Cardiovascular risk factor prevalence in three Chinese communities in 1989

Xuxu Rao[1], Bridget H-H Hsu-Hage[2], Mark L Wahlqvist[2], Yihe Li[1], Xiaoqing Liu[1], Kui Zhang[1], Tiehan Kuang[3], Daolin Zhang[4], Zongrong Dai[5], and the Australia-PR China Collaborative Health Study team[6]

1. Guangdong Provincial Cardiovascular Institute, Guangzhou, China; 2. Monash University, Department of Medicine, Australia; 3. Bureau of Public Health, Xinhui County, Guangdong, China; 4. Chaozhou Medical Research Institute, Chaozhou County, Guangdong, China; 5. Meizhou People's (Hunagtong) Hospital, Meizhou County, Guangdong, China; 6. Monash University, Australia: BH-H Hsu-Hage, ML Wahlqvist, N Balazs; Guangdong Provincial Cardiovascular Institute, China: Xuxu Rao, Yihe Li, Runchao Cen, Zhendong Huang, Kui Zhang, Gemin Ni, Peifang Chen, Xiangbin Huang, Limin Ma, Xiaoqing Liu, Xiangmin Gao, Jinzhuong Mai, Chenye Guo, Meiling Shi, Biaorong Liang, Yiling Zhuo, Jian Luo, Hongshui Wu, Dexing Deng, Ciacien Jiang, Wen Li, Yanja Long; Guangdong Provincial Public Health Bureau, China: Guoshen Jiang; Bureau of Public Health Xinhui County, China: Tiehan Kuang; Chaozhou Medical Research Institute, Chaozhou County, China: Daolin Zhang; Meizhou People's (Huangtong) Hospital, Meizhou County, China: Zongrong Dai.

The cardiovascular risk prevalence of 935 adult Chinese living in Chauzhou, Meizhou, and Xinhui cities of Guangdong Province, China, is reported. The three communities are geographically separated, and represent the three major dialect group in Guangdong Province (Teochew, Hakka and Cantonese respectively) which are also the major donor populations of overseas Chinese to Australia and South East Asia. Taking into account historical data, the conventional cardiovascular risk factor prevalence of these combined communities in China as a whole is on the increase and approaches or even exceeds that in Western Society. However, the three communities are not very alike in their prevalences of individual conventional cardiovascular risk factors, notably for hyperlipidaemia (most prevalent in Chauzhou), hypertension (most prevalent in Chauzhou men at 12.4% and least in Meizhou women 5.0%) and cigarette smoking (most prevalent in Xinhui men at 72.7% and least in Xinhui women, 0%). They are similar in stature, body weight, BMI, and waist-to-hip ratio, with very low prevalences of overweight/obesity, or abdominal obesity. An understanding of the contributors to sub-ethnic difference in cardiovascular risk should emerge with further study of these Chinese populations.

Introduction

In a migrant health study of adult Chinese living in Melbourne, Australia, it was found that differences in cardiovascular risk profile amongst the Chinese migrants could not be fully explained by the effects of migration alone. They were generally characterised by the length of exposure to the host environment (the Australian lifestyle). Lifestyle (including food habits) of individuals varies in response to the length of exposure to the host environment[1].

Anthropological evidence suggests that regional differences in food beliefs and eating practices amongst the Chinese in China may be characterised by sub-ethnicity[1]. A collaborative study between Australia and China was launched in 1989 to research 1) the effect of migration or 'westernisation' on cardiovascular risk factor prevalence, and 2) the effect of ethnicity on eating practices or food culture. In this paper, the base-line data for conventional cardiovascular risk factor prevalence (indices of body fatness, blood pressure, serum lipids, glycaemic status, and cigarette smoking) in three communities of Guangdong Province, China, are reported.

Methods

Study design and subjects

This is a collaborative study between Monash University, Department of Medicine, in Australia and the Guangdong Cardiovascular Institute in China, which aims to collect comparable data in the two countries. It received ethics approval from all relevant international committees. The study protocol in China followed closely that of the Melbourne Chinese Health Study[1]. The risk factor assessment methodology for the Melbourne Chinese Health Study has been reported elsewhere[2]. Cross-sectional data from Chauzhou, Meixian, and Xinhui counties of Guangdong Province, China, were obtained. The three study communities were geographically dispersed and relatively stable. They represented those who spoke 'Teochew', 'Hakka' and 'Cantonese', respectively, at home. The field work took place during September and October 1989, 935 adults aged 25 and over from three communities (about 300 subjects each) were interviewed. Questionnaires, adopted from the Melbourne Chinese

Correspondence address: Dr Bridget H-H Hsu-Hage, Monash University, Department of Medicine, MMC, 246 Clayton Road, Level 5 Block E, Clayton, Victoria 3168, Australia
Fax : +61-3-9550-5524 Tel: +61-3-9550-5522

Health Study[1], were self-administered and included socio-demographic characteristics, self-reported medical history, lifestyle, and food habits[3]. Cardiovascular risk factor assessments included blood pressure, anthropometry, serum lipids and blood glucose[2]. Each of the three communities were sampled from a random selection of occupational units within the catchment area. Table 1 shows the sampling frame and number sampled.

Risk factor assessment

Body weight, stature, circumferences, and body fatness

Weight was measured to the nearest 0.5 kg in light clothing on a digital scale and height was measured to the nearest 1 cm, without shoes. Body mass index (BMI), an indicator of total body fatness, is the weight in kilograms divided by height in metres squared. The classification for underweight (BMI<20), acceptable weight (BMI 20-24.9), overweight (BMI 25-29.9), and obese (BMI≥30) recommended by the Australian National Health and Medical Research Council were used to assess the prevalence of overweight or obesity[4,5].

Abdominal fatness was assessed using the waist-to-hip circumference ratio[2,6]. The waist circumference was measured to the nearest 0.1 cm at the level of the umbilicus and the hip circumference was measured to the nearest 0.1 cm at the maximum hip diameter in light clothing. Individuals with a waist-to-hip ratio greater than 0.95 for men and 0.85 for women were defined as abdominally obese.

Blood pressure

Blood pressure was measured three times at one session using a standard mercury sphygmomanometer. The participant was seated comfortably for at least 5 minutes, had an empty bladder, and refrained from smoking for at least 15 minutes. Readings were taken from the right arm with the cuff position at heart level. Systolic pressure was obtained at the Korotkoff's first phase (appearance of sound), and diastolic pressure was obtained at the fifth phase (disappearance of sound). The average of the three readings was calculated as was the geometric mean. Hypertension was defined as either an elevation in both diastolic and systolic blood pressure or treatment[2,7].

Serum lipids and whole blood fasting glucose.

Fasting blood specimens were obtained from more than 95% of subjects. Electrical failure occurred following the field work in Xinhui and less than 50% of those blood samples were usable for subsequent analyses.

The lipid analyses were performed in laboratories at Guangdong Provincial Cardiovascular Institute. Serum cholesterol was measured with the Boehringer Mannheim Diagnostics high-performance enzymic reagent calibrated with precise standards on the Abbott Laboratories ABA200 bichromatic analyser.

Serum cholesterol was reported as mg/L and later converted to mmol/L. Serum triglyceride was determined with the use of an enzymic reagent from Abbott Laboratories on the ABA200.

For all specimens the free glycerol blank was measured with an Abbott reagent and subtracted to give the net value. The quality assurance of the laboratory is monitored for analyses of total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), and triglycerides (TG) by the Lipid Standardization Program of the US National Heart, Lung, and Blood Institute, and the Center for Disease Control (CDC). Serum pools prepared by the CDC for internal quality control were used in all analyses.

Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald formula[8]. The prevalence of hyperlipidaemia was defined as TC greater than or equal to 6.5 mmol/L and TG greater than or equal to 2.0 mmol/L[7].

The whole blood fasting glucose level was calibrated on a Boehringer Mannheim Reflolux II device which produced a comparable reading to the YSL glucose analyser (model 23 AM)[2].

Smoking

Smoking prevalence was assessed using a self-administered questionnaire. Participants were asked if they had ever smoked-- if yes, at what age they started smoking and if they were a current smoker-- if yes, the type of tobacco and the amount of tobacco smoked per day (number of cigarettes or grams of hand-rolled tobacco per day). Subjects were classified as current smoker, ex-smoker, or never smoked.

Table 1. Characteristics of the sampling frame for each community

	Study Population		
	Chauzhou	Meizhou	Xinhui
Population	203,912	167,084	848,064
Gender ratio	1.03	1.15	0.99
Income (RMB per capita)	2,000	2,549	2,882
Incidence (per 1000)			
Stroke	1.2[a]	1.9[b]	na
Coronary Heart Disease	0.6[a]	1.2[b]	na
Rheumatic Heart Disease	0.2a	0.7b	na
Catchment area (in occupational units)	Baihua Tia Vocational Middle School Chauzhou Torch & Light Factory; Chinese Industrial & Commercial Bank Chauzhou Branch; Jinshan Middle School; Electric Machinery Factory; Chauzhou Building & Scientist Committee of Chauzhou	United Middle School; Meizhou Cigarette Factory; Huang Tang Hospital; Meizhou Mineral Bureau	Dong Fang Hong Middle School; Labour University; Farmer Machinery Factory & People's Hospital
Total eligible	1569	1627	730
Number sampled	312	309	312
Participation rate (%)	98	99	95

a. provided by Chauzhou City Central Hospital; b. Meizhou City Hospital admission data

Multiple risk score

A multiple risk score was calculated based on the presence of (1) diastolic blood pressure ≥ 95 mmHg, (2) total cholesterol ≥ 6.5 mmol/L, or (3) cigarette smoking, using the Australian National Heart Foundation definition of multiple risk[1]. The multiple risk score equalled the total number of risk factors present.

Results

Demographic characteristics

Over 900 subjects were randomly selected for enrolment and represented the catchment communities of Chauzhou, Meizhou, and Xinhui city in Guangdong Province, China. The participation rate exceeded 95% in all three communities, and the gender ratios were representative of the communities studied. The number of subjects was 312 (202 men and 110 women), 309 (169 men and 140 women), and 312 (194 men and 118 women), drawn from Chauzhou, Meizhou, and Xinhui cities respectively.

The average age was about 44 years for men and 39 years for women. Men in Chauzhou were significantly older than men in Meizhou; Meizhou women were significantly younger than women in Chauzhou and Xinhui. Table 2 shows the age distribution, including mean and standard deviation, of the communities studied.

Table 3 shows distribution for marital status, education level, occupational status, and annual household income by gender and community. Briefly, more than 95% of all three study communities were married. Chauzhou men had the highest percentage (36.6%) who had completed a tertiary education compared to their counterparts in Meizhou (28.7%) and Xinhui (17.4%). For women, about 10% had completed a tertiary education. Meizhou had a noticeably lower percentage of men (4.2%) and women (7.2%) that had only completed primary school. The study communities represented primarily professional, administrative, and clerical occupations. In Chauzhou and Xinhui, more women than men (Chauzhou: 33.3 vs 19.3%; Xinhui: 22.9 vs 7.7%) performed professional or administrative duties. The gross household incomes were similar between men and women for each community, and higher amongst the communities of Meixian and Xinhui.

Anthropometry

Table 4 shows anthropometric data for men and women of each study community. The three communities were similar in body weight (58.6 kg for men and 51.3 kg for women), stature (166.6 cm for men and 156.3 cm for women), waist circumference (76.6 cm for men and 72.8 cm for women) hip circumference (90.3 cm for men and

Table 2. Age (years) distribution, by gender and study community (data collected in 1989 from Guangdong Province, China)

Community		n	Mean	SD	Percentiles 5	10	25	50	75	90	95
Men	Chauzhou	202	46.4[a]	9.14	31	34	40	46	53	58	59
	Meizhou	169	43.2[a]	10.28	27	29	35	43	52	57	58
	Xinhui	194	42.3	9.60	27	31	39	44	51	55	57
	Total	**565**	**44.7**	**9.27**	**28**	**32**	**38**	**44**	**52**	**57**	**59**
Women	Chauzhou	110	40.3[b]	9.19	26	28	33	41	47	52	54
	Meizhou	140	36.7[bc]	8.28	26	27	30	36	43	49	51
	Xinhui	118	40.5[c]	8.16	27	30	34	40	47	51	54
	Total	**368**	**39.0**	**8.69**	**26**	**27**	**32**	**39**	**45**	**51**	**53**

a,b,c. Identical superscripts indicate significant differences between communities ($p<0.05$)

Table 3. Socio-demographic variables characteristics, by gender and study community (data collected in 1989 from Guangdong Province, China)

	Men			Women		
	Chauzhou (n=203)	Meizhou (n=169)	Xinhui (n=194)	Chauzhou (n=111)	Meizhou (n=140)	Xinhui (n=118)
Marital status						
Married	98.5	95.9	93.8	91.9	98.6	95.8
Never married	0.5	3.6	4.6	3.6	0.7	2.5
Separated, divorced, widowed	1.0	0.6	1.5	4.5	0.7	1.6
Education level (yrs)						
0-6	17.3	4.2	31.6	31.8	7.2	35.6
7-9	17.8	26.9	25.8	35.5	38.1	22.0
10-12	28.2	40.1	25.3	21.8	47.5	31.4
13+	36.6	28.7	17.4	10.9	7.2	11.0
Occupation status						
Professional, administrative	19.3	11.9	7.7	33.3	12.1	22.9
Clerical, sales	49.5	53.0	54.6	55.9	78.6	66.1
Manual worker	7.4	5.4	11.3	1.8	1.4	6.8
Other	23.8	29.8	26.3	9.0	7.9	4.2
Gross household income (RMB pa)						
<5,000	24.5	3.6	9.4	27.3	1.4	12.0
5,001-10,000	62.5	63.1	44.0	55.5	57.6	48.7
>10,000	13.0	33.3	46.6	17.3	41.0	39.3

RMB pa, Renminbi or Chinese yuan per annum

91.3 cm for women), body mass index (21.1 for men and 21.0 for women), and waist-to-hip ratio (0.847 for men and 0.796 for women). In all communities, men had a greater body weight, stature, waist circumference, and waist-to-hip circumference than women.

Table 4. Anthropometric data, by gender and study community (data collected in 1989 from Guangdong Province, China)

					Percentiles						
	Community	n	Mean	SD	5	10	25	50	75	90	95
Body weight (kg)											
Men	Chauzhou	203	58.8	8.2	45	49	53	59	63	69	74
	Meizhou	169	59.3	8.5	46	49	54	59	65	70	73
	Xinhui	192	57.7	9.0	45	48	51	56	64	70	75
	Total	564	58.6	8.6	46	48	53	58	64	70	74
Women	Chauzhou	111	50.5	7.3	39	43	46	50	54	62	64
	Meizhou	140	51.6	8.1	41	42	46	51	57	63	65
	Xinhui	118	51.7	7.7	40	42	47	52	56	62	68
	Total	369	51.3	7.7	41	42	46	50	56	62	65
Stature (cm)											
Men	Chauzhou	203	166.5	6.0	156	160	163	166	170	174	176
	Meizhou	169	167.1	6.2	157	160	164	167	171	175	176
	Xinhui	192	166.3	5.8	157	159	162	166	170	174	176
	Total	564	166.6	6.0	156	159	163	167	170	174	176
Women	Chauzhou	111	155.9	5.2	149	151	153	155	160	163	164
	Meizhou	140	156.4	5.0	148	150	153	157	160	163	165
	Xinhui	118	156.6	5.2	149	150	153	156	160	163	165
	Total	369	156.3	5.1	149	150	153	156	160	163	165
Waist circumference (cm)											
Men	Chauzhou	203	76.5	8.0	65	71	70	76	82	87	90
	Meizhou	169	77.1	8.7	64	66	71	77	83	88	90
	Xinhui	194	76.1	9.5	64	66	69	74	82	89	95
	Total	566	76.6	8.8	64	66	70	76	83	88	92
Women	Chauzhou	111	72.9	8.8	62	64	66	71	77	86	90
	Meizhou	140	71.2	8.1	60	62	65	70	76	82	86
	Xinhui	118	74.5	9.0	60	63	69	74	80	87	90
	Total	369	72.8	8.7	60	63	66	72	78	85	89
Hip circumference (cm)											
Men	Chauzhou	203	90.8	5.6	84	84	87	90	94	98	101
	Meizhou	168	90.5	6.4	81	84	87	91	94	97	100
	Xinhui	194	89.6	6.2	81	83	85	89	94	98	100
	Total	565	90.3	6.1	82	84	86	90	94	98	100
Women	Chauzhou	111	91.7	6.1	83	85	88	92	95	99	102
	Meizhou	140	91.2	5.8	82	84	87	91	95	99	101
	Xinhui	118	91.0	6.7	82	84	87	91	95	99	103
	Total	369	91.3	6.1	82	84	87	91	95	99	102
Body mass index (kg/m^2)											
Men	Chauzhou	203	21.2	2.7	17.1	17.9	19.3	20.9	22.8	24.7	25.9
	Meizhou	169	21.2	2.7	16.7	17.5	19.2	21.3	23.0	24.8	26.0
	Xinhui	192	20.9	3.1	16.9	17.6	18.5	20.6	22.4	25.1	26.6
	Total	564	21.1	2.9	16.9	17.7	18.9	20.9	22.7	24.8	26.2
Women	Chauzhou	111	20.8	2.9	16.6	17.7	18.6	20.2	22.4	25.0	26.0
	Meizhou	140	21.1	3.0	16.9	17.7	18.6	20.5	23.4	25.2	26.2
	Xinhui	118	21.1	2.8	16.7	17.6	18.8	20.9	23.0	24.7	26.0
	Total	369	21.0	2.9	16.8	17.7	18.7	20.4	23.0	25.2	26.0
Waist-to-hip ratio											
Men	Chauzhou	203	0.842	0.054	0.757	0.773	0.804	0.840	0.879	0.916	0.933
	Meizhou	169	0.852	0.078	0.754	0.774	0.810	0.846	0.889	0.933	0.949
	Xinhui	194	0.847	0.071	0.756	0.768	0.799	0.843	0.884	0.929	0.964
	Total	566	0.847	0.068	0.756	0.772	0.804	0.843	0.884	0.921	0.947
Women	Chauzhou	111	0.793	0.063	0.701	0.719	0.747	0.790	0.837	0.877	0.893
	Meizhou	140	0.779	0.055	0.703	0.714	0.743	0.776	0.811	0.848	0.879
	Xinhui	118	0.818	0.065	0.716	0.734	0.771	0.820	0.863	0.906	0.933
	Total	369	0.796	0.063	0.705	0.720	0.747	0.790	0.837	0.879	0.906

Blood pressure

The blood pressure profile is shown in Table 5. The average blood pressure was higher in men and women of Chauzhou compared to their counterparts in Meizhou and Xinhui.

Table 5. Blood pressure data, by gender and study community (data collected in 1989 from Guangdong Province, China)

	Community	n	Mean	SD	Percentiles 5	10	25	50	75	90	95
Systolic blood pressure (mmHg)											
Men	Chauzhou	203	126.5	18.6	103	109	115	121	137	151	159
	Meizhou	169	120.8	15.7	99	103	109	119	131	142	152
	Xinhui	193	116.5	15.2	97	100	107	113	123	135	150
	Total	565	121.4	17.1	100	103	110	119	129	143	156
Women	Chauzhou	111	119.9	19.3	97	101	107	115	129	147	163
	Meizhou	140	113.6	15.1	93	98	103	110	122	132	143
	Xinhui	118	110.2	13.8	93	95	101	109	113	129	139
	Total	369	114.4	16.5	93	98	103	110	121	137	148
Diastolic blood pressure (mmHg)											
Men	Chauzhou	203	81.7	9.8	69	70	74	80	89	94	99
	Meizhou	169	79.5	11.2	62	76	71	79	87	85	99
	Xinhui	193	78.3	10.4	63	67	71	79	84	91	95
	Total	565	79.9	10.5	64	68	71	79	87	93	99
Women	Chauzhou	111	77.2	11.3	61	65	69	74	85	90	97
	Meizhou	140	73.8	10.2	60	61	68	72	79	88	91
	Xinhui	118	73.8	9.7	60	63	69	71	78	88	94
	Total	369	74.8	10.5	60	62	69	72	80	89	93

Table 6. Serum lipid data, by gender and study community (data collected in 1989 from Guangdong Province, China)

	Community	n	Mean	SD	Percentiles 5	10	25	50	75	90	95
Serum total cholesterol (mmol/L)											
Men	Chauzhou	190	6.95	2.68	3.9	4.2	5.0	6.2	8.3	10.8	12.8
	Meizhou	161	5.70	1.73	3.4	4.0	4.6	5.3	6.6	7.9	9.0
	Xinhui	85	5.03	1.44	3.6	3.8	4.2	5.0	5.4	6.4	7.1
	Total	436	6.12	2.29	3.7	4.0	4.6	5.4	7.0	9.2	10.8
Women	Chauzhou	105	6.85	2.64	4.1	4.3	4.9	6.2	8.1	10.6	11.4
	Meizhou	138	5.48	1.76	3.4	3.6	4.3	5.1	6.2	7.8	9.1
	Xinhui	46	5.32	1.64	3.5	3.9	4.3	4.9	5.8	7.6	8.7
	Total	289	5.95	2.21	3.5	3.8	4.5	5.3	6.8	9.1	10.6
High density lipoprotein cholesterol (mmol/L)											
Men	Chauzhou	190	1.29	0.39	0.8	0.8	1.0	1.2	1.6	1.8	2.0
	Meizhou	160	1.27	0.33	0.8	0.9	1.0	1.2	1.5	1.7	1.9
	Xinhui	86	1.17	0.41	0.6	0.7	0.9	1.1	1.5	1.7	1.8
	Total	436	1.26	0.37	0.7	0.8	1.0	1.2	1.5	1.7	2.0
Women	Chauzhou	105	1.44	0.36	1.0	1.0	1.2	1.3	1.7	2.0	2.1
	Meizhou	138	1.46	0.38	0.9	1.0	1.2	1.4	1.7	2.0	2.2
	Xinhui	46	1.41	0.29	0.8	0.9	1.3	1.4	1.6	1.8	1.8
	Total	289	1.44	0.36	0.9	1.0	1.2	1.4	1.7	2.0	2.1
Low density lipoprotein cholesterol (mmol/L)											
Men	Chauzhou	190	4.98	2.44	2.1	2.5	3.1	4.3	6.3	8.5	10.0
	Meizhou	160	3.81	1.55	1.8	2.1	2.8	3.4	4.6	5.9	6.9
	Xinhui	85	3.34	1.31	2.1	2.2	2.7	3.0	3.7	4.4	5.5
	Total	435	4.23	2.07	2.0	2.3	2.8	3.7	5.0	7.2	8.3
Women	Chauzhou	105	4.84	2.48	2.0	2.3	3.1	4.3	6.1	8.2	9.3
	Meizhou	137	3.60	1.59	1.5	1.8	2.6	3.4	4.4	5.7	6.9
	Xinhui	46	3.48	1.43	1.9	2.0	2.6	3.2	3.9	5.6	6.4
	Total	288	4.03	2.03	1.8	2.0	2.7	3.6	4.7	6.7	8.0
Triglycerides (mmol/L)											
Men	Chauzhou	190	1.53	0.77	0.7	0.7	1.0	1.4	1.9	2.6	3.0
	Meizhou	161	1.40	1.20	0.5	0.6	0.8	1.0	1.6	2.6	3.5
	Xinhui	85	1.18	0.65	0.6	0.6	0.8	1.0	1.4	2.1	2.6
	Total	436	1.42	0.94	0.6	0.6	0.8	1.1	1.7	2.5	2.9
Women	Chauzhou	105	1.29	0.68	0.5	0.6	0.8	1.1	1.6	2.3	2.8
	Meizhou	137	0.96	0.64	0.4	0.5	0.6	0.8	1.1	1.6	2.5
	Xinhui	46	0.96	0.55	0.5	0.5	0.6	0.8	1.1	1.6	1.8
	Total	288	1.08	0.66	0.5	0.5	0.6	0.9	1.3	1.8	2.5

Table 7. Fasting whole blood glucose data, by gender and study community (data collected in 1989 from Guangdong Province, China)

					Percentiles						
	Community	n	Mean	SD	5	10	25	50	75	90	95
Men	Chauzhou	190	4.27	0.61	3.3	3.5	3.8	4.2	4.6	5.1	5.4
	Meizhou	162	4.03	0.81	2.6	3.1	3.6	4.1	4.4	5.0	5.3
	Xinhui	183	4.48	1.22	3.4	3.6	3.9	4.3	4.7	5.6	6.1
	Total	535	4.27	0.93	3.1	3.4	3.8	4.2	4.6	5.2	5.7
Women	Chauzhou	105	4.91	1.16	3.8	4.1	4.4	4.7	5.3	5.8	6.1
	Meizhou	138	4.40	0.88	2.8	3.4	3.8	4.4	5.1	5.6	5.7
	Xinhui	114	4.50	0.72	3.5	3.7	4.1	4.4	4.7	5.4	5.8
	Total	357	4.58	0.95	3.3	3.7	4.1	4.4	5.1	5.6	5.9

Table 8. Cardiovascular risk factor prevalence, by gender and study community (data collected in 1989 from Guangdong Province, China)

	Men			Women		
	Chauzhou (n=203)	Meizhou (n=169)	Xinhui (n=194)	Chauzhou (n=111)	Meizhou (n=140)	Xinhui (n=118)
Self reported medical history						
High blood pressure	10.1	7.1	8.7	8.1	6.4	5.9
High blood fat	6.0	7.7	6.7	5.4	5.0	15.3
Angina	6.0	3.6	5.2	5.4	1.4	3.4
Diabetes	0.5	0.6	2.6	0	0	0
Receiving treatment for cardiovascular disease risk						
High blood pressure	3.9	4.8	5.7	2.7	4.3	5.1
High blood fat	2.5	4.1	5.7	4.5	2.9	7.6
Angina	4.5	1.8	2.6	1.8	2.1	4.2
Diabetes	0.5	0.6	2.1	0	0	0
Overweight or obese						
Underweight	35.0	33.7	43.2	48.7	42.9	37.3
Acceptable weight	57.1	57.4	46.4	41.4	45.7	53.4
Overweight	7.4	8.9	8.9	9.9	11.4	9.3
Obese	0.5	0.0	1.6	0	0	0
Abdominal obesity						
Waist-to-hip ratio≥0.95	15.3	20.7	17.5			
Waist-to-hip ratio≥0.85				18.9	9.3	30.5
Hypertensive, defined by diastolic blood pressure, systolic blood pressure, and treatment						
On blood pressure tablets, DBP<95 mmHg and SBP<160 mmHg	2.5	1.2	2.1	0.9	1.4	2.5
On blood pressure tablets, DBP≥95 mmHg and SBP≥160 mmHg	1.5	3.6	3.6	1.8	2.9	2.5
Not on blood pressure tablets, DBP≥95 mmHg and/or SBP≥160 mmHg	8.4	5.9	2.1	6.3	0.7	1.7
Total diastolic and systolic hypertensive	12.4	10.7	9.8	9.0	5.0	6.7
Hyperlipidaemia						
Cholesterol≥5.5 mmol/L	60.5	40.6	23.5	64.7	40.6	28.2
Cholesterol≥6.5 mmol/L	46.3	26.7	9.4	41.0	22.5	15.2
Triglyceride≥2.0 mmol/L	22.1	16.2	11.8	13.3	5.1	4.4
Cholesterol≥6.5 mmol/L and Triglyceride≥2.0 mmol/L	16.3	6.8	3.5	11.4	4.4	4.4
Cigarette smoking status						
Current smoker	57.6	61.5	72.7	2.7	1.4	0
Ex-smoker	7.9	9.5	7.2	0	0.7	0
Never smoked regularly	34.5	29.0	20.1	97.3	97.9	100
Multiple risk factors						
No risk factors	20.0	27.3	20.2	54.3	74.6	82.6
One risk factors	50.5	51.6	69.1	41.9	23.9	15.2
Two risk factors	27.9	18.6	9.5	3.8	1.5	2.2
Three risk factors	1.6	2.5	1.2	0	0	0

Serum lipids

Chauzhou men and women had the highest serum TC, LDL-C, and TG compared to their counterparts in Meizhou and Xinhui (Table 6). Chauzhou men (1.29 mmol/L, SD=0.39) also had the highest level of HDL-C compared to Meizhou (1.27 mmol/L, SD=0.33) and Xinhui (1.17 mmol/L, SD=0.41) men. The percentile distributions show that as high as 10% of the Chauzhou community had a serum TC concentration greater than 10 mmol/L and on LDL-C greater than 8 mmol/L; otherwise the lipid distributions for men and women from Chauzhou were proportionally greater than those from Meizhou and Xinhui.

Fasting glucose

Chauzhou women had the highest whole blood fasting glucose concentrations (4.91 mmol/d, SD = 1.16) (Table 7). Fasting glucose in Chauzhou men was 4.27 mmol/L (SD=0.61), between their counterparts in Meizhou and Xinhui. Chauzhou and Meizhou men had a fasting glucose less than their female counterparts.

Prevalence of CVD risk factor Table 8 shows cardiovascular risk factor prevalence for the three communities. Self-reported cardiovascular risk factor prevalence was, in general, higher than the percentage who received some form of treatment for it. The prevalence of overweight was less than 10% for all three communities and obesity was rare. The prevalence of hypertension was about 10% in men and lower in women. Chauzhou had a prevalence of combined hyperlipidaemia (cholesterol ≥ 6.5 mmol/L and triglyceride ≥ 2.0 mmol/L) three to five-fold higher than Meizhou or Xinhui; more than 16% of Chouzhou men were hyperlipidaemic. Cigarette smoking was prevalent in men; more than 70% of Xinhui men currently smoked. Less than 3% of women smoked. Multiple risk factors were more prevalent in men than in women; about 80% of men had at least one risk factor present.

Discussion

Study population

This is a descriptive report of cardiovascular risk factor prevalence in three communities of the rapidly developing Guangdong Province, China. The three communities are geographically isolated from each other and represent three major Chinese dialect populations in China. Each population was randomly sampled from the catchment area. The demographic profile of the study population thus represented the catchment area, not the entire local government area. Each of the three study populations had a male-to-female ratio similar to its entire catchment and age distribution. The three populations however differed in male-to-female ratio, age distribution, education level, occupational status, and household income.

Body weight, stature, BMI, and abdominal fatness

The anthropometric data showed little difference amongst the three communities studied. The body weight and stature were similar to a previous study of urban Chinese in 1982[9], and other large scale studies in native Chinese[10,11]. Over the years, the southern Chinese have steadily increased their body weight, according to the PRC-USA research group report based on 1983 data[12]. The same study also showed a higher body weight and a higher BMI amongst the northern Chinese (Beijing area) compared to the southern populations. In the three communities, the men were about 4 kg lighter and the women 2 kg lighter than the Chinese living in Australia[2] and North America[10].

The results also reflect a similarity in BMI (an average of 21) and the prevalence of overweight/ obesity (BMI ≥ 25, about 9%) with the 1982 urban Chinese population[9] and a study of remote populations (Yi minority groups and Han people) living in the southwest region of China[13]. By comparison, the average BMI and the prevalence of overweight/ obesity in the three communities were somewhat less than a representative sample of Chinese living in Australia[2] or North America[10].

Abdominal fatness was similar to a 1988 Guangzhou population[14] and less pronounced than in Chinese Australians[2]. Waist circumference (not hip) was the main difference with other published data.

Blood pressure

Epidemiologic studies of blood pressure in Chinese populations to date suggest that blood pressure values vary within Chinese populations and may reflect geographic location or degree of modernisation[12,15]. An independent study of cardiovascular risk factor prevalence in a Guangzhou urban population in 1983-84[12] showed a lower mean blood pressure than that of the current study (Table 5). The same study also showed a higher mean blood pressure in Beijing populations than in Guangzhou[12]. The mean blood pressure in our study was close to that in the Beijing populations in 1983-84. The mean blood pressure in Chaozhou men and women was comparable to the Chinese living in Melbourne, Australia[2] and to Australians in general[7]. Diastolic blood pressure in all three communities was higher than in Chinese Australians[2]. The prevalence of untreated hypertension in the Chaozhou community was somewhat higher than in Chinese Australians. The prevalence of hypertension in the present study populations was 2.5 and 1.5 times higher for men and women, respectively than in a study of an urban population of Guangzhou in early 1983-84[12]. In the same study, in comparison to a Beijing urban population, the present study populations were less hypertensive.

Blood lipids and glucose

We found consistently high values of serum TC and LDL-C in all three communities. These values were not only higher than previously reported data in Guangzhou populations[12], but also higher than those of overseas Chinese[2,16]. The prevalence of hypertriglyceridaemia (triglycerides ≥ 2.0 mmol/L) was somewhat lower than Melbourne Chinese[2], but higher than Australians-at-large[7]. Fasting glucose was generally low with no reported diabetes in the study.

Smoking prevalence

The prevalence of cigarette smoking is comparable to that reported in the 1983-84 Guangzhou populations. The prevalence of ex-smokers was about 8% in men, about 3.5% higher than in the 1983-84 Guangzhou male population. There is inadequate evidence to suggest that

quitting smoking is prevalent in the Guangdong male populations. The prevalence of smoking in Guangdong female populations was low, compared to published data from a Beijing elderly Chinese population[17].

Conclusions

In this study, cardiovascular risk factor prevalence is reported in people of Chinese ethnicity living in three communities characterised by geographic separation and different cultural heritage. Current and rapid economic transition is imparting dietary and other lifestyle change to these populations. The principal findings are:

- Conventional cardiovascular risk factor prevalences in the southern Chinese have reached biologically and population-significant levels.
- There remain appreciable differences in risk between sub-ethnic groups in Southern China.
- The prevalence of being overweight or obese remains low for all communities and both genders, the highest being an aggregate for BMI >25 of 11% for Meizhou women.
- Future studies need to identify preventive measures common to the southern Chinese as a whole and also to consider high risk practices pertaining to sub-ethnicity.

Acknowledgement. This project received funding from the Division of Research and Education, Public Health Bureau of Guangdong Province, and from Kanawina Pty Ltd of Australia. Dr Nayana Wattanapenpaiboon provided valuable comments during manuscript preparation.

Cardiovascular risk factor prevalence in three Chinese communities in 1989

Xuxu Rao, et al

Asia Pacific Journal of Clinical Nutrition (1995) Volume 4, Number 3:278-286

1989年三個南中國社區的心血管危險因素的患病率

摘要

作者報導了居住在中國廣東省潮州、梅縣和新會縣的935位成人的心血管危險因素的發病率。這三個地區是地理分隔，並代表廣東省的三種主要方言組（分別爲潮州、客家和四邑方言），他們也是澳洲和東南亞的主要海外華人。從歷史數據分析，這些心血管危險因素發病率在中國範圍內正在增加，接近或甚至超過西方社會。但這三個社區個別心血管危險因素的發病率不盡相同，值得注意的是高脂血症（潮州發病率最高）、高血壓（潮州男子發病率最高，爲12.4%，梅縣婦女發病率最低，爲5.0%）和吸煙（新會男子最高，佔72.7%，新會婦女最低0%）。他們的身高、體重、體重指數（BMI）和腰臀圍比值基本相同，超重和肥胖症發病率很低。作者指出，爲了認識心血管危險因素的種族差異，應對這些中國人群進一步研究。

References

1. Hage BH-H. Food habits and cardiovascular health in adult Melbourne Chinese. BH-H Hsu-Hage: PhD thesis, Monash University Department of Medicine, 1992:
2. Hsu-Hage BH-H, Wahlqvist ML. Cardiovascular risk in adult Melbourne Chinese. Aust J Pub Hlth 1993;17(4):306-313.
3. Hsu-Hage BH-H, Wahlqvist ML. A food frequency questionnaire for use in Chinese populations and its validation. Asia Pac J Clin Nutr 1992;1:211-223.
4. Australian National Health and Medical Research Council. Report of the ninety-eighth session. Canberra: Australian Government Publishing Service, 1984:
5. Australian National Health and Medical Research Council. Report of the one hundredth session. Canberra: Australian Government Publishing Service, 1985:
6. Lapidus L, Bengtsson C, Larsson B, Pennert K, Rybo E, Sjostrom L. Distribution of adipose tissue and risk of cardiovascular disease and death: a 12 year follow up of participants in the population study of women in Gothenburg, Sweden. Br Med J 1984;289:1257-1261.
7. Risk Factor Prevalence Study Management Committee. Risk factor prevalence study: Survey no. 3, 1989. Canberra: Australian Government Publishing Service, 1989:
8. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultra centrifuge. Clin Chem 1972; 18: 499-502.
9. Ge K, Weisell R, Guo X, Cheng L, Ma H, Zhai F, Popkin BM. Body mass index of Chinese adults in the 1980s. Asia Pacific J Clin Nutr 1994; 3: 135-139.
10. Lee MM. Dietary habits, physical activity and body size among Chinese in North America and China. Asia Pacific J Clin Nutr 1994; 3: 145-148.
11. Li YH, Nara Y, Huang ZD, Ishinaga Y, Rao XX, Yamori Y, Cen RC, Zhang K, Chen PF, Ma LM. Trends of diet and blood pressure in Guangzhou, South China.JCardiovascPharmacol 1990;16 Suppl 8: S6-S8.
12. People's Republic of China- United States Cardiovascular and Cardiopulmonary Epidemiology Research Group. An epidemiological study of cardiovascular and cardiopulmonary disease risk factors in four populations in the People's Republic of China. Baseline report from the PRC-USA Collaborative Study. Circulation 1992; 85: 1083-1096.

13. He J, Klag MJ, Whelton PK, Chen JY, Qian MC, He GQ. Body mass and blood pressure in a lean population in southwestern China. Am J Epidemiol 1994; 139: 380-389.
14. Folsom AR, Li Y, Rao X, Cen R, Zhang K, Liu X, He L, Irving S, Dennis BH. Body mass, fat distribution and cardiovascular risk factors in a lean population of south China. J Clin Epidemiol 1994; 47: 173-181.
15. He J, Klag MJ, Whelton PK, Chen JY, Mo JP, Qian MC, Mo PS, He GQ. Migration, blood pressure pattern, and hypertension: the Yi Migrant Study. Am J Epidemiol 1991; 134: 1085-1101.
16. Lyu L-C, Posner BM, Shieh M-J, Lichtenstein AH, Cupples LA, Dwyer JT, Wilson PWF, Schaefer EJ. Cross-cultural comparisons between Taipei Chinese and Framingham Americans: dietary intakes, blood lipids and apolipoproteins. Asia Pacific J Clin Nutr 1994; 3: 119-125.
17. Wang Y, Roe D. The difference in food and nutrient intake between smokers and non-smokers in an elderly Chinese population in Beijing, China. Asia PacificJ Clin Nutr 1994; 3: 89-92.