Community-based Epidemiological Study of Impaired Activities of Daily Living in Older People

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Purpose. The aim of this study was to determine the prevalence of impaired activities of daily living (ADL) in older people.

Methods. This was a community-based, cross-sectional study conducted at Chung-Hsing Village in Taiwan in May 1998. All individuals aged 65 and over were enrolled. A total of 1092 subjects, out of 1774 registered residents, completed questionnaires and participated in this study. The response rate was 61.6%. Socio-demographic characteristics, lifestyle patterns, health-related behaviors, and chronic diseases were collected by well-trained interviewers. Data were analyzed by chi-square test and multivariate logistic regression.

Results. Out of the 1092 subjects, 65.66% were men and 34.34% were women. The mean age was 73.4 ± 5.6 years. The prevalence of impaired ADL was 10.71%. Multivariate logistic regression showed that with the age group 65 to 69 years as a reference, odds ratio for the risk of impaired ADL was considerably higher in people ≥ 80 years (OR = 2.60, 95% CI = 1.40 to 4.85). With no regular exercise as a reference, odds ratio for the risk of impaired ADL was considerably lower in people who regularly exercised (OR = 0.60, 95% CI = 0.37 to 0.97). No significant difference in number of chronic diseases was reported for the risk of impaired ADL.

Conclusions. Increasing age and no regular exercise are associated with increased risk of impaired ADL in older people. **(Mid Taiwan J Med 2005;10:165-70)**

Key words

activities of daily living, chronic diseases, older people, prevalence, regular exercise

INTRODUCTION

With the marked decrease in birth rate and progressive lengthening of life expectancy, the population ≥ 65 years has exceeded 7.0% in Taiwan every year since 1994 [1]. The leading cause of death in Taiwan has shifted insidiously from acute infections to chronic medical diseases such as cerebrovascular disease, cardiovascular disease, diabetes mellitus and hypertension [2,3]. In Posner and colleagues' study [4], 85% of older people suffered from one or more chronic medical diseases; the complications of these diseases often lead to impaired activities of daily living (ADL) [5-14]. The definition of ADL varies, but the most common items include bathing, dressing, grooming, ambulance, chair/bed transfer, toileting and eating, all of which are critical for older people living in the community [9,10]. For many older people, impaired ADL means they can not live independently or normally without assistance. Impaired ADL is also a potential predictor of clinical outcomes, including need for professional home care, length of hospital stay, mortality and nursing home placement [8,11-14]. Early detection and early intervention of the related factors leading to impaired ADL is the key

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Table 1. Related factors leading to impaired ADL by chi-square test

Variables	Total number	Impairment of ADL (%)	*p*
Sex			0.069
Men	717	68 (9.48)	
Women	375	49 (13.07)	
Age (yr)			< 0.0001
65–69	298	25 (8.39)	
70–79	634	53 (8.36)	
≥ 80	154	39 (25.32)	
Regular exercise			< 0.0001
No	222	46 (20.72)	
Yes	867	70 (8.07)	
Chronic medical diseases			0.007
0	330	27 (8.18)	
1	423	39 (9.22)	
≥ 2	339	51 (15.04)	
Self-reported health status*			0.002
Good	713	81 (11.36)	
Fair	284	15 (5.28)	
Poor	54	1 (1.85)	
Educational level*			0.967
Junior high school or less	284	28 (9.86)	
Senior high school	285	29 (10.18)	
Professional training college	153	17 (11.11)	
Undergraduate or graduate	240	23 (9.58)	
Retirement status			0.705
Non-retired	292	33 (11.30)	
Retired	800	84 (10.50)	
Marital status			0.629
Living together	793	836 (10.47)	
Living alone	296	34 (11.49)	
Smoker			0.055
No	878	102 (11.62)	
Yes	212	15 (7.08)	
Drinker			0.372
No	911	101 (11.09)	
Yes	181	16 (8.84)	

*Imprecise summation of total subjects was due to missing data.

to the preservation of ADL [8,11-15]. In addition, older people with impaired ADL always indicate that long term care is needed. This issue has become a challenging problem for public health policy makers [5-7,16].

In order to explore the prevalence of impaired ADL and to identify the potential determinants that might be helpful for our country to develop effective public health strategies to intervene in this issue, we conducted a comprehensive health survey in older people living at Chung-Hsing Village in Taiwan.

MATERIALS AND METHODS

In May 1998, a community-based, cross-sectional study was conducted at Chung-Hsing Village located in central Taiwan. All individuals aged 65 and over (n = 1774) were eligible for this study. A total of 1092 subjects participated in this study. The response rate was 61.6%. Information about each subject's medical condition, socio-demographic characteristics, lifestyle patterns and health-related behaviors was collected by well-trained interviewers via face-to-face interviews. Self reported health status was classified as good, fair and poor. If subjects exercised regularly, their status was classified as exercise. If not, their status was defined as no exercise. Subjects who never smoked or quit smoking were defined as nonsmokers. Subjects who currently smoke were

Table 2. Related factors leading to impaired ADL by multivariate logistic regression

Variables	OR	95% CI
Age (yr)		
65–69	1	
70–79	0.99	0.58–1.69
≥ 80	2.60*	1.40–4.85
Regular exercise		
No	1	
Yes	0.60*	0.37–0.97
No. of chronic diseases		
0	1	
1	1.24	0.71–2.17
≥ 2	1.43	0.81–2.50
Self-reported health status		
Good	1	
Fair	0.55*	0.31–0.98
Poor	0.16	0.02–1.20

OR = odds ratio; CI = confidence interval. *$p < 0.05$.

defined as smokers. Subjects who never drink alcohol or drink alcohol occasionally were classified as nondrinkers. Subjects who reported drinking alcohol often were classified as habitual drinkers. The educational levels were classified as junior high school or less, senior high school, professional training college, and undergraduate or graduate. If the subject was retired, the status was classified as retired. If the subject lived with a spouse or other family members, the marital status was defined as living together. If not, the marital status was defined as living alone.

ADL included the following items: bathing, dressing, taking care of personal appearance, ability to walk, ability to get in and out of bed, toileting and eating [9,10]. Impaired ADL was defined as needing help with at least one of these seven items. Chronic diseases, including cataracts, cancer, cardiovascular disease, stroke, Parkinson's disease, osteoporosis, hypertension, and diabetes mellitus, were recorded by history taking.

The statistical analyses were performed by the aid of an SAS package (Version 6.12, SAS Institute Inc., Cary, North Carolina). The chi-square test identified the factors that might be associated with impaired ADL in this study population. Multivariate logistic regression of the factors identified by the chi-square test as having a significant association was conducted. A p value less than 0.05 was considered statistically significant.

RESULTS

Among the1092 subjects, 65.66% were men and 34.34% were women. The mean age was 73.4 years (standard deviation = 5.6).

The factors related to impaired ADL according to chi-square test are displayed in Table 1. The prevalence of impaired ADL was 10.71%. Only age, regular exercise, chronic medical diseases, and self-reported health status were statistically associated with impaired ADL.

The factors related to impaired ADL by multivariate logistic regression are listed in Table 2. After controlling for the covariates, with the age group 65 to 69 as a reference, odds ratio (OR) for the risk of impaired ADL was considerably higher in people ≥ 80 years (OR = 2.60, 95% confidence interval (CI) = 1.40 to 4.85, $p < 0.05$). With no regular exercise as a reference, odds ratio for the risk of impaired ADL was considerably lower in people who regularly exercised (OR = 0.60, 95% CI = 0.37 to 0.97, $p < 0.05$). With good self-reported health status as a reference, the odds ratio for the risk of developing impaired ADL was considerably lower in people with fair self-reported health status (OR = 0.55, 95% CI = 0.31 to 0.98, $p < 0.05$). The number of chronic medical diseases was not related to the risk of developing impaired ADL.

DISCUSSION

With the progressive aging of the population, functional impairment has become a critically serious challenge to health care delivery systems. Our study identified that the prevalence of impaired ADL was 10.71%. In Hebert and colleagues' study, the incidence of functional decline was 11.9% [17]. In Wu and colleagues' study [7], 11.0% of participants developed impaired ADL during a three year observation period. Because of the different items of ADL surveyed, the different environmental factors and the different races, it is relatively difficult to gauge the reason for the variation between studies.

Our study elicited that increasing age was a

statistically significant factor of developing impaired ADL, which was similar to previous studies [7,18,19]. That is, the older people become, the lower their functional status level becomes. Strawbridge et al [18] suggested that age-related declines in functional status in older people are deeply complex and heterogeneous.

This study also exhibited that lack of regular exercise was a significantly related factor of developing impaired ADL, a finding consistent with previous studies [7,20-22]. Stessman and colleagues suggested that older people should be encouraged to engage in regular physical activity to increase survival [22].

We also observed that co-existing chronic medical diseases was not a related factor of developing impaired ADL. However, our result was not consistent with previous studies [19,23-26].

We found that people with good self-reported health status were more likely to develop impaired ADL than people with fair self-reported health status. In Beck and colleagues' study [27], no difference was observed between groups in self-reported health and functional status. However, other studies have disclosed that people with good self-reported health status performed well in ADL [28,29]. To date, there is no evidence to support our result.

Limitation

Although information was collected by well-trained interviewers via face-to-face interviews, if subjects refused, we could not interview them. Therefore, the subjects in this study were volunteers. That was why the response rate was only 61.6%. Furthermore, most people living in Chung-Hsing Village moved to Taiwan from Mainland China after the civil war during their military service. Because most of them were men, the proportion of men in this sample was higher than that of women.

In conclusion, increasing age and lack of regular exercise are significantly related factors of developing impaired ADL in older people.

REFERENCES

1. National Health Administration, Taiwan: Health statistics: I. Vital statistics. 1971-1996.
2. Department of Health, Taiwan: http://www.doh.gov.tw/english/901123/Health/II/II-2.doc (Accessed April 2005).
3. Main Causes of Death of the Elderly in Taiwan in 2002, Department of Health, Taiwan: http://www.doh.gov.tw/ufile/Doc/S02/9109-eng.xls (Accessed April 2005).
4. Posner BM, Fanelli MT, Krackenfels MM. Position of the American Dietetic Association:nutrition, aging, and the continuum of health care. *J Am Diet Assoc* 1987; 87:344-7.
5. Lau SC, Lee LL, Lin BJ, et al. The health status of rural and urban ambulatory elderly in Taipei County. *Chang Gung Med J* 2001;24:492-501.
6. Wu SC, Hsu HC, Chuang YC, et al. Application of functional assessment in estimating long-term care need among non-institutionalized elderly adults in Taiwan. *Chinese Public Health (Taipei)* 1996;15:533-45.
7. Wu SC, Leu SY, Li CY. Incidence of and predictors for chronic disability in activities of daily living among older people in Taiwan. *J Am Geriatr Soc* 1999;47: 1082-6.
8. Ensrud KE, Nevitt MC, Yunis C, et al. Correlates of impaired function in older women. *J Am Geriatr Soc* 1994;42:481-9.
9. Katz S, Ford AB, Moskowitz RW, et al. Studies of illness in the aged. The index of ADL: a standardized measure of biological and psychosocial function. *JAMA* 1963;185:914-9.
10. Hsiao SH, Chiu HC, Liu HW. A replication of multidimensionality of activities of daily living (ADL): on the elderly in southern Taiwan. *Kaohsiung J Med Sci* 1994;10:449-57. (In Chinese; English abstract)
11. Frederiks CM, te Wierik MJ, Visser AP, et al. The functional status and utilization of care of elderly people living at home. *J Community Health* 1990;15: 307-17.
12. Wachtel TJ, Derby C, Fulton JP. Predicting the outcome of hospitalization for elderly persons: home versus nursing home. *South Med J* 1984;77:1283-5,1290.
13. Narain P, Rubenstein LZ, Wieland GD, et al. Predictors of immediate and 6-month outcomes in

hospitalized elderly patients. The importance of functional status. *J Am Geriatr Soc* 1988;36:775-83.
14. Fillenbaum GG. Screening the elderly. A brief instrumental activities of daily living measure. *J Am Geriatr Soc* 1985;33:698-706.
15. Desai MM, Lentzner HR, Weeks JD. Unmet need for personal assistance with activities of daily living among older adults. *Gerontologist* 2001;41:82-8.
16. Li TC, Lai MC, Yang WH, et al. Cost analysis of nursing homes. *Mid Taiwan J Med* 2001;6:223-32.
17. Hebert R, Brayne C, Spiegelhalter D. Incidence of functional decline and improvement in a community-dwelling, very elderly population. *Am J Epidemiol* 1997;145:935-44.
18. Strawbridge WJ, Kaplan GA, Camacho T, et al. The dynamics of disability and functional change in an elderly cohort: results from the Alameda County Study. *J Am Geriatr Soc* 1992;40:799-806.
19. Guralnik JM, LaCroix AZ, Abbott RD, et al. Maintaining mobility in late life. I. Demographic characteristics and chronic conditions. *Am J Epidemiol* 1993;137:845-57.
20. LaCroix AZ, Guralnik JM, Berkman LF, et al. Maintaining mobility in late life. II. Smoking, alcohol consumption, physical activity, and body mass index. *Am J Epidemiol* 1993;137:858-69.
21. Kaplan GA, Strawbridge WJ, Cohen RD, et al. Natural history of leisure-time physical activity and its correlates: associations with mortality from all causes and cardiovascular disease over 28 years. *Am J Epidemiol* 1996;144:793-7.
22. Stessman J, Maaravi Y, Hammerman-Rozenberg R, et al. The effects of physical activity on mortality in the Jerusalem 70-year-olds longitudinal study. *J Am Geriatr Soc* 2000;48:499-504.
23. Fu LL, Yang JF. Health status and physical function of long term care facility elderly. *J Phys Ther Assoc (Taiwan)* 1998;23:194-201.
24. Tseng IL, Lee SH, Lee MC. Comparative studies on the health status between the elderly in rural and urban areas. *Chung Shan Med J* 1995;6:65-87.
25. Patrick L, Knoefel F, Gaskowski P, et al. Medical comorbidity and rehabilitation efficiency in geriatric inpatients. *J Am Geriatr Soc* 2001;49:1471-7.
26. Kaplan GA. Maintenance of functioning in the elderly. *Ann Epidemiol* 1992;2:823-34.
27. Beck A, Scott J, Williams P, et al. A randomized trial of group outpatient visits for chronically ill older HMO members: the Cooperative Health Care Clinic. *J Am Geriatr Soc* 1997;45:543-9.
28. Szczerbinska K, Hubalewska A. The health status of the long lived elderly in Cracow. *Przegl Lek* 2004;61: 1360-8. (In Polish; English abstract)
29. Reddy KK, Reddy BK, Rao AP. Interaction among body composition, self-rated health and functional status of the elderly in an Indian population. *Asia Pac J Clin Nutr* 2004;13:78-85.

社區老人日常生活活動障礙之流行病學研究

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目的　　爲了瞭解老人日常生活活動有障礙者的盛行率和相關因子。

方法　　於1998年5月以1774個設籍於中興新村之65歲或以上的老人進行橫斷式研究，共有1092人完成問卷調查並參與這次研究，完成率爲61.6%。本研究由訪員進行面對面訪視，收集有關受訪老人之社會經濟狀況、生活形態、自覺健康狀態與罹患慢性病之狀況。分析方法包括卡方檢定分析與多變項羅吉斯迴歸分析。

結果　　其中男性佔65.66%，女生性34.34%，平均年齡爲73.4±5.6歲。老人日常活動能力有障礙者的盛行率爲10.71%。在控制其他變項之後，以多變項羅吉斯迴歸分析來看，80歲或以上的老人發生日常生活活動障礙的勝算比是65-69歲老人的2.60倍(95%信賴區間爲1.40-4.85)。有規則運動的老人，其日常活動能力有障礙的勝算比是沒有規則運動者的0.60倍(95%信賴區間爲0.37-0.97)。罹患慢性病與日常活動能力是否有障礙並沒有顯著相關性。

結論　　年齡越高及沒有規則運動是老人日常活動能力有障礙的相關因子。(**中台灣醫誌2005;10:165-70**)

關鍵詞

日常活動能力，慢性病，老人，盛行率，規則運動

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