An analogical study on antihypertensive effect of moxonidine versus clonidine in patients with renal failure

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Abstract
Background: Hypertension is both a cause and effect of CKD and contributes to its progression. When both exist together the risks of CVD morbidity and mortality are substantially increased. Despite treatment with non-pharmacological interventions and multiple antihypertensive agents, the majority of CKD patients fail to reach target BP.
Objectives: To compare and estimate the antihypertensive effect of Moxonidine versus Clonidine in renal failure patients and to estimate the Quality of life in Renal failure patients
Materials and Methods: A prospective 6 months observational follow up study was done involving 120 patients in renal failure patients suffering from stage 1-5 in the Department of Nephrology, Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India. Patients data collection form was used for recording demographic details of the patients. It was a 6 month study in which blood pressure was recorded before and after treatment with drugs and after 3months of follow up. Quality of life score was obtained using KDQOL- SF 36 questionnaires and Standard WHO questionnaires were used to monitor the adverse effect. Finally analyzed the results.
Results: In this study population majority of patients comes under age of 60-80 years age group, about 30% comes under age group 40-60, 6.5%comes under the age group >80 and 7.5 % comes under <40 age group. Regarding sex percentages, about 65% were males & 35% were females. Regarding habit, about 59% were alcoholics and 61% were non-alcoholics. About 47% were smokers and 73% were non-smokers in this studt. Systolic and diastolic blood pressure indicates highly significant difference before and after treating with Moxonidine than Clonidine including quality of life (QOL).
Conclusion: This study confirms that the drug Moxonidine showed better result in reduction of blood pressure and improved the quality of life in patients who were on therapy with Moxonidine when compared to Clonidine.

Keywords: Moxonidine, CKD, ADR

Introduction
Blood pressure is one of the most commonly measured clinical parameters and blood pressure values are major determinants of therapeutic decisions. However, interpretation of the physiological meaning of blood pressure in an individual patient is not always an easy task. This paper reviews the physical basis and physiological determinants of arterial pressure, and the relationship of arterial pressure to tissue perfusion.[1] Identifying risk factors for progression to CKD in patients with hypertension may help target therapies to slow or prevent decline of kidney function.[2-4]

Therefore, a major component of CKD management is reduction of cardiovascular risk. It is recommended that patients aged 50 years or older with CKD be treated with a low- to moderate-dose statin regardless of low-density lipoprotein cholesterol level. Smoking cessation should also be encouraged. Both the Eighth Joint National Committee (JNC 8) and Kidney Disease: Improving Global Outcomes (KDIGO) guidelines have recommended goal systolic and diastolic blood pressures of less than 140 mm Hg and less than 90 mm Hg, respectively, among adults with CKD based on expert opinion.[5-9] Clonidine works by stimulating alpha receptors that are located throughout the brain and spinal cord as well as other organs throughout the body such as the kidneys, liver, lungs, and heart. Stimulation of the receptors in the hypothalamus causes signals to be sent that keep blood vessels relaxed, which allows the blood pressure to drop. Signals are sent to other parts of the brain to prevent the release of noradrenaline (hormone that increases the heart rate and constricts blood vessels), which may decreases the blood pressure and heart rate. The alpha receptors throughout the body are stimulated by clonidine, causing the muscles that make up the walls of our internal organs and blood vessels to relax. This allows the blood pressure throughout the body to decrease. Clonidine also used to relieve pain. This also involves stimulation of the alpha receptors, specifically the receptors on the spinal cord. When they are stimulated, the receptors send signals that block the feeling sensation throughout the spinal cord and these sensation-blocking signals will continue from the spinal cord out through the nerves that branch off from the spinal cord. Every area of the body served by the nerves will have the sensation of feeling blocked so that pain cannot be detected. This includes the brain, which is why clonidine can be used to relieve your migraines.[10]

Moxonidine is a new-generation centrally acting antihypertensive drug approved for the treatment of mild to

moderate essential hypertension. It may have a role when thiazides, beta blockers, ACE inhibitors and calcium channel blockers are not appropriate or have failed to control blood pressure. In addition, it demonstrates favorable effects on parameters of the insulin resistance syndrome, apparently independent of blood pressure reduction.[11]

In this regard, the objective of this study was to compare and estimate anti-hypertensive effect of Clonidine and Moxinidine in renal failure patients and also to access the quality of life in renal failure patients.

Materials and Methods

Institutional ethical committee approval was obtained and written informed consent was obtained from the patient or care-giver before the conduct of this study. About 120 patients were selected. A prospective 6 months observational follow up study was done involving 120 patients in renal failure patients suffering from stage 1-5 in the Department of Nephrology, Pushpagiri Medical College Hospital, Thiruvalla, Kerala, India. Patients data collection form was used for recording demographic details of the patients. It was a 6 month study in which blood pressure was recorded before and after treatment with drugs and after 3months of follow up. Quality of life score was obtained using KDQOL- SF 36 questionnaires and Standard WHO questionnaires were used to monitor the adverse effect. Finally analyzed the results.

Results

Table.1 Distribution of patients based on age

Age	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
<40	9	7.5	7.5	7.5
40 – 60	36	30.0	30.0	37.5
60 – 80	67	55.8	55.8	93.3
> 80	8	6.7	6.7	100.0
Total	120	100.0	100.0	
Gender	**Frequency**	**Percent**	**Valid percent**	**Cumulative percent**
Male	78	65.0	65.0	65.0
Female	42	35.0	35.0	100.0
Total	120	100.0	100.0	
Distribution of patients based on marital status				
Marital status		**Frequency**	**Percent**	
Unmarried		4	3.3	
Married		116	96.7	
Total		120	100.0	
Distribution of patients based on history of Alcoholism				
Alcoholism		**Frequency**	**Percent**	
No		61	50.8	
Yes		59	49.2	
Total		120	100.0	
Distribution of patients based on history of Smoking				
Smoking		**Frequency**	**Percent**	
No		73	60.8	
Yes		47	39.2	
Total		120	100.0	

Table 2: Effect of drugs blood pressure

Systolic blood pressure				
Drug	**Parameter**	**Maximum**	**Mean**	**SD**
Moxonidine	SBP Before	210	182.00	15.817
	SBP After	180	142.03	11.495
	SBP FP	150	128.67	7.471
Clonidine	SBP Before	290	179.33	28.515
	SBP After	200	153.33	16.292
	SBP FP	190	141.33	18.997

Diastolic blood pressure				
Drug	**Parameter**	**Maximum**	**Mean**	**SD**
Moxonidine	DBP Before	120	95.67	14.656
	DBP After	100	80	9.206
	DBP FP	90	73.33	7.739
Clonidine	DBP Before	150	96	13.55
	DBP After	100	87.33	8.995
	DBP FP	100	84.83	8.129
SBP: Systolic blood pressure, DBP: Diastolic blood pressure				

Table 3: Effect of drugs on quality of life

Drug	Parameter	Maximum	Mean	SD
Moxonidine	QOL Before	64	37.87	12.868
	QOL After	90.1900	72.85	9.227
Clonidine	QOL Before	79	41.70	16.198
	QOL After	85	100.26	9.43
QOL: Quality of life				

Table 4: Comparison of antihypertensive effect and quality of life of patients before and after treatment with moxonidine and clonidine

Parameter	Mean		SD		P value
	Moxonidine	**Clonidine**	**Moxonidine**	**Clonidine**	
BP Before	182	179.33	115.817	28.515	0.58
SBP After	142	153	11.49	16.29	0.000
SBP FP	128.67	141.33	7.471	18.97	0.000
DBP Before	95.67	96	14.656	13.55	0.332
DBP After	80	87.33	9.206	8.99	0.000
DBP FP	73.33	84.83	7.739	8.129	0.000
QOL Before	37.87	41.70	12.868	16.19	0.548
QOL After	72.85	182	9.227	9.21	0.000
SBP: Systolic blood pressure, DBP: Diastolic blood pressure, QOL: Quality of life					

Discussion

Chronic kidney disease (CKD) is an increasingly prevalent condition globally and is strongly associated with incident cardiovascular disease (CVD). Hypertension is both a cause and effect of CKD and affects the vast majority of CKD patients. Control of hypertension is important in those with CKD as it leads to slowing of disease progression as well as reduced CVD risk. Certain pharmacological therapies provide additional BP-independent reno-protective and/or cardio protective action and this must be considered when instituting therapy. Managing hypertension in the context of hemodialysis and following kidney transplantation presents further challenges. Novel therapies may enhance treatment in the near future. Importantly, a personalized and evidence-based management plan remains key to achieving BP targets, reducing CVD risk and slowing progression of CKD. In this regard patients who have satisfied the inclusion criteria where included in the study. A total of 120 patients were included in the study. In this study majority of patients comes under the 60-80 age group 67%), 36% comes under the age group of 40-60, 9% comes under less than 40 age group and 8% comes under more than 80 years of age. In this study 65% were male patients and 35% were female patients. About 96.7% patients were married and 3.3% patients were unmarried. In this study 49.2% patients had history of alcoholism and rest 50% were non-alcoholics. About 39.2% patients had history of smoking and rest 60.8% were non-smokers. In this study, blood pressure of the patients was monitored during the study period. Follow up was conducted after 3 months and their blood pressure was monitored. The patients had high blood pressure before the treatment and their blood pressure was reduced significantly during the treatment with the drugs as there p value shows a significant difference between the pairs (<0.05). The quality of life of the patient was measured using KDQOL SF 36 questionnaire. They showed a poor quality of life before the treatment but quality of life score improved significantly during the treatment phase. The ADR of drugs were measured using WHO standard questionnaire. Both drugs showed a possible reaction and more number of

patients exhibited ADR when treated with Clonidine (45 out of 60) as compared to that of Moxonidine (27 out of 60).

Conclusion

To date, CKD remains an incurable disease and hypertension is the leading cause and / or seconds most risk factor for CKD. In this study primary objective was to focus the blood pressure reduction in patients with renal failure by comparing the antihypertensive action of Moxonidine and clonidine respectively. The secondary objective was to assess quality of life in CKD patients before and after the therapy. The quality of life was determined using KDQOL SF 36 questionnaire.

This study confirms that the drug Moxonidine showed better result in reduction of blood pressure and improved the quality of life in patients who were on therapy with Moxonidine when compared to Clonidine. The drug Moxonidine also showed less adverse drug reaction when compared to that of Clonidine. Hence this study concluded that the newer antihypertensive drug Moxonidine is the best drug in CKD patients for the control of blood pressure and to improve the quality of life.

Source of Funding

None.

Conflict of interest

None.

References

1. Magder SA. The highs and lows of blood pressure: toward meaningful clinical targets in patients with shock. *Crit Care Med*. 2014;42(5):1241–51
2. Fox CS, Larson MG, Leip EP, Culleton B, Wilson PWF, Levy D: Predictors of new-onset kidney disease in a community-based population. *JAMA*. 2004; 291: 844–50.
3. Kahirsagar AV, Bang H, Bomback AS, Vupputuri S, Shoham DA, Kern LM, Klemmer PJ, Mazumdar M, August PA: A simple algorithm to predict incident kidney disease. *Arch Intern Med*. 2008; 168: 2466–73.
4. Hanratty R, Chonchol M, Dickinson LM, Beaty BL, Estacio RO, MacKenzie TD, Hurley LP, Linas SL, Steiner JF, Havranek EP: Incident chronic kidney disease and the rate of kidney function decline in individual with hypertension. Nephrol Dial Transplant.2010; 25: 801–7.
5. Kidney Disease: Improving Global Outcomes (KDIGO) Lipid Work Group. KDIGO clinical practice guideline for lipid management in chronic kidney disease. Kidney Int Suppl. 2013; 3(3):259–305.
6. Tonelli M, Wanner C; Kidney Disease: Improving Global Outcomes Lipid Guideline Development Work Group Members. Lipid management in chronic kidney disease: synopsis of the Kidney Disease: Improving Global Outcomes 2013 clinical practice guideline. *Ann Intern Med*. 2014; 160(3):182.
7. Anderson TJ, Grégoire J, Pearson GJ, et al. 2016 Canadian Cardiovascular Society Guidelines for the management of dyslipidemia for the prevention of cardiovascular disease in the adult. *Can J Cardiol*. 2016; 32(11):1263–82.
8. Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int Suppl*. 2013; 3(1):1–150.
9. Ricardo AC, Anderson CA, Yang W, et al.; CRIC Study Investigators. Healthy lifestyle and risk of kidney disease progression, atherosclerotic events, and death in CKD: findings from the Chronic Renal Insufficiency Cohort (CRIC) study. *Am J Kidney Dis*. 2015; 65(3):412–24.
10. Anastasia G Ptinopoulom, Maria I Pikilidou and Anastosion N Lasaridis. The effect of antihypertensive drugs on kidney disease: a comprehensive review hypertension research. 2013; 36:91-101.
11. Suresh V Sagarad, Sudha Biradar-Kerure, Ramakrishna MR, Chaitanya Kuar S, S S Reddy. A prospective real world experience of Moxonidine use in Indian hypertensive patient-prescription beyond current guidelines. DOI:10.7860/JCDR/2013/557.3474

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