

Relationship between instrumental activities of daily living and self-rated health rehabilitation users

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Abstract In general, elderly persons with limitations in instrumental activities of daily living (IADL) are fragile, due to their various health problems such as disorders, poor cognitive functions. Physical and cognitive status could be predictors for the onset of IADL limitation in elderly persons. On the other hand, self-rated health (SRH), a valid generic health measurement is used as a resource and as an outcome, also was reported as a reliable measurement because it was verified that results of SRH and mortality were correlated. Thus, it can be deemed as a resource which affecting inclusive and dynamic health behavior, and reflecting measure of health status. Therefore, our main objective was to clarify relationships between limitation of IADL levels, SRH, and Mini-Mental State Examination (MMSE) among elderly persons who use ambulatory rehabilitation. As the result, IADL limitation was related to the level of SRH, but not with MMSE scores.

Key words : Instrumental activities of daily living, Self-rated health, Rehabilitation users, The long-term care insurance

Introduction

The long-term care insurance (LTCI) system in Japan provides one of seven services (support level 1-2 and care levels 1-5) to elderly persons depending on recipients' disease condition or functional ability¹⁾. LTCI care levels require more care than support levels, and the higher level require more severe cares.

LTCI certification levels are defined for example, support level 1 "limited in instrumental activities of daily living". Preventive services are programs for individuals who were not certified as having disabilities, neither need support level 1-2 of LTCI, thus for those

who were not given LTCI certification.

One preventive service (service "C") aims to gain intensive improvement in participants' activities of daily living, instrumental activities of daily living (IADL), and physical fitness over a short term of 3 to 6 months; the service program is reviewed each 3 month at least²⁾.

In general, elderly persons with limitations in IADL limitations are fragile, due to their various health problems, such as disorders (e.g., histories of heart disease, stroke, depression, or diabetes), poor cognitive functions, and frequent falls³⁾. Physical and

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cognitive status could be predictors for the onset of IADL limitation in elderly persons⁴. On the other hand, SRH which is a valid generic health measurement is used as a resource (e.g., as a restriction or prerequisite for social participation) and as an outcome (e.g., as an index for health preservation or health improvement), also was reported as a reliable measurement because it was verified that results of SRH and mortality were correlated. Thus, it can be deemed as a resource which affecting inclusive and dynamic health behavior, and reflecting measure of health status.⁵ However, few studies have examined about relationships between IADL items, cognitive functions, and SRH amongst persons who use ambulatory rehabilitation.

Previous studies, moderate participation in neighborhood community associations were more favorable for the maintenance of IADL among female than male. Because female participants often participate in involuntary neighborhood community association⁶.

Therefore, our objective was to clarify relationships between limitation of IADL levels and SRH, MMSE among elderly persons who use ambulatory rehabilitation.

Materials Methods

Participants

Thirty-six elderly persons (11 males and 25 females, aged 81.3 ± 5.7 years) who use ambulatory rehabilitation participated in this study. The present investigation was approved by Kurume Rehabilitation Hospital Ethical Review Board for Medical Research involving Human Subjects (ethical number: 21-001), and this work was supported by the Kabutoyama M S Limited Company R, Japan. Collected data included the sociodemographic characteristics (e.g., gender, age, educational background), anthropometric measurements (e.g., height, weight), health status, personal habits. Body mass index (BMI) was calculated by dividing the weight (kilogram) by height (meter squared).

Questionnaires

IADL limitation was assessed using three sub-items of the Kihon-Checklist⁷ and a self-reported comprehensive health checklist that was developed by the

Japanese Ministry of Health, Labour and Welfare⁸. The three sub-items are as follows: (1) using bus or train by own self, (2) buying daily necessities by own-self, (3) managing own deposits and savings at the bank by ownself. Cognitive function was assessed using 30-questions of MMSE; each correct answer was scored by one point, whereas incorrect or no answers were scored as zero point. The total score ranged from 0 to 30 points.

Statistical analysis.

The statistical analysis software SPSS (Version 26.0, SPSS Inc., Chicago, IL, USA) was used for statistical analysis. In this study, all continuous variables were presented as the mean \pm standard deviation (SD) and categorical data were presented as numbers (percentages). Pair analyses were carried out using unpaired Student's t-tests. Correlations were analyzed by Pearson's correlation coefficient among continuous variables. Chi-square tests were used to compare differences in limitation of IADL level. Differences with a *P*-value of <0.05 were considered statistically significant.

Results

Table 1 provides an overview of the participants ($n=36$). Seventy-eight percentages of the participants needed support 1 and twenty-two percentages of the participants needed support 2. Sixty-one percentages of the participants were with IADL limitation. Females had significantly higher age ($p<0.05$) and IADL ($p<0.05$) than males (Table 2). Pearson's correlation analysis revealed that IADL scores was negatively associated with age ($r=-0.41$, $p<0.05$) and positively associated with SRH ($r=0.41$, $p<0.05$) (Table 3). Table 4 shows the results of IADL limitation in participants who reported subsequent activity limitation. Rate of subsequent activity limitation significantly differed between male and female in regard to buying daily necessities ($p<0.05$) and managing deposits and savings ($p<0.05$).

Table 1 Demographic characteristics of participants

Demographic Characteristics (n=36)	Mean±SD	Numbers (%)
Age (years)	81.3±5.7	36 (100)
Male (age, years)	78.0±7.3	11 (31)
Female (age, years)	82.8±4.1	25 (69)
Educational background		
Junior school	–	17 (47)
High school	–	19 (53)
Level of care needed		
Needs support 1	–	28 (78)
Needs support 2	–	8 (22)
Types of diseases		
Cerebrovascular disorders	–	8 (22)
Bone and joint disorders	–	5 (14)
Heart disorders	–	1 (3)
Hypertension	–	17 (47)
Diabetes mellitus	–	4 (11)
Hyperlipidemia	–	1 (3)
IADL		
Independent	–	14 (39)
Limitation	–	22 (61)
MMSE(scores)		
≤26		20 (56)
27≥		16 (44)
Self-rated health (scores)		
≤3	–	16 (47)
2≤	–	18 (53)

Discussion

This study focused on the effect of IADL limitation and SRH, MMSE of elderly persons. Two main results were found. First, there was relationship between IADL scores and SRH. Second, there was a significant difference in rate of subsequent activity between male and female with regard to buying daily necessities and managing deposits and savings.

This study analyzed determining whether elderly persons had onset experiences of declining three kind of IADLs, including using transportation, shopping, and managing finances. In terms of the other IADLs such as cooking, housekeeping, and handling medication, these activities are also necessary for the maintenance of independence in elderly persons. In addition, previous studies have divided IADLs into two categories based on differences between activities involving

Table 2 Comparison of characteristics between male and female

Variables	Male (n=11)	Female (n=25)	P-value
Age (years)	78.0±7.3	82.8±4.1	0.04*
BMI	24.6±3.4	23.5±4.1	0.43
Education (years)	10.9±1.5	10.4±1.5	0.40
IADL (score)	1.1±1.1	2.2±0.8	0.02*
MMSE (score)	25.2±4.1	26.7±2.3	0.19
Self-rated health (score)	2.3±0.92	2.7±0.96	0.28

*p<0.05 by Pearson's correlation

Table 3 Correlations between variables and IADL scores

Variables	P-value	r
Age	0.02*	0.89
Gender	–0.41	0.02
education	0.01*	0.94
BMI	0.15	0.94
MMSE	0.37	0.05
Self-rated health	0.41	0.03

*p<0.05 by Pearson's correlation

high or low cognitive demand⁹). An earlier study proposed that elderly persons experience greater difficulty in performance of IADLs that involve higher cognitive demand¹⁰). This study suggests that cognitive function including memory and processing speed may be an important factor in maintaining IADLs such as using transportation, shopping, and managing finances in later life. Moreover, being reluctant for elderly persons who use ambulatory rehabilitation may be a premonitory symptom of IADL limitations. Hence, we should take great care if generalizing our findings in elderly persons with functional disabilities, especially among people who living in rural areas or country side with different cultural background.

Our study has several limitations. First, we did not achieve adequate response and follow-up rates. Second, this study is a prospective cohort study, and there may be potential of reverse causation. Finally, the study population of this study comprised only in elderly persons who had independent IADL with baseline and were living in a commuter town in Japan. Thus, it is not certain if this results can be generalizable in other population or persons who live in other areas.

In conclusion, our present findings demonstrated

Table 4 Comparison of characteristics between participants with and without self-reported IADL limitation

IADL items	No. of IADL limitation (n=36)	Male (n=11)	Female (n=25)	p-Value
Subsequent activity limitation (number of participants)				
Using bus or train by oneself	14 (38.8)	8 (72.7)	14 (56.0)	0.24
Going out and buying daily necessities by oneself	28 (77.7)	6 (54.5)	2 (8.0)	0.002*
Managing own deposits and savings at the bank	25 (69.4)	7 (63.6)	4 (16.0)	0.03*

*p<0.05 by Chi-square tests

relationships between IADL limitation and SRH. These suggest may be an important factor in maintaining IADLs such as using transportation, shopping, and managing finances in later life.

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Conflicts of Interest

The authors have read the journal's policy and have the following conflicts; Authors of the present study, Makoto Uchinoura, Seijiro Nishimura and Shinichi Shibata are employees of Kabutoyama M S Limited Company R. However, the sponsor had no role in the study design, data collection and analysis, neither decision to publish, nor preparation of the manuscript. There are no patents, products in development or marketed products to declare. The authors declare no competing interests. Thus, there is no conflicts of interest relevant to this article.

Author Contributions

HM conceptualized the study design and protocol. HM, MU, YK, YY, SN, SS collected the data. HM and YK carried out the analysis and interpretation of data. HM, HS and MM drafted the manuscript. All authors have critically reviewed, revised and approved the manuscript.

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