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ORIGINAL ARTICLE

Effect of simple calculation and reading aloud on cognitive function and depression in postoperative older adults

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Abstract

Background: This study was conducted to determine the effect of simple calculation and reading aloud on postoperative cognitive function and depression level in older adults.

Method: The study was a randomised controlled experimental study. A personal information form, Mini-Mental State Examination (MMSE) and Geriatric Depression Scale (GDS) were used for data collection.

Results: In the evaluation of MMSE and GDS scores of the intervention and control groups 4 weeks after the operation, the differences between the two groups were found to be statistically significant.

Conclusion: The results found that simple calculation and reading aloud after surgery had a positive effect on cognitive function and depression level in older people.

INTRODUCTION

Old age is the process in which cognitive abilities, defined as complex mental activities, begin to decrease, physical functions decrease and transition to the last stage of normal life expectancy.[1] Urological problems increase with ageing in older individuals. Geriatric patients constitute an important part of the daily routine practices of urologists. The most common urological problems in the geriatric age group are: urinary incontinence, voiding dysfunction, nocturia, urinary infections, bladder tumour, sexual dysfunction, and in men, benign hyperplasia and prostate cancer.[2–4] Surgical intervention is frequently used for urological diseases, especially bladder and prostate diseases.[4] Although complications that may develop in the early postoperative period in older patients undergoing surgery are similar to patients in other age groups, the rate of experiencing cognitive dysfunction is higher in older adults.[5–7] Symptoms such as memory loss and lack of concentration are frequently observed in patients undergoing surgery. These symptoms are part of a condition called postoperative cognitive dysfunction, which is not an official diagnosis.[8] Although the causes of postoperative cognitive dysfunction are not certain, it has been stated in the literature that it is a multifactorial condition, including both perioperative and patient-related factors, and may be effective in possible interactions between surgery, anaesthesia and genetic factors.[7] Cognitive dysfunction causes adverse effects such as loss of performance in daily activities, loss of independence and depression in the elderly.[9] While most patients with postoperative cognitive dysfunction recover naturally within 6 months of surgery, approximately 2% of cases of postoperative cognitive dysfunction persist to death.[8] Since the diagnosis of cognitive dysfunction in geriatric patients before and after surgery has an effect on the recovery of the patient after surgery,[4,7,10,11] it is important to evaluate the patient's cognitive functions and increase the level of cognitive function with appropriate interventions.[12] Previous studies in healthy and ill older populations have shown that cognitive training programs have a positive effect on cognitive function and mental health.[13,14] Cognitive training program is an intervention that provides structured practice tasks related to aspects of cognitive function. Many types of cognitive training have been used, such as working memory training,[15] procedural speed

training,[16] brain training game,[17] reading aloud, and solving simple arithmetic calculations.[13]

The aim of this study was to determine the effect of a simple calculation and reading aloud method on the cognitive function and depression level of older patients after transurethral bladder resection.

Hypotheses (H)

H1.Simple calculation and reading aloud has an effect on increasing cognitive function of older patients after transurethral bladder resection.

H2. Simple calculation and reading aloud has an effect on reducing depression of older patients after transurethral bladder resection.

METHODS

Design and setting

This was a randomised controlled experimental study to determine the effects of reading aloud and simple arithmetic calculation on cognitive function and depression level in older patients after transurethral bladder resection. The study was conducted in the urology clinic of a research hospital between March 2019 and June 2021.

Sample

A total of 78 patients were reached between March 2019 and June 2021. The study was conducted with 60 patients because 11 patients did not meet the research criteria and seven patients did not accept the study (Fig. 1). During the pandemic period in which the research was conducted, changes occurred in the health system due to the pandemic in Turkey, as in the rest of the world, elective surgical operations were primarily postponed, and after the decrease in the number of cases, the elective surgeries were restarted by taking COVID-19 precautions in the operating rooms. The surgery was carried out at the scheduled time within the scope of the research pandemic measures. The criteria for inclusion in the study were those aged 65 and over and no visual problems. Exclusion criteria from the study were Alzheimer's, dementia and psychiatric diseases, speech and hearing problems that prevent communication, and reading and writing illiteracy.

Randomisation

The participants were randomly divided into two groups before pre-testing of older individuals who met the criteria of the study admitted to the urology

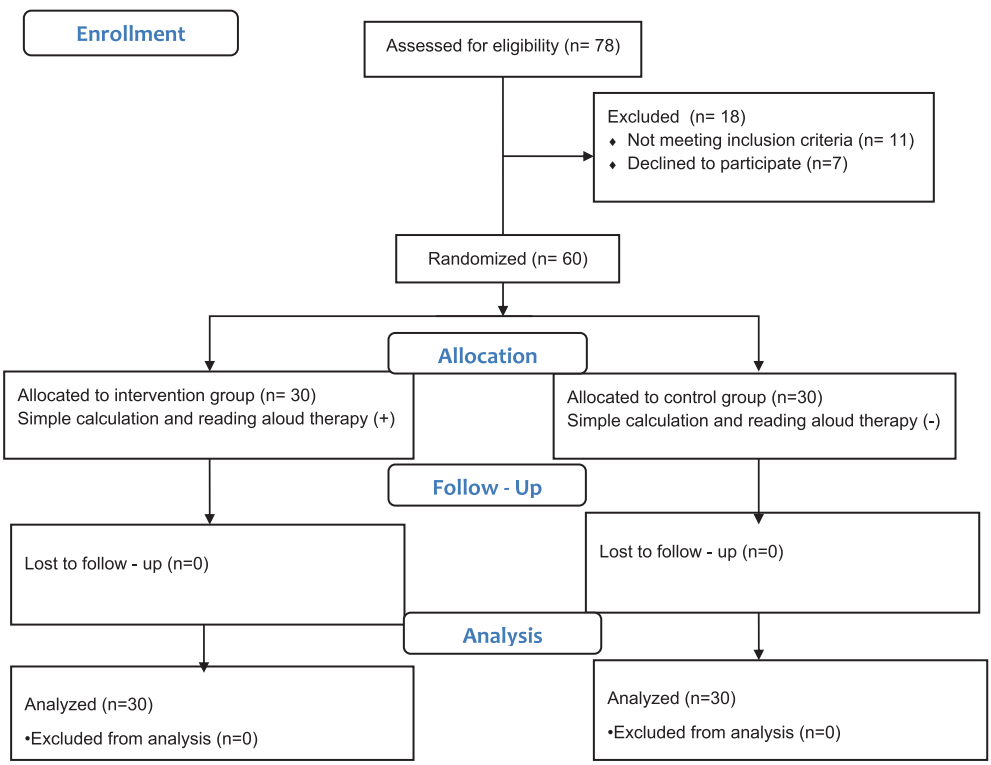

Figure 1 Study flow diagram

clinic for transurethral bladder resection. For randomisation, lots were drawn using the closed-envelope method. The group corresponding to the odd number was divided as the control ($n = 30$), and the group corresponding to the even number was divided as the intervention ($n = 30$) (Fig. 1).

Instrumentation

The study data were collected using a personal information form, Mini-Mental State Examination (MMSE), and Geriatric Depression Scale (GDS).

Personal information

The form included questions about demographic characteristics (age, gender, marital status, educational status), medical characteristics (previous surgical experience, chronic diseases and regular use of medication).

MMSE

The scale was first published by Folstein *et al*. (1975).[18] The reliability and validity study in Turkey was done by Güngen *et al*. (2002).[19] The total score is evaluated out of 30. Güngen *et al*. reported that it is a valid and reliable test in the diagnosis of mild dementia by choosing the ideal threshold value of 23/24 in the Turkish population. In this study, MMSE prepared for educated individuals was used.

GDS

The scale was developed by Yesavage *et al*. (1983)[20] and its validity and reliability tests have been performed. It consists of 30 easy-to-answer questions for older adults, based on the notifications of the applied person. It is a scale with only 'yes' or 'no' answers. Turkish validity and reliability were done by Ertan and Eker (2000).[21] Each response in favour of depression is worth one point, other answers are worth zero points. It was categorised as 0–11 points for no depression, 12–14 points for probable depression, and over 14 points for definite depression.

Intervention

To the patients of the intervention group, MMSE and GDS were applied preoperatively and at postoperative day 1. The simple calculation and reading aloud practices planned on the 1st postoperative day were performed in the hospital before the patient was discharged, and they were informed about how to perform the practices. Until the patient's discharge, a simple calculation table solution prepared by the researchers was made every day for 15 min outside of the routine treatment application and visiting hours. After the simple calculation was completed, the transactions were read aloud. Before discharge, patients were given a chart to make simple calculations at home, and they were asked to do the operations on this chart out loud at home every day after discharge. It was stated to the patients that they should solve the operations on the page in 15 min and that the procedure should be terminated when they could not complete these operations in 15 min. After resting, they were asked to take another 15 min to complete the operations on the page. The patients were instructed to use a timer to remind them of the time limitation while performing the procedures. In order not to forget these practices, the patients were informed by phone calls twice a week by the researchers. During the phone calls, the patient was talked to for 5 min about a certain subject (difficulties faced while doing exercises during the week, solution methods and individual activities, etc.). In the next phone call, it was evaluated whether the patients remembered the previous conversations. Simple calculation and reading aloud exercises were applied for at least 15 min every day for 4 weeks after the surgery. After 4 weeks (30th postoperative day), the patient's daily calculation charts were taken and the MMSE and GDS were applied in the post-test. The simple calculations that the patients would do at home were prepared by the researchers according to the basic education curriculum. The patients applied the arithmetic operations in the weekly charts for 4 weeks.

The patients in the control group were not given any mental exercise at home, and pre-test and post-test data were collected at the same time as the intervention group. Since the patients were in single rooms, there was no interaction between the intervention and control groups.

Data analysis

Statistical analyses were performed using the SPSS (IBM SPSS Statistics 24) package program. The descriptive characteristics of the individuals in the study were evaluated using number, percentage, and Chi-square. Since the MMSE and GDS in the groups did not show normal distribution, they were evaluated with non-parametric tests. The Mann–Whitney *U*-test

Table 1 Characteristics of the study participants ($N = 60$)

	İntervention group ($n = 30$) *n* (%)	Control group ($n = 30$) *n* (%)	χ^2	*P*
Age, mean, SD	69.23 ± 4.23	69.56 ± 3.61		
Gender				
Female	14 (46.7)	11 (36.7)	0.617	0.432
Male	16 (53.3)	19 (63.3)		
Marital status				
Married	18 (60)	9 (30)	0.659	0.417
Single	12 (40)	21 (70)		
Education				
Literate	5 (16.7)	3 (10.0)	1.004	0.605
Primary school	17 (56.7)	16 (53.3)		
High school	8 (26.7)	11 (36.7)		
Previous surgical experience				
Yes	10 (33.3)	15 (50)	1.714	0.190
No	20 (66.7)	15 (50)		
Chronic diseases				
Yes	17 (56.7)	19(63.3)	0.278	0.598
No	13 (43.3)	11 (36.7)		
Regular use of medication				
Yes	16 (53.3)	10 (33.3)	2.443	0.118
No	14.46.7	20 (66.7)		

Note: $P < 0.05$ significance level.

was used to compare the intergroup scale mean scores, and the group-time interactions were evaluated with a non-parametric test for repeated measures of factorial design. The significance level was $P < 0.05$.

Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Before the research, written permission was obtained from the Human Research Ethics Committee of X University (2018/232) and the institution where the research was conducted (28-02-2019/66472688–771). Participation in the research was on a voluntary basis.

RESULTS

Demographic characteristics

The descriptive characteristics of the individuals are given in Table 1. It was seen that the individuals in the two groups were similar in terms of their descriptive characteristics.

Table 2 Comparison of MMSE and GDS intragroup and intergroup

	Intervention group			Control group			
MMSE	Mean ± SD (min-max)	Test statistic	Binary comparisons	Mean ± SD (min-max)	Test statistic	Binary comparisons	Test statistic; *P*
Preoperative (1)	23.86 ± 1.75 (20–28)	$\chi^2 = 47.154$	1–2 $P = 0.101$	23.26 ± 1.59 (20–26)	$\chi^2 = 2.174$	1–2 $P = 0.645$	$U = 352.0$ $P = 0.139$
Postoperative day 1 (2)	23.26 ± 1.91 (20–27)		2–3 $\boldsymbol{P = 0.000}$	23.16 ± 1.39 (19–27)		2–3 $P = 0.270$	$U = 426.0$ $P = 0.716$
Postoperative day 30 (3)	26.70 ± 1.20 (25–29)		1–3 $\boldsymbol{P = 0.000}$	23.56 ± 1.50 (21–26)		1–3 $P = 0.506$	$U = 54.5$ $\boldsymbol{P = 0.000}$
GDS							
Preoperative (1)	14.03 ± 1.37 (10–16)	$\chi^2 = 49.23$	1–2 $P = 0.775$	14.26 ± 1.46 (10–16)	$\chi^2 = 24.481$	1–2 $P = 0.865$	$U = 393.5$ $P = 0.385$
Postoperative day 1 (2)	13.93 ± 1.74 (10–17)		2–3 $\boldsymbol{P = 0.000}$	14.33 ± 1.51 (11–18)		2–3 $\boldsymbol{P = 0.000}$	$U = 404.5$ $P = 0.493$
Postoperative day 30 (3)	9.8 ± 0.61 (9–11)		1–3 $\boldsymbol{P = 0.000}$	12.23 ± 1.25 (10–15)		1–3 $\boldsymbol{P = 0.000}$	$U = 51.0$ $\boldsymbol{P = 0.000}$

Note: χ^2: Friedman test statistic; *U*: Mann–Whitney *U*-test statistic; $P < 0.05$ significance level. Abbreviations: MMSE, Mini-Mental State Examination; GDS: Geriatric Depression Scale.

MMSE

Comparison of in-group and between-group MMSE mean is given in Table 2. When the MMSE mean was evaluated between the groups, there was no significant difference between the preoperative and postoperative 1st day means ($P > 0.05$), but a statistically significant difference was found between the postoperative 30th day means ($P < 0.05$).

When the changes in the MMSE mean for the intervention group were compared according to the time within the group, no statistically significant difference was found between the preoperative measurement and the postoperative 1st day measurements ($P > 0.05$). However, statistical significance was found between the first postoperative day and the postoperative 30th day, and between the preoperative measurement and the postoperative 30th day ($P < 0.05$).

No statistically significant difference was found between all measurement times in the in-group evaluation of the control group ($P > 0.05$).

GDS

Comparison of GDS mean scores between groups and for groups is given in Table 2. When the GDS means of the intervention and control groups were compared between the groups, statistical significance was found in the preoperative and postoperative 30th day means ($P < 0.05$).

When the GDS mean for the intervention group was compared within the group, statistical significance was found between the postoperative 1st day and the postoperative 30th day, and the preoperative measurement and the postoperative 30th day ($P < 0.05$).

The mean GDS of the control group was found to be statistically significant between the 1st postoperative day and the postoperative 30th day, and the preoperative measurement and the postoperative 30th day in the group comparison ($P < 0.05$).

DISCUSSION

Changes in cognitive functions can be observed after anaesthesia and surgery.[22] In previous studies, it has been stated that approximately 16% of older patients over 70 years of age have mild cognitive disorder.[10,23,24] In a study evaluating the cognitive functions of patients after transurethral bladder resection, it was reported that 8.8% of elderly patients had a high risk of confusion.[25] Cognitive function changes are an important parameter to be evaluated before and after surgery, as they cause an increase in various postoperative complications and hospital stay in older patients.[11] The decrease in cognitive function level can be improved with the use of non-pharmacological methods.[14,17] So far, only one study has shown that reading aloud and simple arithmetic calculations have a positive effect on cognitive function in older patients after surgery.[12] In addition, studies on healthy older individuals have shown that reading aloud and simple calculation methods have a positive effect on cognitive functions such as memory, attention and focus,[13,26] and learning therapy positively affects individuals' daily life activities.[17]

In the current study, it has been shown that simple calculation and reading aloud methods applied after transurethral bladder resection improves the level of cognitive function in older patients. In this study, unlike other studies, the difficulties encountered by the patients while performing the procedure and their willingness were evaluated by phone calls twice a week during the cognitive practice program. In addition, the subjects of previous phone calls were evaluated in phone calls in order to increase the functionality of their memory.

Minor depression and depressive symptoms are common in older individuals.[27] In a meta-analysis study, it was reported that the prevalence of major depression was between 4.6% and 9.3%, and the prevalence of all depressive symptoms was between 4.5 and 37.4% in individuals aged 75 and over.[28] It has been reported that patients with depressive symptoms exhibit poor performance in tests related to attention, information processing speed, motor speed, verbal and non-verbal learning, short-term memory and working memory, and executive functions measuring especially cognitive flexibility.[29] There have been studies showing that cognitive training for working memory and processing speed reduces negative emotions and depressive symptoms.[13,30]

The current study showed a decrease in the level of geriatric depression after surgery in patients in the intervention group. Since cognitive training types have been confirmed to improve cognitive functions,[12] simple calculations, reading aloud and telephone calls applied to patients may have been a

factor in reducing the level of depression by providing psychological support to patients.

This study evaluated the effect of simple calculation and reading aloud on the cognitive dysfunction and depression after transurethral bladder resection. The results of the research showed that simple calculation and reading aloud exercises can be used as a complementary tool to correct postoperative cognitive dysfunctions, reduce the level of depression and increase the concentration of patients in their daily lives.

Limitations

There are several limitations in this study. First, the study sample consisted of only transurethral bladder resection and older patients over 65 years of age. In addition, the reliability of the research data is limited to the information given by the interviewers. Second, the study was conducted in only one hospital and was conducted over a 4-week period. However, this study is important because it is the first to evaluate the effects of simple calculation and reading aloud on older patients after bladder surgery.

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DISCLOSURE STATEMENT

The content of the paper has not been published or under consideration for publication elsewhere. We state that there are no conflicts of interest regarding the publication of this article.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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