The correlation between cardiothoracic ratio (CTR) and dietary intake, blood pressure, nutritional status, inflammation, lipid profile and blood sugar in hemodialysis patients.

血液透析患者之心臟/胸廓比與飲食、血壓、營養狀態、發炎、血脂質及血糖相關性探討

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Abstract

- Cardiothoracic ratio (CTR) could predict cardiovascular mortality on hemodialysis (HD) patients. 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 were≧20 years old HD patients. We collected anthropometric data, blood pressure and nutritional status, inflammation, lipid profile and blood sugar data. CTR was taken by X-ray and calculated as heart diameter divide by transverse thoracic diameter. Dietary data were collected by 24h dietary recall. SAS 9.1 was used to perform Spearman rank correlation and when $p < 0.05$ was considered as significant. The result show that CTR was negatively correlated with energy ($p < 0.05$) and fiber ($p < 0.05$) intake, creatinine ($p < 0.05$), and total cholesterol ($p < 0.05$). Conclusion: CTR might be an indicator of nutritional status in HD patients.

- Key words：Hemodialysis, CTR.

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 (CVD) is the first cause of death of hemodialysis patients (HD) (Yang et al., 2008).
- Cardiothoracic ratio (CTR) was a marker of cardiomegaly and an indicator of inflammation and nutritional status. CTR could predict cardiovascular mortality on HD patients (Chen et al., 2008). CTR was taken by X-ray and calculated as heart diameter divide by transverse thoracic diameter (Figure 1).

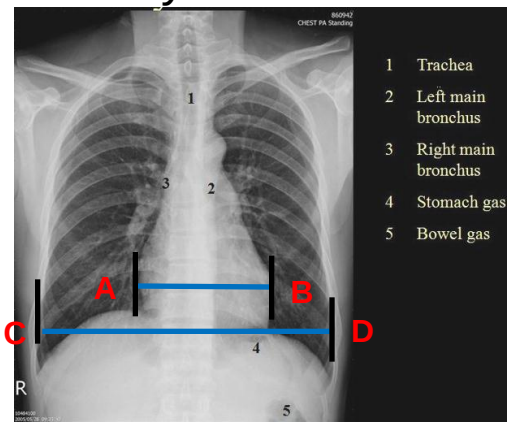

Figure1. CTR = AB/CD

Result

- The result show that 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).

Result

Table 1. 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)	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 .

Result

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%)[2]	Protein (E%)[2]	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.

Result

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/μL)	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. AHEI-T = Alternate healthy eating index-Taiwan, 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.

Conclusion

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