

# Two different techniques in the rehabilitation treatment of low back pain: a randomized controlled trial

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**Aim.** The Back School is a widely accepted and effective method for treating low back pain, whereas no scientific evidence exists about the effects of the Pilates CovaTech method. With this study we wanted to evaluate the efficacy of this new method in patients with low back pain.

**Methods.** Fifty-three patients with at least 3 months of nonspecific low back pain were entered into a Pilates therapy or a Back School treatment group, 43 of which completed the study. Small exercise groups of 7 patients each followed a daily kinesitherapy protocol for 10 days. Evaluations were performed at the start of the study and then at 1, 3 and 6 months after the beginning of treatment. We used the Oswestry Low Back Pain Disability Scale (OLBPDQ) to assess disability and the visual analog scale (VAS) to evaluate pain.

**Results.** Demographic and baseline clinical characteristics were similar for both groups. A significant reduction in pain intensity and disability was observed across the entire sample. The Pilates method group showed better compliance and subjective response to treatment.

**Conclusions.** The results obtained with the Pilates method were comparable to those achieved with the Back School method, suggesting its use as an alternative approach to the treatment of non specific low back pain.

Key words: **Low back pain - Pain - Rehabilitation.**

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Chronic low back pain is a recurrent idiopathic disorder: up to 80% of all Americans are thought to have suffered from back pain at some stage in their lives.<sup>1</sup>

Current guidelines for treating chronic low back pain recommend optimizing spinal functionality, correcting posture and teaching patients to self-manage symptoms as the condition can easily become recurrent or chronic. The first step to a healthier back is a visit to the family physician, who often represents the initial interface for patients with chronic low back pain, or consultation with a specialist.

The most effective treatments are multidisciplinary in approach,<sup>2-23</sup> one popular and proven technique is the Back School method.<sup>12-14, 22</sup>

While Back School techniques vary in detail, they all share the same general principles. In this study we refer to a rehabilitation procedure developed from the Back School method.

Following its introduction in Italy some years ago, the Pilates method has increasingly been applied to enhance body aesthetics and therapeutic benefits. In countries such as Australia it has been known for over 30 years, and numerous scientific studies have demonstrated its usefulness.<sup>24-26</sup> In Italy a specific rehabilitation method derived from the original Pilates method is the Pilates CovaTech, taken from the name

of the therapist who invented it. To date, no scientifically significant evidence has shown whether the method is effective.

To fill this gap, we decided to carry out a controlled study with a view to discovering whether the Pilates CovaTech method is a valid rehabilitative treatment for chronic low back pain. We also compared it with the Back School method to ascertain whether the method is freely accessible and easily adaptable to the National Health Service.

### Materials and methods

From October 2003 to March 2004 we recruited 53 patients of both sexes (mean age, 50.08 years; mean age of males 49, mean age of females 50.65; range, 20-65) receiving treatment for chronic low back pain without radicular symptoms at the outpatient departments of the G. Pini Orthopaedic Institute.

Inclusion criteria were: chronic low back pain without peripheral irradiation for at least 3 months; neurological values within the normal range; negative Lasègue's test, SLR test and Wassermann's test. Exclusion criteria were: clinical history of spinal surgery; neurological values outside the normal range; radicular pain with positive Lasègue's and Wassermann's signs and SLR test; structural deformities such as spondylolisthesis; stenosis of the vertebral channel; computed tomography (CT) or nuclear magnetic resonance (NMR) documented disk hernia; rheumatoid arthritis or other rheumatologically related pathologies; conditions unrelated to the spinal column that mimic lumbalgic symptoms.

Candidates not meeting the inclusion criteria were considered ineligible for entering the study.

During the first session, patient information was collected, including occupation, daily working hours, prevailing body position at work, whether or not heavy objects were lifted at work or at home, how the patient traveled to and from work and the duration of the journey, with a view to revealing occupational risk factors.<sup>27-34</sup> At-risk occupations were defined as: residential cleaner, housewife, assembly-line operator, mechanic, air-conditioning fitter and any other occupation in which the spinal column is subject to constant functional overloading. The patient's medical history was examined for exclusion and inclusion criteria, as well as other chronic low back pain risk fac-

tors such as cigarette smoking, daily amount coffee intake and number of pregnancies.<sup>35-38</sup>

The clinical examination looked for signs that could constitute inclusion or exclusion criteria. Two pain assessment questionnaires were administered: the visual analog scale (VAS) and the Oswestry Low Back Pain Disability Questionnaire (OLBPDQ).

Kinesitherapy using the one or the other method was conducted in 10 consecutive sessions, each lasting about 1 h, in small exercise groups of up to 7 patients each led by a rehabilitation therapist trained in the Back School and by another trained in the Pilates CovaTech method. After completing a cycle of 10 sessions, the patients were given booklets for continuing at home the exercises they had learnt.

The study sample was divided into 2 kinesitherapy groups: 22 patients were assigned to the group using a protocol based on the classical principles of the modern Back School; 21 were assigned to the group following an experimental rehabilitation protocol based on the principles of the Pilates CovaTech method.

The patients gave their consent to participating in an experimental study but did not know whether they were in the experimental treatment group or the comparison group. The physiotherapists supervising the group kinesitherapy sessions did not disclose the type of treatment to the patients.

Two different physicians performed the pretreatment medical and the control follow-up examinations. After undergoing the pretreatment examination, the patients proceeded to the appointments office where they were divided into the 2 groups by the appointments clerk, depending on the times of day they chose for their treatment session. In this way, neither of the two physicians knew which type of treatment the patient had been assigned to nor did the specialist who performed the post-treatment clinical examinations.

At 1 month after the start of treatment the first control visit entailed administration of a clinical examination, evaluation of pain and disability rated with the VAS and OLBPDQ tools, and rating of acceptance of treatment by asking the patients if they were very satisfied, satisfied, neutral or dissatisfied and if they thought they had gained much, little or no benefit from the treatment.

During the follow-up visits at 3 and 6 months the examinations were repeated, and treatment continuity was investigated by asking the patients whether

they had managed to do exercises at home and, if so, how often. During the final control at 6 months, the patients were asked whether they had experienced any relapses, if so, whether these had caused absences from work, and whether they had sought advice from other specialists.

#### *Evaluation scales*

To evaluate pain symptoms, we chose the VAS. This comprises a 10-cm long horizontal line with the wording “no pain” at one end and “intolerable pain” at the other. Patients were asked to indicate their pain level by placing a mark along this horizontal line. The result was then indicated with a number from 0 to 10, given that the horizontal line is 10 cm long.

This scale was chosen because of its reproducibility and reliability in monitoring the progress of pain of individual patients. We bore in mind, however, that this kind of scale loses its precision and validity when used to compare pain in different patients, which is not unexpected since evaluation of subjective pain clearly varies from patient to patient.<sup>39</sup>

To evaluate the disability caused by pain symptoms, we used the OLBPDQ, which is particularly useful when repeating the test, as done in the 6 month follow-up.<sup>39, 40</sup>

The Oswestry Scale Italian version is held to be accurate by the Gruppo di Lavoro Ortopedia Basata sulle prove di Efficacia (GLOBE: [www.globeweb.org](http://www.globeweb.org)), which provides the Italian version used in this study. Moreover, according to the guidelines for the diagnosis and correct surgical treatment of lumbar herniation,<sup>41</sup> issued in October 2005 by the International Programme for Guide Lines of the World Health Organization, the OLBPDQ is indicated as useful clinical advice, and the recommended Italian version is the same one provided by GLOBE.

The questionnaire is divided into 10 sections, each comprising 6 different parts; the sections concern pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sexual activity, social life and traveling. For each section, subjects must choose 1 of 5 statements that best describe their situation. Depending on the statement chosen, a score from 0 to 5 is given and then added up to make the total scores for each section.

The questionnaire has the advantage of being fairly simple and, therefore, suitable for being filled in by the patients themselves, thus saving a considerable amount of the specialist's time.

In 1980, Fairbank *et al.* interpreted the results that could be obtained from this questionnaire as follows: 0 to 20 minimal disability; 20 to 40 moderate disability; 40 to 60 severe disability; 60 to 80 crippled and 80 to 100 bed-bound.<sup>40</sup>

#### *Rehabilitation protocol based on the Back School method*

This rehabilitation program, which is very similar to the one normally used at our institute in group kinesiotherapy for patients with chronic low back pain, was slightly modified to render it comparable with the rehabilitation protocol developed for the Pilates CovaTech method. During each session, patients performed all the exercises listed in the protocol, except for similar ones. In this case, the choice of one variant over another was left to the therapist's discretion.

The protocol includes postural education exercises, respiratory education, muscular extension and strengthening exercises of the paravertebral muscles and lower limbs, mobilizing exercises for the spinal column and antalgic postures. During each treatment session the therapist taught the patients some theoretical notions in the anatomy and pathology of the spinal column and in the principles of postural education.<sup>42, 43</sup>

#### *Rehabilitation protocol based on the principles of the Pilates CovaTech method*

This rehabilitation program follows the basic principles of the Pilates method.

The protocol comprises a program of exercise modules that make it easier to adapt the exercises to the requirements of each patient in each group. This method also enables patients to memorize the exercises and remember their function and utility in specific cases of pain. Our protocol comprised 9 modules: postural education, search for neutral position, sitting exercises, antalgic exercises, stretching exercises, proprioceptivity improvement exercises, breathing education, mobilization of the cervical rachis and the scapula-humeral joint, and theoretical explanations. As was done in the Back School group, the physiotherapist explained the exercise rationale during the treatment session.

For purely practical reasons, we used only the basic level exercises of the Pilates CovaTech “Mat4me” program because following a complete 3-level program

(basic, intermediate and advanced) would have required far longer than 10 sessions of treatment.<sup>26, 44</sup>

*Statistical analysis*

Statistical analysis was performed using the SPSS 5.0 (SPSS INC., Chicago, Ill.). ANOVA was used to test the distribution of epidemiologic parameters such as age, sex, and occupational risk factors.

This test showed that the statistical significance of the differences between the groups was between 0.527 and 0.342, so both groups can be defined as homogeneous.

The  $\chi^2$  test was used to determine the distribution of patients with occupational risk factors. The result was 0.902, with a statistical level of significance of 0.342, so both groups can be defined as homogeneous for this variable.

The intercalary measurement obtained with VAS and OLBPDQ and the results of the other questionnaires were analyzed simply by using frequency tests.

**Results**

A total of 53 patients were recruited, 3 of which (2 from the Back School and 1 from the Pilates group) withdrew spontaneously for health or personal reasons. Ten patients eligible for the study did not participate in the first treatment sessions: 2 because of early diagnosis of cancer; 4 because of conflicting job schedules; 1 because of a work accident; 3 gave no reason.

In overall terms, also considering pregnancy as a predisposing factor, the remaining 43 patients were homogeneously distributed in the 2 treatment groups.

As regards the VAS and Oswestry Scale results, we found that the evolution of mean values over time was similar in both groups (Figure 1 and Figure 2). In the Pilates group the average values obtained from the Oswestry Scale showed a sharper fall in first month *versus* baseline values than in the Back School group. The mean improvement, obtained by calculating the difference between the baseline values and those obtained at the final control visit was similar in both groups.

Table I shows the subjective responses. This outcome is very important because we can correlate it with the VAS results. A reduction of 1 point on the VAS does not necessarily mean a real subjective improve-

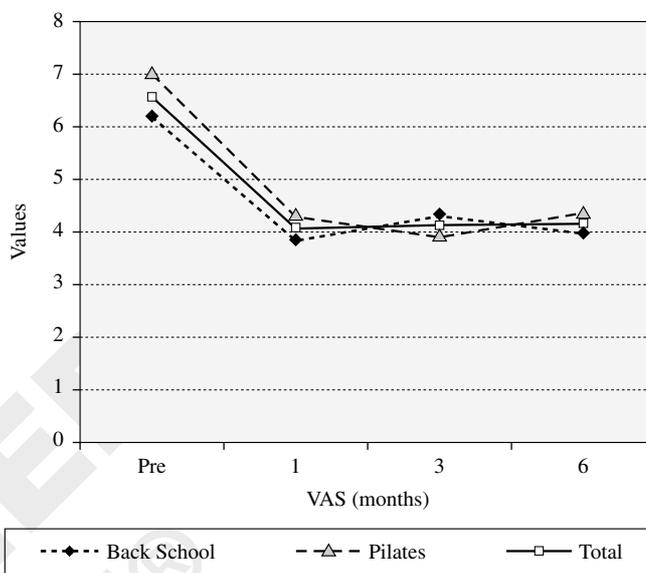


Figure 1.—Mean visual analog scale (VAS) values of the 2 groups.

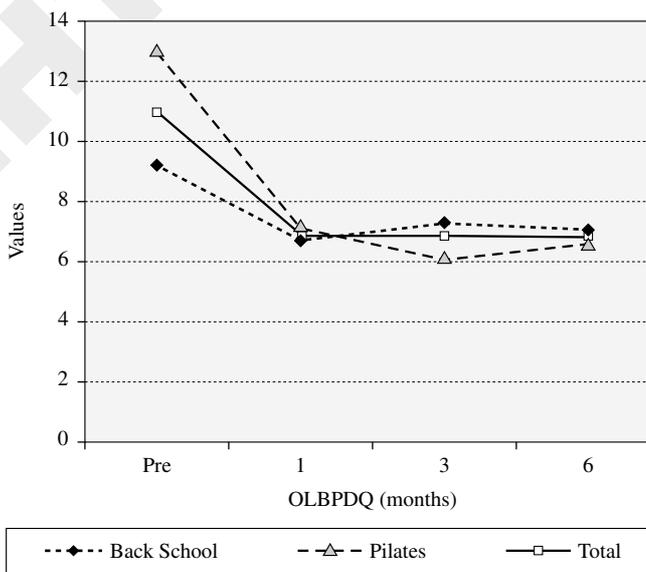


Figure 2.—Average Oswestry Low Back Pain Disability Scale (OLBPDS) values of the 2 groups.

ment in symptoms. It shows that the subjective response was better and remained so in the Pilates group.

As regards treatment compliance, 45.45% of the Back School group and 28.57% of the Pilates group (26.06% of the total) had managed to do their exer-

TABLE I.—Subjective state at the post-treatment control in the two groups.

	Group				Total	
	Back School		Pilates		No. of patients	%
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<i>Subjective status at 1 month</i>						
Worse	5	22.73	3	14.28	5	12.5
Same	3	13.64	1	4.76	4	10
Better	14	63.64	17	80.95	31	77.5
Total	22		21		40	
<i>Subjective status at 3 month</i>						
Worse	6	27.27	2	9.52	5	12.5
Same	8	36.36	3	14.28	11	27.5
Better	8	36.36	16	76.20	24	60
Total	22		21		40	
<i>Subjective status at 6 months</i>						
Worse	7	31.81	2	9.52	6	15
Same	7	31.81	4	19.05	11	27.5
Better	8	36.36	15	71.43	23	57.5
Total	22		21		40	

cises at home. Only 4.5% of the Back School and 9.5% of the Pilates group (6.97% of the total) reported having done the exercises they had learnt on a regular basis.

It was found that the exercises were mainly performed when necessary, in other words, when the pain level had worsened (50% in the Back School group and 61% in the Pilates group; 62.8% of the total).

Acceptance of the method was rated in terms of the benefit perceived and the level of subjective satisfaction. While the majority of the Back School group stated they were satisfied (77.27% *versus* 23.8% of the Pilates group), most of the patients in the Pilates group said they were very satisfied (61.9% *versus* 4.5% of the Back School group); the percentage of patients who said they were a little satisfied was similar in both groups (4.5% of the Back School and 4.76% of the Pilates group); 13.63% of the Back School group said they were dissatisfied, while only 9.5% of the Pilates group felt so.

Similar results were obtained for the benefit perceived: 22.7% of the Back School and 14.3% of the Pilates group referred having gained benefit from treatment; little benefit was claimed by 31.81% and

14.3% of the Back School and the Pilates group, respectively; 36.36% of the Back School and 14.3% of the Pilates group gave a simple “yes” to the question; 9.09% of the Back School and 57.14% of the Pilates group stated they had obtained great benefit from treatment.

## Discussion

Our results confirm previous published evidence<sup>12-14, 22</sup> for the efficacy of the Back School method in treating chronic low back pain, as indicated by a reduction in the average VAS and OLBDQ values. Equally good results were obtained with the Pilates CovaTech method, suggesting that it is as efficacious as the Back-School method in both short-term and long-term outcomes (at 6 months from the start of treatment).

Interestingly, the parameters requiring subjective responses, such as improvement of symptoms and satisfaction with treatment, supported therapy based on the Pilates CovaTech method, indicating better patient compliance with treatment. A possible explanation is that the method is simpler and more easily adaptable to individual patient type, thus allowing more personalized treatment even in a group therapy setting. Additionally, the originality and variety of the exercises may have encouraged a more proactive and trusting attitude to the treatment. It could be argued, however, that the routine of the Back School method involved the therapist less, although he firmly believed in its efficacy, while the originality of the Pilates CovaTech method stimulated his interest, leading him to better involve the patients in this technique. But these are only speculations that should have prompted further investigation.

Owing to the small sample size, we were unable to make a far-reaching analysis of the cost-benefit ratio of the 2 groups, as we had established in our study protocol. Therefore, we cannot confirm previous data on the advantages of active assisted exercises for both patients and health care facility based on a cost-benefits ratio.<sup>45-47</sup>

## Conclusions

Our results indicate that the Pilates CovaTech method is a valid alternative in the treatment of non specific chronic low back pain. Further study is need-

ed to elucidate the effect this new method may have on improving compliance with treatment.

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