Association between social interaction and the functional status of elders in Japanese rural community: a 3-year follow-up study

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Abstract
Objective: This study aimed to examine the association between elders' social interaction and their subsequent functional capacity.
Method: A longitudinal study based on interview and investigation were carried out with the sample of elderly people who living in the rural community of Japan. Total 267 elderly people aged 60 and over were enrolled in this study in 2005 and 2008. The data of social interaction and activity of daily living (ADL) including basic ADL (BADL) and instrumental ADL (IADL) were analyzed by logistic regression analysis to examine the associations between elders’ social interaction and their functional status 3 years later.
Results: Subjects were consisted of 117 men (mean age ± standard deviation, 68 ± 7.0 years) and 150 women (69 ± 7.6 years). During the 3-year follow up, after controlling for elders' age and gender, the significant factors of social activities related to their future BADL included: having a hobby (odds ratio = -1.57, p < 0.05); having a self-identity as a useful social role (odds ratio: -1.78, p < 0.05). For future IADL it included: Participation in community activities (odds ratio: -1.57, 95%, p < 0.05); Feeling importance in normal life (odds ratio: -1.65, p < 0.05) and using handy equipments (odds: -1.47, p <0.05).
Conclusion: The findings in the present study clarified the links between elders’ social interactions and their functional capacity three years later in the sample of rural community. It indicated that more social interaction which engages their physical and intellectual function can probably retard elders' function capacity decline.

Keywords: functional status, ADL, social interaction, elders

1. Introduction
Japan is a typical society that the advancement in social and medical field has been improving the expectation of life. With a longer life span and decreasing birthrate, the aging of the population makes the research an important issue that protest against the decline of elder’s function capacity. In previous studies about elder’s functional capacity, the association had been demonstrated that activities of daily living (ADL), including basic activities of daily living (BADL) and instrumental activities of daily living (IADL) could reflect functional capacity1-3). To date, many studies explored the factors which can affect elders’ activities of daily living in

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socio-demographic and health background according to their models. For example, active participation in community events has a positive effect on maintenance of functional capacity\(^9\). Other studies about cognitive functioning also showed that lower social interaction related to cognitive activity was associated with functional status decline\(^5-7\). Besides, a 3 years follow-up study and a 8 years follow-up study with the older people who are living in an urban community reported that baseline level of social roles and intellectual activities significantly predict the new onset of IADL disability during the 8-year follow-up period\(^5,9\). Summarizing the results of those studies, the point was that high level of social activity and communication are positively related to older people’s functional capacity.

For exploring the association between social activity and functional capacity further, a 3-year follow-up study was carried out to clarify the effect factors in daily social interaction\(^*\). The study was expected to offer helpful evidences to maintain and promote elder’s functional capacity.

2. Participants and methods

2.1 Study sample

A longitudinal study based on interview and investigation were carried out with the sample of elderly people who living in the rural community of Japan, with a population about 4688 and 14.6% of residents were engaged in the primary sector of industry.

All residents who were over 60 years old in 2005 were enrolled, and questionnaire survey was conducted among subjects to understand their age, gender, social activities in 2005 and subsequent functional capacity in 2008. A total of 267 elders participated in this study, including 117 males (mean age ± standard deviation, 68 ± 7.0 years) and 150 females (69 ± 7.6 years) who provided complete data for this study.

2.2 Methods

The questionnaire surveys covered the information about age, gender, function capacity, social interaction, and was delivered to every subject and collected in later days.

Basic activities of daily living\(^2\) consist of 6 items including hearing, vision, transferring, stepping up and down, toileting, and bath. Transferring and stepping up and down were recorded as 5 scales, others were recorded as 4 scales, thus the total score was ranged from 6 to 26, and the higher score means higher level in basic activities of daily living. Subjects whose total score lower than 26 were assigned into BADL decline group, and others were assigned into BADL normal group.

Lawton – Brody IADL Scale comprised 8 items, such as Ability to use telephone, shopping, food preparation, was introduced to measure Instrumental activities of daily living. The total score of IADL was ranged from 8 to 30 and higher score means higher level of ability. Elders whose total score were lower than 30 were assigned into IADL decline group, contrasting IADL normal group whose total score was 30.

Social interaction was measured by introducing “Index of Social Interaction”\(^10\). This scale contains 5 subscales including 18 items totally, and each item was assessed as 4 levels. Higher levels represent higher level social interaction action. The 5 subscales were shown as follow: 1) Independence, which means the elder having motivation to live in a positive lifestyle, determining an approach of life by oneself, being motivated to live as a health way, and having a regular or routine lifestyle; 2) Social curiosity, which composed of reading newspaper, reading books or magazines, having a hobby, using handy equipments, feeling importance in normal life; 3) Interaction, which composed of communication with family, communication with persons who are not family members, and visit to non-family persons; 4) participation in society activities, which included participation in community activities, association with neighborhood, watching television, and having a self-identity as a useful social role; 5) Feeling of safety, which composed of items, for example, having a counsel, having someone who can supply support in an emergency. Each item was scored according the level of response, so the individuals’ total score ranged from 18 to 72.

To identify the association between social interaction and the functional status, the program SAS was introduced and T-test and multiple logistic regression were used to analyze. T-test was used respectively to
examine the difference between decline group and normal group in ISI total score. Chi-square test was used to examine the functional status differences in various age and gender groups. In addition, logistic regression analysis was performed to examine relationship between functional status (BADL and IADL, respectively) of elder and their social interaction. In the regression analysis, each item of ISI (18 items) was considered as independence variable and the original four levels were used (1, 2, 3, and 4), including age and gender, there were 20 independence variables in total. The BADL and IADL were dependence variables and they were classified in to 0 (normal group) and 1 (decline group) respectively. For all statistical analyses, p < 0.05 was accepted as significant level.

3. Results

Table 1 presents the characteristics of the normal and decline group including. The sample size in BADL normal group and BADL decline group were similar, there are 134 subjects in BADL normal group and 133 subjects in BADL decline group. The mean ISI total score of in BADL normal group was 35.32 and significantly greater than the mean (29.89) of BADL decline group (p < 0.0001). There are 106 subjects (39.7%) of BADL normal group and 56 (21.0%) subjects of BADL decline group were 69 ~ 69 years old, 26 (9.7%) and 52 (19.5%) were 70 ~ 79 years old, and 2 (0.8%) and 25 (9.4%) were above 80 years old. The p value of chi-square (p < 0.0001) implied that the variance of distribution of different age levels between BADL normal and BADL decline group was significant. Although there was more female subjects (79) than male (54) in BADL decline group, the difference has no statistic significance (p > 0.05).

In IADL, there are 148 subjects in IADL normal group was 148 more than 118 subjects in IADL decline group. After taking a T-test, the mean score of ISI of IADL normal group was 35.96 and significantly higher than score 29.91 of IADL decline group (p < 0.0001). To the same with BADL, there was a different IADL distribution between normal and decline group among different age groups (p < 0.0001). There were 114 subjects (42.7%) of normal group and 48 (18.0%) individuals of decline group in 60 - 69 group, 31 individuals (11.6%) and 47 individuals (17.6%) in level of 70 - 79 group, 4 individuals (1.5%) and 23 individuals (8.6%) in the group of above 80. Besides, there were more male subjects (70) in IADL decline group than female (48), and the difference has statistic significance (p < 0.0001).

Table 2 shows the results of multiple logistic regression analyses which were performed to examine the association between independent variables of functional capacity and BADL which was introduced as dependent variable. After controlling for elders’ age (OR: 3.321, 95%CI: 1.964 – 5.282) and gender, the items of ‘having a hobby (OR: -1.574, 95%CI: -2.225 – -1.113)’ and ‘having a self-identity (OR: -1.783, 95%CI: -2.623 – -1.212)’ significantly predict the decline of BADL 3 years later.

As shown in table 3, the association between independent variables of functional capacity and dependent variable BADL was examined by multiple logistic regression analyses. After controlling for elders’ age (OR: 3.771, 95%CI: 2.215 – 6.421) and gender (OR: 0.209, 95%CI: 0.109 – 0.403), the predictors which significantly related to the decline of IADL contained the following items: Participation in community activities (OR: -1.569, 95%CI: -2.182 – -1.128); Feeling importance in normal life (OR: -1.652, 95%CI: -2.371 – -1.151); and Using handy equipments (OR: -1.472, 95%CI: -2.007 – -1.080).

4. Discussion

Japan is advanced country which has been experiencing the aging population society for many years. How to maintain and improve the functional capacity of elders has attracted much attention. The cross-sectional study has limitation to examine the associations in a long term, so the present study focus on the association between elders’ social interaction in baseline year and subsequent functional status including BADL and IADL from a longitudinal perspective.

The findings of this study indicated that the social interaction of elders was associated the status of BADL and IADL, specifically, the low level of social interaction predicted the decline of functional status in BADL and IADL. The findings were similar to the results of other previous studies. For example, the risk factors of disability of functional capacity assessed by ADL based on a 10-year follow up of residents living at home who aged 69–71 years had been reported 11, and the previous study examined the predictors for functional decline in
BADL, as well as predictors for decline in IADL based on a 3-year longitudinal observation of residents who aged from 65 to 89 years in a rural area. Their results showed that low social activities and poor social role at baseline were significantly associated with function decline for both men and women. In addition, Functional decline in IADL could predict the future onset of decline in BADL and mortality. This view explained the status that decline of both BADL and IADL expressed the simultaneity with the growth of age. Gender was not considered as the factors associated with BADL in some previous studies, but a significant association was found between gender and IADL decline in this study, however, the other previous study also showed the reverse effect of male and female as the risk factors for IADL. In consideration of results of non-association in other previous studies, if gender was a predictor of functional capacity didn’t has enough evidence and need more demonstrations.

After controlling age and gender, if elder has a hobby and have a self-identity as a useful social role were considered as the significant predictors for BADL decline. A 12-year population-based prospective cohort study showed that depression status was a reliable predictor of BADL decline among Japanese community-dwelling older adults. The existing study also reported that there was a significant association between depression and physical decline in older adults. In addition, other studies pointed out that having less involvement in hobbies or interests was an independent predictor for depression, and suggested that female elders who had continued to enjoy hobbies have higher levels of cognitive function, quality of life, physical activity, social activity and life satisfaction than those who had not. Thus, it could be explained that having a hobby presented a positive effect on elders’ BADL, specifically, enjoying a hobby could relieve the prevalence of depression so that guard against decline of BADL in normal life.

The previous study revealed that older people’s occupations and roles are diverse, and increasing age does not appear to reduce occupational or role engagement, and continued participation in valued roles may be important for older people’s life satisfaction. Although physical and intellectual functional capacity of elder declined as increasing age in normal life, pursuing the life satisfaction in mental aspect did not suspend. The results of this study indicated that the initiative of having a self-identity as a useful social role has a positive effect on elders’ functional capacity.

Besides, a conclusion was presented in a 6 years prospective study that older populations, disability in social role and intellectual activity preceded IADL disability, and predicted significantly the future onset of IADL disability in both urban and rural community. Although significant association between IADL and having a self-identity was not found in this study, the potential relationship may exist.

In the present study, participation in community activities, feeling importance in normal life, and using handy equipments were found associated with decline of IADL. The findings are consistent with many previous studies, such as a 2-year follow up study reported that participating in community activities was identified as significant predictors of functional outcome among older persons. Other studies pointed out that often participation in activities had a positive effect on functional status among older people. In addition, previous studies presented that increase or maintenance of exposure to intellectual activities over a period of 2 years was associated with increased likelihood of better IADL functioning trajectory (i.e. improvement or stability) over the subsequent 2 years, and cognitive status contributed independently to the risk of functional dependence in non-disabled. Using handy equipments which is an item of social curiosity perhaps maintain and improve elders’ functional capacity by the approach in intellectual activity. The finding of the present study suggested that community activities should cover both physical and intellectual.

This point that feeling important was one of the factors related to mortality of older persons in an 11 years longitudinal study. In addition, other previous studies suggested that loss of functional independence was a predictor to mortality of older persons. Thus, the result of this study revealed that feeling important in normal life was a significant predictor that is related to IADL, and it may explain elders’ mortality. In conclusion, this study also suggested that help elders to feel importance may reduce elders’ mortality.

The study has some limitations. Firstly, the sample size decreased since the loss of follow up (subjects died during three years.), so as to the bias of sample may existed. Secondly, this study just focused on the association between social interaction and functional capacity, other potential predictors were not covered, because we aims to clarify the variables affect functional capacity through the way of social interaction.
5. Conclusion
The present study showed the specific associations between social interactions of elders who living in the rural community and their physical function after 3 years. As shown in the results, having a hobby and self-identify, participation in activities, feeling importance, and using handy equipments were the predictors related to elders’ functional capacity after controlling age and gender.

6. References


Table 1 Comparison of sample characteristics between normal and decline group

<table>
<thead>
<tr>
<th>Items</th>
<th>BADL</th>
<th>IADL</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Normal</td>
<td>Decline</td>
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<tr>
<td>Age 60 ~ 69</td>
<td>106</td>
<td>56</td>
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<tr>
<td>Age 70 ~ 79</td>
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<td>52</td>
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<tr>
<td>Age 80 ~</td>
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<td>25</td>
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<tr>
<td>Gender Male</td>
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<td>54</td>
</tr>
<tr>
<td>Gender Female</td>
<td>71</td>
<td>79</td>
</tr>
<tr>
<td>Mean score of ISI</td>
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<td>29.89</td>
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<td>Total</td>
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<td>133</td>
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Table 2 Association between functional capacity and BADL analyzed by multiple logistic regression

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>3.221</td>
<td>1.964 - 5.282</td>
<td>&lt;0.001</td>
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<tr>
<td>Gender (contrast to male)</td>
<td>1.077</td>
<td>0.619 - 1.874</td>
<td>0.792</td>
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<tr>
<td>Having a hobby</td>
<td>-1.574</td>
<td>-2.225 - -1.113</td>
<td>0.010</td>
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<td>Having a self-identity as a useful social role</td>
<td>-1.783</td>
<td>-2.623 - -1.212</td>
<td>0.003</td>
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Table 3 Association between functional capacity and IADL analyzed by multiple logistic regression

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<tr>
<td>Participation in community activities</td>
<td>-1.569</td>
<td>-2.182 - -1.128</td>
<td>0.008</td>
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<tr>
<td>Feeling importance in normal life</td>
<td>-1.652</td>
<td>-2.371 - -1.151</td>
<td>0.006</td>
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<td>using handy equipments</td>
<td>-1.472</td>
<td>-2.007 - -1.080</td>
<td>0.014</td>
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