Executive function measured by Stroop test and mood for elderly people in a facility for the elderly

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Abstract

The number of elderly people has been increasing recently, and it is important to keep cognitive function healthy. This study aims to investigate relationships between cognitive function measured by the Stroop test and mood for elders in an institute. Ten elders participated in this study voluntarily. They performed the Stroop task (Stroop interference, reverse Stroop interference, correct number) to measure cognitive function, and completed the POMS (Profile of Mood Scale). The scores of “Tension-Anxiety,” “Depression,” “Anger,” “Fatigue” and “Confusion” were lower than those of the standard, and the “Vigor” score was higher than the standard. The Stroop-interference ratio was higher, the reverse Stroop interference ratio was lower, and the correct response numbers were almost lower than the standard. The Stroop ratio was significantly related with Vigor (r=-0.65, p<0.05), the reverse Stroop ratio was significantly related with Tension-Anxiety (r=-0.63, p<0.05), and the correct response number was related with Vigor (r=0.59, p<0.05). These results showed that the elders of this institute stated to have good moods, and interference of words was high, though color interference was low. Elders with high vigor could inhibit word interference and named colors correctly, and elders with low tension-anxiety could inhibit color interference and named words correctly. Elders with high vigor showed high performance. Promoting vigor may lead much more cognitive health.

Method

Participants

Inclusion criteria were that a person could communicate with others, and that a person could express their intention about participating. Exclusion criteria were that elders had serious mental illness or dementia. Participants in this study were 10 elders (female) who lived in a facility for elders. They needed some kind of help from nursing care staff. The mean age was 73 years.

Scales

Cognitive function: We used the Stoop test II [5,6]. It can measure the Stroop interference ratio (inhibition of words to respond to color), the reverse Stroop interference ratio (inhibition of color to respond to words), and correct response number.

Mood: We used POMS (Profile of Mood Scale) which was developed by McNair, Lorr, and Droppleman [7] and was translated into a Japanese version [8]. It consists of six factors: Tension-Anxiety, Depression, Anger, Vigor, Fatigue, and Confusion.

Procedure

The researcher visited the facility after getting permission from

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the ethical committee. The staff in the institution asked elders for this
study who cleared inclusion criteria and confirmed elder’s intention
whether they would participate or not in this study. The researcher met
an elderly individually. The elderly received both the Stroop test and
the POMS. The total duration time was about 30 minutes.

**Ethical consideration**

This study was approved from the ethical committee in authors’
college and from the facility for elders.

**Results**

Table 1 shows the basic scores of elders and the scores of sub-
category of POMS. Most of the scores were lower than the standard [8].
It shows that they are in a good mood. Moreover, they had high vigor.

Table 2 shows that the Stroop and the reverse Stroop ratio, and
correct number. The scores of the Stroop were higher than the standard
[5,6], but the reverse Stroop was lower. The correct response number of
elders in the present study was lower than the standard.

Table 3 shows the correlation coefficients between the Stroop
test and mood. The Stroop interference score is negatively related
with Vigor (r=-0.65, p<0.05), the reverse Stroop interference score
is negatively related with Tension-Anxiety (r=-0.63, p<0.05). Vigor is
also significantly correlated with the correct response number (r=0.59,
p<0.05).

**Discussion**

About Mood, the scores of the present study were lower than
those of the standard, except Vigor. This means that there was no
problem about mood and that they spend daily life peaceful in a
facility. However, as for the correct response number, their correct
response number of Task 1, Task 2, and Task 3 were lower than the
standard. That is, though the moods of the elders in the facility were
calm, their cognitive function might be lower than the elders who live
in community dwellings. Some kind of intervention to keep cognitive
function might be needed. It is a little similar that the correct response
number of workers recovering from clinical depression was lower than
healthy people, although they did not feel fatigue subjectively [2].

As for the Stroop test (Table 2), the score of the Stroop interference
ratio was higher than those of the standard (70-86 years), but the score
of the reverse Stroop interference was lower. It suggests that elders in
the present study cannot inhibit word inference when they need to focus
on color, and they can inhibit color inference when they need to focus
on words. The power of words may be strong. Park et al. [9] showed
that the meaning memory as language ability is hard to influence by
aging and is thought to increase; therefore, word interference may be
strong. Moreover, their week inhibition of color may be related with
decreased sensitivity of retinal illuminance and contrast sensitivity
[10]. In clinical situations, it may be useful for nursing care staffs to
propose exercises including color or contrives including color in a
facility to keep elder’s color ability.

About correlation, the significant relationship between the Stroop
interference ratio and Vigor of POMS suggests that vigor can inhibit
words well and treat color information. Since word information process
is a daily habit, vigor will be needed to process color information. This
result supports that high arousal improves response time in the Stroop
test [3].

The significant relationship between the reverse Stroop interference
ratio and tension-anxiety suggests that low tension-anxiety can inhibit
color information and treat word information. Elders with low tension-
anxiety can read books or newspapers in daily life in the institution, not
interfered by color information.

Lastly, the positive relationship between the correct response
number and Vigor suggests that cognitive function needs much more
vigor. It supports that more energy will be needed in executive function.

As a limitation, the number of participants was small and we
could not generalize this fact. In the future, much more participants
will be needed. Moreover, we need to develop intervention to promote
cognitive function in the future.

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