, eighth, twelveth, as well as twenty-fourth weeks. Both groups showed a statistically significant drop in systolic blood pressure (P value < 0.0000001). Both medicines regulated blood pressure in similar ways. However, the Azilsartan group had a lower mean SBP and DBP than the Olmesartan group. Both medicines were well tolerated, and no severe side effects were observed throughout the research.

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INTRODUCTION

The ultimate goal of antihypertensive treatment is to lower the morbidity and death of cardiovascular disease linked to hypertension, as hypertension is the strongest risk factor for cardiovascular illnesses. Blood pressure (BPs) typically have a clear circadian rhythm, which is defined as a 10%–30% drop during sleep, followed by a moderate to substantial increase at the moment of awakening [1]. A strong predictor of target organ damage, morning hypertension is a clinical condition of great importance, closely linked to cardiovascular disease. Long-acting, well-tolerated antihypertensive medications are

needed to regulate morning blood pressure levels. A persistent systolic blood pressure of more than 140 mm Hg or a sustained diastolic blood pressure of more than 90 mm Hg is deemed to be hypertension, according to the Joint National Committee (JNC VIII) on hypertension. Renal dysfunction, ischemic heart disease, stroke, and heart failure are among the conditions for which hypertension is a major risk factor. In 2008, almost 40% of persons 25 years of age and older had elevated blood pressure generally, according to WHO data [2]. Indians aged 25 and above have a 29.8% prevalence of hypertension, based on the literature of India. There was a significant difference in the prevalence of hypertension between rural and urban areas [27.6% (23.2-32.0) and 33.8% (29.7-378.8); P = 0.05]. Therefore, lowering blood pressure should not be the only objective of controlling hypertension; other goals should also include lowering total renal and cardiovascular morbidity as well as mortality [3]. In these contexts, the failure of existing treatments to control hypertension is one of the numerous factors driving the development of new antihypertensive drugs. Numerous antihypertensives are available, such as angiotensin II receptor blockers (ARB) and ACE inhibitors. blocking of the renin-angiotensin system with ACE inhibitors has given successful therapy of several disorders; nevertheless, angiotensin II blocking doesn't seem to be connected to all of the negative effects of ACE inhibitors. Bradykinin and prostaglandin breakdown, for instance, are further consequences of ACE inhibition that include cough and angioedema. Generally speaking, ARBs are well tolerated. There isn't a particular, dose-dependent side effect for any of the medications under investigation. Studies using ARBs have especially addressed cough because it is thought to be a class effect of ACE inhibitors. Compared to individuals taking ACE inhibitors, people receiving ARBs experience coughing far less frequently [4]. Angiotensin receptor blockers (ARBs) can totally suppress angiotensin and are a more selective form of angiotensin blocker than ACE inhibitors. These days, the most widely used antihypertensive medications are ARBs. Compared to other ARBs, azilartan is a potent newcomer that has a stronger affinity for the AT 1 receptor and a slower rate of dissociation. Another ARB that doctors frequently prescribe is olmesartan.

Other drugs in the angiotensin II receptor blocker (ARB) family, which also includes olmesartan, include telmisartan, candesartan, losartan, valsartan, as well as irbesartan [5]. ARBs specifically bind to the angiotensin receptor 1 (AT1), blocking the binding of the protein angiotensin II. This results in hypertensive effects, including vasoconstriction, cardiac stimulation, stimulation and production of aldosterone and ADH, and renal reabsorption of salt. Olmesartan's physiological effects include reduced blood pressure, aldosterone levels, cardiac activity, and improved salt excretion overall [6].

Renin-angiotensin-aldosterone system (RAAS): responsible for maintaining hemostasis and also regulating cardiac, vascular, as well as renal functions, is likewise impacted by olmesartan. A contributing factor to the aetiology and development of heart failure, renal illness, and cardiovascular disease is the inhibition of negative regulatory feedback within RAAS by pharmacological blocking of AT1 receptor blockade. Specifically, heart failure is associated with chronic RAAS activation, which results in inappropriate fluid retention, vasoconstriction, and ultimately worsening left ventricular function. ARBs have been shown to have a protective effect on the heart because of their capacity to improve cardiac function, reduce afterload, increase cardiac output, and prevent ventricular hypertrophy as well as remodelling [7].

In individuals who cannot tolerate ACE inhibitors, olmesartan is used widely to treat both hypertension as well as nephropathy related to Type 2 Diabetes. Numerous extensive clinical outcomes trials have demonstrated the beneficial effects of ARBs, such olmesartan, on cardiovascular outcomes, including a decreased risk of myocardial infarction, stroke, heart failure progression, and hospitalisation. Olmesartan's renoprotective properties, similar to those of other ARBs, reduce the progression of diabetic nephropathy.

Thus, this investigation was started to examine the safety and effectiveness of both medications. Because the smooth muscle of the blood vessels of the adrenal gland contain angiotensin-1 (AT1) receptors, abilsartan selectively blocks these

receptors to inhibit angiotensin II binding, causing vasodilation and a reduction in the effects of aldosterone [8]. With a comparable safety and tolerability profile to other ARBSs, abilistan, a newly licenced ARB, seems to be more effective in lowering blood pressure. There have been a lot of clinical trials done.

MATERIALS AND METHODS

The Department of Cardiology at Acsr Government Medical College and Hospital carried out an open-label comparative study. The ACSR Medical College, SPSR Nellore Institutional Ethical Committee provided authorization for the project. Patients who met the inclusion criteria and also visited the cardiac outpatient department at ACSR General Hospital with stage I systemic hypertension of any sex, aged 20–65, and blood pressures higher than 140/90 mmHg and/or diabetes mellitus were eligible to enrol in the trial. A history of hypersensitivity or allergy to olemesartan or azilsartan, a test result showing reduced kidney function as indicated by a blood creatinine level greater than 2 mg/dl. The trial excludes patients with asthma, pregnant or nursing women, people who have received prior antihypertensive treatment, patients who are noncompliant, those with poor liver function tests (SGOT or SGPT>two times standard limit), and people who are unwilling to give informed permission. Upon patient selection, the consulting physician performed an examination to exclude Grade I Essential hypertension [9]. A standard sphygmomanometer to determine the blood pressure's diastolic as well as systolic values in the right arm while the patient was seated, utilising the auscultatory approach. The diastolic Pressure is determined by measuring it at which the sounds stop occurring, while the systolic pressure is determined by measuring the pressure at which the sounds arrive. Every fifteen minutes, the same doctor takes two blood pressure readings. The results of the physical examination, the clinical examination, the family history, and prior medical history were all recorded on the case report form and results following the initial screening. A 40 mg tablet of Azilsartan or an Olmesartan tablet of the other group was assigned at random to diagnosed cases of essential hypertension [10].

Group A

In stage I study, 50 patients with stage I hypertension were given 40 mg of Azilsartan once day for six months.

Group O

In stage I group, Olmesartan 40 mg once daily was administered for six months to 50 individuals with stage I hypertension. The tablet was to be taken orally once a day in the morning with a glass of water for each patient. Patients were instructed to report for follow-up on the fourth, eighth, twelfth, and twenty-fourth week for review [11]. Blood pressure was taken on each visit. Prior to beginning treatment, measurements of blood sugar, urine, liver, and kidney functions, as well as an ECG, were made. In the event that any side effects, such as postural dizziness or nasopharyngitis, occurred, the patients were urged to report right away [12].

Study Design:

In the outpatient departments, this prospective observational study is being conducted.

Study Period:

At the Acsr Government Medical College and Hospital in Nellore, a six-month prospective observational research was conducted.

Inclusion Criteria

Patients who visited the cardiac outpatient department and met the inclusion criteria were included in the study if they had stage I systemic hypertension, were of either sex, aged 20–65, had blood pressure higher than 140/90 mmHg, and/or had diabetes mellitus [13].

Exclusion Criteria

The study excluded patients with asthma, women who were pregnant or nursing, people who had previously received another antihypertensive medication, patients who were noncompliant, patients who had previously experienced hypersensitivity or allergy to olemesartan or azilsartan, patients whose serum creatinine level was higher than 2 mg/dl, and patients with impaired liver function tests (SGOT or SGPT) greater than twice the standard limit [14].

Statistical methods

Excel 2010 was used to enter and analyse the data. The current study included both descriptive and inferential statistical analysis. The findings of categorical measures were reported in Number (%), whereas the results of continuous measurements were displayed as mean±SD (Min-Max). A 5% threshold of significance was used to evaluate significance. Intragroup factors were compared using the ANOVA test [15].

RESULTS AND DISCUSSION

The present study was conducted in the Department of Cardiology at ACSR Government College and Hospital, Hyderabad, to evaluate the safety profile and efficacy of Olmesartan 40 mg and Azilsartan 40 mg in treating stage I hypertension in patients receiving cardiac outpatient dialysis in a tertiary care facility. These are the study's findings are as follows.

Table 1 Indicates the age distribution

Age group	Group A	Percentage	Group O	Percentage
41-49 y	21	38	18	39
51-59 y	16	35	21	38
61-69 years	13	27	11	23
Total	50	100	50	100
mean± SD	48.61± 9.3 y		49.22± 8.58 y	

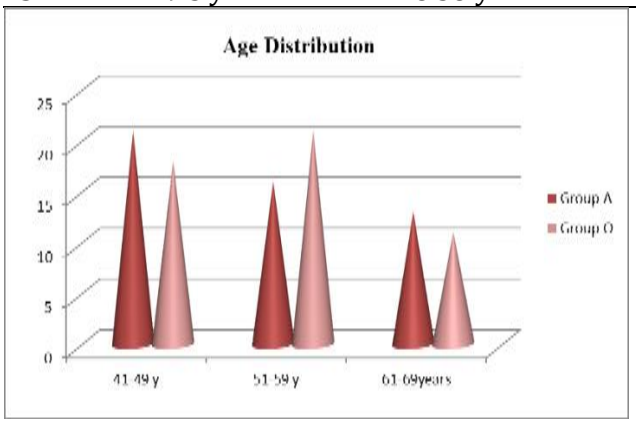

Figure 1 Shows the age distribution

The age group of 41–49 years old accounted for 39% of the study population is A group, followed by 51–59 years old (38%) and 61–69 years old (23%). Among the O group, 38% belonged to 51-59 y, followed by (39%) of 41-49 y, as well as 61-69 y (23%).

Table 2 Indicates the distribution of genders

Gender	Males	Females	Total
Group azilsartan	30	20	50
Percentage	61	39	100
Group Olmesartan	41	9	50
Percentage	81	19	100

In the study population, 61% of the O group was male, while 39% were female. In the T group, 81% were men and 19% were women.

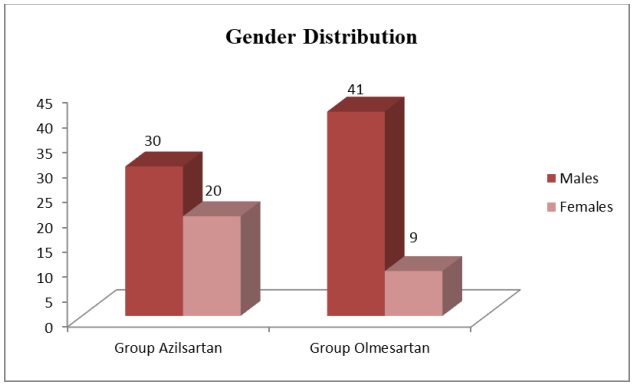

Figure 2 Showing the research population's gender distribution

The average height of the A group in the research population was 165.2±6.25 cm. The mean height in the O group was 157.4±8.1 cm. There was no discernible statistical difference between the two groups' mean heights. The Azilsartan group in the study population had a mean weight of 64.8±10.52 kg. The mean weight of the Olmesartan group was 70.9±6.9 kg. There was no discernible statistical difference in the mean weights of the groups. The mean BMI for the Azilsartan group, the study population, was 26.54 kg/m2. The average BMI for

Table 3 Showing the average parameter values

Parameter	Group Azilsartan		Group Olmesartan		P value
	Mean	Standard Deviation	Mean	Standard Deviation	
Height in cms	165.2	6.25	157.4	8.1	T=1.75, P=0.07
Weight in kgs	64.8	10.52	70.9	6.9	T=-0.51, P=0.5
BodyMass Index in kg/m2	26.54	3.55	30.56	3.96	T=-1.36, P=0.17

the Olmesartan group was 30.56±3.96 kg/m2. There was no discernible statistically significant variation in the groups' mean BMIs.

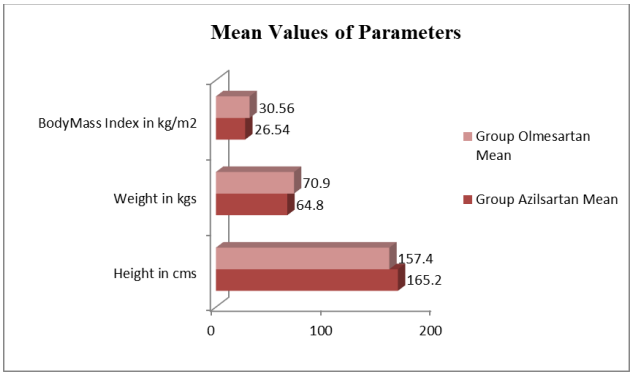

Figure 3 Shows the mean and standard deviation values of baseline parameters

Table 4 Indicates the mean and standard deviation values of baseline parameters

Parameter	Group Azilsartan		Group Olmesartan	
	Mean	SD	Mean	SD
Systolic (mmHg)	149.37	5.19	148.57	4.88
Diastolic (mmHg)	93.37	4.15	93.20	3.92

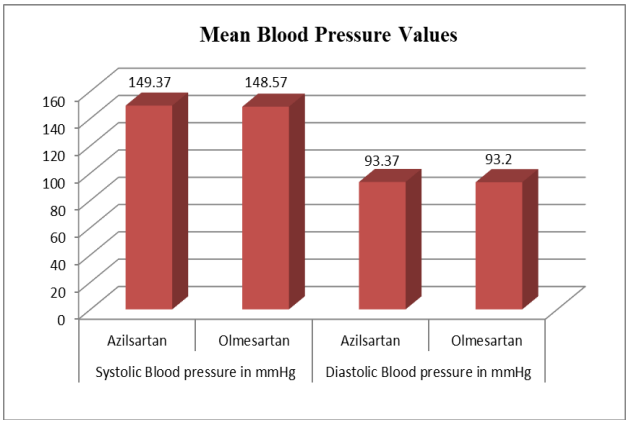

Figure 4 Shows the mean blood pressure values of Baseline Parameters

Table 5 Indicates the average blood pressure measurements in the 4th week

BP in 4th week	Group Azilsartan		Group Olmesartan	
	Mean	SD	Mean	SD
Systolic (mmHg)	144.35	5.37	142.21	5.29
Diastolic (mmHg)	91.53	4.31	91.51	4.21

In the fourth week of the research, the Azilsartan group's mean systolic blood pressure was 144.35±5.37 mm Hg. 91.53±4.31 mm Hg was the average diastolic blood pressure reading. The Olmesartan group's mean systolic blood pressure in the fourth week was 142.21±5.29 mm Hg. Blood pressure at diastolic levels measured 91.53±4.31 mm Hg on average.

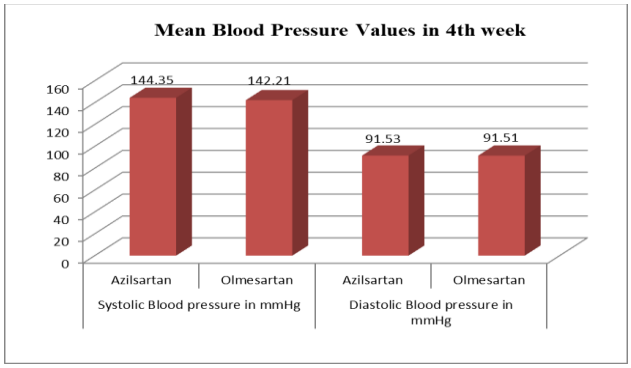

Figure 5 Shows the mean blood pressure values in 4th week

Table 6 Indicates the average blood pressure measurements in the 8th week

BP in 8th week	Group Azilsartan		Group Olmesartan	
	Mean	SD	Mean	SD
Systolic (mmHg)	138.29	4.51	138	3.2
Diastolic (mmHg)	86.50	3.41	85.06	2.21

A mean systolic blood pressure of 138.29±4.51 mm Hg was recorded for the Azilsartan group at the eighth week of the research. The diastolic mean blood pressure was 86.50±3.41 mm Hg. The Olmesartan group's average systolic blood pressure in the eighth week was 138±3.2 mm Hg. 86.06±2.21 mm Hg was the diastolic mean blood pressure.

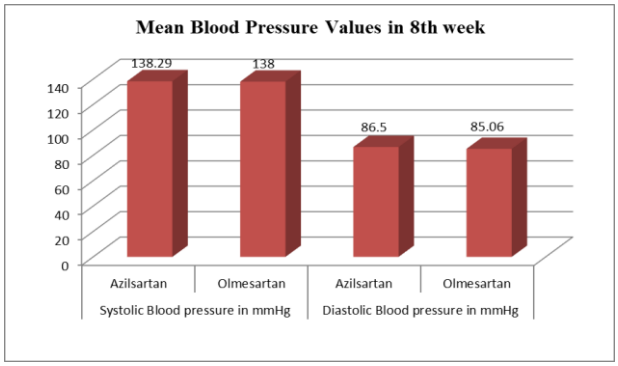

Figure 6 Shows the mean blood pressure values in 8th week

Table 7 Indicates the average blood pressure measurements in the 12th week

Blood pressure in 12th week	Group Azilsartan		Group Olmesartan	
	Mean	SD	Mean	SD
Systolic (mmHg)	132.67	5.1	128.41	6.2
Diastolic (mmHg)	83.53	1.67	85.21	3.21

During the 12th week of the study, the Azilsartan group's mean systolic blood pressure was measured at 132.67±4.1 mm Hg. The diastolic blood pressure was found to be 83.53±2.67 mm Hg. By the twelfth week, the Olmesartan group's mean systolic blood pressure was 128.41±6.2 mm Hg. The diastolic blood pressure was found to be 85.21±3.21 mm Hg.

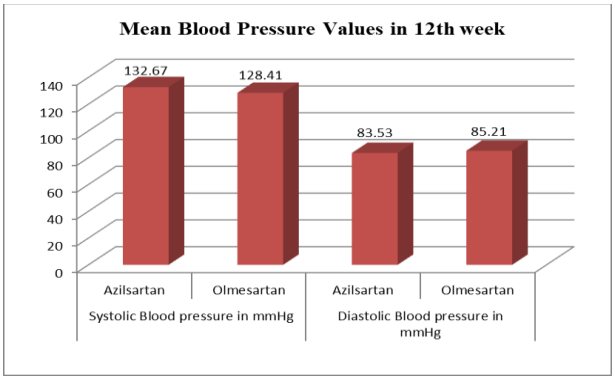

Figure 7 Shows the mean blood pressure values in 12th week

Table 8 Indicates the average blood pressure measurements in the 24th week

Blood pressure in 24th week	Group Azilsartan		Group Olmesartan	
	Mean	SD	Mean	SD
Systolic (mmHg)	120	5.2	124	3.9
Diastolic (mmHg)	81.01	3.1	82	6.21

In the study population among the Azilsartan group, the mean systolic blood pressure at week 24 was 120±5.2 mm Hg. The diastolic blood pressure was found to be 81.01±3.1 mm Hg. In the 24th week, the mean systolic blood pressure in the Olmesartan group was 124±3.9 mm Hg. The blood pressure at the diastolic mean was 82±6.21 mm Hg.

At the end of the research period, the mean systolic blood pressure of the Azilsartan group in the study population dropped to 120±5.2 mm Hg from 149.37±5.19 at baseline. With a P value of less than 0.0000001, the difference between the SBP at different intervals is statistically significant.

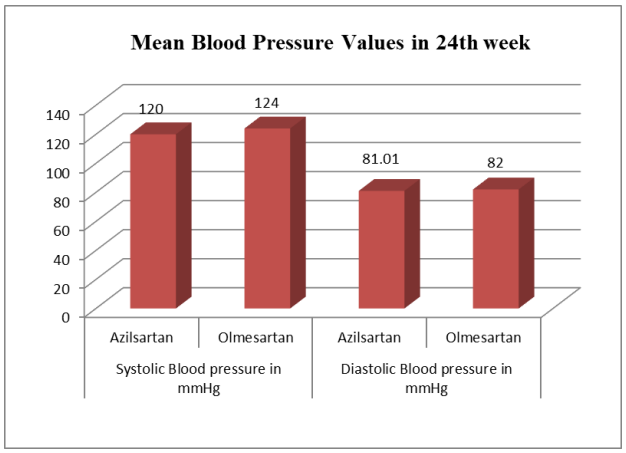

Figure 8 Shows the mean blood pressure values in 24th week

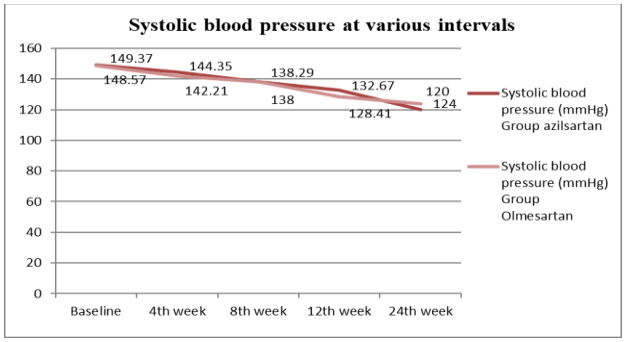

Figure 9 Represents the blood pressure's systolic value at different intervals

Table 9 Indicates the average blood pressure measurements at various intervals

Parameter	Systolic blood pressure in mmHg			
	Group azilsartan	ANOVA P value	Group Olmesartan	ANOVA P value
Baseline	149.37±5.19	<0.0000001	148.57±4.88	<0.0000001**
4th w	144.35±5.37	(Highly significant)	142.21±5.29	(Highly significant)
8th w	138.29±4.51		138±3.2	
12th w	132.67±5.1		128.41±6.2	
24th w	120±5.2		124±3.9	

Table 10 Indicates the average blood pressure readings at various intervals

Parameter	Diastolic blood pressure in mmHg			
	Group azilsartan	ANOVA P value	Group Olmesartan	ANOVA P value
Baseline	91.37±4.15	<0.0000001	91.20±2.92	<0.0000001**
4th w	90.53±3.31	(Highly significant)	90.51±3.21	(Highly significant)
8th w	86.50±3.41		87.06±3.21	
12th w	81.53±2.67		82.21±4.21	
24th w	80±2.1		81±5.21	

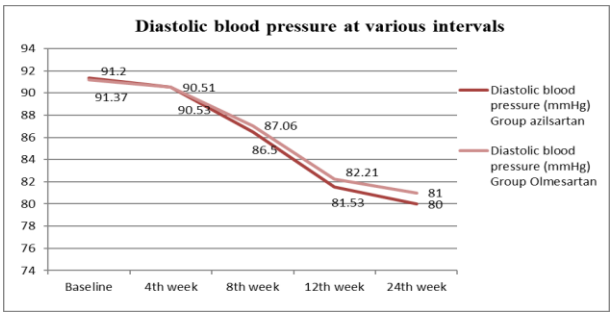

Figure 10 Shows the diastolic blood pressure at various intervals

After a period of investigation, the mean diastolic blood pressure of the Azilsartan group in the study population dropped to 80±2.1 mm Hg from 91.37±4.15. A statistically significant difference (P <0.0000001) exists between the DBP at different intervals. By the conclusion of the research period, the mean diastolic blood pressure of the Olmesartan group had dropped from 91.20±2.92 mmHg to 81±5.21 mmHg. A statistically significant difference (P <0.0000001) exists between the DBP at different intervals.

Table 11 Indicates the negative side effects and reactions of drugs

ADR`	Group azilsartan	%	Group Olmesartan	%
Present	5	13	8	15
Absent	43	87	42	85
Total	50	100	50	100

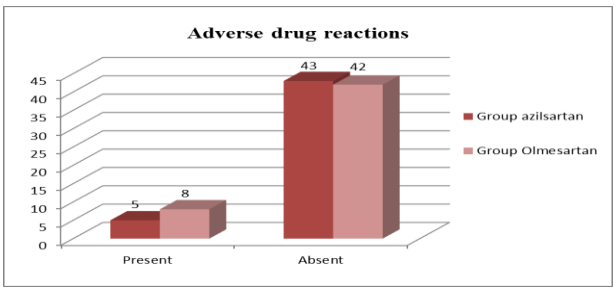

Figure 11 Represents adverse medication reactions among the study population: Group A and O

In the study population, 12% of the Azilsartan group reported side effects from the medicines. Among the Olmesartan group, 14% reported side effects from the drugs.

Table 12 Indicates the negative side effects and reactions of drugs

ADR/Side effects	Group azilsartan	Percentage	Group Olmesartan	Percentage
Headache	2	32.33	1	13.28
Nausea	1	17.66	2	29.56
Fatigue	2	17.66	3	42.84
Dizziness	1	32.33	1	15.28
Total	6	100.00	7	100.00

Only two patients in the Azilsartan group complained headaches and fatigue. Dizziness, nausea, and weariness were noted by one patient each. Three individuals in the Olmesartan group felt weariness, while two reported nausea. One patient felt both a headache and dizziness. As seen in Table 14.

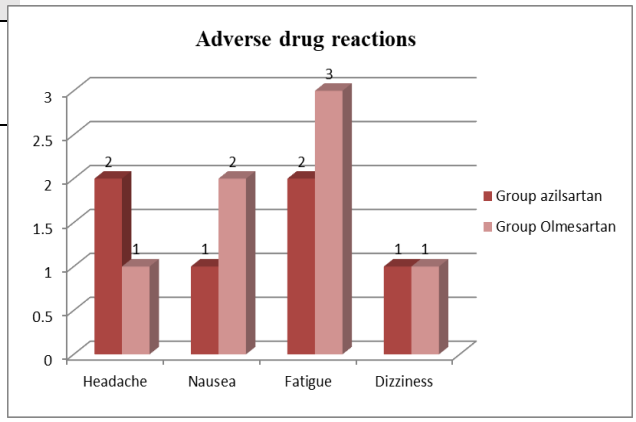

Figure 12 Represents adverse medication reactions among the study population: Group A and O

CONCLUSION

The goal of the current study was to assess the safety and effectiveness of 40 mg tablets of olemesartan and 40 mg of azailsartan in patients with stage I hypertension. The two medications reduced blood pressure in comparable ways. Nonetheless, compared to the Olmesartan Group, the Azilsartan Group's mean SBP and DBP was lower. Throughout the trial, neither medication caused any serious side effects, and both were well tolerated. While both medications are equally effective and safe, Azilsartan may be the more potent option.

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Conflict of Interest

The authors declare no conflict of interest, financial or otherwise.

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REFERENCES

[1] Esunge PM, et al. From blood pressure to hypertension: the history of research. Journal of the Royal Society of Medicine. 1991;84(10):621.

[2] Kotchen TA, et al. Historical trends and milestones in hypertension research: a model of the process of translational research. Hypertension. 2011;58(4):522-538.

[3] Katherine TM, Stefanescu A, He J, et al. The global prevalence of hypertension. Nature Review Nephrology. 2020;16(4):223-237.

[4] Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, and Di Angelantonio E, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. Journal of Hypertension. 2014;32(6):1170-1177.

[5] Bir Singh P, Singh S, Gill GK, et al. Role of combination drug therapy for the management of hypertension with increasing age. Asian Journal of Pharmaceutical and Clinical Research. 2021;14(10):53-58.

[6] Sharma S, Kumar Singh S, Baranwal PK, Singh DK, Kale V, et al. 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 Journal of Pharmaceutical and Clinical Research. 2022;15(9):98-101.

[7] Angeloni E, et al. Azilsartan medoxomil in the management of hypertension: an evidence-based review of its place in therapy. Core Evid. 2016;11:1-10.

[8] Pagani M, et al. Ipertensione arteriosa, stress e betablocco [Arterial hypertension, stress, and beta-blockers]. Cardiologia. 1993;38(12);Suppl 1:435-442.

[9] de Luis DA, Conde R, Gonzalez Sagrado M, Aller R, Izaola O, Duenas A, et al. Effects of telmisartan vs. olmesartan on metabolic parameters, insulin resistance and adipocytokines in hypertensive obese patients. Nutricion Hospitalaria, 2010;25(2):275 279.

[10] Sharma AM, Janke J, Gorzelniak K, Engeli S, Luft FC. Angiotensin blockade prevents type 2 diabetes by formation of fat cells. Hypertension, 2002;40(5):609 611.

[11] Johnson ML, Pietz K, Battleman DS, Beyth RJ. Prevalence of comorbid hypertension and dyslipidemia and associated cardiovascular disease. The American Journal of Managed Care, 2004;10(12):926 932.

[12] Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr., et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension, 2003;42(6):1206 1252.

[13] Goebel M, Clemenz M, Unger T, et al. Effective treatment of hypertension by AT(1) receptor antagonism: The past and future of telmisartan. Expert Review of Cardiovascular Therapy, 2006;4(5):615 29.

[14] Barutcuoglu B, Parildar Z, Mutaf MI, Ozmen D, Alloglu E, Habif S, et al. Effect of Olmesartan on vascular endothelium in

hypertensive and type 2 diabetic hypertensive patients. Turkish Journal of Medicinal Sciences. 2010;40(2):11.

[15] Akyürek Ö, Akbal E, Güneş F, Akyürek N. Peroxisome proliferator activated receptor gamma concentrations in newly diagnosed hypertension patients and the metabolic effects of olmesartan. Archives of Medical Research, 2014;45(2):138 142.