Original Article

Cardiovascular Risk Factors in Rural Malays and Aborigines in Perak, Malaysia; An Alarming Situation

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ABSTRACT

Objective: Cardiovascular disease (CVD) is a leading cause of morbidity and mortality worldwide. In our study, we determined the prevalence and clustering of CVD risk factors in adult, non-diabetic, rural Malays and Orang Aslis in Perak, Malaysia.

Study Design: Community based cross sectional study

Place and Duration of Study: This study was conducted at the Perak state, Malaysia from March 2013 to December 2013.

Materials and Methods: Study included Orang Aslis and Malays in rural communities in Perak including males and females ≥18 years of age. Two districts selected randomly from Perak. One Orang Asli and one Malay village were taken from each district. Data was collected from maximum number of people during multiple visits. Sick, debilitated, known diabetics, unwilling to participate or unable to communicate were excluded. We collected data about lipid profile and anthropometric values, adapting standard protocol.

Results: Total 274 participants, 93 males and 181 females. Overall; overweight/obese 47.8%, abdominal obesity 22.4%, hypertension 24.8%, hypercholesterolemia 44.7%, high LDL 42.3%, low HDL 51.3%, high triglycerides 30.0%, smokers 22.8%. Likelihood of hypertension, hypercholesterolemia and raised LDL was significantly higher in ≥45 years age. General and central obesity was significantly more likely in Malays. Majority had multiple risk factors.

Conclusion: There was high prevalence and clustering of CVD risk factors in our study population. This may indicate epidemiological transition to modern life style in these rural communities.

Key Words: Cardiovascular disease, Malaysia, Malays, Orang Asli

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INTRODUCTION

Incidence of cardiovascular disease (CVD) is increasing[1]. Data from 188 countries shows that the number of deaths due to CVD increased by 41% during 1990-2013[2]. Aging population will become triple by 2050, especially in Western Pacific Region, increasing the burden of CVD to half of the global burden in this area[3]. Each year 38 million people die due to non-communicable diseases (NCD), three quarters in low/middle-income countries. CVD accounts for most NCD mortality.

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Tobacco, sedentary lifestyle, alcohol misuse and unhealthy diet may increase mortality from NCD[1]. According to NHMS, in ten years prevalence of hypertension, diabetes mellitus (DM) and obesity increased from 29.9% to 42.6%, 8.3% to 14.9% and 4.4% to 14% respectively[4]. Coronary heart disease risk factors include smoking, increased low-density lipoproteins (LDL), decreased high-density lipoproteins (HDL), hypertension, DM, sedentary life, obesity and unhealthy diet while the risk markers are poor socioeconomic status, increased prothrombotic factors, inflammatory markers and blood homocysteine along with psychological factors[5].

Epidemiological transition is observed with socioeconomic development and urbanization, changing morbidity and mortality patterns from predominantly nutritional deficiencies/infectious diseases to degenerative problems like CVD, DM and malignancies[6]. This epidemiological transition may be marked in rural Malaysia especially among the aborigines (Orang Asli/OA). We studied the prevalence of CVD risk factors among the rural population including OA. The results may help on allocation of resources to improve cardiovascular outcome and to avoid health inequalities between urban and rural.

MATERIALS AND METHODS

This cross-sectional study was conducted from March to December 2013. It included apparently healthy Malays and OA from rural Perak, both males and females ≥18 years of age. We selected healthy people without an apparent illness. Acute illnesses can affect the lipid profile.[7] Diagnosed cases of DM were not included. Most of the studies on CVD risk factors (RF) included diabetics but we excluded those with diagnosed DM. We also excluded those not willing to participate. Using cluster sampling, two districts, Hulu Perak and Batang Padang, were chosen randomly from Perak state. Two villages, one Malay and one Orang Asli, were taken randomly from these two districts. People in the localities were informed well in advance about the visits and they gathered at selected place for data collection.

Sample size calculation: Assumed prevalence of hypertension and hypercholesterolemia in Malays was 34% and 38% respectively (confidence level 95%, allowable error 8) giving sample size of 135 and 141. For OA presumed prevalence was 30% each, and calculated sample size was 126.[8,9] Informed consent was obtained before data collection.

Following data was collected:

(i) Anthropometry: We measured *Height* (centimetres) using portable wall mounted Stadiometer (Seca body meter 206) adapting standard method[10]. *Weight* (kilograms) was taken by "Seca 762 personal scale", using standardized method[10]. Body mass index (BMI) was calculated by standard formula[10]. It was labelled high (≥25 kg/m^2) according to WHO criteria.[11,12] *Waist circumference* (WC) was measured at the central line between costal margin and iliac crest. ATP III criteria was used for the classification of abdominal obesity (men>102cm, women>88cm).[13]

(ii) Blood pressure (BP): Measured by electronic device (OMRON automatic blood pressure monitor, model MX3). Hypertension was classified according to JNC VII report.[14]

(iii) Fasting blood glucose was measured by "Accucheck glucometer ROCHE" after 12 hours fast and 2 hours Post-prandial glucose measured in those having impaired Fasting glucose (IFG: ≥ 6.1mmol/L).

(iv) Total cholesterol (TC), HDL and Triglycerides (TG) were measured after 12 hours fast. Values for high/abnormal levels were as following:

TC ≥5.2 mmol/L; LDL ≥3.4 mmol/L; HDL, Males <1 mmoL/L; Females <1.3mmoL/L; Triglycerides >1.7mmol/L.[13,15,16] LDL was calculated by Fried wald equation[17]

(v) Data about age, gender, ethnicity, education, occupation and smoking was collected by using a questionnaire.

Data was analysed by using Statistical Package, Social Sciences software (SPSS17), performing Independent T test, Chi Square, and multivariate Logistic Regression analysis. Missing data was not included in calculation. We considered P value <0.05 as statistically significant. Ethic committee, Royal College of Medicine Perak, approved the study.

RESULTS

Demographic profile: Total 274 participants (133 OA, 141 Malays) majority being females (overall 66.1%, among OA 72.9%, among Malays 59.6%). Overall, <45 years were 63.1% (among OA 78.2%, among Malays 48.9%). Overall mean age was 40.7 years (OA 35.5, Malays 45.5). Majority were unemployed (51.1%) followed by those who were self-employed (28.8%). Maximum people were educated up to secondary school (n=148; 54%) followed by those educated to primary school (n=70; 25.5%).

Means of cardiovascular risk factors: In <45 years age group, most cardiovascular RF had higher mean values in Malays. However, in ≥45 years, 6 out of 9 RF had higher values in OA. In males and females SBP, DBP, FBG and HDL showed significant differences. (Table 1).

Overall prevalence of risk factors: High BMI 47.8%, abdominal obesity 22.4%, hypertension and newly diagnosed DM/IFG 24.8%/4.7% respectively, hypercholesterolemia and low HDL 44.7% and 51.3% respectively, high LDL and triglycerides 42.3% and 30.0% respectively and smoking in 22.8%. (Table 2)

Prevalence of risk factors in different socio-demographic groups: Except general and abdominal obesity and low HDL, RF had higher prevalence in males. Hypertension, hypercholesterolemia and raised LDL were significantly more prevalent in older people. Interestingly prevalence of obesity, low HDL and smoking was high in youngsters. (Table 2)

Prevalence according to ethnic groups: In < 45 years, all the CVD risk factors, except smoking, were more prevalent in Malays ($p < 0.05$ in overweight/obesity, hypertension and raised TG). However, in older age 6 RF were more prevalent in OA. (Table 3)

Multivariate Logistic regression analysis: Hypertension, hypercholesterolemia and high LDL were significantly more likely in ≥45 years age group. Overweight/obesity was significantly more likely among Malays. Abdominal obesity was significantly more likely in in females and Malays. (Table 4)

Clustering of risk factors: Overall, two and four RF were found in 22.3% and 18.6% respectively and 8% had ≥ 6 RF. In <45 years, 2 RF showed highest prevalence (23.7%) followed by four RF (19.1%). In ≥ 45 years, 19.8% had two, 17.8% had four and 9.9% had ≥6 RF. Clustering of <3 RF was high in young while >4 RF showed higher prevalence in old. In men, 20.4% had two, 25.8% had four and 8.6% had ≥6 RF. In women, 23.2% had two, 14.9% had four and 7.7% had ≥6 RF. Clustering of ≥4 RF in men was higher than women. In OA maximum people had two while in Malays maximum had four RF. Clustering of ≤3 RF was more in OA but >3 RF was more in Malays. (Figure 1)

Table No.1: Comparison of Mean values of CVD risk factors in ethnic groups

Cardiovascular Risk Factors	Overall	Groups according to ethnicity mean (±standard deviation)		P value
		Orang Asli (133)	Malays (141)	
< 45 years of age				
BMI	25.3 (5.2)	24.4 (4.5)	26.8 (5.8)	0.002
WC	82.0 (12.1)	80.1 (11.1)	84.8 (13.0)	0.014
SBP	119.1 (14.1)	116.6 (13.4)	122.8 (14.3)	0.006
DBP	75.5 (10.7)	74.1 (10.4)	77.64 (10.9)	0.033
FBG	3.7 (1.1)	3.5 (0.9)	3.9 (1.3)	0.014
Total Cholesterol	4.9 (1.0)	4.8 (1.0)	5.0 (0.9)	0.102
LDL	3.1 (0.9)	3.0 (0.9)	3.2 (0.9)	0.178
HDL	1.2 (0.3)	1.2 (0.3)	1.2 (0.3)	0.082
Triglyceride	1.293 (0.9)	1.2 (0.7)	1.5 (1.0)	0.023
≥ 45 years				
BMI	24.8(5.3)	22.3 (4.8)	25.8 (5.2)	0.003
WC	84.9 (16.0)	79.2 (12.5)	87.3 (16.8)	0.021
SBP	133.6 (20.5)	133.9 (17.8)	133.5 (21.6)	0.924
DBP	82.6 (12.6)	84.7 (13.3)	81.8 (12.4)	0.309
FBG	4.0 (1.1)	3.7 (1.0)	4.1 (1.1)	0.078
Total Cholesterol	5.5 (1.0)	5.6 (1.1)	5.5 (1.0)	0.609
LDL	3.5 (1.0)	3.6 (1.0)	3.5 (1.0)	0.558
HDL	1.2 (0.3)	1.1 (0.3)	1.2 (0.3)	0.506
Triglyceride	1.8(1.7)	2.1 (2.3)	1.6 (1.4)	0.275

Table No.2: Prevalence of CVD risk factors in various demographic groups **n: Number**

Cardiovascular Risk Factors	Overall n (%)	Males n (%)	Females n (%)	P - value	< 45 years n (%)	> 45 yrs, n (%)	P – value
Overweight and obesity	131(47.8)	39 (41.9)	92 (50.8)	0.163	83 (48)	48 (47.5)	0.942
Abdominal Obesity (n=263)	59 (22.4)	6 (6.5)	53 (31.0)	0.000	37 (22.7)	22 (22.0)	0.895
Hypertension (n=270) (≥140/90 mmHg)	67 (24.8)	29 (31.5)	38 (21.3)	0.067	27 (15.9)	40 (40.0)	0.000
Newly diagnosed DM/IFG	13(4.7)	8 (8.6)	5(2.8)	0.031	6 (3.5)	7 (6.9)	0.193
Hypercholesterolemia (n=273)	122(44.7)	43 (46.2)	79 (43.)	0.722	64 (37.2)	58 (57.4)	0.004
High LDL (n=272)	114(42.3)	40 (43.0)	75 (41.9)	0.587	61 (35.5)	54 (54.0)	0.011
Low HDL (n=273)	140(51.3)	47 (50.5)	93 (51.7)	0.860	90 (52.3)	50 (49.5)	0.653
High TG (n=273)	82 (30.0)	35 (37.6)	47 (26.1)	0.049	47(27.3)	35 (34.7)	0.202
Cigarette smoking (n=272)	62 (22.8)	51 (56.0)	11 (6.1)	0.000	41(23.8)	21 (21.0)	0.803

Table No.3: Prevalence of CVD risk factors according to ethnicity * Fisher exact test applied

Cardiovascular Risk Factors	Overall	Groups according to ethnicity numbers(percentage)		
		Orang Asli	Malays	P value
< 45 years of age				
Overweight and obesity	83(48.0)	43(41.3)	40(58.0)	0.032
Abdominal Obesity	37(22.7)	17(17.9)	20(29.4)	0.083
Hypertension	27(15.9)	11(10.9)	16(23.2)	0.031
Newly diagnosed DM/IFG	6(3.5)	2(1.9)	4(5.8)	0.173*
Hypercholesterolemia	64(37.0)	36(34.6)	28(40.6)	0.541
High LDL	61(35.3)	33(31.7)	28(40.6)	0.370
Low HDL	90(52.3)	48(46.6)	42(60.9)	0.066
High TG	47(27.3)	22(21.4)	25(36.2)	0.032
Cigarette smoking	41(23.7)	27(26.0)	14(20.3)	0.338
≥ 45 years of age				
Overweight and obesity	48(47.5)	8(27.6)	40(55.6)	0.011
Abdominal Obesity	22(22.0)	5(17.2)	17(23.9)	0.463
Hypertension	40(40.0)	15(53.6)	25(34.7)	0.084
Newly diagnosed DM/IFG	7(6.9)	2(6.9)	5(6.9)	0.993*
Hypercholesterolemia	58(57.4)	19(65.5)	39(54.2)	0.297
High LDL	54(53.5)	18(62.1)	36(50.0)	0.126
Low HDL	50(49.5)	17(58.6)	33(45.8)	0.245
High TG	35(34.7)	13(44.8)	22(30.6)	0.173
Cigarette smoking	21(20.8)	10(34.5)	11(15.3)	0.086

Table No.4: Multivariate Logistic regression analysis, predicting CVD risk in different groups

CVD Risk factors	Age (years)		Sex		Race	
	Less than 45	45 and above	Female	Male	Orang Aslis	Malay
Overweight and Obesity OR (95% CI)	Ref	0.77 (0.454-1.334)	Ref	0.62(0.36-1.05)	Ref	2.49 (1.46-4.27) P<0.05
Abdominal Obesity OR (95% CI)	Ref	0.97 (0.49-1.89)	Ref	0.13 (0.05-0.33) P<0.05	Ref	2.15 (1.10-4.19) P<0.05
Hypertension OR (95% CI)	Ref	3.403 (1.851 to 6.257) P<0.05	Ref	1.426 (0.784 to 2.593)	Ref	1.030 (0.553 to 1.919)
Newly diagnosed DM/IFG OR (95% CI)	Ref	1.40 (0.41-4.83)	Ref	3.00 (0.93-9.64)	Ref	1.95 (0.51-7.49)
Hypercholesterolemia OR (95% CI)	Ref	2.31(1.36-3.93) P<0.05	Ref	0.99 (0.59-1.66)	Ref	0.99 (0.58-1.69)
High LDL OR (95% CI)	Ref	2.08 (1.22-3.53) P<0.05	Ref	0.94 (0.56-1.60)	Ref	1.07 (0.63-1.82)
Low HDL OR (95% CI)	Ref	0.91 (0.53 to 1.56)	Ref	0.94 (0.56 to 1.59)	Ref	1.028 (0.60 to 1.73)
High TG OR (95% CI)	Ref	1.37 (0.77 to 2.43)	Ref	1.63 (0.93 to 2.856)	Ref	1.004 (0.56 to 1.78)

Bold digits show significant difference CI: Confidence interval OR: Odd ratios Ref: Reference values

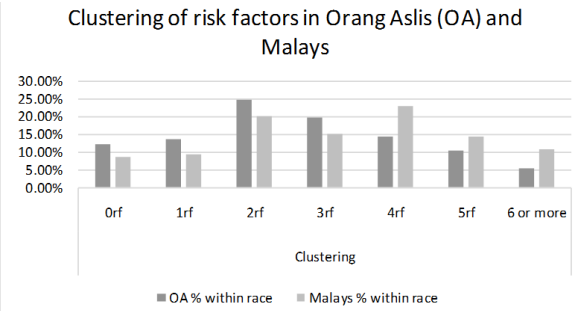

Figure No.1: Clustering of risk factors in ethnic groups rf: Risk factors

DISCUSSION

We observed three major findings. First: Overall prevalence of cardiovascular RF was high suggesting an epidemiological transition. Prevalence was different from some studies in Malaysia and other countries, probably due to difference in the developmental status. Generally, socioeconomic development leads to high prevalence of cardiovascular RF. In a similar population in Dengkil, Selangor, the prevalence of hypertension was 26.8%, quite comparable to our study but obesity was less prevalent (11.4%)[18]. In a predominantly Malay and more developed population in Kuala Selangor, the prevalence of abdominal obesity (51.2%), hypertension (51.2%) and smoking (25.2%), were higher than our study[19]. A study from rural Vietnam showed that prevalence of hypertension (20.5%) was comparable to our study[20]. In a rural Indian population, hypertension, obesity and hyperlipidaemia were attributed to sedentary lifestyle[21]. In rural Tamil Nadu, 35.2% were hypertensive, 35.8% overweight/obese and 15% smokers[22]. In rural Nepal, lower prevalence of hypertension (12.3%) and obesity/overweight (37.4%) may be related to high physical activity in mountainous areas[23]. However, in rural Kazakh population high prevalence of hypertension (49.9%), overweight/obesity (72.5%), smoking (60.4%) and alcohol intake (64.8%) was attributed to lower knowledge about cardiovascular RF[24]. Second, the prevalence of cardiovascular RF was higher in Malays especially with age <45. The mean BMI was significantly higher in Malays. In >45, no significant difference in mean SBP/DBP and lipid profiles was observed between two ethnicities. Other studies have shown differences between ethnic groups/races of the same district, region or country.[18-24]. The prevalence of cardiovascular RF may be related to socio-economic conditions. However, in some cases specific conditions like access to health care and health equity may influence, as demonstrated by Kazakh and Nepal studies. Third, the clustering of RF was observed in all especially Malays. According to NHMSIII survey, 14% had three or more RF, 33% had two or more and 63% had at least one cardiovascular RF[25]. Increased likelihood of hypertension and hypercholesterolemia in older age was not unusual and similar findings were shown in other reports.[11] Higher likelihood of overweight/obesity in Malays may be attributed to transition to urbanized lifestyle.

CONCLUSION

The prevalence of cardiovascular RF was high in both Malays and Orang Aslis, especially the obesity and abnormal lipid profile. This may demonstrate the epidemiological transition to modern life style. An alarmingly high rate of clustering of RF was observed in both ethnic groups. Probably a re-evaluation of epidemiology of cardiovascular RF is needed, especially in OA, which may help in health planning to prevent CVD.

Author's Contribution:

Concept & Design of Study:	Waseem Ahmad
Drafting:	Sandheep Sugathan, Sabaridah Ismail
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Revisiting Critically:	Waseem Ahmad, Sandheep Sugathan, Sabaridah Ismail
Final Approval of version:	Waseem Ahmad

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REFERENCES

1. Cardiovascular diseases (CVDs): World Health Organization (WHO); 2016 [updated June 2016; cited 2016 30th. June]. Available from: http:// www.who.int/mediacentre/factsheets/fs317/en/.
2. Deaths from cardiovascular disease increase globally while mortality rates decrease. : Institute for Health Metrics and Evaluation; 2016 [cited 2016 30th June]. Available from: http://www. healthdata.org/news-release/deaths-cardiovascular-disease-increase-globally-while-mortality-rates-decrease.
3. World population projected to reach 9.7 billion by 2050: United Nation, Department of Economic and Social Affairs; 2016 [cited 2016 30th June]. Available from: http://www.un.org/en/develop-ment/desa/news/population/2015-report.html.
4. Nuur Amalina AG, Jamaiyah H, Selvarajah S. Geographical variation of cardiovascular risk factors in Malaysia. Med J Malaysia 2012;67(1): 31-8.
5. Oldenburg B. Causes and 'causes of the causes' of chronic conditions; 2016 [cited 2016 30th June]. Available from: http://www.med.monash.edu.au/ ascend/docs/s24-causes-of-causes.pdf.
6. McKeown RE. The Epidemiologic Transition: Changing Patterns of Mortality and Population Dynamics. Am J Lifestyle Med 2009;3(1 Suppl): 19S-26S.
7. Balci B. The Modification of Serum Lipids after Acute Coronary Syndrome and Importance in Clinical Practice. Curr Cardiol Rev 2011;7(4): 272–276.
8. Phipps ME, Chan KKL, Naidu R, Mohamad NW, Hoh BP, Quek KF, et al. Cardio-metabolic health risks in indigenous populations of Southeast Asia and the influence of urbanization. BMC Public Health 2015;15:47.
9. National Health and Morbidity Survey 2011 (NHMS 2011). Vol. II: Non-Communicable Diseases. Malaysia 2011.p 21-27.
10. Bell M FK, Barker P, Edtl N, Fogels L, Grilliot K, Hansen R, et al. Measuring Height/Weight and Calculating BMI Guidelines for Schools. Alaska; In: Services DoHS, editors. State of Alaska, 2011.
11. Amplavanar NT GK, Salmiah MS, Odhayakumar N. Prevalence of Cardiovascular Disease Risk Factors Among Attendees of the Batu 9, Cheras Health Centre, Selangor, Malaysia. Med J Malaysia 2010;65(3): 166-72.
12. Obesity and overweight; January 2015. [cited 9 March 2016]. Available from: http://www.who.int/ mediacentre/factsheets/fs311/en/.
13. National Cholesterol Education Program. ATP III Guidelines At-A-Glance Quick Desk Reference. [cited 20 December 2016]. Available from: https://www.nhlbi.nih.gov/guidelines/cholesterol/at glance.pdf
14. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension 2003;42(6):1206-52.
15. Walker SW. Laboratory reference ranges. In: Walker BR, Colledge NR, Ralston SH, Penman ID, editors. Davidson's Principles and Practice of Medicine. 22nd ed. Edinburgh: Churchill Living Stone Elsevier; 2014.p.1307-1312.
16. Cholesterol Menu. A Comprehensive Guide on Ideal Cholesterol Levels: [cited 21 December 2016]. Available from: http://www.cholesterol-menu.com/cholesterol-levels-chart/
17. Fukuyama N, Homma K, Wakana N, Kudo K, Suyama A, et al. Validation of the Friedewald Equation for Evaluation of Plasma LDL-Cholesterol. J Clin Biochem Nutr 2008; 43(1):1-5.
18. Yunus AM, Sidik SM, Zulkefli NAM, Rampal L, Tiew. K. Prevalence of cardiovascular risk factors in a rural community in Mukim Dengkil, Selangor. Mal J Nutr 2004;10(1):5-11.
19. Aniza I, Normawati A, Hanizah Y, Ahmad Taufik J. Modifiable risk factors of cardiovascular disease among adults in rural community of Malaysia: a crosssectional study. Malaysian J Public Health Med 2016;16(1):53-61.
20. Nguyen TPL, Schuiling-Veninga CCM, Nguyen TBY, Hang VTT, Wright EP, Postma MJ. Models to Predict the Burden of Cardiovascular Disease Risk in a Rural Mountainous Region of Vietnam. Value Health Reg Issues 2014;3:87-93.
21. Gupta N, Batta M, Arora K. Cardiovascular disease risk factors assessment in urban versus rural women of same ethnicity. Int J Biomed Res 2015;6(05):334-7.
22. Ramraj B, Logaraj M, John. KR. A study on clustering of cardiovascular risk factors among a rural adult population in Tamil Nadu. J Cardiovasc Dis Res 2015;6(2):85-8.
23. Dhungana RR, Devkota S, Khanal MK, Gurung Y, Giri RK, Parajuli RK, et al. Prevalence of cardiovascular health risk behaviours in a remote rural community of Sindhuli district, Nepal. BMC Cardiovasc Disord 2014;14(1):1-8.
24. Kulkayeva G, Harun-or-Rashid, Yoshida Y, Tulebayez K, Sakamoto J. Cardiovascular disease risk factors among Rural Kazakh Population. Nagoya J Med Sci 2012;74:51-61.
25. Selvarajah S, Haniff J, Kaur G, Hiong TG, Cheong KC, Lim CM, et al. Clustering of cardiovascular risk factors in a middle-income country: a call for urgency. Eur J Prev Cardiol 2013;20(2):368-75.