Diabetology

Extended Abstract

Effect of Antihypertensive Agents on Biochemical Parameters in Diabetic Patients in Taif – KSA - Niveen M. Daoud - Taif University, Saudi Arabia

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Abstract

Hypertension and diabetes mellitus are chronic medical conditions that frequently coexist. Our objective is to evaluate the effect of Angiotensin converting enzyme inhibitors and Angiotensin II receptor blockers comparatively and in integration with Metformin, dipeptidyl 4 inhibitors and insulin on lipid profile, serum creatinine, liver enzymes and electrolytes in type II diabetic patients. The hypertensive patient with type II diabetes is especially at risk of adverse cardiovascular events, because diabetes adversely affects the arteries, predisposing them to atherosclerosis (narrowing of the arteries) [1].

There are many studies conducted to detect the effect of antihypertensive agents on cardiovascular events. The United Kingdom Prospective Diabetes Study (UKPDS) and Hypertension Optimal Treatment (HOT) studies suggested that treatment to a lower target blood pressure resulted in better prevention of clinical disease in these patients [2]. Most trials comparing antihypertensive agents have shown only minimal differences between the various agents. The evidence from the trials suggests that angiotensin converting enzyme (ACE) inhibitors, angiotensin II receptor blockers ARB), calcium channel blockers (CCBs), beta-blockers and diuretics will all successfully reduce adverse clinical events. While only limited studies have been reported to detect the effect of antihypertensive on different biochemical parameters in diabetic patients [2]. So our study was designed to detect the effect of antihypertensive agents, separately, comparatively or in integration with antidiabetic agents on some biochemical parameter in type II diabetic patients.

Methodology

Data of the study were collected from clinical reports of 100 hypertensive patients with type II diabetes from Taif Diabetic Center. Male and non-pregnant female with an average age (55 ± 10 years) who's treated with ACE Inhibitors and ARBs were our target. Clinical reports of male and non-pregnant female diabetic patients in Taif Diabetic Center (TDC) which diagnosed with hypertension were investigated by us. Out of 325 clinical reports only 100 reports (49 male and 51 female) were included in our study regarding to the following criteria: 1) **Age** : our study determine age from 45 to 65 years with average (55 ± 10) as the incidence of diabetes mellitus type II mostly occur in this age [3]. 2) **Pregnancy:** pregnant female was excluded as pregnancy has some physiological biochemical changes. 3) Patients with **nephropathy** were excluded from our study as kidney function test was one of our testing parameters. 4) **Completed clinical biochemical lab reports** for three successive follow ups with (3-4 months) time interval. 5) **Drugs:** patients only treated with monotherapy antihypertensive drug were involved in our study to prevent factor of drug interaction as it isn't from our aim. Among all hypertensive classes only **ACE inhibitors and ARBs** mostly prescribed in (TDC), so our study conducted on them. **Antidiabetic agents** were recorded for detecting the underline effects of combination between antihypertensive drugs and antidiabetics agents on biochemical parameters.

Results

Our results recorded that, ARBs significantly increase AST in compared to ACE inhibitors while chloride level decrease with ACE inhibitors in compared to ARBs.

On other hand, when we compared the effect of ACE/ARBs in combined with antidiabetic agents Significant increase in TC was recorded with ACE inhibitors + Metformin, also LDL was increase with ACE inhibitors + insulin while ARBs + Insulin was increase HDL. Serum creatinine increased in both groups used Insulin. ALT was significantly increases with ARBs + Metformin + DPP-4 inhibitors.

Electrolytes were affected during the combination with antidiabetic agents, Sodium level was increased with ARBs + Metformin + DPP4 inhibitors and potassium was increase with ARBs + Insulin.

Conclusion

There are slight effects on selected biochemical parameters was

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recorded during the treatment with ACE inhibitors and ARBs separately and when combined with antidiabetic agents. Our study is one of novel studies that concern with the effects of mono antihypertensive agents (ACE inhibitors and ARBs) during 3 consecutive follow ups (3-4 months interval) in hypertensive type II diabetic patients. As well as Their underline effects (ACE inhibitors and ARB) in a combination with antidiabetics agents (insulin or Biguanide or Biguanide plus DPP-4 inhibitors) on the biochemical parameters (lipid profile, renal function parameter ,liver function parameters and electrolytes electrolytes) in three consecutive follow ups.

Regarding lipid profile, our result noticed that, there is no significance on TC, TG, LDL and HDL levels during the treatment with ACE inhibitors and ARBs. This disagree with Mohamad Alblihed and Husni Farah [5,6] which reported significant increase in TC and TG levels in post-treated patients with captopril (ACE inhibitors) compared with the control subjects.

On other side when we compared the effect of ACE inhibitors in combination with antidiabetic agents we recorded significant increase ($P < 0.05$) in TC with ACE inhibitors + Biguanide (208.8 ± 20.2) in compared with ACE inhibitors + insulin (157.2 ± 7.9) in second follow up. Also LDL level was significantly increase in ACE inhibitors + Biguanide (141.4 ± 21.6) in compared to ACE inhibitors + Insulin and ACE inhibitors + Biguanide + DPP-4 inhibitors (96.5 ± 6.9), (104.3 ± 6.9) respectively in second follow up. While HDL level was significantly increase in ARBs + Insulin (46.2 ± 3.5) in compared to ARBs+ Biguanide (36.5 ± 2.2) in first follow up.

Our result recorded that, the mean Serum creatinine levels were almost stable during the 3 consecutive follow ups. Jahnavi and Ervilla [7] partially agree with us as they reported that, ARBs stabilized serum creatinine during the treatment (1.97 ± 1.19), (1.96 ± 1.15), (1.97 ± 1.32) for three months respectively. Our result disagree with Mohamad Alblihed and Husni Farah [5,6] which founded significant increase in Serum Creatinine (1.33 ± 0.13) in patient treated with ACE inhibitors in comparison to control group. They were refer the increase in SrCr to the biological effects.

On other hand our result was supported by peter [8] as they recommended for using ACE inhibitors and ARBs in diabetic patients as they offer a protection against nephropathy through a specific effect on the renal microcirculation by reducing intraglomerular pressure.

The combination between ACE inhibitors and antidiabetic agents recorded a significant increase ($p < 0.05$) of serum creatinine in ACE inhibitors + Insulin (1.0 ± 0.0) in compared to both groups (0.8 ± 0.0) in first follow up and (0.7 ± 0.0) in second follow up.

Also significant increase in SrCr in second follow up was documented with ARBs + Insulin (1.0 ± 0.0) in comparison to both groups (0.8 ± 0.0). While in third follow up ARBs + Insulin significantly increase (1.0 ± 0.1) in compare to ARBs + Biguanide + DPP-4 inhibitors (0.8 ± 0.0).

The high SrCr level in patients treated with insulin who is resistant to oral antidiabetic agents in both groups can be referred to long term uncontrolled diabetes. Which can lead to the complication of microvascular disease (nephropathy) [9].

Regarding liver function test; liver enzyme AST was significantly increased in patients who is treated with ARBs (43.9 ± 6.1) in compared to ACE inhibitors (23.4 ± 2.5) in first follow up while ALT and Albumin were not affected. This result was supported by Kim and Douglas [10] reported that the ARBs have been associated with a minimal rate of serum enzyme elevations during therapy which are usually mild-to-moderate in severity, self-limited, and rarely require dose modification or discontinuation. In contrast to our study; Lina, et al. [11] recorded that, the use of ACE inhibitors lead to moderate increase in the liver enzymes in some patients, ALT and AST were increase by (11.18%) without any symptom of hepatotoxicity.

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