A REVIEW ON COMPLEMENTARY AND ALTERNATIVE MEDICINE

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ABSTRACT
Alternative medical systems are complete health systems with their own approaches to diagnosis and treatment that differ from the conventional biomedical approach to health. Some are cultural systems such as Ayurveda and Traditional Medicine, while others, such as Homeopathy and Naturopathy are relatively recent and were developed. This review discussed on alternative medicine, history of alternative medicine, regulation and herbalism.

Keywords: Ayurveda, Traditional Medicine, Alternative medicine.

INTRODUCTION
Dating from the 1970s, medical professionals, sociologists, anthropologists and other commentators noted the increasing visibility of a wide variety of health practices that had neither derived directly from nor been verified by mainstream biomedical science. Since that time, those who have analyzed this trend have deliberated over the most apt language with which to describe this emergent health field. A variety of terms have been used, including heterodox, irregular, fringe and alternative medicine while others, particularly medical commentators, have been satisfied to label them as instances of quackery. The most persistent term has been alternative medicine but its use is problematic as it assumes a value-laden dichotomy between a medical fringe, implicitly of borderline acceptability at best, and a privileged medical orthodoxy, associated with validated medico-scientific norms. As a relational concept, the category of alternative medicine can never become an object of analysis in its own right, but can only be understood in terms of the current medical orthodoxy. It can also be misleading as the use of the term alternative may also erroneously imply that a real medical alternative exists. As with near-synonymous expressions, such as unorthodox, complementary, marginal, or the nakedly polemical quack, these linguistic devices have served, in the context of processes of professionalisation and market competition, to establish the authority of official medicine and police the boundary between it and its unconventional rivals. From a historical perspective, the emergence of alternative medicine, if not the term itself, is typically dated to the 19th century. This is despite the fact that there are variants of Western non-conventional medicine that arose in the late-eighteenth century or earlier and some non-Western medical traditions, currently considered alternative in the West and elsewhere, which boast extended historical pedigrees. Alternative medical systems, however, can only be said to exist when there is an identifiable, regularized and authoritative medical orthodoxy, such as arose in the West during the nineteenth-century, to which they can function as an alternative [1].

During the late eighteenth and nineteenth centuries regular and irregular medical practitioners became more clearly differentiated throughout much of Europe. As the nineteenth century progressed, most Western states converged in the creation of legally delimited and semi-protected medical markets. It is at this point that an official medicine, created in cooperation with the state and employing a scientific rhetoric of legitimacy, emerges as a recognizable entity and that the concept of alternative medicine as a historical category becomes tenable. As part of this process, professional adherents of mainstream medicine in countries such as Germany, France, and Britain increasingly invoked the scientific basis of their discipline as a means of engendering internal professional unity and of external differentiation in the face of

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sustained market competition from homeopaths, naturopaths, mesmerists and other nonconventional medical practitioners, finally achieving a degree of imperfect dominance through alliance with the state and the passage of regulatory legislation. In the United States the Johns Hopkins University School of Medicine, based in Baltimore, Maryland, opened in 1893 and was the first medical school devoted to teaching German scientific medicine. Buttressed by the increased authority consequent to the significant advances in the medical sciences of the late 19th century onwards — including the development and application of the germ theory of disease by the chemist Louis Pasteur and the surgeon Joseph Lister, 1st Baron Lister, and of the use of X-rays (Röntgen rays) — the 1910 Flexner Report called upon American medical schools to follow the model set by the John Hopkins School of Medicine and adhere to mainstream science in their teaching and research. This was in a belief, mentioned in the Report's introduction, that the preliminary and professional training then prevailing in medical schools should be reformed in view of the new means for diagnosing and combating disease being made available to physicians and surgeons by the sciences on which medicine depended. Among putative medical practices available at the time which later became known as alternative medicine were homeopathy (founded in Germany in the early 19c.) and chiropractic (founded in North America in the late 19c.). These conflicted in principle with the developments in medical science upon which the Flexner reforms were based, and they have not become compatible with further advances of medical science such as listed in Timeline of medicine and medical technology, 1900-1999 and 2000-present, nor have Ayurveda, acupuncture or other kinds of alternative medicine [2].

At the same time Tropical medicine was being developed as a specialist branch of western medicine in research establishments such as Liverpool School of Tropical Medicine founded 1898, London School of Hygiene & Tropical Medicine, founded 1899 and Tulane University School of Public Health and Tropical Medicine, founded 1912. A distinction was being made between western scientific medicine and indigenous systems. An example is given by an official report about indigenous systems of medicine in India, including Ayurveda, submitted by Mohammad Usman of Madras and others in 1923. This stated that the first question the Committee considered was to decide whether the indigenous systems of medicine were scientific or not.

By the later twentieth century the term ‘alternative medicine’ had come into use for the purposes of public discussion, but it was not always being used with the same meaning by all parties. Arnold S. Relman remarked in 1998 that in the best kind of medical practice, all proposed treatments must be tested objectively, and that in the end there will only be treatments that pass and those that do not, those that are proven worthwhile and those that are not [3].

In respect of alternative medicine since the 1970s in North America, Great Britain and elsewhere, there has been a tendency for the terms ‘alternative’ and ‘complementary’ to be used interchangeably to describe a wide diversity of therapies that attempt to use the self-healing powers of the body by amplifying natural recuperative processes to restore health. By 1990, approximately 60 million Americans had used one or more complementary or alternative therapies to address health issues, according to a nationwide survey in the United States published in 1993 by David Eisenberg. A study published in the November 11, 1998 issue of the Journal of the American Medical Association reported that 42% of Americans had used complementary and alternative therapies, up from 34% in 1990. However, despite the growth in patient demand for complementary medicine, most of the early alternative/complementary medical centers failed [4].

Terri Winnick, writing about From Quackery to Complementary Medicine: The American Medical Profession Confronts Alternative Therapies, proposed that the medical profession responded to the growth of CAM in three phases. This was based on an analysis of trends in the coverage of complementary and alternative medicine (CAM) in five prestigious American medical journals during the period of reorganization within medicine (1965–1999). In each phase, there were changes in the medical marketplace which influenced the type of response in the journals. The changes were such as relaxed medical licensing, the development of managed care, rising consumerism, and the establishment of the USA Office of Alternative Medicine (now National Center for Complementary and Alternative Medicine). In the condemnation phase, from the late 1960s to the early 1970s, authors ridiculed, exaggerated the risks, and petitioned the state to contain CAM. In the reassessment phase (mid-1970s through early 1990s), when increased consumer utilization of CAM was prompting concern, authors pondered whether patient dissatisfaction and shortcomings in conventional care contributed to the trend. In the integration phase of the 1990s, struggles to outlaw CAM were abandoned, physicians began learning to work around or administer CAM, and the subjugation of CAM to scientific scrutiny became the primary means of control [5].

Medical education (20c. to present)

Mainly as a result of reforms following the Flexner Report of 1910 medical education in established medical schools in the United States of America has generally not included alternative medicine as a teaching topic. Typically, their teaching is based on current practice and scientific knowledge about: anatomy, physiology, histology, embryology, neuroanatomy,
pathology, pharmacology, microbiology and immunology. Medical schools’ teaching includes such topics as doctor-patient communication, ethics, the art of medicine, and engaging in complex clinical reasoning (medical decision-making). Writing in 2002, Snyderman and Weil remarked that by the early twentieth century the Flexner model had helped to create the 20th-century academic health center in which education, research and practice were inseparable. But, while this had much improved medical practice by defining with increasing certainty the pathophysiological basis of disease, a single-minded focus on the pathophysiological had diverted much of mainstream American medicine from clinical conditions which were not well understood in mechanistic terms and were not effectively treated by conventional therapies.

By 2001 some form of CAM training was being offered by most medical schools in USA (at least 75 out of 125), and, exceptionally, the School of Medicine of the University of Maryland, Baltimore in the state of Maryland, includes a research institute for integrative medicine (a member entity of the Cochrane Collaboration). Medical schools are responsible for conferring medical degrees, but a physician typically may not legally practice medicine until licensed by the local government authority. Licensed physicians in the United States who have attended one of the established medical schools there have usually graduated Doctor of Medicine (MD). All states require that applicants for MD licensure be graduates of an approved medical school and complete the United States Medical Licensing Exam (USMLE) [6]. The British Medical Association, in its publication Complementary Medicine, New Approach to Good Practice (1993), gave as a working definition of non-conventional therapies (including acupuncture, chiropractic and homeopathy): those forms of treatment which are not widely used by the orthodox health-care professions, and the skills of which are not part of the undergraduate curriculum of orthodox medical and paramedical health-care courses. By 2000 some medical schools in the United Kingdom were offering CAM familiarisation courses to undergraduate medical students while some were also offering modules specifically on CAM [7].

Proponents and opponents

The Cochrane Collaboration Complementary Medicine Field explains its Scope and Topics by giving a broad and general definition for complementary medicine as including practices and ideas which are outside the domain of conventional medicine in several countries and defined by its users as preventing or treating illness, or promoting health and well being, and which complement mainstream medicine in three ways: by contributing to a common whole, by satisfying a demand not met by conventional practices, and by diversifying the conceptual framework of medicine [8].

Edzard Ernst, a former professor of complementary medicine, characterized the evidence for many alternative techniques as weak, nonexistent, or negative. Ernst has concluded that 95% of the alternative treatments he and his team studied, including acupuncture, herbal medicine, homeopathy, and reflexology, are statistically indistinguishable from placebo treatments, but he also believes there is something that conventional doctors can usefully learn from the chiropractors and homeopaths: this is the therapeutic value of the placebo effect, one of the strangest phenomena in medicine.

Proponents of an evidence-base for medicine such as the Cochrane Collaboration (founded in 1993 and from 2011 providing input for WHO resolutions) take a position that all systematic reviews of treatments, whether mainstream or alternative, ought to be held to the current standards of scientific method. In a study titled Development and classification of an operational definition of complementary and alternative medicine for the Cochrane Collaboration (2011) it was proposed that indicators that a therapy is accepted include government licensing of practitioners, coverage by health insurance, statements of approval by government agencies, and recommendation as part of a practice guideline; and that if something is currently a standard, accepted therapy, then it is not likely to be widely considered as CAM.

In other studies or reports it has been proposed that alternative medicine refers to any practice (not included in the degree courses of established medical schools), that is put forward as having the healing effects of medicine, but is not based on evidence gathered with the scientific method, when used independently or in place of medicine based on science [9].

Complementary medicine

Complementary medicine refers to use of alternative medicine alongside conventional science based medicine, in the belief that it increases the effectiveness. In Science and Technology: Public Attitudes and Public Understanding, chapter 7 of a report Science and Technology: Public Attitudes and Public Understanding, 2002, issued by a United States government agency (The National Science Foundation), it was stated that the term alternative medicine was there being used to refer to all treatments that had not been proven effective using scientific methods. Many of the claims regarding the safety and efficacy of alternative medicine are controversial. Some alternative treatments have been associated with unexpected side effects, which can be fatal. Some opponents, focused upon health fraud, misinformation, and quackery as public health problems in the United States, are highly critical of alternative medicine, notably Wallace Sampson and Paul.
Grounds for opposing alternative medicine which have been stated are:

- that it is usually based on religion, tradition, superstition, belief in supernatural energies, pseudoscience, errors in reasoning, propaganda, or fraud.
- that alternative therapies typically lack any scientific validation, and their effectiveness is either unproved or disproved.
- that the treatments are those that are not part of the conventional healthcare system.
- that research on alternative medicine is frequently of low quality and methodologically flawed.
- that where alternative treatments are used in place of conventional science-based medicine, even with the very safest alternative medicines, failure to use or delay in using conventional science-based medicine has resulted in deaths [11].

Critics say the expression is deceptive because it implies there is an effective alternative to science-based medicine, and that complementary is deceptive because the word implies that the treatment increases the effectiveness of (complements) science-based medicine, while alternative medicines which have been tested nearly always have no measurable positive effect compared to placebo. Despite such objections, some fields of alternative practice are regulated in a manner similar to that governing evidence-based medicine, and others have no regulation.

Alternative medicine practices and beliefs are diverse in their foundations and methodologies, and typically make use of preparations and dosages other than such as are included in the Pharmacopeia recognised by established medical schools. Methods may incorporate or base themselves on traditional medicine, folk knowledge, spiritual beliefs, ignorance or misunderstanding of scientific principles, errors in reasoning, or newly conceived approaches claiming to heal. African, Caribbean, Pacific Island, Native American, and other regional cultures have traditional medical systems as diverse as their diversity of cultures [12].

Classes of Complementary and Alternative Medicines

Complementary and alternative medicines include a wide range of treatments and practices. Some stem from nineteenth century North America, such as Chiropractic and Naturopathy, some, mentioned by Jütte, originated in eighteenth- and nineteenth-century Germany, such as homeopathy and hydropa thy, some have originated in China or India. The following examples include some of the more common methods in use. Most therapies can be considered as part of five broad classes; biological based approaches, energy therapies, alternative medical systems, muscle and joint manipulation and mind body therapies [13].

Alternative Medical Systems

Alternative medical systems are complete health systems with their own approaches to diagnosis and treatment that differ from the conventional biomedical approach to health. Some are cultural systems such as Ayurveda and Traditional Chinese Medicine, while others, such as Homeopathy and Naturopathy are relatively recent and were developed in the West. Writing as a historian Matthew Ramsey has asked whether some counter-hegemonic medicines are better understood as manifestations of more general developments in the larger society, or as the product of a coherent alternative world view [14].

Ayurvedic medicine

Ayurvedic medicine is a traditional medicine of India and has strong links with Buddhism and Hinduism. It is based on the belief that health is controlled by 3 humours with disease caused by an imbalance of these humours. The basis of treatment has some similarities with Western medicine. Remedies are mainly plant based with some use of animal materials. Safety concerns have been raised about Ayurveda, with two U.S. studies finding about 20 percent of Ayurvedic Indian-manufactured patent medicines contained toxic levels of heavy metals such as lead, mercury and arsenic. Other concerns include the use of herbs containing toxic compounds and the lack of quality control in Ayurvedic facilities.

Traditional Chinese Medicine

Traditional Chinese Medicine is based on a concept of spirit called qi, considerations of Chinese Astrology as in acupuncture, traditional use of herbs and other substances found in China, and a belief that a map of the body is contained on the tongue, which reflects changes in the body [15].

Homeopathy

Homeopathy is based on the belief that a disease can be cured by a very low dose of substance that creates similar symptoms in a healthy person. These ideas are known as 'like cures like' and the 'law of the minimum dose. This conflicts with fundamental concepts of physics and chemistry and there is no good evidence from reviews of research to support its use. The prevailing point of view among physicians practicing conventional medicine
is that homeopathy is considered to be quackery [16].

Naturopathy

Naturopathy is based on a belief in vitalism, which posits that a special energy called vital energy or vital force guides bodily processes such as metabolism, reproduction, growth, and adaptation. Naturopathy favors a holistic approach with non-invasive treatment and, similar to conventional medicine, encourages minimal use of surgery and drugs. The term naturopathy is derived from Greek and Latin, and literally translates as nature disease. Modern naturopathy grew out of the Natural Cure movement of Europe. The term was coined in 1895 by John Scheel and popularized by Benedict Lust, the father of U.S. naturopathy. Beginning in the 1970s, there was a revival of interest in the United States and Canada in conjunction with the holistic health movement. Today, naturopathy is primarily practiced in the United States and Canada. The scope of practice varies widely between jurisdictions, and naturopaths in unregulated jurisdictions may use the Naturopathic Doctor designation or other titles regardless of level of education [17].

Energy Therapies

Energy therapies are designed to influence energy fields (biofields) that practitioners believe surround and enter the body. Some energy therapies involve the use of crystals, while others use magnets and electric fields. NCCAM (the US-based National Center for Complementary and Alternative Medicine) has distinguished two types of energy medicine: one, Veritable involving scientifically observable energy, including magnet therapy, colorpuncture and light therapy; the other Putative which invoke physically undetectable or unverifiable energy [18].

Biofields

Biofield therapies are intended to influence energy fields that, it is purported, surround and penetrate the body. Writers such as Carl Sagan (1934-1996), noted astrophysicist, advocate of skeptical thinking (Scientific skepticism) and author of The Demon-Haunted World: Science as a Candle in the Dark (1996), have described the lack of empirical evidence to support the existence of the putative energy fields on which these therapies are predicated.

Acupuncture is a component of Traditional Chinese Medicine. In acupuncture, it is believed that a supernatural energy called qi flows through the universe and through the body, and helps propel the blood, blockage of which leads to disease. It is believed that insertion of needles at various parts of the body determined by astrological calculations can restore balance to the blocked flows, and thereby cure disease. Chiropractic was developed in the belief that manipulating the spine affects the flow of a supernatural vital energy and thereby affects health and disease. In the western version of Japanese Reiki, the palms are placed on the patient near Chakras, believed to be centers of supernatural energies, in a belief that the supernatural energies can transferred through the palms of the practitioner, to heal the patient [19].

Electromagnetic Fields

Bioelectromagnetic-based therapies use verifiable electromagnetic fields, such as pulsed fields, alternating-current, or direct-current fields in an unconventional manner. Magnetic healing does not claim existence of supernatural energies, but asserts that magnets can be used to defy the laws of physics to influence health and disease.

Mind Body Therapies

Mind–body therapies attempt to use the mind to affect bodily symptoms and functions; examples include yoga, spirituality and relaxation. Mind-body medicine takes a holistic approach to health that explores the interconnection between the mind, body, and spirit. It works under the premise that the mind can affect bodily functions and symptoms. Mind body medicines includes healing claims made in yoga, meditation, deep-breathing exercises, guided imagery, hypnotherapy, progressive relaxation, qi gong, and tai chi. Yoga, a method of traditional stretches, exercises, and meditations in Hinduism, may also be classified as an energy medicine insofar as its healing effects are believed by to be due to a healing life energy that is absorbed into the body through the breath, and is thereby believed to treat a wide variety of illnesses and complaints [20]. Religion based healing practices, such as use of prayer and the laying of hands in Christian faith healing, rely on belief in divine intervention for healing.

Herbs, Diet and Vitamins

Biological approaches include the use of herbal medicines, special diets or very high doses of vitamins. Substance based practices use substances found in nature such as herbs, foods, non-vitamin supplements and megavitamins, and minerals, and includes traditional herbal remedies with herbs specific to regions in which the cultural practices arose. Herbal remedies in this case, may include use of nonherbal toxic chemicals from a nonbiological sources, such as use of the poison lead in Traditional Chinese Medicine. Nonvitamin supplements include fish oil, Omega-3 fatty acid, glucosamine, echinacea, flaxseed oil or pills, and ginseng, when used under a claim to have healing effects [21].

Body manipulation

Body-based therapies such as massage, chiropractic and osteopathy use movement and physical manipulation of joints and muscles. Manipulative and
body-based practices feature manipulation or movement of body parts, such as is done in chiropractic manipulation.

Criticism

CAM, and use of the term alternative medicine, have been criticised, mainly in the USA, on various grounds and for various reasons in the name of consumers, physicians and research scientists, in medical journals or elsewhere. Some of the criticism makes assertions about misleading terminology or makes adverse inferences about motivation, some is on scientific grounds or errors of reasoning, or about taking resources from real medical research, or abuse of medical authority, ethics, dangerous misinformation or fraud, and some of the criticism has been with support from independent research or evidence, such as research studies of effectiveness. For instance, a US government agency, the National Science Foundation, reporting on Public Attitudes and Public Understanding in Science and Engineering Indicators 2002 stated that the term alternative medicine as used in the report was referring to treatments that had not been proven effective using scientific methods [23].

Instances of criticism by individuals include Wallace Sampson, writing in an article in Annals of the New York Academy of Sciences, June 1995 (first published online Dec 2006). There, Sampson argued that proponents of alternative medicine often used terminology which was loose or ambiguous to create the appearance that a choice between alternative effective treatments existed when it did not, or that there was effectiveness or scientific validity when it did not exist, or to suggest that a dichotomy existed when it did not, or to suggest that consistency with science existed when it might not; that the term alternative was to suggest that a patient had a choice between effective treatments when there was not; that use of the word conventional or mainstream was to suggest that the difference between alternative medicine and science based medicine was the prevalence of use, rather than lack of a scientific basis of alternative medicine as compared to conventional or mainstream science based medicine; that use of the term complementary was to suggest that purported supernatural energies of alternative medicine could add to or complement science based medicine; that use of the term integrative was to suggest that supernatural beliefs can be consistently integrated with science and the result has scientific validity. Sampson, Stanford University medical professor, former chairperson of the National Council Against Health Fraud, advisor to the California Attorney General and numerous district attorneys on medical fraud, and editor of Scientific Review of Alternative Medicine, has also written that CAM is the propagation of the absurd, and argued that alternative and complementary have been substituted for quackery, dubious and implausible. Another critic, with reference to government funding studies of integrating alternative medicine techniques into the mainstream, Steven Novella, a neurologist at Yale School of Medicine, wrote that it is used to lend an appearance of legitimacy to treatments that are not legitimate. Another, Marcia Angell, former executive editor of The New England Journal of Medicine argued that it was a new name for snake oil. Angell considered that critics felt that healthcare practices should be classified based solely on scientific evidence, and if a treatment had been rigorously tested and found safe and effective, science based medicine will adopt it regardless of whether it was considered alternative to begin with. It was thus possible for a method to change categories (proven vs. unproven), based on increased knowledge of its effectiveness or lack thereof. Prominent supporters of this position include George D. Lundberg, former editor of the Journal of the American Medical Association (JAMA).

Richard Dawkins, an evolutionary biologist, has defined alternative medicine as a set of practices that cannot be tested, refuse to be tested, or consistently fail tests. He has also stated that there is no alternative medicine. There is only medicine that works and medicine that doesn't work. He has argued that if a technique is demonstrated effective in properly performed trials, it ceases to be alternative and simply becomes medicine [24]. In an article first published in CA: A Cancer Journal for Clinicians, November/December 1999, Evaluating complementary and alternative therapies for cancer patients, Barrie R. Cassileth mentioned that a 1997 letter to the US Senate Subcommittee on Public Health and Safety which had deplored the lack of critical thinking and scientific rigor in OAM-supported research had been signed by four Nobel Laureates and other prominent scientists. This was supported by the National Institutes of Health (NIH).

In March, 2009 a Washington Post staff writer reported that the impending national discussion about broadening access to health care, improving medical practice and saving money was giving a group of scientists an opening to propose shutting down the National Center for Complementary and Alternative Medicine, quoting one of them, Steven Salzberg, a genome researcher and computational biologist at the University of Maryland, saying One of our concerns is that NIH is funding pseudoscience. They argued that the vast majority of studies were based on fundamental misunderstandings of physiology and disease, and have shown little or no effect [24].

Stephen Barrett, founder and operator of Quackwatch, has argued that practices labeled alternative should be reclassified as either genuine, experimental, or questionable. Here he defines genuine as being methods that have sound evidence for safety and effectiveness, experimental as being unproven but with a
plausible rationale for effectiveness, and questionable as groundless without a scientifically plausible rationale. Sampson has also pointed out that CAM tolerated contradiction without thorough reason and experiment. Barrett has pointed out that there is a policy at the NIH of never saying something doesn't work only that a different version or dose might give different results. Barrett also expressed concern that, just because some alternatives have merit, there is the impression that the rest deserve equal consideration and respect even though most are worthless, since they are all classified under the one heading of alternative medicine [25].

A group of prominent scientists argued before the federal government, USA, that plausibility of interventions such as diet, relaxation, yoga and botanical remedies, should not be used to support research on implausible interventions based on superstition and belief in the supernatural, and that the plausible methods can be studied just as well in other parts of NIH, where they should be made to compete on an equal footing with other research projects. The NCCAM budget has been criticized because, despite the duration and intensity of studies to measure the efficacy of alternative medicine, there had been no effective CAM treatments supported by scientific evidence as of 2002 according to the QuackWatch website. Despite this, the National Center for Complementary and Alternative Medicine budget has been on a sharp sustained rise to support complementary medicine. There have been negative results in almost all studies conducted over ten years at a cost of $2.5 billion by the NCCAM.

A research methods expert and author of Snake Oil Science, R. Barker Bausell, has stated that it’s become politically correct to investigate nonsense. There are concerns that just having NIH support is being used to give unfounded legitimacy to treatments that are not legitimate. Use of placebos in order to achieve a placebo effect in integrative medicine has been criticized as diverting research time, money, and other resources from more fruitful lines of investigation in order to pursue a theory that has no basis in biology. Speaking of ethics, in November 2011 Edzard Ernst stated that the level of misinformation about alternative medicine has now reached the point where it has become dangerous and unethical. So far, alternative medicine has remained an ethics-free zone. It is time to change this. Ernst requested that Prince Charles recall two guides to alternative medicine published by the Foundation for Integrated Health, on the grounds that they both contain numerous misleading and inaccurate claims concerning the supposed benefits of alternative medicine and that the nation cannot be served by promoting ineffective and sometimes dangerous alternative treatments [26].

According to two writers, Wallace Sampson and K. Butler, Marketing is part of the medical training required in chiropractic education, and propaganda methods in alternative medicine have been traced back to those used by Hitler and Goebels in their promotion of pseudoscience in medicine. Another critic has argued that academic proponents of integrative medicine sometimes recommend misleading patients by using known placebo treatments in order to achieve a placebo effect. However, a 2010 survey of family physicians found that 56% of respondents said they had used a placebo in clinical practice as well. Eighty-five percent of respondents believed placebos can have both psychological and physical benefits. Integrative medicine has been criticized in that its practitioners, trained in science based medicine, deliberately mislead patients by pretending placebos are not. Quackademic medicine is a pejorative term used for integrative medicine, which is considered to be an infiltration of quackery into academic science-based medicine.

Prevalence of use

Studies show that prayer is a common complementary practice, in the belief it might increase the efficacy of science based medicine.

Complementary and alternative medicine (CAM) has been described as a broad domain of healing resources that encompasses all health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period. CAM includes all such practices and ideas self-defined by their users as preventing or treating illness or promoting health and well-being. Boundaries within CAM and between the CAM domain and that of the dominant system are not always sharp or fixed [27]. In respect of taxation in the U.S.A. the Internal Revenue Service has discriminated in favour of medical expenses for acupuncture and chiropractor (and others including Christian Science practitioner) but against homeopathy and the use of non-prescription required medicine.

About 50% of people in developed countries use some kind of complementary and alternative medicine other than prayer for health. About 40% of cancer patients use some form of CAM. The use of alternative medicine in developed countries is increasing, with a 50 percent increase in expenditures and a 25 percent increase in the use of alternative therapies between 1990 and 1997 in America. Americans spend many billions on the therapies
annually. Most Americans used CAM to treat and/or prevent musculoskeletal conditions or other conditions associated with chronic or recurring pain. In America, women were more likely than men to use CAM, with the biggest difference in use of mind-body therapies including prayer specifically for health reasons. In 2008, more than 37% of American hospitals offered alternative therapies, up from 26.5 percent in 2005, and 25% in 2004. More than 70% of the hospitals offering CAM were in urban areas [28].

A survey of Americans found that 88 percent agreed that there are some good ways of treating sickness that medical science does not recognize. Use of magnets was the most common tool in energy medicine in America, and among users of it, 58 percent described it as at least sort of scientific, when it is not at all scientific. In 2002, at least 60 percent of US medical schools have at least some class time spent teaching alternative therapies. Therapeutic touch, was taught at more than 100 colleges and universities in 75 countries before the practice was debunked by a nine-year-old child for a school science project. In Austria and Germany complementary and alternative medicine is mainly in the hands of doctors with MDs, and half or more of the American alternative practitioners are licensed MDs. In Germany herbs are tightly regulated: half are prescribed by doctors and covered by health insurance [29].

In developing nations, access to essential medicines is severely restricted by lack of resources and poverty. Traditional remedies, often closely resembling or forming the basis for alternative remedies, may comprise primary healthcare or be integrated into the healthcare system. In Africa, traditional medicine is used for 80% of primary healthcare, and in developing nations as a whole over one-third of the population lack access to essential medicines. A 1997 survey found that 13.7% of respondents in the United States had sought the services of both a medical doctor and an alternative medicine practitioner. The same survey found that 96% of respondents who sought the services of an alternative medicine practitioner also sought the services of a medical doctor in the past 12 months. Medical doctors are often unaware of their patient’s use of alternative medical treatments as only 38.5% of the patients alternative therapies were discussed with their medical doctor. A British telephone survey by the BBC of 1209 adults in 1998 shows that around 20% of adults in Britain had used alternative medicine in the past 12 months.

**Prevalence of use of specific therapies**

The most common CAM therapies used in the US in 2002 were prayer (45.2%), herbalism (18.9%), breathing meditation (11.6%), meditation (7.6%), chiropractic medicine (7.5%), yoga (5.1%-6.1%), body work (5.0%), diet-based therapy (3.5%), progressive relaxation (3.0%), mega-vitamin therapy (2.8%) and Visualization (2.1%) In Britain, the most often used alternative therapies were Alexander technique, Aromatherapy, Bach and other flower remedies, Body work therapies including massage, Counselling stress therapies, hypnotherapy, Meditation, Reflexology, Shiatsu, Ayurvedic medicine, Nutritional medicine, and Yoga. According to the National Health Service (England), the most commonly used complementary and alternative medicines (CAM) supported by the NHS in the UK are: acupuncture, aromatherapy, chiropractic, homeopathy, massage, osteopathy and clinical hypnotherapy. Complementary medicine treatments used for pain include: acupuncture, low-level laser therapy, meditation, aroma therapy, Chinese medicine, dance therapy, music therapy, massage, herbalism, therapeutic touch, yoga, osteopathy, chiropractic, naturopathy, and homeopathy.

**Palliative care**

Complementary therapies are often used in palliative care or by practitioners attempting to manage chronic pain in patients. Complementary medicine is considered more acceptable in the interdisciplinary approach used in palliative care than in other areas of medicine. From its early experiences of care for the dying, palliative care took for granted the necessity of placing patient values and lifestyle habits at the core of any design and delivery of quality care at the end of life. If the patient desired complementary therapies, and as long as such treatments provided additional support and did not endanger the patient, they were considered acceptable. The non-pharmacologic interventions of complementary medicine can employ mind-body interventions designed to reduce pain and concomitant mood disturbance and increase quality of life.

**Regulation**

Some professions of complementary/ traditional/ alternative medicine, such as chiropractic medicine, have achieved full regulation in North America and other parts of the world and are are regulated in a manner similar to that governing science-based medicine. In contrast, other approaches may be partially recognized and others have no regulation at all. Regulation and licensing of alternative medicine ranges widely from country to country, and state to state. Government bodies in the USA and elsewhere have published information or guidance about alternative medicine. One of those is the U.S. Food and Drug Administration (FDA), which mentions specifically homeopathic products, traditional Chinese medicine and Ayurvedic products - complementary and alternative medicine (CAM) are being used to encompass a wide array of health care practices, products, and therapies which are distinct from those used in conventional or allopathic medicine.

- some forms of CAM, such as traditional Chinese
medicine and Ayurvedic medicine, have been practiced for centuries, and others, such as electrotherapy, are of more recent origin.
- in a publication of The Institute of Medicine it has been stated that more than one-third of American adults reported using some form of CAM and that visits to CAM providers each year exceed those to primary care physicians.
- no mention (in the document) of a particular CAM therapy, practice or product should be taken as expressing FDA’s support or endorsement of it or as an agency determination that a particular product is safe and effective [28-30].

Efficacy
Criteria and principles about evidence and the validity of clinical tests or trials applicable to healthcare interventions, including alternative medicine, were considered by Steven Woolf and others in a paper published in 2012 titled Developing clinical practice guidelines: types of evidence and outcomes. This indicated the importance of skill, knowledge and objectivity in the design and conduct of trials and in recording and reporting the benefits, harms, and other outcomes that were considered.

The position of Arnold S. Relman, a physician who has also written on Health care reform in U.S.A., is that most varieties of alternative therapies that have not been proven effective in clinical trials should be among the exclusions from health care benefits prescribed by physicians. Alternative therapies lack the requisite scientific validation, and their effectiveness is either unproved or disproved. Many of the claims regarding the efficacy of alternative medicines are controversial, since research on them is frequently of low quality and methodologically flawed. Selective publication of results (misleading results from only publishing positive results, and not all results), marked differences in product quality and standardisation, and some companies making unsubstantiated claims, call into question the claims of efficacy of isolated examples where herbs may have some evidence of containing chemicals that may affect health. The Scientific Review of Alternative Medicine points to confusions in the general population - a person may attribute symptomatic relief to an otherwise-ineffective therapy just because they are taking something (the placebo effect); the natural recovery from or the cyclical nature of an illness (the regression fallacy) gets misattributed to an alternative medicine being taken; a person not diagnosed with science based medicine may never originally have had a true illness diagnosed as an alternative disease category.

Acupuncture
There is evidence of benefit for acupuncture combined with exercise is effective for shoulder pain after stroke, reducing nausea post surgery and is cost-effective for some chronic pain syndromes.

Homeopathy
There is insufficient good evidence to enable robust conclusions to be made about Oscillococcinum® in the prevention or treatment of influenza and influenza-like illness. The evidence from controlled clinical trials therefore fails to show that homeopathy is an efficacious treatment for eczema. Limited evidence does not demonstrate a statistically significant effect of homeopathic medicines for insomnia treatment.

Mind/body medicine
The use of evidence-based mind-body therapies can alleviate depression severity.

Yoga
Yoga may be superior to conventional physical-activity interventions in elderly people. In addition, Yoga therapy has been found to reduce high blood pressure but it has also been demonstrated to effectively reduce blood glucose level, cholesterol level, and body weight, and may effective as an ancillary treatment of neurological and psychiatric disorders.

Testing
In 2003, a project funded by the CDC identified 208 condition-treatment pairs, of which 58% had been studied by at least one randomized controlled trial (RCT), and 23% had been assessed with a meta-analysis. According to a 2005 book by a US Institute of Medicine panel, the number of RCTs focused on CAM has risen dramatically. The book cites Vickers (1998), who found that many of the CAM-related RCTs are in the Cochrane register, but 19% of these trials were not in MEDLINE, and 84% were in conventional medical journals.

As of 2005, the Cochrane Library had 145 CAM-related Cochrane systematic reviews and 340 non-Cochrane systematic reviews. An analysis of the conclusions of only the 145 Cochrane reviews was done by two readers. In 83% of the cases, the readers agreed. In the 17% in which they disagreed, a third reader agreed with one of the initial readers to set a rating. These studies found that, for CAM, 38.4% concluded positive effect or possibly positive (12.4%) effect, 4.8% concluded no effect, 0.69% concluded harmful effect, and 56.6% concluded insufficient evidence. An assessment of conventional treatments found that 41.3% concluded positive or possibly positive effect, 20% concluded no effect, 8.1% concluded net harmful effects, and 21.3% concluded insufficient evidence. However, the CAM review used the 2004 Cochrane database, while the conventional review used the 1998 Cochrane database. Lists of the Cochrane Reviews on alternative medicine...
including summaries of the results sorted by type of therapy (updated monthly) are made available at ViFABs (Knowledge and Research Center for Alternative Medicines).

Most alternative medical treatments are not patentable, which may lead to less research funding from the private sector. In addition, in most countries, alternative treatments (in contrast to pharmaceuticals) can be marketed without any proof of efficacy—also a disincentive for manufacturers to fund scientific research. Some have proposed adopting a prize system to reward medical research. However, public funding for research exists. Increasing the funding for research on alternative medicine techniques is the purpose of the US National Center for Complementary and Alternative Medicine. NCCAM and its predecessor, the Office of Alternative Medicine, have spent more than $2.5 billion on such research since 1992; this research has largely not demonstrated the efficacy of alternative treatments.

In the same way as for conventional therapies, drugs, and interventions, it can be difficult to test the efficacy of alternative medicine in clinical trials. In instances where an established, effective, treatment for a condition is already available, the Helsinki Declaration states that withholding such treatment is unethical in most circumstances. Use of standard-of-care treatment in addition to an alternative technique being tested may produce confounded or difficult-to-interpret results.

Contrary to much popular and scientific writing, many alternative cancer treatments have been investigated in good-quality clinical trials, and they have been shown to be ineffective. In this article, clinical trial data on a number of alternative cancer cures including Livingston-Wheeler, Di Bella Multitherapy, antineoplastons, vitamin C, hydrazine sulfate, Laetrile, and psychotherapy are reviewed. The label unproven is inappropriate for such therapies; it is time to assert that many alternative cancer therapies have been disproven [31-34].

Adequacy of regulation and CAM safety

One of the commonly voiced concerns about complementary alternative medicine (CAM) is the manner in which is regulated. There have been significant developments in how CAMs should be assessed prior to re-sale in the United Kingdom and the European Union (EU) in the last 2 years. Despite this, it has been suggested that current regulatory bodies have been ineffective in preventing deception of patients as many companies have re-labelled their drugs to avoid the new laws. There is no general consensus about how to balance consumer protection (from false claims, toxicity, and advertising) with freedom to choose remedies.

Advocates of CAM suggest that regulation of the industry will adversely affect patients looking for alternative ways to manage their symptoms, even if many of the benefits may represent the placebo affect. Some contend that alternative medicines should not require any more regulation than over-the-counter medicines that can also be toxic in overdose (such as paracetamol).

Interactions with conventional pharmaceuticals

Forms of alternative medicine that are biologically active can be dangerous even when used in conjunction with conventional medicine. Examples include immuno-augmentation therapy, shark cartilage, bioresonance therapy, oxygen and ozone therapies, insulin potentiation therapy. Some herbal remedies can cause dangerous interactions with chemotherapy drugs, radiation therapy, or anesthetics during surgery, among other problems. An anecdotal example of these dangers was reported by Associate Professor Alastair MacLennan of Adelaide University, Australia regarding a patient who almost bled to death on the operating table after neglecting to mention that she had been taking natural potions to build up her strength before the operation, including a powerful anticoagulant that nearly caused her death.

Another possible mechanism

And lastly there's the cynicism and disappointment and depression that some patients get from going on from one alternative medicine to the next, and they find after three months the placebo effect wears off, and they're disappointed and they move on to the next one, and they're disappointed and disillusioned, and that can create depression and make the eventual treatment of the patient with anything effective difficult, because you may not get compliance, because they've seen the failure so often in the past.

Potential side-effects

Conventional treatments are subjected to testing for undesired side-effects, whereas alternative treatments, in general, are not subjected to such testing at all. Any treatment – whether conventional or alternative – that has a biological or psychological effect on a patient may also have potential to possess dangerous biological or psychological side-effects. Attempts to refute this fact with regard to alternative treatments sometimes use the appeal to nature fallacy, i.e., that which is natural cannot be harmful.

An exception to the normal thinking regarding side-effects is Homeopathy. Since 1938, the U.S. Food and Drug Administration (FDA) has regulated homeopathic products in several significantly different ways from other drugs. Homeopathic preparations, termed remedies, are extremely dilute, often far beyond the point where a single molecule of the original active (and possibly toxic) ingredient is likely to remain. They are, thus, considered safe on that count, but their products are exempt from good manufacturing practice requirements.
related to expiration dating and from finished product testing for identity and strength, and their alcohol concentration may be much higher than allowed in conventional drugs.

**Treatment delay**

Those having experienced or perceived success with one alternative therapy for a minor ailment may be convinced of its efficacy and persuaded to extrapolate that success to some other alternative therapy for a more serious, possibly life-threatening illness. For this reason, critics argue that therapies that rely on the placebo effect to define success are very dangerous. According to mental health journalist Scott Lilienfeld in 2002, unvalidated or scientifically unsupported mental health practices can lead individuals to forgo effective treatments and refer to this as opportunity cost. Individuals who spend large amounts of time and money on ineffective treatments may be left with precious little of either, and may forfeit the opportunity to obtain treatments that could be more helpful. In short, even innocuous treatments can indirectly produce negative outcomes.

Between 2001 and 2003, four children died in Australia because their parents chose ineffective naturopathic, homeopathic, or other alternative medicines and diets rather than conventional therapies. In all, they found 17 instances in which children were significantly harmed by a failure to use conventional medicine.

**Unconventional cancer cures**

Perhaps because many forms of cancer are difficult or impossible to cure, there have always been many therapies offered outside of conventional cancer treatment centers and based on theories not found in biomedicine. These alternative cancer cures have often been described as unproven, suggesting that appropriate clinical trials have not been conducted and that the therapeutic value of the treatment is unknown. However, many alternative cancer treatments have been investigated in good-quality clinical trials, and they have been shown to be ineffective.

**Research funding**

Although the Dutch government funded CAM research between 1986 and 2003, it formally ended funding in 2006.

**Appeal**

A study published in 1998 indicates that a majority of alternative medicine use was in conjunction with standard medical treatments. Approximately 4.4 percent of those studied used alternative medicine as a replacement for conventional medicine. The research found that those having used alternative medicine tended to have higher education or report poorer health status. Dissatisfaction with conventional medicine was not a meaningful factor in the choice, but rather the majority of alternative medicine users appear to be doing so largely because they find these healthcare alternatives to be more congruent with their own values, beliefs, and philosophical orientations toward health and life. In particular, subjects reported a holistic orientation to health, a transformational experience that changed their worldview, identification with a number of groups committed to environmentalism, feminism, psychology, and/or spirituality and personal growth, or that they were suffering from a variety of common and minor ailments—noteable ones being anxiety, back problems, and chronic pain.

Authors have speculated on the socio-cultural and psychological reasons for the appeal of alternative medicines among that minority using them in lieu of conventional medicine. There are several socio-cultural reasons for the interest in these treatments centered on the low level of scientific literacy among the public at large and a concomitant increase in antiscientific attitudes and new age mysticism. Related to this are vigorous marketing of extravagant claims by the alternative medical community combined with inadequate media scrutiny and attacks on critics.

There is also an increase in conspiracy theories toward conventional medicine and pharmaceutical companies, mistrust of traditional authority figures, such as the physician, and a dislike of the current delivery methods of scientific biomedicine, all of which have led patients to seek out alternative medicine to treat a variety of ailments. Many patients lack access to contemporary medicine, due to a lack of private or public health insurance, which leads them to seek out lower-cost alternative medicine. Medical doctors are also aggressively marketing alternative medicine to profit from this market.

In addition to the social-cultural underpinnings of the popularity of alternative medicine, there are several psychological issues that are critical to its growth. One of the most critical is the placebo effect, which is a well-established observation in medicine. Related to it are similar psychological effects such as the will to believe, cognitive biases that help maintain self-esteem and promote harmonious social functioning, and the post hoc, ergo propter hoc fallacy. Patients can also be averse to the painful, unpleasant, and sometimes-dangerous side effects of biomedical treatments. Treatments for severe diseases such as cancer and HIV infection have well-known, significant side-effects. Even low-risk medications such as antibiotics can have potential to cause life-threatening anaphylactic reactions in a very few individuals. Also, many medications may cause minor but bothersome symptoms such as cough or upset stomach. In all of these cases, patients may be seeking out alternative treatments to avoid the adverse effects of conventional treatments.
Schofield et al., in a systematic review published in 2011, make ten recommendations which they think may increase the effectiveness of consultations in a conventional (here: oncology) setting, such as Ask questions about CAM use at critical points in the illness trajectory; Respond to the person's emotional state; and Provide balanced, evidence-based advice. They suggest that this approach may encourage informed decision-making about CAM and ultimately, improve outcomes for patients.

An analysis of the reasons why this is so points towards the therapeutic relationship as a key factor. Providers of CAM tend to build better therapeutic relationships than mainstream healthcare professionals. In turn, this implies that much of the popularity of CAM is a poignant criticism of the failure of mainstream healthcare. We should consider it seriously with a view of improving our service to patients.

Physicians who practice complementary medicine usually discuss and advise patients as to available complementary therapies. Patients often express interest in mind-body complementary therapies because they offer a non-drug approach to treating some health conditions. Some mind-body techniques, such as cognitive-behavioral therapy, were once considered complementary medicine, but are now a part of conventional medicine in the United States [35-38].

Self-characterization

The US National Center for Complementary and Alternative Medicine (NCCAM) defines CAM as a group of diverse medical and healthcare systems, practices, and products, that are not currently part of conventional medicine, in a context where conventional medicine is that which is scientifically proven. This definition of CAM is widely known and used and is inclusive of many different types of therapies and products [39-42].

The Danish Knowledge and Research Center for Alternative Medicine an independent institution under the Danish Ministry of the Interior and Health uses the term alternative medicine for: Treatments performed by therapists that are not authorized healthcare professionals, where authorized healthcare professionals are those practicing what is proven by science.

Treatments performed by authorized healthcare professionals, but those based on methods otherwise used mainly outside the healthcare system, which is based on science in Denmark. People without a healthcare authorisation must be able to perform the treatments.

Institutions

In General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine, published in 2000 by the World Health Organization, complementary and alternative medicine were there defined as a broad set of health care practices that are not part of that country's own tradition and are not integrated into the dominant health care system. In a consensus report released in 2005, entitled Complementary and Alternative Medicine in the United States, the Institute of Medicine (IOM) described complementary and alternative medicine (CAM) as health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the dominant health system of a particular society or culture in a given historical period. Similar wording has been adopted by the Cochrane Collaboration, and official government bodies such as the UK Department of Health. While some herbal therapies are mainstream in Europe, but are alternative in the United States.

Special terminology used by selected individuals

Two advocates of integrative medicine claim that it also addresses alleged problems with medicine based on science, which are not addressed by CAM; Ralph Snyderman and Andrew Weil state that integrative medicine is not synonymous with complementary and alternative medicine. It has a far larger meaning and mission in that it calls for restoration of the focus of medicine on health and healing and emphasizes the centrality of the patient-physician relationship [41-45].

CONCLUSION

Extinction of medicinal plant species because over 50% of prescription drugs are derived from chemicals first identified in plants, a 2008 report from the Botanic Gardens Conservation International warned that cures for things such as cancer and HIV may become 'extinct before they are ever found'. They identified 400 medicinal plants at risk of extinction from over-collection and deforestation, threatening the discovery of future cures for disease. These included Yew trees (the bark is used for the cancer drug paclitaxel); Hoodia (from Namibia, a potential source of weight loss drugs); half of Magnolias (used as Chinese medicine for 5,000 years to fight cancer, dementia and heart disease); and Autumn crocus (for gout). Their report said that five billion people still rely on traditional plant-based medicine as their primary form of health care.

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