

Protein Electrophoresis Fraction in Serum of the Rural Elderly Patient

Chong Ho Kim^{1,†}, Chung-Oh Park², Young-Tae Kang³ and Seung-Taek Park⁴

¹*Department of Clinical Laboratory Science, Wonkwang Health Science College, Iksan 570-750, Korea.*

²*Department of Medical Technology, Seoul Health College, Sungnam 461-713, Korea.*

³*Department of Biomedical Laboratory Science, Mokpo Science College, Mokpo 530-730, Korea.*

⁴*School of Medicine, Wonkwang University, Iksan 570-749, Korea*

We analyzed total protein (TP), albumin (AL), aspartic aminotransferase (AST), alanine aminotransferase (ALT), urea nitrogen (UN), creatinine (CRE) and serum protein electrophoretic fractions in sera of rural elderly patients to evaluate the health status in rural elderly patients. We observed that the frequencies of patients showed lower level of total protein, albumin, and both total protein and albumin than them of reference range were 20.3%, 22.8% and 19.0%, respectively. The rates of patients showed higher level of AST, ALT, both of AST and ALT, UN, creatinine and both of UN and creatinine than them of reference range were 33.8%, 40.0%, 30.0%, 17.7%, 15.2% and 7.9%, respectively. Comparison of protein fractions of each patient to reference range showed that 77.2% of patients showed normal in all of patterns. Few of patients showed abnormal pattern in albumin (13.6%), α_1 -globulin (0.0%), α_2 -globulin (1.1%), β -globulin (1.9%) and γ -globulin (6.2%). These data suggest that many of rural elderly patients may suffer from heart, liver and kidney diseases. The serum protein fractions are not typical criterion to evaluate the disease, but production of proteins in rural elderly patients may be affected by liver disease and kidney disease.

Key Words: Albumin (AL), Aspartic aminotransferase (AST), Aspartic aminotransferase (ALT), Creatinine (CRE), Urea nitrogen (UN), Electrophoresis

INTRODUCTION

Elderly persons aged 60 years and older are the fastest growing segment of the population in countries. Compared with urban elders, rural elders have lower incomes, are more likely to be poor, and have less formal education. Elderly persons are more likely to suffer from chronic illnesses and to require costly medical care than are urban elders (Rice et al., 1983; Cho, 2003). The prevalence of chronic physical and mental illness increases dramatically with age, particularly in persons 60 and older (Ouslander et al., 1982). The rates for chronic illnesses in the elderly such as arthritis, hypertension, organic heart disease, sensory impairments and urinary incontinence are about twice the rates in persons younger than 60. A number of studies suggest that 40% to

50% of elderly patients' health problems are unknown to their personal physicians (Tulloch et al., 1979; Besdine, 1980; Ouslander et al., 1982; Shock, 1984; Williams, 1984).

While cardiac, pulmonary and major central nervous system disorders were both reported and detected in most studies (Tulloch et al., 1979; Besdine, 1980; Williams, 1984) Earlier studies in Japan. The association of chronic diseases with both physical and cognitive function has been investigated. They demonstrated that factors associated with disability in elderly persons were chronic arthritis, osteoporosis bone fracture, cerebrovascular accident, diabetes, chronic lung disease, eye disease, malignancy, Alzheimer disease, depression and Parkinson's disease (Furner et al., 1995; Fried et al., 1997; Ikebe et al., 2001; Ho, 2002; Sauvaget et al., 2002; Volpato, et al., 2002). Unfortunately, much chronic illness and disability in rural elderly persons are unreported or undetected. Disabilities such as urinary incontinence, locomotor dysfunction, defective hearing and vision, podiatric problems, depression, alcoholism, liver function problem, kidney function problem and nonmedical social needs were not detected well. In this study, we analyzed the con-

*Received: August 18, 2006

Accepted after revision: September 7, 2006

†Corresponding author: Chong-Ho Kim, Department of Clinical Laboratory Science, Wonkwang Health Science College, Iksan 570-750, Korea.

Tel: 82-63-840-1213, Fax: 82-64-840-1219

e-mail: chkim@wkhc.ac.kr

centration biochemical components and protein electrophoresis fractions in sera of rural elderly patients.

MATERIALS AND METHODS

Sera were collected from elderly outpatients (n=256) aged 60 years and older and lived in rural area. Total protein (TP), albumin (AL), aspartic aminotransferase (AST), aspartic aminotransferase (ALT), creatinine (CRE) and urea nitrogen (UN) were determined by Hitachi automatic clinical analyzer (Hitachi High-Technologies Co., Tokyo, Japan). The concentration of chemical components was compared to reference range (Burtis et al., 1999; Kim et al., 2004). Sera of patients were carried out electrophoresis by cellulose acetate membrane electrophoresis technique with Helena Laboratory electrophoresis system (Jeppsson et al., 1979). Sera were loaded on the cellulose acetate membrane absorbed buffer. The membrane was run for 15 min. at 180 V and stained with Ponceau S. Fractions were analyzed with image analyzer (Vilber Lourmat, Cedex, France). The relative percent of the each protein fractions in serum was calculated and compared with reference range (Jeppsson et al., 1979; McClatchey, 2002; Burtis et al., 2006). All data were analyzed by SPSS software (Chicago, IL, USA).

RESULTS AND DISCUSSION

Liver function tests are widely performed blood tests used in patients with suspected liver disease or unexplained illness. The most widely used tests are those used to detect the AST and ALT which are associated with hepatocellular injury. Raised concentrations than reference range may indicate serious underlying chronic liver disease, recognition of which is important for guiding interventions to modify

life style and use of specific therapies such as interferon for hepatitis C to prevent the risk of progression to cirrhosis (Pratt et al., 2000; Kyrilagkitsis et al., 2003).

Measurement of blood and plasma urea has been used for many years as an indicator of kidney function. It is generally accepted that creatinine measurement provides better information in this respect. Both plasma creatinine and urea nitrogen concentrations are markedly increased in patients with renal disease (Sugita et al., 1992; Swan, 1997).

To understand the health status of liver and kidney function in rural elderly outpatients, we analyzed total protein, albumin, AST, ALT, UN and creatinine in sera (Son and Cho, 1997). The data were compared to reference range of total protein (6.0~8.5 g/dL), albumin (3.5~5.2 g/dL), AST (10~30 U/L), ALT (10~40 U/L), UN (6~20 mg/dL) and creatinine (0.7~1.3 mg/dL). The frequencies of patient showed lower level of total protein, albumin, and both total protein and albumin than them of reference range were 20.3%, 22.8% and 19.0%, respectively. The rates of patient showed higher level of AST, ALT, both of AST and ALT, UN, creatinine and both of UN and creatinine than them of reference range were 33.8%, 40.0%, 30.0%, 17.7%, 15.2% and 7.9%, respectively (Table 1).

A number of investigators suggested that mental disease, cardiovascular disease, organic heart disease, and renal disease were significantly increased in elderly (Kim and Lim, 1993; Kim et al., 1995; Park, 2002). Our data suggest that rural elderly patients may suffer from cardiovascular disease and organic heart disease (33.8%), liver disease (30.0%) and renal disease (7.9%), respectively. These data do not have significant differences to the report which demonstrated in 1993 by Kim and Lim, but shows higher rate of patients than the reports previously described (Kim et al., 1995; Son and Cho, 1997).

Table 1. The elderly patients in rural area showed abnormal concentration of chemicals in serum

Biochemical	TP	Al	TP and Al	AST	ALT	AST and ALT	UN	CRE	UN and CRE
Patient	52	59	49	87	103	77	46	39	20
%	20.3	22.8	19.0	33.8	40.0	30.0	17.7	15.2	7.9

Table 2. Relative serum protein fractions (%) of rural elderly patients (Mean \pm SD)

Fractions	Albumin	α_1 -globulin	α_2 -globulin	β -globulin	γ -globulin
Reference range	57.0 \pm 15.8	4.1 \pm 2.8	13.8 \pm 7.0	10.4 \pm 3.6	15.2 \pm 10.4
Patient	55.3 \pm 7.3	4.0 \pm 2.1	13.3 \pm 5.1	11.2 \pm 5.3	14.9 \pm 7.5

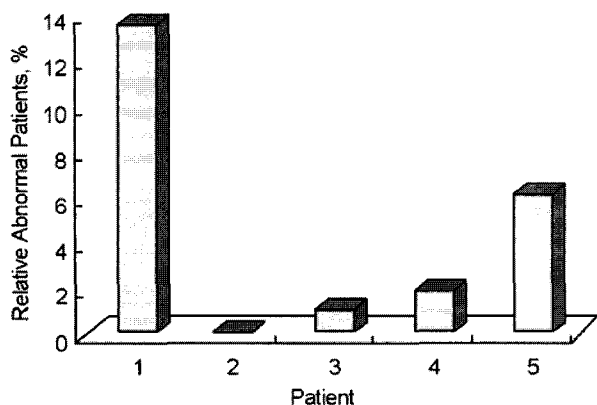


Fig. 1. Relative abnormal patients (%) aged 60 and over in rural area showed lower level of albumin (1), and showed higher level of α_1 -globulin (2), α_2 -globulin (3), β -globulin (4) and γ -globulin (5) than reference range. The percentages were expressed the relative patients compare to reference range (Lewandrowski, 2002).

Most laboratories rely primarily on visual interpretation of the overall electrophoresis patterns of serum protein. Previous investigators suggested that decrease of albumin, increase of β -globulin and γ -globulin were shown in patients with liver disease and that decrease of albumin, increase of α_2 -globulin and γ -globulin were shown in patients with nephrotic syndrome (Jeppsson et al., 1979; Lewandrowski, 2002; Burtis et al., 2006).

To evaluate the fractions, we analyzed the relative concentration of serum protein electrophoretic fractions in rural elderly patients (Table 2). The concentration of protein fractions in our data did not show significant differences. Comparison of protein fractions of each patient to reference range showed that 77.2% of patients showed normal all of patterns. Few of patients showed abnormal pattern in albumin (13.6%), α_1 -globulin (0.0%), α_2 -globulin (1.1%), β -globulin (1.9%) and γ -globulin (6.2%) (Fig. 1). These data suggest that production of proteins in rural elderly patients may be affected by liver disease and kidney disease. We can conclude that many of rural elderly patients may suffer from cardiovascular disease, liver disease and renal disease.

Acknowledgements

This work was supported by grant from Wonkwang Health Science College, 2006.

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