Effect of pelvic floor muscle training on urinary incontinence and sexual function in female stroke survivors

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Received February 26.2017, Accepted February 29.2017

Abstract

Background: Urinary incontinence and sexual dysfunction are common conditions ignored in the rehabilitation of female stroke survivors.

Objectives: To determine the effect of Pelvic Floor Muscle Training on urinary incontinence and sexual dysfunction in female stroke survivors.

Methodology: Twenty six patients with stress urinary incontinence and sexual dysfunction were randomly assigned to the experimental and control group constituting 13 patients each. Participants were assessed pre and post intervention in both groups. The frequency of voiding was recorded using a voiding diary, the rate of fluid loss in form of incontinence was measured using a pad test; the pelvic floor muscle strength, static and dynamic endurance were assessed using vaginal palpation. The female sexual function index questionnaire was used to assess sexual dysfunction in participants. The experimental group received pelvic floor muscle training and conventional treatment in form of fluid management and decrease in bladder irritants. The control group received conventional treatment alone.

Results: Results indicate significant ($P< 0.05$) difference in the frequency of voiding, weight of pad, pelvic floor muscle strength, dynamic endurance and sexual function domains between pre and post intervention in the experimental group. There was no significant relationship between duration post stroke, frequency of voiding, weight of pad, static endurance, dynamic endurance and sexual function domains.

Conclusion and Recommendation: The use of pelvic floor muscle training is effective in the management of stress urinary incontinence and sexual dysfunction in female stroke survivors and should be used in physiotherapy clinic as part of rehabilitation.

Keywords: *Pelvic floor; urinary incontinence; sexual function*

Introduction

Urinary incontinence (UI) is common among stroke survivors [1] and is associated with higher levels of mortality, disability [2], and discharge to institutional care [3] than in continent survivors. Large proportion of people admitted in the hospital after stroke can have problems with urinary incontinence, with a quarter of stroke survivors still having problems on hospital discharge. Early intervention whilst the person is still in hospital may prevent long-term problems for the patient and family, early rehabilitation intervention in stroke results is known in giving a better outcome overall [4].

The more severe the stroke, the greater is the likelihood of urinary incontinence [5]. Due to its severity, the symptoms of urinary incontinence are reported to have more of an effect on the lives of stroke survivors, when compared with other groups of people with incontinence [6]. Urinary symptoms after stroke are seen to have more impact on sleep, daily activities, quality of life, physical discomfort, social life and relationships. Incontinence is not just a physical problem, but impacts on what people can do and how they feel. Tibaek, Gard and Jensen[7] and Brittain [8]. assessed the effect of pelvic floor muscle training on urinary incontinence but the result of the studies were not specific to the type of incontinence. The present study intends to determine the effect of pelvic floor muscle training on stress urinary incontinence and sexual function following stroke in females.

Sexual dysfunction is also common in females following stroke. Following stroke, a large proportion of patients suffer sexual dysfunction [9, 10]. Sexual dysfunction seen in these women includes a variety of cases along the domain [11]. Sexual dysfunction resulting from stroke can have a profound effect on relationships and lead to

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significant changes in how couples relate on physical, psychological, social and emotional level [9].Thompson and Walker [12] reported that sexuality comprises of more than just sexual intercourse. Marked decline in sexual activity after stroke have been reported by Monga and Osterman [13]. Also, sexuality after stroke can usually go unassessed which can be depressing to the patient [14].

Researches conducted by Sjogren and Fugl [15] and Monga, Lawson and Inglis [10] reported decreases in quality of sexual lives of patients after stroke. The fact that sexual dysfunction consists of a decline in libido, sexual pain, decreased orgasm and arousal, the results of these two studies does not provide a complete picture of sexual dysfunction; they considered either one or two of the sexual domains. The present study focused on all domains of sexual dysfunction giving a better picture of the disorder among female stroke survivors.

Management techniques of urinary incontinence along with sexual dysfunction include biofeedback, pelvic floor muscle training, electrical stimulation, drug treatments, surgical interventions and mechanical devices. Pelvic floor muscle training after delivery is effective in reducing incontinence in the immediate postpartum period [16]. Most outcome studies conducted on the effect of pelvic floor muscle training in females with urinary incontinence following stroke showed improvement in quality of life of some patients [17]. A recent study Tibaek, Gard and Jensen [17] was carried out in order to identify the effectiveness of pelvic floor muscle training on stroke irrespective of the type of stroke with urinary incontinence and sexual dysfunction. However, the results of these researches conducted were inconsistent and focused more on men. The present study noted the limitations of the previous studies and determined the effect of pelvic floor muscle training on urinary incontinence and sexual function, considering all domains of sexual function among female stroke survivors using standardized protocols.

Methods

***Research Design*:** This study is a randomized controlled clinical trial on the effect of pelvic floor muscle training on urinary incontinence and sexual function among female stroke survivors. It was implemented in this study as represents the gold standard for evaluating health care intervention's effectiveness and allows for randomization in order to prevent being biased to both experimental and control groups. This study was clinically based and thus, the use of randomized controlled trial designs.

Population of the Study: The population of the study consisted of all female ischemic stroke survivors in Aminu Kano Teaching Hospital (AKTH), Kano, having stress urinary incontinence and sexual dysfunction.

Sample size and sampling technique:

A .Statistical power: The acceptable risk of a type II error (β) is generally set at 1 in 5 that is a probability of 0.2. Therefore statistical power (1-β) is set at 1-0.2=0.8.

B. Effect size: (The expected magnitude of difference or correlation between groups): The Cohen's Rule of the Thumb specifies that small, medium, and large effect sizes corresponds to 0.2 (20%), 0.5 (50%), and 0.8 (80%) respectively [18]. Therefore medium effect size of 0.5 was used for the study.

C. Using the Cohen's table, the power of 0.8 that corresponds to effect size of 0.5 at alpha (α_i) level of 0.05 gives the sample size of 15 participants in each group with allocation ration between group 1 and group 2 as 1.

Twenty-six (26) (using the Cohen Table) female stroke survivors with urinary incontinence and sexual dysfunction at AKTH, Kano were selected.

Random sampling was employed and thirteen (13) subjects each were randomly allocated to the experimental and control groups. Allocation concealment, a procedure for protecting the randomization process so that the treatment to the allocated is not known before the patient is recruited into the study, was performed. The participants were simply randomized into the control group and experimental group. The first participant recruited was allocated to group 1, while the next was allocated to group 2 and so on.

Participant selection was made based on the following inclusion and exclusion criteria:

Inclusion criteria

1. All married females with first ever ischemic stroke. This was determined using the Oxford Community Stroke Project (OCSP) [19] classification of ischemic stroke.
2. Conscious and mentally alert patient. This was determined using a Mini cognition tool.
3. Females with stress urinary incontinence and females having sexual dysfunction.

Exclusion criteria

1. Stroke survivors with previous history of sexual dysfunction prior to stroke attack.
2. Stroke survivors with previous history of incontinence.
3. Stroke survivors with severe aphasia.
4. Patients with chronic degenerative diseases that would affect muscular and nerve tissue. This was determined using patient file.

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Data collection instrument

The following instruments were used to collect data for the study:

1. The Female Sexual Function Index (FSFI) Questionnaire: This questionnaire was used to assess key dimensions of female sexual function due to its high clinical validity and reliability. The FSFI has been validated on clinically diagnosed samples of women with female sexual arousal disorder, female orgasmic disorder and hypoactive sexual desire disorder[[20]. The internal reliability for the total FSFI and six domain scores will be found to be good excellent (Cronbach alphas >0.9) for combined samples of sexual dysfunctional and non-sexual dysfunctional and Cronbach alpha's 0.8 for the sexual dysfunctional and non- sexual dysfunctional samples independently. It has sensitivity of 0.707-0.772 and specificity of 0.881-0.854 [20].

2. Pad (ALWAYS ULTRA): The medium size ALWAYS ULTRA pad was used to determine fluid loss of the patients.

3. 24-Hour Voiding Diary: Frequency of voiding was recorded using the voiding diary. The confidence interval of the diary data is calculated by applying the normal distribution to daytime voiding frequency and the Poisson distribution to daytime incontinence frequency. For daytime voiding frequency, the 95% confidence interval was estimated to be (x - 2.65, x + 2.65) (x - 1.53, x + 1.53) (x - 1, x + 1), where x is the 1-day, 3-day, and 7-day diary mean, respectively. For daytime incontinence frequency, the confidence interval depended on both the diary length and the diary mean. It is estimated to be (0, 6.39), (1.72, 4.28), (2.36, 3.64), by using a diary mean of 3 or 1-day, 7-day, and 28-day diaries, respectively. Also, it is estimated to be (0, 1.02), (1.72, 4.28), (7.66, 12.34), when the 7-day diary mean was 0.5, 3, and 10, respectively.

4. Weighing apparatus (Zhengya, China)*:* This was used to assess the weight of the pad as an outcome measure of urinary incontinence.

5. Stop watch (Quartz, China)*:* This was used in order to determine the static endurance of the pelvic floor muscle.

6. Weighing scale (Super, Japan)*:* This was used to assess the body mass of the participants.

7. Tape measure (Butterfly, China)*:* This was used to measure the participant's stature.

Data Collection Procedure

Prior to the collection of data, ethical approval was sought from the ethnical committee at AKTH. Consent was sought from all the female stroke survivors that were recruited from the hospital by presenting an informed consent form. The subjects were screened for inclusion into the study using the inclusion/exclusion criteria. All subjects in this study received a general rehabilitation in the department of physiotherapy for managing stress urinary incontinence and sexual dysfunction, two times a week for a duration of six weeks. This study incorporated 2 research assistants.

The following were assessed and recorded:

1. **Age:** The age of the female stroke survivors was recorded in years.
2. **Body mass:** Participants' weight was measured using a standard measuring scale with provision for calibration. Participants were asked to present themselves in light clothing and to remove all heavy objects prior to measurement. They were then asked to step on the weighing scale bare footed and stand erect, with the face looking straight forward and their hands by the side. The reading was taken and recorded to the nearest 0.5kg [21].
3. **Stature:** Participants were asked to relax, barefoot or wearing socks or stockings. The stadiometer was mounted on a straight wall that is at a true 90˚ angle to the floor. The heel plate was mounted on the floor in the same vertical plane as the backboard of the stadiometer. The participant stand with their back against the wall-mounted stadiometer, heels together. The horizontal bar down firmly onto the top of the head and a weight of about 0.5kg was placed on the headboard and the measurement is recorded on the counter [22].
4. **Body Mass Index:** The body mass index (BMI) was computed by dividing the participant's weight in kilogram by the square of their height in meter. BMI is an index used for assessing body fat [23].
   BMI = Body Mass (kg)/ [Stature (m)]
5. **Duration Post Stroke**: This was measured in months and categorized as follows [24]:

Acute stage: Stroke survivors of less than or equal to three months were included in this stage. This group will be coded as group 1 (≤3 months=1).

Sub acute stage: Stroke survivors of greater than or equal to 3 months were included in this stage. This group was coded as group 2(>3-6 months=2).

Chronic stage:

i. Stroke survivors of more than 6 months were included in this stage. This group was coded as group 3 ($> 6 - 12 months = 3$).

ii. Stroke survivors of more than a year were included in this stage. This group was coded group 4 ($> 12 months = 4$).

6. **Sexual function**: The (FSFI) questionnaire was administered to individual participants and was collected same day. This was assessed before and after the intervention. The questionnaire consists of six domains which include libido, sexual arousal, vaginal lu-

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brication, female orgasm, sexual satisfaction and dyspareunia with 19 items [20].

- Libido: This was scored based on sum of the scores of questions 1 and 2; scores <8 were considered as diminished libido.
- Sexual arousal: This was scored based on sum of the scores of questions 3-6. Scores<16 were considered sexual arousal disorder.
- Vaginal lubrication: This was scored based on sum of the scores of questions 7-10. Scores<16 were considered as diminished in vaginal lubrication.
- Female orgasm: This was scored based on sum of scores of questions 11-12. Scores<8 were considered as female orgasmic disorder.
- Sexual satisfaction: This was scored based on sum of the scores of questions 13-16. Scores <16 were indication of sexual dissatisfaction.
- Pain: This was scored based on sum of the scores of questions 17-19. Scores<12 were considered as dyspareunia.

Scoring: Scores were summarized and categorized with minimum score of 2 and maximum score of 95, as follows: Score of 2 = no sexual activity; 3-19 = severe sexual dysfunction; 20-57 = moderate sexual dysfunction; 58-76 = mild sexual dysfunction; 77-95 = no sexual dysfunction.

The higher the score, the lesser the severity of sexual dysfunction and lower the score, the more severe the sexual dysfunction. The sexual function was assessed before and after intervention.

7. **Urinary incontinence**: A female stroke survivor having stress urinary incontinence, as defined by the International Continence Society (complaint of involuntary leakage of urine on effort or exertion, or on sneezing or coughing) was considered to participate in the study. Involuntary leakage from the urethra of the subjects due to increases intra-abdominal pressure such as when sneezing or coughing was observed via the stress test.

The following outcome measures were used in assessment of urinary incontinence before and after the intervention:

1. 24-hour voiding diary: A 24 hour voiding diary in a modified version[25] measuring variables (primary outcomes) was used, which contains: Time of voiding; number of incontinence episodes; fluid intake amount; strong urge to urinate; activity when leaked.

All subjects were informed of the purpose of the diary and instructed on how to fill in records continuously over a period of 24 hours. Daytime in the diary is defined as time between 7:00 am and 11:00 pm, night time is between 11:00 pm and 7:00am.

2. Pad test: A 24 hour home pad test was performed [26]. An absorbent pad (always ultra) was worn by the patients as many as needed and was enclosed in a self-sealing plastic bag. Pad number and weight was recorded before and after use. Increased weight of the pad gives an estimate of how much urine leaks. The subjects were instructed not to change their daily activities and fluid intakes.

3. **Dynamic endurance of pelvic floor muscles (repetitions)**: The dynamic contraction was determined by the number of PFM contractions. The subjects were instructed to repeat the contractions as frequently as possible, the number of repetitions the patients were able to carry out were recorded [27].

4. Static endurance of pelvic floor muscles: The static endurance was measured with a stop watch and the result was expressed as time in seconds to perform the pelvic floor muscle contraction. The subjects were instructed to keep the muscles contracted as long as they can[27].

5. Strength of the pelvic floor muscle: The subjects were instructed to perform a maximal voluntary contraction (MVC) of PFM without co-contraction of other muscles. The result was expressed on a Modified Oxford Grading System[27] The test was repeated thrice and the best result was taken. This was assessed before and after intervention.

Dynamic endurance, static endurance and strength of pelvic floor muscle was assessed by a therapist, who was not aware of the group the patient belonged to.

Intervention

This study was a six weeks intervention.

Groups:

Group 1 was regarded as the Experimental group

Group 2 was regarded as the Control group

Group 1 – Experimental Group

This group received pelvic floor muscle training and conventional treatment and these are described as follows:

- **Pelvic Floor Muscle Training**

Prior to onset of the training, the subjects were instructed to empty their bladders. The subjects were made to lie comfortably on their backs, with legs in crook position. The therapist identified the pelvic floor muscles by inserting a finger into the vagina and asking the subject to contract the muscles used in stopping the flow of urine. These muscles were isolated and are targeted. The subjects were then instructed to contract and hold the muscles for 5 seconds, and then relax for 5 seconds and are repeated 10 times. The timing for contraction and relaxation of the muscles was gradually increased according to

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protocol of Shah[28]. Subjects were instructed to aim for at least 10 repetitions while supine, standing and sitting positions.

Standard protocol for pelvic floor muscle training involves the following which was adopted:

1. Muscle isolation*:* Elimination of accessory muscle substitution through identification and modulation of associated muscle groups.
2. Discrimination training*:* Enhancement of sensory awareness of tension and release variations to maximize conscious control of muscle contraction.
3. Pelvic floor muscle strengthening*:* Enhancement of pelvic floor muscle motor recruitment.
4. Endurance training*:* Maintenance of isolated pelvic floor muscle motor recruitment by sustained contractions.
5. Down-training*:* Inhibition of hypertonic muscle activity to lower elevated resting tone.

- **Conventional treatment**

This included behavioral lifestyle modifications, which included the following:

1. **Fluid management**: The subject's fluid intake was monitored, they were advised to take atleast6 glasses (250mls each) a day as recommended by Dowd, Campbell and Jones[29].
2. **Caffeine:** In addition to being a diuretic, caffeine is also a bladder irritant for women. Subjects were advised to reduce caffeine intake. It is shown to reduce episodes of stress incontinence[30].
3. **Consumption of bladder irritants:** Bladder irritants such as sugar substitutes, citrus fruits, spicy foods and tomato products were advised to be minimized in the diet of the subjects.

Group 2- Control Group

This group received only conventional treatment for a period of 6 weeks as detailed above.

Pelvic floor muscle strength, static and dynamic endurance was assessed by a licensed physiotherapist in the Obstetrics and Gynaecology unit of the Physiotherapy department, who were not aware of the group the subjects belong to.

Data Analysis Procedure

Data was analyzed using descriptive and inferential statistics. Descriptive statistics of mean, percentage and standard deviation was used to summarize the data. Inferential statistics of dependent t-test was used to determine difference in the outcome of urinary incontinence (pelvic floor strength, static and dynamic endurance, frequency of voiding and weight of the pad) before and after intervention in both experimental and control groups. Wilcoxon signed rank test was computed to determine difference in the female sexual domains (desire, arousal, lubrication, satisfaction, orgasm and pain) before after intervention in both experimental and control groups. Pearson's correlation was computed to determine the relationship between duration post-stroke and urinary incontinence (pelvic floor strength, static and dynamic endurance, frequency of voiding and weight of the pad). Spearman correlation was computed to determine the relationship between duration post stroke and sexual function domains (desire, arousal, lubrication, satisfaction, orgasm and pain) following intervention in the experimental and control groups. Statistical significance was determined at $P<0.05$. The Statistical Package for Social Science (SPSS), Version 20, was used to run the analysis.

Results

A total of 26 women participated in the study. Thirteen of which were subjected to pelvic floor muscle training in conjunction with conventional training and the other thirteen subjects were solely subjected to conventional training in form of advice on fluid management, intake of caffeine and other bladder irritants.

The physical characteristics of the subjects are shown in table 1.

On average, participants in both the experimental and control groups were obese. There is no significant difference between the experimental group and control group with regards to participant's age, height, weight and BMI.

The summary of participant's duration post-stroke and domains of sexual function in both the experimental and control group is shown in table 2.

Table 2 shows that majority of participants in experimental were in chronic stage of stroke. The control group had a majority of stroke participants in sub-acute stage. Sexual dysfunction in the experimental and control groups were reported to be high in desire, satisfaction, orgasm and pain. The difference between frequency of voiding, weight of pad, pelvic floor muscle strength, static and dynamic endurance is shown in table 3.

Table 3 shows that there is a significant difference ($P<0.05$) in urinary incontinence parameters (pad weight, frequency of voiding, pelvic floor strength and dynamic endurance) before and after intervention in the experimental and control groups with the exception of static endurance. There is a decrease in weight of pad and frequency of voiding in the experimental group. The pelvic floor muscle strength and dynamic endurance increased following the intervention in the experimental group. For the control group, there is no significant difference in all urinary incontinence parameters except the weight of pad following intervention, which increased following intervention.

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Table 1. Physical characteristics of subjects (N=26)

Variables	Experimental group M±*SD*	Control group M±*SD*	Total M±*SD*	t-value	p-value
	n=13	n=13			
Age(yrs)	52. 00 ±9.94	47.92±10.04	49.96±10.01	0.309	0.309
Height(m)	1.52±0.06	1.55±0.06	1.54±0.06	-1.211	0.238
Weight(Kg)	71.69±11.99	71.2. 00 ±12.63	71.46±12.07	0.096	0.925
BMI(Kg^2/m)	30.76±5.35	29.40 ±5.56	30.08 ±5.39	0.634	0.532

Table 2. Summary of participants duration post stroke and sexual function

Variables		Experimental Group n=13	Control Group n=13
Duration post stroke	Acute	23%	23%
	Sub-acute	23%	46%
	Chronic 1	46%	23%
	Chronic 2	7%	7%
Sexual Dysfunction			
	Desire	92%	53%
	Arousal	15%	23%
	Lubrication	15%	15%
	Satisfaction	46%	15%
	Orgasm	28%	23%
	Pain	28%	28%

Table 3. Summary of dependent t-test showing the difference in pre/post urinary incontinence parameters in experimental and control groups

Variables		M±SD	df	t-value	p-value
Experimental group					
Pad weight(g)	Pre	156.54± 37.540	12	2.879*	0.014
	Post	129.23± 41.223			
Freq of voiding	Pre	6.23± 0.927	12	5.734*	0.000
	Post	4.69± 0.927			
PFM strength	Pre	1.77± 0.725	12	-4.788*	0.000
	Post	3.00± 0.577			
Static endurance	Pre	2.38± 1.981	12	-2.168	0.051
	Post	3.69± 2.213			
Dynamic endurance	Pre	1.31± 1.109	12	-6.306*	0.000
	Post	3.38± 1.193			
Control group					
Pad weight(g)	Pre	136.92± 34.311	12	-4.764*	0.000
	Post	156.15± 38.79			
Freq of voiding	Pre	5.31± 1.032	12	-2.309	0.40
	Post	5.92 ±1.65			
PFM strength	Pre	2.31± 0.63	12	3.742	0.30
	Post	1.77± 0.832			
Static endurance	Pre	3.54± 2.295	12	-0.615	0.55
	Post	3.92± 2.431			
Dynamic endurance	Pre	1.46± 1.050	12	1.76	0.104
	Post	1.15± 0.689			

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Table 4. Summary of Wilcoxon Signed Rank Test showing the difference in pre and post intervention parameters of sexual function in both groups

Variables		Mean rank	Sum of ranks	Z	P value
Experimental Group					
Desire	Pre	5.00	45.00	-2.677*	0.007
	Post	0.00	0.00		
Arousal	Pre	6.25	50.0	-2.299*	0.021
	Post	2.5	5.00		
Lubrication	Pre	6.00	66.00	-2.937*	0.003
	Post	0.00	0.00		
Orgasm	Pre	5.44	49.00	-2.203*	0.028
	Post	6.00	6.00		
Satisfaction	Pre	4.50	36.00	-2.527*	0.012
	Post	0.00	0.00		
Pain	Pre	6.00	66.00	-2.949*	0.003
	Post	0.00	0.00		
Control group					
Desire	Pre	3.00	6.00	-1.357	0.175
	Post	4.40	22.00		
Arousal	Pre	3.25	6.50	-2.816	0.11
	Post	7.15	71.50		
Lubrication	Pre	0.00	0.00	-2.816	0.500
	Post	5.50	55.0		
Orgasm	Pre	8.00	8.00	-1.994	0.46
	Post	5.22	47.00		
Pre satisfaction	Pre	9.20	46.00	-0.345	0.972
	Post	5.63	45.00		
Pain	Pre	0.00	0.00	-2.820	0.50
	Post	5.50	55.00		

Table 5. Summary of Pearson's correlation showing the relationship between duration post stroke and urinary incontinence parameters

Variables	r	p-value
Experimental group		
Weight of pad(g)	-0.339	0.257
Frequency of voiding	0.34	0.912
Pelvic floor muscle strength	0.601*	0.030
Static endurance	0.256	0.398
Dynamic endurance	0.369	0.215
Control group		
Weight of pad(g)	-0.277	0.360
Frequency of voiding	-0.54	0.861
Pelvic floor muscle strength	0.027	0.931
Static endurance	0.076	0.804
Dynamic endurance	0.119	0.699

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Table 6. Summary of Spearman correlation showing the relationship between duration post stroke and sexual function domains

Variable	r	p-value
Experimental group		
Desire	0.021	0.946
Arousal	0.274	0.364
Lubrication	0.409	0.165
Orgasm	-0.086	0.779
Satisfaction	0.248	0.414
Pain	0.086	0.781
Sexual function index	-0.249	0.413
Control group		
Desire	-0.006	0.984
Arousal	0.072	0.816
Lubrication	-0.216	0.478
Orgasm	-0.79	0.799
Satisfaction	0.372	0.211
Pain	0.175	0.568
Sexual function index	-0.024	0.938

Table 4 shows the difference in the female sexual function following intervention in both the experimental and control groups.

Table 4 shows that there is a significant difference ($P<0.05$) between pre and post intervention values in all sexual function domains in the experimental group (group 1). Nine (9) participants reported improvement in desire, 8 participants in arousal, 11 in lubrication, 9 in orgasm, 8 in satisfaction and 11 participants in pain level following the intervention. However, there is no significant difference ($P> 0.05$) between pre and post intervention values in all sexual function domains in the control group (group 2).

Table 5 shows the relationship between duration post stroke and urinary incontinence parameters (weight of pad, frequency of voiding, pelvic floor muscle strength, static and dynamic endurance) in both experimental and control groups.

Table 5 shows no significant ($P>0.05$) relationship between duration post stroke and urinary incontinence parameters (weight of pad, frequency of voiding, pelvic floor muscle static and dynamic endurance)in both the control group (group 2) and experimental group (group 1) with exception of pelvic floor muscle strength. It is further noted that the relationship is weak.

Table 6 shows the relationship between duration post stroke and sexual function domains (desire, arousal, lubrication, satisfaction, orgasm, pain)in both experimental and control groups

Table 6 shows that there is no significant ($P>0.05$) relationship between duration post stroke, sexual domains (desire, arousal, lubrication, satisfaction, orgasm and pain) and sexual function index scores in both the experimental group (group 1) and control group (group 2).

Discussion

This study was conducted in order to determine the effect of pelvic floor muscle training in the rehabilitation of female stroke survivors with stress urinary incontinence and sexual dysfunction. All subjects participated in the study, but some were reluctant as sensitive and personal issues were assessed. However, this problem was tackled by developing rapport and reassuring the participants that the study entails a high confidentiality level and therefore they do not need to be bothered.

At baseline, there was no significant difference between the anthropometric characteristics of the participants such as in body weight, height, basal metabolic index (BMI) and duration post stroke in both the experimental and control group. This implies that the outcome of the study was not affected by difference in physical characteristics between the groups as the data was evenly distributed.

The results of this study identified the effect of Pelvic Floor Muscle Training on urinary incontinence and sexual function in participants. The result of the 24-hour voiding diary showed that pelvic floor muscle training was effective, the frequency of voiding in daytime was reduced and the total voiding frequency decreased significantly. Frequency of voiding in normal healthy women in daytime was stated as 5-6 times according to Burgio, Engel and Locher [31] which is similar to the post intervention values obtained in this study. There was a significant effect of pelvic floor muscle training measured by pad test following intervention in the experimental group. It is worthy to note that this was also achieved in the control group and is same to the findings of Blaivas, Appell and Fanti[32].

Positive effect of Pelvic floor muscle training was indicated in the three tests carried out by vaginal palpa-

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tion. The pelvic floor muscle strength improved significantly following intervention. This is in contrast to the study of Bo et al [16]. In the dynamic endurance of the participants, positive effect of Pelvic floor muscle training was achieved as the number of pelvic floor contractions (repetitions) increased following intervention. There was difference in pelvic floor static endurance, however, this difference is weak. No relationship existed between duration post stroke, pelvic floor muscle static endurance, dynamic endurance, frequency of voiding and weight of the pad. However, an inverse relationship existed between pelvic floor muscle strength and duration post stroke.

The results of this study found greater reduction in urinary incontinence as well as improvement in sexual function in the participants. This is in contrary to findings of Burney et al [33].

This study found pelvic floor muscle training effective in management of Stress urinary incontinence and Sexual function in female stroke survivors. It reports the use of pelvic floor muscle training, twice a week for a period of six weeks with an improvement observed in these patients. This is in line with the findings of Tibaek, Gard and Jensen [17]. However, this study focused on female stroke survivors, of which anecdotal evidence exist till now.

The results of this study indicated a positive effect of pelvic floor muscle training in women with urinary incontinence and sexual function. Improvement in urinary incontinence was achieved as reduced frequency of voiding and urine leakage, and improved pelvic floor muscle strength, dynamic strength and static endurance in participants. Sexual functions in form of desire, arousal, lubrication, satisfaction, orgasm and pain were seen to increase following pelvic floor muscle training. Furthermore, the study found no relationship between duration post stroke, desire, arousal, lubrication, satisfaction, orgasm, pain and sexual function index.

Among the strengths of this study is the use of gold standard assessment tools: Modified Oxford Grading System and 24-hour Voiding Diary and Female Sexual Function Index Questionnaire, for urinary incontinence and sexual function assessment respectively.

Sexual dysfunction is common in females after stroke with a large proportion of patients affected[10]. Sexual dysfunction seen in these women did not include all the sexual domains [34]. The current study found major sexual problems in desire, satisfaction, orgasm and pain in the experiment group, with desire, arousal and pain as the major problems of participants in the control group. A significant difference in desire, arousal, lubrication, orgasm, satisfaction and pain level following the intervention was observed in the experiment group.

Sexuality after stroke is usually unassessed[14]. A research conducted by Sjogren and Fugl [15], found decrease in sexual lives of patients after stroke, however, a complete picture of sexual dysfunction in individuals was not gotten. This study assessed sexuality in females after stroke as well as gives a clearer view of sexual dysfunction involving each domain. It finally shows improvement in all sexual domains following pelvic floor muscle training with most improvement seen in lubrication and satisfaction.

References

1. Brocklehurst J.K., Andrews K., Richards B., Leycock P.J. Incidence and correlation of incontinence in stroke patients. Stroke, 1985; 35: 2549-2555.
2. Taub N.A., Wolfe C.D., Richardson E. Predicting the disability of first time stroke sufferers at 1 year follow up of a population based cohort in southeast England. Stroke, 1994; 25: 352-357.
3. Patel M.D., McKevitt C., Lawrence E., Rudd A.G., Wolfe C.D. Clinical determinants of long-term quality of life after stroke. Age Ageing, 2007; 36 (3): 316-322.
4. Cifu D.X., Stewart D.G. Factors affecting functional outcome after stroke, a critical review of rehabilitation interventions. Stroke, 1999; 26: 111-130.
5. Burney T.I., Senapati M., Dessai S. Acute cerebrovascular accident and lower urinary tract symptoms, a prospective correlation of the site of brain injury with urodynamic findings. Stroke, 1996; 10: 22-27.
6. Brittain K., Susan M., John F., Mark C. Urinary symptoms & depression in stroke survivors. Stroke, 1998; 27: 116-117.
7. Tibaek S., Gard G., Jensen R. Is there a long-lasting effect of pelvic floor muscle training in women with urinary incontinence after ischemic stroke? Journal of International Urogynecology, 2006; 18: 281-287.
8. Brittain K., Susan M., John F., Mark C. Prevalence and management of UI in stroke survivors. Stroke, 1999; 28: 509-571.
9. Kolpelainen J., Nieminen P., Myllya V. Sexual functioning among stroke patients and their spouses. A Journal of Cerebral Circulation, 1999; 30: 715-719.
10. Monga T.N., Lawson J.S., Inglis J. Sexual dysfunction in stroke patients. Archive of Physical Medicine & Rehabilitation, 1986; 67: 19-22.
11. Jha S., Thakar R. Female Sexual dysfunction. European Journal of O & G and Reproductive Biology, 2010; 153: 117-123.
12. Thompson S.B., Walker L. Sexual dysfunction after stroke: underestimating the importance of psychological and physical issues. Webmed Central Physical Medicine, 2011; 1-12.
13. Monga T.N., Ostermann H.J. Sexuality and sexual adjustment in stroke patients. Phys Med Rehabil State Art Rev, 1995; 9: 345-359.
14. Rosenbaum T., Vadas D., Kalichman L. Sexual function in post-stroke patients: considerations for rehabilitation. The Journal of Sexual Medicine. 2014; 11 (1): 15-21.
15. Sjogren K., Fugl-Meyer A.R. Adjustment to life after stroke with special reference to sexual intercourse and leisure. J Psychosom Res, 1982; 26: 409-417.
16. Bo K., Bo K., Berghmans B., Morkved S. Evidence-based Physical Therapy for pelvic floor. Neurourol Urodyn, 2007; 22: 648-653.
17. Tibaek S., Gard G., Jensen R. Pelvic floor muscle training is effective in women with urinary incontinence after stroke. Journal of Department of Rehabilitation, 2004; 24: 348-357.
18. Portney L.G., Watkins M.P. Foundation of clinical research. In: Application to practice ed. 1., New Jersey; Upper Sadle River : 2009; 438-469.
19. Bamford J., Sandercock P., Dennis M., Burn J., Warlow C. Classification and natural history of clinically identifiable subtypes of cerebral infarction. Lancet, 1991; 337: 1521-1526.

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20. Rosen R., Brown C., Heimman J., Leiblum S., Meston C., Shabsigh R., Ferguson D., D'Agostino D. The female sexual function index (FSFI): A multidimensional self-report instrument for the assessment of female sexual function. Journal of Sex & Marital Therapy, 2000; 26: 191-208.
21. Preedy V.R. Handbook of anthropometry – physical measures of human form in health and disease. London: Springer, 2012;
22. Winter E.M., Jones A.M., Davidson RC., Bromley P.D., Mercer, T.H. Sport and Exercise Physiology Testing – Guidelines. London: Taylor & Francis, 2006;
23. Janssen I., Katzmarzyk P.T., Srinivasan S.R., Chen W., Malina R.M., Bouchard C., Berenson G.S. Combined influence of body mass index and waist circumference on coronary artery disease risk factors among children and adolescents. Pediatrics, 2005; 115 (6): 1623-1630.
24. Johnson K.G., Johnson D.C. Frequency of sleep apnea and TIA patients: A meta-analysis. J Clin Sleep Med, 2010; 6 (2): 131-137.
25. Fitzgerald M.P., Brubaker L. Variability of 24-hour voiding diary variables among asymptomatic women. J Urol, 2003; 169 (1): 207-209.
26. Rasmussen A., Mouritsen L., Dalgaard A., Frimodt-Moller C. Twenty-four hour pad weighing test: reproducibility and dependency of activity level and fluid intake. Neurourol Urodyn, 1994 ; 13 (3): 261-265.
27. Laycock J., Jerwood D. Pelvic floor training and incontinence.In:urinary incontinence. KPS; Cald Well, 1993;
28. Shah A.S., Kashanian M., Azari A. The effect of pelvic floor exercises on quality of life in women with stress urinary incontinence. The Bring knowledge Magazine, 2011; 15.
29. Dowd T.T., Campbell J.M., Jones J.A. Fluid intake and urinary incontinence in older community-dwelling women. J Community Health Nurs, 1996; 13 (3): 179-186.
30. Bryant C.M., Dowell C.J., Fairbrother G. Caffeine reduction education to improve urinary symptoms. Br J Nurs, 2002; 11 (8): 560-565.
31. Burgio K.L., Engel B.T., Locher J.L. Normative patterns of diurnal urination across 6 age decades. J Urol, 1991; 145: 728-731.
32. Blaivas J.G., Appell R.A., Fanti J. Standards of Efficacy for evaluation of treatment outcomes in urinary incontinence. Neurourol Urodyn, 1997; 16: 145-147.
33. Burney T.L., Senapati M., Desai S., Choudhary S.T., Badlani G.H. Effects of cerebrovascular accident on micturition. Urol Clin North Am, 1996; 23: 483-490.
34. Jha S., Thakar R. Female sexual dysfunction. Eur J Obstet Gynecol Reprod Biol, 2010; 153: 117-123.

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Conflict of interest:
The authors have declared no conflict of interest.

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