The role of Complementary and Alternative Medicine (CAM) in the management of musculoskeletal disorders

EUROCAM

This document reflects the position of EUROCAM, the foundation uniting European umbrella organisations of patients, medical doctors, veterinarians and practitioners in the field of Complementary and Alternative Medicine.

The following European umbrella organisations work together in EUROCAM:
European Ayurveda Association – EUAA
European Central Council of Homeopaths – ECCH
European Committee for Homeopathy – ECH
European Council of Doctors for Plurality in Medicine – ECPM
European Federation of Homeopathic Patients' Associations – EFHPA
European Federation of Osteopaths – EFO
European Federation of Patients' Associations for Anthroposophic Medicine – EFPAM
European Herbal & Traditional Medicine Practitioners Association – EHTPA
European Traditional Chinese Medicine Associations – ETCMA
International Association for Veterinary Homeopathy – IAVH
International Council of Medical Acupuncture and Related Techniques – ICMART
International Federation of Anthroposophic Arts and Eurythmy Therapies – IFAAET
International Federation of Anthroposophic Medical Associations – IVAA

The objective of EUROCAM is to promote and facilitate CAM's role in maintaining citizens' health, highlight the health promotion and illness prevention aspects of CAM for EU public health policy and programmes, to advance the accessibility, affordability and availability of CAM, and generally promote CAM at European level.

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1. Introduction

1.1. The chronic disease burden

The impact of the major chronic diseases (cardiovascular diseases, cancer, diabetes, chronic respiratory diseases, musculoskeletal conditions, oral diseases, mental disorders and others) cannot be overstated. It is estimated that these conditions account for 86% of the deaths and 82% of the disease burden in the WHO European region.[1] The WHO considers the rise in chronic diseases an epidemic and estimates that this epidemic will claim the lives of 52 million people in the European Region by 2030.[2]

Over 100 million EU citizens (or 40% of the population in Europe above the age of 15) are reported to have a chronic disease.[3] 1.7% of GDP is spent on disability and paid sick leave each year on average in EU countries, more than what is spent on unemployment benefits. In 2015, health spending accounted for 9.9% of GDP in the EU. People with musculoskeletal diseases generally have lower employment rates and are more likely to leave employment early compared to people without such musculoskeletal problems. For example, a cohort study in the United Kingdom shows that a third of people who had symptoms of arthritis left work due to ill health (Oxford Economics, 2010).[4]

A study from Belgium describes that musculoskeletal, cardiovascular, and respiratory diseases were the main contributors to the disability burden.[5]

Chronic pain either as a symptom or as independent disease represents another major medical condition causing disability, sick leave and psychosocial distress in the EU. A large-scale computer-assisted telephone survey in Europe revealed prevalence of up to 40% in 15 European countries and Israel. Twenty one percent of affected persons suffered from depression caused by chronic pain and forty percent of participants reported about inadequate management of their pain.[6]

Two out of three people, who have reached retirement age, have suffered from at least two chronic conditions; this explains why 70% to 80% of healthcare expenditure is

[1] Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2015. Geneva, World Health Organization; 2016. Global Health Estimates 2015: Burden of disease by Cause, Age, Sex, by Country and by Region, 2000-2015. Geneva, World Health Organization; 2016

[2] United Nations General Assembly 19 May 2011 Report by the Secretary-General on the prevention and control of non-communicable (A/66/83) accessed June 23, 2011

[3] http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/steering-group/operational_plan.pdf and European Chronic Disease Alliance, WHO Europe

[4] OECD/EU (2016), Health at a Glance: Europe 2016 – State of Health in the EU Cycle, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264265592-en

[5] Tsang A, Von Korff M, Lee S, Alonso J, Karam E, Angermeyer MC, Borges GL, Bromet EJ, Demytteneare K, de Girolamo G, de Graaf R, Gureje O, Lepine JP, Haro JM, Levinson D, Oakley Browne MA, Posada-Villa J, Seedat S, Watanabe M: Common chronic pain conditions in developed and developing countries: gender and age differences and comorbidity with depression/anxiety disorders. J Pain 2008, 9:883–891

[6] Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D: Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. Eur J Pain 2006, 10:287–333

spent managing chronic diseases. This corresponds to an annual budget €700 billion in the European Union - a figure undoubtedly set to rise in the coming years.[7]

1.2. Musculoskeletal disorders (MSDs) as a major cause of disability

Painful conditions and dysfunction of the musculoskeletal system constitute some of the most challenging chronic disorders that are encountered in clinical practice. Over 150 diseases and syndromes are currently classified within the term musculoskeletal disorders. The most common of these are back and neck pain and other musculoskeletal disorders osteoarthritis (OA) and rheumatoid arthritis (RA). In a very recent survey the overall prevalence of chronic musculoskeletal pain was 35.7% (28.8-31.7), ranging from 18.6% (17.1-20.1) for Switzerland to 45.6% (43.3-47.8) for France. This study included 61,157 participants older than 50 years residing in 14 different European countries.[8] The general term musculoskeletal disorder (MSD) is a non-diagnostic designation which includes wide range of painful conditions affecting the musculoskeletal system.[9]

MSDs are the most common cause of severe long-term pain and disability in the European Union (EU). A 2007 EU survey found that 22% of the population was currently experiencing or had suffered long-term MSDs such as rheumatism and arthritis resulting in significant healthcare and social support costs.[10] MSDs are a major cause of sickness absence from work involving significant economic cost through lost productivity. Over 44 million (one in six) members of the EU workforce now have a long-standing health problem or disability that affects their ability to work and MSDs account for a higher proportion of sickness absence from work than any other health condition.[11] MSDs account for nearly half (49%) of all absences from work and 60% of permanent work incapacity in the EU. These, and other socio-economic consequences of suffering from poor health due to muscle and joint pain, represent an estimated cost to the EU of around €240 billion per annum.[12]

Low back pain is the most prevalent of the musculoskeletal conditions and is the second most common complaint in general practice with a lifetime prevalence of up to 75% affecting a large proportion of the adult population.[13] Low back pain is the leading cause of years lived with disability (YLDs), not only in central and eastern Europe, but also throughout the world.[14]

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[7] See http://www.oecd.org/dataoecd/43/9/48245231.pdf. Accessed 14/2/18 and "The future of healthcare in Europe", The Economist Intelligence Unit Limited 2011 (http://www.janssen-emea.com/sites/default/files/The%20Future%20Of%20Healthcare%20in%20Europe.pdf), Accessed 14/2/18

[8] Cimas M, Ayala A, Sanz B, Agulló-Tomás MS, Escobar A, Forjaz MJ (2018). Chronic musculoskeletal pain in European older adults: Cross-national and gender differences. Eur J Pain, 22(2):333-345.

[9] http://ec.europa.eu/health/major_chronic_diseases/diseases/musculoskeletal/index_en.htm. Accessed 24/4/16.

[10] EUmusc.net. Musculoskeletal Health in Europe Report v5.0. http://www.eumusc.net/myUploadData/files/Musculoskeletal%20Health%20in%20Europe%20Report%20v5.pdf Accessed 24/4/16.

[11] Bevan S et al (2009) Fit For Work? Musculoskeletal Disorders in the European Workforce. The Work Foundation, London

[12] Ibid.

[13] Murthy V,Sibbritt DW, Adams J (2015). An integrative review of complementary and alternative medicine use for back pain: a focus on prevalence, reasons for use, influential factors, self-perceived effectiveness, and communication. The Spine Journal, 15:1870–1883

[14] Vos T et al (2012). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, The Lancet, 380(9859):2163-96.

Around 15-20% of consultations in primary care are for MSDs.[15] Treatment of MSDs often involves costly diagnostic and therapeutic procedures. While conventional medical treatment can alleviate these conditions to some extent, this usually involves a taking a cocktail of drugs. By and large these are treatments that aim at symptom control rather than resolution; they neither emphasise the need for beneficial lifestyle and/or dietary changes nor encourage recovery motivated by the patient. These approaches frequently are associated with adverse effects and/or permit continuation of bad habits (e.g. lack of exercise or poor diet) that are the cause of the MSDs. Recent Cochrane reviews clearly demonstrate a lack of long-term effectiveness for single treatment approaches including surgical interventions in the treatment of chronic conditions affecting the musculoskeletal system.[16,17,18,19,20]

A European Consensus Report addressing the spiralling costs spent on largely ineffective treatments for chronic pain highlights the fact that most chronic pain problems are caused by MSDs.[21]

[15] http://ec.europa.eu/health/major_chronic_diseases/diseases/musculoskeletal/index_en.htm. Accessed 24/4/16.
[16] O'Connell NE et al (2013). Interventions for treating pain and disability in adults with complex regional pain syndrome.Cochrane Database Syst Rev. 4:CD009416.
[17] Safoora E et al (2014). Therapeutic ultrasound for chronic low-back pain Cochrane database of systematic reviews, 3(3):CD009169.
[18] Wiffen PJ et al (2013). Antiepileptic drugs for neuropathic pain and fibromyalgia - an overview of Cochrane reviews.Cochrane Database Syst Rev, 11:CD010567.
[19] Chaparro LE et al (2013). Opioids compared to placebo or other treatments for chronic low-back pain. Cochrane Database Syst Rev,8:CD004959
[20] Jacobs W et al (2012). Total disc replacement for chronic back pain in the presence of disc degeneration.Cochrane Database Syst Rev.,9:CD008326.
[21] Pain Proposal - Improving the current and future management of chronic pain, published by European Pain Federation EFIC, available at http://www.efic.org/userfiles/file/pain_proposal.pdf. Accessed 24/4/16.

2. The role of CAM in managing musculoskeletal disorders

Complementary and Alternative Medicine (CAM) can offer innovative options for prevention and treatment of MSDs. CAM modalities are generally based on a holistic approach that understands health to be based on adaptable, self-regulating, integrated body/mind systems maintaining homeostasis within a constantly changing environment. Illness/disease represents a disruption of these life affirming processes whether on the physical, emotional, social, mental, and spiritual levels. CAM therapies incorporate the important notion that individuals should take responsibility for their mental and physical health. Treatment involves mobilisation and stimulation of patients' self-regulating capacity to restore balance in the physical and psycho-spiritual system thereby reinforcing the autonomy and resilience of the individual. Care is patient centred and individualized and responsibility is shared between the health professional and the patient.

In the case of musculoskeletal disorders CAM offers a broad range of modalities, which can be used effectively for prevention and long-term management e.g. remedial exercises (such as qigong, breathing therapy, mindfulness stress reduction, eurhythmy therapy, taijiquan -AKA tai chi chuan - & yoga), and specific treatments (e.g. acupuncture, anthroposophic medicine, homeopathy, reflexology & shiatsu). Several of these modalities can be used together for both prevention and treatment**.** Good examples of the long-term effectiveness of CAM methods in a multimodal setting are two recent studies[22,23] showing that patients suffering from lumbar disc herniation and from symptomatic cervical intervertebral disc herniation had long-term benefit in pain, disability and quality of life accompanied by high satisfaction rates.

It can be assumed that the high satisfaction with CAM treatments is not negligible as CAM is currently used by one out of two EU citizens.[24] This high demand is reflected by the fact that CAM is offered by 150,000 registered medical doctors and more than 180,000 registered and CAM-certified non-medical practitioners in the EU. This makes an impressive ratio of 65 CAM providers per 100,000 EU citizens in comparison to the ratio of 95 general medical practitioners per 100,000 EU citizens. Statistics regarding the use of CAM among patients are less clear due to a large data gap, but estimates for some Member States suggest over 80% of EU citizens are accessing CAM. Studies surveying the prevalence of CAM use indicate that MSDs were the conditions most reported to be treated using CAM interventions.[25]

Acupuncture is the most frequently provided method (53% of all practitioners) with 80,000 physicians and 16,000 non-medical practitioners trained in the therapy, followed by homeopathy (27% - 45,000 and 4,500, respectively). These two disciplines are widely practised by physicians as well as non-medical practitioners. Herbal medicine and

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[22] Shin J-S, Lee J, Lee YJ, Kim M-R, Ahn Y-J, Park KB, Shin BC, Lee MS, Ha I-H (2016). Long-term course of alternative and integrative therapy for lumbar disc herniation and risk factors for surgery: a prospective observational 5-year follow-up study. *Spine* (Phila Pa 1976). 2016

[23] Baek SH, Oh JW, Shin J-S, Lee J, Lee YJ, Kim M-R, Ahn Y-J, Choi A, Park KB, Shin B-C, Lee MS, Ha I-H. 2VLong term follow-up of cervical intervertebral disc herniation in patients treated with integrated complementary and alternative medicine: a prospective case series observational study. BMC.*Complement Altern Med* 2016; 16: 2

[24] http://cordis.europa.eu/news/rcn/35388_en.html. Accessed 23/8/14

[25] CAMbrella Final Report 2013. http://cordis.europa.eu/publication/rcn/15840_en.html. Accessed 24/4/16.

manual therapies are almost exclusively provided by non-medical practitioners. Naturopathy, on the other hand, is dominated by 15,000 (mostly German) physicians, as is anthroposophic medicine (4,500) and neural therapy (1,500). This widespread use of CAM suggests that it may play a major role in managing musculoskeletal disorders.

A recent review of international literature on CAM use for back pain drew on sample sizes ranging from 6% to 76.4%.[26] It showed that of the CAM modalities, acupuncture, chiropractic, osteopathy, and massage therapy were commonly used for back pain. The most common reasons for CAM use for back pain from large sample–sized population studies were 'frequent, disabling or chronic back pain.' Nearly half the reviewed articles reported on self-assessed effectiveness of CAM use demonstrating that back pain sufferers using CAM perceive their CAM treatments to be beneficial.

CAM is also increasingly used alongside conventional medications to treat osteoarthritis of the knee. In general, arthritis is among the top 6 conditions for which CAM is used.[27]

3. Effectiveness research

Despite a universally unsatisfactory situation in funding CAM projects and research within the last decades, CAM has nevertheless accumulated a commendable degree of scientific evidence for its use.

However, to make informed decisions about the use of CAM there is urgent need to prove its effectiveness by all scientific measures. These include qualitative and quantitative clinical research as well as comparative effectiveness research, employing a diversity of methods to evaluate CAM's complex systems so as to enable full integration of CAM into the healthcare systems of Member States and particularly measure its use for MSDs.

3.1. Acupuncture

In the West acupuncture is the most well-known therapy in traditional Chinese medicine. It uses the insertion of fine metal needles at precisely established points on the skin for diagnostic and/or therapeutic purposes; these points may be spontaneously painful or tender (known as 'Ah Shi points' in Chinese).

In case of musculoskeletal disorders acupuncture aims to reduce pain and to improve function. There is a huge body of scientific evidence showing that acupuncture has specific physiological effects on different levels of the nervous, endocrine and humoral system as well as connective tissue.[1-5] (references at the end of the manuscript) Acupuncture evokes a close patient-therapist relationship and high credibility[6] and is therefore able to

[26] Murthy V,Sibbritt DW, Adams J (2015), see 11.
[27] Lapane KL, Sands MR, Yang S, McAlindon TE, Eaton CB (2012). Use of complementary and alternative medicine among patients with radiographic-confirmed knee osteoarthritis. Osteoarthritis Cartilage, 20(1):22-8.

evoke self-healing processes and improve self-care strategies.[7] In short, acupuncture fulfils the criteria of patient-centred medicine.[8]

From a scientific point of view, acupuncture has been shown to be effective in some of the major musculoskeletal disorders. This includes low back pain, neck pain, shoulder pain and osteoarthritis of the knee. Clinically relevant effects have been described in many large-scale randomized trials published in the last twenty years.

Early trials revealed that acupuncture was more effective than conventional massage in neck pain,[9] that acupuncture was superior to standard treatment in shoulder pain,[10] that acupuncture had better effects on pain and dysfunction compared to standard medical treatment in osteoarthritis[11] and that acupuncture was superior to standard care in improving function in patients with low back pain[12].

This gave rise to several high-quality meta-analyses such as those of the Cochrane collaboration on the efficacy of acupuncture in MSDs.[13-15] These claimed the need for further high-quality trials. As the number of methodological rigorous trials increased, further meta-analytic evidence was established for clinically relevant effects of acupuncture in the treatment of MSDs in comparison to standard care and no treatment.[16-18] In comparison to sham-acupuncture controls, these reviews, however, often identified small effect sizes.

Since bias may arise from usual meta-analyses which are solely based on population average data, whenever possible, a meta-analysis of individual patient data should be performed, because it provides the least biased and most reliable means for addressing questions that have not been satisfactorily resolved by individual clinical trials.[19] Thus, a group of international renowned researchers have performed meta-analyses of individual patient data obtained in acupuncture trials on chronic MSDs.[20] These results represent the highest level of evidence in this field and demonstrate clinically relevant effects of acupuncture in the treatment of back pain, shoulder pain and osteoarthritis in comparison to both sham-acupuncture and non-acupuncture controls (standard care & waiting list). These results have recently been confirmed by updated individual patient data meta-analyses including data of 20,827 patients assessed in 39 trials.[21] From this individual patient data substantial long-term effects (1 year) of acupuncture in the treatment of MSDs has also been identified.[21,22] According to this substantial body of evidence, effects of acupuncture are large in comparison to standard care and no treatment (standard mean difference of 0.5) while a comparison to sham-acupuncture interventions revealed smaller effect sizes around 0.2. This fact has clearly been linked to the large treatment effects elicited by skin penetration during sham-procedures.[23]

Regarding the safety of acupuncture, large studies and surveys have demonstrated that acupuncture is a safe treatment with an extremely low rate of severe adverse events and a low rate of minor adverse events.[24,25] Acupuncture has also been found cost-effective in the treatment of chronic neck pain[26], osteoarthritis of the knee[27] and low back pain[28].

Taking all this together, it has been widely demonstrated that acupuncture has a plausible physiological basis; it can provide an effective and safe treatment for patients with MSDs where the aim of the treatment is to reduce pain and disability. In summary,

acupuncture seems to be an ideal form of treatment to treat many types of MSDs so long as the quality and standards of acupuncture practice is assured.

3.2. Anthroposophic medicine

Anthroposophic medicine (AM) is an integrative multimodal therapy system based on a holistic understanding of man and nature and of disease and treatment.[1] (references at the end of the manuscript) AM is provided by medical doctors, therapists, and nurses and is integrated with conventional medicine in large hospitals and medical practices. AM utilises medicines derived from plants, minerals, and animals; and art therapy, eurythmy therapy, and rhythmical massage; counselling; psychotherapy; and specific nursing techniques such as external embrocation.

Interdisciplinary management and treatment of MSDs with AM has a 90-year history with high patient satisfaction. Scientific research shows the following:

Low back pain
In a 12-month prospective comparative observational study of outpatients with non-specific and discogenic (i.e. pain originating from a damaged vertebral disc) low back pain (LPB), multimodal AM treatment was followed by improvement in symptoms and quality of life, with a low use of back-related drugs (analgesics, NSAID, muscle relaxants, antidepressants). Improvements were comparable to or more extensive than in patients receiving conventional care.[2] Follow-up-analyses of the AM patients confirmed these improvements in a larger sample and showed that the improvements were maintained at two[3] and four-year[4] follow-ups.

A retrospective comparative observational study showed that in outpatients with acute discogenic LBP, subcutaneous injections of AM medications, combined with a local anaesthetic, had better results than injections of an opioid + local anaesthetic. AM medication injections as an add-on to acupuncture had no additional benefit, compared to acupuncture alone.[5] According to another retrospective comparative observational study, comprehensive inpatient AM therapy for discogenic LBP was followed by reduced NSAID and muscle relaxant use and earlier return to work, compared to conventional inpatient treatment.[6]

Neck pain
In a descriptive analysis, comprehensive AM treatment in non-specific neck pain was associated with improvements in quality of life (the Short Form (36) Health Survey[28]) of similar order of magnitude to improvements of the same outcomes in other treatment studies for this condition.[7]

A single-arm study showed that in patients with acute muscular occipital pain, subcutaneous injections of AM medications resulted in pain relief, often with immediate effect.[8]

[28] The SF-36 is a generic patient-reported outcome measure aimed at quantifying health status and is often used as a measure of health-related quality of life.

Rheumatoid arthritis
Data from a small single-arm observational study with two-year follow-up indicate that symptoms and inflammatory markers can be reduced without disease modifying anti rheumatic drugs (DMARD).[9] A large four-year prospective comparative observational study of AM vs. conventional treatment for early rheumatoid arthritis has been carried out.[29]

Other musculoskeletal indications
In a double-blind placebo-controlled RCT a research team demonstrated that AM medications (Arnica oral and ointment) for pain relief after endoscopic surgery for carpal tunnel syndrome lead to more pain reduction after two weeks, compared to placebo. There was no difference in grip strength or wrist circumference.[10]

The AM medication *Stannum metallicum* 5% ointment was followed by improvement in pain and functional impairment in a single arm study.[11] The therapy was used for patients with osteoarthritis (83 x knee osteoarthritis, 29 polyarticular osteoarthritis, 4 post meniscectomy and 14 others with OA). In another single-arm study AM rhythmic embrocation therapy was followed by improvement of chronic, predominantly musculoskeletal pain.[12]

3.3. Ayurveda

Ayurveda (the 'science of life') is a system of traditional medicine native to the Indian subcontinent using methods for achieving physical, mental and spiritual health and wellbeing. Ayurveda emphasizes prevention and a holistic approach to diagnosis and therapy. In its native countries, Ayurveda has a status equal to western medicine, but it is practised as a form of CAM within the western world. Several of its methods, such as the use of herbs, massage, and yoga are applied on their own as a form of CAM treatment. In recent years, Ayurveda has been a fast-growing CAM modality in Europe and is recognized by WHO as a medical science.[1] (references at the end of the manuscript)

Ayurveda uses individualized approaches to treatment based on its inherent paradigms of health/balance or disease/imbalance. Musculoskeletal disorders are a disease category that is discussed in depth in the classical medicinal textbooks of Ayurveda. Usually, Ayurveda recommends a therapeutic approach tailored to the individual according to the diagnosis of the constitution of the patient, disease process and individual pathogenic factors. The therapy comprises various treatments/measures like individualized diet, exercise, behavioural changes, herbal preparations for internal and external use, relaxation techniques (meditation) and so-called purification therapies ("pancha karma" or five-fold therapy). All these therapies can be used as appropriate and may also be integrated with conventional western medicine treatment.

Though Ayurveda has been practiced for millennia in its countries of origin, high quality research with evidence-based results is still in its initial phase. Ayurvedic therapy of musculoskeletal disorders seems to be the area with the widest research activity so far with trials also going on in European settings.

[29] Simon L, Hamre HJ et al (2018). Patient Preference and Adherence, in press.

A meta-analysis of 33 controlled clinical trials on musculoskeletal disorders from Charité University Berlin shows that there is good evidence in the use of ayurvedic multi-herbal formulations.[2]

A study in Norway that assessed ayurvedic treatment in the treatment of MSD showed encouraging results in the treatment of fibromyalgia with multimodal ayurvedic treatment protocols in both short and long term follow up.[3] A more recent study performed at Charité University Berlin showed excellent results using an individualized ayurvedic intervention in comparison to standard treatment.[4]

A trial by Furst et al employing Ayurveda, methotrexate and their combination in the treatment of rheumatoid arthritis, found all 3 treatments were approximately equivalent in efficacy and that adverse events were numerically fewer in the Ayurveda-only group. [5,6]

A number of herbs traditionally used in Ayurveda in the treatment of musculoskeletal disorders have demonstrated their potential as anti-inflammatory agents with minimal side effects. Research at University of Heidelberg performed by Prof. H.P.T. Ammon indicates that frankincense (*Boswellia serrata*) and Indian myrrh (*Commiphora mukul*) are efficient modulators of inflammatory processes (see also the section on Herbal Medicine below).[7]

Musculoskeletal disorders present with multiple symptoms and a variety of aetiologies. Ayurveda has much to offer through its various modalities: meditation and yoga release tensions and improve physical flexibility, herbal preparations reduce pain and inflammation and purification therapies release blockages that cause pain, inflammation and restrictions in physical movement. Ayurveda has been used outside India only for a relatively short time and for it to be widely accepted and used alongside mainstream medicine more research needs to be undertaken to prove its value.

Yoga is described under a separate heading.

3.4. Herbal medicine

Herbal medicine – also called botanical medicine, phytomedicine or phytotherapy – refers to using a plant's seeds, berries, roots, leaves, bark, or flowers at therapeutic doses in the maintenance of optimal health, and in the treatment and prevention of disease. Whole herbs contain many chemical constituents working synergistically together to treat disease and support the body's own healing mechanisms (e.g. its immunity).

Recent research has demonstrated that plant medicines, rich in anti-inflammatory phytochemicals such as flavonoids and catechins from green tea and rosehip, curcumin from turmeric, and resveratrol from blueberries, grape skins and Japanese knotweed (*Polygonum cuspidatum*) may have significant anti-inflammatory actions. Resveratrol has, for example, been shown to be a potent inhibitor of TNF-alpha and IL-1beta induced NF-kappaB activation that inflames synovial cells in those with arthritis.[1] (references at the end of the manuscript) Moreover, studies have revealed that mixtures of these phytochemicals may be more effective than the individual compounds. Treatment with curcumin and

resveratrol suppresses expression of the NF-κB-regulated gene products involved in inflammation (i.e. COX-2, MMP-3, MMP-9), and vascular endothelial growth factor (VEGF).[2] This highlights the use of traditional *combinations* of herbal medicines to maximise their anti-inflammatory potential.

Osteoarthritis

The use of herbal medicines to treat osteoarthritis was evaluated in a systematic review of randomized controlled trials of herbal medicines published by Long et al. in 2001.[3] Twelve clinical trials and two systematic reviews fulfilled the authors' inclusion criteria. The authors found promising evidence of effective use of some herbal preparations in the treatment of osteoarthritis. In addition, evidence was found to suggest that some herbal medicines might reduce dosage or use of non-steroidal anti-inflammatory drugs. The authors concluded that some herbal medicines might be realistic alternatives for patients with osteoarthritis.

A more recent systematic review by De Silva et al. of the efficacy of oral and topical complementary and alternative medicines – including herbal medicines – for the management of osteoarthritis including 56 RCTs, found consistent evidence in 5 RCTs with a median Jadad score of 4 that capsaicin derived from chilli peppers (*Capsicum minimum*) is efficacious in the management of osteoarthritis.[4] Jadad scoring is the most widely used procedure to independently assess the methodological quality of a clinical trial. The efficacy of Indian frankincense (*Boswellia serrata*) for knee osteoarthritis was demonstrated across 3 RCTs with a median Jadad score of 4. The efficacy of rose hip (*Rosa canina*) for osteoarthritis was demonstrated across 3 RCTs with a median Jadad score of 3.

Chinese herbal medicine is an ancient form of herbal medicine practised according to the precepts of traditional Chinese medicine (TCM). Current research is validating the application of several medicinal plants and herbal formulations traditionally used in TCM to treat osteoarthritis. For example, two main components of the plant *Angelica sinensis* (dang gui), the phytochemical, sodium ferulate, and a polysaccharidic fraction have recently been tested on osteoarthritis animal models or in human chondrocytes stimulated by the pro-inflammatory cytokine, Interleukine-1β. The results showed that sodium ferulate exhibited marked anti-inflammatory and anti-apoptotic properties while the polysaccharidic fraction was found to promote proteoglycan biosynthesis in cartilage matrix. (Proteoglycans enable tissue to withstand compressional forces.) This research suggests that the combined action of sodium ferulate and the polysaccharidic fraction in *Angelica sinensis* may prevent cartilage destruction in osteoarthritis encouraging cartilage repair.[5]

Research into CHM is urgently needed but as is the case for other forms of herbal medicine the usual funding streams available for conventional drug development are largely inaccessible.

Rheumatoid arthritis

A Cochrane review of herbal therapy for rheumatoid arthritis in 22 RCTs involving 1020 subjects, based on pooled data from 7 studies, indicated potential benefits of evening primrose (*Oenothera biennis*), borage seed (*Borago officinalis*), and blackcurrant seed (*Ribes nigrum*) oils, all of which contain gamma linolenic acid (GLA), in reducing pain intensity. Thunder God Vine (*Tripterygium wilfordii* Hook F), used in TCM, was shown to relieve RA symptoms compared with placebo and compared with sulfasalazine, but

heterogeneity of the 3 relevant included trials precluded meta-analysis.[6] Some serious side effects are associated with use of this plant and in China it is normally used in conjunction with liver and kidney function tests.

Gout
A systematic review of the effectiveness and safety of Chinese herbal medicines for gout found that Chinese herbal medicines combined with conventional medicine was more effective than conventional medicine alone, and also more effective than conventional medicine in those included trials that reported on function limitation relief.[7]

Further investigation of each traditional herbal therapy is urgently needed and is likely to yield rich therapeutic rewards.

See also section on Ayurveda above for further herbal information.

3.5. Homeopathy

Homeopathy is used by tens of thousands of physicians and over 500 million people worldwide, making it one of the most popular forms of complementary medicine. It is based on the concept of 'treating like with like'. Homeopathic treatment aims to stimulate and direct the body's self-healing capacity by triggering a reaction. It treats the person not the disease. Medicines are selected on the basis of the patient and his or her symptoms. Each treatment – like each person – is unique.[1] (references at the end of the manuscript)

Homeopathic medicines are prepared from plant, mineral and animal sources by a process of repeated dilution and succussion. In the European Union, the authorisation for a homeopathic medicine for human use to be present on the market is regulated by Directive 2001/83/EC on medicinal products for human use, completed with specific provisions on the proof of quality, safety and efficacy in Directive 2003/63/EC.[2] There is a growing demand for homeopathic products worldwide, whose sells amounted to $386 million in 2015 and it is forecasted will reach $17 billion in 2024.[3]

Homeopathy is part of the national health care systems of many countries. In Europe, homeopathy is present in the national health care systems of Switzerland, France, Belgium, Germany, United Kingdom and Italy.[4] Outside Europe, countries like India, Brazil and Cuba have integrated homeopathy in their public health and health care systems.[5] This is in line with the World Health Organization 2014-2023 Strategy on Traditional, Complementary and Integrative Medicine, which encourages countries to develop proactive policies and implement action plans on traditional and complementary medicine.[6]

There is published scientific evidence for the benefits of homeopathy in many musculoskeletal conditions: arthritis, osteoarthritis, fibromyalgia, back pain and osteoporosis. All these scientific papers are available from the research database CORE-Hom, which comprises 1,015 clinical trials on homeopathy and provides information on the quality of the studies it contains.[7]

Patients with musculoskeletal conditions treated by homeopathic physicians showed a similar clinical progression but took about half the amount of non-steroidal anti-

inflammatory drugs (NSAIDs) compared to conventionally-treated patients, with fewer NSAID-related adverse events and no loss of therapeutic opportunity.[8] This is the conclusion of the largest comparative effectiveness study of homeopathy published to date: the EPI3 study. A nationwide study in France, coordinated by the Department of Pharmacoepidemiology at the University of Bordeaux, which included 6,379 patients at 804 medical practices. It compared treatment outcomes for patients attending conventional, homeopathic, and mixed practice family physicians in musculoskeletal conditions, upper respiratory tract infection, sleep disorders, anxiety, and depression in terms of clinical benefit, medical care and medication, adverse effects, and loss of therapeutic opportunity. Patients did not differ between groups except for the chronicity of their illness, which was greater in the homeopathic group.

The same EPI3 study concluded that the overall health expenditure was 20% less for patients consulting homeopathic physicians.[9] This confirms all previous studies that showed reduced cost or no additional cost for homeopathic treatment.

There is no evidence of serious adverse effects from homeopathic medicines[10]. If adverse effects occur, they are usually mild and transient. The main risks associated with homeopathy are indirect, relating to the prescriber rather than the medicine.

To summarise, there is scientific evidence for the benefits of homeopathy in many musculoskeletal conditions. Its integration in the health care system implies better outcomes, less drugs and economic benefits for patients and the community.

3.6. Osteopathy

Osteopathy is a system of diagnosis and treatment for a wide range of medical conditions. It is based on the principle that the well-being of an individual depends on the skeleton, muscles, ligaments and connective tissues functioning smoothly together.

To an osteopath, for your body to work well, its structure must also work well. So osteopaths work to restore your body to a state of balance, where possible without the use of drugs or surgery. Osteopaths use touch, physical manipulation, stretching and massage and treatment attends to body mechanics and manipulative methods in diagnosis and therapy. It is a contact and patient-centred healthcare discipline, that emphasises the interrelationship of structure and function of the body, facilitates the body's innate ability to heal itself and supports a whole-person approach to all aspects of health and healthy development, principally through manual treatment.

The practice of osteopathy uses current medical and scientific knowledge to apply the principles of osteopathy to patient care. Scientific plausibility and evidence-based outcomes have a high priority in patient treatment and case management. Osteopathy provides a broad range of approaches to the maintenance of health and the management of disease. It embraces the concept of the unity of the individual's structure (anatomy) and function (physiology); as such osteopathy is a patient-centred rather than disease-centred system of health care.

An essential component of osteopathy is its primary focus on body mechanics and its

employment of skilful manual techniques in diagnosis and therapy. Osteopathy was developed as a means to facilitate normal self-regulating/self-healing mechanisms in the body by addressing areas of tissue strain, stress or dysfunction which may impede normal neural, vascular and biochemical mechanisms.

Franke et al. assessed effectiveness of osteopathic manipulative treatment (OMT) in the management of nonspecific low back pain (LBP) regarding pain and functional status.[1] (references at the end of the manuscript) They conducted a systematic literature search and identified 307 studies, 31 of them were evaluated and 16 excluded. Of the 15 studies reviewed, 10 investigated effectiveness of osteopathic manipulative treatment (OMT) for nonspecific LBP, 3 assessed the effect of OMT for LBP in pregnant women, and 2 the effect of OMT for LBP in postpartum women. Twelve studies demonstrated a low risk of bias. Moderate quality evidence suggested OMT had a significant effect on pain relief and functional status in acute and chronic nonspecific LBP. In chronic nonspecific LBP, moderate quality evidence suggested a significant difference in favour of OMT regarding pain and functional status. For nonspecific LBP in pregnancy, low quality evidence suggested a significant difference in favour of OMT for pain and functional status, whereas moderate quality evidence suggested a significant difference in favour of OMT for pain and functional status in nonspecific LBP postpartum.

The authors conclude that this systematic review used the most comprehensive search for studies of OMT for nonspecific LBP. The studies they reviewed generally had a low risk of bias, but most had relatively small sample sizes of patients. Clinically relevant effects of OMT were found for reducing pain and improving functional status in patients with acute and chronic none specific LBP and for LBP and pregnant and postpartum women at three months post treatment. However, larger, high-quality randomized controlled trials with robust comparison groups are recommended.

Registry data collection project

More recently, Morris et al. reported the results of a registry data collection project within a secondary care spinal osteopathy service.[2] Clinical and demographic data were collected using the Spine Tango Conservative registry data collection tool. Outcomes were assessed using the Numerical Pain Rating Scale (NPRS), Oswestry Disability Index (ODI), Neck Disability Index (NDI), COMI Low Back Conservative (COMI-LBC), COMI Neck Conservative (COMI-NC) and EQ5D. Global treatment outcome (GTO), satisfaction with care and therapeutic complications were reported using the Spine Tango Patient Self-Assessment form (STPSA). The correlation of GTO and PROM change scores was analysed using Spearman's rank correlation coefficient.

The results were impressive as of the 262 patients that presented during the study period, 100% of patients had chronic spinal pain and 98.8% had previously received other interventions for the same episode. 83.2% of patients reported that osteopathy had 'helped a lot' or 'helped'. 96.2% of patients were 'very satisfied' or 'satisfied' with care. There were no serious therapeutic complications.

Conclusions that can be drawn at present are that the secondary care spinal osteopathy service demonstrated high satisfaction, few therapeutic complications and positive outcomes on all PROMs. Registry participation has facilitated robust clinical governance and the data supports the use of osteopaths to deliver a conservative spinal service in this setting.

3.7. Taijiquan (AKA Tai Chi Chuan or Tai Chi)

Taijiquan developed as martial art in China, where it has been practised for centuries. It has become a popular sport all over Asia aiming to promote health and self-development and to prevent diseases. Taiji typically includes a series of dance-like movements that combine to postures or forms. The forms are executed using slow and smooth movements that flow into each other. Taiji is not only a movement therapy, but also includes meditative aspects that make it an effective means of reducing stress and increasing psychological well-being. It combines different dynamic exercises based on self-defense performed as singular or partner exercise or in a group setting. Group therapy helps to foster contact and social support.

Qigong is a related traditional method based on martial arts, influenced by Daoism, Buddhism and especially Traditional Chinese Medicine. It consists of different static and dynamic exercises, breathing and mediation. In the last centuries Qigong exercises have been especially developed for the treatment of disease and health prevention.

There is scientific evidence, that regularly exercising these methods can have beneficial effects on different musculoskeletal disorders.

Osteoarthritis

Patients with osteoarthritis of the knee might benefit from taiji by increasing lower extremity muscular strength and joint stability. This was shown by Lauche R et al., who published a systematic review and meta-analysis on the effectiveness of taiji for osteoarthritis of the knee.(1) (references at the end of the manuscript) Five RCTs with a total of 252 patients were included. Four studies had a low risk of bias. The systematic review found moderate overall evidence for short-term effectiveness for pain, physical function, and stiffness. Strong evidence was found for short-term improvement of the physical component of quality of life. Given that Taiji appears to be at least effective and safe in the short-term, it might be preliminarily recommended as an adjuvant treatment for patients with osteoarthritis of the knee.

Low back pain

In chronic low back pain Taiji and Qigong can improve restricted mobility, coordination and self-perception. A recent high-quality trial reported qigong to be at least equal to conventional exercises.[2] In a systematic review Peng[3] identified one trial on taiji and low back pain[4]. On the basis of this high-quality trial with narrow confidence intervals and high adherence, there is evidence to suggest that taiji is beneficial for pain relief and disability associated with chronic low back pain. However, another recent trial failed to show that qigong might be better than the waiting list in elderly patients.[5]

Fibromyalgia

Fibromyalgia is another widespread chronic pain condition. One RCT on fibromyalgia demonstrated significant improvements at the end of 12-week training in the taiji group, according to several scores currently in use. [6] The effect sizes found in this study were much larger than those from FDA-approved pharmacotherapy, including antidepressants, gabapentinoids and milnacipran. On the basis of this high-quality trial with narrow confidence intervals and high adherence, evidence suggests that taiji is beneficial for pain relief, physical function, and psychological wellbeing in patients with fibromyalgia.

Prevention
A major benefit of qigong and taiji can be seen on the level of prevention of disease. In a high quality RCT taiji practice reduced in at-risk adults and older adults the rate of falls and injury-related falls over the short term (<12 months) by approximately 43% and 50%, respectively. This is in line with a systematic review by Huang et al.,[7] which underlines the improvement of balance control ability and flexibility in the elderly.

3.8. Traditional Chinese Medicine (TCM)

Traditional Chinese medicine (TCM) originated in ancient China and has evolved over thousands of years. It encompasses many different practices, including acupuncture, moxibustion (burning a herb above or on the skin to apply heat to acupuncture points), Chinese herbal medicine, tuina (Chinese therapeutic massage), gua sha (a skin scraping therapy), dietary therapy, and taiji (tai chi) and qigong (practices that combine specific movements or postures, coordinated breathing, and mental focus). TCM dates back more than 2,500 years. Traditional systems of medicine also exist in other East and South Asian countries, including Japan (where the traditional herbal medicine is called Kampo) and Korea. Some of these systems have been influenced by TCM and are similar to it, but each has developed distinctive features of its own.

Acupuncture and taiji (tai chi) are described under separate headings. Chinese herbal medicine is addressed in the section on herbal medicine.

3.9. Yoga

Yoga is a systematic practice of physical exercise, breath control, relaxation, diet control, positive thinking and meditation aimed at developing harmony in the body, mind, and environment. The practice entails low-impact physical activity, postures (called asanas), breathing techniques (pranayama), relaxation, and meditation.

Regular practice of yoga can lead to reduced stress levels, improved flexibility and muscle strength, improved posture, improved awareness of the physical body and the self. As it is not necessary to be in peak physical condition to practice yoga, it is an ideal activity for sedentary people and for seniors as well as for those who are more active.

Low back pain
The practice of yoga appears among the most common complementary treatments used to manage low back pain (LBP). Cramer et al (2013) identified 10 trials, involving a total of 967 participants, and included them in a systematic review.[1] (references at the end of the manuscript) Although heterogeneity of yoga interventions regarding yoga style, length of the programme and frequency of the intervention might limit interpretation of the results, there is evidence that yoga improves pain and disability in patients with chronic LBP. The effect sizes are similar in magnitude to other effective therapies for this condition. Potential advantages of yoga over other therapies are that it is usually group-based and delivered in a community rather than a hospital setting and it has been also shown to have other health benefits. According to the authors there was strong evidence for

short-term effectiveness and moderate evidence for long-term effectiveness of yoga for chronic LBP in the most important patient-centred outcomes. The authors stated that the results of the review were applicable to most patients with LBP seen in clinical practice. Yoga can be recommended as an additional therapy to patients who do not improve with education on self-care options.

Neck pain
While the effects of yoga on neck pain have been less intensively studied than those on low back pain, a recent systematic review assessed three randomized trials of which two were of higher quality.[2] This analysis found positive effects of yoga on pain intensity, disability, quality of life and mood. Yoga was not associated with serious adverse events.

Rheumatic diseases
In another systematic review Cramer et al. (2013) evaluated the quality of evidence and the strength of recommendation for yoga as an ancillary intervention in rheumatic diseases.[3] Eight RCTs with a total of 559 subjects were included. There was very low evidence for effects on pain and low evidence for effects on disability.

Arthritis
In a scoping review, Haaz and Bartlett (2010) evaluated 4 randomized and 7 non-randomized studies on yoga for patients with arthritis and found positive effects on disease symptoms and disability.[4] The intervention was not associated with serious adverse events and the patients' compliance was comparable or better than typical for exercise interventions in this patient group.

Fibromyalgia
A further systematic review assessed the effects of meditative movements in the fibromyalgia syndrome.[5] Among others, this review included two randomized trials on yoga and found significant effects on pain, fatigue, sleep, depression and health-related quality of life.

4. Contribution of CAM to preventing and minimising disability, sick leave and premature retirement

As demonstrated above there is increasing evidence that CAM therapies may be used to relieve pain and improve disability in MSDs while various physiological mechanisms underlying these effects have been identified. In addition to symptomatic pain relief, there are other reasons why CAM interventions may also help to minimize sick leave and premature retirement linked to musculoskeletal disorders. CAM therapies seek to engender patient self-sufficiency, encouraging beneficial life-style changes instead of dependence on a particular drug or treatment. Treatment is tailored to the patient´s needs, changing throughout a course of treatment according to presenting circumstances. In short, CAM fulfils the criteria of patient-centred care, providing care that is respectful of and responsive to individual patient preferences, needs, and values,

ensuring that the patient participates in all decisions regarding treatment.[30] According to an independent panel convened by the US National Institutes of Health, this should be the basis of any treatment of chronic disease characterised by chronic pain.[31, 32, 33, 34, 35] CAM therapies play an important role in an integrative treatment approach thereby optimising treatment effects of conventional care,[36] CAM therapies are based on a strong patient-therapist working relationship which appears critical to the management of chronic pain.[37] Such an integrative approach can benefit the general health of patients suffering from MSDs, ensuring patients' reintegration as healthy and productive members of society.

5. Concluding remarks and proposals

EUROCAM proposes that an integrated approach to the prevention, treatment and management of musculoskeletal disorders involving the use of complementary and alternative medicine along with conventional care can offer a significant dividend for EU citizens and its health systems. We propose that the development of such a best practice approach be funded under the Strategic Plan 2016-2020 of DG Health & Food Safety.[38] Recent research as well as clinical experience show several CAM modalities to be cost effective options for the treatment of musculoskeletal disorders. Therefore, EUROCAM votes in favour of any initiatives aiming to evaluate the use of complementary and alternative medicine in musculoskeletal disorders within the research frameworks of the European Union.

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EUROCAM supports all calls on governments and non-governmental agencies to fund, research and promote activities that advance the inclusion of CAM into evidence based integrative care projects. CAM offers hereby appropriate therapeutic and lifestyle approaches to achieve optimal health and healing in musculoskeletal disorders.

Benefits of integrating CAM into conventional approaches to treat MSDs would be to:

- improve knowledge about CAM as an option for prevention and treatment of musculoskeletal disorders at a European level.
- demonstrate the potential of CAM for preventing and treating musculoskeletal disorders in innovative partnership with conventional medical approaches.
- create practical partnerships incorporating appropriate CAM approaches and techniques to develop strategies that can be delivered as an integral part of primary and secondary care to help prevent and treat musculoskeletal disorders.

We suggest **three specific objectives for this best practice approach**:

(1) the provision of integrated care involving the use of CAM modalities, such as acupuncture, anthroposophic medicine, Ayurveda, herbal medicine, homeopathy, osteopathy, taiji, traditional Chinese medicine and yoga alongside conventional medical approaches in primary care settings for the treatment of musculoskeletal disorders in middle-aged and older patients with a view to providing more effective treatment, less hospitalisations and a healthier, more productive and longer life.

(2) the creation of a record system noting the progress of patients undergoing this integrated care on a case by case basis, including the outcome of such an integrated system on levels and costs of conventional medication, its beneficial impact on progression of the condition compared to routine results and finally the subsequent rate of use of the primary care service and record of subsequent hospitalisations. This data will enable a clear cost benefit analysis of such integrated treatment to be assessed.

(3) the development of specific CAM programs for the occupational setting, for self-care management and the development of preventive strategies arising from the application of appropriate CAM modalities.

Outcome targets

- return of physical function or decrease in functional impairment,
- reduction in pain
- increased capacity to cope with condition at less cost to health services
- reduced use of conventional medication

- reduced cost of hospitalisations and of other health system support services as well as doctors' time spent managing MSDs.
- provision of additional skills available to care providers
- increase in patient self-care and self-empowerment
- increased individual wellbeing, health and health literacy
- longer and healthier active work and social participation (Healthy Life Years)

Innovation and partnership

- a multi-disciplinary and multi stakeholder approach
- use of CAM approaches in partnership with conventional medicine,
- creation of a new model of care for musculoskeletal conditions, including protocols for integration of CAM and conventional approaches and individualised care plans
- creation of a new care model with application to a wide range of other chronic conditions
- creation of a record system for the evaluation of this new integrated approach
- education of the health workforce in new skills enabling the successful provision and application of complementary approaches and therapies
- enhancement of the treatment process through the education of patients on the causes of their condition, motivating them to make healthy lifestyle changes, individual self-care plans and the adoption of health maintenance techniques
- reduction of side effects of surgical and pharmacological treatments
- improved general health literacy and self-responsibility for health among patients resulting in less use of primary care services, medication and hospitalisations
- demonstration of long-term treatment and cost benefits that can make up for the initially high costs of some CAM approaches that may involve ongoing personal consultations.
- training and support of carers
- provision of healthy living education
- provision of information and guidelines utilising web pages and the social media to instruct the public and healthcare workers about CAM approaches and

reputable outlets offering CAM therapies in their locality

- demonstration of the effectiveness and cost effectiveness of CAM for the prevention and treatment of musculoskeletal conditions

- cost-reduction to the healthcare system by encouraging and enabling patients to take responsibility for their own health and actively to participate in managing their conditions.

- developing models for patient education and delivery of treatment that are transferable across the EU

- providing platforms/outlets across the EU providing health-care practitioners with reliable information based on robust research data about the use of CAM for preventing and treating musculoskeletal disorders.

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