

Eurythmy therapy in chronic disease: a four-year prospective cohort study

Harald J Hamre^{1§}, Claudia M Witt², Anja Glockmann¹, Renatus Ziegler³, Stefan N. Willich², Helmut Kiene¹

¹Institute for Applied Epistemology and Medical Methodology, Böcklerstr. 5, 79110 Freiburg, Germany

²Institute of Social Medicine, Epidemiology, and Health Economics, Charité University Medical Center, Campus Mitte, 10098 Berlin, Germany

³Society for Cancer Research, Kirschweg 9, 4144 Arlesheim, Switzerland

§Corresponding author

Email addresses:

HJH: harald.hamre@ifaemm.de

CMW: claudia.witt@charite.de

AG: anja.glockmann@ifaemm.de

RZ: ziegler@hiscia.ch

SNW: stefan.willich@charite.de

HK: helmut.kiene@ifaemm.de

Abstract

Background

Many patients with chronic diseases use complementary therapies, often provided by their physicians. In Germany, several physician-provided complementary therapies have been reimbursed by health insurance companies as part of health benefit programs. In most of these therapies, the patient has a predominantly passive role. In eurythmy therapy, however, patients actively exercise specific movements with the hands, the feet or the whole body. The purpose of this study was to describe clinical outcomes in patients practising eurythmy therapy exercises for chronic diseases.

Methods

In conjunction with a health benefit program, 419 consecutive outpatients from 94 medical practices in Germany, referred to 118 eurythmy therapists, participated in a prospective cohort study. Main outcomes were disease severity (Disease and Symptom Scores, physicians' and patients' assessment on numerical rating scales 0-10) and quality of life (adults: SF-36, children aged 8-16: KINDL, children 1-7: KITA). Disease Score was measured after 6 and 12 months, other outcomes after 3, 6, 12, 18, 24, and (SF-36 and Symptom Score) 48 months.

Results

Most common indications were mental disorders (31.7% of patients; primarily depression, fatigue, and childhood emotional disorder) and musculoskeletal diseases (23.4%). Median disease duration at baseline was 3.0 years (interquartile range 1.0-8.5). Median number of eurythmy therapy sessions was 12 (interquartile range 10-19), median therapy duration was 119 (84-188) days.

All outcomes improved significantly between baseline and all subsequent follow-ups (exceptions: KITA Psychosoma in first three months and KINDL). Improvements

from baseline to 12 months were: Disease Score from (mean \pm standard deviation) 6.65 ± 1.81 to 3.19 ± 2.27 ($p < 0.001$), Symptom Score from 5.95 ± 1.75 to 3.49 ± 2.12 ($p < 0.001$), SF-36 Physical Component score from 43.13 ± 10.25 to 47.10 ± 9.78 ($p < 0.001$), SF-36 Mental Component score from 38.31 ± 11.67 to 45.01 ± 11.76 ($p < 0.001$), KITA Psychosoma from 69.53 ± 15.45 to 77.21 ± 13.60 ($p = 0.001$), and KITA Daily Life from 59.23 ± 21.78 to 68.14 ± 18.52 ($p = 0.001$).

All these improvements were maintained until the last follow-up. Improvements were similar in patients with prior disease duration of at least 12 months, and in patients not using diagnosis-related adjunctive therapies within the first six study months.

Adverse reactions to eurythmy therapy occurred in 3.1% (13/419) of patients. No patient stopped eurythmy therapy due to adverse reactions.

Conclusions

Patients practising eurythmy therapy exercises had long-term improvement of chronic disease symptoms and quality of life. Within the limits of the pre-post design, study findings suggest that eurythmy therapy can be useful for patients motivated for this therapy.

Background

In the developed world the most frequent reason for people to seek health care is a chronic disease [1]. Chronic diseases are the most common cause of disease burden worldwide, are often associated with comorbidity, and are rarely completely cured [1]. Strategies to improve the outcome of chronic diseases include drug regimens, enhanced healthcare provision, and patient self-management programs [2-4]. Many patients with chronic disease also use complementary therapies [5,6], often provided by their physicians. In Germany, several physician-provided complementary therapies have been reimbursed by health insurance companies as part of special health benefit programs (“Modellvorhaben”) [7-10]. In most of these complementary therapies the physician is the active person, directly treating (e. g. giving acupuncture) or prescribing therapy (e. g. homoeopathic medications), while the patient has a predominantly passive role. Anthroposophic medicine (AM, a complementary system of medicine founded by Rudolf Steiner and Ita Wegman [11]), however, includes two interventions that require the patient to engage in active exercises: AM art and eurythmy therapy.

Eurythmy therapy (EYT, Greek “harmonious rhythm”) is an exercise therapy involving cognitive, emotional, and volitional elements [12]. EYT is prescribed by AM physicians and provided by EYT therapists in individual or small group sessions during which patients are instructed to perform specific movements with the hands, the feet or the whole body. EYT movements are related to the sounds of vowels and consonants, to music intervals or to soul gestures, e. g. sympathy-antipathy. For each patient one or several movements are selected, depending on the patient’s disease, his constitution, and on the EYT therapist’s observation of the patient’s movement

pattern. This selection is based on a core set of principles, prescribing specific EYT movements for specific diseases, constitutional types, and movement patterns [13,14]. EYT sessions usually last 45 min; between therapy sessions patients practice EYT exercises daily [14]. An EYT therapy cycle usually consists of 12-15 sessions. EYT can be used as monotherapy or combined with other AM therapies. Qualification as an EYT therapist requires 5½ years of training according to an international, standardised curriculum. EYT is presently provided by approximately 1,300 therapists in 31 countries worldwide (A. Jaschke, International Coordination AM, personal communication, July 2005).

EYT is believed to have both general effects (e. g. improving breathing patterns and posture, strengthening muscle tone, enhancing physical vitality [15]) and specific therapeutic effects [14]. Observational studies suggest that EYT and other AM therapies can be useful for a variety of clinical conditions [12,16-25]. However, all these studies were monocentric, all but one [12] evaluated multimodal AM therapy including EYT in only a proportion of the patients, and all but three studies [18-20] had a sample size of less than 25 AM patients. Here we present a multi-centre long-term study of EYT with 419 patients.

Methods

Study design and objective

This is a prospective four-year cohort study in a real-world medical setting. The study was part of a research project on the effectiveness and costs of AM therapies in outpatients with chronic disease (Anthroposophic Medicine Outcomes Study, AMOS) [8,26]. The AMOS project was initiated by a health insurance company in conjunction with a health benefit program and included the following effectiveness issues:

- 1) Are AM therapies in general associated with clinically relevant improvements of chronic diseases? (see [8])
- 2) Are specific AM therapies (such as EYT) associated with such improvements?
- 3) If yes: To which extent are these improvements found in different age, gender, and diagnostic subgroups?
- 4) How do improvements of specific diagnostic groups compare to improvements with other interventions?

The issues 2 and 3 were addressed in this EYT analysis, the objective of which was to study symptoms, quality of life, adjunctive therapies, health service use, adverse reactions, and therapy satisfaction in outpatients with chronic diseases receiving EYT under routine clinical conditions.

Setting and participants

All physicians certified by the Physicians' Association for Anthroposophical Medicine in Germany and working in an office-based practice or outpatient clinic in Germany were invited to participate in the study. The participating physicians recruited consecutive patients fulfilling the following criteria:

Inclusion criteria: Outpatients aged 1-75 years, referred to EYT for any indication (main diagnosis).

Exclusion criteria: Previous EYT for main diagnosis, ongoing EYT.

Participating EYT therapists were certified by the Eurythmy Therapy Association of Germany.

Clinical outcomes

- Disease severity on numerical rating scales [27] from 0 („not present“) to 10 („worst possible“): Disease Score (physician's global assessment, documented in patients enrolled up to 30 Sep 2000) after 0, 6 and 12 months; Symptom

Score (patients' assessment of one to six most relevant symptoms present at baseline, documented in patients enrolled after 1 Jan 1999) after 0, 3, 6, 12, 18, 24, and 48 months.

- Quality of life after 0, 3, 6, 12, 18, 24, and (in adults) 48 months: SF-36[®] Physical and Mental Component Summary Measures (PCS, MCS), eight subscales, and Health Change item [28] for adults; KINDL[®] Summary Score and four subscales [29] for children 8-16 years; KITA Psychosoma and Daily Life subscales [30] for children 1-7 years.

Other outcomes

- Adjunctive therapy and health service use in pre-study year (documented at study enrolment), first study year (documented after six and 12 months), and second study year (documented after 18 and 24 months): medication (additional documentation after three months), physician and dentist visits, paraclinical investigations, inpatient hospital and rehabilitation treatment, surgeries, physiotherapy, ergotherapy, psychotherapy, Heilpraktiker (non-medical practitioner) visits, sick leave.
- Use of diagnosis-related adjunctive therapies within the first six study months (analysed in patients with a main diagnosis of mental, respiratory or musculoskeletal diseases, or headache disorders). Diagnosis-related therapies were any of the following therapies, if used for at least one day per month:
Mental diseases: psychotherapy (in children ergotherapy or play therapy), antiepileptic, psycholeptic, analeptic, and anti-addiction drugs (ATC-Index N03A, N05-06, N07B); Respiratory diseases: relevant drugs (H02, J01-02, J04-05, J07A, L03, R01, R03, R06-07) or surgery; Musculoskeletal diseases: immunosuppressive, musculoskeletal, analgesic and antidepressant drugs (L04,

M01-05, M09, N02A-B, N06A), physiotherapy or relevant surgery; Headache disorders: analgesics, antimigraine drugs and antidepressants (C04AX01, C07AA05, C07AB02, C08CA06, C08DA01, N02, N03AG01, N06A, N07CA03).

- Therapy ratings after six and 12 months: Patient rating of therapy outcome, patient satisfaction with therapy, EYT effectiveness rating by patient and physician.
- Adverse drug or therapy reactions during the first 24 study months: cause, intensity (mild / moderate / severe = no / some / complete impairment of normal daily activities); Serious Adverse Events (physician documentation).

Data collection

All data were documented with questionnaires sent in sealed envelopes to the study office. Physicians documented eligibility criteria; therapists documented EYT administration; all other items were documented by patients (by caregivers of children < 17 years), unless otherwise stated. Patient responses were not made available to physicians. Physicians were compensated € 40 per included and fully documented patient, while patients received no compensation.

Data were entered twice by two different persons into Microsoft[®] Access 97. The two datasets were compared and discrepancies resolved by checking with the original data.

Quality assurance, adherence to regulations

The study was approved by the Ethics Committee of the Faculty of Medicine Charité, Humboldt University Berlin, and was conducted according to the Helsinki Declaration and ICH-GCP guidelines. Written informed consent was obtained from all patients before enrolment.

Data analysis

Data analysis (SPSS[®] 13.0.1, StatXact[®] 5.0.3) followed the intention-to-treat principle. For continuous data Wilcoxon Signed-Rank test was used for paired samples, Mann-Whitney U-test for independent samples; median differences with 95% confidence intervals (95%-CI) were estimated according to Hodges and Lehmann [31]. For binominal data McNemar test and Fisher's exact test were used. All tests were two-tailed. Significance criteria were $p < 0.05$ and 95%-CI not including 0. Pre-post effect sizes were calculated as Standardised Response Mean and classified as small (0.20-0.49), medium (0.50-0.79), and large (≥ 0.80) [32]. Unless otherwise stated, therapies and health services were analysed in patients enrolled after 1 Jan 1999 with at least three out of five follow-ups available; for each item and follow-up period, missing values were replaced by the group mean value. Clinical outcomes were analysed in patients with evaluable data for each follow-up, without replacement of missing values.

Results

Participating physicians and therapists

101 physicians screened patients. 94 physicians enrolled patients into the study; these physicians did not differ significantly from all AM-certified physicians in Germany ($n = 362$) regarding gender (59.6% vs. 62.2% males), age (mean 46.7 ± 6.9 vs. 47.5 ± 7.9 years), number of years in practice (18.6 ± 7.1 vs. 19.5 ± 8.7), and the proportion of primary care physicians (90.4% vs. 85.0%). Patients were treated by 118 EYT therapists. Comparing these therapists to certified EYT therapists without study patients ($n = 231$), no significant differences were found regarding gender (87.3% vs. 86.6% females) or age (mean 50.8 ± 8.1 vs. 52.9 ± 9.7 years). Median number of years since EYT school graduation was 9.0 years (interquartile range IQR 7.0-15.0) for therapists with study patients and 13.0 (IQR 8.0-22.0) years for

therapists without study patients (median difference 2.0 years; 95%-CI 1.0-4.0 years; $p = 0.005$).

Patient recruitment and follow-up

From 1 July 1998 to 31 March 2001, a total of 498 patients were screened for inclusion. 419 patients fulfilled all eligibility criteria and were included in the study (Figure 1). The last patient follow-up ensued on 12 April 2005. Included and not included patients did not differ significantly regarding age, gender, diagnosis, disease duration, baseline Disease Score, or baseline Symptom Score.

75.4% (316/419) of patients were enrolled by general practitioners, 10.0% by paediatricians, 4.5% by internists, and 10.0% by other specialists. The physicians' setting was primary care practice (87.8% of patients, $n = 368/419$), referral practice (8.6%), and outpatient clinic (3.6%). Each physician enrolled median 3.0 (IQR 2.0-4.0) patients.

97.4% (408/419) of patients returned at least one follow-up questionnaire. The 12-month questionnaire was returned by 87.6% of patients; these patients did not differ significantly from non-respondents (12.4%) regarding age, gender, diagnosis, disease duration, baseline Disease Score, and baseline Symptom Score. Corresponding dropout analyses for the 24-month follow-up also showed no differences. 88.3% (339/384) of patients enrolled after 1 Jan 1999 were evaluable for adjunctive therapy and health service analysis. The physician follow-up documentation was available for 84.7% (355/419) of patients after six months and for 77.2% after 12 months.

Baseline characteristics

Disease status: Most frequent main diagnoses, classified by ICD-10 (International Classification of Diseases, Tenth Edition), were F00-F99 Mental Disorders (31.7%, 133/419 patients), M00-M99 Musculoskeletal Diseases (23.4%), and J00-J99

Respiratory Diseases (7.6%). Most frequent single diagnoses were back pain / sciatica (8.1%, 34/419 patients), neck-shoulder-arm pain (7.6%), depression (6.4%), fatigue (6.2%), childhood emotional disorder (3.8%), headache/migraine (3.3%), and asthma (3.1%).

Median disease duration was 3.0 years (IQR 1.0-8.5, mean 6.2 ± 7.8 years); in 97.9% (410/419) of patients disease duration was six weeks or longer. The patients had median 1.0 (IQR 0.0-2.0) comorbid diseases. Most common comorbid diseases, classified by ICD-10, were F00-F99 Mental Disorders (14.1%, 91 out of 645 diagnoses), M00-M99 Musculoskeletal Diseases (12.4%), E00-E90 Endocrine, Nutritional and Metabolic Diseases (9.5%), and I00-I99 Circulatory Diseases (8.5%).

Socio-demographics: The patients were recruited from 13 of 16 German federal states. Median age was 38.0 (IQR 14.0-48.0) years. Compared to the German population, socio-demographic items were more favourable for education, occupation, alcohol, smoking, and overweight; similar for unemployment, low-income, living alone, severe disability status, sport, underweight; and less favourable for work disability pension and sick-leave (Table 1).

Therapies

EYT was definitely administered to 93.6% (392/419) of patients; 2.9% did not have EYT; for 3.6% EYT documentation is incomplete or inconclusive. EYT started median 15 (IQR 4-41) days after enrolment. Median therapy duration was 119 (IQR 84-188) days, median number of therapy sessions was 12 (IQR 10-19). During the first six months after study enrolment 72.1% (302/419) of patients used AM medication and 1.4% (6/419) had AM art therapy.

Non-AM adjunctive therapies, health services, and sick leave are listed in Table 2, together with AM medication. Comparing the pre-study year to the first and second

study year, respectively, the only consistent change was an increase in psychotherapy by average one session per patient. In the first study year AM medication use and the number of physician and dentist visits increased, and in the second year the number of rehabilitation days and non-AM medication use decreased, compared to the pre-study year. Remaining items did not change significantly.

Use of diagnosis-related adjunctive therapies (see Methods) within the first six study months was analysed in patients with a main diagnosis of mental, respiratory or musculoskeletal diseases, or headache disorders (n = 278). Out of 251 evaluable patients, 63% (n = 157) had no diagnosis-related adjunctive therapy.

Clinical outcomes

Disease and Symptom Scores (Figure 2), all eleven SF-36 scores (adults, Figure 3), and both KITA subscales (children aged 1-7, Figure 5) improved significantly between baseline and all subsequent follow-ups (except KITA Psychosoma in the first three months). For all these 15 outcomes, the most pronounced improvement occurred during the first six months. After 12 months, Disease and Symptom Scores were improved from baseline in 86.9% and 83.6% of patients, respectively (Table 3); an improvement of $\geq 30\%$ of baseline scores was observed in 75.1% (178/237 evaluable patients) and 61.6% (207/336), respectively. Disease and Symptom Scores improved similarly in male and female adults, and in children. Effect sizes for the 0-12 month comparison were large for Disease and Symptom Scores (1.34 and 1.04) and small-to-medium (range 0.41-0.67) for the SF-36 and KITA scores (Table 3). All these improvements were maintained until the last follow-up.

In children aged 8-16, KINDL Summary Score (Figure 4) as well as KINDL Psychic and Somatic subscales improved significantly between baseline and the six-month,

18-month (except Somatic subscale), and 24-month follow-ups, respectively. KINDL Social and Function subscales did not change significantly during the study.

Three **sensitivity analyses** were performed for 0-12 month Symptom Score outcomes.

The main analysis comprised all patients with evaluable data at baseline and 12-month follow-up. In the first sensitivity analysis (Table 4, SA1) missing values after 12 months were replaced with the last value carried forward, reducing the average 0-12 month improvement by 4% (2.46→2.35 points). In the second analysis (Table 4, SA2), the sample was restricted to patients with disease duration of at least 12 months prior to study enrolment, reducing the improvement by 7% (2.46→2.30 points).

Combining SA1+SA2, the improvement was reduced by altogether 11% (2.46→2.18 points).

The third analysis (Table 4, SA3) was performed on patients with a main diagnosis of mental, respiratory or musculoskeletal diseases or headache disorders. Restricting this sample to patients not using diagnosis-related adjunctive therapies during the first six study months (see Methods), the average Symptom Score improvement was increased by 6% (2.23→2.36 points). Combining SA1+SA2+SA3, the improvement was reduced by altogether 3% (2.23→2.16 points).

Other outcomes

Therapy ratings: At six-month follow-up, patients' average therapy outcome rating (numeric scale: 0 "no help at all", 10 "helped very well") was 7.42 ± 2.29 ; patient satisfaction with therapy (0 "very dissatisfied", 10 "very satisfied") was 8.08 ± 2.19 . Patients' EYT effectiveness rating was positive ("very effective" or "effective") in 86.1% (315/366) of patients, and negative ("less effective", "ineffective" or "not evaluable") in 13.9%. Physicians' effectiveness rating was positive in 79.3% (264/333) and negative in 20.7%. Ratings of therapy outcome, satisfaction, and

effectiveness did not differ significantly between adults and children, or between six- and 12-month follow-ups.

Adverse reactions during the first 24 study months: Adverse reactions to EYT occurred in 3.1% (13/419) of patients. Three (0.7%) patients had adverse reactions of severe intensity (symptom aggravation, inner tension, abjection), no patient stopped EYT due to adverse reactions. One child had adverse reactions (moderate restlessness) to adjunctive AM massage therapy, which was stopped. Four patients had adverse reactions to non-AM therapies. Adverse drug reactions occurred more than twice as frequently from non-AM medication (12.8% of users, 46/358) than from AM medication (5.3%, 18/337) ($p < 0.001$).

Nine patients had Serious Adverse Events (SAE). Three patients were acutely hospitalised and six patients died: five from malignant disease and one patient, hospitalised for severe depression, from an accident, possibly suicide. None of these SAE were related to any therapy or medication.

Discussion

Apart from a study with only five patients [12], this prospective cohort study is the first study focusing on EYT as primary therapy. We aimed to obtain information on EYT under routine conditions in Germany and studied clinical outcomes in consecutive outpatients referred to EYT for chronic diseases. The study was conducted in conjunction with a health insurance program providing EYT regardless of diagnosis. For this reason, and because the range and frequency of indications for EYT in outpatient care was largely unknown prior to the study, we included patients of all ages with all diagnoses. Most frequent indications were mental and musculoskeletal disorders. Following EYT (and adjunctive AM medication), substantial improvements of disease symptoms and quality of life were observed. The

improvements were maintained during the four-year follow-up and were not accompanied by an increase of adjunctive therapies, except for a small increase in psychotherapy use.

Strengths and limitations

Strengths of this study include a large patient sample, a long follow-up period, high follow-up rates, and the participation of 30% of all AM-certified physicians and EYT therapists in Germany. The participating physicians resembled all eligible physicians/therapists with respect to socio-demographic characteristics, and included patients resembled not included, screened patients regarding baseline characteristics. These features suggest that the study to a high degree mirrors contemporary EYT practice. Moreover, since patients with all diagnoses were included, our study offers a comprehensive picture of EYT practice. Therefore, in the present early phase of EYT evaluation, the inclusion of all diagnoses is an advantage. On the other hand, it was not feasible to have disease-specific outcomes for all diagnoses included.

Nonetheless, this study is part of a larger AM evaluation project which included disease-specific outcomes for major disease groups, results of which will be presented elsewhere.

Another consequence of the broad inclusion criteria is that the mix of diagnoses and age groups in the present study might not be matched if our study should be replicated in other settings. However, future EYT studies will probably not attempt to replicate the present case-mix, but rather focus on individual diagnoses and age groups.

Notably, in the present study we found only minor outcome differences between different age and gender groups and between evaluable diagnosis groups. The only exceptions were SF-36 outcomes differing between diagnosis groups. These

differences are well-known; they reflect different responsiveness of SF-36 scores in different diseases.

A limitation of the study is the absence of a comparison group receiving another treatment or no therapy. The observed improvements may have several causes apart from EYT. According to a sensitivity analysis of Symptom Score, dropout bias and spontaneous improvement (assumed to be possible in patients with disease duration of less than 12 months) can together explain only 11% of the average 0-12-month improvement. Notably, this analysis does not exclude regression to the mean due to symptom fluctuation with preferential self-selection to therapy and study inclusion at symptom peaks. Other possible confounders are psychological factors like patient expectations and observation bias, AM medication (which was used by three-fourth of patients), and other adjunctive therapies. Notably, in patients with mental, respiratory or musculoskeletal disease or headache disorders (together comprising 66% of the study sample), diagnosis-related non-AM adjunctive therapies (medication, psychotherapy or surgery if appropriate) could not explain the improvement, since the improvement was even more pronounced in patients not using such therapies. Since EYT was to be evaluated under routine conditions, therapy was not administered according to a standardised protocol, but at the discretion of the physicians and EYT therapists. This raises the question of whether study interventions would be replicable in future studies. However, EYT therapists worldwide are trained according to a highly standardised curriculum, specifying individual EYT movements for specific diseases, constitution types, and movement patterns. Therefore, relevant therapy differences across settings would not be expected. Moreover, in this study, any local therapy differences would probably be offset by the large number of

participating EYT therapists. Nevertheless, a limitation of our study is that the specific EYT movements selected for each patient were not documented.

Self-reporting of adjunctive therapies and health service use can be affected by recall bias. In this study, however, any systematic recall bias would probably have been conservative, making results appear less favourable. The reason is: While at study enrolment patients were asked about therapies and health services during the preceding 12 months, these items were thereafter asked every six months (medication use also after three months). Since patients' recall of resource utilisation declines over time with a net tendency towards under-reporting [33], under-reporting is more likely for the 12-month pre-study period than for the shorter periods after study enrolment. Dropout bias is unlikely to have biased the analysis of adjunctive therapies and health services: For this analysis, 88% of the patients were evaluable. Moreover, there is no *a priori* reason to assume that therapies and health services are used differently by dropouts and respondents.

Study implications

This study confirms previous studies of the characteristics of AM users [15,34-36]: Patients are predominantly middle-aged women or children, education and occupation levels are higher than average, and typical indications are mental and musculoskeletal disorders. Previous studies conducted in inpatient [16-24] and outpatient clinics [24,25] have evaluated AM therapy including EYT for rheumatoid arthritis [16], asthma [24], hepatitis C [17,25], breast cancer [18], anorexia nervosa [19], lumbar disc disease [20], chronic musculoskeletal pain [21], and in the rehabilitation after stroke [22] and myocardial infarction [23]. All these studies had some favourable outcomes; the three largest studies (range 60-81 AM patients) found improved quality of life in breast cancer patients [18]; high anorexia nervosa cure rates [19]; and

reduced pain, reduced NSAID and muscle relaxant use, and earlier return to work in lumbar disc disease [20].

In accordance with these findings from secondary care, our predominantly primary care study of EYT users demonstrated long-standing improvements in disease symptoms and quality of life across a range of conditions. At 12-month follow-up almost two-thirds of the patients had a clinically relevant symptom improvement of at least 30% of their baseline score.

Most common indications for EYT were musculoskeletal pain, depression, fatigue, childhood emotional disorder, and headache disorders. For these conditions some patients will not profit from standard therapies (drugs, physiotherapy, psychotherapy, multimodal inpatient therapies, surgery), e. g. between three and five patients must be treated with drugs for one patient to benefit [37-40]. Other patients discontinue standard therapies due to adverse reactions or reject them because therapies are passive (e. g. drugs, passive physiotherapy) or can be felt as intrusive, too verbal (psychotherapy) or too mechanical-repetitive (exercise physiotherapy). Thus, for patients where standard therapies are not preferred or tolerated well, or do not cure, EYT as a non-verbal artistic exercising therapy is a promising treatment option.

Conclusions

In this study, patients practising EYT exercises had substantial long-term reduction of chronic disease symptoms and improvement of quality of life, without relevant increase in health service use. Within the limits of the pre-post design, study findings suggest that EYT can be useful for patients motivated for this therapy.

List of abbreviations

AM: anthroposophic medicine, ADH-CD-ED: Attention Deficit / Hyperkinetic /

Conduct Disorder / Childhood Emotional Disorder, EYT: eurythmy therapy, IQR:

interquartile range, SF-36-MCS (-PCS): SF-36 Mental (Physical) Component Summary Measure.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

HJH, CMW, SNW, and HK contributed to study design. HJH, AG, and HK contributed to data collection. HJH, RZ, and HK wrote analysis plan, HJH and AG analysed data. HJH was principal author of the paper, had full access to all data, and is guarantor. All authors contributed to manuscript drafting and revision and approved the final manuscript.

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Figure captions

Figure 1 - Patient recruitment and follow-up

*18-, 24-, and 48-month follow-up questionnaires were not sent to patients enrolled before 1 Jan 1999.

Figure 2 - Disease and Symptom Scores

Disease Score: physicians' assessment, Symptom Score: patients' assessment. Range 0 "not present", 10 "worst possible".

Figure 3 - SF-36 Physical and Mental Component Summary Measures

Higher scores indicate better health. Adult patients and German population (age 17-74 years) [28]

Figure 4 - KINDL Summary Score

Range 0-100, higher scores indicate better health. Children aged 8-16 years.

Figure 5 - KITA Psychosoma and Daily Life subscales

Range 0-100, higher scores indicate better health. Children aged 1-7 years.

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Table captions

Table 1 - Socio-demographic data

Table 2 - AM medication, non-AM adjunctive therapies, health service use, and sick leave days

Patients enrolled after 1 Jan 1999 with at least 3 of 5 follow-ups (n = 339). *Patients engaged in economic activity (n = 128). **Patients with complete data for all time periods.

Table 3 - Clinical outcomes 0-12 months

*Positive differences indicate improvement. Improved: Percentage of patients improved from baseline. **1 = “much better now than one year ago”, 5 = “much worse now than one year ago”. SRM: Standardised Response Mean effect size (small: 0.20-0.49, medium: 0.50-0.79, large: ≥ 0.80).

Table 4 - Symptom Score 0-12 months: Sensitivity analysis (SA)

*Symptom Score was not documented in patients enrolled before 1.1.1999.

Tables

Table 1 - Socio-demographic data

Items		Study patients		German primary care patients	
		N	Percent	Percent	Source
Female gender		297/419	71%	53%	[41]
Age groups	0-19 years	111/419	26%	14%	[41]
	20-39 years	115/419	27%	27%	[41]
	40-59 years	150/419	36%	27%	[41]
	60-75 years	43/419	10%	21%	[41]
		Adult study patients enrolled after 1 Jan 1999		German population	
"Fachhochschule" or university entrance qualification		172/280	61%	19%	[42]
University degree		76/279	27%	6%	[42]
Wage earners		8/280	3%	18%	[42]
Unemployed during last 12 months	Economically active patients	7/147	5%	10%	[42]
Living alone		57/278	20%	21%	[42]
Net family income < 900 € per month		33/231	14%	16%	[42]
Alcohol use daily (EYT) vs. almost daily (Germany)	Male	1/53	2%	28%	[43]
	Female	7/227	3%	11%	
Regular smoking	Male	9/53	17%	37%	[44]
	Female	40/226	18%	28%	
Sports activity ≥ 1 hour weekly	Age 25-69	116/257	45%	39%	[45]
Body mass index < 18.5 (low)	Male	4/53	8%	1%	[46]
	Female	12/223	5%	4%	
Body mass index ≥ 25 (overweight)	Male	8/53	15%	56%	[46]
	Female	69/223	31%	39%	
Permanent work disability pension		20/279	7%	3%	[47]
Severe disability status		24/279	9%	12%	[48]
Sick leave days in the last 12 months (mean ± SD)	Economically active patients	33.0 ± 68.3 days		17.0 days	[49]

Table 2 - AM medication, non-AM adjunctive therapies, health service use, and sick leave days

Patients enrolled after 1 Jan 1999 with at least 3 of 5 follow-ups (n = 339). *Patients engaged in economic activity (n = 128). **Patients with complete data for all time periods.

Item	Pre-study year		0-12 months				12-24 months			
	Mean	SD	Mean	SD	Median difference (95%-CI) from pre-study year	P value	Mean	SD	Median difference (95%-CI) from pre-study year	P value
AM medicines per day	0.45	0.80	0.70	0.90	0.24 (0.17 to 0.37)	p < 0.001	0.40	0.71	-0.02 (-0.08 to 0.04)	p = 0.505
Non-AM medicines / day	0.65	0.90	0.69	0.94	0.01 (-0.04 to 0.06)	p = 0.628	0.59	0.88	-0.06 (-0.13 to -0.01)	p = 0.032
Physician and dentist visits	18.12	21.19	18.82	16.03	1.24 (0.19 to 2.50)	p = 0.028	18.67	50.41	-1.43 (-2.50 to 0.00)	p = 0.041
Paraclinical investigations	5.70	6.66	5.75	6.77	0.00 (-0.62 to 0.50)	p = 0.737	5.24	6.71	-0.50 (-1.00 to 0.00)	p = 0.093
Hospital days	3.42	14.72	2.57	10.91	-1.10 (-5.00 to 1.46)	p = 0.346	2.04	7.42	-0.04 (-2.32 to 1.18)	p = 0.929
Rehabilitation days	2.02	8.36	1.76	7.48	0.00 (-10.02 to 7.46)	p = 0.921	1.55	6.20	-0.69 (-0.97 to -0.62)	p = 0.005
Surgeries	0.19	0.51	0.14	0.41	0.00 (-0.47 to 0.00)	p = 0.323	0.12	0.38	0.00 (-0.42 to 0.07)	p = 0.909
Physiotherapy and ergotherapy sessions	8.92	17.83	9.25	22.80	1.00 (-2.00 to 4.00)	p = 0.425	10.91	28.35	-1.22 (-4.19 to 1.31)	p = 0.379
Psychotherapy sessions	2.64	12.96	3.54	9.42	3.98 (1.50 to 7.00)	p = 0.008	3.56	10.34	2.68 (1.67 to 3.67)	p < 0.001
Sick leave days*	32.97	68.26	34.61	80.65	3.50 (-2.00 to 8.00)	p = 0.185	29.85	68.69	3.18 (-2.18 to 8.00)	p = 0.210
Patients with Heilpraktiker visit (n + %)**	32/250	12.8%	29/250	11.6%		p = 0.710	27/250	10.8%		p = 0.511

Table 3 - Clinical outcomes 0-12 months

*Positive differences indicate improvement. Improved: Percentage of patients improved from baseline. **1 = “much better now than one year ago”, 5 = “much worse now than one year ago”. SRM: Standardised Response Mean effect size (small: 0.20-0.49, medium: 0.50-0.79, large: ≥ 0.80).

Item	N	0 months		12 months		0 months vs. 12 months			
		Mean	SD	Mean	SD	P-value	Median difference (95%-CI)*	Improved	SRM
Disease Score (0-10)	237	6.65	1.81	3.19	2.27	p < 0.001	4.00 (3.50 to 4.00)	87%	1.34
Symptom Score (0-10)	336	5.95	1.75	3.49	2.12	p < 0.001	2.50 (2.25 to 2.75)	84%	1.04
SF-36 scales (0-100)									
-Physical Function	270	75.34	22.74	83.18	19.41	p < 0.001	10.00 (7.50 to 10.00)	63%	0.42
-Role Physical	267	42.51	39.20	67.79	37.20	p < 0.001	37.50 (37.50 to 50.00)	55%	0.63
-Role-Emotional	268	47.26	41.87	70.58	38.09	p < 0.001	33.34 (33.30 to 50.00)	49%	0.55
-Social Functioning	272	62.13	25.75	75.28	24.37	p < 0.001	18.75 (12.50 to 25.00)	58%	0.49
-Mental Health	271	54.21	18.65	65.05	19.00	p < 0.001	12.00 (8.00 to 14.00)	71%	0.57
-Bodily Pain	272	55.91	28.41	66.93	27.65	p < 0.001	16.00 (11.50 to 20.00)	55%	0.41
-Vitality	271	38.68	17.85	51.49	18.68	p < 0.001	15.00 (12.50 to 17.50)	68%	0.67
-General Health	268	50.86	18.80	58.39	19.55	p < 0.001	8.50 (6.00 to 10.00)	65%	0.44
SF-36 Health Change (1-5**)	272	3.23	1.08	2.15	1.09	p < 0.001	1.50 (1.00 to 1.50)	69%	0.68
SF-36 Physical Component	263	43.13	10.25	47.10	9.78	p < 0.001	3.90 (2.83 to 4.97)	68%	0.44
SF-36 Mental Component	263	38.31	11.67	45.01	11.76	p < 0.001	6.45 (4.94 to 7.96)	69%	0.55
KINDL subscales (0-100)									
-Psychic	35	67,36	15,27	70,68	15,64	p = 0.188	3.41 (-2.27 to 9.09)	60%	0.20
-Somatic	35	70,57	14,47	75,60	9,35	p = 0.071	4.17 (0.00 to 9.72)	66%	0.37
-Social	35	69,90	11,95	73,16	11,78	p = 0.063	4.17 (0.00 to 7.29)	66%	0.28
-Function	33	64,39	14,33	67,94	10,44	p = 0.187	3.41 (-2.27 to 7.96)	61%	0.25
KINDL Summary Score (0-100)	35	67.86	11.02	71.48	9.79	p = 0.063	3.59 (-0.07 to 7.65)	63%	0.34
KITA subscales (0-100)									
-Psychosoma	51	69.53	15.45	77.21	13.60	p = 0.001	9.38 (4.17 to 12.50)	69%	0.51
-Daily Life	56	59.23	21.78	68.14	18.52	p = 0.001	10.42 (4.17 to 14.58)	63%	0.53

Table 4 - Symptom Score 0-12 months: Sensitivity analysis (SA)

*Symptom Score was not documented in patients enrolled before 1.1.1999.

Analysis	N	0 months		12 months		0-12 month difference			
		Mean	SD	Mean	SD	Mean	SD	P-value	Median difference (95%-CI)
Main analysis: patients enrolled after 1.1.1999* with evaluable data at 0 and 12 months	336	5.95	1.75	3.49	2.12	2.46	2.38	p < 0.001	2.50 (2.25 to 2.75)
SA1: last value carried forward	384	5.98	1.79	3.63	2.20	2.35	2.38	p < 0.001	2.50 (2.25 to 2.75)
SA2: patients with disease duration \geq 12 months at study enrolment	269	5.87	1.82	3.57	2.18	2.30	2.36	p < 0.001	2.33 (2.03 to 2.67)
SA1+SA2	310	5.92	1.86	3.73	2.22	2.18	2.33	p < 0.001	2.33 (2.00 to 2.58)
Patients with a main diagnosis of mental, respiratory or musculoskeletal diseases, or headache syndromes									
Main analysis: patients enrolled after 1.1.1999* with evaluable data at 0 and 12 months	223	5.82	1.67	3.59	2.10	2.23	2.25	p < 0.001	2.33 (2.00 to 2.63)
SA3: patients not using diagnosis-related therapies (see Methods) in month 0-6	129	5.74	1.69	3.39	1.96	2.36	2.24	p < 0.001	2.42 (2.00 to 2.83)
SA1+SA2+SA3	113	5.64	1.74	3.49	1.98	2.16	2.13	p < 0.001	2.25 (1.75 to 2.67)

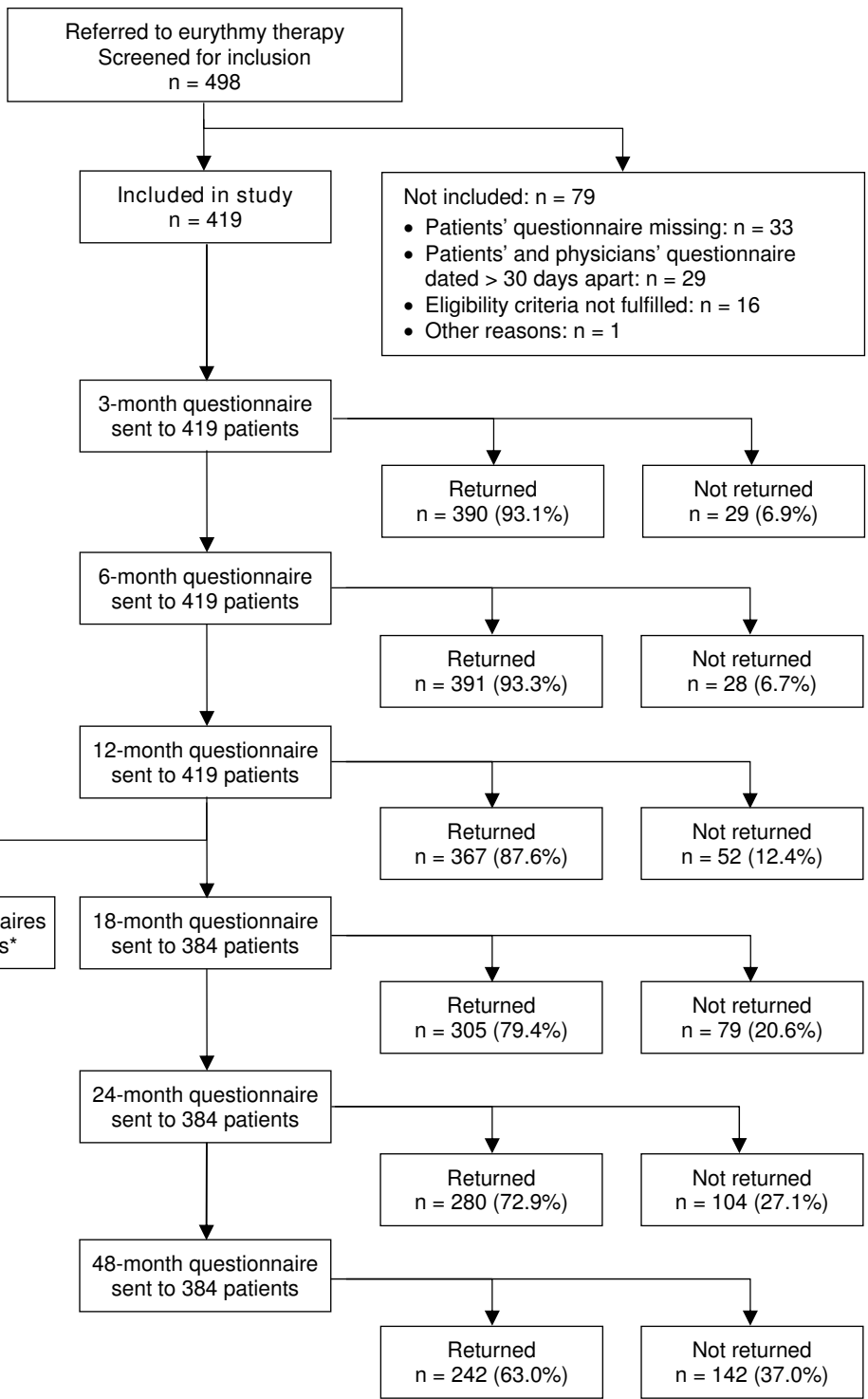
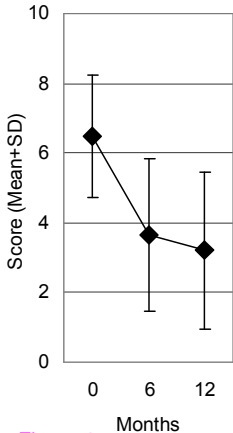


Figure 1

Disease Score



Symptom Score

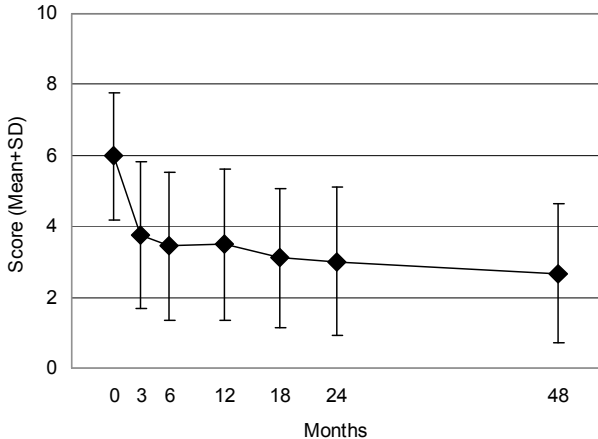


Figure 2

SF-36 Physical Component Summary

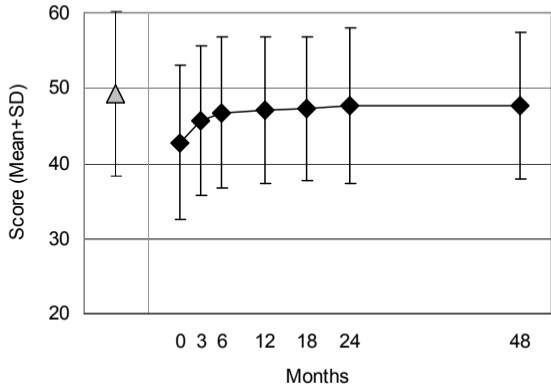
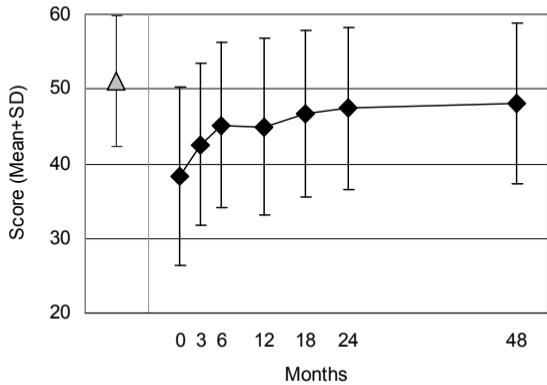


Figure 3

△ German population —◆— Patients

SF-36 Mental Component Summary



△ German population —◆— Patients

KINDL Summary Score

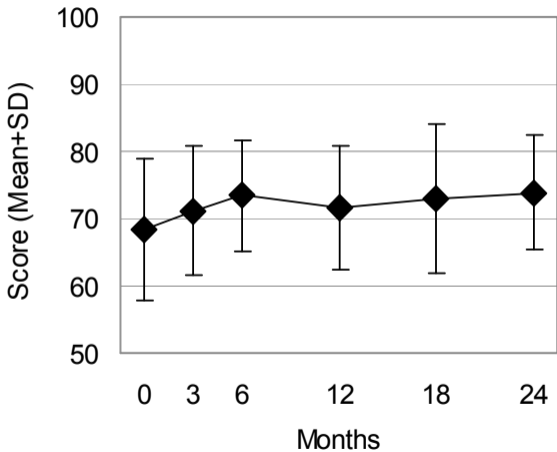
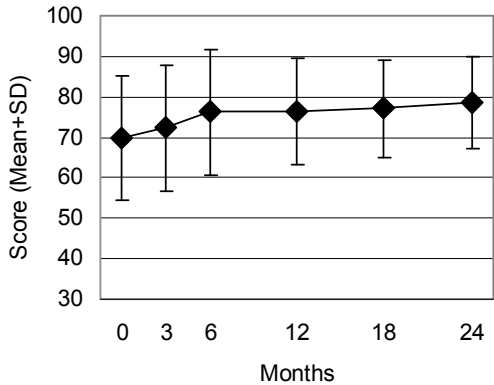


Figure 4

KITA Psychosoma



KITA Daily Life

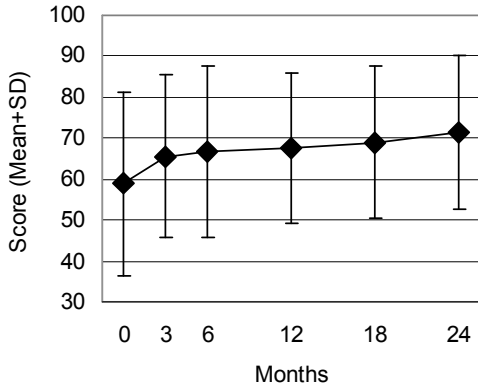


Figure 5