HYPOALBUMINEMIA: a hospital based study

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ABSTRACT

Hypoalbuminemia occurs in a variety of disease states and is associated with an increased rate of complications during hospitalization, resulting in an increased length of stay. The purpose of this study is to investigate the prevalence of hypoalbuminemia in IPD and OPD patients and to see which age group and sex have high prevalence of hypoalbuminemia.

Nine hundred forty four patients, attending Nepalgunj medical college and Teaching Hospital, Banke, Nepal from March 2011 to February 2012 were included in this study. The normal reference range for serum albumin was 3.5 – 5.5gm/dL in males and females. Hypoalbuminemia is defined as serum albumin < 3.5 gm/dL. The outcome assessments in the hypoalbuminemia and normal albumin groups were compared. Serum albumin level estimation was done by using the diagnostic reagent kit manufactured by RFCL kit , India. A number of 944 studies were selected, the statistical information of which was collected for systematic analysis.

The results showed that the high prevalence of hypoalbuminemia found in males (89.72%) as compare to females(88.12%). The prevalence of hypoalbuminemia is different as the period of age and it increases after 21-40 years and high prevalence seen in after the age of 60. Serum albumin level was low in male as compare to female.

Key words: Prevalence, Hypoalbuminemia, Serum albumin level.

INTRODUCTION

The serum albumin level is one of the parameters reflecting the status of general health.[1,2] Albumin (69 kDa) is the major protein of human plasma and makes up approximately 60% of the total plasma protein. About 40% of albumin is present in the plasma, and the other 60% is present in the extracellular space. The liver produces about 12 g of albumin per day, representing about 25% of total hepatic protein synthesis and half its secreted protein. Albumin is initially synthesized as a preproprotein. Its signal peptide is removed as it passes into the cisternae of the rough endoplasmic reticulum, and a hexapeptide at the resulting amino terminal is subsequently cleaved off further along the secretory pathway.[3]

Multiple factors influence albumin synthesis, but clinically relevant decreases in production are typically due to the following: hepatic failure, inflammation, or chronic malnutrition. Because the liver is the primary location of albumin synthesis, hepatic failure resulting in a loss of more than 75% of hepatic function can result in hypoalbuminemia.[4] In patients with an inflammatory component to their hepatic disease, albumin production can be decreased because of its

function as a negative acute-phase protein.[1] In patients with cirrhosis and portal hypertension associates with ascites, newly synthesized albumin may not be deposited directly into the systemic circulation and therefore is not measured in serum albumin assays. Instead, a large portion of newly synthesized albumin ends up in the ascitic fluid outside the intravascular compartment. The protein is assumed to leave the hepatic parenchyma and enters the peritoneal fluid via exudation through the capsule of the liver or via hepatic lymphatics.[5-7]

MATERIALS AND METHODS

It was a retrospective study, planned on collection of 944 patients serum for analyzation of albumin level in the Clinical Laboratory of Biochemistry of Nepalgunj Medical College, Banke, Nepal from March 2011 to February 2012. The reference range of serum albumin was 3.5 – 5.5 gm/dL in males and females. Hypoalbuminemia is defined as serum albumin < 3.5 gm/dL.[8] The serum albumin estimation was determined by applying the diagnostic reagent kit manufactured by RFCL, India. Patients were categorized into males and females. The instructions, test procedure, reagents and accessories to follow were supplied with the kit.

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RESULTS

Total 944 patients were included in this study. 53.60 % male and 46.40 % female were tested for serum albumin level (Figure.1). Serum albumin level found low in 840 patients and 104 found within normal range. In 840 hypoalbuminemia cases 454 were male and 386 were female. In 104 normal range

cases 52 were male and 52 were female. Maximum case of hypoalbuminemia were found in the age group of more than 21-40 (Table.1 & Figure.2).

Table 1
Prevalence of Hypoalbuminemia according to Age group wise distribution

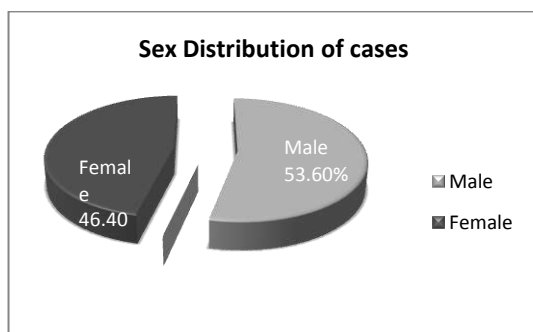| Age group	Serum Albumin Level		Total	Prevalence rate (%)
	Normal	Low		
0-20	19	151	170	88.82
21-40	41	338	379	89.18
41-60	36	216	252	85.71
>60	8	135	143	94.41
Total	104	840	944	88.98

Figure.1
Sex Distribution of cases

The prevalence of total patients was 88.98 %. Prevalence of hypoalbuminemia of total female was 88.12% and the prevalence of hypoalbuminemia of total male was 89.72 % (Table.2). The highest prevalence of hypoalbuminemia of male (35.02 %) and female (46.37%) found in the age group 21-40 (Table 3 and Figure 3).

Table 2
Sex Wise Prevalence of Hypoalbuminemia.

Sex	Serum albumin level		Total	Prevalence rate (%)
	Normal	Low		
Male	52	454	506 (53.60%)	89.72
Female	52	386	438 (46.40%)	88.12
Total	104	840	944 (100%)	88.98

DISCUSSION

In this present study, the total number of patients with low serum albumin level was 840 which including 454 males and 386 females. The prevalence of hypoalbuminemia in suspected cases was 88.98%. The prevalence of hypoalbuminemia in suspected male cases was 89.72%. The prevalence of hypoalbuminemia in suspected female cases was 88.12%.
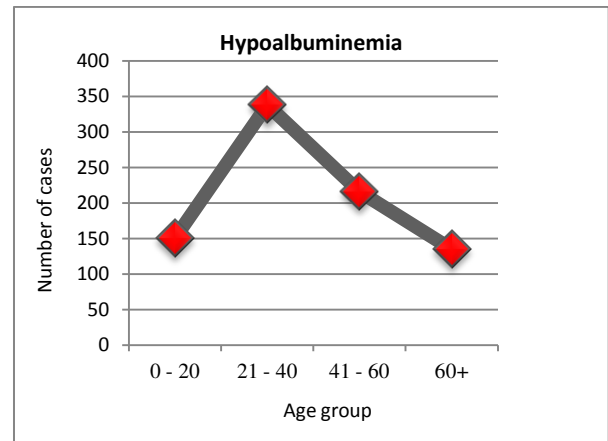

Figure.2
Age group wise distribution of low level of serum albumin in total patients.

Table 3
Prevalence of hypoalbuminemia according to Sex wise Distribution in different age groups.

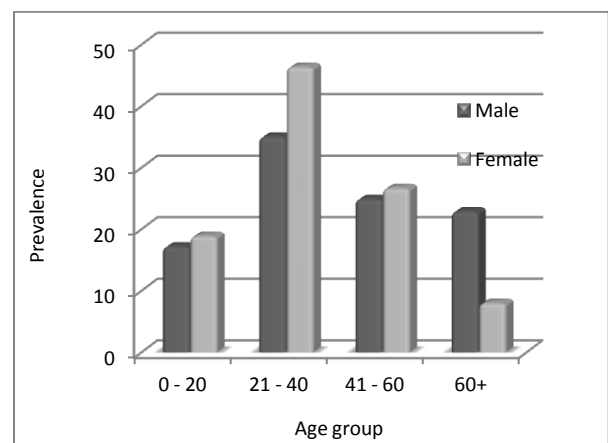| Age group	Prevalence male (%)	Prevalence Female (%)
0-20	17.18	18.91
21-40	35.02	46.37
41-60	24.89	26.68
> 60	22.91	8.03
total	89.72	88.12

Figure 3
The comparative prevalence of hypoalbuminemia of male and female in different age group.

In this study, we found that there was a decrease level of albumin after the age of 60. Similarly, albumin levels are known to decrease by 9.7% for each decade after 60 years of age.[9,10] Hypoalbuminemia associated with adverse outcomes in kidney disease, chronic heart failure, wound repair, and acute coronary syndromes.[2, 11, 14-19] Furthermore, such studies to be done according to the disease which are related to low albumin level variation.

CONCLUSION

The prevalence of hypoalbuminemia is different as the period of age and it increases after 21-40 years and high prevalence seen in after the age of 60. Serum albumin level was low in male as compare to female.

REFERENCES

1. Doweiko, J. P., and Nompleggi, D. J. 1991. Role of albumin in human physiology and patho physiology. J Parent Enteral Nutr. 15: 207–11.
2. Peters, T. J. 1996. The albumin molecule: its structure and chemical properties : All about Albumin. Biochemistry Genetics and Medical Applications. San Diego, Academic Press. 9–75.
3. Robert, K. M., et al. 2003. Harper's Illustrated Biochemistry 26th ed:Plasma Proteins & Immunoglobulin's, McGraw-Hill Companies page 583.
4. Mazzaferro, E. M., Rudloff, E., and Kirby, R. 2002. The role of albumin replacement in the critically ill veterinary patient. J Vet Emerg Crit Care 12(2):113–124.
5. Rothschild, M. A., Oratz, M., and Schreiber, S. S. 1988. Serum albumin. Hepatology. 8(2):385–401.
6. Rothschild, M. A., Oratz, M., and Schreiber, S. S. 1973. Albumin metabolism. Gastroenterology 64(2):324–337.
7. Rothschild, M. A., Oratz, M., and Schreiber, S. S. 1972. Albumin synthesis (Part 2). N Engl J Med 286(15):816–821.
8. Tung, C. F., Chow, W. K., Chang, C. S., Peng, Y. C., and Hu, W. H. 2007. The prevalence and significance of hypoalbuminemia in non-variceal upper gastrointestinal bleeding: Hepatogastro enterology.54(76):1153-6.
9. Greenblatt, D. J. 1979. Reduced serum albumin concentration in the elderly: a report from the Boston Collaborative Drug Surveillance Program. J Am Geriatr Soc. 27(1):20-2.
10. Iwata, M., Kuzuyaa, M., Kitagaawa, Y. et al. 2006. Prognostic value of serum albumin combined with serum C-reactive protein levels in older hospitalized patients: continuing importance of serum albumin. Aging Clin Exp Res. 18(4): 307-11.
11. Gillum, R. F. 2000. Assessment of serum albumin concentration as a risk factor for stroke and coronary disease in african americans and whites. J Natl Med Assoc. 92(1):3-9.
12. Doweiko, J. P., and Nompleggi, D. J. 1991. The role of albumin in human physiology and pathophysiology, part III: Albumin and disease states. JPEN J Parenter Enteral Nutr. 15(4):476-483.
13. Djousse, L., Rothman, K. J., Cupples, L. A., Levy, D., and Ellison, R. C. 2002. Serum albumin and risk of myocardial infarction and all-cause mortality in the framingham offspring study. Circulation. 106(23): 2919-2924.
14. Gillum, R. F., and Makuc, D. M. 1992. Serum albumin, coronary heart disease, and death. Am Heart J. 123(2):507-513.
15. Goldwasser, P., and Feldman, J. 1997. Association of serum albumin and mortality risk. J Clin Epidemiol. 50(6):693-703.
16. Hartopo, A. B., Gharini, P. P., and Setianto, B. Y. 2010. Low serum albumin levels and in-hospital adverse outcomes in acute coronary syndrome. Int Heart J. 51(4):221-226.
17. Phillips, A., Shaper, A. G., and Whincup. P. H. 1989. Association between serum albumin and mortality from cardiovascular disease, cancer, and other causes. Lancet. 2(8677):1434-1436.
18. Vincent, J. L., Dubois, M. J., Navickis, R. J., Wilkes, M. M. 2003. Hypoalbuminemia in acute illness: Is there a rationale for intervention? A meta-analysis of cohort studies and controlled trials. Ann Surg. 237(3):319-334.