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An exploratory study on risk factors for chronic non-communicable diseases among adolescents in Malaysia: overview of the Malaysian Health and Adolescents Longitudinal Research Team study (The MyHeART study)

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Abstract

Background: The National Health & Morbidity Survey (NHMS) IV (2011) observed that the prevalence of obese children aged less than 18 years in Malaysia is 6.1% compared to 5.4% overweight and obese in NHMS III (2006). As such, this observation is of public health importance as obesity is a forewarning risk factor for chronic diseases such as type-2 diabetes, cardiovascular diseases (CVD) and certain types of cancers. This MyHeART (Malaysian Health and Adolescents longitudinal Research Team) study aims to examine risk factors of non-communicable diseases (NCD) among adolescents.

Methods/design: The MyHeART study is longitudinal cohort study of 1361 schoolchildren (13-years old) attending 15 public secondary schools from the central (Kuala Lumpur and Selangor) and northern (Perak) regions of Peninsular Malaysia. The study used a stratified sampling design to select the study participants. Data collected at baseline included socio-economic, lifestyle (e.g. smoking, physical activity assessment, fitness assessment, seven-day diet history), and environmental information, anthropometric measurements, blood pressure, handgrip strength and bone mineral density. Blood samples for fasting blood glucose and lipid profiles, full blood count, renal profile, as well as bone profile and serum vitamin D were taken. This study cohort will be followed up again when participants turn 15, 17 and lastly, after a period of ten years (around the age of 27).

Results: Nine percent of the adolescents from this study were obese. More male participants smoked compared to female participants (15.4% vs. 4.7%). Adolescent males had higher fasting blood glucose but the female participants had lower high density lipoprotein (HDL-cholesterol) and higher low density lipoprotein (LDL-cholesterol). In addition, adolescents from the rural area had higher fasting blood glucose, diastolic blood pressure, total cholesterol and LDL-cholesterol.

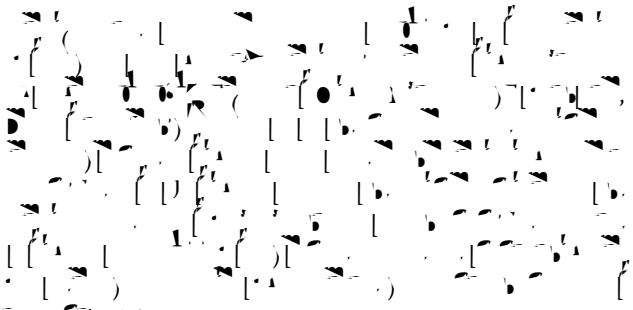
Discussion: Our results demonstrated that adolescents from the rural area are at higher risk of NCDs compared to their urban counterpart. Tailor made public health interventions are highly recommended for adolescents as this may

Background

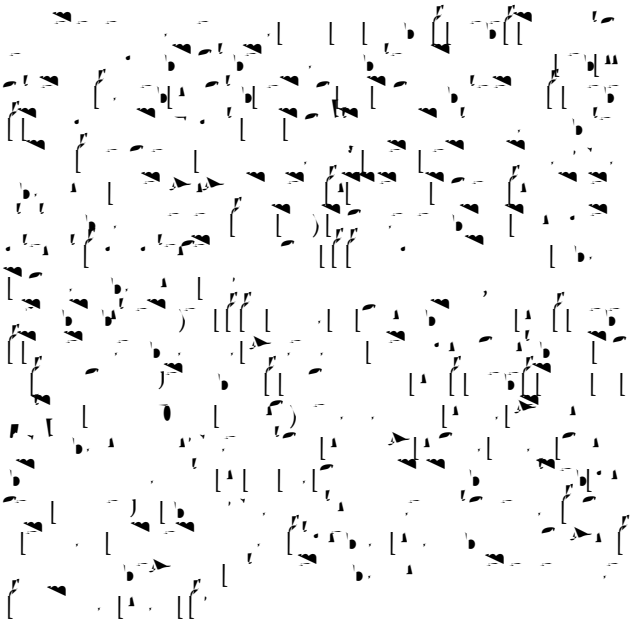
Dietary assessment

Physical activity

Physical evaluation



Blood profile



Competing interests

The authors declare that they have no competing interests.

Authors' contributions

All authors contribute to the study design; MAH, MYJ, NAS and TTS were involved in the field work and data collection. MAH was responsible for the drafting of this manuscript and all authors approved the final manuscript.

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References

1. Beaglehole R., Ebrahim S., Reddy S., Voûte J., on behalf of the Chronic Disease Action Group: Prevention of Chronic Diseases: A Call to Action. *The Lancet* 2007, 370(9605):2152-2157.
2. World Health Organization: *Global status report on non-communicable diseases* Geneva: World Health Organization; 2011.
3. Mathers C, Loncar D: Projections of Global Mortality and Burden of Disease from 2002 to 2030. *PLoS Med* 2006, 3(11):e442.
4. Zalilah MS, Khor GL, Mirnalini K, Norimah AK, Ang M: Dietary intake, physical activity and energy expenditure of Malaysian adolescents. *Singapore Med J* 2006, 47(6):491-498.
5. Institute of Public Health (2011) the National Health and Morbidity Survey 2011 (NHMS 2011): Kuala Lumpur, Malaysia: Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia; 188p.
6. Wijnstok NJ, Twisk JW:wr(:491-6-22.7079MT4(Morbidity)-332(Survey)]TJ2.10800004-1.334(99997sid*

25. Ogden CL, Carroll MD, Kit BK, Flegal KM: Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA* 2014, 311(8):806-814.
26. Bluher S, Schwarz P: Metabolically healthy obesity from childhood to adulthood - Does weight status alone matter? *Metabolism* 2014, 63(9):1084-1092, doi: 10.1016/j.metabol.2014.06.009.
27. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, *et al*: Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014, doi:10.1016/S0140-6736(14)60460-8.
28. Zhang YX, Wang SR: Prevalence and regional distribution of childhood overweight and obesity in Shandong Province, China. *World J Pediatr* 2013, 9(2):135-139.
29. Ebrahim S, Kinra S, Bowen L, Andersen E, Ben-Shlomo Y, Lyngdoh T, *et al*: The effect of rural-to-urban migration on obesity and diabetes in India: a cross-sectional study. *PLoS Med* 2010, 7(4):e1000268.
30. Cesani MF, Garraza M, Bergel Sanchis ML, Luis MA, Torres MF, Quintero FA, *et al*: A comparative study on nutritional status and body composition of urban and rural schoolchildren from Brandsen district (Argentina). *PLoS One* 2013, 8(1):e52792.
31. Machado-Rodrigues AM, Coelho-e-Silva MJ, Mota J, Padez C, Ronque E, Cumming SP, *et al*: Cardiorespiratory fitness, weight status and objectively measured sedentary behaviour and physical activity in rural and urban Portuguese adolescents. *J Child Health Care* 2012, 16(2):166-77.
32. Ballantyne CM, Hoogeveen RC, McNeill AM, Heiss G, Schmidt MI, Duncan BB, Pankow JS: Metabolic syndrome risk for cardiovascular disease and diabetes in the ARIC study. *International Journal of Obesit* 2008, 32(Suppl 2):21-24.
33. Mottillo S, Filion KB, Genest J, Joseph L, Pilote L, Poirier P, Rinfret S, Schiffrin EL, Eisenberg MJ: The Metabolic Syndrome and Cardiovascular Risk: A Systematic Review and Meta-Analysis. *Journal of the American College of Cardiolog* 2010, 56(14):1113-1132.
34. Wilson PW, D'Agostino RB, Parise H, Sullivan L, Meigs JB: Metabolic Syndrome as a Precursor of Cardiovascular Disease and Type 2 Diabetes