



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

台灣版健康飲食評量指標與血液透析患者之心血管疾病危險因子相關性探討

研究生：楊斯涵

指導老師：楊淑惠

臺北醫學大學

TAIPEI MEDICAL UNIVERSITY

Abstract

- This study purpose is to assess diet quality of hemodialysis (HD) patients with Alternate healthy eating index for Taiwan (AHEI-T) and to investigate the correlation between AHEI-T and risk factors of cardiovascular disease. Subjects were ≥ 20 years old chronic HD patients and without malignant tumor and liver failure. We collected the following data: anthropometric data, Cardiothoracic ratio (CTR), blood pressure, biochemical data and dietary data. AHEI-T, a dietary index was used for evaluating dietary data by. SAS 9.1 was used to perform Spearman rank or partial Spearman rank correlation and when $p < 0.05$ was considered as significant. Sixty-eight HD patients were recruited. The mean age of subjects was 64.8 ± 1.7 years old, dietary energy intake was 1367 ± 52 kcal and AHEI-T score was 32.5 ± 0.63 , CTR was 0.52 ± 0.00 . About 39.7% subjects were $CTR < 50\%$, 50.0% were $CTR 50-60\%$, 10.3% were $CTR > 60\%$. The correlation between the component of AHEI-T and CTR: vegetable score was negatively associated with CTR. Most subjects intook low and medium potassium-contained vegetables. Conclusion: The more vegetable intake the less CTR, which means the more vegetable intake the more cardiovascular disease protection effect.
- Key words : Hemodialysis, Alternate healthy eating index for Taiwan, cardiothoracic ratio

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 an indicator of inflammation and nutritional status and could predict cardiovascular mortality on HD patients. While AHEI, a dietary index predicted CVD risk better than the others (McCullough et al., 2002). Our laboratory modified Alternate healthy eating index (AHEI) to Alternate healthy eating index for Taiwan (AHEI-T) according to Taiwan daily dietary guidelines in 2009.

Result

- 68 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, 23.3 ± 0.9 kcal/kg body weight. For AHEI-T score, they got 32.5 ± 0.63 and found it was positively correlated to good control of systolic blood pressure (Table 1).

Table 1. Spearman rank correlation between AHEI-T and percentage of good control of blood pressure and biochemistry data according to recommendation¹

	SBP (mmHg)	DBP (mmHg)	Alb (g/dL)	TP (g/dL)	Cr (mg/dL)	Hb (g/dL)	WBC (10 ³ /μL)	TC (mg/dL)	TG (mg/dL)	AC-sugar (mg/dL)
Recommendation	<140	<90	≥ 4 g	6-8.2	≥ 10	11-13	4.8-10.8	151-199	<150	<100
AHEI-T	0.27	0.13	0.02	-0.08	-0.05	0.08	0.07	0.05	0.10	0.04
<i>p</i> -value ²	0.0252	0.2836	0.8690	0.4923	0.6888	0.5163	0.5695	0.6011	0.0867	0.7507

¹Values 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.

²Statistical analysis by Spearman rank correlation.

Result

- After divided participants into two groups according to the third rank of AHEI-T score in baseline (High AHEI-T score group: ≥ 34.3 ; Low AHEI-T score group < 34.3) and follow up for 2 months. We found that High AHEI-T score group was improved in triglyceride (Table 2).

Table 2. Comparisons of High AHEI-T score and Low AHEI-T score group in lipid profile, glycemic and dialysis quality between baseline, Month 1 and Month 2¹

	High AHEI-T score (n=23)			Low AHEI-T score (n=45)			<i>p</i> for group ²	<i>p</i> for time ²	<i>p</i> for interaction ²
	AHEI-T score: ≥ 34.3			AHEI-T score: < 34.3					
	Baseline	Month 1	Month 2	Baseline	Month 1	Month 2			
Lipid profile									
TC (mg/dL)	180.8 \pm 7.9	177.0 \pm 8.3	180.7 \pm 10.0	176.9 \pm 8.2	177.1 \pm 7.4	173.4 \pm 7.5	0.75	0.81	0.54
TG (mg/dL)	156.1 \pm 13.7 ^{ab}	176.8 \pm 12.4 ^a	149.1 \pm 11.4 ^b	224.8 \pm 10.1 [*]	231.4 \pm 13.0	210.7 \pm 18.3	0.03	0.04	0.27
Glycemic									
AC-sugar (mg/dL)	140.0 \pm 15.0	145.3 \pm 16.3	138.6 \pm 13.3	105.9 \pm 4.8	108.3 \pm 6.8	107.1 \pm 7.6	0.56	0.31	0.94

¹Values are mean \pm SEM. AHEI-T = Alternate healthy eating index-Taiwan, TC = total cholesterol, TG = triglyceride, AC-sugar = preprandial blood glucose.

²Statistical analysis by Friedman test.

³Values in the same row with different superscript letters are significantly different by Wilcoxon rank sum test at $p < 0.05$ between Month 1 and Month 2 in High AHEI-T score and values with * are different from by Wilcoxon sign rank test at $p < 0.05$ between High AHEI-T score and Low AHEI-T score in baseline.

Result

- Analyzing correlation between AHEI-T components and CTR, found vegetable score was negatively correlated to cardiothoracic ratio under multi-factors adjusted (Table 3). And low and medium potassium vegetables were the main vegetable category.

Table 3. Spearman rank correlation between AHEI-T and CTR components¹

	AHEI-T	Vegetable	Fruit	Nuts and soy protein	White/red meat	Whole grain	Trans fat	P/S ratio	Multivitamin use
CTR									
Unadjusted ²	-0.02	-0.16	0.12	0.04	-0.01	0.23	0.08	-0.05	0.07
	0.8098	0.0279	0.0938	0.5899	0.8781	0.0009	0.2377	0.5105	0.3416
Model A ³	-0.03	-0.15	0.14	0.02	-0.01	0.16	0.10	-0.02	0.02
	0.9686	0.0314	0.0460	0.7325	0.8516	0.0231	0.1687	0.7345	0.7590
Model B ⁴	--0.02	-0.35	0.16	0.05	0.07	0.31	0.10	0.02	0.06
	0.9135	0.0114	0.2675	0.7310	0.6166	0.1933	0.4781	0.8634	0.6923

¹Values are correlation coefficients. AHEI-T = Alternate healthy eating index-Taiwan, CTR = cardiothoracic ratio.

²Statistical significance analysis by Spearman rank correlation and partial Spearman rank correlation.

³Model A = sex and age adjusted.

⁴Model B = Model A + dialysis vintage, dialysis duration, activity, BMI, interdialytic weight gain, energy, dietary fiber, Alb, TP, Cr, Hb, WBC, SBP, TC, TG, AC-sugar, Kt/V.



Conclusion

- The higher AHEI-T score, the higher rate of good control in SBP and TG and the more low and medium potassium vegetable intake the more CTR protection effect. Therefore AHEI-T can be Taiwan HD patients' dietary quality index and the higher AHEI-T score, the lower CVD risk.