The correlation between Alternate healthy eating index for Taiwan (AHEI –T) and the risk factors of cardiovascular disease on hemodialysis patients.

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Introduction

The United States Renal Data System (USRDS) 2010 reported that incidence and prevalence of end stage renal disease in Taiwan are the highest of the world. Taiwan Society of Nephrology proposed that cardiovascular diseases is the first cause of death of hemodialysis patients (HD) (Yang et al., 2008). Cardiothoracic ratio (CTR) is a marker of cardiomegaly (Giamouzis et al., 2008). And is an indicator of inflammation and nutritional status and could predict cardiovascular mortality on hemodialysis (HD) patients (Chen et al., 2008).

Purpose

The purpose of this study is to investigate correlation between dietary intake, blood pressure, nutritional status, inflammation, lipid profile and blood sugar and CTR.

Subjects and Methods

This is a cross-sectional study. 68 HD patients were recruited and collected the following data: anthropometric data, CTR, blood pressure, nutritional status, inflammation, lipid profile, blood sugar and dietary data. CTR was calculated by heart diameter divide by transverse thoracic diameter (Figure 1). Dietary data were collected by 24h dietary recall and dietary record. Values were expressed as number, percentage or mean ± SEM. SAS 9.1 was used to perform Spearson correlation test. When $p < 0.05$ was considered as significant.

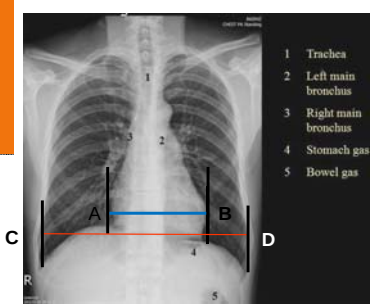

Figure 1. CTR = AB/CD

Results and Discussion

Sixty-eight HD patients were recruited, including 35men and 33women.The mean age was 64.8 ± 1.7 years old, dialysis vintage was 45.4 ± 6.2 months, energy intake was 1367 ± 52 kcal. 39.7% patients were normal, 50% were mild cardiomegaly, 10.3% were moderate-to-severe cardiomegaly (Figure 2).The distribution was similar to Yen et al, 45.3% HD patients were mild cardiomegaly (Yen et al., 2009).

CTR was positively correlated with age ($p < 0.001$) (Table 1). CTR was negatively correlated with energy ($p < 0.05$) and fiber ($p < 0.05$) intake (Table 2). CTR was negatively correlated with creatinine ($p < 0.001$) and total cholesterol ($p < 0.05$) (Table 3). Vascular aging occurs with increasing age and is associated with changes in vascular wall, which leads to increased arterial stiffness. As a result, aging is associated with elevated CTR (Jani et al., 2006). Higher energy intake could predict a better nutritional status and higher fiber intake could avoid coronary artery disease. Both could perdict lower CTR value. serum creatinine levels represent the muscle bulk and reflect the nutritional status in the HD patients. A higher creatinine and cholesterol level indicates a better nutrition. Good nutrition is associated with low CTR value due to less inflammation and atherosclerosis.

Conclusion

CTR might be an indicator of nutritional status in HD patients.

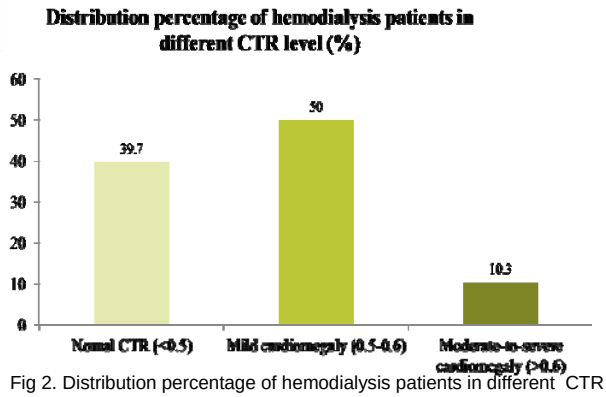

Fig 2. Distribution percentage of hemodialysis patients in different CTR level (n = 68)

Table1. Spearman rank correlation between CTR and subjects' characteristic and anthropometric data[1]

	Sex	Age (y)	Dialysis vintage (months)	Dialysis duration (minutes)	Activity (MET··min/wk[2])	Height (cm)	Dry weight (kg)	BMI (kg/m[2])	Interdialytic weight gain (kg)
CTR	-0.04	0.54	-0.15	-0.23	0.08	-0.14	-0.06	-0.04	0.08
p-value[2]	0.7604	< 0.001	0.2168	0.0814	0.9029	0.2595	0.6239	0.6086	0.5302

[1]Values are correlation coefficients. CTR = cardiothoracic ratio, MET = metabolic equivalent, BMI = body mass index.
[2]Statistical analysis by Spearman rank correlation.

Table2. Spearman rank correlation between CTR and dietary data[1]

	Energy (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Fiber (g)	Fluid intake (mL)	Carbohydrate (E%)	Protein (E%)	Fat (E%)
CTR	-0.26	-0.21	-0.08	-0.08	-0.25	0.11	0.15	0.14	0.05
p-value[2]	0.0312	0.0834	0.5204	0.5343	0.0362	0.3516	0.2222	0.2644	0.6604

[1]Values are correlation coefficients. CTR = cardiothoracic ratio, E% = percentage of energy.
[2]Statistical analysis by Spearman rank correlation.

Table3. Spearman rank correlation between CTR, blood pressure, biochemical data and dialysis quality[1]

	SBP (mmHg)	DBP (mmHg)	Alb (g/dL)	TP (mg/dL)	Cr (mg/dL)	Hb (g/dL)	WBC ($10^3/\mu$L)	TC (mg/dL)	TG (mg/dL)	AC-sugar (mg/dL)	Kt/V
CTR	0.18	-0.32	-0.20	-0.17	-0.43	-0.24	-0.16	-0.33	-0.20	0.14	-0.04
p-value[2]	0.1478	0.0687	0.1088	0.1800	0.0002	0.0510	0.1831	0.0064	0.1084	0.2531	0.7646

[1]Values are correlation coefficients.SBP = systolic blood pressure, DBP = diastolic blood pressure, Alb = albumin, TP = total protein, Cr = creatinine, Hb = hemoglobin, WBC = white blood cell, TC = total cholesterol, TG = triglyceride, AC-sugar = preprandial blood glucose.
[2]Statistical analysis by Spearman rank correlation at $p < 0.05$.