Tele-rehabilitation in women with stress urinary incontinence: a feasibility study

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ABSTRACT

Background: *Stress urinary incontinence is a serious widely spread condition that affects large number of women. After Covid -19 pandemic, health associations worldwide have released recommendations about care from distance using tools of communication and information technologies such as telehealth, and tele-rehabilitation. Purpose: This study aimed at investigating the feasibility of assessing stress urinary incontinence through tele-rehabilitation. Methods: A total of 124 women were selected from Kasr Al-Ainy women's health outpatient clinic with ages between 20 to 60 years, and a body mass index of 20.5 to 41.53 kg/m2. Stress urinary incontinence was evaluated by Urogenital Distress Inventory Short Form (UDI-6), an online- administered questionnaire and by in-person objective measuring of pelvic floor muscles' strength using the perineometer. Results: Regarding scores of UDI-6 questionnaire, the median (IQR) scores value was 11.5 (8 – 14). For the measurements of the perineometer examination, they ranged from 0 to 18 mmHg with a mean value (± SD) of 5.71 (± 3.02) mmHg. Results indicated a statistically significant negative correlation between the UDI-6 scores and pelvic floor muscle strength (P<0.001). Conclusions: Tele-rehabilitation can replace face to face assessment of pelvic floor muscle strength in women with SUI.*

Keywords: Questionnaire, Stress Urinary incontinence, Tele-rehabilitation, Women's Health.

INTRODUCTION

Stress urinary incontinence (SUI), defined as the involuntary, sudden loss of urine secondary to increased intra-abdominal pressure, affects around 15.7% of adult women, 77.5% of which report the symptoms to be bothersome and 28.8% report the symptoms to be moderate to severe. This condition negatively impacts the patient's quality of life. Complete resolution of SUI may not be feasible, rather, a combination of behavioral, pharmacological, and surgical treatment may be necessary [1].

Tele-rehabilitation is a valuable technology in linking clinicians with patients to ensure they make long-term lifestyle changes. Due to the pandemic caused by coronavirus disease 2019 (COVID-19), health associations worldwide have released recommendations about care from distance using tools of communication and information technologies. It has significant benefits for medical office staff. This many times eliminates the burden of patient check-in and concentrates on higher-value tasks. With online visit capability, clinicians may care for their patients while still potentially assisting other affected practices. Tele-rehabilitation minimizes the doctors' and patient travel around the globe and changes each sick person's life, ensuring that each sick person receives the appropriate health treatment [2].

Tele-rehabilitation in physical therapy could be comparable with in-person rehabilitation or better than no rehabilitation for conditions such as osteoarthritis, low-back pain, hip and knee replacement, and multiple sclerosis and in the context of cardiac and pulmonary rehabilitation [3].

Conducting better quality clinical trials and systematic reviews regarding telerehabilitation provides the best available evidence on the effectiveness of tele-rehabilitation to professionals, mainly physical therapists, which could impact the decision-making process and therefore yield better clinical outcomes for patients [3]. Therefore, this study was conducted to explore the feasibility of using telerehabilitation in assessing women with SUI, hypothesizing that it would be feasible.

MATERIALS AND METHODS

Study design and ethical approval

The present study was conducted as an observational feasibility study that received ethical approval from the Research Ethics Committee of the Faculty of Physical Therapy at Cairo University [No: P.T.REC/012/004346]. The study was conducted in the period from March 2023 to March 2024.

Participants and study settings:

The technique of convenience sampling was used to initially recruit women with SUI, who had leakage at least once/week from Kasr Al-Ainy women's health outpatient clinic, Giza, Egypt. Patients were diagnosed based on careful clinical evaluation by objective SUI tests[4] . Participants were considered suitable for sharing in the study based on the subsequent criteria for eligibility; age range from 20 to 60 years, body mass index (BMI) from 20.5 to 41.53 kg/m2, primiparous and multiparous women, medically stable and fully oriented patients. While pregnant women, women who underwent previous surgeries for treating SUI, women with neurogenic bladder or having any neurological disease with affected sensation of the legs/ lower abdomen, women who have any psychiatric disorder affecting the cognitive function and those with malignancy in the lower abdomen/ pelvis were excluded.

A hundred twenty-four females met the eligibility criteria and agreed to participate in the study. Study objectives and procedures were explained to each

participant before starting the study, and a consent form was signed by each participant. Also, they were informed that the data collected during study would be used for publication but in an anonymous form.

A data recording sheet was used to collect information regarding personal, past, obstetrical (number of births and mode of delivery), menstrual and present history, demographic data (age, weight, height, BMI), as well as SUI assessment variables (some questions to assess the magnitude and frequency of urine loss).

Evaluating tele-rehabilitation feasibility in the assessment of SUI

To explore the feasibility of telerehabilitation in women's health and specially among women having SUI, a questionnaire, Urogenital Distress Inventory Short Form (UDI-6), was sent via e-mail and/or Facebook and WhatsApp to each woman involved in the study. Then, after filling and receiving them back, responses from the form were compared with the results from clinical assessment, conducted by the objective digital perineometer.

The UDI-6 was used as an online-administrated questionnaire to assess the quality of life affected by SUI. It consists of 6 items: 1-frequent urination, 2-leakage related to feeling of urgency, 3-leakage related to activity, 4- coughing, or sneezing small amounts of leakage (drops), 5-difficulty emptying the bladder, and 6- pain or discomfort in the lower abdominal or genital area. Total score ranges from 0 to 100, with higher scores indicating higher distress and lower quality of life[5]. UDI-6 validation level according to intraclass correlation coefficients (ICC) grades is A, with ICC value of 0.98 demonstrating excellent intra-rater reliability [6] , and Cronbach's α of 0.99 (>0.9), confirming an excellent correlation between the different items [7].

An Arabic translated version of the questionnaire was used for the participants to be familiar with the questions[7]. The questionnaire was made in a google form to be answered by each participant. Their reply indicated whether they could determine their case of SUI and thus to detect feasibility of tele-rehabilitation in the detection and diagnosis of the condition.

After receiving all questionnaire forms, each woman attended the clinic for in-person objective reassessment of the pelvic floor muscles' condition with the perineometer. The Kegel perineometer was used in this study. It consists of a vaginal probe, connected to the perineometer's main body with an 80-cm plastic tube. When the probe is compressed, a pressure sensor measures the vaginal pressure in cm H2O. These vaginal pressure readings provide surrogate measures of PFM strength[8] . The perineometer was found to have good inter-rater reliability (ICC=0.72 – 0.91), intra-rater reliability (ICC=0.90 – 0.96), and validity[9].

After inserting the lubricated probe inside the vagina, each woman was asked to squeeze as hard as possible to evaluate the strength of pelvic floor muscles. Normally resting pressure value is approximately 5 mm Hg while the pressure with appropriately contracted pelvic musculature reaches an average of 15 mm Hg [10].

Statistical analysis:

The sample size was calculated using the G*Power software (version 3.0.10). Considering a power of 0.90, α level of 0.05 (two tailed) and Correlation pH1 of 0.3, pH0 of 0; a generated sample size of at least 112 subjects, adding 12 subjects (10% as drop out), so total sample size of 124 subjects was required.

Statistical analysis was done by SPSS v26 (IBM Inc., Chicago, IL, USA).

Shapiro-Wilks test was used to evaluate the normality of the data distribution. Quantitative parametric data were presented as mean and standard deviation (SD). Quantitative non-parametric data were presented as median and interquartile range (IQR). Qualitative variables were presented as frequency and percentage (%).

RESULTS

In the current study, a total of 124 women with SUI were participated in this study, and were included during the one year enrolment started from March 2023 to March 2024.All the demographic characteristics of the subjects are presented in Table 1.

Table 1: Demographic data of the studied patients

		N=124
Age (years)	**Mean ± SD**	40.9 ± 9.74
	Range	23 - 60
Weight (Kg)	**Mean ± SD**	84.4 ± 9.43
	Range	60 - 110
Height (m)	**Mean ± SD**	1.62 ± 0.05
	Range	1.5 - 1.8
BMI (kg/m^2)	**Mean ± SD**	32.06 ± 3.23
	Range	22.04 - 41.53
Job	**Retired**	3 (2.42%)
	Housewife	80 (64.52%)
	Office specialist	1 (0.81%)
	Education	1 (0.81%)
	Employee	5 (4.03%)
	Teacher	16 (12.9%)
	Accountant	1 (0.81%)
	Nurse	1 (0.81%)
	Bachelor of science	1 (0.81%)
	Specialist medical tests	1 (0.81%)
	Engineer	1 (0.81%)
	Social worker	1 (0.81%)
	E-Marketing	1 (0.81%)
	Doctor	11 (8.87%)
Number of birth	**Mean ± SD**	3.3 ± 0.95
	Range	1 - 6
Number of normal birth	**Mean ± SD**	1.49 ± 1.51
	Range	0 - 5
Number of caesarean birth	**Mean ± SD**	1.78 ± 1.32
	Range	0 - 5
Weight of a newborn (kg)	**Mean ± SD**	3.15 ± 0.53

	Range	2 - 4

Data are presented as frequency (%) or mean (± SD), BMI: Body mass index.

Furthermore, data about menstruation were collected and represented that the ranged age of menarch for the treated sample was 12-17, as presented in Table 2.

Table 2: Menstruation of the studied patients

		N=124
Did you have a miscarriage		38 (30.65%)
How old were you when the first time you menstruated (years)	**Mean ± SD**	13.81 ± 1.23
	Range	12 - 17
Is there still menstruation		99 (79.84%)
Are you in the end of menstrual period		24 (19.35%)
Have you stopped menstruating for a long time		18 (14.52%)

Data are presented as mean ± SD or frequency (%).

All patients leaked some urine droppers. Some of them leaked some urine droppers during coughing, they were 86 (69.35%).others were 117 (94.35%) who leaked some urine droppers while sneezing, and 68 (54.84%) women leaked some urine droppers while laughing, as presented in Table 3.

Table 3: Leakage of urine droppers of the studied patients

	N=124
Did you suffer from any health problems or have you had any operations in the past	42 (33.87%)
Do some urine droppers leak	124 (100%)
Does leakage occur during coughing	86 (69.35%)
Does leakage occur while sneezing	117 (94.35%)
Does leakage occur while laughing	68 (54.84%)

Data are presented as frequency (%).

The UDI-6 was the questionnaire which used as an online-administrated questionnaire to assess the quality of life affected by SUI. Frequency of urination was quite a bit in 33 (26.61%) women, somewhat in 22 (17.74%) women and moderately in 54 (43.55%) women. Urine leakage associated with a feeling of urgency was quite a bit in 52 (41.94%) women, somewhat in 20 (16.13%) women and moderately in 45 (36.29%) women. Urine leakage related to coughing, sneezing or laughing was quite a bit in 48 (38.71%) women, somewhat in 14 (11.29%) women and moderately in 56 (45.16%) women. As presented in Table 4.

Table 4: Questionnaire of UDI-6 of the studied patients

		N=124
Do you suffer from frequent urination	**Quite a bit**	33 (26.61%)
	Somewhat	22 (17.74%)
	Moderately	54 (43.55%)
Do you often experience urine leakage Associated with a feeling of urgency? this is a strong sensation of needing to go to the bathroom	**Quite a bit**	52 (41.94%)
	Somewhat	20 (16.13%)
	Moderately	45 (36.29%)
Do you usually experience from urine leakage related to coughing, sneezing or laughing	**Quite a bit**	48 (38.71%)
	Somewhat	14 (11.29%)
	Moderately	56 (45.16%)
Do you experience small amounts of urine leakage (that is. drops)	**Quite a bit**	60 (48.39%)
	Somewhat	15 (12.1%)
	Moderately	41 (33.06%)
Do you experience difficulty emptying your bladder (urinating)	**Quite a bit**	12 (9.68%)
	Somewhat	32 (25.81%)
	Moderately	34 (27.42%)
Do you usually experience pain or discomfort in the lower abdomen or genital region	**Quite a bit**	11 (8.87%)
	Somewhat	51 (41.13%)
	Moderately	43 (34.68%)

Data are presented as frequency (%).

The median (IQR) of Score of the UDI-6 questionnaire was 11.5 (8 – 14).

The result of the perineometer examination ranged from 0 to 18 mmHg with a mean value (± SD) of 5.71 (±3.02) mmHg.

There was negative correlation between result of the perineometer examination and (score of the UDI-6 questioner) (P value<0.001), as it presented in Table 5 and figure 1.

Table 5: Correlation between result of the perineometer examination and (score of the questioner)

	r	P value
Score of the questionnaire UDI-6	-0.485	**<0.001***

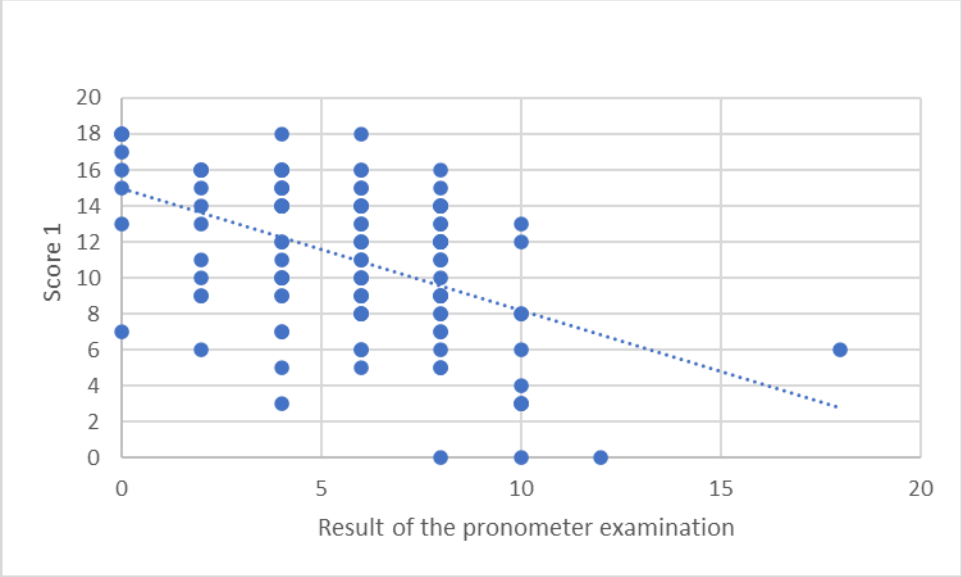

Figure 1: Correlation between result of the perineometer examination and the score of the questioner.

DISCUSSION

One of the most applied fields of telemedicine in the last decade is tele-rehabilitation that involves using telecommunication technologies [11]. The current study aimed to investigate if tele-rehabilitation, in the form of UDI-6 online questionnaire, can replace face to face assessment for women with SUI. The study results revealed a significant negative correlation between the UDI-6 scores and the measurements of pelvic floor strength taken by the perineometer, meaning that the higher the score of the questionnaire that indicates more severe condition, the lower the grade of the perineometer indicating more weakness of pelvic floor muscles. Thus, tele-rehabilitation results through UDI-6 online questionnaire corresponded to that of the objective face to face assessment by the perineometer.

The same results were observed in a review by Cottrell et al. [12], in which real-time tele-rehabilitation for musculoskeletal conditions was reported to improve physical function and pain, making it effective and comparable to conventional methods. Although more evidence is needed to establish care standards, studies have indicated that tele-rehabilitation is as efficient as face-to-face care in terms of assessment [12] and this is agreement with the findings of the current study. Our findings were also consistent with those of Da Mata et al.[13], whose data showed that women who received the intervention remotely presented significant improvement in their symptoms, such as reducing the number of incontinence episodes and voiding frequency, improving PFM strength and improving quality of life compared to

women who had the face-to-face assessment and treatment. Another study by Chumbler et al. [14] has considered the effectiveness of tele-rehabilitation on improving in the quality of life in stroke patients who used tele-rehabilitation.

Strengths, Limitations and implications

The current study presents a new way to assess cases with SUI remotely, this study has a strength of being the first study up to the author's knowledge to assess the feasibility of applying tele-rehabilitation in women's health among Egyptian females. Yet, this study had some limitations in terms of the socio-cultural barriers to fill the online questionnaire. Further studies are needed to validate the current study results and take it to the next step for rehabilitation. Other studies may be conducted on tele-rehabilitation for other pelvic floor dysfunction conditions (e.g., genital prolapse, vaginismus). Moreover, exploring the feasibility of tele-rehabilitation in managing women's health conditions would be beneficial.

Conclusion

Through this research, the core Conclusion
Tele-rehabilitation can facilitate effective delivery of health services, particularly, physical therapy in women's health, and can replace face to face assessment in women with SUI for better patients' compliance.

Abbreviations:
Body mass index (BMI). Intraclass correlation coefficient (ICC). Pelvic floor muscle (PFM).

Stress urinary incontinence (SUI). Urogenital Distress Inventory short form (UDI-6).

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Conflict of Interest
The authors declare no potential conflicts of interest.

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