Association Between Thrombogenic and Lipophilic Indicators With Anthropometric Measurements In Children and Adolescents

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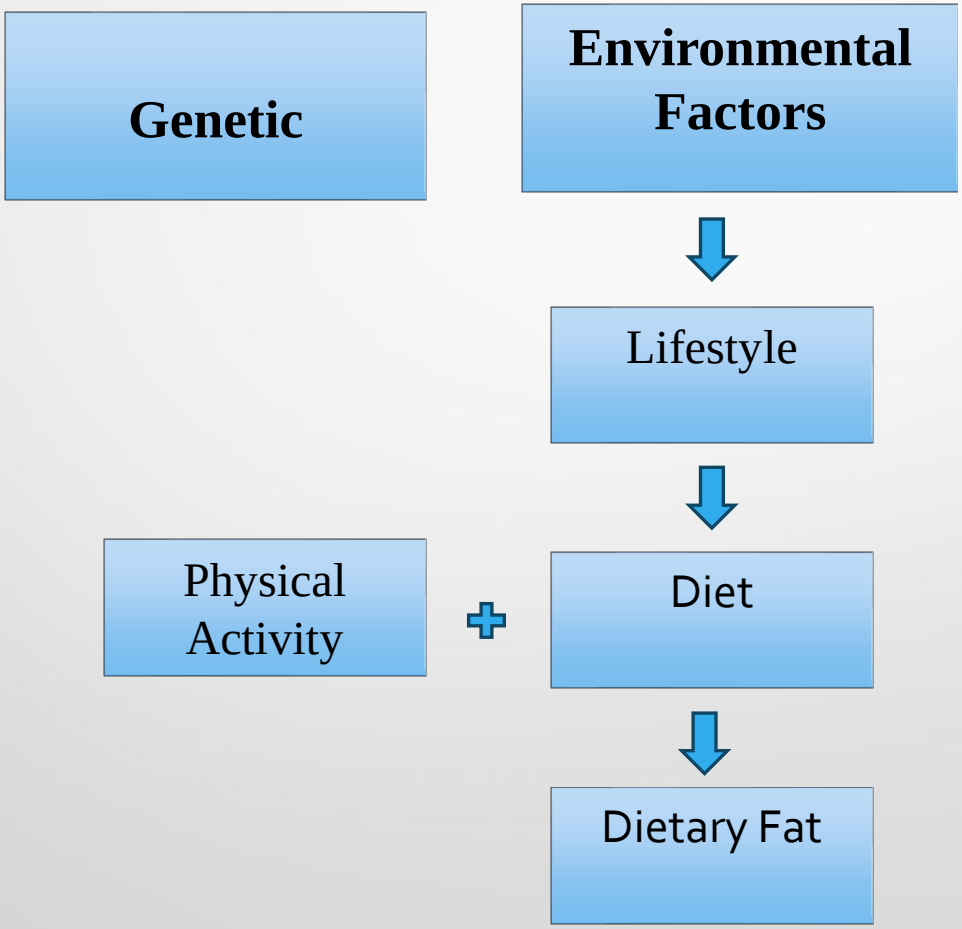
Introduction

- World Health Organization (WHO) : over 340 million children and adolescents (5–19 years) were overweight or obese

- A recent meta-analysis :prevalence of overweight and obesity about 12 and 11%, respectively in Iran

Sarokhani D, et al. Journal of Pediatric Endocrinology and Metabolism. 2020.

Various Factors Overweight and Obesity



Studies showed that the relative proportions of fatty acids were more associated with excess weight and NCDs in comparison with their absolute amounts in the diet.

Hypothesis

Evaluate the quality of the dietary fatty acids intake and its association with different anthropometric measures in Iranian children and adolescents.

Methods

Subjects

❑ Inclusion criteria

- Students :6 to 18 years old
- Not suffering from acute or chronic diseases or metabolic disorders
- Not taking medicine or special supplements by the child

Data Collection Method

- Completing and signing the consent form
- General information questionnaire
- Physical Activity Questionnaire
- Anthropometric measurements
- Food frequency questionnaire (FFQ)
- Calculation of fat quality indices

Anthropometric Indices

- Weight
- Height
- Neck Circumference (NC)
- Waist Circumference (WC)
- Wrist Circumference (WrC)

Calculation of Fat Quality Indices

- Extracting the required fatty acids from the database **USDA**
- Calculation of **fatty acids** consumed for each person
- Extracting the **melting point of fatty acids** from the database (Lipid Bank)
- Calculation of fat quality indices for each person using the formulas of each index

Calculation of LI & TI

- $TI = \frac{(14{:}0+16{:}0+18{:}0)}{(0.5 \times MUFA)} + (0.5 \times \sum n-6) + (3 \times \sum n-3) + \left(\frac{\sum n3}{\sum n6}\right)$
-
- $Dietary\ LI = \frac{\sum_K Fatty\ acide(g)_i \times Melting\ point\ (℃)_i}{\sum_K Fatty\ acide(g)_i}$

Statistical Analysis

- Mean±standard deviation (SD): quantitative variables
- frequency (percentage): qualitative variables
- The percentages of categorical variables: Pearson's χ^2 test
- The association between anthropometric indices (dependent variables) and TI and LI score (categorized independent variables): linear regression models

Table 1 Characteristics of the study population according to quartiles of TI

		TI Quartiles					
		Q1	Q2	Q3	Q4	Total	*p*-value
Number		1080	1081	1081	1081	4323	
Gender, Number (%)	boy	576(25.4)[a]	569(25.1)	552(24.3)	573(25.2)	2270	0.726
	girl	504(24.5)	512(24.9)	529(25.8)	508(24.7)	2053	
Region, Number (%)	rural	362(29.2)	327(26.3)	285(23.0)	267(21.5)	1241	**< 0.001**
	urban	718(23.3)	754(24.5)	796(25.8)	814(26.4)	3082	
Age (years)		11.70 ± 3.21[b]	11.44 ± 3.11	11.38 ± 3.22	11.06 ± 3.22	11.39 ± 3.19803	**< 0.001**
PA		42.60 ± 13.54	44.25 ± 12.91	43.79 ± 11.80	44.89 ± 11.72	43.88 ± 12.53977	**< 0.001**
LI (mEq/day)		22.19 ± 2.11	25.22 ± 1.33	27.27 ± 1.11	30.41 ± 1.84	26.27 ± 3.41752	**< 0.001**
TI (mEq/day)		0.70 ± 0.10	0.93 ± 0.05	1.12 ± 0.06	1.48 ± 0.22	1.06 ± .31282	**< 0.001**
BMI Z-score		-0.04 ± 0.95	-0.04 ± 0.92	0.05 ± 1.06	0.02 ± 1.04	0.00 ± .99708	0.076
Weight Z-score		-0.02 ± 1.02	-0.04 ± 0.94	0.03 ± 1.03	0.03 ± 1.01	0.00 ± .99710	0.283
Height Z-score		-0.15 ± 0.89	-0.09 ± 1.04	-0.12 ± 0.97	-0.03 ± 1.18	-0.09 ± 1.02442	**0.038**
Wrist Z-score		0.04 ± 1.08	-0.04 ± 0.94	-0.01 ± 1.00	0.00 ± 0.97	0.00 ± 1.00	0.306
NC Z-score		0.06 ± 1.03	-0.04 ± 0.96	0.01 ± 1.01	-0.03 ± 0.98	0.00 ± 1.00	0.098
WC Z-score		0.00 ± 1.07	-0.03 ± 0.94	0.01 ± 1.01	0.03 ± 0.97	0.00 ± 1.00	0.594
HC Z-score		0.01 ± 1.03	-0.04 ± 0.97	0.02 ± 0.98	0.01 ± 1.01	0.00 ± 1.00	0.47
WHR (cm)		0.83 ± 0.11	0.83 ± 0.13	0.82 ± 0.08	0.83 ± 0.09	0.83 ± .10668	0.27
WHtR (cm)		0.45 ± 0.07	0.45 ± 0.06	0.46 ± 0.07	0.46 ± 0.07	0.45 ± .06468	0.372
TMI (kg/m3)		12.87 ± 3.13	12.87 ± 4.17	13.28 ± 4.96	13.20 ± 5.70	13.06 ± 4.59	0.069
TMI Z-score		-0.03 ± 0.89	-0.03 ± 0.98	0.04 ± 1.05	0.02 ± 1.06	0.00 ± 1.00	0.29
ABSI		0.79 ± 0.09	0.78 ± 0.08	0.78 ± 0.09	0.79 ± 0.08	0.78 ± 0.08	0.285

Table 2 Characteristics of the study population according to quartiles of LI

		LI Quartiles					
		Q1	**Q2**	**Q3**	**Q4**	**Total**	***p*-value**
Number		1080	1081	1081	1081	4323	
Gender, Number (%)	boy	559(24.6) a	575(25.3)	561(24.7)	575(25.3)	2270	0.81
	girl	521(25.4)	506(24.6)	520(25.3)	506(24.6)	2053	
Region, Number (%)	rural	395(31.8)	324(26.1)	281(22.6)	241(19.4)	1241	**< 0.001**
	urban	685(22.2)	757(24.6)	800(26.0)	840(27.3)	3082	
Age (years)		11.85 ± 3.19b	11.42 ± 3.11	11.24 ± 3.19	11.05 ± 3.24	11.39 ± 3.20	**< 0.001**
PA		42.28 ± 13.93	44.10 ± 12.43	44.43 ± 11.52	44.72 ± 12.03	43.88 ± 12.54	**< 0.001**
LI (mEq/day)		21.92 ± 1.74	25.20 ± 0.68	27.36 ± 0.62	30.61 ± 1.66	26.27 ± 3.42	**< 0.001**
TI (mEq/day)		0.72 ± 0.12	0.94 ± 0.10	1.12 ± 0.11	1.46 ± 0.25	1.06 ± 0.31	**< 0.001**
BMI Z-score		-0.05 ± 0.95	-0.02 ± 0.96	0.02 ± 1.01	0.05 ± 1.06	0.00 ± 1.00	0.102
Weight Z-score		-0.05 ± 1.02	0.00 ± 0.95	0.03 ± 1.02	0.03 ± 1.00	0.00 ± 1.00	0.211
Height Z-score		-0.18 ± 0.88	-0.05 ± 1.06	-0.08 ± 0.94	-0.07 ± 1.19	-0.09 ± 1.02	**0.009**
Wrist Z-score		0.02 ± 1.09	-0.01 ± 0.96	-0.02 ± 0.98	0.01 ± 0.95	0.00 ± 1.00	0.862
NC Z-score		0.06 ± 1.03	-0.03 ± 0.98	-0.01 ± 0.96	-0.03 ± 1.01	0.00 ± 1.00	0.094
WC Z-score		-0.03 ± 1.05	-0.01 ± 0.98	0.01 ± 0.99	0.03 ± 0.97	0.00 ± 1.00	0.456
HC Z-score		-0.03 ± 1.04	-0.01 ± 0.97	0.02 ± 0.97	0.02 ± 1.01	0.00 ± 1.00	0.585
WHR (cm)		0.83 ± 0.12	0.83 ± 0.13	0.83 ± 0.08	0.83 ± 0.08	0.83 ± 0.11	0.53
WHtR (cm)		0.45 ± 0.06	0.45 ± 0.06	0.45 ± 0.07	0.46 ± 0.07	0.45 ± 0.06	0.342
TMI Z-score		-0.03 ± 0.89	-0.02 ± 1.04	0.00 ± 0.96	0.05 ± 1.09	0.00 ± 1.00	0.296
ABSI		0.78 ± 0.09	0.79 ± 0.08	0.78 ± 0.08	0.79 ± 0.08	0.78 ± 0.08	0.603

Table 4 Associations between the TI and anthropometric measures

	Model I					Model II				
	TI quartiles					TI quartiles				
	Q1	Q2	Q3	Q4	R^2, BIC	Q1	Q2	Q3	Q4	R^2, BIC
BMI Z-score	Ref.	-0.003(0.09,0.08)[a]	0.09(0.01,0.18)	0.06(-0.03,0.14)	0.001	Ref.	-0.01(-0.09,0.08)	0.08(-0.004,0.16)	0.05(-0.04,0.13)	0.0007
		0.953[b]	**0.034**	0.17	12169.2		0.874	0.062	0.294	12183.6
Weight Z-score	Ref.	-.013(-0.10,0.07)	.053(-0.03,0.14)	.051(-0.03,0.14)	0.0002	Ref.	-0.02(-0.11,0.06)	0.03(-0.05,0.11)	0.02(-0.06,0.10)	-0.0004
		0.768	0.213	0.235	12257.5		0.57	0.484	0.638	12282.3
Height Z-score	Ref.	.061(-0.02,0.15)	.026(-0.06,0.11)	.121(0.03,0.21)	0.0013	Ref.	0.04(-0.04,0.13)	-0.002(0.09,0.08)	0.07(-0.01,0.16)	0.0195
		0.163	0.553	**0.006**	12483.5		0.342	0.971	0.1	12426.2
WC Z-score	Ref.	-0.03(-0.11,0.06)	0.01(-0.07,0.10)	0.03(-0.05,0.12)	0.0004	Ref.	-0.04(-0.12,0.05)	-0.01(-0.10,0.07)	0.002(-0.08,0.09)	0.0003
		0.538	0.801	0.462	12233.9		0.402	0.775	0.957	12253.5
Wrist Z-score	Ref.	-0.08(-0.16,0.00)	-0.05(-0.14,0.03)	-0.04(-0.12,0.04)	0.0001	Ref.	-0.09(-0.17,0.003)	-0.06(-0.15,0.02)	-0.06(-0.14,0.03)	-0.0005
		0.06	0.236	0.346	12209.6		**0.042**	0.145	0.191	12234.7
NC Z-score	Ref.	-0.10(-0.18,-0.01)	-0.05(-0.14,0.03)	-0.09(-0.17,-0.01)	0.0008	Ref.	-0.10(-0.19,-0.02)	-0.07(-0.15,0.02)	-0.11(-0.19,-0.02)	0.0002
		0.026	0.234	**0.038**	12132.9		**0.017**	0.132	**0.013**	12157.4
HC Z-score	Ref.	-0.05(-0.14,0.03)	0.01(-0.07,0.10)	-0.002(0.09,0.08)	0.0006	Ref.	-0.06(-0.15,0.02)	-0.02(-0.10,0.07)	-0.04(-0.12,0.05)	-0.0004
		0.229	0.797	0.962	12241.7		0.134	0.719	0.397	12265.36
WHR	Ref.	0.005(-0.004,0.01)	-0.001(-0.01,0.01)	0.01(-0.003,0.02)	0.0002	Ref.	0.004(0.00,0.01)	-0.002(0.01,0.01)	0.004(-0.01,0.01)	0.06
		0.298	0.783	0.158	-7021.6		0.36	0.736	0.371	-7255
WHtR	Ref.	-0.003(0.01,0.002)	0.001(-0.004,0.01)	0.001(0.004,0.01)	0.0007	Ref.	-.003(-0.01,0.002)	.001(-0.01,0.01)	-0.0001(0.01,0.01)	0.004
		0.275	0.64	0.681	-11322.8		0.236	0.843	0.987	-11319.2
TMI Z-score	Ref.	0.0004(-0.08,0.08)	0.07(-0.02,0.15)	0.05(-0.04,0.13)	0.0002	Ref.	-0.0004(0.08,0.08)	0.06(-0.02,0.15)	0.04(-0.04,0.13)	-0.0001
		0.993	0.119	0.277	12197.9		0.992	0.138	0.315	12221.2
ABSI	Ref.	0.0002(-0.01,0.01)	-0.004(0.01,0.004)	0.004(0.004,0.01)	0.0002	Ref.	-0.002(-0.01,0.01)	-0.01(0.01,0.002)	-0.001(-0.01,0.01)	0.07
		0.952	0.334	0.327	-9014.4		0.62	0.132	0.861	-9298.9

TI thrombogenic index, *BMI* body mass index, *WC* waist circumference, *HC* hip circumference, *NC* neck circumference, *WHR* waist to hip ratio, *WHtR* waist to height ratio, *TMI* tri-ponderal mass index, *ABSI* a body shape index, R^2 adjusted R-square, *BIC* Bayesian information criteria

[a] Coefficient regression (95% CI) in a linear model regression, [b] *p*-value. Model I: crude model, Model II: Adjusted for age, gender, physical activity, residence area

Table 5 Associations between the LI index and anthropometric measures

	Model I					Model II				
	LI quartiles					LI quartiles				
	Q1	Q2	Q3	Q4	R^2, BIC	Q1	Q2	Q3	Q4	R^2, BIC
BMI Z-score	Ref	0.03(-0.05,0.11)	0.08(-0.01,0.16)	0.10(0.01,0.18)	0.001	Ref	0.02(-0.06,0.10)	0.06(-0.03,0.14)	0.07(-0.01,0.16)	0.001
		0.481	0.078	**0.024**	12161.5		0.638	0.17	0.087	12184.6
Weight Z-score	Ref	0.05(-0.04,0.13)	0.08(-0.01,0.16)	0.08(0.00,0.16)	0.0004	Ref	0.03(-0.06,0.11)	0.04(-0.04,0.13)	0.03(-0.05,0.12)	-0.0003
		0.258	0.071	0.061	12256.8		0.546	0.331	0.461	12281.5
Height Z-score	Ref	0.14(0.05,0.22)	0.11(0.02,0.19)	0.12(0.03,0.20)	0.002	Ref	0.10(0.01,0.18)	0.05(-0.03,0.14)	0.04(-0.04,0.13)	0.02
		0.002	**0.015**	**0.009**	12480.4		**0.025**	0.211	0.314	12424.2
WC Z-score	Ref	0.03(-0.06,0.11)	0.04(-0.04,0.12)	0.07(-0.02,0.15)	0.0006	Ref	0.01(-0.08,0.09)	0.005(-0.08,0.09)	0.02(-0.06,0.10)	0.001
		0.526	0.351	0.112	12233.2		0.895	0.908	0.65	12252.5
Wrist Z-score	Ref	-0.02(-0.11,0.06)	-0.04(-0.12,0.05)	-0.01(-0.10,0.07)	0.0002	Ref	-0.04(-0.12,0.05)	-0.05(-0.14,0.03)	-0.04(-0.12,0.05)	-0.001
		0.577	0.409	0.761	12212.5		0.404	0.213	0.386	12237.6
NC Z-score	Ref	-0.10(-0.18,-0.01)	-0.07(-0.16,0.01)	-0.09(-0.18,-0.01)	0.001	Ref	-0.11(-0.20,-0.03)	-0.09(-0.18,-0.01)	-0.12(-0.21,-0.04)	0.0003
		0.024	0.098	**0.036**	12132.9		**0.01**	**0.031**	**0.006**	12157.3
HC Z-score	Ref	0.02(-0.06,0.10)	0.05(-0.04,0.13)	0.05(-0.03,0.14)	0.0004	Ref	-0.004(-0.09,0.08)	0.01(-0.07,0.09)	-0.003(-0.09,0.08)	-0.001
		0.629	0.255	0.234	12242.4		0.92	0.833	0.938	12265.7
WHR	Ref	0.004(-0.01,0.01)	0.0003(0.01,0.01)	0.01(0.00,0.01)	0.0005	Ref	0.001(-0.01,0.01)	-0.002(0.01,0.01)	0.002(-0.01,0.01)	0.01
		0.422	0.946	0.206	-7019.9		0.759	0.624	0.669	-7253.6
WHtR	Ref	-0.001(0.01,0.005)	0.001(0.004,0.01)	0.004(0.001,0.01)	0.0001	Ref	-0.002(0.01,0.004)	0.0001(0.01,0.01)	0.002(0.003,0.01)	0.004
		0.814	0.601	0.147	-11323.1		0.787	0.416	0.739	-11319.3
TMI Z-score	Ref	0.01(-0.07,0.10)	0.02(-0.06,0.11)	0.08(-0.01,0.16)	0.0002	Ref	0.01(-0.08,0.09)	0.02(-0.06,0.11)	0.07(-0.02,0.16)	-0.0001
		0.787	0.562	0.075	12198.04		0.828	0.633	0.107	12221.2
ABSI	Ref	0.002(0.005,0.01)	0.001(-0.01,0.01)	0.005(0.002,0.01)	0.0004	Ref	-0.001(-0.01,0.01)	-0.003(0.01,0.00)	-0.001(0.01,0.01)	0.07
		0.528	0.69	0.184	-9012.5		0.578	0.976	0.471	-9296.9

LI lipophilic index, *BMI* body mass index, *WC* waist circumference, *HC* hip circumference, *NC* neck circumference, *WHR* waist to hip ratio, *WHtR* waist to height ratio, *TMI* tri-ponderal mass index, *ABSI* a body shape index, R^2 adjusted R-square, *BIC* Bayesian information criteria

[a] Coefficient regression (95% CI) in a linear model regression, [b]*p*-value. Model I: crude model, Model II: Adjusted for age, gender, physical activity, residence area

High dietary LI and TI were correlated with higher intake of SFAs, cholesterol and trans fatty acids and lower intake of PUFAs and MUFAs.

Table 3 Fatty acids intakes

	melting point	Fatty acids intake (mean ± SD)			Correlation (r) [a] with TI	Correlation (r) [a] with LI
		girl	boy	total		
Animal _Fat		44.36 ± 24.14	42.83 ± 23.57	43.56 ± 23.85	.169[b]	.131[b]
Vegetable _Fat		34.88 ± 19.12	33.67 ± 18.36	34.25 ± 18.73	-.394[b]	-.392[b]
Total _Fat		85.38 ± 35.65	82.62 ± 34.23	83.93 ± 34.94	-.092[b]	-.111[b]
SFAs		29.60 ± 13.03	28.91 ± 13.05	29.24 ± 13.04	.339[b]	.318[b]
c4_00	-7.9	0.95 ± 0.57	0.91 ± 0.56	0.93 ± 0.56	.559[b]	.490[b]
c6_00	-3.4	0.63 ± 0.37	0.61 ± 0.36	0.62 ± 0.37	.569[b]	.502[b]
c8_00	16.7	0.50 ± 0.27	0.49 ± 0.27	0.49 ± 0.27	.562[b]	.508[b]
c10_00	31.6	1.11 ± 0.61	1.08 ± 0.60	1.09 ± 0.60	.522[b]	.473[b]
c12_00	44.2	1.31 ± 0.76	1.27 ± 0.78	1.29 ± 0.77	.403[b]	.425[b]
c14_00	53.9	3.41 ± 1.78	3.29 ± 1.77	3.35 ± 1.78	.563[b]	.515[b]
c16_00	63.1	15.26 ± 6.40	14.76 ± 6.34	15.00 ± 6.37	.317[b]	.277[b]
c18_00	69.6	6.71 ± 3.00	6.58 ± 3.03	6.64 ± 3.01	.245[b]	.230[b]
MUFAs		29.31 ± 13.36	28.36 ± 12.88	28.81 ± 13.12	-.223[b]	-.190[b]
c16_01	0	0.95 ± 0.47	0.92 ± 0.48	0.94 ± 0.48	.278[b]	.278[b]
c18_01	16	28.99 ± 13.31	27.90 ± 12.74	28.42 ± 13.02	-.213[b]	-.188[b]
c20_01	23.25	0.19 ± 0.13	0.19 ± 0.14	0.19 ± 0.13	-.384[b]	-.343[b]
c22_01	33.35	0.01 ± 0.02	0.01 ± 0.03	0.01 ± 0.02	-.134[b]	-.077[b]
PUFAs		19.77 ± 11.02	18.77 ± 9.52	19.24 ± 10.27	-.422[b]	-.507[b]
c18_02	-5	17.96 ± 9.99	17.16 ± 8.66	17.54 ± 9.32	-.432[b]	-.509[b]
c18_3n_3	-11.15	0.32 ± 0.46	0.28 ± 0.25	0.30 ± 0.37	-.238[b]	-.244[b]
c18_3n_6	-11.15	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	-.231[b]	-.230[b]
c18_03	-11.15	1.58 ± 0.81	1.48 ± 0.68	1.52 ± 0.75	-.057[b]	-.127[b]
c18_04	-57	0.03 ± 0.06	0.03 ± 0.07	0.03 ± 0.06	-.100[b]	-.097[b]
c20_04	-49.5	0.16 ± 0.10	0.15 ± 0.10	0.16 ± 0.10	.017	.037[c]
EPA	-54.1	0.06 ± 0.12	0.06 ± 0.14	0.06 ± 0.13	-.094[b]	-.090[b]
DPA	-78	0.01 ± 0.02	0.01 ± 0.02	0.01 ± 0.02	.031[c]	.055[b]
DHA	-44.15	0.10 ± 0.15	0.10 ± 0.17	0.10 ± 0.16	-.096[b]	-.091[b]
TFAs		0.92 ± 0.50	0.88 ± 0.48	0.90 ± 0.49	.147[b]	.087[b]
F_16_1lt	31	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	-.049[b]	-.010
F_18_1LT	48.7	1.67 ± 2.30	1.77 ± 2.42	1.72 ± 2.36	-.078[b]	.134[b]
F_18_2trans	5.7	0.16 ± 0.14	0.17 ± 0.14	0.17 ± 0.14	.006	.183[b]
Chol		318.72 ± 220.70	328.06 ± 225.45	323.63 ± 223.23	.166[b]	.177[b]

MUFA monounsaturated fatty acid, *PUFA* polyunsaturated fatty acid, *SFA* saturated fatty acid, *TFA* Trans fatty acid

[a] Pearson's correlation. [b] significant in 0.01 level, [c] significant in 0.05 level

Discussion

BMI

NC

Height

WC

WHtR

❑ This study:

- The results of the present study indicated that the LI and TI were positively associated with BMI z-score.

❑ Previous studies:

- A cross-sectional study among 295 women aged 18–59 years in Ghana: direct association between LI and TI with BMI .
- The Women's Health Initiative (WHI) observational cohort study: association between higher dietary LI (median (IQR) 27.6 (3.5)) and higher BMI among postmenopausal women with coronary heart disease (CHD) .
- Study on 504 participants with age range of 18–64 years in Iran: Positive association between LI (mean (SD) 34.99(6.91)) and BMI ($\beta = 0.17$; $P = 0.04$)
- A prospective nested case-control study among US men with CHD: both plasma and erythrocyte LI were consistently correlated with higher BMI.

❑This study:

we found an inverse association between LI and TI with NC Z-score.

❑Previous studies:

- A cross-sectional survey among Chinese postmenopausal women: NC was significantly correlated with HOMA-IR and triglycerides, and negatively correlated with HDL-C .
- Another study : association between NC and metabolic risk factors in obese children between 5 and 18 years of age.

BMI

NC

Height

WC

WHtR

- This study:
  - a direct association was found between LI and height Z-score.
- Previous studies:
  - A cross-sectional study among 307 children aged 2-6 years in Ghana: n-6 fatty acids were significantly positively associated with height Z-score and these fatty acids were critical in childhood linear growth
  - Another study in China between 196 children aged 1-5 : consumption of fatty acids may be associated with growth and height in children aged 1-5 years.

BMI

NC

Height

WC

WHtR

- This study:
  - No association between TI or LI and WHtR Z-score and WC Z-score
- Previous studies:
  - A cross sectional study: a **positive association between TI and WC and WHtR** among Ghanaian women.
  - A positive association between LI and WHtR
  - Another observational study :504 Iranian population with metabolic phenotypes, indicated **positive associations between LI** and WC.

BMI

NC

Height

WC

WHtR

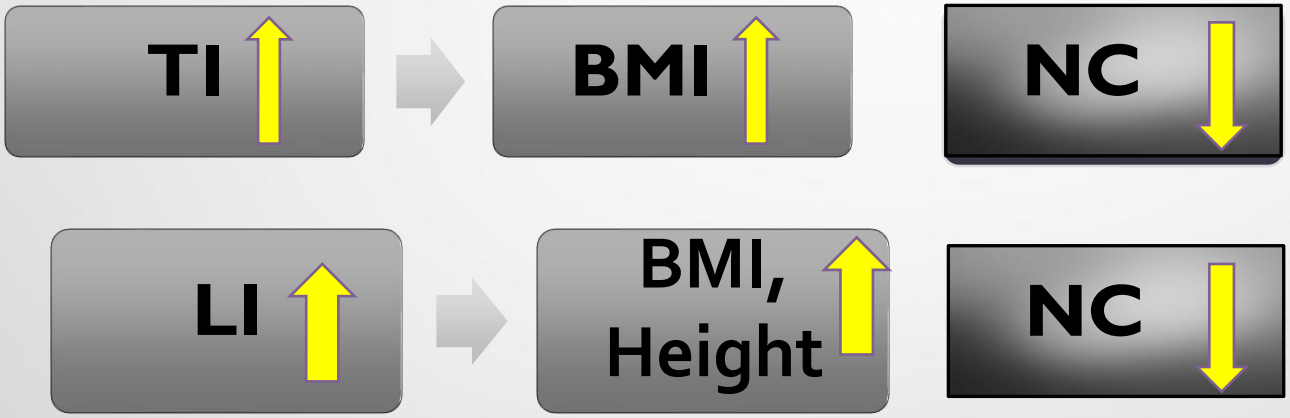
Mechanisms

- According to lipophilicity, the quality of fatty acids is determined by their melting points
- longer hydrocarbon chain
- a higher saturation rating and
- a presence of a double bond in the trans configuration
- higher LI ⟹ high melting points of fatty acids ⟹ less membrane fluidity excessive accumulation of plasma triglycerides and also increase the concentration of circulating cholesterol ⟹ insulin resistance

Mechanisms

- SFAs such as myristic, palmitic and stearic acids and high arachidonic acid intake lead to increase values of LI and TI : proinflammatory and procoagulant effects and can develop atherosclerosis.
- AA : adipogenesis
- SFAs reduce expression of genes involve in fatty acid β-oxidation and triglyceride synthesis ⇨ decrease lipid handling capacity of the adipocytes and increase inflammation .
- Higher intake of PUFA-3 and MUFA suppress the expression of lipogenesis genes in various organs and increase fatty acid β-oxidation
- In general, omega-3 fatty acids and MUFA : anti-inflammatory effect, anti-arrhythmic effect, and anti-thrombotic effect /
- omega-6 fatty acids : inflammation and thrombus formation

Conclusion




THANK YOU FOR
YOUR ATTENTION