

LETTER TO THE EDITOR

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Effect of a dual-task exercise to motor and memory function for Japanese older individuals in depopulated rural districts: preliminary intervention research from 2016 to 2019

In Japan, the first country to experience a super-aging society, the development of independent rehabilitative care for older individuals in depopulated rural areas is an indispensable challenge to decrease a high incidence of weak psychosomatic state to need care. Interestingly, some studies provide evidence that dual-task training has been shown to induce improvements in targeted motor and cognitive function (Suzuki *et al.*, 2013; Tait *et al.*, 2017). However, these findings remain for older individuals living in relatively urban neighborhoods. This preliminary study examined the effect of dual-task training for Japanese older persons in depopulated rural areas.

This research was conducted from 2016 to 2019, including the Katagami's study, and our previous studies at Oga and Higashinaruse areas (Kume *et al.*, 2017, 2019). Thirty-five participants (age [mean±SD] 72.0±5.4 years; education, 11.4±2.3 years; %female, 94%) without a history of neurological, psychiatric disorders, and dementia were recruited from rural areas in Akita prefecture. The participants performed a 90-minute exercise program comprised of stretching, muscle strength training, a step-up/down aerobic exercise using the stepstool, and dual-task training (e.g. the step-up/down movement while working naming tasks, a colorful ladder exercise combined the Stroop task) for once per one or two weeks for six months (Suzuki *et al.*, 2013). Physical and cognitive measurements were performed at baseline and after the six-month intervention. The physical measurement consisted of the Timed Up and Go test (TUG), grip strength (GS), and the Sit to Stand-5 (SS-5). The National Center for Geriatrics and Gerontology Functional Assessment Tool (Shimada *et al.*, 2017) was also applied to examine the effect to cognitive function before and after the intervention, comprised of the Word Recognition Memory (WRM) and the tablet version of the Trail Making Test – part A and part B (TMT-A, TMT-B). This study was approved by the Ethics Committee of Akita University (No. 1769).

The result of the Wilcoxon signed-rank test indicated that a required time (second) of the SS-5 was significantly shorter (median [interquartile range], pre-test = 6.7 [1.8], post-test = 5.4 [1.6], $p < 0.0001$), and

the WRM score was significantly improved (pre = 12.0 [5.0], post = 13.0 [4.6], $p = 0.008$) after the intervention. However, a significant difference between pre- and post-tests was not observed in other physical and cognitive domains, such as the TUG ($p = 0.44$), the GS ($p = 0.63$), the TMT-A ($p = 0.83$) and TMT-B ($p = 0.72$).

Our preliminary findings lead us to believe that a dual-task exercise program can be potentially effective to the enhancement of motor and memory function for Japanese older persons in depopulated rural districts, in accordance with an improvement of memory scores following dual-task training (Suzuki *et al.*, 2013; Tait *et al.*, 2017). Whether these results generalize to enhancements for subjects in other areas remains unclear but warrants examination involving a randomized controlled trial.

Conflict of Interest

None.

Description of authors' roles

Authors contributed to data collections, data interpretation and writing, and revision of the report.

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YU KUME,¹ TOMOE FUJITA,² SACHIKO UEMURA,³
SHOKO INOMATA,² MEGUMI TSUGARUYA,¹
AKIKO SATO,⁴ YORIKO NAKAMURA,²
YUKI ITAKURA⁵ AND HIDETAKA OTA⁵

¹Department of Occupational Therapy, Graduate School of Medicine, Doctorial Course in Health Sciences, Akita University, Akita, Japan

²Department of Nursing for Community Living, Graduate School of Medicine, Doctorial Course in Health Sciences, Akita University, Akita, Japan

³Department of Physical Therapy, Graduate School of Medicine, Doctorial Course in Health Sciences, Akita University, Akita, Japan

⁴Graduate School of Medicine, Center for Aging in Place, Akita University, Akita, Japan

⁵Advanced Research Center for Geriatric Medicine, Akita University, Akita, Japan

Correspondence should be addressed to: Yu Kume,
Department of Occupational Therapy, Graduate
School of Medicine, Doctorial Course in Health
Sciences, Akita University, 1-1-1 Hondo, Akita,
010-8543, Japan. Phone: +81-18-884-6556;
Fax: +81-18-884-6556.
Email: kume.yuu@hs.akita-u.ac.jp