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Functional Status of the Elderly in Singapore

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ABSTRACT

Background: This study was done to look at prevalence and factors affecting functional dependence. The data in this paper were part of the 'Community Study on State of Health, Function, Cognitive and Social State of Elderly People in Singapore' conducted in Singapore between September 1992 and December 1993.

Patients: Four hundred and one elderly, aged 60 years and above were studied. Sixty-eight subjects (17%) were dependent in at least one function of Activities of Daily Living (ADL) as measured by the Barthel's Index (BI).

Results: The most common problem identified using this index was urinary incontinence. Forty subjects (10.4%) were dependent in at least one Instrumental Activities of Daily Living (IADL) function. The most common mode of transportation was by public transport, of which travelling by bus was the most common (59.9%) and mass rapid transit (MRT) was the least common (4%). Female gender and age ⩾ 75 were significant factors associated with dependence measured on Barthel's index but not on IADL.

Conclusion: Results of this study were also compared with two previous surveys done in Singapore. Discrepancies in results noted could be attributed to different definitions in which the functions were assessed. We should aim to standardise the definition and measures of function in the local context in order to measure changes in the elderly population.

Keywords: elderly, Barthel's Index, instrumental ADL, functional dependence

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INTRODUCTION

Singapore's population is ageing rapidly. In 1980, there were about 170,400 (7.5% of the Singapore resident population) persons aged 60 years and above. By 1994, this has increased by 67% to 284,700. Over the years, this number is going to increase at an even faster rate such that by the year 2030, the projected elderly population is expected to increase by more than 3 times the present level to 1.055 million persons[1]. This makes Singapore the fastest ageing population in Asia[2]. With the increase in elderly population, the country's health spending may hit 11% of Gross Domestic Product by 2030[3]. This escalating health care cost may be contained by improving preventive care, and utilising family and community support as an alternative to hospitalisation whenever suitable[3]. Besides availability of social support, the ability of the elderly to live independently in the community is probably influenced by their functional capabilities or dependencies. Other studies have shown that functional status is significantly correlated with hospital admissions and nursing home placement[4,5], and is also a predictor of mortality[4,6].

Objectives

Not much data is currently available on the functional (basic ADL and IADL) state of our local elderly population. The purpose of this study was to describe the prevalence and types of functional dependence of elderly living in the community.

Study design

The data in this paper were part of the 'Community Study on State of Health, Function, Cognitive and Social State of Elderly People in Singapore' conducted in Singapore between September 1992 and December 1993. This was a cross-sectional random sample survey of elderly persons aged 60 and older who live in the community in Singapore. A sample of 3,000 names were obtained from the database of the Ministry of Home Affairs based on the 1990 population census. This database comprises the names, addresses and age of all Singapore citizens without pre-selection.

A community-based polyclinic (Hougang Polyclinic) was chosen to be the base for this survey. Letters of invitation were sent to 2,582 elderly who had local and complete addresses. The purpose of the invitation was explained clearly and they were invited to participate in a questionnaire and clinical examination at an appointed date at the polyclinic. This was followed up by a telephone reminder the day before the appointment. A new appointment was given at the subject's convenience.

The questionnaire and health screening was conducted by a team of six geriatricians. Training was provided to standardise administration of the questionnaire and measurements during clinical examination. Components of the questionnaire included basic personal data, knowledge of own

health and illness, exercise, function, most common mode of transportation, mental and continence status, history and pattern of falls (if present), living arrangement and medication usage[7].

Measures

Functional status was assessed using Barthel's Index (BI) and the Instrumental Activities of Daily Living (IADL). Functional dependence in basic ADL implies that the subject needs assistance in one or more of these tasks.

Higher levels of independent function were measured by the Instrumental Activities of Daily Living (IADL) where subjects were asked specifically if they could prepare a simple meal (like cooking instant noodles or rice and a simple dish), shop on their own (for groceries and household items), use the telephone independently (in dialing out and receiving phone calls), perform housekeeping (like sweeping the floor, dusting and tidying the house) and taking their own medications (remembering and knowing what medicine to take). The responses allowed included 'Yes', 'No' or 'Don't Know', when they have not tried those chores before.

Subjects were also asked the most frequent mode of transportation used whenever they go out, and this included the following options: bus, taxi, mass rapid transit (MRT), and others. Travelling by bus, taxi or MRT was classified as using public transport, while travelling by car (whether self driven or chauffeured) was classified as private transport.

Statistical analysis

Data were collected in Microsoft Access format, and analysed with SPSS 6.1 for Windows. Strength of association between the factors and dependence in one or more ADLs was evaluated by calculating odds ratios and their corresponding confidence intervals.

Response rate and limitations of study

Response rate to this study was 21%. This response rate could be affected by various reasons: (1) Those sampled, being elderly, are dependent on their children or caregivers to take them. Since this is just a survey, they may not be too keen to take leave for this purpose. (2) Some of those sampled may not be able to attend because of ill health or immobility. (3) As all screening was done at Hougang Polyclinic, those staying far away, for example, in the Western part of Singapore, may not want to go. (4) Problem of ageism, where the elderly or their caregivers may not see the value of health screening. Response rates of surveys using this methodology also bear substantial variation ranging from 5% to 83%, and tend to fall with increasing age[7]. This response rate is comparable to the recently reported functional status of elderly in Singapore where the response rate was reported to be 12.33%[8].

RESULTS

Barthel's Index: Sixty-eight subjects (17.0%) were dependent in at least one function of ADL. Female subjects and those ≥ 75 years old were more likely to be dependent in more than 1 activity: odds ratio 2.26 (95% CI 1.27 – 4.04) for female gender and 7.33 (95% CI 3.95 – 13.63) for age. Table I shows the age-gender distribution of the number of functional dependence.

The most common type of functional dependence was urinary incontinence (58 subjects or 14.5%). Of these 58 subjects, only 1 subject was incontinent all the time while 57 had incontinence occasionally. This was followed by bowel incontinence (11 subjects), problem with steps (9), poor mobility (7), problem with transferring (from bed to chair or chair to chair/commode) (6), using the toilet (4) and in grooming (3). The least common functional dependence were in feeding, dressing and bathing (only 2 subjects in each category). Table II shows the type and frequency of functional dependence.

Instrumental ADLs (IADL)

Five items were assessed: ability to prepare a simple meal, shop for groceries and household items, use the phone, do simple housekeeping and take their medicine. Of the 401 subjects assessed, 17 were excluded from the analysis because they did not know if they could perform those functions. Forty subjects (10.4%) had at least 1 IADL function that they could not perform. Table III shows their responses.

The most common dependence in IADL was in preparing a simple meal, followed by shopping, taking their own medicine and using the phone. The least frequent problem was in housekeeping. Women were less dependent with preparing meals (OR 3.47, 95% CI 1.17 – 11.01), while there were no gender differences in the other aspects of IADL: shopping (OR 1.71, 95% CI 0.60 – 5.00), using the phone (OR 1.88, 95% CI 0.67 – 5.42), housekeeping (OR 1.42, 95% CI 0.45 – 4.60) and taking own medicine (OR 1.64, 95% CI 0.52 – 5.30). As expected, ability to perform tasks of IADL was associated with a full Barthel's score: meals – OR 4.64, 95% CI 1.76 – 12.20, shopping – OR 5.07, 95% CI 1.80 – 14.24, using the phone – OR 5.10, 95% CI 1.81 – 13.08, housekeeping – OR 6.52, 95% CI 2.05 – 18.14 and taking own medicine – OR 6.46, 95% CI 2.03 – 20.74.

Transportation

The most common mode of transportation was by bus (240 subjects, 59.9%), followed by private car (74, 18.5%), taxi (52, 13.0%), while the least frequent was by MRT (16, 4%). The remaining 19 (4.6%) subjects travelled by other means (like walking or cycling). Majority (308, 76.9%) of the elderly surveyed could still use public transportation. Comparing the group taking bus and the group that does not, there were no significant differences in gender (OR = 1.16, 95% CI 0.76 – 1.76), age (OR = 1.33, 95% CI 0.78 – 2.29) or Barthel's score (OR = 1.18, 95% CI 0.68 – 2.06). Between the group taking taxi and those taking private transport (self drive or chauffeured), no differences were found for gender (OR = 1.47, 95%

Table I – Age-gender distribution of number of functional dependence

Age (yr)	Number of functional dependence (sex distribution) n (M/F)					
	10	6	5	3	2	1
< 75	1 (1M)	0	0	0	0	33 (8M, 25F)
⩾ 75	0	1 (1M)	2 (2M)	3 (2M, 1F)	6 (3M, 3F)	22 (7M, 15F)
Total	1	1	2	3	6	55

Table II – Types of functional dependency +

Item – description of dependence	No. (% of dependency)
Bowel – incontinence or occasional incontinence	11 (2.7%)
Bladder – incontinence or occasional incontinence	58 (14.5%)
Grooming – needs help	3 (0.8%)
Toilet use – dependent or needs help	4 (1.0%)
Feeding – unable to or needs help	2 (0.5%)
Transfer – unable to, needs major help or needs minor help	6 (1.5%)
Mobility – immobile or wheelchair independent or needs untrained help	7 (1.7%)
Dressing – dependent or needs help	2 (0.5%)
Steps – unable to or needs help	9 (2.2%)
Bathing – dependent	2 (0.5%)

+ Some subjects were dependent in more than 1 activity

Table III – Frequency distribution of IADL

IADL items	Responses		Persons with dependencies		Number with 'Don't know' responses
	n	(%)	n	(%)	
Meals	368	91.8	22	5.6	11
Shopping	378	94.3	19	4.8	4
Phone	380	94.7	19	4.8	2
Housekeeping	382	95.3	15	3.8	4
Take medicine	379	94.5	15	3.8	7

Table IV – Comparison of functional dependencies with previous studies

Activities	Current study 1992-1993 % dependent	1992 survey % dependent	1982 survey[9] % dependent
Toilet use	3.9	10.6	2.2
Mobility	6.7	2.8	1.0
Dressing	1.9	3.9	2.0
Steps	8.6	12.1	10.4
Bathing	1.9	4.6	2.6
Preparing a meal	5.6	7.4	16.4
Shopping	4.8	25.5	18.8
Housekeeping	3.8	13.4	10.9

CI 0.17 – 3.19) or age (OR = 0.78, 95% CI 0.31 – 2.02). However, the group taking taxi was associated with dependencies in basic ADL functions (OR=2.69, 95% CI 1.02 – 7.18).

DISCUSSION

This study shows a surprisingly high percentage (17%) of elderly ⩾ 60 years who were dependent in at least one activity of ADL. This is much higher than a previous assessment of ADL function[9,10] which state that 'virtually all respondents could attend to their personal needs independently and that only 1% to 2% of the elderly needed help in feeding, bathing and dressing'. However, when we compared the functions being assessed by the 2 studies, we assessed different numbers and functions of ADL and IADL. Looking at the individual functions that were assessed commonly, the percentage of dependency also varied among the previous 2 surveys. Table IV shows the comparison.

This relatively wide variation in functional dependency could be due to sample bias, small numbers involved (Table II) and different definitions and standards used in assessing the individual function. Taking 'shopping' as an example, the 1982 survey assessed this function as the 'ability to shop or do marketing', Lee and Tan defined it as the 'ability to lift and carry a full bag of grocery', while we define it as the ability to 'shop on their own for groceries and household items'.

In this study, female subjects and those ⩾ 75 years old were more likely to be dependent in 2 or more activities of daily living. Another study however, showed no significant correlation between Barthel's Index and sex, although an inverse regression was demonstrated between age and Barthel's Index[11].

While the Barthel's Index measures the basic capacity of persons to care for themselves, IADL scales are used to assess higher levels of performance and is more sensitive to functional changes[12]. 'Preparing a meal' was the most common problem, followed by 'shopping' and 'using the phone', while 'housekeeping' and 'ability to take medicine on their own' were the least common problems. As expected, those who were able to perform all tasks of IADL had full BI score because competence in IADL requires more complex skills whereas BI assesses the basic skills involved in routine ADL.

About 77% of the elderly surveyed used public transport (bus, taxi and MRT) as the most common mode of transportation. Among the public transport group, travelling by bus was the most common (59.9%), while travelling by MRT was the least common (4%). Possible reasons for this are: the elderly subjects are more familiar with travelling by bus, cheaper alternative and bus stops are more accessible to the elderly. There were no significant differences in age or Barthel's Index between the group taking bus and the group that did not. That MRT was not a popular choice is not surprising as it is still a new mode of transportation in Singapore then, and access

APPENDIX 1: BARTHEL'S INDEX

S/No.	Items	Description	Score
1	Bowel	Continent	2
		Occasional incontinence	1
		Incontinent	0
2	Bladder	Continent	2
		Occasional incontinence	1
		Incontinent	0
3	Grooming	Independent	1
		Needs help	0
4	Toilet use	Independent	2
		Needs help	1
		Unable to	0
5	Feeding	Independent	2
		Needs help	1
		Unable to feed	0
6	Transfer	Independent	3
		Needs minor help	2
		Needs major help	1
		Unable to	0
7	Mobility	Independent	3
		Needs untrained help	2
		Wheelchair independent	1
		Immobile	0
8	Dressing	Independent	2
		Needs help	1
		Dependent	0
9	Steps	Independent	2
		Needs help	1
		Unable to	0
10	Bathing	Independent	1
		Dependent	0

to the MRT is not elder friendly – with steep and fast escalators, the need to get in and out of the trains fast, and instructions only in the four official languages over the PA system are not usually clear.

Although the group taking taxi or private transport (self drive or chauffeured) used the car as the mode of transport, we found that the group taking taxi was associated with dependency in basic ADL functions (OR = 2.69, 95% CI 1.02 – 7.18). No differences were found for gender (OR = 1.47, 95% CI 0.17 – 3.19) or age (OR = 0.78, 95% CI 0.31 – 2.02) between the 2 groups. This study and those done previously highlighted the difficulties in studying functional status of a population. We should work towards developing a standard definition and understanding (within the local context) of the functions being assessed. This will make it easier for comparative studies. With progressively high cost and difficulties in looking after a disabled elderly at home, more studies should be done to assess the changing patterns of functional dependence and the factors associated with it. Preventive programmes can then be instituted to reduce the functional decline.

REFERENCES

1. Paul Cheung. The Ageing Population. In: Chan KM, Yap KB, Wong SF, eds. Geriatric Medicine for Singapore, Singapore: Armour Publishing 1996; 3-10.
2. Chua LH. S'pore has fastest ageing population in Asia: Study. The Straits Times 1996, Aug 3.
3. S'pore's health spending may hit 11% of GDP by 2030: Study. [editorial] The Straits Times 1996, Aug 3.
4. Nikolas T, Bach M, Oster P, Schlierf G. Prospective value of self-report and performance-based tests of functional status for 18-month outcomes in elderly patients. Ageing 1996; 8:271-6.
5. Woo J, Ho SC, Lau J, Yuen YK. Age and marital status are major factors associated with institutionalisation in elderly Hong Kong Chinese. J Epidemiol Community Health 1994; 48:306-9.
6. Scott WK, Macera CA, Cornmen CB, Sharpe PA. Functional health status as a predictor of mortality in men and women over 65. J Clin Epidemiol 1997, 50:291-6.
7. O'Neill TW, Marsden D, Matthis C, Raspe H, Silman AJ. Survey responserates: national and regional differences in a European multicentre study of vertebral osteoporosis. J Epidemiol Community Health 1995; 49:87-93.
8. Chan KM, Pang WS, Ee CH, Ding YY, P Choo. Epidemiology of Falls Among the Elderly Community Dwellers in Singapore. Singapore Med J 1997; 38:427-31.
9. Lee KS, Tan TC. Functional Status of the Elderly in Singapore - The Trend over a Decade. Ann Acad Med Singapore 1997; 26:727-30.
10. Report on the national survey of senior citizens. Singapore: Ministry of Social Affairs, 1983.
11. Palagi L, Paoletti ML, Alma A, Re M, Petrille GA, Salerno F, Murgiano S. Factors affecting insufficiency in activity daily living in the elderly. Panminerva Med 1997; 39:275-9.
12. Avlund K, Schultz-Larsen K, Kreiner S. The measurement of instrumental ADL: content validity and construct validity. Ageing 1993; 5:371-83.