The Prevalence and Incidence of COPD Among Urban Older Persons of Bangkok Metropolis†

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Abstract

COPD substantially affects the national healthcare resource and healthcare cost especially among the older persons. Identifying the accurate prevalence and incidence reflects the scale of problem posed by COPD. This epidemiological study using the criteria for diagnosing COPD based on ratio of $FEV_{1.0}$/FVC less than 70 per cent and the reversibility of less than 15 per cent increase of post bronchodilator $FEV_{1.0}$ in the absence of parenchymal lesions and cardiomegaly in CXR (PA and lateral view) revealed the prevalence (1998) of COPD among the 3094 older persons aged 60 years and over in the communities of Bangkok Metropolis 10 km around Siriraj Hospital was 7.11 per cent (95% CI : 6.21-8.01), whereas the incidence (1999) of COPD was 3.63 per cent (95% CI : 2.83-4.43). Both the prevalence and the incidence were increased with increasing age.The disease occurred predominantly among male smokers. The distribution of mild : moderate : severe COPD in the prevalence study was 5.6 : 2.2 : 1.

The current findings also suggest that tobacco smoking is the prime important cause of COPD and the indoor pollution especially cooking smoke is not significant. In particular, the unexpectedly high incidence compared with prevalence in this population probably represents the warning message to the national policy maker for prompt and effective health promotion and disease prevention to prevent further social and economic loss.

Key word : Prevalence, Incidence, COPD, Urban, Older persons, Bangkok Metropolis

COPD is a growing health problem with increasing prevalence worldwide. This chronic disabling disease substantially affects the national healthcare resource and healthcare cost especially among the older persons, whose population has rapidly increased and will outnumber the rest in the near future. Identifying the accurate prevalence and incidence of the disease reflects the scale of the problem posed by COPD and would be vital for national policy making on planning prevention services and healthcare delivery especially health promotion.

The population surveys necessary to develop accurate estimates of COPD prevalence and incidence are costly to do and therefore have not been conducted in many countries. To our knowledge, however, there has been no epidemiological field survey aimed to determine COPD prevalence and incidence among older persons in the urban areas. This field survey study was first part of the 11th project among 16 projects under the mega project of Faculty of Medicine Siriraj Hospital on the Integrated Health Research Program for the Thai Elderly (IHRE) and aimed to determine the prevalence (1998) and incidence (1999) including the severity of COPD among the urban older persons of Bangkok Metropolis using the criteria for diagnosing COPD based on guideline of the Thoracic Society of Thailand.

MATERIALS AND METHOD

The study was approved by the Ethic Committee on Human Right involving Human Research of the Faculty of Medicine Siriraj Hospital. The design of the study was cross sectional for the prevalence of COPD and followed by cohort study for the incidence. Subjects included all the older persons aged 60 years and over resided in 124 communities located within 10 km around Siriraj Hospital who agreed to participate throughout the study. Only data of those who could complete both the spirometry and the chest radiography were analyzed. The exclusion criteria was the presence of upper respiratory tract infection on the day of study.

Method

Following our 3-month survey registration of all the older persons in the 124 urban communities 10 km around Siriraj Hospital in January 1998, the participants underwent at the communities the spirometry both before and after two puffs of Salbutamol from MDI *via* spacer as well as the two views of postero-anterior and lateral position chest radio-

graphy. The gold standard for diagnosing COPD was based on the Thoracic Society of Thailand guideline i.e. the ratio of $FEV_{1.0}/FVC$ less than 70 per cent and the reversibility of less than 15 per cent increase of post bronchodilator $FEV_{1.0}$ in the absence of parenchymal lesions and cardiomegaly in chest radiography[1]. The severity of COPD was defined as $FEV_{1.0} \geq 70$ per cent, 50-69 per cent and less than 50 per cent of predicted value to be mild, moderate and severe degree of airways obstruction consecutively.

The spirometer was the electronic turbine, flow sensing pneumotachometer (Pony Graphic 3.0) which was accepted to the standard of the American Thoracic Society[2]. Volume and flow were recorded in BTPS. The spirometry was performed in sitting position with nose clip guided by the group of experienced respiratory technicians. $FEV_{1.0}$ and FVC were the maximal values from three acceptable graphs and the $FEV_{1.0}/FVC$ ratio was from the best test curve.

Subjects with initially normal spirometry and chest radiograph were requested to repeat the procedures at one year follow-up started in January 1999 to obtain new COPD cases for the incidence rate.

Statistical analysis

All data were presented as mean $\pm$ SD unless otherwise stated. The comparison between COPD and non-COPD subjects was performed by student unpaired *t*-test and comparison of the proportion. A p-value of < 0.05 indicates statistically significant differences between the groups. All analyzing was calculated by SPSS for windows version 9.05.

RESULTS

There were 3,094 cases who could accomplish both spirometry and chest radiography and 220 subjects were accepted to the definition of COPD. The characteristics of prevalence surveyed population, COPD compared with non-COPD subjects (Table 1) demonstrated that COPD subjects were the older, predominantly males and tobacco smokers with higher numbers of pack-year than the non-COPD group. The risk ratio yielded get approximately 5 times for male or smokers (regardless of being previous or current smokers). The distribution of mild : moderate : severe COPD was 5.64 :2.16 : 1. The prevalence of COPD in this survey was 220/3,094 = 7.11 per cent (95% CI : 6.21-8.01), higher among

Table 1. The characteristics of prevalence surveyed population.

	Population	COPD	Non-COPD	RR (95% CI)	P-value*
Number (cases)	3,094	220	2,874		
Age mean ± SD (years)	67.9 ± 6.4	70.2 ± 6.7	67.7 ± 6.3		< 0.001
Sex Male : Female	0.6 : 1	2.6 : 1	0.5 : 1	4.47 (3.36-5.94)	< 0.002
Smoker (%)	1,134 (36.6)	166 (75.5)	968 (33.7)	5.31 (3.94-7.16)	< 0.002
Pack-year mean ± SD	25.8 ± 24.4	32.8 ± 26.4	24.7 ± 23.8		< 0.001
Previous smoker (%)	449 (14.5)	64 (29.1)	385 (13.4)	5.17 (3.65-7.32)	< 0.002
Current smoker (%)	685 (22.1)	102 (46.4)	583 (20.3)	5.4 (3.93-7.43)	< 0.002
Non-smoker (%)**	1,959 (63.3)	54 (24.5)	1,905 (66.3)	1	< 0.002

* COPD vs non-COPD,

** Tobacco smoking ≤ 0.5 pack-year
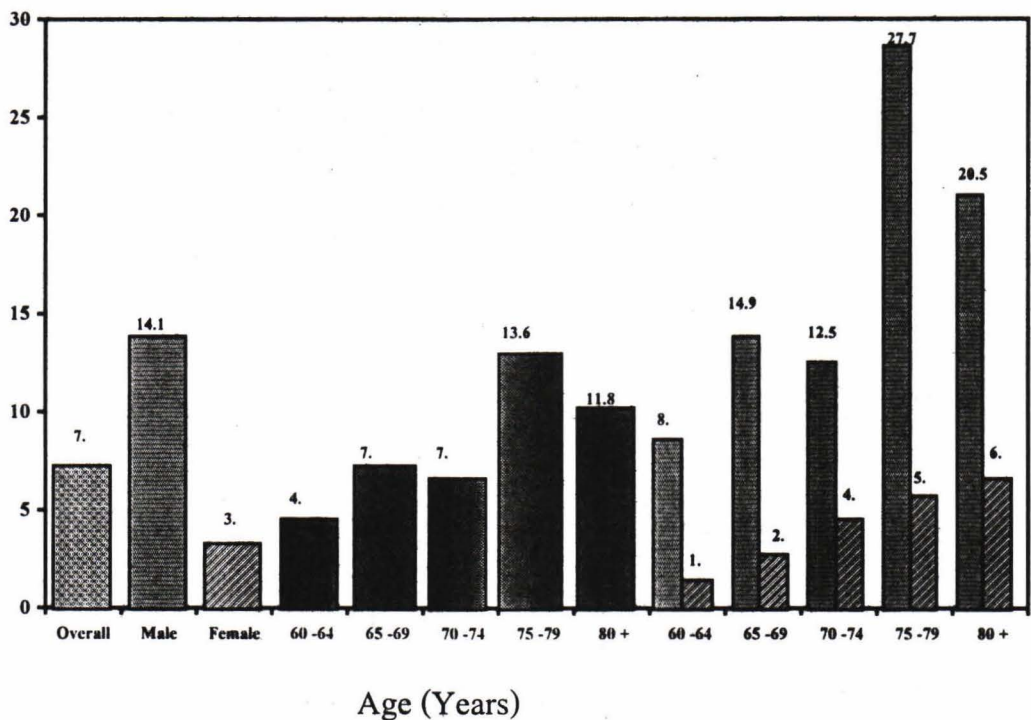
Prevalence (%)

Fig. 1.   Prevalence of COPD among urban older persons of Bangkok according to sex and age.

males and increasing with age both sexes (Fig. 1). Regarding the severity of COPD, the prevalence (95% CI) for mild, moderate and severe COPD was 4.56 (3.82-5.29), 1.75 (1.28-2.21) and 0.51 (0.49-1.12) respectively.

From the 2,547 cases with initially normal spirometry and chest radiography, 1,943 cases were able to participate at one year follow-up. It was found that the 604 defaulters (23.4% of all) had no statistical difference from the study group regarding base-

line characteristic data (p > 0.05). The 1,930 cases could complete the study and 70 cases of COPD were identified. The characteristics of the 1930 cases in incidence survey (Table 2) indicated that COPD subjects were also predominantly the older, male tobacco smokers than non-COPD group with no statistically difference in numbers of pack-year. The highest risk ratio appeared to be among current smokers. (Table 2) The incidence of COPD in the study population was 70/1930 = 3.63 per cent (95% CI : 2.83-4.43), higher among males and also increasing with age (Fig. 2).

Table 2.   The characteristics of incidence surveyed population.

	Population	COPD	Non-COPD	RR (95% CI)	P-value*
Number (cases)	1,930	70	1,860		
Age mean ± SD (years)	67.4 ± 6.0	70.2 ± 7.4	67.3 ± 5.9		< 0.001
Sex Male : Female	0.5 : 1	1.8 : 1	0.4 : 1	5.4 (3.34-8.73)	< 0.001
Smoker (%)	602 (31.2)	50 (71.4)	552 (29.7)	5.51 (3.31-9.18)	< 0.002
Pack-year mean ± SD	24.3 ± 22.6	26.9 ± 27.4	24.1 ± 22.1		0.388
Previous smoker (%)	243 (12.6)	16 (22.9)	227 (12.2)	4.36 (2.29-8.29)	< 0.002
Current smoker (%)	362 (18.8)	34 (48.6)	328 (17.6)	6.22 (3.62-10.67)	< 0.002
Non- smoker (%)**	1,324 (68.6)	20 (28.6)	1,304 (70.1)	1	< 0.002

* COPD vs non-COPD,
** Tobacco smoking ≤ 0.5 pack-year
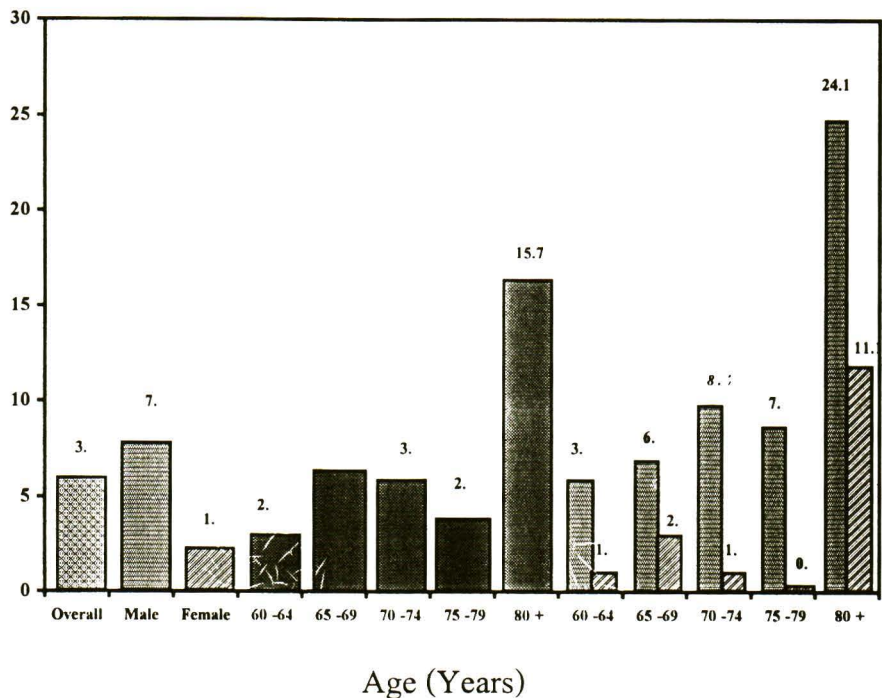
Incidence (%)

Age (Years)

Fig. 2.   Incidence of COPD among urban older persons of Bangkok according to sex and age.

The highest prevalence and incidence were among males age 75 years old and over (Table 3) as well as male current smokers (Table 4). The lowest prevalence and incidence were found among females aged 60-74 years old (Table 3) and among female non-smokers (Table 4).

DISCUSSION

Our prevalence of COPD among the Thai urban older persons of Bangkok compared with the previous NHES (Table 5) demonstrated the much higher prevalence in this study among older males and much lower among older females than the NHES in spite of the modified data of comparable age-range (3). This may be attributable to different year of study, materials and method and the gold standard for COPD diagnosis. NHES subjects included COPD and asthma in urban and rural communities and the design was based on questionnaire and peak expiratory flow rate; the diagnostic criteria using the PEFR of less than 80 per cent of predicted value[3] and moreover, neither reversibility test nor postero-anterior and lateral chest roentgenography were performed.

The accurate prevalence of COPD data from population survey based on the presence of airflow limitation provides a more accurate estimate of a

Table 3. Age and sex-specific prevalence and incidence of COPD among urban older persons of Bangkok.

Age (years)	Prevalence (95% CI) %	Incidence (95% CI) %
60-74 (young-old)	6.0 (5.07-6.89)	3.1 (2.3-3.9)
Male	11.8 (9.73-13.87)	6.1 (4.1-8.1)
Female	2.71 (1.93-3.49)	1.6 (0.9-2.3)
≥ 75 (old-old)	12.9 (9.99-15.85)	6.8 (3.8-9.8)
Male	25.0 (18.87-31.12)	13.2 (5.9-20.5)
Female	5.47 (2.94-7.99)	3.9 (1.1-6.7)
Total		
Male	14.1 (12.03-16.09)	7.03 (5.05-9.01)
Female	3.1 (2.38-3.92)	1.93 (1.18-2.68)

Table 4. The prevalence and incidence of COPD according to sex and smoking history among older persons of Bangkok.

Smoking	Prevalence (95% CI) %	Incidence (95% CI) %
Current smoker	14.9 (12.22-17.56)	9.4 (6.4-12.4)
Male	18.5 (15.00-22.02)	11.0 (7.0-15.0)
Female	7.0 (3.57-10.38)	6.5 (2.1-10.9)
Previous smoker	14.3 (11.02-17.49)	6.6 (3.5-9.7)
Male	14.6 (10.91-18.32)	7.3 (3.6-11.0)
Female	13.0 (6.41-15.59)	4.1 (-1.4-9.6)
Non -smoker	2.8 (2.03-3.48)	1.5 (0.9-2.1)
Male	6.6 (3.78-9.33)*	2.4 (0.3-4.5)**
Female	2.1 (1.37-2.74)*	1.3 (0.6-2.0)**

* p-value = 0.46, ** p-value = 0.4

Table 5. Prevalence of COPD among Thai older persons in 1991 and 1998.

Age (year)	Male				Female			
	60-64	65-69	70-74	≥ 75	60-64	65-69	70-74	≥ 75
Maranetra N et al 2002	8.7	14.9	12.5	25	1.9	2.9	4	5.5
NHES 1991*	4.3	5.3	← 7.9 →		3.4	4.6	← 5.0 →	

* National Health Examination Survey : modified data (COPD and asthma)

burden of COPD probably soon will be clinically significant. We believed that the latest report from Saenghirunvatana S et al[4] on prevalence and incidence of COPD especially in Bangkok were probably underestimated even with comparable age-range. Their interesting study was not population-based field survey study, but based on smoking rate calculation method; subjects calculated including people of 40 years old and over, and in addition, all the subjects were patients from the index hospitals, whereas our study was the field survey including the older persons from 60 years and over and the COPD subjects encompassed asymptomatics with the criteria of COPD based on the Thoracic Society of Thailand Guideline.

The higher prevalence among males and the lower prevalence among females of present study compared with international studies as to modified data of comparable age-range were summarized[5-8] (Table 6). Generally, the prevalence of COPD is likely to vary appreciably depending on the prevalence of risk factor exposure, age distribution and the prevalence of susceptibility genes in different communities. The lack of international standard in the criteria for diagnosis of COPD results in difficulties for the intercountry data comparisons. The other variable factors are e.g. sample size and characteristics of subjects. In most reports, the diagnoses of COPD were based on questionnaires of chronic respiratory symptoms and smoking or physician's diagnosis and spirometry, but none of them referred to chest roentgenography. Only Isoaho R[6] using the bronchodilator reversibility test with the diagnostic criteria of COPD by $FEV_{1.0}/VC \leq 65$ per cent showed similar result to our study both among males and females. It was also noted that our COPD prevalence was higher than in Northern and Southern Europe[7], and WHO Region [8]. Nevertheless, the finding of higher prevalence of COPD among men compared with women (Table 3) in our study was similar to population-based studies in developed countries e.g. USA[9], but different from some developing countries[10-14].

The incidence of COPD reported by Barach AL et al[15] in USA was 0.3 per cent which is lower than our study (3.6%). The study among miners in Poland by Boros P. et al.[16] revealed the incidence of 11 per cent which was also higher and clearly indicated the impact of occupation and pollution in smokers.

Concerning causes of COPD in urban older persons of Bangkok, our study probably pointed to tobacco smoking as the most important determinant

Table 6. The prevalence of COPD among older persons in various countries.

Country	Age	Sample size	Prevalence							
			Total	Male	Female	Male age		Female age	
						65-74	≥75	65-74	≥75
Maranetra N et al 2002	≥60	3,094	7.1	14.1	3.1	14.0	25.0	3.3	5.5
Lacasse Y et al[5] 1999	≥55	17,626	5.7	6.3	5.2	6.6	9.1	4.4	7.8
Canada 1980-1995						(4.5-8.8)	(5.4-18.90)	(2.7-6.1)	(5.2-10.5)
Isoaho R et al[6] 1994	>64	1,207	-	12.5	3.0				
Finland 1990									
Gulsvika A[7] 1999	-	-	4.6						
Northern and Southern Europe									
WHO[8]1999	-	-	2.1	2.2	1.9				
Member states 1998									

due to higher prevalence and incidence among men compared with women and smokers than non-smokers (Table 3, 4). Other causes especially indoor pollution e.g. cooking smoke seemed to play no significant role due to less prevalence and incidence of COPD among female and male non-smokers with no statistically significant difference between the groups (p > 0.05, Table 4).

With regard to the severity of COPD, this study showed mild COPD as majority group in the prevalence study population. Nevertheless, the ratio of mild : moderate : severe degree of airways obstructions 5.6 : 2.1 : 1 in this prevalence study was also different from the report of Viegi G[17] which was 19 : 4.4 : 0 and based on the same criteria for diagnosing COPD.

Another interesting result in this study (Table 3) was the highest prevalence and incidence of COPD among the old-old persons of dependency lifestyle. This might be a warning message of large burden to family members, and society including national health economy.

In particular, our study revealed the prevalence of 7.11 per cent and unexpectedly high incidence of 3.63 per cent in spite of slow progressive nature of the disease. Whether this result represents the alarming health situation in these communities depends on the magnitude of mortality rate of COPD compared with prevalence and the incidence. If the mortality rate from any causes of COPD patients in these communities is far behind the prevalence and incidence, it, therefore, appears important that, COPD

may be a disease to be aware of and need prompt effective intervention started from now on to prevent the coming economic and social loss.It is reasonable that the accurate prevalence and incidence of COPD nationwide beyond older persons to estimate the size of COPD problem are warranted as first stage of operation. Accordingly, in the presence of present national economic crisis era, the cost-effectiveness screening test appropriate for field survey study to early detect COPD is unavoidable.

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ความชุกและอุบัติการณ์ของโรคปอดอุดกั้นเรื้อรังในผู้สูงอายุไทยในชุมชนเมืองก.ท.ม.†

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โรคปอดอุดกั้นเรื้อรังเป็นโรคของผู้สูงอายุที่มีความสำคัญทางเศรษฐกิจและสังคมของประเทศและในอนาคต ประชากร
ผู้สูงอายุจะมีสัดส่วนเพิ่มสูงขึ้นเร็ว การทราบความชุกและอุบัติการณ์ที่แท้จริงของโรคน่าจะทำให้ทราบขนาดของปัญหาโรคปอด-
อุดกั้นเรื้อรัง และอาจนำมาช่วยในการพิจารณาปรับนโยบายระดับประเทศ คณะผู้วิจัยได้ทำการศึกษาผู้สูงอายุตั้งแต่ 60 ปี
ขึ้นไปในชุมชนกรุงเทพ ฯ 124 ชุมชน ภายในรัศมี 10 กม รอบโรงพยาบาลศิริราช เพื่อหาความชุกปี 2541 และอุบัติการณ์
ปี 2542 ของโรคปอดอุดกั้นเรื้อรัง การวินิจฉัยโรคปอดอุดกั้นเรื้อรัง ยึดตามหลักเกณฑ์ของสมาคมอุรเวชซ์แห่งประเทศไทย

มีผู้สูงอายุ 3,094 ราย ที่รับการตรวจครบทั้งการตรวจสมรรถภาพปอด (สไปโรเมตรีย์) และเอ็กซเรย์ทรวงอกท่า
หน้า–หลัง และด้านข้าง พบว่าผู้สูงอายุที่ได้รับการวินิจฉัยเป็นโรคปอดอุดกั้นเรื้อรังมี 220 ราย สำหรับผู้สูงอายุที่สมรรถภาพ
ปอดปกติและผลเอ็กซเรย์ทรวงอกปกติ ได้รับการตรวจซ้ำเช่นเดิมห่างจากครั้งแรก 1 ปี พบว่ามีผู้สูงอายุที่รับการตรวจครบทั้ง
2 วิธี 1,930 ราย มีผู้สูงอายุที่ได้รับการวินิจฉัยเป็นโรคปอดอุดกั้นเรื้อรังรายใหม่ 70 ราย นั่นคือ ความชุกของโรคปอดอุดกั้น
เรื้อรังในผู้สูงอายุในชุมชนเหล่านี้เป็น 7.11% (95% CI : 6.21–8.01%) และอุบัติการณ์ของโรคปอดอุดกั้นเรื้อรังเป็น 3.63%
(95% CI : 2.83–4.43%) ทั้งความชุกและอุบัติการณ์ของโรคปอดอุดกั้นเรื้อรังในผู้สูงอายุเพิ่มสูงขึ้นตามอายุ และในเพศชาย
สูงกว่าเพศหญิง มีผู้สูงอายุที่อัตราส่วนโรครุนแรงน้อย : รุนแรงปานกลาง : รุนแรงมาก เป็น 5.6 : 2.2 : 1

ผลการศึกษาสนับสนุนการสูบบุหรี่เป็นสาเหตุสำคัญของโรคปอดอุดกั้นเรื้อรัง ส่วนมลภาวะในบ้านโดยเฉพาะควันจาก
การทำอาหารไม่น่าเป็นสาเหตุสำคัญ จากการศึกษาครั้งนี้พบอุบัติการณ์ค่อนข้างสูงมากเมื่อเทียบกับความชุกของโรคปอดอุดกั้น
เรื้อรังในผู้สูงอายุ คณะผู้วิจัยเชื่อว่าโรคปอดอุดกั้นเรื้อรังน่าจะเป็นปัญหาสำคัญทางสาธารณสุขในอนาคตอันใกล้และสมควรต้องมี
มาตรการระดับประเทศเพื่อป้องกันและแก้ไขปัญหาโดยเร็ว

คำสำคัญ : ความชุก, อุบัติการณ์, โรคปอดอุดกั้นเรื้อรัง, ผู้สูงอายุ, ชุมชนเมืองก.ท.ม.

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