

PREVALENCE OF DYSLIPIDEMIA IN THE ELDERLY IN RURAL AREAS OF THAILAND

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Abstract. Dyslipidemia is highly prevalent in the urban areas of Thailand but information in the rural area, particularly in the elderly, is limited. The objective of this study was to determine the prevalence of dyslipidemia in the elderly who live in the rural areas of Thailand. Random sampling of the volunteers aged ≥ 60 years in 3 districts of Samut Songkhram and Ratchaburi provinces was done. After 12-hour fast, the blood sampling was drawn for the analysis of total cholesterol, triglycerides, high-density lipoprotein (HDL) cholesterol and low-density lipoprotein (LDL) cholesterol. Eighty men and 123 women, aged 60-87 years old, were included in the study. Mean serum lipid levels of cholesterol, LDL cholesterol, HDL cholesterol and triglycerides were 261.74 ± 47.58 , 180.35 ± 45.06 , 43.72 ± 12.06 , and 188.38 ± 103.84 mg/dl respectively. Women had significantly higher body mass index, cholesterol and LDL cholesterol levels than men. Seventy percent of them had cholesterol ≥ 240 mg/dl and LDL cholesterol ≥ 160 mg/dl. Twenty-five percent had HDL cholesterol ≤ 35 mg/dl. However, LDL/HDL cholesterol ratio > 5 which indicated high risk for coronary heart disease were found in only 34%. In conclusion, prevalence of dyslipidemia was very high in Thai rural elderly. Further surveillance in this population is essential in verifying the impact of dyslipidemia as a risk of cardiovascular disease in Thai elderly people.

INTRODUCTION

The percentage of the elderly population in Thailand increased from 5.0 in the year 1980 to 8.6 in the year 1997 (National Statistical Office, 1984; 1997). This number exceeded the prediction that the percentage of the elderly in Thailand would be around 7.0% by the year 2000 (National Economic and Social Development Board, 1985). This is a result of an improvement in quality and distribution of health care in this country. However, with increasing age of the population, the incidence of chronic non-communicable diseases also increases (Supornsilaphachai, 1993). Death from cardiac causes increased from 16.1/100,000 population in 1977 to 34.1/100,000 in 1982 and 546.9/100,000 in 1995 (National Statistical Office, 1984; 1997). Thus, identification of prevalence of risk factors of coronary artery disease in the elderly population is necessary in planning the health care services for them.

There were many studies about the prevalence of dyslipidemia, one coronary risk factor in the Thai population, especially in the urban area (Viseshakul *et al*, 1979a, b; Leelahagul *et al*, 1995). However, information in the elderly in rural areas is lacking.

The objective of this study was to determine the prevalence of dyslipidemia in the elderly who

live in the rural area of Thailand.

MATERIALS AND METHODS

The survey was conducted between March and May 1995. The subjects were randomly recruited from the geriatric day centers organized by the district hospitals in Amphawa and Bang Khonthi districts in Samut Songkhram Province and Wat Phleng district in Ratchaburi Province.

Weight was measured by calibrated balancing scale to the nearest 0.1 kg in the morning, with the subject wearing light clothes. Height was measured to the nearest 0.1 cm without wearing shoes. Body mass index (BMI) was calculated [BMI=weight (kg)/height(m²) (WHO, 1995)] .

Ten milliliters of venous blood samples were drawn after 12-hour fast. The blood samples were stored in cool container and directly sent to the laboratory of Faculty of Medical Technology, Mahidol University for analysis of total cholesterol, triglycerides, high-density lipoprotein (HDL) cholesterol and low-density lipoprotein (LDL) cholesterol levels. Serum total cholesterol (Allain *et al*, 1974), triglycerides (Wahlefeld, 1974), and HDL cholesterol (Allain *et al*, 1974; Burstein *et al*, 1970; Lopes-Virella *et al*, 1977) were measured by enzymatic method using the SMA12. LDL chole-

terol was calculated by using Friedwald's formula if triglycerides levels did not exceed 350 mg/dl (Friedwald *et al*, 1972).

Statistical analysis

Statistical analysis was performed by Statistical Package for Social Science (SPSS) for Windows release 7.5.1 (Social Science Data Service, University of California Davis). Means and standard deviations of various numerical parameters were calculated. Non-paired Student's *t*-test was used to compare the mean serum lipid levels among groups.

RESULTS

There were 203 elderly subjects recruited in the study. Their age ranged from 60-87 years old (mean±SD 69.3±6.67 years). Thirty-six percent of them were farmers, while other 23% were employees, 12% housekeepers and 12% work in their family business. The BMI of women and men were 24.51±3.94 and 22.76±3.81 kg/m² respectively. Women had significantly higher BMI than men (p = 0.002).

The means and standard deviations of serum total cholesterol, triglycerides, HDL cholesterol and LDL cholesterol were 261.74±47.58, 180.35±45.06, 43.72±12.06, and 188.38±103.84 mg/dl respectively. The means and standard deviations of the subjects in each sex are shown in Table 1. Women had significantly higher total cholesterol and LDL cholesterol levels than men. The distribution of serum total cholesterol, triglycerides and LDL cholesterol in each sex are shown in Figs 1, 2 and 3 respectively. All women and 87.5% of the men had total cholesterol greater than 200 mg/dl, 87% of women and 67.5% of men had serum total cholesterol greater than 240 mg/dl respectively. On

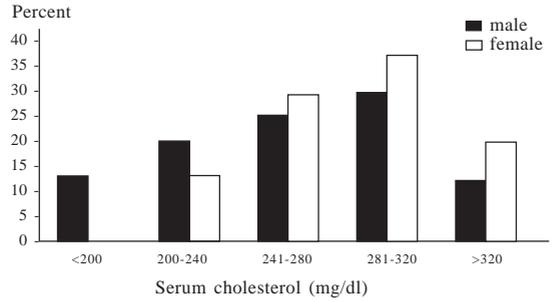


Fig 1-Percentage distribution of serum cholesterol.

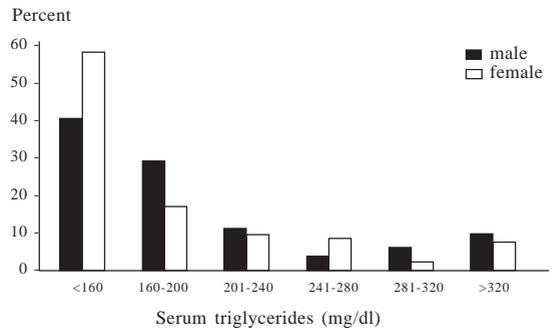


Fig 2-Percentage distribution of serum triglycerides.

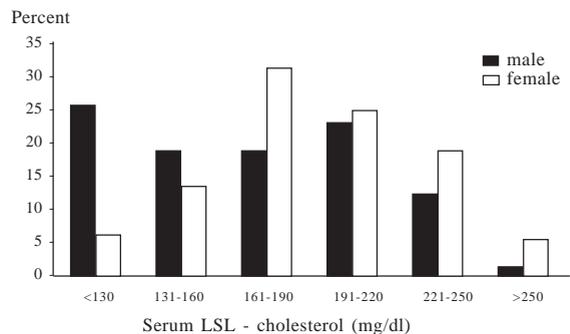


Fig 3-Percentage distribution of serum LDL-C.

Table 1
Serum lipid levels of women and men (mean±SD mg/dl).

Serum lipids	Women (no. = 123)	Men (no. = 80)
Total cholesterol	271.76 ± 42.54	246.35 ± 50.98*
Triglycerides	197.32 ± 113.97	174.64 ± 84.83
HDL cholesterol	44.09 ± 12.13	43.15 ± 11.99
LDL cholesterol	190.29 ± 39.27	168.59 ± 49.23*

p < 0.005

the other hand, 25.2% of women and 31.2% of men had serum triglycerides greater than 200 mg/dl. Only 6.2% of women and 25.7% of men had LDL cholesterol lower than the desirable level of 130 mg/dl. Eighty percent of women and 55.4% of men had LDL cholesterol greater than 160 mg/dl. However, a HDL cholesterol level lower than 35 mg/dl was found in only 23.6% of women and 26.3% of men. Thus, only 34% of them had cholesterol/HDL cholesterol ratio > 5 which indicated a high risk for coronary heart disease.

DISCUSSION

There are few studies about the elderly in Thailand and most of the data in the past few decades reflected malnutrition as a major problem for them (Swaddiwudhipong *et al*, 1991; Yasamutr and Suwannarungsri, 1985). Only one study had mentioned serum lipid levels in the elderly in institutions (Viseshakul *et al*, 1982). In that study, the mean total cholesterol was below 200 mg/dl. Interestingly, the authors reported HDL cholesterol level that was higher than an average HDL cholesterol in many other countries. The total cholesterol levels in the present study were higher and HDL cholesterol level was lower than those in previous reports. This might be the result of changing dietary pattern and lifestyle of Thai people in the past 15 years.

The most recent community study that included the elderly as a part of the population in that survey was the National Health Survey in the Thai Population in 1991-1992 (Churapawan, 1996). From that study, prevalence of hypercholesterolemia increases with age from below 10% in young adult, to about 25% in the elderly. However, that study was conducted throughout the country which differed from the present study which focused on a small group of the elderly in the seaside area. The difference in location may partly explain the higher prevalence of hypercholesterolemia in our population. The other explanation may be the semi-urbanization of the area which was only about 1 hour drive from Bangkok, the capital of the country. The cholesterol levels and prevalence of dyslipidemia in the present study were close to but slightly higher than those in the report in younger population in Singapore, the other country in southeast Asia which has a similar change in lifestyle in the past decades (Teo *et al*, 1992).

It is clear that high cholesterol level increases

risk for coronary artery disease in most population (Anderson *et al*, 1987; Neaton *et al*, 1992; Stamler *et al*, 1993; Yano *et al*, 1988). However, the ability of total cholesterol level to predict coronary heart disease in the elderly has been repeatedly questioned. The effect of total cholesterol levels on coronary heart disease in the elderly has been shown to be a U- or J-shaped relationship (Anderson *et al*, 1987; Staessen *et al*, 1990) or not related to risk for death (Kronmal *et al*, 1993; Krumholz *et al*, 1994). However, recent data suggested that elevated serum total cholesterol is a risk factor for death from coronary heart disease and the apparent adverse effects associated with low cholesterol levels are secondary to co-morbidity and fragility (Corti *et al*, 1997). In addition, data from the Established Population for Epidemiologic Studies in the Elderly (ESPESE) suggested that a low HDL cholesterol level is a more specific and powerful predictor of risk for coronary death than total cholesterol (Corti *et al*, 1995). Thus, screening for dyslipidemia in the elderly is recommended. On the other hand, there is no strong evidence that cholesterol lowering drugs are cost-effective in primary prevention of coronary heart disease in this group of people. So, the National Cholesterol Education Program (NCEP II, 1993) has recommended diet therapy and lifestyle modification as major strategies in lowering cholesterol level in primary prevention of coronary artery disease and limited use of cholesterol lowering drugs to only in high risk elderly who are otherwise in good health.

The very high prevalence of dyslipidemia in this group of people is alarming and more attention should be paid to the elderly in urban and rural area of this country. Even though the benefit of treatment of individuals with hypercholesterolemia for primary coronary prevention is controversial, health education and campaigns to lower fat and cholesterol intake in this population are mandatory. In addition, long term follow-up is necessary to verify the impact of high cholesterol levels in this elderly population.

CONCLUSION

Dyslipidemia, especially hypercholesterolemia is highly prevalent in the elderly living in the seaside area of Thailand. However, most of the cases had high HDL cholesterol levels and had cholesterol/HDL cholesterol ratio lower than 5. Even though

long-term follow-up is required to determine the impact of high cholesterol levels on risk of coronary heart disease and death, this high prevalence should be alarming. Community intervention is necessary to decrease the cholesterol levels and other risk factors in this population.

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REFERENCES

- Allain CC, Poon LS, Chan CSG, Richmond W, Fu PC. Enzymatic determination of total serum cholesterol. *Clin Chem* 1974; 20: 470-5.
- Anderson KM, Castelli WP, Levy D. Cholesterol and mortality. 30 years of follow-up from the Framingham Study. *JAMA* 1987; 257: 2176-80.
- Burstein M, Scholnick HR, Morfin R. Rapid method for isolation of lipoproteins from human serum by precipitation with polyanions. *J Lipid Res* 1970; 11: 583-7.
- Chuprapawan C. ed. for the Health System Research Institute. Report of the First National Health Survey in Thai Population 1991-1992. Bangkok: Desire 1996: 105-7 (in Thai).
- Corti MC, Guralnik JM, Salive ME, *et al.* Clarifying the direct relation between total cholesterol levels and death from coronary heart disease in older persons. *Ann Intern Med* 1997; 126: 753-60.
- Corti MC, Guralnik JM, Salive ME, *et al.* HDL cholesterol predicts coronary heart disease mortality in older adults. *JAMA* 1995; 274: 539-44.
- Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Summary of the second report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. (Adult Treatment Panel II). *JAMA* 1993; 269: 3015-23.
- Friedwald WT, Levy RI, Fredrickson DS. Estimation of concentration of low-density lipoprotein-cholesterol in plasma without the use of preparative ultracentrifuge. *Clin Chem* 1972; 18: 499-502.
- Kronmal RA, Cain KC, Ye Z, Omenn GS. Total serum cholesterol levels and mortality risk as a function of age. A report based on the Framingham data. *Arch Intern Med* 1993; 53: 1065-73.
- Krumholz HM, Seeman TE, Merrill SS, *et al.* Lack of association between cholesterol and coronary heart disease mortality and morbidity and all-cause mortality in persons older than 70 years. *JAMA* 1994; 272: 1335-40.
- Leelahagul P, Tanphaichitr V. Current status on diet-related chronic disease in Thailand. *Intern Med* 1995; 11: 28-33.
- Lopes-Virella MF, Stone P, Ellis S, Colwel JA. Cholesterol determination in high-density lipoproteins separated by three different methods. *Clin Chem* 1977; 23: 882-4.
- National Economic and Social Development Board. Population projection for Thailand 1980-2015. National Statistical Office, Office of the Prime Minister, Bangkok. 1985: 17-8.
- National Statistic Office, Office of the Prime Minister. Statistic yearbook Thailand. No. 33. 1981-1984. Bangkok: Society of Agricultural Co-operation of Thailand Publ, 1984: 53, 112.
- National Statistic Office, Office of the Prime Minister. Statistic yearbook Thailand. No. 44. 1997. Bangkok: Text and Journal Publication 1997: 38, 78.
- Neaton JD, Blackburn H, Jacobs D, *et al.* Serum cholesterol level and mortality findings for men screened in the Multiple Risk Factor Intervention Trial. *Arch Intern Med* 1992; 152: 1490-500.
- Saessen J, Amery A, Birkenhager W, *et al.* Is a high serum cholesterol level associated with longer survival in elderly hypertensives? *J Hypertens* 1990; 8: 755-61.
- Stamler J, Dyer AR, Shekelle RB, Neaton J, Stamler R. Relationship of baseline major risk factors to coronary and all-cause mortality, and to longevity: Findings from long-term follow-up of Chicago Cohorts. *Cardiology* 1993; 82: 191-222.
- Supornsilaphachai C. Incidence of diseases related to atherosclerosis in Thailand. *Intern Med* 1993; 8: 114-7.

- Swaddiwaudhipong W, Koonchote S, Nguntra P, Chaovakiratipong C. Assessment of socio-economic, functional and medical problems among the elderly in one rural community of Thailand. *Southeast Asian J Trop Med Public Health* 1991; 22: 299-306.
- Teo WS, Ng AS, Chee TS, Chua TS, Yan P. Lipid screening in a volunteer population in Singapore. *Ann Acad Singapore* 1992; 21: 5-9.
- Viseshakul D, Chaivasu C, Soonthornsima P, *et al*. Health screening survey to determine risk factors of cardiovascular diseases in a selected Thai population: A study in 1331 Thai Government Saving Bank clerks. *J Med Assoc Thai* 1979a; 62: 550-9.
- Viseshakul D, Premwatana P, Chularojamontri V, Kewsiri D. The prevalence of three major risk factors of cardiovascular disease : (glucose intolerance, hypertension, hyperlipoproteinaemia) in a sample of Thai social class 1. *J Med Assoc Thai* 1979b; 62: 116-22.
- Viseshakul D, Chumpala P, Tengumnuay C, Yutisri P, Dangprasert C, Rachatasilapin A. The plasma high-density lipoprotein cholesterol and longevity: A study in elderly Thais. *J Med Assoc Thai* 1982; 65: 549-55.
- Wahlefeld AW. Triglycerides. Determination after enzymatic hydrolysis. In: Bergmeyer HU, ed. *Methods of enzymatic analysis*. 2nd English ed. New York: Verlag Chemie Weinheim and Academic Press, 1974: 1831ff.
- WHO Expert Committee on Physical Status. Physical status : the use and interpretation of anthropometry. *WHO Tech Rep Ser* 1995; 854: 1-452.
- Yano K, MacLean CJ, Reed DM, *et al*. A comparison of the 12-year mortality and predictive factors of coronary heart disease among Japanese men in Japan and Hawaii. *Am J Epidemiol* 1988; 127: 476-87.
- Yasamutr S, Suwannarungsri D. General information and diseases of the elderly in Lampang Hospital. *J Dept Med Ser* 1985; 9: 787-94 (in Thai).