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THIAMIN CONSUMPTION AND CARDIOVASCULAR COMPLAINTS

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A recent report (1) has indicated a positive correlation between carbohydrate consumption and some early characteristic, if not pathognomonic, findings suggestive of cardiovascular pathosis in relatively healthy individuals. Specifically, the older the subject and the greater the carbohydrate intake (particularly of refined carbohydrate foods), the greater the frequency of cardiovascular complaints.

Because of the known relationship of thiamin (vitamin B_1) to carbohydrate metabolism (2), this report is designed to relate vitamin B_1 intake to cardiovascular symptoms and signs.

MATERIAL AND METHODS

Seventy-four dental practitioners and their wives (members of the Southern Academy of Clinical Nutrition) participated in this study. The relevant raw data are listed in Table 1. The largest number of the subjects were in the fourth age decade (Table 2). Each participant completed the Cornell Medical Index Health Questionnaire (3). Thirteen of the questions (Table 3) deal with the cardiovascular system. Shown in Table 4 is the frequency distribution of affirmative response. In the majority of cases (41 of the 74) there were no positive findings. Affirmative answers, however, ranged up to a high of seven per individual. Each participant also submitted a seven-day dietary survey. Daily thiamin consumption was calculated from food tables (4). The daily thiamin intakes (milligrams) are summarized in Table 5. The largest proportion of subjects (21.6 per cent) consumed between 0.90 and 0.99 mg per day. The recommended allowance for thiamin is 0.4 mg per 1000 calories for all ages, with added allowances for pregnancy and lactation (5). When the caloric intake is less than 2000 per day, maintenance of the thiamin intake at 0.8 mg daily is suggested. Table 5 shows that 25.8 per cent of the subjects were consuming less than 0.8 mg per day. The daily total caloric intakes are summarized in Table 6. Ten of the 41 males (25 per cent) and 23 of the 33 females (70 per cent) were consuming less than 2000 calories per day.

RESULTS

The 74 subjects were divided into two equal subgroups so as to relate the mean number of cardiovascular complaints according to relatively low or

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TABLE 1

Relationship of Cardiovascular Complaints to Daily Thiamin Consumption

Subject	Age & Sex	Thiamin (mg)	No. of Cardiovasc. Complaints	Subject	Age & Sex	Thiamin (mg)	No. of Cardiovasc. Complaints
13018	33 M	0.88	1	13074	25 F	1.14	1
13019	32 F	0.78	0	13075	47 F	0.48	3
13022	37 M	1.44	0	13076	49 M	1.25	0
13025	37 F	0.72	0	13083	41 F	2.54	1
13026	32 M	0.87	6	13084	38 M	0.99	0
13027	32 F	2.95	1	13089	27 F	0.87	0
13028	40 M	1.69	0	13090	35 M	0.82	0
13029	34 M	0.74	0	13097	43 M	1.15	1
13030	33 F	0.92	0	13099	42 F	0.96	2
13033	36 F	1.05	0	13100	41 M	1.17	0
13034	36 M	1.37	3	13105	43 M	1.12	0
13035	40 M	0.93	0	13106	45 F	0.91	0
13036	38 F	0.48	1	13108	33 F	0.13	0
13039	41 M	1.10	1	13109	36 M	1.28	0
13042	32 F	0.94	0	13115	55 F	0.79	5
13044	30 M	1.59	0	13116	56 M	1.09	0
13047	44 F	0.88	4	13121	33 F	0.62	3
13048	47 M	1.14	0	13122	32 M	0.90	0
13051	41 M	1.27	2	13123	32 F	0.63	0
13052	38 F	0.91	0	13124	34 M	0.62	0
13053	41 M	0.90	0	13128	48 F	0.85	1
13054	47 F	0.69	7	13129	48 M	1.10	1
13055	48 M	1.04	1	13132	39 M	0.85	2
13056	34 M	1.15	0	13133	36 F	0.66	2
13057	23 F	0.73	1	13140	37 M	1.26	0
13059	33 M	1.55	0	13144	40 F	0.82	0
13060	32 F	1.09	0	13145	40 M	0.91	1
13062	46 M	0.88	0	13147	41 F	0.63	0
13063	39 M	0.63	0	13148	44 M	0.92	5
13064	32 F	0.53	0	13150	42 M	0.72	0
13065	39 F	0.55	1	13151	34 F	0.71	2
13066	50 M	0.70	0	13152	36 M	1.45	1
13067	30 F	2.09	1	13153	40 M	1.36	0
13068	37 M	0.84	1	13154	40 F	1.03	2
13071	49 F	0.60	4	13158	32 M	1.31	0
13072	48 M	1.25	2	13159	31 F	0.78	0
13073	35 M	1.27	2	13160	34 M	0.98	0

high thiamin consumption. One group of 37 persons consumed 0.13 to 0.91 mg of thiamin per day. The remaining group of 37 persons consumed 0.92 to 2.95 mg per day. Table 7 shows that, on a mean basis for the entire sample, subjects consuming the *lesser* amount of thiamin had *more* cardiovascular complaints (1.2) than subjects in the higher intake group (0.7). The difference was almost twofold.

It is generally conceded that one of the most important ingredients in

TABLE 2

Age and Sex Distribution

Age Groups	Males	Females	Total
20–29	0 (0.0%)	3 (9.1%)	3 (4.1%)
30–39	21 (51.2%)	18 (54.5%)	39 (52.7%)
40–49	18 (43.9%)	11 (33.3%)	29 (39.2%)
50–59	2 (4.9%)	1 (3.0%)	3 (4.1%)
Total	41 (100.0%)	33 (100.0%)*	74 (100.0%)*

* Approximate.

TABLE 3

Questions re Cardiovascular Symptoms—Cornell Medical Index Health Questionnaire

1. Has a doctor ever said your blood pressure was too high?
2. Has a doctor ever said your blood pressure was too low?
3. Do you have pains in the heart or chest?
4. Are you often bothered by thumping of the heart?
5. Does your heart often race like mad?
6. Do you often have difficulty in breathing?
7. Do you get out of breath long before anyone else?
8. Do you sometimes get out of breath just sitting still?
9. Are your ankles often badly swollen?
10. Do cold hands or feet trouble you even in hot weather?
11. Do you suffer from frequent cramps in your legs?
12. Has a doctor ever said you had heart trouble?
13. Does heart trouble run in your family?

TABLE 4

Distribution of Cardiovascular Complaints

No. of Cardiovasc. Complaints	Males	Females	Total
0	26 (63.4%)	15 (45.5%)	41 (55.4%)
1	8 (19.5%)	8 (24.2%)	16 (21.6%)
2	4 (9.8%)	4 (12.1%)	8 (10.8%)
3	1 (2.4%)	2 (6.1%)	3 (4.1%)
4	0 (0.0%)	2 (6.1%)	2 (2.7%)
5	1 (2.4%)	1 (3.0%)	2 (2.7%)
6	1 (2.4%)	0 (0.0%)	1 (1.4%)
7	0 (0.0%)	1 (3.0%)	1 (1.4%)
Total	41 (100.0%)*	33 (100.0%)	74 (100.0%)*

* Approximate.

chronic disease is time. Accordingly, the relationship of thiamin consumption to cardiovascular findings was further studied in the light of the age factor. In the younger group (23–37 years), the mean numbers of cardiovascular complaints were 0.9 and 0.5 for subjects consuming the lesser and

TABLE 5
Thiamin (Vitamin B_1) Intake

Thiamin Intake (mg)	No. of Subjects	% of Subjects
0.10–0.19	1	1.4
0.50–0.59	3	4.1
0.60–0.69	7	9.5
0.70–0.79	8	10.8
0.80–0.89	6	8.1
0.90–0.99	16	21.6
1.00–1.09	5	6.8
1.10–1.19	8	10.8
1.20–1.29	3	4.1
1.30–1.39	7	9.5
1.40–1.49	3	4.1
1.50–1.59	1	1.4
1.60–1.69	2	2.7
1.70–1.79	1	1.4
2.10–2.19	1	1.4
2.50–2.59	1	1.4
3.00–3.09	1	1.4
Total	74	100.0%*

* Approximate.

greater amounts of thiamin respectively. In the older group (38–56 years), the mean numbers of complaints were 1.5 and 0.9 for the lower and higher thiamin intakes respectively.

DISCUSSION

In Table 8 are summarized the mean numbers of cardiovascular complaints in terms of the two age groups (younger and older) and thiamin consumption (lower and higher). It is noteworthy that, of the four combinations, the older subjects consuming the lesser amount of thiamin had the greatest mean number of cardiovascular complaints (1.5). In contrast, the younger subjects with the higher thiamin intake had the least mean number of cardiovascular complaints (0.5). Thus, there was a threefold difference between these two age groups. It is also noteworthy that in the older group with the higher B_1 consumption, the findings (0.9) were essentially the same as in the younger group with the lower intake (0.9).

These observations are of interest for two reasons: 1) the fact that such correlations prevail in the early, ill-defined, marginal area between optimal health and obvious disease, and 2) thiamin plays a vital co-carboxylase role in the enzyme systems (6) so necessary in the intermediary metabolism of carbohydrate foodstuffs.

It should be pointed out, however, that the relationships cited here do not in themselves prove that thiamin modifies the cardiovascular picture. The

TABLE 6

Daily Total Caloric Intake

Calories	Males	Females
600–699	0	1
1200–1299	0	4
1300–1399	0	4
1400–1499	0	3
1500–1599	1	6
1600–1699	1	0
1700–1799	1	2
1800–1899	3	1
1900–1999	4	2
2000–2099	2	4
2100–2199	3	0
2200–2299	6	1
2300–2399	2	4
2400–2499	3	1
2500–2599	4	0
2600–2699	1	0
2700–2799	2	0
2800–2899	2	0
2900–2999	1	0
3000–3099	1	0
3100–3199	2	0
3200–3299	1	0
3600–3699	1	0
Totals	41	33
Means	2357	1705

TABLE 7

Mean Number of Cardiovascular Complaints in Terms of Daily Thiamin Intake

Age Group (yrs)	Daily Thiamin Intake		Total
	0.13–0.91 mg	0.92–2.95 mg	
23–37	(18)* 0.9	(18) 0.5	(36) 0.7
38–56	(19) 1.5	(19) 0.9	(38) 1.2
Entire sample	(37) 1.2	(37) 0.7	(74) 1.0

* Number in parenthesis is sample size.

TABLE 8

Summary of Mean Number of Cardiovascular Complaints

Age Category	Thiamin Intake	Mean No. of Cardiovasc. Findings
Older	Lower	1.5
Older	Higher	0.9
Younger	Lower	0.9
Younger	Higher	0.5

possible causative role of thiamin would require an analysis of the frequency of cardiovascular symptoms before and after administration of thiamin versus placebo.

We are now preparing a report on the frequency of cardiovascular signs and symptoms in the light of *both* thiamin and carbohydrate consumption.

SUMMARY

A study was made of the correlation between cardiovascular complaints (elicited by means of the Cornell Medical Index Health Questionnaire) and daily thiamin (vitamin B_1) consumption in 74 dental practitioners and their wives.

The results suggest a greater frequency of cardiovascular complaints in relatively older persons who consume relatively smaller quantities of vitamin B_1.

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