Faridpur Med. Coll. J. 2026;21(2):13-19 DOI: https://doi.org/10.3329/fmcj.v21i2.90749

Original Article

Evaluation of Antihypertensive Efficacy and Tolerability of Telmisartan over Losartan on Mild to Moderate Hypertension in a Tertiary Care Hospital

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Abstract:

Background: *Angiotensin II Receptor Blockers (ARBs) are one of the first line drugs for the treatment of hypertension. The objective of the study was to evaluate and compare the efficacy and tolerability between Telmisartan and Losartan in mild to moderate hypertension.*

Materials & Methods: *This prospective analytical study was performed in the Medicine Outpatient Department including Hypertension Clinic of DMCH from January 2022 to December 2022. Total 160 patients with mild to moderate hypertension were divided into two groups; patients in Group A were administered Tab. Telmisartan once daily and patients in group B were administered Tab. Losartan once daily.*

Results: *At baseline and after 6 weeks, there were no significant differences in mean systolic blood pressure (SBP) and mean diastolic blood pressure (DBP) between the two groups. However, at 12 weeks, both mean SBP and mean DBP were significantly lower in Telmisartan group compared to the Losartan group. Serum sodium, serum potassium and serum creatinine levels showed no significant differences throughout the study period. Adverse effects such as dizziness and vomiting were more frequent in Losartan group.*

Conclusion: *Telmisartan demonstrated superior efficacy and better tolerability, making it a preferable option for managing mild-to-moderate hypertension.*

Keywords: Hypertension, Losartan, Telmisartan.

Introduction:

Hypertension is one of the leading cardiovascular disorders, which is rising at a rapid pace and becoming a major health problem in developed as well as developing countries. Hypertension increases the risk of cardiovascular diseases such as coronary heart disease (CHD), congestive heart failure, cerebrovascular events, renal failure, and peripheral arterial disease.[1] Around

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1.28 billion individuals worldwide are affected by hypertension (World Health Organization, 2021). The global prevalence of hypertension is projected to increase from 26% in 2000 to 29.2% by 2025, which will be approximately 29% of the world's population.[2]

The prevalence of hypertension varies in different population and ethnic groups. Since last few decades, it has increase specially in urban population.[3] In Bangladesh approximately 20% of adult and 45-60% elderly are suffering from hypertension. Higher incidence of metabolic syndrome and lifestyle related factors may play an important role in pathology of hypertension.[4,5]

Various classes of drugs are being used in the treatment of hypertension such as Angiotensin converting enzyme (ACE) inhibitors, diuretics, Angiotensin II receptor blockers (ARBs), calcium channel blockers, and β adrenergic blockers.[6]

The renin-angiotensin-aldosterone system (RAAS) is an important mediator in the pathophysiology of hypertension.[7] Evidence also suggests that the RAAS plays an important role in organ damage, potentially leading to left ventricular hypertrophy (LVH), congestive heart failure (CHF) and end-stage renal disease (ESRD).[8] The peptide angiotensin II (AII) is a primary effector of the RAAS. Angiotensin II enhances sympathetic activity by peripheral action as well it releases Adrenaline from adrenal medulla, stimulates autonomic ganglia and increases the output of Noradrenaline (NA) from adrenergic nerve endings.[6] Angiotensin converting enzyme (ACE) inhibitors block the RAAS by inhibiting conversion of angiotensin I to AII, whereas AII receptor antagonists, including telmisartan, have the potential to block the system more completely through antagonism of AII binding to the AII type 1 (AT1) receptor, thereby inhibiting the vasoconstriction and aldosterone-secreting effects of Angiotensin II.[9] Telmisartan is an ARB that selectively inhibits the angiotensin II receptor. It has a partial peroxisome proliferator-activated receptor-gamma (PPAR-γ) agonistic activity. PPAR-γ belongs to the nuclear hormone receptor superfamily. Inhibition by losartan is transient and readily reversible, while that of Telmisartan is insurmountable, which causes prolonged and irreversible inhibition of angiotensin II receptor type1(AT1).[10]

Angiotensin II inhibitors lower blood pressure principally by decreasing peripheral vascular resistance. Cardiac output and heart rate are not significantly changed. Unlike direct vasodilators, these agents do not result in reflex sympathetic activation and can be used safely in persons with ischemic heart disease.[11]

Our primary care physicians taking care of hypertensive patients are always in search of optimal antihypertensive drugs have higher efficacy and show minimal side effects for better management of HTN. Therefore, the present study was planned in patients of mild to moderate hypertension with the objectives to compare the efficacy and tolerability of Losartan and Telmisartan.

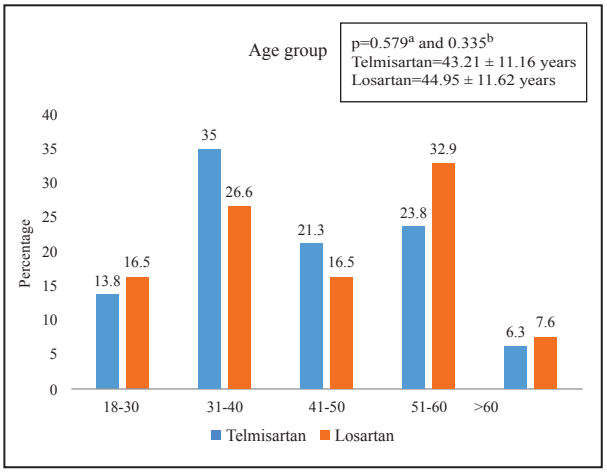
Materials and Methods:

This prospective analytical study was conducted into Medicine Outpatient Department including Hypertension Clinic of Dhaka Medical College Hospital from January 2022 to December 2022. The study was performed on 160 patients (18 to 65 years of age) with mild to moderate hypertension and were divided into two groups; patients in Group A were administered Tab. Telmisartan (40-80mg) once daily and patients in group B were administered Tab. Losartan (50-100mg) once daily. Reduction of blood pressure, side effects and renal profile before treatment and post-treatment follow up at 6th week and 12th week were observed in both groups. A data collection form was used for data collection. Data collection was carried out by the investigator himself. Data analysis was done with the help of Statistical Software for Social Science 24 (SPSS 24).

Results:

A total of 160 patients were enrolled in this study. The findings of the study are presented by graphs and tables.

There were no significant differences in mean age and different age distribution of participants in Telmisartan and losartan groups. Patients's age for both the groups ranged between18 and 65 years. Most of the participants received Telmisartan were in 31-40 years age group (35%), while Losartan group of participants were in 51-60 years age group (32.9%). However, mean age was similar in both groups (Figure 1).



a. Chi-squared Test (χ^2) was performed.
b. Student t-test was performed.

Figure 1: Age distribution of hypertensive patients in different groups.

The mean initial SBP and after 6 weeks of follow-up there were no significant differences between Telmisartan and Losartan groups. However, after 12 weeks follow-up, SBP of Telmisartan group (128.56 ± 6.83 mmHg) was significantly lower than that of Losartan group (137.01 ± 9.97 mmHg). Here P value was<0.001 (Table 1).

Table 1: Effect of Telmisartan and Losartan on systolic SBP in hypertensive patients (N=160).

Variables	Telmisartan (n=80) mm of Hg	Losartan (n=80) mm of Hg	P value[a]
Initial SBP	155.38 ± 5.23	155.52 ± 5.86	0.876
After 6weeks of treatment	139.25 ± 5.80	140.74 ± 12.5	0.335
After 12 weeks of treatment	128.56 ± 6.83	137.01 ± 9.97	<0.001

Values are expressed as Mean ± SD

a. P value was determined by independent student t test.

The mean initial DBP and after 6 weeks of follow-up had no significant differences in both Telmisartan and Losartan groups. However, after 12 weeks follow-up, DBP of Telmisartan group (74.85 ± 6.33 mmHg) was significantly lower than that of Losartan group (77.88 ± 8.32 mmHg) (Table 2).

Table 2: Effect of Telmisartan and Losartan on DBP in hypertensive patients (N=160).

Variables	Telmisartan (n=80) mm of Hg	Losartan (n=80) mm of Hg	P value[a]
Initial DBP	99.69 ± 5.83	99.17 ± 6.21	0.586
After 6 weeks of treatment	90.89 ± 5.97	89.43 ± 5.17	0.099
After 12 weeks of treatment	74.85 ± 6.33	77.88 ± 8.32	0.011

Values are expressed as Mean ± SD

a. P value was determined by independent student t test.

In this study, serum sodium level had no significant difference in initial assessments, after 6 weeks or 12 weeks follow-up in both groups. Serum sodium level had significantly changed from initial findings to first follow up at 6weeks after treatment and 12 weeks after treatment among both individual group of patients (p<0.001), except in after 6weeks of treatment vs. after 12 weeks of treatment in Losartan group (p>0.05). (Table 3).

Table 3: Effect of Telmisartan and Losartan on serum sodium level in hypertensive patients (N=160)

Serum sodium level	Telmisartan (n=80) mmol/L	Losartan (n=80) mmol/L	P value[a]
Statistical analysis P value[b]			
Initial vs 6 weeks vs 12 weeks treatment	<0.001		<0.001
Initial vs. After 6 weeks of treatment	<0.001		<0.001
After 6 weeks of treatment vs. After 12 weeks of treatment	0.002		0.095
Initial vs. After 12 weeks of treatment	<0.001		<0.001

Values are expressed as Mean ± SD

a. P value was determined by independent student t test.
b. p value was determined by ANOVA test.

In this study, serum potassium level had no significant difference in initial assessments, after 6 weeks or after 12 weeks of follow-up. Serum potassium level had significantly changed from initial findings to first follow up at 6weeks after treatment and 12 weeks after treatment in both individual group of patients (p<0.001). (Table 4).

Table 4: Effect of Telmisartan and Losartan on serum Potassium level in hypertensive patients (N=160)

Serum postassium level	Telmisartan (n=80) mmol/L	Losartan (n=80) mmol/L	P value[a]
Initial	4.49 ± 0.31	4.45 ± 0.29	0.314
After 6weeks of treatment	5.06 ± 0.31	5.12 ± 049	0.336
After 12 weeks of treatment	5.43 ± 0.31	5.52 ± 0.91	0.376
Statistical analysis P value[b]			
Initial vs 6 weeks vs 12 weeks treatment		<0.001	<0.001
Initial vs. After 6 weeks of treatment		<0.001	<0.001
After 6 weeks of treatment vs. After 12 weeks of treatment		<0.001	<0.001
Initial vs. After 12 weeks of treatment		<0.001	<0.001

Values are expressed as Mean ± SD

a. P value was determined by independent student t test.

b. p value was determined by ANOVA test.

Serum creatinine level at 6 weeks or 12 weeks of follow-up had no statistical difference. Serum creatinine level had significantly changed from initial findings to first follow up at 6weeks after treatment and 12 weeks after treatment in both individual group of patients (p<0.001) except in after 6weeks of treatment vs. after 12 weeks of treatment in Telmisartan group (p>0.05). (Table 5).

Table 5: Effect of Telmisartan and Losartan on S. Creatinine in hypertensive patients (N=160)

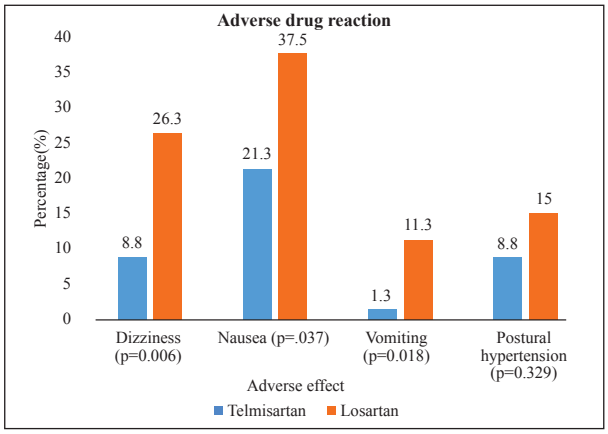
S. Creatinine	Telmisartan (n=80) mg%	Losartan (n=80) mg%	P value[a]
Initial	1.31 ± 0.39	1.42 ± 0.35	0.064
After 6weeks of treatment	1.08 ± 0.41	1.12 ± 0.38	0.547
After 12 weeks of treatment	0.96 ± 0.39	0.97 ± 0.38	0.838
Statistical analysis P value[b]			
Initial vs 6 weeks vs 12 weeks of treatment		<0.001	<0.001
Initial vs. After 6 weeks of treatment		<0.001	<0.001
After 6 weeks of treatment vs. After 12 weeks of treatment		0.147	0.025
Initial vs. After 12 weeks of treatment		<0.001	<0.001

Values are expressed as Mean ± SD

a. P value was determined by independent student t test.

b. p value was determined by ANOVA test.

As adverse drug effect, dizziness was found mostly in Losartan group of participants (26.3%), which was significantly higher (p=0.006) than Telmisartan group (8.8%). Similarly, nausea and vomiting were found mostly among Losartan group than Telmisartan group and was statistically significant (p=0.037 and p=0.018 respectively). Other drug adverse effects had no statistical significance in both groups of participants (Figure 2).



Fisher's exact test was performed.

Figure 2: Adverse effects of drug reaction of patients in different groups.

Discussion:

In term of distribution of the patients according to age between two groups, mean age of the patients were 43.21±11.16 years and 44.95±11.62 years with age range of in Telmisartan and Losartan treated group. Patient's age for both the groups ranged between 18 and 65 years. Most of the participants received Telmisartan were in 31-40 years age group (35%), while Losartan group of participants were in 51-60 years age group (32.9%). However, mean age was similar in both groups. Chandrasekar et al. shows mean age in Telmisartan group was 46.46 ± 5.26 years and Losartan group was 44 ± 6.27 years which was similar to this study.[9]

In the present study, SBP felt from mean of 155.38 ± 5.23 mm of Hg at baseline to 128.56 ± 6.83 mm of Hg after 12 weeks of treatment in Telmisartan group. There was lowering of BP on every visit & at 12th week there was a mean difference of 26.82 mm of Hg from baseline & this lowering was statistically significant. In Losartan group SBP felt on each visit from mean 155.52 ± 5.86mm of Hg at baseline to 137.01 + 9.97 mm Hg after 12 weeks of treatment. At 12th week there was a mean difference of 18.51 mm Hg from baseline. After 12 weeks follow-up, SBP of Telmisartan group (128.56 ± 6.83 mmHg) was significantly lower than that of Losartan group (137.01 ± 9.97 mmHg). Here P value was<0.001.

In the present study, DBP fell from mean 99.69 ± 5.83 mm of Hg at baseline to 74.85 ± 6.33 mm Hg after 12 weeks of treatment in Telmisartan group. At 12th week there was mean difference of 24.84 mm Hg from baseline. There was lowering of DBP on every visit and was significant at 12th week [Table 5]. In Losartan group, diastolic blood pressure fell on each visit from mean of baseline 99.17 + 6.21mm of Hg to 77.88 ± 8.32 mm Hg after 12 weeks of treatment. At 12th week there was mean difference of 21.29 mm Hg from baseline. However, on comparing the two groups the difference was found to be statistically significant (p value<0.011). There was more lowering of DBP in Telmisartan group. Similar result was found in Puram et al. stated that Telmisartan is as effective as Losartan in lowering systolic and diastolic blood pressure in patients of essential hypertension. There is data to suggest that newer ARBs like Telmisartan may be more effective than older ARBs e.g. Losartan in hypertension.[12] In another study Kalikar et al. also showed that Telmisartan were more efficacious than losartan in reducing DBP.[1] Zhu JR et al. also showed that Telmisartan was more effective than Losartan in hypertensive patients.[13]

In our study, serum creatinine was reduced from baseline with the treatment of both drugs simultaneously. Serum creatinine level at 6 weeks or 12 weeks follow-up had no statistical difference between two groups. Serum creatinine level had significantly changed from initial findings to first follow up at 6 weeks after treatment and 12 weeks after treatment in both individual group of patients and the difference was statistically significant (p<0.001).

Other study found that, creatinine was significantly reduced by 18% from baseline (p<0.05) with the treatment of Telmisartan[14]. Similarly, serum creatinine levels decreased in hypertensive chronic kidney disease (CKD) patients treated with Telmisartan 40mg once daily for 12 months and the decline was significantly greater than in the losartan group (p< 0.05)[15]. In another study, the results indicate that there were no statistically significant alterations in mean serum creatinine, blood urea and in mean serum potassium levels compared to baseline within the two groups as well as when mean of both groups were compared, Losartan showed a better reduction in blood pressure as compared to Telmisartan[16]. Others have reported that creatinine decreased slightly after treatment with Telmisartan. The precise cause for these discrepant results is unclear it may be partly related to differences in the patient profiles, Telmisartan dose, renal function or duration of treatment[14,17,18]. Study also stated that serum creatinine, proteinuria decreased and 24-hour creatinine clearance increased more strikingly in the Telmisartan group than the losartan group. These data suggest that Telmisartan is more effective than losartan for protecting renovascular functions, and potentially for ameliorating atherosclerosis, in hypertensive CKD patients with moderate renal insufficiency[19].

In this study initially serum sodium level was 141.46 ± 2.94 mmol/L in Telmisartan group and 141.71± 2.74 mmol/L in Losartan group. After 12 weeks treatment serum sodium was 138.67 + 4.62 mmol/L and 138.6 ± 4.50 mmol/L respectively in both groups. Serum sodium level had no significant difference in initial assessments, after 6 weeks or 12 weeks follow-up in both groups. Serum sodium level had significantly changed from initial findings to first follow up at 6 weeks after treatment and 12 weeks after treatment among individual group of patients and the difference was statistically significant (p<0.001), except in after 6 weeks of treatment vs. after 12 weeks of treatment in Losartan group (p>0.05).

In this study initially serum potassium level was 4.49 ± 0.31 mmol/L in Telmisartan group and 4.45 ± 0.29

mmol/L in Losartan group. After 12 weeks treatment serum potassium was 5.43 ± 0.31mmol/L and 5.52 ± 0.91 mmol/L respectively in both groups. Serum potassium level had no significant difference in initial assessments, after 6 weeks or 12 weeks follow-up. Serum potassium level had significantly changed from initial findings to first follow up at 6weeks after treatment and 12 weeks after treatment in individual group of patients and the difference was statistically significant ($p<0.001$).

Hasegawa H. et al. in a study showed serum sodium level was initially141.6 ± 2.0 mmol/L and 141.3 ± 1.8mmol/L between two groups respectively and serum potassium level was 4.3 ± 0.4 mmol/L and 4.2 ± 0.5 mmol/L respectively. After one year serum sodium 142.1 ± 1.9 mmol/Land 141.1 ± 2.0 mmol/L between two group respectively and serum potassium level was 4.3 ± 0.3 mmol/Land 4.2 ± 0.4 mmol/l respectively. There were no significant differences of sodium and potassium levels in between two groups in initial assessment and one year later.[20]

In addition to the present study demonstrating the superior antihypertensive activity of Telmisartan compared with Losartan, dizziness was found mostly in Losartan group of patients (26.3%), which was significantly higher ($p=0.006$) than Telmisartan group (8.8%). Similarly, nausea and vomiting were found mostly among Losartan group than Telmisartan group and was statistically significant ($p=0.037$ and $p=0.018$ respectively). Other drug adverse effects had no statistical association in both groups of patients. Other study also shows similar results, where the most frequently occurring adverse events were dizziness, headache and diarrhoea. The events were predominantly mild in intensity and transient in nature. Both of these events were considered to be unrelated to the study drug.[13,21]

Conclusion:

The present study findings concluded that Telmisartan and Losartan are efficacious in reducing both systolic and diastolic blood pressure, however when compared to Losartan, Telmisartan is more efficacious in reducing both systolic and diastolic blood pressure. Telmisartan also demonstrated more favorable effects on serum creatinine and less side-effects compared to Losartan. Telmisartan the drug of choice which sustains a clinically significant therapeutic effect and well tolerated treatment in patients with mild-to-moderate hypertension.

Conflict of interest:

There is no conflict of interest.

Acknowledgment:

The authors would like to thank all patients, the staff and the doctors of the department of Medicine and Pharmacology, Dhaka Medical College (DMC), Dhaka without whom the work would have been impossible.

References:

1. Kalikar M, Nivangune K, Dakhale G, Bajait C, Sontakke S, Motghare V et al. Efficacy and tolerability of olmesartan, telmisartan, and losartan in patients of stage I hypertension: A randomized, open-label study. *Journal of Pharmacology and Pharmacotherapeutics*.2017; 8(3):106 -11.

2. Saiduzzaman M, Kabir MS, Rabbani AG, Matin MA, Alam MR, Rubaiyat KA, et al. Analysis of Risk Factors among the Hypertensive Patients in a Tertiary Care Hospital of a Northern District in Bangladesh. *Cardiovascular Journal*. 2022; 15(1): 69-74.

3. Mohammed Nawi A, Mohammad Z, Jetly K, Abd Razak MA, Ramli NS, Wan Ibadullah WAH et al. The Prevalence and Risk Factors of Hypertension among the Urban Population in Southeast Asian Countries: A Systematic Review and Meta-Analysis. *International Journal of Hypertension*. 2021; 1-4.

4. Islam AM, Majumder AA. Hypertension in Bangladesh, a review. *Indian heart journal*. 2012; 64(3): 319-23.

5. Chowdhury MZI, Rahman M, Akter T, Akhter T, Ahmed A, Shovon MA, et al. Hypertension prevalence and its trend in Bangladesh: evidence from a systematic review and meta-analysis. *Clinical Hypertension*. 2020; 26(10): 1-19.

6. Tripathi KD. *Essentials of medical pharmacology*. 8th edition. New Delhi: Jaypee Brothers Medical Publishers; 2018:536.

7. Chrysant SG, Chrysant GS, Desai A. Current status of angiotensin receptor blockers for the treatment of cardiovascular diseases: focus on telmisartan. *Journal of Human Hypertension*. 2005; 19(3): 173-83.

8. Ames MK, Atkins CE, Pitt B. The renin-angiotensin-aldosterone system and its suppression. *Journal of Veterinary Internal Medicine*. 2019; 33(2): 363-82.

9. Chandrasekar T, Muniappan M, Muthiah NS. Comparison on Safety and Efficacy of Telmisartan and Losartan with their Effects on Cardiovascular – A Single Centre Study. *Journal of Pharmaceutical Research International*.2021; 1-12.

10. Kumari K, Toppo M, Majhi L, Kumar A. Blood pressure-lowering effect of telmisartan compared to losartan among mild to moderate essential hypertensive adult subjects: A meta-analysis. *Journal of Family Medicine and Primary Care*. 2022; 11(10): 6227.

11. Katzung, Bertram G. *Basic & clinical pharmacology*. 14th. NewYork: McGraw-Hill; 2018:187-89.

12. Puram N, Karande V, Ramanand J, Ramanand S, Halasawadekar N, Bhosale R. Comparison of efficacy of telmisartan with losartan in patients of essential hypertension with cognitive impairment. *International Journal of Basic and Clinical Pharmacology*. 2016;5(3): 702-06.

13. Zhu JR, Bai J, Cai NS, Tang B, Fan WH, Guo JZ et al. Efficacy and safety of telmisartan vs. losartan in control of mild-to-moderate hypertension: A multicentre, randomised, double-blind study. *International Journal of Clinical Practice, Supplement*. 2004; 58(145): 46-49.

14. Cupisti A, Rizza GM, D'Alessandro C, Morelli E, Barsotti G. Effect of telmisartan on the proteinuria and circadian blood pressure profile in chronic renal patients. *Biomedicine and Pharmacotherapy*. 2003;57(3): 169-72.

15. Ono T, Sanai T, Miyahara Y, Noda R. Olmesartan is More Effective Than Other Angiotensin Receptor Antagonists in Reducing Proteinuria in Patients With Chronic Kidney Disease Other Than Diabetic Nephropathy. *Current Therapeutic Research-Clinical and Experimental*. 2013; 74(4):62-67.

16. Gupta V, Singh P. A short term evaluation of effect on serum urea, creatinine and potassium levels with use of angiotensin II receptor blockers (Losartan or telmisartan) in stage 1 hypertensive patients. *International Journal of Basic & Clinical Pharmacology*. 2019;8(10): 2328.

17. Aranda P, Segura J, Ruilope LM, Aranda FJ, Frutos MA, López V et al. Long-term renoprotective effects of standard versus high doses of telmisartan in hypertensive nondiabetic nephropathies. *American Journal of Kidney Diseases*. 2005;46(6): 1074-79.

18. Agrawal A, Kamila S, Reddy S, Lilly J, Mariyala MS. Effect of telmisartan on kidney function in patients with chronic kidney disease: an observational study. *Journal of Drug Assessment*.2016;5(1):24-28.

19. Nakamura T, Inoue T, Suzuki T, Kawagoe Y, Ueda Y, Koide H et al. Comparison of renal and vascular protective effects between telmisartan and amlodipine in hypertensive patients with chronic kidney disease with mild renal insufficiency. *Hypertension Research*.2008;31 (5):841-50.

20. Hasegawa H, Takano H, Narumi H, Ohtsuka M, Mizuguchi T, Namiki T et al. Effects of telmisartan and losartan on cardiovascular protection in Japanese hypertensive patients. *Hypertension Research*.2011;34 (11):1179-84.

21. Neutel JM, Littlejohn TW, Chrysant SG, Singh A. Telmisartan/hydrochlorothiazide in comparison with losartan/hydrochlorothiazide in managing patients with mild-to-moderate hypertension. *Hypertension Research*. 2005; 28(7): 555-63.