Effect of Abdominal Muscles Strengthening Exercises on the Severity of Chronic Constipation in Older Adults

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Abstract

Chronic constipation is a significant healthcare problem in older people and impacts negatively on quality of life. The nurse should encourage the older adults to perform abdominal muscles strengthening exercises, it can strengthen the abdominal muscles and increase the frequency of bowel movements in constipated patients. ***Objective:*** *Determine the effect of abdominal muscles strengthening exercises on the severity of chronic constipation among the older adults.* ***Setting:*** *The outpatient clinics at the Specialized Medical Hospital, Mansoura University.* ***Subjects:*** *100 older adult patients aged 60 years and above, have chronic constipation for at least one year.* ***Tools:*** *Six tools were used namely; Older Adults Socio-demographic and Clinical Data Structured Interview Schedule, Katz and Akpom Scale, Lawton and Brady Scale, Constipation Assessment Scale, Older Adults' Knowledge Related to Constipation Structured Interview Schedule, and Constipation Management Observational Checklist.* ***Results:*** *After the intervention the elders who have moderate and severe degree of chronic constipation reported improvement in the severity of chronic constipation and decrease in their numbers.* ***Conclusion:*** *Performance of abdominal muscle strengthening exercises improved the severity of the degree of chronic constipation for the majority of the subjects in the study group.* ***Recommendations:*** *Nurses and caregivers raise awareness of community dwelling older adults who attend the outpatient clinics and reside in assisted living facilities regarding healthy lifestyle and abdominal muscle strengthening exercises.*

Keywords: Abdominal Muscles Strengthening Exercises, Chronic Constipation, Older Adults.

Introduction

Constipation is defined as a functional bowel disorder characterized by difficult, infrequent, or incomplete defecation. The prevalence of constipation varies greatly, depending on the definitions, in the United States Self-reported rates of constipation have ranged from 12% to 45% in community-dwelling older persons to as high as 50% to 79% in institutionalized geriatric patients[1]. Chronic constipation is the passage of small amounts of hard dry stool fewer than 3 times per week, more than 12 weeks duration in the previous 12 months (not be consecutive), it is usually a reaction to a particular cause such as change in lifestyle or change in diet, accompanied by straining, and feeling of being bloated or having abdominal fullness[2,3]. Aging is associated with many physiological changes

that affect the gastrointestinal tract such as decreased saliva and number of teeth which currently affect chewing and quality of food intake. In turn, this can lead to indigestion, dysphagia, anorexia and gastric discomfort. Also, decreased stomach emptying time, peristalsis movement and number of cilia that affect food absorption, all these can put the elders at risk for constipation[4].

Constipation is often multifactorial and can be caused by a combination of systemic conditions, lifestyle issues and medications. In some cases, constipation may occur with symptoms that might indicate a serious or life-threatening condition that should be immediately evaluated in an emergency setting such as bloody, black or tarry stool, Change in level of consciousness or alertness, such as passing out or unresponsiveness, dizziness, high fever, major rectal bleeding, tachycardia or tachypnea, rigid board-like abdomen, severe abdominal pain, weakness, yellow skin and whites of the eyes[5-8]. The major complications of constipation in older people are fecal impaction and fecal incontinence, hemorrhoids, anal fissure, organ prolapsed, bowel perforation, stercoral peritonitis and diverticular disease[9,10].

There are many types of abdominal muscles strengthening exercises namely, abdominal massage, abdominal muscles contraction, pelvic tilt exercise, squatting exercise and lower abdominal muscles exercise. Abdominal massage for approximately 15-20 minutes and abdominal muscle contraction and relaxation for about eight to ten repetitions, can strengthen the abdominal muscles, stimulate peristalsis, decrease colonic transit time, increase the frequency of bowel movements in constipated patients, and decrease the feelings of discomfort and pain that accompany it[4,11-14]. Patient education is an important component in the management of chronic constipation and the first line of lifestyle modifications. It allows patients to cooperate positively during nursing procedures. The nurse should plan according to the patient's age and style of learning. Handouts are a helpful adjunct and can be kept for reviewing at home and sharing with family and friends[7,15]. The nurse has an important and active role in teaching and motivating older adult persons to participate in the program, by emphasizing the benefits in terms of promoting peristalsis and a return to normal bowel function, maintaining and increasing the functional abilities of older adults[16,17].

A study done in China which was conducted with older adult patients revealed that constipation was decreased after only ten days of abdominal massage, and that the effect lasted for 7 to 10 days after massage was stopped[18]. For older persons who are unable to walk, chair or bed exercises, such as pelvic tilt exercise, squatting exercise, low trunk rotation, and single leg lifts are recommended. The exercises should be performed for 15-20 minutes at least twice a day[19,20].

Aim of the Study

Determine the effect of abdominal muscles strengthening exercises on the severity of chronic constipation in older adults.

Research Hypothesis:

Older adults who receive the abdominal muscles strengthening exercises report regular bowel elimination than those who do not receive it.

Materials and Method

Materials

Design: The study followed a quasi-experimental design.

Setting: The study was carried out in the outpatient clinics, namely Diabetes mellitus clinic, Cardiovascular diseases clinic, Endocrinology clinic and gastrointestinal

and hepatology clinic at the Specialized Medical Hospital, Mansoura University.

Subjects: The study included one hundred (100) older adult patients aged 60 years and above, have chronic constipation for at least one year, have no neurological disorders, mobile and able to comprehend and communicate. The study subjects were divided into two groups fifty (50) subjects each, one experimental and one control group. The EPI info V 7.0 was used to estimate the sample size.

Tools: The following tools were used for data collection:

Tool I: Older Adults Socio-demographic and Clinical Data Structured Interview Schedule

This tool was developed by the researcher based on relevant literature, it included data such as age, sex, level of education, marital status, living condition, defecation habits such as frequency and use of medications that may contribute to constipation and age related changes that may result in constipation.

Tool II: Katz and Akpom Scale (1976)[21]

This scale was developed by Katz and Akpom (1976), it is originally designed to assess the degree of dependency in performing activities of daily living (ADL). It was translated into Arabic language and validated by (Melis and El Shazly 1999)[22]. The scale includes six activities of daily living namely, grooming, toileting, eating, dressing, bathing and mobility. The activities of daily living are measured and scored according to the individual's actual performance. They are categorized into three levels of dependency: independent, partially dependent and totally dependent. A score from one to three was assigned to each level of dependency, which one indicates that the person is independent in performing the activities, two indicates that the person perform the activity with assistance, while a score of three indicated that the person is totally dependent. A score of 6 is assigned for those who are independent, a score from 7 to 12 is assigned for those who are partially dependent, while a score from 13 to 18 is assigned for those who are totally dependent.

Tool III: Lawton and Brady Scale (1969)[23]

This scale was developed by Lawton and Brady (1969), it is originally designed to assess the degree of assistance needed in performing instrumental activities of daily living (IADL). It was translated into Arabic and validated by (Shehata 2001)[24]. The scale includes eight items: ability to use the telephone, go shopping, food preparation, house keeping, laundry, transportation, responsibility for own medication and ability to handle finances. The maximum score was 16 for females and 10 for males. The score achieved by the older adults is calculated as a percentage from the maximum score of his category representing 100%. The total degree of the elderly performance is categorized into three levels of dependency: independent, partially dependent and totally dependent. A score of $\geq$ 75% is assigned for those who are independent, a score from 25% to less than 75% is assigned for those who are partially dependent, while a score from zero (0) to less than 25% is gained by those who are totally dependent.

Tool IV: Constipation Assessment Scale[25]

The Constipation assessment scale developed by McMillan and Williams, 1989 was used in the present study to assess the severity of constipation for each subject. The scale includes eight items that focus on the symptoms of constipation. These items are abdominal distension or bloating, change in amount of gas passed rectally, less frequent bowel movement, oozing liquid stool, rectal fullness or pressure, rectal pain with bowel movements, smaller stool size, urge but inability to pass stool.

The severity degree of constipation is measured and scored by using a three–point likert scale, from zero(0) to two(2), where zero (0) indicates no problem, one (1) indicates some problem, while two (2) indicates severe problem. The total score of the scale ranged between 0 and 16. A score from 2 to 6 is assigned for those who have mild constipation, a score from 7 to 10 is assigned for those who have moderate constipation, while a score of 11 and above is assigned for those who have severe constipation.

Tool V: Older Adults' Knowledge Related to Constipation Structured Interview Schedule

This tool was developed by the researcher after reviewing the relevant literature. It was used to assess knowledge of the study subjects before and after conduction of the proposed lifestyle modification interventions. It included questions about constipation such as meaning of constipation, causes, risk factors, sign and symptoms and complications of constipation. The total number of questions are ten (10), each question had a group of correct answers, each correct answer is given a score of one (1) and wrong or no answer is given a score of zero (0). The total score is 73.

Tool VI: Constipation Management Observational Checklist

This tool was developed by the researcher based on current literature review. It includes five (5) procedures that the older adult performed for the management of chronic constipation. These procedures are abdominal massage, abdominal muscle contraction, pelvic tilt exercise, squats exercise and lower abdominal muscles exercises. The performance of the study subjects of each step of the procedure was evaluated by a 3 point likert scale ranging from zero(0) to two (2). A score of two (2) is given to those who perform each step correct and completely, a score of one (1) is gained by those who perform each step incompletely, while those who did not perform the step got a score of zero(0). The total score of the five (5) procedures is 68.

Method

1- An official letter was issued from the Faculty of Nursing, Mansoura University and forwarded to the director of the specialized medical hospital in Mansoura in order to obtain his approval to carry out the study.

2- Tool I, V, and VI were developed by the researcher based on review of relevant literature. As for tool 2 and 3 the Arabic version was used. These tools were tested for content validity by seven experts in the related fields. Modifications were done accordingly.

3- Tool IV (The Constipation Assessment Scale) was translated into Arabic and tested for its reliability. This tool was applied to 10 geriatric patients with chronic constipation selected from El-Mansoura University hospital outpatient clinics. Reliability of the tool was measured by Cronbach's alpha test (r) = 0.88.

4- A pilot study was carried out on 10 geriatric patients with chronic constipation selected from El Mansoura University Hospital outpatient clinics to test and ascertain the clarity, feasibility, applicability of the study tools and the necessary modifications were done accordingly. The elders who included in the pilot study were excluded from the study sample.

5- The booklet was developed by the researcher based on reviewing the related literature. It includes knowledge and practices required for the management of chronic constipation in older adults. It covered items related to the meaning of constipation, causes and risk factors, signs and symptoms,

complications of constipation, the establishment of regular bowel movements, effect of medications, healthy life style such as nutrition, hydration and exercises, written in simple Arabic language with colored pictures and large sized font to accommodate age-related visual changes to enhance the learning process.

6- Tool number II ADL, III IADL and IV (The Constipation Assessment Scale) were used for selection the sample to fulfill the criteria for the study subjects.

7- Each study subject in both the experimental and the control groups was interviewed individually by the researcher in the waiting room of the out patient clinic starting from 9 am to 2 pm. The researcher used to welcome each patient on admission, ensures that the patient is seated comfortably, introduces herself and explain the purpose of the study. Then a verbal consent from each study subject to participate in the study was obtained.

8- The researcher assessed each study subject using study tools I, II ,III, IV and V (pre-test). The necessary information took nearly 30-45 minutes. The researcher took the phone numbers of the study subjects to ensure continuous contact.

9- The booklet content was implemented on group basis, each group ranged from three to five (3-5) subjects, it was covered in four sessions, two sessions for provision of knowledge and two sessions for training, two sessions / week for two weeks. The duration for each session took about 30 to 45 minutes approximately.

10- During each session, an illustrated booklet was used in order to clarify the knowledge, and practices for each elder. Other teaching methods used were lectures, open discussion, demonstration, redemonstration and real life demonstration. As well, the researcher used to stay in touch with all the study group members in order to answer any questions, clarify any vague points to maintain motivation and give positive feedback and reinforcement.

11- Each older adult was allowed to redemonstrate the procedure and reward each patient by giving him/ her simple things like juice, biscuits, bearish, and recognition during sessions.

12- The researcher demonstrated the components of each training session in the presence of one of patient's family member to supervise the elderly during the performance.

13- Reassessment of each study subject was done three times to evaluate the effect of abdominal muscles strengthening exercises on the severity of chronic constipation among the elderly. This was done immediately after the implementation of the sessions, then the second reassessment after 3 months, followed by the third assessment after 6 months.

14- Data were collected during a period of 10 months (from the beginning of October 2012 until the end of July of 2013).

Ethical considerations:

A written consent from the study subjects to participate in the study was being obtained after explanation of the study purpose. Privacy and anonymity of the study subjects and confidentiality of the collected data were maintained. The right to withdraw at any time was assured.

Statistical Analysis

After data were collected, they were coded and transferred into special design formats, so as to be suitable for computer feeding. The Statistical Package for Social Sciences "SPSS" software version 20.0 was utilized for data analysis and tabulation. The 0.05 level was used as the cut off value for statistical significance and the following statistical measures were used. Descriptive statistics: Count and percentage. Analytical statistics which include: Chi Square $(x)^2$, Independent sample t-test, Paired sample t-test, Wilcoxon signed ranked test and F-test(One Way ANOVA).

Results

Table (1) shows that 70.0% of subjects in the study group are aged from 60 years to less than 75 years, compared to 76.0% in the control group. As for the subjects in the age group more than 75 years to 85 years, 30.0% in the study group, compared to 22.0% in the control group with a mean of 70.06±6.74 years in the study group, compared to 69.52±6.75 years in the control group. Female constituted 68.0% of subjects in the study group and 62.0 % in the control group. 56.0% of subjects in the study group, compared to 48.0 % in the control group are married. As for the educational level, 46.0% of subjects in the study group and 42.0% in the control group are illiterate. Concerning occupation prior to retirement, 52.0% of subjects in the study group and 44.0% in the control group are housewives. The monthly income reported by the study subjects ranges from less than 200 LE to more than 400 LE per month. 36.0% of subjects in the study group and 40.0% in the control group reported 400 LE per month and more.

Table (2) shows that cardiovascular disorders were reported by 76.0% of subjects in the study group and 90.0 % in the control group, followed by Musculoskeletal disorders in 42.0% of subjects in the study group and 58.0% in the control group. Regarding the medications consumed by the study subjects and contributed to constipation, laxatives are consumed by 80.0% of subjects in the study group and 64.0% in the control groups.

Table (3) shows that 52.0% of subjects in the study group and 42% in the control group reported having two bowel movements daily before having the current constipation. Regarding the duration of the current constipation, the study subjects who reported to have constipation for 3 years and more constituted 76.0% of subjects in the study group and 72.0% in the control group.

Table (4) shows 62.0% of subjects in the study group and 50.0% in the control group reported having dry mouth. 64.0% of subjects in the study group and 52.0% in the control group reported having heart burn. Teeth loss was reported by 48.0% of subjects in the study group and 58.0% in the control group.

It can be observed from **table (5)** that 76.0% of subjects in the study group and 68.0% in the control group are partially dependent in performing activities of daily living. As regards the degree of dependency in performing instrumental activities of daily living, 64.0% of subjects in the study group and 70.0% in the control group are partially dependent.

Table (6) shows that before the study intervention, severe constipation was reported by 36.0% of subjects in the study group and 32.0% in the control group with no statistically significant difference between the two groups. Three months after the intervention 12.0% of subjects in the study group reported severe constipation, compared to 34.7% in the control group and the difference between the two groups is statistically significant P=0.016. Six months after the intervention 8.3% of subjects in the study group reported severe constipation, compared to 45.8% in the control group and the difference between the two groups is statistically significant P=0.000.

Table (7) shows that before the study intervention the total mean score of knowledge of the subjects in the study group was 10.72±3.43 with no statistically significant difference between knowledge of the subjects in the study group and those in the control group. Immediately after the intervention the total mean score of knowledge of subjects in the study group is 41.30±6.43 and the difference is statistically significant between knowledge of the subjects in the study group and those in the control group (P=0.000). Three months after the intervention the total mean score of knowledge of subjects in the study group is 34.84±6.62 and the difference is statistically significant between knowledge of the subjects in the study group and those in the control group (P=0.000). Six months after the intervention the total mean score of knowledge of subjects in the study group is 32.37±6.39 and the difference is statistically significant between knowledge of the subjects in the study group and those in the control group (P=0.000).

With regard to performing of the abdominal muscle strengthening exercises, **table (8)** shows significant improvement in practicing all types of abdominal muscles strengthening exercises among the subjects in the study group immediately after the intervention. Three months after the intervention performance of the abdominal muscles strengthening exercises of subjects in the study group have decreased and the difference is still statistically significant (P=0.008). Six months after the intervention performing of abdominal muscles strengthening exercises of subjects in the study group is decreased more and the difference is still statistically significant (P=0.000).

Table (9) shows that immediately after the intervention the total mean score of performing the abdominal muscle strengthening exercises is 55.51±4.25 of subjects aged 60 to less than 75 years and the difference between age of the study group and performing of abdominal muscles strengthening exercises is statistically significant (P=0.019). Three months after the intervention the total mean score of performing abdominal muscle strengthening exercises of the study group is 51.60±9.82 of subjects aged 60 to less than 75 years and the difference is not statistically significant. Six months after the intervention the total mean score of performing abdominal muscle strengthening exercises of the study group is 49.26±9.94 of subjects aged 60 to less than 75 years and the difference is not statistically significant. Concerning the sex of the study subjects, immediately after the intervention the total mean score of performing abdominal muscle strengthening exercises of the study group is higher 57.13±2.31 in males and 53.24±5.23 in females and the difference is statistically significant (P=0.001). Three months after the intervention the total mean score is 54.25±4.16 in males and 49.71±9.78 in females and the difference is not statistically significant. Six months after the intervention the total mean score is 52.31±4.81 in males and 47.47±9.54 in females and the difference is not statistically significant.

Regarding the level of education of the study subjects and performance of abdominal muscles strengthening exercises, immediately after the intervention the total mean score of performing the abdominal muscle strengthening exercises of the study group is 59.50±2.12 in those with university education, followed by 57.00±2.00 in subjects with preparatory education, and 56.00±3.46 in subjects with secondary education. Three months after the intervention the total mean score of performing the abdominal muscle strengthening exercises of the study group is 59.50±2.12 in subjects with university education, followed by 56.33±1.53 in those with preparatory education, and 54.80±4.49 in those with secondary education. Six months after the intervention the total mean score is 59.50±2.12 in subjects with university education and 54.00±1.73 in subjects with preparatory education.

Table (10) shows that immediately after the intervention the total mean score of knowledge of the older adults in the study group about constipation is 41.30±6.43 and the total mean score of performing the abdominal muscle strengthening exercises is 54.48±4.83 and the difference is statistically significant (0.629, P=0.000). Three months after the intervention the total mean score of knowledge of the older adults in the study group about constipation is 34.84±6.62 and the total mean score of performing the abdominal muscle strengthening exercises is 51.16±8.62 and the difference is statistically significant (0.298, P=0.036). Six months after the intervention the total mean score of knowledge of the older adults in the study group about constipation is 32.37±6.39 and the total mean score of performing the abdominal muscle strengthening exercises is 49.08±8.52 and the difference is statistically significant (0.347, P=0.016).

Table (11) shows that three months after the intervention the total mean score of performing the abdominal muscle strengthening exercises is 53.33±4.08 in the older adults in the study group who have severe constipation than in the older adults in the study group who have moderate and mild constipation. Six months after the intervention the total mean score of performing the abdominal muscle strengthening exercises is 51.75±1.70 in the older adults in the study group who have severe constipation. The total mean score of performing the abdominal muscle strengthening exercises is 48.95±11.96 in the older adults in the study group who have moderate constipation than in the older adults who have moderate and mild constipation.

Discussion

Chronic constipation is a problem in many patients all over the world. In older adults, chronic constipation is a significant health-care problem, but in the majority of them chronic constipation is an aggravating but not life-threatening or debilitating, complaint that can be managed in primary care with cost-effective control of symptoms[26]. Management of chronic constipation in the older adults is to relieve symptoms and restore normal bowel habit namely, the passage of a soft, formed stool at least three times a week, without straining. This can be achieved by increasing fiber intake with adequate fluid intake, regular exercise, bowel retraining and improving knowledge about chronic constipation[27,28].

With regard to the socio-demographic characteristics of the study subjects, this study revealed that, the majority of subjects in both the study and control groups are young old (Table 1). This finding is in accordance with that of other studies Mohsen (2007) and Miles et al (2011) who reported that nearly two thirds of subjects are young old. [29,30] Females were more prevalent in the study than males, this may be due to the fact that the female sex contribute to higher constipation rates. Moreover, women are more likely to report the symptoms, and tend to respond to surveys more than men[31]. (McCrea et al 2009) This finding is consistent with that of Iraji et al (2012) reported that chronic constipation is twice as common in women than in men[32]. Regarding the marital status and education, more than one half of the subjects in the study group and almost one half in the control group were married and nearly one half of the subjects in both groups were illiterate. These results are supported by Zarghi et al (2007) and Sayed et al (2010) who found that more than one half of older adults with constipation were married, while the majority were illiterate. Also, it was observed that the majority of the female in both groups were housewives[33,34].

As for the medical diagnosis of the study subjects, cardiovascular disorders were reported by the majority of the study subjects in both in both the study and control groups followed by the musculoskeletal disorders and then

endocrine disorders (Table 2). This finding may be explained by the fact that cardiovascular disorders are expected to occur in the elderly population, and the use of some drugs such as antihypertensive drugs which are considered risk factors for developing constipation. Moreover, elderly patients with heart diseases who stimulate the defecation reflex by valsalva maneuver. The same finding was reported by other studies done in the USA by Sodeman (2005) and in Dakahlia by Mohamed (2008) who concluded that cardiovascular diseases particularly heart failure is the most frequent type of chronic conditions among elderly people[35,36]. The majority of subjects in the present study in both the study and control groups reported the use of laxatives, which affected bowel movements negatively. This finding is in accordance with findings of studies done by Evans et al (2007) and Miles et al (2011) who concluded that different classes and different combinations of laxatives were used by the majority of the elderly for the management of constipation[30,37].

As regards the defecation habits of the study subjects before having constipation, the present study revealed that almost one half of the study subjects in both groups reported having two bowel movements every day, refers to several healthy habits, first taking high roughage food, adequate amount of fluid and keeping active (Table 3). The same result is reported by the Dinning et al (2004) and Woodward (2012) which concluded that more than one half of the elderly patients in the study subjects reported having two bowel movements daily[38,39]. Regarding the duration of the current constipation in the study subjects, the present study revealed that nearly two thirds of them in both the study and control groups reported having constipation for three years and more. This finding may be related to the intake of certain medications which contribute to and cause constipation. These medications as reported by the study subjects include laxatives, antihypertensive and sedatives. This finding is in agreement with that of a study done by Higgins et al (2004) who reported that the majority of elderly patients suffer from chronic constipation for two years and more[40].

The majority of the study subjects in both the study and control groups reported having dry mouth followed by chewing difficulty (Table 4). This finding is expected and is related to the aging changes which affect the salivary glands function and result in a marked decrease in the volume of saliva secretion resulting in dry tongue, mouth and in chewing difficulty. This finding is in line with that of other studies conducted by Ship et al (2008) and Ghanim et al (2011)[41,42]. In relation to the degree of dependency of the study subjects in performing the activities of daily living and instrumental activities of daily living, the present study revealed that the majority of subjects in both groups are partially dependent (Table 5). This may be related to the presence of cardiovascular and musculoskeletal disorders among the majority of the study subjects. This result is in agreement with other studies done by Quinn (2011) and Vieira et al (2013) who concluded that older people with acute and chronic problems that act together to adversely affect their functional abilities[43,44].

Regarding the degree of severity of chronic constipation, the present study revealed that moderate and severe degree of constipation are more prevalent among the majority of the study subjects in both groups (Table 6). This finding may be explained by the fact that the majority of the study subjects in both groups reported consuming low amount of fiber rich foods, inadequate fluid intake, being physically inactive and taking medications which contribute to constipation. However, a highly significant improvement is observed among subjects in the study group after the intervention and nearly one half of them reported improvement of the degree of severity of constipation to a mild degree compared to the control group where nearly one half of subjects reported severe

constipation. This finding is in accordance with other studies conducted by Wisten and Messner (2005) and Lindberg et al (2011) who reported that the spontaneous bowel movements significantly increased and severity degree of chronic constipation decreased among the study group after the intervention[45,46].

Concerning knowledge of the study subjects about constipation, the present study revealed that before the intervention low level of knowledge was found in subjects in both groups with no statistically significant difference between the two groups. Immediately after the intervention knowledge of subjects in the study group has improved with a statistically significant difference between subjects in both groups (Table 7). This finding is consist with the results of studies conducted by Abdo and mohamed (2010), Alame and Bahna (2012) and Abd Allah et al (2013) who reported that their findings demonstrated generally low levels of satisfactory knowledge in both groups at the pre-intervention phase. Also, significant improvement in the knowledge of the elderly in the study group was shown at the post-intervention phase in all areas under study[47-49].

Three months after the intervention although knowledge of subjects in the study group about constipation decreased, six months after the intervention knowledge of the study group about constipation decreased more but still retain knowledge however knowledge of the study subjects in the study group is high and the difference between the study and control groups is statistically significant. This finding is expected and related to several causes first retention of knowledge decreases as time goes on, second with advancing age forgetfulness is possible and thirdly low level education of nearly one half of the elderly in the study group. The same result was found by Saleh (2012) Alame and Bahna (2012) and Abd Allah et al (2013) who reported a decline in knowledge retention of the studied subjects three and six months after the implementation of an educational program[48,49,50].

The results in (Table 8) showed significant improvement in practicing the abdominal muscles strengthening exercises among the subjects in the study group immediately after the intervention with a statistically significant difference was found between the study and control groups. Three months after the intervention performance of the abdominal muscles strengthening exercises of subjects in the study group have decreased, six months after the intervention performing of abdominal muscles strengthening exercises of subjects in the study group is decreased more and the difference is still statistically significant. This finding come in consistence with that of other studies Lamas et al (2010), McClurg et al (2011) and Abd Allah et al (2013) who reported that the practices related to constipation significantly improved among the elderly exposed to the intervention, with subsequent improvement of the problem. While no such improvements could be revealed among the control group subjects[49,51,14].

The results in (Table 9) showed that the study group reported improvement in performance of the abdominal muscle strengthening exercises, this improvement did not reach a statistically significant level three and six months after the intervention and the significant difference is not found between sociodemographic characteristics of the study group and their performance. The same finding was reported by Lamas et al (2010), McClurg et al (2011) and Abd Allah et al (2013)[49,51,14]. Performance of the abdominal muscle strengthening exercises has improved more in younger age group than in higher older age group and in males than in females and the difference is statistically significant between different age groups and sex of the study group and performance of the abdominal muscle strengthening exercises immediately after the intervention. This may be attributed to the sex difference where more females

suffer from chronic problems such as heart diseases and osteoarthritis. Also, in early life pattern where males are more engaged in physical exercise than females.

Furthermore, it was observed that the higher the education of the subjects the more total mean score in performing the abdominal muscle strengthening exercises. This can be justified by the fact that lack of education will result in ignorance of the importance of performing exercises regularly. This is in accordance with other studies done by Lembo and Camilleri, (2010) and Mckay et al (2012) which reported a significant positive association between higher education of the elders and practicing exercises[26,20]. A significant positive relation was found between older adults knowledge and performance of the abdominal muscles strengthening exercises immediately, three and six months after the intervention (Table 10). The improvement in the level of knowledge of subjects in the study group is associated with improving in their performance of abdominal muscles strengthening exercises. This finding is consistent with Rosediani et al (2012) who found significant positive correlation between knowledge and practicing exercises[52]. Also, other studies conducted by Tariq (2007) who reported that significant association was found between provision of knowledge and proper practicing physical exercise[53].

With respect to the relation between performance of abdominal muscles strengthening exercises and the severity of chronic constipation three and six months after the intervention, the elders who have moderate and severe constipation reported improvement in the severity of chronic constipation and decrease in numbers of older adults in the study group. However, the difference is not statistically significant in (Table 11). This finding is in agreement with Daley et al (2008) and Johannesson et al (2011) who reported that practicing of the abdominal muscles strengthening exercises significantly improved chronic constipation compared with the standard of care. They added an individualized, supervised physical activity program from twenty to sixty minutes of moderate to vigorous activity, three to five days per week over a twelve-week period significantly improved the symptoms and the severity scores of constipated elderly patients[54,55].

Conclusion

Performance of the abdominal muscle strengthening exercises improved for the majority of the subjects in the study group however, it has improved more in the young old age group than the old old age group, in males than in females and in those with higher education. Also, it improved the severity of the degree of chronic constipation for the majority of subjects in the study group however, it has improved more in young old age subjects than in old old age subjects and in females more than males.

Recommendations

Based on the results of the present study the following recommendations are suggested:

1- The developed illustrated booklet to be distributed to all elderly patients in all outpatient clinics in Dakahlia governorate through responsible personnel.

2- Assessment of nurses and all health care providers knowledge and skills related to abdominal muscle strengthening exercises and should always update themselves with current information and development in the health profession regarding constipation management.

3- Development of a training program for nurses, health care personal and caregivers based on their assessment to fulfill their needs.

4- Nurses and caregivers raise awareness of community dwelling

older adults who attend the outpatient clinics and reside in the assisted living facilities regarding healthy lifestyle and abdominal muscle strengthening exercises.

Table (1): Socio-demographic characteristics of the study subjects.

Items	Study group		Control group		P- value
	N= (50)	(%)	N= (50)	(%)	
Age (in years):					
60-	35	70.0	38	76.0	
75-	15	30.0	11	22.0	0.112
85 +	0	0.0	1	2.0	
Mean± SD=	70.06 ± 6.74		69.52 ± 6.75		
Sex:					
Female	34	68.0	31	62.0	0.529
Male	16	32.0	19	38.0	
Marital status:					
Married	28	56.0	24	48.0	
Widow	20	40.0	24	48.0	0.198
Divorced	0	0.0	2	4.0	
Single	2	4.0	0	0.0	
Level of education:					
Illiterate	23	46.0	21	42.0	
Read and write	11	22.0	8	16.0	0.926
Basic education	9	18.0	11	22.0	
Secondary education	5	10.0	7	14.0	
University education	2	4.0	3	6.0	
Occupation before retirement:					
Housewives	26	52.0	22	44.0	
Workers	14	28.0	16	32.0	0.693
Employees	10	20.0	12	24.0	
Monthly income(LE):					
<200	14	28.0	15	30.0	
200-	6	12.0	7	14.0	0.797
300-	12	24.0	8	16.0	
400 and more	18	36.0	20	40.0	

More than one answer was given

Table (2): Clinical data of the study subjects.

Items	Study group		Control group		P-value
	N= (50)	(%)	N= (50)	(%)	
Medical diagnosis: #					
-Cardiovascular disorders: (Hypertension, myocardial infarction, Angina)	38	76.0	45	90.0	0.445
-Musculoskeletal disorders: (Osteoarthritis, Osteoporosis)	21	42.0	29	58.0	0.921
-Endocrine disorders: (Diabetes mellitus, hypothyroidism)	26	52.0	21	42.0	0.316
-Respiratory disorders: (Bronchial asthma, COPD)	13	26.0	6	12.0	0.074
-Gastrointestinal disorders (Liver diseases, duodenal ulcer)	8	16.0	6	12.0	0.564
-Urological disorders (Kidney stones, renal failure)	4	8.0	7	14.0	0.338
Types of the medication consumed and contributed to constipation: #					
- Laxatives	40	80.0	32	64.0	0.095
- Antihypertensive drugs	21	42.0	18	36.0	0.539
- Antacids	11	22.0	7	14.0	0.298
- Sedatives	7	14.0	10	20.0	0.424
- Calcium supplements	6	12.0	7	14.0	0.766
- Antihistamines	5	10.0	6	12.0	0.749
- Iron supplements	2	4.0	5	10.0	0.240

More than one answer was given

Table (3): Distribution of the study subjects according to the defecation habits before having constipation and duration of the current constipation.

Items	Study group		Control group		P- value
	N= (50)	(%)	N= (50)	(%)	
Defecation habits of the study subjects before having constipation:					
Once / day	14	28	18	36	
Twice / day	26	52	21	42	0.387
Three times/ day	3	6	1	2	
Once/ 2 days	5	10	4	8	
Irregular	2	4	6	12	
Duration of the current constipation in the study subjects (years):					
1 year	3	6	0	0	0.126
1< 3	9	18	14	28	
3 years and more	38	76	36	72	

Table (4): Age related changes of the study subjects.

Items	Study group		Control group		P- value
	N= (50)	(%)	N= (50)	(%)	
Age related changes: #					
Smell changes	10	20.0	6	12.0	0.207
Taste changes	19	38.0	13	26.0	0.198
Dry mouth	31	62.0	25	50.0	0.227
Teeth loss: - Complete - Partial	(24) 13 11	48.0 54.2 45.8	(29) 14 15	58.0 48.3 51.7	0.313
Artificial teeth: - Complete - Partial	(18) 11 7	36.0 61.1 38.9	(15) 8 7	30.0 53.3 46.7	0.738
Chewing difficulty	20	40.0	25	50.0	0.315
Swallowing difficulty	10	20.0	9	18.0	0.799
Heart burn	32	64.0	26	52.0	0.224

More than one answer was given

Table (5): Independence of the study subjects in performing activities of daily living and instrumental activities of daily living.

Independence in ADL and IADL	Study group		Control group		P- value
	No=(50)	%	No=(50)	%	
Activities of daily Living(ADL): - Independent -Partially dependent	 12 38	 24 76	 16 34	 32 68	0.373
Instrumental activities of dai living(IADL): - Independent -Partially dependent	 18 32	 36 64	 15 35	 30 70	0.827

Table (6): The severity of constipation of the study subjects before the intervention and after the intervention with the study group.

Items	Study group		Control group		P-value
	N= (50)	(%)	N= (50)	(%)	
Before the intervention:					
Mild constipation	6	12.0	11	22.0	
Moderate constipation	26	52.0	23	46,0	P1= 0.412
Severe constipation	18	36.0	16	32.0	
3 months after the intervention:	(50)		(49)#		
Mild constipation	16	32.0	8	16.3	
Moderate constipation	28	54.0	24	49.0	P2= 0.016*
Severe constipation	6	12.0	17	34.7	
Z Test(P)1	4.491(0.000)**		1.633(0.102)		
6 months after the intervention:	(48)##		(48)##		
Mild constipation	23	47.9	6	12.5	
Moderate constipation	21	43.8	20	41.7	P3= 0.000**
Severe constipation	4	8.3	22	45.8	
Z Test (P)2	5.240(0.000)**		2.668(0.008)**		

The older adult patient (1) withdrew from the study because of being hospitalized.
The older adult patients died (3).

Table (7): Knowledge of the study subjects about constipation before the intervention and after the intervention with the study group.

knowledge about constipation	Study group	Control group	P-Value
	Mean± SD	Mean± SD	
- Before the intervention: knowledge about constipation	10.72± 3.43	11.14± 4.46	0.599
Immediately after the intervention: knowledge about constipation	41.30± 6.43	11.62±4.83	0.000**
T -Test (P)1	0.000**	0.027*	
- 3 months after the intervention: knowledge about constipation	34.84±6.62	12.40± 4.63	0.000**
T- Test (P)2	0.000**	0.000**	
- 6 months after the intervention: knowledge about constipation	32.37±6.39	12.45±4.65	0.000**
T- Test (P)3	0.000**	0.000**	

*The difference is statistically significant at $P \leq 0.05$
**The difference is statistically significant at $P \leq 0.01$

Table (8): Performance of the abdominal muscles strengthening exercises of the study subjects after the intervention with the study group.

Items	Immediately after the intervention N= 50						3 months after the intervention N= 50						6 months after the intervention N= 48					
	Complete done		Incomplete done		Not done		Complete done		Incomplete done		Not done		Complete done		Incomplete done		Not done	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1-Abdominal massage	45	90.0	5	10.0	0	0.0	46	92.0	3	6.0	1	2.0	44	91.6	3	6.3	1	2.1
Mean± SD=	3.26±3.39						3.20±3.37						3.23±3.34					
2-Abdominal muscles contraction	44	88.0	6	12.0	0	0.0	44	88.0	4	8.0	2	4.0	42	87.5	4	8.3	2	4.2
Mean± SD=	3.24±3.37						3.14±3.36						3.02±3.30					
3-Pelvic tilt exercise	50	100.0	0	0.0	0	0.0	49	98.0	0	0.0	1	2.0	47	97.9	0	0.0	1	2.1
Mean± SD=	4.88±4.96						4.50±4.67						4.24±4.51					
4-Squatting exercise	47	94.0	3	6.0	0	0.0	45	90.0	4	8.0	1	2.0	35	72.9	7	14.6	6	12.5
Mean± SD=	4.32±4.44.						4.05±4.25						3.39±4.04					
5-Lower abdominal muscles exercises	50	100.0	0	0.0	0	0.0	47	94.0	2	4.0	1	2.0	47	94.0	0	0.0	1	2.0
Mean± SD=	23.08±2.12						21.58±4.29						20.95±4.15					
Total mean score=	54.48± 4.83						51.16± 8.62						49.08±8.52					
T-test(P)1	2.752 (0.008)**																	
T-test (P)2	4.059 (0.000)**																	

** The difference is statistically significant at $P \leq 0.01$

T-test(P)1 : Comparing immediately and three months after the intervention

T-test(P)2 : Comparing immediately and six months after the intervention

Table (9): Relation between sociodemographic characteristics and performance of abdominal muscle strengthening exercises of the study group after the intervention.

Sociodemographic characteristics		*AMSE of the study group immediately after the intervention N= 50		*AMSE of the study group 3 months after the intervention N= 50		*AMSE of the study group 6 months after the intervention N= 48	
		No	Mean± SD	No	Mean± SD	No	Mean± SD
Age (in years):	60-75	35	55.51±4.25	35	51.60±9.82	34	49.26±9.94
	75- 85	15	52.07±5.40	15	50.13±4.94	14	48.64±3.41
Test of significance		F=5.863, P= 0.019*		F=0.299, P= 0.587		F=0.052, P= 0.821	
Sex:	Female	34	53.24±5.23	34	49.71±9.78	32	47.47±9.54
	Male	16	57.13±2.31	16	54.25±4.16	16	52.31±4.81
Test of significance		F=3.649, P= 0.001*		F=1.776, P= 0.082		F=1.906, P=0.063	
Level of education:							
Illiterate		23	54.26±4.91	23	51.61±3.65	22	49.27±3.63
Read and write		11	52.45±6.14	11	45.09±15.86	11	43.82±14.97
Primary education		6	54.83±3.19	6	52.17±2.93	5	48.00±3.74
preparatory education		3	57.00±2.00	3	56.33±1.53	3	54.00±1.73
Secondary education		5	56.00±3.46	5	54.80±4.49	5	53.80±5.50
University education		2	59.50±2.12	2	59.50±2.12	2	59.50±2.12
Test of significance		F=1.106, P= 0.371		F=2.099, P=0.083		F=2.212, P= 0.071	

** The difference is statistically significant at $P \leq 0.01$
* AMSE= Abdominal Muscle Strengthening Exercises

Table (10): Relation between knowledge of subjects of the study group about constipation and performance of abdominal muscle strengthening exercises after the intervention.

Abdominal muscle strengthening exercises of the study group	Knowledge of the study group about constipation	r =
Mean ±SD	Mean ±SD	
Immediately after the intervention N=50 (54.48± 4.83)	**Immediately after the intervention N=50** (41.30± 6.43)	0.629 (0.000)**
3 months after the intervention N=50 (51.16± 8.62)	**3 months after the intervention (N=50)** (34.84±6.62)	0.298 (0.036)*
6 months after the intervention (N=48) (49.08±8.52)	**6 months after the intervention (N=48)** (32.37±6.39)	0.347 (0.016)*

** Correlation is significant at the level 0.01 level (2-tailed) * Correlation is significant at the level 0.05 level (2-tailed)

Table (11): Relation between performance of abdominal muscle strengthening exercises and the severity of constipation of the study group after the intervention.

Severity of constipation	Abdominal muscle strengthening exercises of the study group		
	No	Mean± SD	F=
Before the intervention:		**Before the intervention (N=50)**	
Mild	6		
Moderate	26	#	#
Severe	18		
3 months after the intervention:		**3 months after the intervention (N=50)**	
Mild	16	50.37±4.78	F=0.249, P=0.781
Moderate	28	51.14±10.84	
Severe	6	53.33±4.08	
6 months after the intervention:		**6 months after the intervention (N=48)**	
Mild	23	48.73±4.83	F=0.210, P=0.812
Moderate	21	48..95±11.96	
Severe	4	51.75±1.70	

F= One way ANOVA test # All tests of pre-test cannot be computed because the standard deviations are zero

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