ISSN: 2319 - 6475

Available Online at http://www.resealert.com

International Journal of Current Advanced Research
Vol.1, Issue, 2, pp.26 - 29, October, 2012

International Journal of Current Advanced Research

RESEARCH ARTICLE

Blood Urea Nitrogen and Clinical Data Analysis Caronary Heart Disease in Nagapattinam District

[1]Prem Kumar .T., [2]Muthu kumaran.B., [1]Niraimathi, S and [3]Govindarajan, M

[1]P.G and Research Department of Biochemistry, R.V.S College of Arts & Science, Karaikal- 609 609
[2]Department of Science and Humanities, SCSVMV University, Enathur, kanchipuram, Tamilnadu, India.
[3]Department of Zoology, Annamalai University, Annamalai Nagar-608 002, Tamilnadu, India.

A R T I C L E I N F O

Article History:

Received 10th August, 2012
Received in revised form 25th, August, 2012
Accepted 15th September, 2012
Published online 27th October, 2012

Key words:

A B S T R A C T

In these studies and others, renal function has routinely been assessed with an estimated creatinine clearance, serum creatinine, or an estimated glomerular filtration rate derived from the serum creatinine. A BUN level of more than 21 mg/dL is considered elevated, although the exact cutoff varies between laboratories. This can be caused by heart failure when the heart is not strong enough to pump sufficient blood to the kidneys, or by dehydration (caused by too much diuretic medication). Baseline characteristics for the entire CAD are presented in Table 1. Baseline characteristics for the dichotomized CAD burden variable are presented in Table 2. Baseline characteristics for those who did and did not rule in for MI are presented in Table 3. Those subjects who ruled in for myocardial infarction had a lower body mass index (BMI) (27.0 mg/dl vs. 29.3 mg/dl), and a higher CAD burden score, (5.2 vs. 2.9,), compared with those who did not rule in for myocardial infarction. On univariate and multivariate analysis, an increased BUN was not associated with an increased odds of ruling in for MI (OR 0.99 (0.07, 1.02); and (OR 0.99 (0.96, 1.05) respectively. A serum creatinine test measures the amount of creatinine in the blood, another waste product that is filtered out of the blood by the kidneys. High levels of creatinine in the blood may be a sign of kidney problems resulting in fluid buildup. A normal value for women ranges from 0.5 to 1.1 mg/dL (milligrams per deciliter) or 44 to 97 mcmol/L (micromoles per liter). The BUN levels were a single measurement and are not necessarily a reflection of one's chronic level. No patient in our study, however, had known active bleeding, or was known to be taking loop diuretics or steroids. We were unable to account for potential dietary influences on serum BUN.

INTRODUCTION

Renal dysfunction has been associated with adverse cardiovascular outcomes (McCullough, 2003; Dossetor, 1966; Conte *et al.,* 1987; Aronson *et al.,* 2004). In these studies and others, renal function has routinely been assessed with an estimated creatinine clearance, serum creatinine, or an estimated glomerular filtration rate derived from the serum creatinine (Suwaidi *et al.,* 2002). Serum blood urea nitrogen (BUN) levels, however, may provide supplemental information in regard to renal function as renal proximal tubule cells may increase BUN reabsorption in the setting of increased neurohormonal activation (Shlipak *et al.,* 2002). Accordingly, higher serum BUN has been associated with adverse outcomes in subjects with acute coronary syndromes (Levey *et al.,* 1999). We examined whether admission serum BUN in subjects presenting with symptoms of unstable angina and without known coronary artery disease (CAD) was associated with the burden of CAD on cardiac catheterization and with ruling in for myocardial infarction (MI**).** CBC (Complete Blood Count) This test measures the quality and number of red blood cells, white blood cells,hemoglobin (the oxygen carrier), and platelets in your This test measures the amount of different electrolytes (molecules that carry an electric charge) in your blood, including sodium, potassium, chlorate, and bicarbonate. Abnormal levels of electrolytes can be caused by heart failure, kidney problems, or other conditions. If you have heart failure, your electrolyte levels need to be monitored regularly to manage the levels of fluid in

your body because taking diuretics or ACE inhibitors can alter your electrolyte balance too much if not monitored carefully.blood. A CBC test can diagnose anemia, which may be a marker of advanced heart failure.

A BUN (Blood Urea Nitrogen) test is used to determine how well your kidneys are working by measuring the amount of urea nitrogen in the blood. Blood urea nitrogen is a waste product that is filtered out of the blood by the kidneys: high levels of BUN indicate the kidneys are not working properly. An BUN level of more than 21 mg/dL is considered elevated, although the exact cutoff varies between laboratories. This can be caused by heart failure when the heart is not strong enough to pump sufficient blood to the kidneys, or by dehydration (caused by too much diuretic medication). A serum creatinine test measures the amount of creatinine in the blood, another waste product that is filtered out of the blood by the kidneys. High levels of creatinine in the blood may be a sign of kidney problems resulting in fluid buildup. A normal value for women ranges from 0.5 to 1.1 mg/dL (milligrams per deciliter) or 44 to 97 mcmol/L (micromoles per liter).

MATERIALS AND METHODS

We performed a retrospective chart review on 156 consecutive adult patients presenting to the Center Emergency in Nagapattinam hospitals beginning on November, 2011, with symptoms of unstable angina and no known prior history of CAD who underwent cardiac catheterization as part of their index hospitalization. No known CAD was defined as: any known history of MI, percutaneous coronary intervention, or coronary artery bypass surgery. Additional exclusion criteria were: (1) cardiac catheterization within the previous six months, (2) serum creatinine > 3.0 mg/dl or hemodialysis, (3) a history of heart failure, or (4) other severe acute illness or organ failure.. Diabetes was defined as a history of diabetes or anti-hyperglycemic medication use. Hypertension (HTN) was defined as a history of HTN or anti-hypertensive medication use. Positive cardiac markers defined ruling in for MI.

RESULT AND DISCUSSION

Baseline characteristics for the entire CAD are presented in Table 1. Baseline characteristics for the dichotomized CAD burden variable are presented in Table 2. The CAD burden score range was 0-19 with a 75th percentile of seven. Subjects with a CAD burden score greater than or equal to the 75th percentile were older (69.2 years vs. 61.0,), had lower CrCl (75.7 vs. 100.3,), lower BMI (26.5 vs. 28.9,), and higher BUN (20.5 vs. 16.5,). On univariate analysis, each 1 mg/dl increase in BUN was associated with an average increased odds of having a CAD burden score greater or equal to the 75th percentile of 12% (OR 1.12 (1.05, 1.19)). On multivariate analysis, which included age, sex, CrCl, body mass index, history of smoking, hyperlipidemia, HTN, and diabetes, each 1 mg/dl increase in BUN was associated with an average increased odds of having a CAD burden score greater or equal to the 75th percentile of 9% (OR 1.09 (1.01, 1.12)). When MI status during index hospitalization was added to the multivariate model, the association of BUN and burden of CAD remained significant. Baseline characteristics for those who did and did not rule in for MI are presented in Table 3. Those subjects who ruled in for myocardial infarction had a lower body mass index (BMI) (27.0 mg/dl vs. 29.3 mg/dl), and a higher CAD burden score, (5.2 vs. 2.9,), compared with those who did not rule in for myocardial infarction. On univariate and multivariate analysis, an increased BUN was not associated with an increased odds of ruling in for MI (OR 0.99 (0.07, 1.02); and (OR 0.99 (0.96, 1.05) respectively. We found that elevated serum BUN on admission was associated with an increased burden of CAD on cardiac catheterization during index hospitalization in patients who presented with symptoms of unstable angina and without known cardiovascular disease. To the best of our knowledge, this study is the first to demonstrate

Table 1 baseline characteristic of heart disease

S.No	Baseline patients	Values (n=154)
1	Age	63.2 (+/-) 13.3
2	BUN	17.4 (+/- 6.0)
3	Creatinine	94.0 (+/- 59.7)
4	hypertension	73.1%
5	BMI	28.3% (+/- 5.9%)
6	Diabetes	28.2%

Table 2 Baseline Patient Characteristics by Dichotomized CAD Burden Score

S.No	Baseline patients	Values (n=154)
1	Age	61.0 (+/- 13.5)
2	BUN	16.5 (+/- 5.2)
3	Creatinine	100.3 (+/- 65.4)
4	hypertension	71.0%
5	BMI	28.9 (+/- 6.4)
6	Diabetes	25.7%

Table 3 Baseline Patient Characteristics by Presence or Absence of MI*

S.No	Baseline patients	Values (n=154)
1	Age	63.4 (+/- 12.9)
2	BUN	17.4 (+/- 6.1)
3	Creatinine	95.5 (+/- 75.4)
4	hypertension	67.6%
5	BMI	27.0 (+/- 5.1)
6	Diabetes	20.6%

BMI = body mass index; BUN = blood urea nitrogen; CAD = coronary artery disease

HTN = hypertension; MI = myocardial infarction;. this association. Furthermore, each 1mg/dl increase in BUN was associated with an increased burden of CAD. Admission BUN, however, was not associated with ruling in for myocardial infarction. Blood urea nitrogen may have pro-atherosclerotic effects, as uremia has been associated with an increased burden of oxidative stress (Himmelfarb *et al.,* 2002). BUN may also both inhibit nitric oxide synthesis and promote macrophage proliferation (Moeslinger *et al.,* 1999). Specifically, in vivo studies demonstrate that increasing levels of urea inhibit nitric oxide synthesis in mouse macrophages with concurrent macrophage proliferation (Conte *et al.,* 1987). Furthermore, uremia accelerates atherosclerosis in

Apolipoprotein E-deficient mice. Other studies indicate that uremia induces the expression of osteoblast differentiation factor Cbfa1 in the media of arteries, which may lead to vascular calcification (Moe *et al.,* 2003). Elevated BUN may also serve as a marker of an activated sympathetic nervous system and/ or an upregulated renin-angiotensin system, reported promoters of atherosclerosis (Kirtane *et al.,* 2005; Ostfeld et *al.,* 2006; Manuck *et al.,* 1988; Rozanski *et al.,* 1990; Tummala *et al.,* 1999). Activation of these neurohormonal systems has been associated with increased BUN reabsorption in the renal tubules. We observed this association between increased BUN and CAD while correcting for creatinine clearance. Concurrently, Kirtane et al. (2005) reported that increasing BUN predicts poor outcome in subjects with acute coronary syndromes despite normal or mildly reduced glomerular filtration rates. Consequently, an elevated serum BUN may represent an independent marker of renal dysfunction, which would further support the wellestablished association between renal disease and CAD (Anvekar *et al.,* 2004; Foley *et al.,* 2005). However, additional study is required to evaluate this point. Counterintuitively, we found that a reduced BMI was associated with both an increased burden of CAD and with ruling in for myocardial infarction. This finding may be secondary to chance. Alternatively, it may lend support to the "obesity paradox," where overweight or obese patients have greater cardiovascular risk yet appear to have improved outcomes compared to patients who are not overweight or obese (Pingitore *et al.,* 2007). Our study has several limitations. It is a retrospective analysis. The BUN levels were a single measurement and are not necessarily a reflection of one's chronic level. BUN elevation may occur for reasons other than neurohormonal up-regulation and/or the presence of renal dysfunction, such as bleeding, diuretic or steroid use and/or dietary sources (Mark *et al.,* 1994). No patient in our study, however, had known active bleeding, or was known to be taking loop diuretics or steroids. We were unable to account for potential dietary influences on serum BUN. Furthermore, our measure of the burden of CAD, as previously reported (Usberti *et al.,* 1985), although deemed "appropriate" by three independent cardiologists, has not been validated. However, previous studies have utilized a similar scale in grading coronary artery lesions based on angiographic findings (Warnholtz et *al.,* 1999; Goetz, 1997).

References

1. Anvekar, N.S., McMurray, J.J., Velazquez, E.J., Solomon, S.D., Kober, L., Roulau, J.L., White, H.D., Nrdlander, R., Maggioni, A., Dickstein, K., Zelenkfske, S., Leimberger, J.D., Califf, R.M., Pfeffer, M.A. (2004). Relation between renal dysfunction and cardiovascular outcomes after myocardial infarction. N Engl J Med 351(13):1285-95.
2. Aronson, D., Mittleman, M.A., Burger, A.J. (2004). Elevated blood urea nitrogen level as a predictor of mortality in patients admitted for decompensated heart failure. Am J Med 116:466-73.
3. Conte, G., Dal Canton, A., Terribile, M., Cianciaruso, B., Di Minno, G., Pannain, M., Russo, D., Andreucci, V.E. (1987). Renal handling of urea in subjects with persistent azotemia and normal renal function. Kidney Int 32:721-7.
4. Dossetor, J.B. (1966). Creatinemia versus uremia: The relative significance of blood urea nitrogen and serum creatinine concentration in azotemia. Ann Intern Med 65:1287-99.
5. Foley, R.N., Wang, C., Collins, A.J. (2005). Cardiovascular risk factor profiles and kidney function stage in the US general population: The NHANES III study. Mayo Clin Proc 1980(10):1270-7.
6. Goetz, R.M. (1997). The antiatherogenic potential of blocking the renin-angiotensin system. Expert Opin Investig Drugs 6:1651-8.
7. Himmelfarb, J., Stenvinkel, J., Ikizler, T.A., Hakim, R.M. (2002). The elephant in uremia: Oxidant stress as a unifying concept of cardiovascular disease in uremia. Kidney Int 62:1524-38.
8. Kirtane, A.J., Leder, D.M., Waikar, S.S., Chertow, G.M., Ray, K.K., Pinto, D.S., Karmpaliotis, D., Burger, A.J., Murphy, S.A., Cannon, C.P., Braunwald, E., Gibson, C.M. (2005). Serum blood urea nitrogen as an independent marker of subsequent mortality among patients with acute coronary syndromes and normal to mildly reduced glomerular filtration rates. J Am Coll Cardiol 45:1781-86.
9. Levey, A.S., Bosch, J.P., Lewis, J.B., Greene, T., Rogers, N., Roth, D. (1999). A more accurate method to estimate glomerular filtration rate from serum creatinine: A new prediction equation. Ann Intern Med 130:461-70.
10. Manuck, S.B., Kaplan, J.R., Adams, M.R., Clarkson, T.B. (1988). Effects of stress and the sympathetic nervous system on coronary atherosclerosis in the cynomolgus macaque. Am Heart J 116:328-33?
11. Mark, D.B., Nelson, C.L., Califf, R.M., Harrell Jr., F.E., Lee, K.L., Jones, R.H., Fortin, D.F., Stack, R.S., Glower, D.D., Smith, L.R., DeLong, E.R., Smith, P.K., Reves, J.G., Jollis, J.G., Tcheng, J.E., Muhlbaier, L.H., Lowe, J.E., Phillips, H.R., Pryor, D.B. (1994). Continuing evolution of therapy for coronary artery disease. Circulation 89:2015-25.
12. McCullough, P.A. (2003). Interface between heart disease and renal dysfunction: From association to action. ACC Curr J Rev 12:20-4.
13. Moe, S., Duan, D., Doehle, D.P., O'Neill, K.D., Chen, N.S. (2003). Uremia induces the osteoblast differentiation factor Cbfa1 in human blood vessels. Kidney Int 63:1003-11.
14. Moeslinger, T., Roswitha, F., Volf, I., Brunner, M., Baran, H., Koller, E., Spieckermann, P. (1999). Urea induces macrophage proliferation by inhibition of inducible nitric oxide synthesis. Kidney Int 56:581-8.
15. Ostfeld, R., Mookherjee, D., Spinelli, M., Holtzman, D., Shoyeb, A., Schaefer, M., Doddamani, S., Spevack, D., Du, Y. (2006). A triglyceride/high-density lipoprotein ratio > or = 3.5 is associated with an increased burden of coronary artery disease on cardiac catheterization. JCMS 1:13-5.

16. Pingitore, A., Di Bella, G., Lombardi, N., Iervasi, G., Strata, E., Aquaro, G.D., Positano, V., De Marchi, D., Rossi, G., L'Abbate, A., Rovai, D. (2007). The obesity paradox and myocardial infarct size. J Cardiovasc Med 8(9):714-7.
17. Rozanski, A., Blumenthal, J.A., Kaplan, J. (1990). Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy. Circulation 99:2192-2217.
18. Shlipak, M.G., Heidenreich, P.A., Noguchi, H., Chertow, G.M., Browner, W.S., McClellan, M.B. (2002). Association in renal insufficiency with treatment and outcomes after myocardial infarction in elderly patients. Ann Intern Med 137:555-62.
19. Suwaidi, J.A., Reddan, D.N., Williams, K., Pieper, K.S., Harrington, R.A., Califf, R.M., Granger, C.B., Ohman, E.M., Holmes, D.R. (2002). Prognostic implications of abnormalities in renal function in patients with acute coronary syndromes. Circulation 106:974-80.
20. Tummala, P.E., Chen, X.L., Sundell, C.L., Laursen, J.B., Hammes, P., Alexander, R.W., Harrison, D.G., Medford, R.M. (1999). Angiotensin II induces vascular cell adhesion molecule-1 expression in rat vasculature. Circulation 100:1223-9.
21. Usberti, M., Federico, S., Di Minno, G., Ungaro, B., Ardillo, G., Pecoraro, C., Cianciaruso, B., Cerbone, A.M., Cirillo, F., Pannain, M., Gargiulo, A., Andreucci, V.E. (1985). Effects of angiotensin II on plasma ADH, prostaglandin synthesis, and water excretion in normal humans. Am J Physiol 248:F254-9.
22. Warnholtz, A., Nickenig, G., Schulz, E., Macharzina, R., Brasen, J.H., Skatchkov, M., Heitzer, T., Stasch, J.P., Griendling, K.K., Harrison, D.G., Bohm, M., Meinertz, T., Munzel, T. (1999). Increased NADH-oxidase-mediated superoxide production in the early stages of atherosclerosis. Evidence for involvement of the renin-angiotensin system. Circulation 99:2027-33.

****