

## The effect of pelvic floor exercises in the treatment of genuine urinary stress incontinence in women at two hospitals

S. M. HENALLA, P. KIRWAN, C. M. CASTLEDEN, C. J. HUTCHINS,  
A. J. BREESON

**Summary.** The results of the pelvic floor exercises for the treatment of genuine stress incontinence of urine were compared between two different hospitals geographically 50 miles apart. A perineal pad weighing test was used to assess the quantity of urine lost during exercise before and after treatment. A similar percentage of patients in the two studies responded to treatment and became either completely dry or significantly improved at the end of 3 months interval; 69% at LCH and 65% at LGH. Overall, 67% of patients achieved complete continence or a significant improvement as a result of pelvic floor exercises alone.

Stress urinary incontinence is the commonest form of female incontinence. Treatment has varied between conservative management with various forms of physiotherapy (Brown 1977) to a variety of surgical procedures (Stanton & Cardozo 1979). Previous reports have shown different success rates for treatment of stress urinary incontinence by pelvic floor exercises since Kegel (1951) introduced this idea. It is widely believed among clinicians that various

forms of physiotherapy are useful in treatment for genuine stress incontinence in selected patients (Wilson 1984). However, Jones (1963) suggested that the majority of women achieve continence when pelvic floor exercises alone were the primary treatment. Montgomery & Shepherd (1983) and Harrison (1983) noted that success following pelvic floor exercises depended on the instructor's enthusiasm and knowledge and on the patient's co-operation and motivation. In some series good results were achieved after 4 weeks of treatment with pelvic floor exercises (Castleden *et al.* 1984).

The aim of the present study was to assess, by objective means, the value of pelvic floor exercises in the treatment of urinary stress incontinence. We have compared the results in the two different hospitals from patients who were treated by two different physiotherapists in order to assess the reproducibility of such treatment. The perineal pad weighing technique was used to assess the severity of the condition and the response to the treatment provided. This was originally described by Caldwell (1974) and subsequently tested by Sutherst *et al.* (1981). Its reproducibility has been assessed by Christensen *et al.* (1984) and Mundt-Petterssen *et al.* (1984). A slight modification of this technique was used

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**Leicester General Hospital, Leicester LE5 4PW**  
**Department of Obstetrics and Gynaecology**

S. M. HENALLA *Lecturer*  
P. KIRWAN *Senior Lecturer*

**Department of Geriatrics**  
C. M. CASTLEDEN *Professor*

**Department of Obstetrics and Gynaecology, George Eliot Hospital, Nuneaton**  
C. J. HUTCHINS *Consultant*

**Department of Obstetrics and Gynaecology, Lincoln County Hospital, Lincoln**  
A. J. BREESON *Consultant*

Correspondence: Mr S. M. Henalla, Senior Registrar, Department of Obstetrics and Gynaecology, The Jessop Hospital for Women, Leavygreave Road, Sheffield S3 7RE

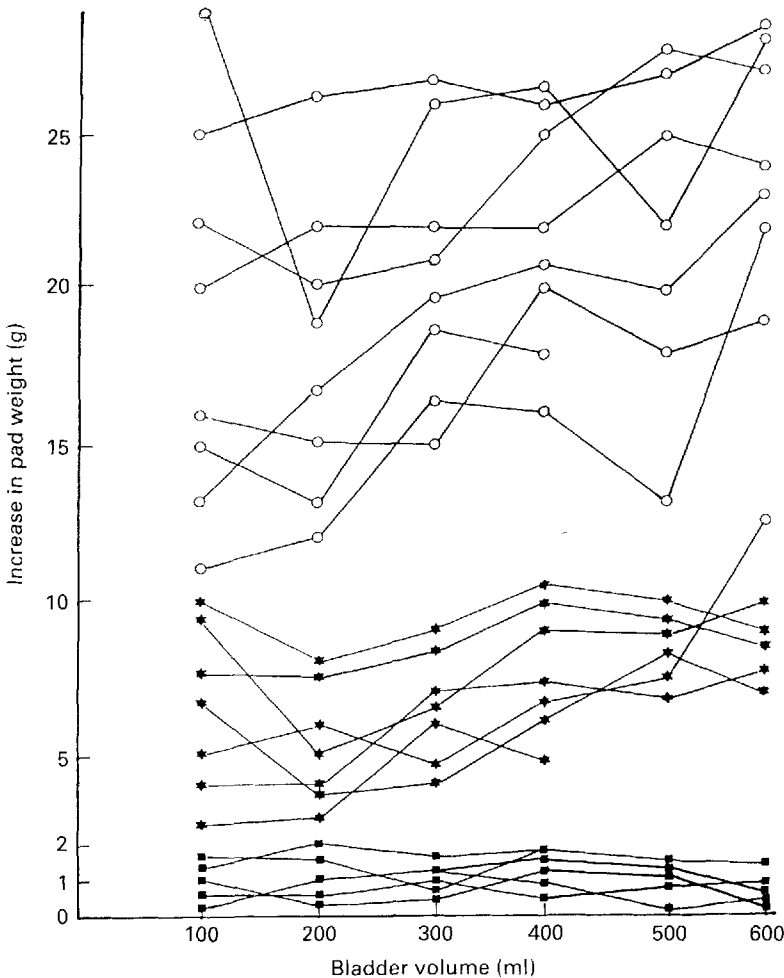
in the present study and its reproducibility has been assessed (Fig. 1).

**Patients and methods**

The two studies were conducted at Lincoln County and Leicester General Hospitals. The first study conducted at Lincoln County Hospital was in the form of a pilot study. Forty-nine consecutive women with incontinence problems were considered. Five were lost to follow-up and 12 had detrusor instability, the other 32 patients had urodynamically proven genuine stress incontinence. They had a mean age of 46 years (range 27-77 years) and entered our first study. The second study was conducted at Leicester General Hospital. This was a randomized con-

trolled study which included 104 patients. These patients were allocated at random to four different groups. The first group of 26 patients received a course of pelvic floor exercises for 3 months. The results of treatment in this group were compared with the results obtained in the first study. The other three groups form a part of another randomized controlled study and are not considered in this paper.

Patients who entered the two studies had the same routine filling and voiding cystometry, urethral pressure studies as well as fluid bridge test before their enrolment in these two studies. All these patients had a normal detrusor pressure profile at rest and on stress. Perineal pad weighing test was performed to quantify the amount of urine loss during defined domestic



**Fig. 1.** Reproducibility of pad weighing test in 20 patients complaining of urinary stress incontinence: ■, mild; \*, moderate; ○, severe.

**Table 1.** Exercise programme for pad testing

1. Washing hands × 10 times
2. Walking around the ward for 5 min
3. Picking up objects × 10 times
4. Lifting two sandbags 8lb each × 10 times
5. Squatting × 10 times
6. Climbing up stairs × 2 times (two floors)
7. Stretching abdominal muscles × 10 times
8. Jumping up and down × 10 times
9. Jumping and coughing × 10 times
10. Coughing while pushing down × 10 times

and stressful exercises (Table 1). Patients were asked not to pass urine from 4 h before test, as it has been shown previously that bladder volume has only a small influence on the amount of urine loss (Sutherst *et al.* 1984). The exercise programme which was used was accepted by all patients. Each pad was weighed before and after exercise to determine the amount of urine loss, and the urine volume passed on completion of the programme was measured. The degree of stress incontinence was graded as mild (urine loss at all exercises <2 ml), moderate (maximum urine loss at one exercise 2–10 ml) and severe (urine loss >10 ml). The 32 patients in the first study and the 26 patients in the second study were seen by two different physiotherapists in the two different hospitals but they were assessed by the same investigator. The two groups of patients were comparable regarding their age, weight, parity, and the severity of incontinence (Table 2). After a simple description of the pelvic floor muscles, the physiotherapist taught the patient to contract the correct muscles. This was achieved by asking the patient

to insert into her vagina the index and middle fingers of her right hand. Both fast and slow types of contractions were practised. The fast contractions were performed in time as the patient said: contract-relax, contract-relax. The slow contractions were sustained for between 3 and 4 s, with the patient counting up to 5. Equal numbers of fast and slow contractions were performed in each session. The frequency of the exercise sessions was increased gradually until they were performed hourly during the day. Each session lasted up to 10 min at any one time depending on the response of the patient to the exercise. The patients were supervised carefully by a particular physiotherapist with a special interest in incontinence in the relevant hospital. Both physiotherapists performed vaginal examinations, using the index and middle fingers, while the patient was lying on her back for weekly assessment.

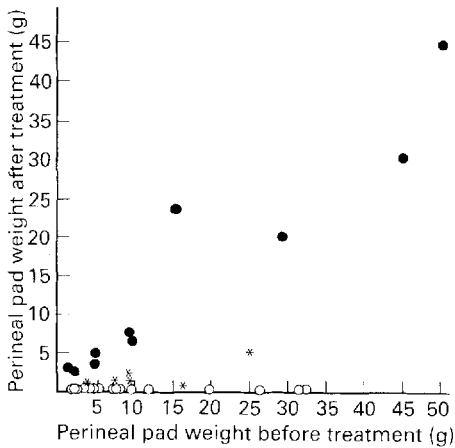
Full clinical assessment and pad testing with the same volume of fluid as the initial test in the bladder were repeated after treatment was completed.

## Results

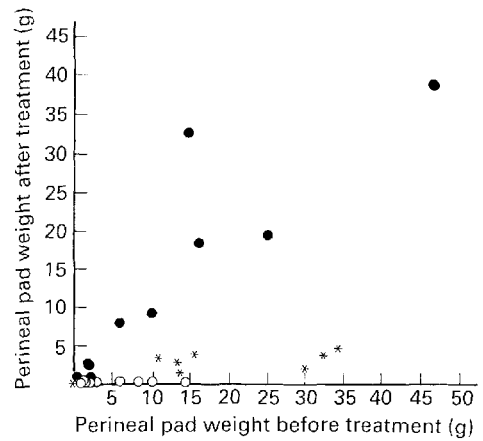
Figures 2 and 3 show the pad weight changes after treatment with pelvic floor exercises at the two hospitals. The  $\chi^2$ -test was used to assess the influence of age, the severity of the condition and the duration of symptoms on the response rate after pelvic floor exercise treatment in both studies (Table 3). Neither the severity of the condition nor the patient's age had a significant effect on the treatment results, but the treatment

**Table 2.** Age, weight, parity, and severity of incontinence in the two groups of patients treated with pelvic floor exercises at Lincoln County (LCH) and Leicester General Hospital (LGH)

Variables	LCH (n = 32)	LGH (n = 26)
Age (years)		
Range	27–77	26–74
Mean (SD)	46.2 (12.5)	45.9 (10.9)
Weight (kg)		
Range	51–102	50–81
Mean (SD)	66.1 (13.0)	65.2 (7.9)
Parity		
Range	0–4	1–6
Mean (SD)	2.2 (1.1)	2.8 (1.5)
Severity of incontinence		
Mild	8	8
Moderate	13	7
Severe	11	11



**Fig. 2.** Effects of exercise treatment on urine loss measured by perineal pad weighing test. ○, cured; \*, improved; ●, failed. (Lincoln County Hospital.)



**Fig. 3.** Effects of exercise treatment on urine loss measured by perineal pad weighing test. ○, cured; \*, improved; ●, failed. (Leicester General Hospital.)

was more effective with a shorter duration of symptoms (<1 year) ( $P<0.05$ ). Similar results were obtained in the two studies. Table 3 shows a comparison between the duration of stress incontinence in the two groups of patients treated with pelvic floor exercises at the two hospitals.

**Discussion**

In the two studies we have attempted to assess objectively the effect of pelvic floor exercises for the treatment of pure stress incontinence. The

pad weighing technique was used for grading the severity of incontinence as it is simple, inexpensive and proved to be fairly reproducible. We have tested the reproducibility and accuracy of our pad weighing technique with gradual increasing amounts of bladder volume in 20 patients with different grades of stress incontinence (Fig. 1). The two studies show that pelvic floor exercises are an effective conservative method for treating genuine stress incontinence of urine.

Overall, 58 patients with genuine stress incontinence were treated with pelvic floor re-educ-

**Table 3.** Effect of age, severity and duration of symptoms on response to treatment with pelvic floor exercises in patients with urinary incontinence at two hospitals

Variable	Lincoln County Hospital		Leicester General Hospital	
	Cured/improved (n = 22)	Unchanged (n = 10)	Cured/improved (n = 17)	Unchanged (n = 9)
Age (years)				
26-39	8	2	5	3
40-60	10	6	10	6
>60	4	2	2	—
Degree of incontinence				
Mild	6	2	5	3
Moderate	9	4	5	2
Severe	7	4	7	4
Duration of symptoms (years)				
<1	13*	2	8*	2
1-3	7	3	6	1
>3	2	5	3	6

The treatment was significantly more effective after the shortest duration of symptoms \* $P<0.05$   $\chi^2$ -test.

cation by a simple exercise regimen and 67% showed improvement or complete relief after 3 months. Similar results were achieved at the two hospitals (Figs 2 & 3) although two different physiotherapists were involved. Neither age nor the severity of the condition should influence the selection of patients for pelvic floor exercises. From Figs 2 and 3 it appears that there was a higher proportion with complete relief of incontinence at the District General Hospital (50%) than at the Central Regional Hospital (35%). This observation could not be explained by the patients' ages, weights, parity, severity of incontinence or previous history. However, this may be due to the difference between the two groups in the duration of their incontinence and the nature of their recruitment to both studies. A certain number of patients seen at Lincoln County Hospital were recruited via an advertisement on the local radio. This may explain why a larger percentage of these patients had a shorter duration of symptoms than those treated at the Leicester General Hospital. There is no associated morbidity with this method of treatment in comparison with surgery. The physiotherapist should be experienced in this particular field and should be able to examine the patient vaginally at each attendance to ensure that pelvic floor exercises are undertaken in the correct manner.

About one third of the patients in both studies failed to respond to physiotherapy. Some of these women did not perform the exercises conscientiously and were poor attenders and so may be considered patient rather than method failures. However, some women with stress incontinence are not helped by exercises and this is the group for whom surgery must be considered.

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