




Telmisartan is More Effective in Reducing Systolic Blood Pressure Than Losartan

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Abstract: *Background:* Systemic arterial hypertension is the leading cause of mortality and morbidity worldwide and among the antihypertensive drugs, Telmisartan and Losartan are the more commonly used anti-hypertensive drugs. *Methods:* This quasi-experimental study was conducted on 90 patients of mild to moderate hypertensive patients at the department of Pharmacology in collaboration with the Department of Medicine, Rajshahi Medical College and hospital, Rajshahi. Data were collected by a semi structured questionnaire and analysis were done by SPSS version-24. *Results:* Telmisartan is more effective in reducing systolic blood pressure than Losartan and it was statistically significant ($p < 0.001$). Telmisartan also reduced diastolic blood pressure more effectively than Losartan but it was statistically non-significant ($p > 0.05$). *Conclusion:* The study concluded that both Telmisartan and Losartan were found effective in reducing blood pressure but Telmisartan was more effective than Losartan.

Keywords: Hypertension, Systolic blood pressure and Diastolic blood pressure.

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Article at a glance:

Study Purpose: The purpose of this study was to determine and compare the efficacy of Telmisartan and Losartan in lowering blood pressure.

Key findings: Telmisartan reduced systolic blood pressure significantly but did not reduce diastolic blood pressure significantly comparing Losartan.

Newer findings: Telmisartan might be a preferable antihypertensive drug over Losartan.

Abbreviations: ACEI=Angiotensin-converting enzyme inhibitors, ARB=Angiotensin receptor blockers, CCB=Calcium channel blockers, SBP=Systolic blood pressure and DBP=Diastolic blood pressure.



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INTRODUCTION

Hypertension is the most common non-communicable disease seen in the community.¹ Hypertension leads to myocardial infarction, stroke, renal failure and many more¹ and death also occurs if not detected early and treated properly. Around 1 billion individuals were affected with

hypertension worldwide.² The prevalence of hypertension is increasing in low and middle income countries while it is steady or decreasing in high income countries.^{3,4} In Bangladesh approximately 20% of the adults and 40-65% elderly people suffer from hypertension⁵ with the prevalence 27.4%.⁶ The prevalence of hypertension

varies with advancing age, race, education and many other factors.⁷ Effective antihypertensive therapy reduces the risk of various life-threatening diseases like stroke, cardiac failure, renal insufficiency and also reduce the mortality and morbidity rate.

Hypertension is a sustained increase in blood pressure $\geq 140/90$ mm of Hg.⁸ According to British Hypertension Society, hypertension is classified as mild (Grade-1), moderate (Grade-2) and severe (Grade-3). Mild hypertension is when systolic blood pressure is within 140-159 mm of Hg and diastolic blood pressure is within 90-99 mm of Hg. Moderate hypertension is when systolic blood pressure is within 160-179 mm of Hg and diastolic blood pressure is within 100-109 mm of Hg. Severe hypertension is when systolic blood pressure is 180 mm of hg or more and diastolic blood pressure is 110 mm of Hg or more. Pharmacological therapy is very effective in lowering BP and preventing CVD outcomes in most patients. Various classes of drugs are used in treatment of hypertension such as Angiotensin-converting enzyme inhibitors (ACEI), Angiotensin receptor blockers (ARB), Calcium channel blockers (CCB), Diuretics and Beta adrenergic blockers.⁹ The choice of drugs, therefore depend on the severity of hypertension, their efficacy, safety and associated patient factors.

Angiotensin converting enzyme inhibitors (ACEI) and Angiotensin receptor blockers (ARBs) are the 1st line antihypertensive drugs. ARBs are preferred because of their effectiveness in reducing blood pressure, good tolerability profile and also convenience, once daily dosing.¹⁰ Losartan, Olmesartan, Telmisartan, Valsartan, Irbesartan, Candesartan, Eprosartan etc. are included in ARBs. The ARBs produce their blood pressure lowering effects by antagonizing angiotensin II induced vasoconstriction, aldosterone release, arginine vasopressin release, water intake and hypertrophic response.¹¹

Losartan and Telmisartan have shown a good control of blood pressure but Losartan has short half-life and Telmisartan has a long plasma half-life of 24 hours.¹² Few studies concluded that Losartan cannot control 24-hour blood pressure due to its short half-life.^{13,14} Again, in some studies reported that Losartan is better than Telmisartan in

lowering blood pressure. So, there was a controversy regarding the efficacy of Telmisartan and Losartan in controlling blood pressure in term of duration and action. The aim of this study was to compare the efficacy of Telmisartan and Losartan in mild to moderate hypertension. The study findings might be helpful for medicine specialists and general physicians in prescribing drugs in case of mild to moderate hypertension.

METHODS

This was a quasi-experimental study performed at the Department of Pharmacology and Therapeutics in collaboration with Medicine, Rajshahi Medical College, Rajshahi from July 2021 to June 2022 to observe and compare the efficacy outcome of two first line oral antihypertensive drugs named Telmisartan and Losartan. Before commencement of the study, ethical clearance was obtained from the Ethical review committee of Rajshahi. Newly diagnosed 90 patients with mild to moderate hypertension in outpatient department of Medicine were the study population. Convenient sampling technique was employed to enroll the required number of patients with predefined eligibility criteria. Patients were divided into two groups.

Group A was the experimental group and patients were given Telmisartan 40 mg once daily for 12 weeks and group B was considered as controlled group and patients were given Losartan 50 mg once daily for same duration. Blood pressure was measured at the starting, after 4 weeks and also after 12 weeks of treatment to compare the antihypertensive effect of Telmisartan and Losartan. All the patients were resident of Rajshahi city. NGO worker & businessman patients were proportionately higher in Telmisartan group but day labour & housewife patients were higher in Losartan group. All efforts were made to collect data accurately. Chi-square Test was used to compare different risk factors between the groups. Repeated measure ANOVA statistics was done to monitor blood pressure at different time interval and comparison of blood pressure between two groups was done by Unpaired-t test. Level of significance was set at 0.05 and p-value < 0.05 was considered significant for all tests.

RESULTS

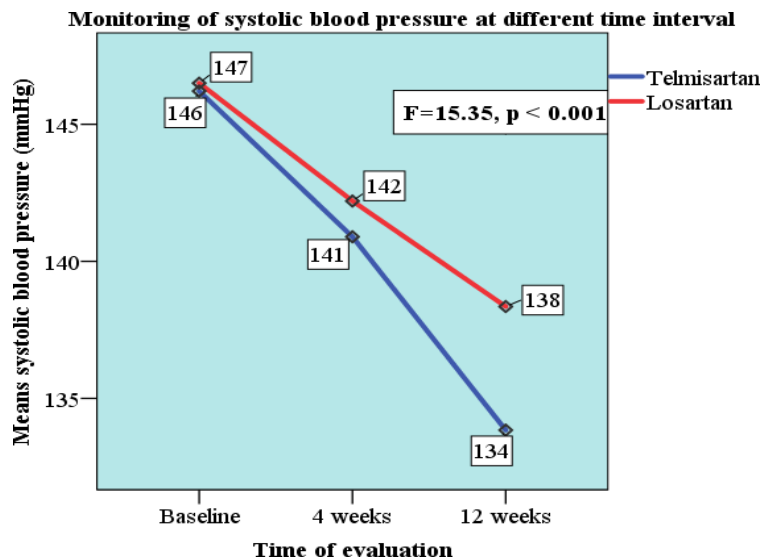
Table-01: Comparison of baseline variables between the two groups (n=45 in each group)

Variables	Group		p-value
	Telmisartan (n = 45)	Losartan (n = 45)	
Mean age (Years) [#]	52.13±6.97 years	52.00±7.85 years	0.93
Sex*			
Male	30 (66.70%)	27 (60.00%)	0.51
Female	15 (33.30%)	18 (40.00%)	
Presence of risk factors*			
Smoking habit	19 (42.20%)	18 (40.00%)	0.83
Family history of HTN	25 (55.60%)	28 (62.20%)	0.52
Baseline Blood pressure [#]			
Systolic blood pressure (mmHg)	145.33 ± 4.24	146.18 ± 5.38	0.41
Diastolic blood pressure (mmHg)	99.73 ± 4.68	98.16 ± 4.56	0.12

*Chi-squared Test (χ^2) was done to analyze the data and were presented as frequency (%). [#]Data were analyze using **Unpaired t-Test** and were presented as **mean ± SD**.

The mean age of the patients in the Telmisartan group was 52.13±6.97 years and in the Losartan, group was 52.00±7.85 years and it was statistically non-significant ($p = 0.93$). In both groups male patients were proportionately higher but statistically non-significant ($p=0.51$). In the Telmisartan group 42.20% had history of smoking and in Losartan group 40.00% had history of smoking and it was not statistically significant ($p = 0.83$). Family history of hypertension was

considerably less in the Telmisartan group than that in the Losartan group and it was also statistically non-significant ($p = 0.52$). The mean systolic blood pressure was somewhat lower in Telmisartan Group and the mean diastolic blood pressure was somewhat lower in Losartan Group, although the differences did not reach the level of significance ($p = 0.41$ and $p = 0.12$, respectively) (Table-01).

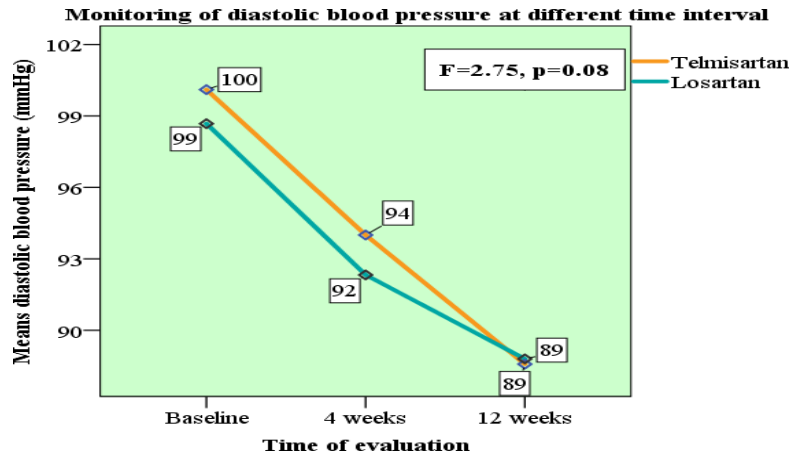


(#Data were analyzed using Repeated Measure ANOVA statistics and were presented as mean ± SD.)

Figure-1: Monitoring of systolic blood pressure at different time interval

The overall reduction of SBP from baseline to 2nd follow up of intervention between the two

drug was statistically significant ($p < 0.001$) (Figure-1).



(#Data were analyzed using Repeated Measure ANOVA statistics and were presented as mean ± SD.)

Figure-2: Monitoring of diastolic blood pressure at different time interval

The overall reduction of DBP from baseline to 2nd follow up of intervention between the two

drug was not statistically significant (p = 0.08) (Figure-II).

Table 02: Comparison of efficacy between the two groups (Telmisartan-38, Losartan-40)

Mean reduction in blood pressure after 3 months [#]	Group		t-value	p-value
	Telmisartan (n = 38)	Losartan (n = 40)		
Systolic blood pressure (mmHg)	12.34±3.89	8.15±4.54	4.40	< 0.001
Diastolic blood pressure (mmHg)	11.53±4.86	9.88±4.48	1.56	0.12

[#]Data were analyze using **Unpaired t-Test** and were presented as **mean ± SD**

The mean reductions in systolic blood pressure after 3 months of intervention in Telmisartan and Losartan groups were 12.37±3.87 mmHg and 8.15±4.54 mmHg, respectively (p < 0.001) and that in diastolic blood pressures were

11.53±4.86 mmHg 9.88±4.48 mmHg, respectively (p = 0.12). So, Telmisartan was most effective drug in controlling systolic blood pressure in comparison to Losartan (Table-02).

DISCUSSION AND CONCLUSION

Hypertension is the most common cardiovascular disorder and it causes pathological changes in the vasculature and hypertrophy of the left ventricle which invites many complications. Effective antihypertensive therapy reduces the risk of these complications and subsequently reduces morbidity and mortality rates. The main aim of this study is to compare the efficacy of Telmisartan and Losartan in case of treatment of hypertension. These two drugs have been used conventionally as a pulse and continuous therapy. In the present study, the mean age of the patients in the Telmisartan group was 52.13±6.97 years and in the Losartan group was 52.00±7.85 years. Nearly similar findings were found in a study done by Kalikar *et al.*¹³ in India where mean age in the Telmisartan group was 48.26±9.88 years and in

Losartan group was 49.94±9.84 years. Similar findings were also found with the studies done by Salve *et al.*¹⁴ and Chandrasekar *et al.*¹⁵. But our findings were not similar with a study done by Hasegawa *et al.*¹⁶ in Japan where the mean age in the Telmisartan group was 59.10±10.30 years and in the Losartan group was 56.4±10.10 years.

In the current study, gender distribution of the patients revealed that in the Telmisartan group, 66.70% of the patients were male and only 33.30% were female. Similarly, in the Losartan group, 60% of the patients were male and 40% were female. Similar findings were found in a study done by Salve *et al.*¹⁴ where the percentage of male patients was more than female patients, 81.25% in Telmisartan group and 77.42% in Losartan group. Our nearly similar findings were found in a study

done by Hasegawa *et al.*¹⁶ where 31.0% were female in Telmisartan group and 32.10% in Losartan group. Our contradictory findings found in a study done by Chandrasekar *et al.*¹⁵ where female patients were more than male.

In the current study, the mean SBP in the Losartan group at baseline was 146.50 ± 5.45 mmHg which decreased to 142.20 ± 4.94 mmHg at the end of 4 weeks and then to 138.35 ± 5.43 mmHg at the end of 12 weeks of drug administration and it was statistically highly significant ($p < 0.001$). Our similar findings were found in a study done by Salve *et al.*¹⁴ where there was a significant decrease in systolic blood pressure (SBP) at the end of 6 and 12 weeks in Losartan group ($p < 0.001$). Kalikar *et al.*¹³ also found our similar findings where mean SBP at baseline in Losartan group was 149.9 ± 3.84 mmHg which reduced to 142.00 ± 5.41 mmHg at the end of 4 weeks and 138.7 ± 5.61 mmHg at the end of 12 weeks and it was statistically highly significant ($p < 0.001$). Similar findings also found in a study done by Chandrasekar *et al.*¹⁵ In the present study the mean DBP at baseline was 98.68 ± 4.23 mmHg which decreased to 92.33 ± 4.91 mmHg at the end of 4 weeks and then to 88.80 ± 5.14 mmHg at the end of 12 weeks of drug administration in the Losartan group and it was statistically non-significant ($p = 0.08$).

Our findings were not similar with a study done by Salve *et al.*¹⁴ where there was a significant decrease in diastolic blood pressure (DBP) at the end of 6 and 12 weeks in losartan group ($p < 0.001$). Our contradictory findings were found by Kalikar *et al.*¹³ where mean DBP at baseline was 93.44 ± 2.45 mmHg which reduced to 87.33 ± 5.05 mmHg at the end of 4 weeks and 86.11 ± 5.15 mmHg at the end of 12 weeks and it was statistically highly significant ($p < 0.001$). Contradictory findings were also found in a study done by Chandrasekar *et al.*¹⁵ where reduction of diastolic blood pressure was statistically highly significant ($p < 0.01$). The mean reductions in systolic blood pressure after 3 months of intervention in Telmisartan and Losartan groups were 12.37 ± 3.87 mmHg and 8.15 ± 4.54 mmHg respectively ($p < 0.001$) and that in diastolic blood pressures were 11.53 ± 4.86 mmHg 9.88 ± 4.48 mmHg respectively ($p = 0.12$). So, Telmisartan was most effective drug in controlling systolic blood pressure in comparison to Losartan.

Contradictory finding was found in a study done by Kalikar *et al.*¹³ where Telmisartan were more efficacious than losartan in reducing DBP. Salve *et al.*¹⁴ concluded that Telmisartan and Losartan therapy provides significant antihypertensive effect but there was no significant difference in reduction of blood pressure between both groups suggesting that both drugs are equally efficacious as far as antihypertensive action is concerned which was contradictory with our findings. One of the limitations of the study was that it was a single center study on small sample size. Duration of follow-up was short and blinding technique was not followed.

CONCLUSION

The study concluded that after observing and comparing the final outcome after 12 weeks of treatment, it appears that the reduction of mean SBP is statistically significant in Telmisartan than Losartan. So, Telmisartan is more effective in mild to moderate hypertensive patients.

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Declarations

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Conflict of interest: Authors declared no conflict of interest.

Ethical approval: Ethical approval of the study was obtained from the Ethical Review Committee, Rajshahi Medical College, Rajshahi. Informed consent was taken from all participants. All the study methodology was carried out following the relevant ethical guidelines and regulations.

Consent for publication: Taken.

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