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Stack-Weight supported Back Training Health and economic effects for different levels of back pain - A controlled multicenter study.

Back pain causes more years of healthy life lost than any other condition and can significantly reduce the quality of life of those being affected [1]. Physical training for chronic low back pain is considered a first-line therapy [2]. But why physical training has positive effects and how much the health and economic long-term effects of physical training also depend on the severity of back pain are largely unclear. Within a multicenter study of the back concept of the AOK-Baden-Württemberg, both questions were investigated.

Almost two-thirds of the German population is affected by back pain within one year, and about 15% reports chronic back pain during the same period [3]. While the majority of affected individuals are symptom-free within one to two months, 8-10% of individuals develop chronic pain. Chronicity of symptoms imposes high direct and indirect costs; for example, back pain is one of the most common causes of health care utilization, work disability, and early retirement [4, 5]. Data from the AOK show that in 2020, among health-insured persons in employment, the diagnosis of back pain (ICD-10: M54) accounted for the largest proportion of days of incapacity to work (6.1%), which is particularly noteworthy considering the Covid-19 pandemic [6]. Despite the large socioeconomic impact, there is insufficient evidence to date on cost-effectiveness and efficacy mechanisms of exercise interventions [7 - 9].

Stack-Weight -supported training program for people with back problems

Since 2005, the AOK Baden-Württemberg has been offering its health-insured members a comprehensive back training concept, which is used by around 30,000 members with back complaints every year. The AOK Back Concept (ARK) was designed on the basis of previous research findings for the prevention and treatment of back pain and consists of stack-weight-supported dynamic strength training of the trunk stabilizers and neck muscles, functional gymnastic exercises and exercises in everyday motor skills. The program includes 36 one-hour training sessions spread over 24 weeks. In the first 12 weeks (basic training phase), there are two sessions per week with one set of exercises per unit. In the following 12 weeks (maintenance training phase), participants complete one session per week with two sets per device. At the end of the program, participants receive a home exercise program.

Methods

As part of the evaluation of the program, the health and economic effectiveness of the ARK (n= 1829) was compared with standard care (RV) (n=495). Data from 39 health centers of the AOK Baden-Württemberg were pooled. The direct and indirect costs incurred as well as the health effects in intervention and control groups were collected after 6, 12, 18 and 24 months respectively. The cost data were additionally collected for the two years before the start of

the intervention. The control group was generated from AOK Baden-Württemberg billing data and the survey data via propensity score matching. In order to be able to measure the health effects, chronic pain status was recorded using the Graded Chronic Pain Status (GCPS) before the start of the intervention (t0) and at the further measurement time points (t1-t4) [10]. Inclusion criterion was a GCPS of at least grade I. A more detailed description of the methods and results has been published elsewhere [11].

The effects increase with the severity of back pain

The ARK was health effective for all severity levels of GCPS, with particular benefit to participants with pain-related functional limitations (grades III-IV). The dimensions of pain intensity and functional limitations were significantly reduced by the ARK. While the health effects of the training program were already apparent during the first year of the intervention, the economic effects were more pronounced in the second year. Within two years after the start of the intervention, the direct medical costs of the intervention group were significantly lower. These cost savings resulted predominantly from the group of participants with high functional limitations (grade IV). Savings from the ARK averaged €4,543 per participant over two years in GCPS IV [11]. Both the health and economic effects of training increased with the degree of back discomfort (Fig. 2). The results presented underline the relationship between the severity of back pain and the effect of physical training and are confirmed by the results of Hochheim et al [12].

What is the reason, if it works?

For the evidence-based development of sustainable training programs, the underlying mechanisms of action are of particular interest. In another study, the influence of training volume and physical performance improvement (including strength and mobility of trunk stabilizers) on the reduction of back pain was investigated in the sample described above [13]. The reduction of back pain could be predominantly attributed to the training volume. This dose-response relationship is well established [14, 15]. However, unlike the review by Steiger et al [16], there was also a small effect between the physical performance increases and the reduction in back pain [13]. This may be due to the significantly longer study period of this study compared to the study periods of the studies included in the review by Steiger et al [16, 13]. Also in this study, these effects could only be presented at the two-year observation period [13]. However, training volume and physical performance enhancement are not the only effect factors discussed in the literature. It seems likely that the effect of training volume is mediated by other underlying factors. In this regard, interactions with cognitive and emotional processes have been discussed, such as the reduction of avoidance behaviors through the experience of pain-free exercise [17, 18]. To further elucidate the mechanisms of action, future studies should investigate the psycho-cognitive, psycho-social, biopsychic, and physical effects of back training on pain reduction.

Sources/Literature

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