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Original Research Article

A Short Term Comparative Evaluation of Antihypertensive Efficacy and Safety of Olmesartan versus Telmisartan in Patients of Stage 1 Hypertension

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Abstract: Angiotensin type-1 receptor blockers (ARBs) are being one of the first-line treatments for hypertension. Despite the availability of various types of ARBs, there are no comparative studies of their effects in North Indian patients. In this open-label, prospective, randomized study, we compared the antihypertensive effects of olmesartan (20 mg/day) versus telmisartan (40 mg/day) in newly diagnosed patients of stage I hypertension as defined under JNC-VII guidelines. 60 patients were randomized into 2 groups. The odd numbers was allotted to olmesartan (group A) & even numbers to telmisartan (group B). Group A was allotted olmesartan 20 mg/day and group B was given telmisartan 40 mg/day for 12 weeks. Efficacy and safety was assessed by the changes in the blood pressure in terms of adverse event rates and control of blood pressure, including abnormal clinical laboratory variables related to kidney function and serum electrolyte levels. The follow up was done at 2, 4, 8 and 12 weeks. We analyzed the blood pressure lowering effects of each drug by blood pressure monitoring at 0, 2, 4, 8, 12 weeks and metabolic parameters were assessed. Olmesartan lowered mean systolic and diastolic blood pressure more significantly than telmisartan. Our results indicate that olmesartan has more potent arterial blood pressure lowering effect than telmisartan. None of the patient complained about any adverse effect with the use of either olmesartan (20mg per day) or telmisartan (40mg/day).
Keywords: Olmesartan, Telmisartan, Hypertension, Efficacy, Safety

INTRODUCTION:

Hypertension is a multifactorial disease and is the most common, readily identifiable and reversible risk factor for myocardial infarction, stroke, kidney disease and blindness. A sustained increase in blood pressure > 140/90mm Hg and is associated with marked morbidity and mortality [1].

Renin angiotensin system (RAS) plays an important role in pathophysiology of cardiovascular disease. Angiotensin II receptor blockers (ARBs) are being used as one of the agents for the treatment of hypertension and are known to be effective in the prevention of cardiovascular end-organ damage because of its anti-inflammatory and anti-oxidant effects [2, 3]. They are also more beneficial in lowering the risk of type 2 diabetes mellitus in comparison with other antihypertensives. ARBs prevent the hypertensive effects of angiotensin II by selective blockade of the angiotensin II type 1 (AT1) receptor [4].

Although many researches have been done so far to compare the antihypertensive efficacy of ARBs, but such comparative studies have mainly been conducted against Losartan only [5]. It was reported in few studies, that olmesartan exerts strong antihypertensive effect by its higher selectively and very strong binding with AT1 receptor [6]. While Telmisartan has more sustained reduction in blood pressure by a longer residence time on AT1 receptor [7, 8]. Therefore, in the present study, we were interested in comparing the efficacy and safety of olmesartan versus telmisartan in patients of stage 1(JNCVII) hypertension.

AIM AND OBJECTIVES

To comparatively evaluate the anti-hypertensive efficacy and safety of OLMESARTAN 20 mg versus TELMISARTAN 40 mg in stage 1 hypertensive patients (JNC VII)

MATERIAL AND METHODS

A prospective one year randomized open label interventional clinical study was conducted amongst the patients diagnosed with hypertension stage-1(JNCVII) attending to the medicine OPD of RMCH, Bareilly after ethical clearance by IEC(institutional ethical committee) and written informed consent of the subjects.

Study was conducted for 3 months and all the patients during 3 months of study period of age group 30 to 80 years of both genders attending medicine OPD diagnosed with hypertension stage -1 (JNCVII), were enrolled after doing relevant investigations.

DATA ANALYSIS

Statistical analysis was done by using specific software SPSS version 20. The results are displayed with the help of tables. A total of 60 patients of age 30-80 years of both genders of all socio-economic status were enrolled for the study and then randomized into olmesartan and telmisartan group. The odd numbers were allotted to olmesartan & even numbers to telmisartan.

Inclusion Criteria

All patients of both the genders, aged 30 to 80 years of stage 1 hypertension was included in the study

Exclusion Criteria-

- Patient of age group less than 30 and more than 80 years.
- The subjects with presence of history of any acute or chronic disease that would affect the study variables were excluded.
- Pregnant and lactating females.
- History of Significant renal disease or liver and cardiovascular disease.
- Known hypersensitivity to angiotensin receptor.

Baseline Investigations

Done In all patients -

Haemogram – Hb, TLC, DLC, ESR, GBP, Blood sugar fasting/Blood Sugar PP or RBS, Serum Creatinine, Serum k+ levels, Blood Urea ,SGPT, Fasting lipid profile, Urine Routine & Microscopy Exam, Chest X ray PA view, ECG.

- **Done In Selected Patients**

  Fundoscopy for retinopathy, Fasting T3, T4, TSH in thyroid disorder patients

RESULTS:

Table 1 shows the demographic characteristic of the patients in which differences were found to be statistically non-significant in both the groups. Hence both Olmesartan and Telmisartan treated groups were comparable with respect to age, gender, locality, education and socioeconomic status.

Table 1: Baseline Demographic parameters

Characteristic	Group- A (OLMESARTAN)	Group-B (TELMISARTAN)	p – value	significance
Age	52.6±10.59	51.8±8.42	0.7472	NS
Sex				
Male	16	14	0.6056	
Female	14	16		NS
Locality				
Rural	14	12		
Urban	16	18	0.3006	NS
Education				
Illiterate	11	17		
Literate	19	13	0.1205	NS
Socioeconomic status				
Upper class	2	0		
Upper middle	11	7		
Upper lower	9	20		
Lower middle	7	3		
Lower class	1	0	0.0384	SIGNIFICANT

p- Value <0.05 is considered to be statistically significant

Table 2. shows the mean changes in systolic blood pressure (SBP) from baseline upto 3 month following treatment with olmesartan (Group A) versus telmisartan (Group B).Baseline mean values of SBP for both the groups were comparable (P=0.7851).From the 2nd week onwards difference in reduction in SBP was

significantly more in olmesartan treated group which becomes highly significant at 3rd month of follow up (P= 0.0345 0.0175, 0.0029 and 0.0037 at 2nd wk, 1 month, 2month and 3 months respectively).

It also depicts the comparative evaluation of Diastolic Blood Pressure (DBP) between the two groups. The baseline valves of DBP for both the groups were statistically comparable. There was statistically significant decrease (P=0.0296) in DBP in Group A as compared to Group B as early as 2nd week of Pharmacotherapy with olmesartan and telmisartan which continued to be significant at 1 month (P=0.0450) 2nd month (P=0.0349) and at the end point 3rd month (P=0.047).

Table 2: Systolic Blood Pressure (SBP)

VISITS	GROUP A (OLMESARTAN) SBP (mmHg) MEAN ± SD	GROUP B (TELMESARTAN) SBP (mmHg) MEAN ± SD	t-value	P-value	SIGNIFICANCE
BASELINE	151.13 ± 6.80	150.7 ± 5.26	0.2740	0.7851	NS
2nd WEEK	141.48 ± 5.39	144.06 ± 3.68	2.1287	0.0345	SIGNIFICANT
1MONTH	137.5 ± 5.18	140.4 ± 3.77	2.4337	0.0175	SIGNIFICANT
2MONTH	134.9 ± 5.44	138.6 ± 3.40	3.1122	0.0029	SIGNIFICANT
3MONTH	133.1 ± 5.60	136.67 ± 3.22	2.9875	0.0037	HIGHLY SIGNIFICANT
Diastolic Blood Pressure (SBP)					
VISITS	**GROUP A (OLMESARTAN) DBP (mmHg) MEAN ± SD**	**GROUP B (TELMESARTAN) DBP (mmHg) MEAN ± SD**	**t-value**	**P-value**	**SIGNIFICANCE**
BASELINE	91.3 ± 4.29	90.60 ± 3.49	0.6933	.04909	NS
2nd WEEK	84.7 ± 3.60	86.6 ± 2.97	2.1817	0.0296	SIGNIFICANT
1 MONTH	82.4 ± 3.29	84.17 ± 3.40	1.9927	0.0450	SIGNFICANT
2 MONTH	81.4 ± 2.70	83.10 ± 3.36	2.0903	0.0349	SIGNFICANT
3 MONTH	80.8 ± 2.49	82.07 ± 2.36	1.9297	0.0472	SIGNIFICANT
***p- value <0.05 is considered to be statistically significant,* NS – not statistically significant**					

Table no 3 shows that all the biochemical changes were found to be statistically non-significant between two groups at baseline and after 3rd months of treatment.

Table 3: Shows differences in biochemical parameters between Group A and Group B.

FASTING SUGAR (mg/DL)	GROUP A (OLMESARTAN) Mean±SD	GROUP B (TELMISARTAN) Mean±SD	p-value	Significance
Baseline	98.46±20.7	92.83±14.43	0.2266	NS
3 month	99.57±18.60	91.3± 15.05	0.0692	NS
p-value	0.722(NS)	0.2119(NS)		
Serum creatinine (mg %)				
Baseline	1.15±0.29	1.14±0.27	0.8905	NS
3 month	1.14±0.28	1.16±0.26	0.7808	NS
p-value	0.9241(NS)	0.1714(NS)		
Serum urea (mg %)				
Baseline	29.87±6.05	31.07±6.77	0.472	NS
3month	30.25±5.09	30.93±6.47	0.6634	NS
p-value	0.7936(NS)	0.7367(NS)		
Serum – K+(m-mol/L)				
Baseline	3.74±0.21	3.83±0.25	0.1365	NS
3month	3.78±0.183	3.85±0.24	0.2683	NS
p-value	0.3689(NS)	0.4072(NS)		

p- Value <0.05 is considered to be statistically significant, NS –not statistically significant

DISCUSSION:

In this study, olmesartan treated patients (Gp A) showed statistically significant reduction both in SBP and DBP as compared to Telmisartan (Gp B) in all the follow-ups (SBP at 2wk, P= 0.0345, 1 month, P= 0.0175, 2 month, p> 0.0029 and 3 month, P= 0.0296 and 3 month P = 0.0472), Our findings are consistent with the study by Nakayama S *et al.;* [9]. who observed that Olmesartan lowered systolic, diastolic and mean blood pressure by 3.3, 2.7 and 3.1 mm Hg more than did Telmisartan (P=0.0305, 0.0087 and 0.0058 for SBP, DBP and mean BP respectively). Moreover, their data also reported that olmesartan at 20mg/day Lowered BP more than telmisartan at 40 mg/day. Further they observed that olmesartan therapy lowered mean systolic and diastolic BP to below 130/80mm Hg which JNC7 [10] and ESH/ESC [11] both recommended.

Smith *et al.;* [12] observed that olmesartan is significantly more effective than Losartan or valsartan as antihypertensive, similarly Mirza *et al.;* [13] reported that, olmesartan regarding BP lowering agent may have strong vaso-depressor effect and has dual inverse agonism i.e. strong inverse agonistic action towards inositol triphosphate (IP) production and extracellular signal regulated kinase action independent of Ang II stimulation, which might be responsible of greater lowering of blood pressure.

Few other researchers [14, 15] also supported our findings. Another explanation for greater BP lowering effect of olmesartan as compared to Telmisartan was explained in the study of Le *et al.;* [16], which in addition reported that although both ARBs were competitive antagonist at but olmesartan had higher affinity, greater degree of unsorrmountability and slower dissociation from AT1 receptor than telmisartan. A number of studies [17-19] also depicted that olmesartan showed a greater binding with AT1 receptor and a better antihypertensive than other ARBs.

However, many studies do not support our findings. Pathapati *et al.;* [20] found no statistically significant difference between the two groups with respect to reduction in SBP and DBP both. In another study by Luis DA *et al.;* [21] both drugs had similar blood pressure lowering effect in hypertensive obese patients.

Another contradiction was observed by Arao *et al.;* [20]. In their cross-over study, no significant difference in antihypertensive effect between olmesartan and Telmisartan were found (SBP. P- 0.543, DBP, P= 0.308). Our study contradict the study of Sasaki *et al.;* [23] who documented telmisartan to be more effective blood pressure lowering agent as compared to olmesartan.

In this study we also compared the effects of olmesartan and telmisartan on biochemicals parameters. Despite various types of ARBs are available, there are few studies which compared the effect on biochemical profile. We found no statistically significant alterations within the two groups as well as when mean of both groups were compared. Nakayana *et al.;* [9] also observed no significant alteration in biochemical parameters which supported our observations.

In 2 months study by Kumar *et al.;* [24] the mean FBS values for Telmisartan & Olmesartan baseline were 114.17 mg/dl and 109.75 mg/dl respectively and at the end point 99.25mg/dl & 98.42mg/dl respectively. The decrease in FBS values with both the drugs was highly significant. But both drugs were compared; with each other regarding reduction in FBS value it was found to be statistically non-significant.

Amarender *et al.;* [25] in their 12 week study observed no statistically significant difference in FBS (mg/dl) S. urea (mg/dl) and S. Creatinine (mg/dl) values when mean of the two groups were compared. This is in accordance with our findings. But there significant decrease in serum urea and s. creatinine from baseline to end point within the groups of olmesartan and Telmisartan inhibitors which is contradictory with our study.

Arao *et al.;* [22] reported significant reduction in FBS with olmesartan (P=0.006) than telmisartan and they suggested olmesartan to be superior to telmisartan in term of improving glucose metabolism, insulin resistance and lipid metabolism.

Ramachendran *et al.;* [26] reported that although olmesartan is more potent as Blood pressure lowering agent than Telmisartan but not observed with metabolic parameters.

CONCLUSION:

Olmesartan showed a better reduction in blood pressure with similar effects in biochemical parameters as telmisartan.

LIMITATIONS:

As this study was of 3 months duration, so long term results cannot be depicted. Therefore longer duration of study may be required to observe the effect of olmesartan and telmisartan on blood pressure and metabolic parameters.

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REFERENCES:-

1. Michel T, Hoffman B; Treatment of Myocardial Ischemia and Hypertension. In: Brunton LL, Chabner BA, Knollmann BC editor. Goodman & Gillman's The Pharmacological Basis of Therapeutics. 12th Ed. New York: McGraw Hills; 2011; 766.
2. Zhang C, Hein TW, Wang W, Kou L; Divergent roles of angiotensin II AT1 and AT2 receptors in modulating coronary micro vascular function. Circ Res 2003; 92: 322-329.
3. Dzau VJ; Theodore Cooper Lecture: tissue angiotensin and path biology of vascular disease: a unifying hypothesis. Hypertension 2001; 37: 1047-1052.
4. Burnier M, Brunner HR; Angiotensin II receptor antagonists. Lance. 2000; 355:637-645.
5. Oparil S, Williams D, Chrysant SG, Marbury TC, Neutel J; Comparative efficacy of olmesartan, Losartan, valsartan, and irbesartan in the control of essential hypertension. The journal of Clinical Hypertension. 2001; 3(5):283-318.
6. Mezuno M, Sada T, Ikeda M, Fukuda N, Miyamoto M, Yanagisawa H *et al.;* Pharmacology of CS_866, a novel nonpeptide angiotensin II receptor antagonist, Eur J Pharmacol 1995; 285(2): 181-188.
7. Burnier M, Brunner HR; Angiotensin II receptor antagonists. Lancet 2000; 355: 637-645.
8. Kakuta H, Sudoh K, Sasamta M, Yamagishi S; Telmisartan has the strongest binding affinity to angiotensin II type 1 receptor: comparison with other angiotensin II type 1 receptor blockers. Int J Clin Pharmacol Res 2005; 25: 41-46.
9. Nakayama S, Watada H, Mita T, Ikeda F, Shimizu T, Uchino H *et al.;* Comparison of effects of olmesartan and telmisartan on blood pressure and metabolic parameters in Japanese early-stage type-2 diabetics with hypertension. Hypertension Research. 2008; 31(1):7.
10. Chobanian AV, Bakris GL, Black HR, Cushman W.C, Green L.A, Izzo J.L *et al.;* The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA 2003; 42(6), 1206-1252.
11. European Society of Hypertension – European Society of Cardiology guidelines for the management of arterial hypertension. J Hypertens 2003; 21: 1011-1053.
12. Smith DH, Dubiel R, Jones M; Use of 24-hour ambulatory blood pressure monitoring to assess antihypertensive efficacy: a comparison of olmesartan medoxomil, Losartan potassium, valsartan, and irbesartan. Am J Cardiovascular Drugs 2005; 5: 41-50.
13. Miura S, Saku K; Do all angiotensin II type 1 receptor blockers have the same beneficial effects? British journal of pharmacology. 2007; 151(7):912-3.
14. Palta S, Sehgal VK, Gupta AK, Singh H; Comparative study to evaluate efficacy & cost effectiveness of olmesartan versus telmisartan, in patients of stage I hypertension. *International Journal of Medical and Dental Sciences, 2015*; 1(4): 568-576.
15. Jadhav UM, Anala K, Soniya P; Comparative efficacy of telmisartan 40mg and olmesartan 20mg on 24hours ambulatory blood pressure monitoring in hypertension. The journal of Clinical Hypertension 2012; 14(1):20.
16. Le MT, Liefde IV, Pugsley MK, Vauquelin G; Molecular characterization of the interactions between olmesartan and telmisartan and the human angiotensin II AT1 receptor. Br J Pharmacol 2007; 151; 952-962 .
17. Kiya, Y. Miura, S., Fujino M, Imaizumi S, Karnik S.S, Saku K; Clinical and pharmacotherapeutic relevance of the double-cain domain of the angiotensin II type 1 receptor blocker olmesartan. Clin Exp Hypertens. 2010; 32(2): 129-136.
18. Oparil S, Williams D, Chrysant S.G, Marbury T.C, Neutel J; Comparative efficacy of olmesartan, Losartan, valsartan, and irbesartan in the control of essential hypertension. J Clin Hypertens. 2001; 3(5): 283-318.
19. De la Sierra A, Volpe M; lmesartan-based therapies: an effective way to improve blood pressure control and cardiovascular protection. J Hypertens. 2013; 31: S13-S17.
20. Pathapati RM, Rajesh Kumar M, Chirra BR, Buchineni M, Devaraju SR, Naidu MU; Acute Effects of Two Angiotensin Receptor Blockers on Vascular Hemodynamics, Arterial Stiffness, and Oxidative Stress in Patients with Mild to Moderate Hypertension: An Open Label Parallel Group Study. ISRN Vascular Medicine. 2013; 2013.
21. De Luis DA, Conde R, González-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. Nutr Hosp. 2010; 25(2):275-9.
22. Arao T, Okada Y, Mori H, Nishida K, Tanaka Y; Antihypertensive and metabolic effects of high-dose olmesartan and telmisartan in type 2 diabetes patients with hypertension. Endocrine journal. 2013; 60(5):563-70.
23. Sasaki T, Noda Y, Yasuoka Y, Irino H, Abe H, Adachi H, *et al.;* Comparison of the effects of telmisartan and olmesartan on home blood pressure, glucose, and lipid profiles in patients with hypertension, chronic heart failure, and metabolic syndrome. Hypertension Research. 2008; 31(5):921-9.

24. Vijaya Kumar PR, Priya K, Srivastava P, Paul D; To Compare the Pleiotropic Effects of Telmisartan and Olmesartan in Hypertensive Patients with Metabolic Syndrome Based On ATP III Criteria. IOSR Journal of Pharmacy. 2013; 3(1):59-67.
25. Amarender S, Dass A; Assessment of Olmesartan Antihypertensive Effects with Telmisartan in Type II Diabetics with Hypertension on Metformin. International Journal of Pharmacy and Biological Sciences. 2015;5(2):201-206.
26. Ramachandran A, Snehalatha C, Satyavani K, Sivasankari S, Vijay V; Metabolic syndrome in urban Asian Indian adults—a population study using modified ATP III criteria. Diabetes research and clinical practice. 2003; 60(3):199-204.