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PROPOSAL OF NEW INDEX AND CLASSIFICATION OF ROBUSTICITY OF VIETNAMESE ADULTS

ABSTRACT — After studying indexes of robusticity of Vietnamese adults aged from 18 to 70, the authors have proposed new index (combined index) for evaluation of robusticity and presented classification scales of robusticity of Vietnamese adults in different groups of ages of both sexes.

KEY WORDS: Anthropometry — Robusticity index — Vietnamese adults.

SUBJECTS AND METHOD

We have studied 3486 Vietnamese adults (1080 men, 2406 women) aged from 18 to 70, living in provinces Thanh hoa, Thai binh (North Vietnam) and Lam dong, Hau giang (South Vietnam).

On each subject we measured body dimensions connected with his (or her) robusticity by usual anthropological methods and instruments.

Classification scales of robusticity are established due to methods of biological statistics.

RESULTS AND DISCUSSIONS

Proposal of new index of robusticity

The Pignet index of robusticity is commonly used in Vietnam and elsewhere. In 1970, Nguyen Quang Quyen et al. proposed Q. V. C index for

evaluating the robusticity of Vietnamese adults. In the above index the authors applied body perimeters (thorax, thigh and arm perimeters) instead of weigh. In our study we have found that these two indexes (Pignet's and Q. V. C) have their advantages and disadvantages. Therefore we established a new index called a combined index (C. I).

C. I = Height (cm) — (Weigh /kg/ + Maximal inhaled thorax perimeter /cm/ + Right thigh perimeter /cm/ + Contractive right arm perimeter /cm/) + 100.

Coefficient of correlation between the combined index and Pignet's index is 0,74, between the combined index and Q. V. C index is 0,88. The combined index has in this way a close correlation with two above indexes and it may be put into practice.

Robusticity indexes and classification scales

The results obtained are presented in Table 1.

TABLE 1. Indexes of robusticity

Indexes	Sexes	Age groups			
		18—25	26—40	41—55	Over 55
1. Broca i = Height [cm] — Weigh [kg]	Men	112 ± 4	112 ± 5	112 ± 4	113 ± 4
	Women	105 ± 4	105 ± 5	106 ± 4	107 ± 4
2. Quetelet i = Weigh [kg] / Height [dm]	Men	3.0 ± 0.3	3.1 ± 0.3	3.0 ± 0.3	2.9 ± 0.3
	Women	2.9 ± 0.3	3.0 ± 0.3	2.9 ± 0.3	2.8 ± 0.3
3. Kaup i = Weigh [g] / Height [cm]	Men	2.0 ± 0.2	1.9 ± 0.2	1.9 ± 0.2	1.8 ± 0.1
	Women	2.0 ± 0.2	2.0 ± 0.2	1.9 ± 0.1	1.9 ± 0.1
4. Rohrer i = Weigh [kg] / Height ³ [cm]	Men	1.2 ± 0.2	1.2 ± 0.2	1.2 ± 0.2	1.1 ± 0.2
	Women	1.3 ± 0.2	1.3 ± 0.2	1.3 ± 0.2	1.2 ± 0.2
5. Coefficient thorax-abdomen i = Perimeter of thorax [cm] — Perimeter abdomen [cm]	Men	8.0 ± 2.0	7.5 ± 2.0	8.5 ± 2.0	8.5 ± 2.0
	Women	6.0 ± 2.0	4.0 ± 2.0	5.5 ± 2.0	5.0 ± 2.0
6. Brugsch Average perimeter of thorax [cm] × 100 / Height [cm]	Men	47.8 ± 1.8	48.0 ± 1.8	48.0 ± 1.8	48.3 ± 1.6
	Women	48.8 ± 1.6	50.4 ± 1.8	48.4 ± 1.6	47.9 ± 1.8
7. Hirtz i = Max. inhaled thorax perimeter [cm] — Max. exhaled thorax perimeter [cm]	Men	6.2 ± 1.2	6.5 ± 1.0	6.2 ± 1.0	5.6 ± 1.2
	Women	5.7 ± 1.0	5.8 ± 1.0	5.4 ± 1.2	5.0 ± 1.0
8. Wervaeck Weigh [kg] + Average perim. of thorax [cm] / Height [cm]	Men	78.0 ± 5.0	79.0 ± 4.0	78.0 ± 4.0	75.5 ± 5.0
	Women	79.0 ± 4.0	79.5 ± 4.0	77.0 ± 4.0	75.5 ± 4.0
9. Pignet i = Height [cm] — (Weigh/[kg] + Average perim. of thorax [cm])	Men	35 ± 6	34 ± 6	35 ± 6	39 ± 5
	Women	32 ± 6	31 ± 6	34 ± 6	36 ± 5
10. Q. V. C i = Height [cm] — (Max. inhaled thor. perim. [cm] + Right thigh perim. [cm] + Contract. right arm perim. [cm])	Men	12 ± 6	10 ± 6	11 ± 6	16 ± 6
	Women	3 ± 6	3 ± 6	6 ± 6	11 ± 6
11. Combined index [C. I] i = Height [cm] — (Weigh [kg] + Max. inhaled thor. perim. [cm] + Right thigh perim. [cm] + Contract. right arm perim. [cm]) + 100.	Men	63 ± 7	60 ± 7	63 ± 7	71 ± 6
	Women	58 ± 7	57 ± 7	62 ± 7	70 ± 6

Relying upon the result of table we established classification scales of robusticity as follow:

TABLE 2. Classification scales of robusticity

Indexes	Age	Sexes	Degree				
			Very fat	Fat	Average	Thin	Very thin
1. Broca	18—25	Men	Under 106	106—109.9	110—114	114.1—118	Over 118
		Women	Under 99	99—102.9	103—107	107.1—111	Over 111
	26—40	Men	Under 104.5	104.5—109.4	109.5—114.5	114.6—119.5	Over 119.5
		Women	Under 97.5	97.5—102.4	102.5—107.5	107.6—112.5	Over 112.5
	41—55	Men	Under 106	106—109.9	110—114	114.6—118	Over 118
		Women	Under 100	100—103.9	104—108	108.1—112	Over 112
	Over 55	Men	Under 107	107—110.9	111—115	115.1—119	Over 119
		Women	Under 101	101—104.9	105—109	109.1—113	Over 113

TABLE 2 (continued)

Indexes	Age	Sexes	Degree				
			Very fat	Fat	Average	Thin	Very thin
2. Quetelet	18—25	Men	Over 3.45	3.16—3.45	2.85—3.15	2.55—2.84	Under 2.55
		Women	Over 3.35	3.06—3.35	2.75—3.05	2.45—2.74	Under 2.45
	26—40	Men	Over 3.55	3.26—3.55	2.95—3.25	2.65—2.94	Under 2.65
		Women	Over 3.45	3.16—3.45	2.85—3.15	2.55—2.84	Under 2.55
3. Kaup	41—55	Men	Over 4.45	3.16—3.45	2.85—3.15	2.55—2.84	Under 2.55
		Women	Over 3.35	3.06—3.35	2.75—3.05	2.45—2.74	Under 2.45
	Over 55	Men	Over 3.30	3.01—3.30	2.70—3.00	2.40—2.69	Under 2.40
		Women	Over 3.20	2.91—3.20	2.40—2.90	2.30—2.59	Under 2.30
4. Rohrer	18—25	Men	Over 2.11	1.96—2.11	1.79—1.95	1.63—1.78	Under 1.63
		Women	Over 2.23	2.08—2.23	1.91—2.07	1.75—1.90	Under 1.75
	26—40	Men	Over 2.14	1.99—2.14	1.82—1.98	1.66—1.81	Under 1.66
		Women	Over 2.24	2.09—2.24	1.92—2.08	1.76—1.91	Under 1.76
5. Coefficient thorax-abdomen	41—55	Men	Over 2.10	1.95—2.10	1.78—1.94	1.62—1.77	Under 1.62
		Women	Over 2.13	2.00—2.13	1.85—1.99	1.71—1.84	Under 1.71
	Over 55	Men	Over 2.01	1.88—2.01	1.73—1.87	1.59—1.72	Under 1.59
		Women	Over 2.08	1.85—2.08	1.80—1.94	1.66—1.79	Under 1.66
6. Brugsch	18—25	Men	Over 1.40	1.25—1.40	1.08—1.24	0.92—1.07	Under 0.92
		Women	Over 1.56	1.41—1.56	1.24—1.40	1.08—1.23	Under 1.08
	26—40	Men	Over 1.42	1.26—1.42	1.10—1.26	0.94—1.09	Under 0.94
		Women	Over 1.60	1.43—1.60	1.24—1.42	1.06—1.23	Under 1.06
7. Hirtz	41—55	Men	Over 1.41	1.26—1.41	1.09—1.25	0.93—1.08	Under 0.93
		Women	Over 1.52	1.37—1.52	1.20—1.36	1.04—1.19	Under 1.04
	Over 55	Men	Over 1.38	1.23—1.38	1.06—1.22	0.90—1.05	Under 0.90
		Women	Over 1.50	1.35—1.50	1.18—1.34	1.02—1.17	Under 1.02
8. Vervaeck	18—25	Men	Under 5.0	5.0—6.9	7.0—9.0	9.1—11.0	Over 11.0
		Women	Under 3.0	3.0—4.9	5.0—7.0	7.1—9.0	Over 9.0
	26—40	Men	Under 4.5	4.5—6.4	6.5—8.5	8.6—10.5	Over 10.5
		Women	Under 1.0	1.0—3.0	3.0—5.0	5.1—7.0	Over 7.0
9. Pignet	41—55	Men	Under 5.5	5.5—7.4	7.5—9.5	9.6—11.5	Over 11.5
		Women	Under 2.5	2.5—4.4	4.5—6.5	6.6—8.5	Over 8.5
	Over 55	Men	Under 5.5	5.5—7.4	7.5—9.5	9.6—11.6	Over 11.6
		Women	Under 2.0	2.0—3.9	4.0—6.0	6.1—8.0	Over 8.1
Indexes	Age	Sexes	Very strong	Strong	Average	Weak	Very weak
10. Q. V. C	18—25	Men	Over 50.5	48.8—50.3	46.9—48.7	45.1—46.8	Under 45.1
		Women	Over 51.2	49.7—51.2	48.0—49.6	46.4—47.9	Under 46.4
	26—40	Men	Over 50.7	49.0—50.7	47.1—48.9	45.3—47.0	Under 45.3
		Women	Over 52.1	51.4—52.1	49.5—51.3	47.7—49.4	Under 47.7
11. Combined index [C. I]	41—55	Men	Over 50.7	49.0—50.7	47.1—48.9	45.3—47.0	Under 45.3
		Women	Over 50.8	49.3—50.8	47.6—49.2	46.0—47.5	Under 46.0
	Over 55	Men	Over 50.7	49.2—50.7	47.5—49.1	46.9—47.4	Under 46.9
		Women	Over 50.6	48.9—50.6	47.0—48.8	45.2—46.9	Under 45.2

TABLE 2 (continued)

Indexes	Age	Sexes	Degree				
			Very strong	Strong	Average	Weak	Very weak
9. Pignet	18—25	Men	Under 26.0	26.0—31.9	32.0—38.0	38.1—44.0	Over 44.0
		Women	Under 23.0	23.0—28.9	29.0—35.0	35.1—41.0	Over 41.0
	26—40	Men	Under 25.0	25.0—30.9	31.0—37.0	37.1—43.0	Over 43.0
		Women	Under 22.0	22.0—27.9	28.0—34.0	34.1—40.0	Over 40.0
	41—55	Men	Under 26.0	26.0—31.9	32.0—38.0	38.1—44.0	Over 44.0
		Women	Under 25.0	25.0—30.9	31.0—37.0	37.1—43.0	Over 43.0
	Over 55	Men	Under 30.5	30.5—36.4	36.5—41.5	41.6—46.5	Over 46.5
		Women	Under 28.5	28.5—33.4	33.5—38.5	38.6—43.5	Over 43.5
10. Q. V. C	18—25	Men	Under 3.0	3.0—8.9	9.0—15.0	15.1—21.0	Over 21.0
		Women	Under 6.0	(—6.0)—(—0.1)	0.0—6.0	6.1—12.0	Over 12.0
	26—40	Men	Under 1.0	1.0—6.9	7.0—13.0	13.1—19.0	Over 19.0
		Women	Under 6.0	(—6.0)—(—0.1)	0.0—6.0	6.1—12.0	Over 12.0
	41—55	Men	Under 2.0	2.0—7.9	8.0—14.0	14.1—20.0	Over 20.0
		Women	Under 3.0	(—3.0)—2.9	8.0—9.0	9.1—15.0	Over 15.0
	Over 55	Men	Under 7.0	7.0—12.9	13.0—19.0	19.1—25.0	Over 25.0
		Women	Under 2.0	2.0—7.9	8.0—14.0	14.1—20.0	Over 20.0
11. Combined index/C. I	18—25	Men	Under 52.5	52.5—59.4	59.5—66.5	66.6—73.5	Over 73.5
		Women	Under 47.5	47.5—54.4	54.5—61.5	61.6—68.5	Over 68.5
	26—40	Men	Under 49.5	49.5—56.4	56.5—63.5	63.6—70.5	Over 70.5
		Women	Under 46.5	46.5—53.4	53.5—60.5	60.6—67.5	Over 67.5
	41—55	Men	Under 52.5	52.5—59.4	59.5—66.5	66.6—73.5	Over 73.5
		Women	Under 51.5	51.5—58.4	58.5—65.5	65.6—72.5	Over 72.5
	Over 55	Men	Under 62.0	62.0—67.0	68.0—74.0	74.1—80.0	Over 80.0
		Women	Under 61.0	61.0—66.9	76.0—73.0	73.1—79.0	Over 79.0

On analyzing data from *Tables 1* and *2* we have found that there is a difference between robusticity of men and women and between robusticity of the groups of age. That's why it is necessary to establish classification scales for each sex and each group of age.

CONCLUSION

After studying indexes of robusticity of 3486 Vietnamese adults (1080 men, 2406 women) aged from 18 to 70, we draw the following conclusions:
— Combined index of Pignet and Q. V. C is better than the above indexes therefore it's better to use it for evaluation of robusticity.
— Because our classification scales of robusticity

are established on a great number of subjects they may be used to evaluate robusticity of Vietnamese adults in different groups of ages of both sexes.

REFERENCES

- NGUYEN QUANG QUYEN, 1974: *Anthropometry in Vietnamese*. Medical edition of Hanoi. (in Vietnamese).
- NGUYEN QUANG QUYEN, DO NHU CUONG, 1972: L'étude des indices de la robusticité chez les Vietnamiens. — *Anthropologie* X/2,3:
- TRINH HUU VACH et al., 1986: *Study of morphological parameters of Vietnamese adults*. Hinh thai hoc 1986. Hanoi. (in Vietnamese).
- TRINH HUU VACH, (in press): Etude des échelles de classification de la robusticité chez les adultes Vietnamiens. *Revue médicale* 1986. Edition médicale Hanoi.

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