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THE VALUE OF EXERCISES IN THE TREATMENT OF LOW BACK PAIN*

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SUMMARY

The results of treatment with short-wave diathermy were compared with those achieved by short-wave diathermy combined with back extension or lumbar isometric flexion exercises in 43 patients with back pain. Subjects were relatively young and normally engaged in sporting activities. Marginally more patients improved amongst those receiving extension exercises. Significant reduction of pain and increase of spinal flexion occurred with each treatment and the periods taken to resume work or sport were similar in each group. Neither exercise regime appeared to have a major influence on recovery. Isometric flexion exercises did not seem to be more beneficial for those with a prominent lumbar lordosis.

Low back pain in the community at large is very common. In the absence of identifiable pathology, management tends to be empirical. This is reflected by the results of a national survey which indicated that a wide spectrum of treatments is currently employed for this disorder (Anderson, 1978). The treatment of first choice in the majority of physiotherapy departments was back extension exercises. Other exercise programmes were employed more frequently than corsets, traction or manipulation. Short-wave diathermy was almost as popular a choice of treatment as extension exercises.

The prevalence of back pain may be particularly high amongst those who pursue athletic interests (Smith, 1977). Amongst this relatively young and fit population, exercises might seem an obvious approach to low back pain. However, despite their widespread use, there have been few attempts to assess their relative merits. We have examined the influence of two distinct exercise regimes on the recovery of subjects who presented with low back pain and who normally engaged in sport.

SUBJECTS AND METHODS

Patients of any age were admitted to the study if low back pain interfered with the performance of their usual sporting activities. Eligibility was confined to those with symptoms of more than three weeks' but less than six months' duration, who had not previously undergone physical treatment and whose symptoms were not obviously improving at the time of presentation. Those with signs suggesting nerve root compression or with radiological evidence of lumbar disc degeneration were excluded as were those with evidence of spondylolysis on oblique spinal radiographs.

Subjects were distributed randomly amongst three treatment groups which were stratified for age and duration of symptoms. These comprised short-wave diathermy (SWD) to the lumbosacral spine; back extension exercises combined with SWD and lumbar isometric flexion exercises with SWD. Extension exercises were conducted with patients lying prone and raising their trunks (Gardiner, 1964) and isometric flexion

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exercises were performed in the manner described by Hume Kendall and Jenkins (1968*a*). Treatments were continued for a four-week period under the supervision of the same physiotherapist (L.T.).

Assessments were made by a single observer who was unaware of the treatment allocations. Pain was measured on a visual analogue scale (Huskisson, 1974) and the range of lumbar-spine flexion was measured by the method of Macrae and Wright (1969). It has been suggested that isometric flexion exercises are especially beneficial for patients with a prominent lumbar lordosis (Hume Kendall and Jenkins, 1968*a*). The depth of lordosis was therefore evaluated by placing a flexible ruler against each lumbosacral spine, tracing the spinal impression on graph paper and then measuring the maximum depth of the concavity. The time taken for subjects to resume normal work and sporting activities was recorded. Assessments were performed before, then after two and four weeks of treatment. Where appropriate, results were compared statistically using the chi-square test and the Wilcoxon signed rank test for paired observations.

RESULTS

Forty-seven patients were admitted to the study but four failed to attend for regular assessment, two because of improvement soon after beginning treatment and two were lost to follow-up. The clinical details of the 43 patients available for evaluation over four weeks are listed in Table I. The treatment groups were well matched for sex, age and duration of symptoms.

The number of subjects reporting relief of pain is illustrated in Table II. It is noteworthy that three patients were initially made worse by flexion exercises. One was

TABLE I

DETAILS OF 43 PATIENTS WHOSE ASSESSMENTS WERE COMPLETED OVER FOUR WEEKS

Treatment	SWD	SWD/Extension exercises	SWD/Isometric flexion exercises
No. of patients (sex)	15 (11M : 4F)	14 (9M : 5F)	14 (12M : 2F)
Mean age (range)	24 (16–36)	27 (17–40)	25 (15–45)
Mean duration symptoms ±s.d. (weeks)	12±8.4	18.5±9	13.5±8.7

TABLE II

NUMBERS OF PATIENTS WITH PARTIAL OR COMPLETE RELIEF OF PAIN AFTER TWO AND FOUR WEEKS OF TREATMENT

	Treatment					
	SWD		SWD/Extension exercises		SWD/Isometric flexion exercises	
	Weeks		Weeks		Weeks	
	2	4	2	4	2	4
Improved	8 (53%)	10 (66%)	11 (78%)	13 (93%)	7 (50%)	12 (86%)
Recovered	3 (20%)	6 (40%)	5 (36%)	9 (64%)	4 (28%)	8 (57%)
Worse	1 (7%)	1 (7%)	0	0	3 (22%)	1 (7%)
Unchanged	6 (40%)	4 (27%)	3 (22%)	1 (7%)	4 (28%)	1 (7%)

withdrawn from treatment but the others improved after continued therapy. The percentage of patients with improved symptoms was largest in the group receiving extension exercises but no statistically significant differences emerged between the treatments in this respect. On concluding the study, complete remission of symptoms was seen most frequently in those given extension exercises and was least in those receiving SWD alone ($\chi^2 = 1.71$; N.S.). Significant improvements of pain, and of spinal flexion were observed in each treatment group by the fourth week (Table III).

TABLE III

MEAN (±S.D.) MEASUREMENTS OF PAIN SCORE, RANGE OF FLEXION AND LUMBAR LORDOSIS AT EACH ASSESSMENT AND NUMBER OF PATIENTS WITH PRONOUNCED LUMBAR LORDOSIS AND THEIR RESPONSE TO TREATMENT

Treatment	SWD			SWD/Extension exercises			SWD/Isometric flexion exercises		
	Weeks			Weeks			Weeks		
	0	2	4	0	2	4	0	2	4
Visual analogue pain score (mm)	8.7 ±3.3	6.0 ±5.1	3.7 ±5.4*	11.2 ±4.4	5.0 ±6.0	1.8 ±3.6*	7.3 ±3.2	5.8 ±5.2	1.3 ±2.2*
Range of flexion (cm)	3.9 ±1.4	4.9 ±1.6	5.2 ±1.6†	3.6 ±1.5	4.5 ±1.3	4.9 ±1.1†	4.1 ±0.9	4.8 ±0.7	5.1 ±0.9*
Depth of lordosis (cm)	1.6 ±0.4	1.6 ±0.4	1.7 ±0.4	1.8 ±0.6	1.6 ±0.6	1.7 ±0.7	1.8 ±0.6	1.6 ±0.6	1.6 ±0.6
Lordosis >2 cm: total number			5			4			6
number with complete relief			3			3			3

* $P<0.05$; † $P<0.01$ (measurement at 4 weeks compared with pre-treatment values)

There were no significant alterations of the mean depth of lumbar lordosis after any of the treatments. The response of 15 patients with a pronounced lordosis (>2 cm) was similar for each of the treatments (Table III).

TABLE IV

NUMBER OF PATIENTS UNABLE TO WORK OR PLAY SPORT AND THE AVERAGE TIME TAKEN FROM THE COMMENCEMENT OF TREATMENT BEFORE RESUMPTION OF NORMAL ACTIVITIES

Treatment	SWD	SWD/Extension exercises	SWD/Isometric flexion exercises
Number unable to work	5	2	3
Average and range of time taken before resumption of work (weeks)	2 (1–3)	2	4 (2–6)
Number unable to play sport	10	11	9
Average and range of time taken before resumption of sport (weeks)	4 (2–6)	4 (2–10)	5 (2–12)

On entrance to the study, 10 patients were unable to work and 30 were unable to pursue their normal sport. All were able to resume normal work and leisure activities after intervals which were similar for each treatment group (Table IV).

DISCUSSION

Back pain is common amongst athletes (Smith, 1977) and may be a source of long-term disability (Billings *et al.*, 1977). It is likely that the underlying pathology is as heterogeneous as that seen in the nonathletic population with the probable exception that spondylolysis is a more frequent finding (Billings *et al.*, 1977). Treatment is most arbitrary when the cause of symptoms can only be surmised and it is this group of patients which comprises a large segment of the backache population. It is to such patients that we confined our study.

It is paradoxical that while recent reviews of back pain management have referred only briefly to the role of exercises (Mathews, 1977; Mooney and Cairns, 1978) these forms of treatment are employed more frequently than any other (Anderson, 1978). Indeed, a vivid programme of extension and flexion exercises has been advocated for athletes with back pain (Smith, 1977). Despite the popularity of exercises, their usefulness has not been proven.

The current study demonstrated that partial and complete relief of pain was achieved in more patients who underwent SWD combined with exercises than SWD alone but the differences were not significant. More of those who received back extension exercises experienced pain relief than those who performed isometric flexion exercises. Three patients were initially made worse by the latter treatment and one of these was withdrawn from the study. These observations are in marked contrast to those of Hume Kendall and Jenkins (1968*a*) who claimed significantly greater benefit from lumbar isometric flexion compared with back extension exercises. Their study was conducted on a similar number of subjects but no clinical details were provided and it is possible that they examined an entirely different spectrum of back pain from that studied by us. The same authors suggested that isometric flexion exercises were particularly useful for those with an accentuated lumbar lordosis (Hume Kendall and Jenkins, 1968*b*) but we could not find evidence to support this view nor was the depth of lordosis appreciably altered by flexion exercises.

Arguably, the small differences between treatment groups might have achieved statistical significance in a study of larger numbers. Nevertheless, significant and similar degrees of improvement were recorded in the mean measurements of pain (visual analogue scale) and spinal flexion in all three treatment groups. Furthermore, although complete relief of pain was obtained in approximately only 50% of patients, all were able to resume their usual activities after similar intervals of time. Thus, neither exercise regime appeared to have any major influence on overall recovery, compared with SWD alone. In the absence of a placebo treatment we cannot entirely exclude that the improvements which we measured merely reflected the natural history of the disease. This possibility does not invalidate the conclusions of our study which attempted to determine whether exercises could contribute to the improvement of back pain in the context of young patients with symptoms of relatively short duration.

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