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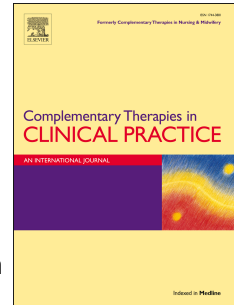
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Knowledge, Attitude and Use of Complementary and Alternative Medicine among Nurses: A Systematic Review

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Abstract

Objectives: The purpose of this study was to systematically review the literature to describe the knowledge, attitude and practice of CAM by nurses.

Methods: Three databases were searched for relevant studies from launch through September of 2017 and included MEDLINE, Scopus and Web of science.

Results: The average knowledge of CAM therapies by nurses was 62.2% with attitude about use averaging 65.7%. Close to two-thirds (65.9%) reported use of CAM therapies with patients. The primary reasons nurses suggested use of CAM were for stress and anxiety reduction and health improvement.

Conclusion: Current evidence demonstrates the need for nurse education programs to integrate and strengthen CAM content into existing curricula. Similarly, documentation of the nature and extent of nurse use of CAM therapies in the clinical setting, as well as patient-reported use and preferences for CAM therapies, would provide valuable prospective data.

Key Words: Complementary Therapies; Knowledge; Attitude; Nurses; Systematic review

1. Background

Complementary and alternative medicine (CAM) refers to “a group of diverse medical and health care systems, practices, and products that are not generally considered part of conventional medicine.” [1] CAM is divided into five main categories: alternative medical systems, mind/body interventions, body-based manipulation therapies, biologically based interventions (natural products), and energy/metaphysical therapies (Table 1) [2, 3] .

Table 1. Categories of CAM therapies

Alternative Medical Systems	Mind/Body Interventions	Biologically Based Interventions (Natural Products)	Body-Based Manipulation Therapies	Energy/Metaphysical Therapies
Naturopathy Homeopathy Ayurveda Chinese Medicine (Acupuncture) Tibetan Medicine	Meditation Relaxation Art/music therapy Biofeedback Hypnotherapy Prayer/Spiritual healing Yoga Dance Tai chi	Aromatherapy Herbal/Botanical therapies Non-herbal supplements Diet/vitamins	Massage/Body works (Traditional Massage, Reflexology, Craniosacral Therapy, Rolfing, Hellerwork and Movement) Osteopathy Acupressure Chiropractic	Therapeutic touch Qi gong Magnets Reiki

CAM therapies have gained popularity over the last decades [4, 5]. Studies in the United States (U.S.) demonstrate that 32.3-33.2% of adults [6] and 2.3-3.1% of children aged 4-17 years used such therapies [7]. In Europe, 21-50% of adults use CAM [8], and 68% of people in Saudi Arabia [9] and 74.8% in South Korea [9] reportedly use such methods. With such widespread use, nurses frequently interact with large numbers of patients who use these therapies [10].

In recent years, efforts have been made to integrate knowledge and use of CAM therapies into nursing education in both Australia [11] and USA [12]; it is unknown the extent to which such knowledge is integrated into nurse education curricula in other countries. Existing literature, however, demonstrates that as few as 3% of nurses have sufficient knowledge about CAM therapies despite having a high degree of interaction with patients [13]. As the largest group of health care providers across the globe, nurses are an important potential source of information about CAM therapies by patients [14].

In addition to variable knowledge about CAM therapies, nurses often hold mixed attitudes about patient use of such methods [15, 16]. A scoping review of nurses' knowledge, attitudes, and ability to communicate risks and benefits of CAM found similar results. In the 15 papers reviewed, 66.4% of nurses were found to have a positive attitude toward CAM though more than two-thirds (77.4%) lacked comprehensive understanding of the risks and benefits associated with CAM use, and nearly half (47.3%) were uncomfortable discussing CAM therapies with patients [17]. While the review did not evaluate quality of included studies and barriers to use of CAM therapies was not reported, findings underscored the need for systematic study of nurse knowledge, attitude, and use of CAM therapies in professional practice.

The primary purpose of this systematic review was to evaluate and summarize the quality of the evidence related to knowledge and attitude about the use of CAM therapies by nurses, as well the extent of use in clinical practice. In addition, secondary aims were to identify the barriers to use of CAM therapies, as well as nurses source of information about CAM therapies.

2. Methods

2.1. Registration and eligibility criteria

The methods adopted for this systematic review are consistent with the guidelines detailed on the PRISMA checklist [18]. The protocol of this systematic review has been registered in PROSPERO 2017 (registration number: CRD42017069130) [19]. Our

systematic review included all observational studies, regardless of sampling design though the minimum sample size for study inclusion was 25. Letter to editors, case reports, study protocols, reviews, and narrative reviews were excluded. We included all studies examining the primary outcome of knowledge, attitude, and/or use of CAM therapies by nurses working in hospitals, as well as nursing students and nurse faculty members. Studies were also examined for nurse identification of barriers to use of CAM therapies and CAM information sources utilized by participants.

2.2. Search strategy

Searches were conducted by two independent researchers following consultation with a health sciences librarian who assisted in development of the overall search strategy, and the identification of key MESH search terms and free terms according to the PRESS standard[20]. Keywords used for search of electronic databases are listed in Table 1. Three electronic databases were searched from launch through September of 2017 and included MEDLINE (PubMed interface), Scopus (OVID interface), ISI Web of science (web of science interface), as well as the key targeted publication journal (Journal of Alternative and Complementary Medicine). Only full text papers available in English were included. To ensure literature saturation, we also scanned the reference lists of included studies or relevant reviews identified through the search. The MEDLINE strategy was first finalized, then adapted for search in other identified databases. As well, PROSPERO was also searched for ongoing or recently related completed systematic reviews.

Table 1. List of keywords used in search of the literature.

Participants	CAM	Outcomes
“nurses” “students” “faculty members”	“complementary and alternative medicine” “complementary medicine” “alternative medicine”	“knowledge” “attitude” “use” “practice” “KAP”

2.3. Selection of studies and data extraction

Consistent with study protocol, two researchers independently screened the titles and abstracts for eligibility. The full text was then reviewed to confirm that eligibility criteria were met and for extraction of requisite information which included basic information about the General information (first author, year of publication and country), study characteristics (sample Size/RR, sampling method, mode of questioner completion, risk of bias, instrumentation, reliability and validity), Participants characteristics (target population, age group and gender) and outcome measures (Knowledge, Attitude, Use, Barriers to use and Source of information) were also collected. Duplicate studies then removed. Where there was a discrepancy between the researchers regarding inclusion of a study, discussions were held among the study authors to resolve the concerns through consensus.

2.4. Quality assessment and abstraction

To assess the methodological quality and risk of bias of each included observational study, the Hoy tool critical appraisal checklist was used [21]. This 10-item checklist evaluated the quality of studies in two dimensions including external validity (items 1-4 assess target population, sampling frame, sampling method and nonresponse bias minimal) and internal validity (items 5-9 assess data collection method, case definition, study instrument, mode of data collection); item 10 assesses bias related to the analysis. Each study was evaluated for risk of bias by two independent project researchers with disagreements resolved through consensus method.

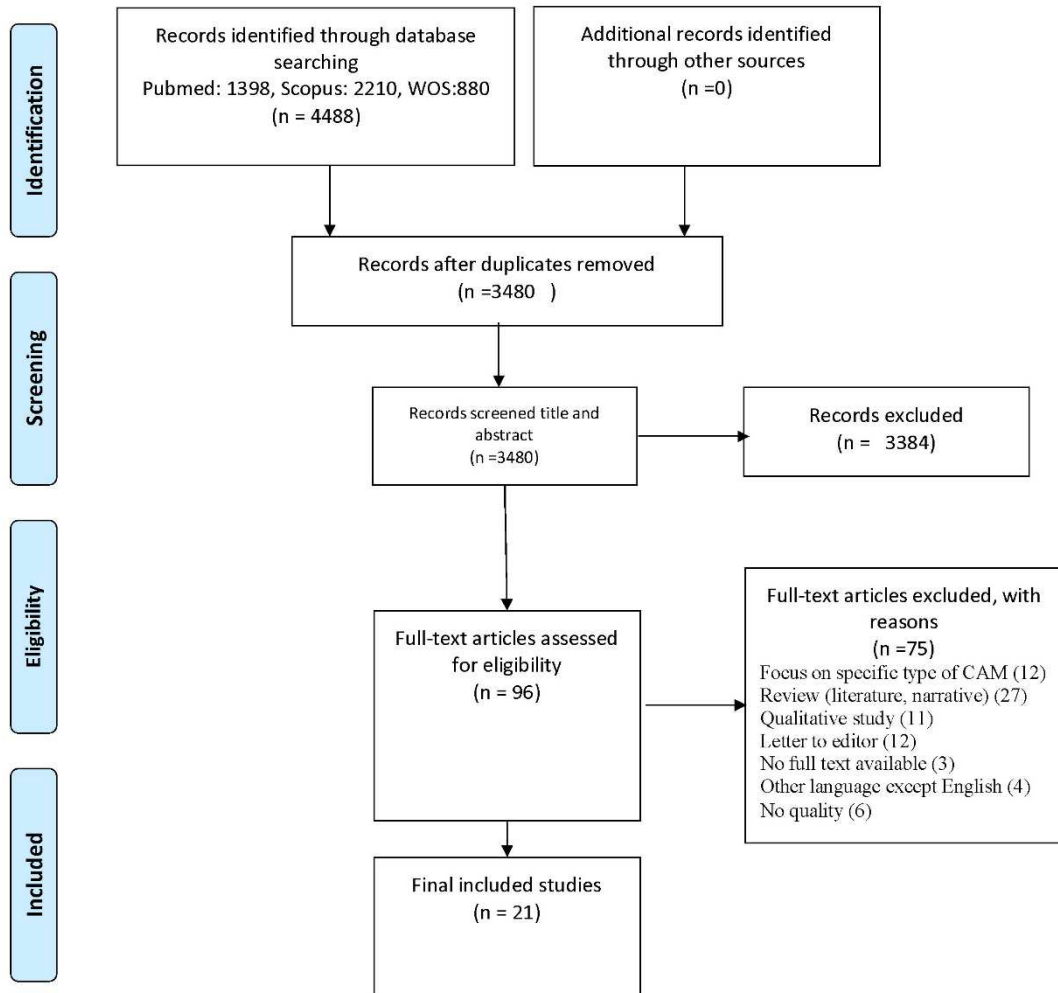
3. Results

3. Overall results

3.1.1. Study selection

A total of 4,488 articles were retrieved from the initial search in different databases. Out of 3,480 non-duplicated studies in the title and abstract screening process, 3,384 studies were excluded due to unrelated titles. Of the remaining 96 studies, 21 met eligibility criteria. Of the 75 excluded studies, 27 were review articles, 12 focused on a specific type of CAM, 12 were letters to editor, three did not have full text, 11 were qualitative studies, four were in a language other than English, and six did not meet quality requirements for inclusion in the study. (Figure 1. The list of summary studies is available at Table 2.

Figure 1- Flow Diagram of study selection



3.1.2. Study characteristics

Studies included in this systematic review were conducted with 5,254 clinical nurses/midwives, nursing students and nursing faculty, with an age range of 18 to 65 years. Most participants were female (n=5,346; 85%). Of the 21 included studies, all provided cross-sectional data with participants representing 13 different countries. Seven studies were from the U.S. [16, 22-27], three were from Australia and Turkey [28-33], with one from each of the following countries: Iran [15], Israel [34], Italy [35], Korea [36], Netherlands [37], Cyprus [38], China [39], Germany [33], Switzerland [33], and Pakistan [40]. The primary target populations across studies were nurses in clinical practice (n=15), nursing students (n=4), and nursing faculty (n=2); one study targeted only nurse-midwives. The sampling methods that were used included convenience (n=16), systematic random (n=2), census (complete enumeration) (n=2) and simple random (n=1). More than 90% (19 of 21) of the included studies had a low risk of bias when evaluated using the Hoy critical appraisal tool. See Table 2.

Table 2. Studies included in the systematic review (N=21)

First Author (Year)	Country	Sample Size /RR	Target Population	Age group (Year)	Male/female /non response	Sampling Method	Methodology	Risk of Bias
Avino et al (2011) [23]	USA	117/100	Faculty	26-66	115/2/0	Convenience	Self-Report	Low
Balouchi et al (2016) [15]	Iran	250/62.5	Clinical Nurses	18-40	103/54/0	Convenience	Interview /Self Report	Low
Camurdan et al (2013) [32]	Turkey	321/86.2	Nursing Students	18-40	7/267/0	Convenience	Self-Report	Low
Cooke et al (2012) [31]	Australia	1413/26.8	Clinical Nurses	24-67	50/326/0	Convenience	Self-Report	Low
Cutshall et al (2010) [16]	USA	76/64	Clinical Nurses	50-64	0/49	Convenience	Self-Report	Low
DeKeyser et al (2001) [34]	Israel	369/76	Clinical Nurses	22-63	36/243	Systematic Random	Self-Report	Low
Halcón et al (2003) [26]	USA	Students:174/68 Faculty:76/66	Nursing Students Faculty	21-57	10/110 3/48	Convenience	Self-Report	Low
Hastings-Tolsma et al (2009) [24]	USA	227/78/178	Nurse-Midwives	24 and older	3/175	Systematic Random	Self-Report	Low
Hayes et al (2000) [27]	USA	284/73/201	Clinical Nurses	25-70	3/198	Convenience	Self-Report	Low
Holroyd et al (2008) [39]	China	187/100	Clinical Nurses	Not reported	43/144	Convenience	Self-Report	Moderate
Ott et al (2015) [33]	Germany Switzerland Australia	877/100	Clinical Nurses	<30 to >50	176/701	Convenience	Self-Report	Low
Rojas-Cooley et al (2009) [25]	USA	3637/24/850	Clinical Nurses	22-70	32/814/4	Simple random	Self-Report	Low
Shorofi et al (2017)[30]	Australia	460/70/322	Clinical Nurses	20-65	31/291	Convenience	Self-Report	Low

Somani et al (2014) [40]	Pakistan	142/93/132	Clinical Nurses	20-54	35/97	Census	Self-Report	Low
Trail-Mahan et al (2013) [22]	USA	825/18/153	Clinical Nurses	20 to 60 and older	0/153	Convenience	Self-Report	Moderate
Turker et al (2011) [29]	Turkey	354/91.2/322	Nursing Students	Not reported	0/323	Convenience	Self-Report	Low
van Vliet et al (2015) [37]	Netherlands	36000/32.4/355	Clinical Nurses	<36 to >65	32/323	Convenience	Self-Report	Low
Yildirim et al (2010) [28]	Turkey	477/100	Nursing Students	17-29	144/333	Convenience	Self-Report	Low
Yom et al (2008) [36]	Korea	500/97/485	Clinical Nurses	20-29	5/480	Convenience	Self-Report	Low
Zanini et al (2008) [35]	Italy	270/57.4/155	Clinical Nurses	<30 to >50	26/128/1	Census	Self-Report	Low
Zoe et al (2014) [38]	Cyprus	138/100	Clinical Nurses	23-48	51/87	Convenience	Self-Report	Low

3.2. Main results

3.2.1. Instruments

In general, all instruments used in the various studies were developed by the researchers in consultation with experts from each study. Items differed from study-to-study but generally included nurse/nurse-midwifery knowledge, attitude, and use of CAM therapies, as well as barriers related to use of CAM therapies and information resources. The number of items varied with focus of the study and most had between 14 and 32 items. Psychometric properties of the developed instruments were reported in only four of the 21 studies and included work by Balouchi [15], Rojas-Cooley [25], Shorofi [30], and Trail-Mahan [22].

3.2.2. Nurses knowledge about complementary and alternative medicine

Of the 21 studies included in this systematic review, 19 reported nurse level of knowledge about CAM therapies. Knowledge of CAM therapies was measured by asking whether nurses were familiar with or had heard about CAM therapies. Most of the included studies queried nurses' general knowledge CAM therapies classified as poor, moderate, or good. Also, in a study, the knowledge rate was not clear and it mostly dealt with the knowledge of nurses about the different dimensions of complementary medicine [28]. Most studies (15 studies) reported knowledge. The lowest knowledge rate was 29.7% [30] and the highest was 93.6% [39]. The mean knowledge of the nurses was 62.2% in 15 studies. Two studies reported the knowledge rate of good, intermediate, and poor to be 12.1%, 60.5% and 27.4%, respectively [15], and good and poor to be 49% and 51%, respectively [22].

3.2.3 Nurse attitude about complementary and alternative medicine

Out of 21 studies, 15 evaluated nurse attitudes as either positive or negative toward CAM therapy use. Nine of the included studies reported an overall positive attitude by nurses regarding use of CAM therapies with the lowest positive attitude toward use of 38.3% [31] and the highest positive attitude of 95% [26]. The average overall attitude in nurses was

65.75%. Two studies reported attitude to be very positive and positive (61% and 20%) [33], and very positive and relatively positive (22.4% and 36.6%), respectively [30]. One study described the attitude to be between 10% and 82% in different study groups [37]. Another study described the attitude as a mean score of 5.47% to 7.66% [25]. One study reported the attitude as positive in qualitative terms and mentioned no definite value [34]. One study also classified the attitude as good, moderate and weak (51.6%, 47.8%, and 0.6%) [15]. See Table 3.

3.2.4. CAM practice/use among nurses

Four aspects of CAM therapy use by nurses in clinical practice were also examined. These aspects included personal use or use by patients, rationale for use of the CAM method, the most commonly used CAM therapies and barriers to use.

Among the 21 studies, 12 reported the overall use of complementary and alternative therapies by nurses. Of the 12 studies, 11 reported use of a CAM method in general terms. The lowest rate of CAM use reported was 25% [40] and the highest rate of use at 95.7% [30]. The overall rate of use of complementary and alternative medicine among nurses was 65.9%. In one study, the rate of use was classified as good, moderate and weak (12.1%, 30.6%, and 57.3%) [15].

Reasons for use of CAM were detailed in seven of the 21 studies. The main reasons for use were reduction of stress (93.4%), reduction of anxiety (93.1%), decreased restlessness [31] (89.4%), general health (74.5%) [27], and treatment of a cold (73.5%) [32]. The most popular and widely used CAM therapies were described in 13 of the 21 studies. All studies, except for halcon [26], outlined the methods used in terms of percentages. The use of commonly used methods was between 4% [34] and 85.5% [24].

The most commonly used CAM therapies were massaging -30 ,26 ,23 ,16 ,15] [37 ,32, herbal therapies [32 ,29 ,27 ,24 ,15] and mind-body therapies [16, 24, 26,

34, 37]. The least commonly used methods across all studies were aromatherapy [37], acupuncture [34], and homeopathy [34] (see Table 3).

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Table 3. Knowledge attitude, practice, source of information towards CAM therapies.

First Author (Year)	Outcome Measures	Instrumentation	Reliability, Validity	Overall Knowledge (%)	Attitude (%)	CAM Use 1.Overall use 2.Primary reasons 3.Top used modalities 4.Barriers to use	Source of information
AVINO (2011) [23]	Knowledge, Attitudes, Practices	32 items-Aspects (attitude, barriers, use and source of information)	NR	75%, n = 68	Positive Attitudes: 80%	1.80% 2.NR 3. Nutritional supplements and Prayer --/spiritual healing (58%), Massage (57%) 4. Lack of staff training (87%), Lack of evidence for practices (82%), Unavailability of credentialed Providers (81%)	Peer professionals (90%), professional journals and sources (75%), other health care providers (69%), and mass media (58%)
Balouchi A, et al (2016) [15]	Knowledge, Attitudes, Use	39 items-(6 demographic, items, knowledge (11items),scoring: Attitude(11 items),scoring:11-25(poor),26-40(average),42-55(good) and use(11 items),scoring:11-	Reliability (Cronbach's alpha) Knowledge (0.87),Attitudes(0.75), Use (0.67).	Categorized : Average %60.5, Poor: 27.4%. Good: 12.1%	Categorized: Good:51.6%, Average: 47.8%, Poor: 0.6%	1. Categorized: Good (12.1%), Average (30.6%), Poor (57.3%) 2.NR 3. Prayer therapy (29.9%) Massage (24.2%) Herbal therapy (30.6%)	NR

		17(poor),18-25(average),26-33(good)				4.NR	
Camurdan et al (2013) [32]	Use Knowledge	20 items- demographic(7 items),Use(13items),scoring: NR	NR	Overall:72.4%	-	1.72.7% 2. Colds/flu (73.5%), Abdominal pain (65.5%), Headache (57.1%) 3. Herbals (82.3%), hot and cold application (71.3) and Massage (61.5%) 4.NR	Books/magazines (65.5%), school (60.3%), Website (57.9 %), television (38.7%) and newspaper (31.6%).
Cooke, M et al (2012) [31]	Knowledge, Practice	31 items- (Demographic and Professional details; 2. Evidence required to recommend or use CAM; 3. Attitudes towards CAM; 4. Current or needed knowledge about CAM; 5. Current professional use of CAM; and 6. Barriers to the use of CAM in practice.	NR	-	Positive Attitudes:38.3	1.50.3% 2. Stress (93.4%); anxiety (93.1%); restlessness (89.4%); 3. Exercise (85.5%), Diet (85.4%), massage (69.5%). 4. Lack of staff training (91.8%) and lack of knowledge regarding appropriateness of CAM therapies (89.8%).	the internet (79.7%); other providers (79.1%); nursing, health, medical journals (76.8%); peers (76.4%); and mass media such as television, radio, newspapers, magazines (61.2%)
Cutshall, S et al (2010) [16]	Knowledge, Attitudes, Use	23-items- that focused on questions related to knowledge, attitudes, use, and	NR	Enough knowledge to refer for services.	Positive Attitudes:43%	1.NR 2.NR 3. Spirituality and prayer (71%),	Educational pamphlets (63%) CDs (59%) Therapist/practition

		barriers to use CAM, Scoring: NR		(42%), Minimal knowledge (27%), enough knowledge to be able to Provide at least some of these services in their position (31%)		Massage (66%), Music therapy (61%) 4.lack of available providers/ practitioners, 65%; lack of training, 57%; lack of institutional Support, 53%.	ers (51%) Web sites (45%) Classes (43%) Books (35) Video on demand in hospital TV system (24%)
DeKeyser FG et al (2001) [34]	Knowledge, Attitudes	A self-administrated Four section questioner (knowledge and attitude, scoring=1- 4.), 2.satisfaction with patient and physician relationship 3.health locus of control 4.demographics.	NR	Overall: 62%	Nurses overall felt were very positive toward CAM	1.32% 2. Saw it as an adjunct to conventional medicine (43 %),felt that CAM dealt with whole person(32%). 3. Homeopathy (5%), acupuncture (5%), reflexology (n=4%) 4.NR	NR
Halcón, L. L et al (2003) [26]	Attitudes	The questionnaire parts were (overall attitudes toward CAM, information	NR	Overall:37 %	Positive Attitudes:95 %	1.NR 2.NR 3.Biofeedback, chiropractic,	peer professionals professional journals health care

		about training, personal use, perceived barriers, and the intent to integrate CAM into clinical practice)				massage, 4.1. Lack of evidence for practice (86-96 %), lack of reimbursement 82-90%), and (3) lack of staff training (86-93%).	providers mass media
Hastings-Tolsma et al (2009) [24]	Use	Questionnaire developed in three parts: I = 26 items detailing demographic background and practice-related information and knowledge (5 items), II = listing of CAM therapies (74 herbal preparations, 16 pharmacologic/biologic treatments, 11 manual applications, 9 mind body interventions, 4 diet/nutrition/lifestyle items III = rating of practice related to use of holistic health care practices.	NR	Overall: 60%	NR	1.82% 2.NR 3. Herbal preparations (85%), pharmacologic/biologic treatments (82%), mind body interventions (80%) 4.NR	NR

Hayes, K. M et al (2000) [27]	Knowledge, Personal Use	30 items questionnaire were (knowledge level, personal and professional experience with, and level of interest in CAM)	NR	Overall:78 %	NR	1.63.4% 2. Pain (55%), stress reduction/relaxation (74.5%), general health (39.3%). 3. Herbal medicine (39.1%), pressure point therapies (34.7%), meditation (33.2%) 4.NR	NR
Holroyd, E et al (2008) [39]	Knowledge, Attitudes	17 items questioner, Respondents were scored on a four-point Likert scale ranging.	NR	Overall: 93.6%	Positive Attitudes:71.9%	-	Newspaper/magazines (63.1 %) Friends (59.1) Books (42.3%) Internet (22.1%) Family (23.5%) Interest groups/extra-mural studies (20.1%) CAM course in the nursing program (19.5%) Health database(16.1) Videos(2.7) Formal training that leads to Registration/practicing license (4.0%)
Ott, I. M. et al	Knowledge,	The questionnaire	NR	Overall:	Very Positive	1.70%	NR

(2015) [33]	Attitudes	comprises 27 questions in total included Demographic data, attitude, experiences, knowledge and source of information regarding CAM, Current offer of CAM at the center the participant is working, Interest in education and projects regarding CAM.		71%	Attitudes:61 % Positive Attitudes: 20%	2. Better coping (42%), increasing quality of life (47%) 3.NR 4.NR	
Rojas-Cooley, M. T et al (2009) [25]	Knowledge, Attitudes	The first section (assesses CAM knowledge, attitudes, and resources. The second section measures nurses' experiences with patients who asked about or disclosed use of CAM. Scoring range for attitude(0 to 10)	Cronbach alpha of 0.65 for knowledge and 0.81 for attitudes	Overall: 70%	Mean score range :5.47 to 7.66	-	NR
Shorofi, S. A et al (2017) [30]	Knowledge, Attitudes, Use	A self-complete questionnaire in two sections: the first section(personal and	Cronbach's alpha was 0.929	Overall: 29.7%	Very Positive Attitudes: (22.4%), slightly	1.personal=95.7% professional=49.7% 2.Fits into my way of	NR

		professional use of CAM, reasons for personal use, knowledge and attitude toward CAM, The second section(socio-demographic variables)			Positive (36.6%)	life/philosophy(37.7 %), Potential improvement in my condition (37%), Proven benefit in my condition (29.9%) 3. Massage therapy (72%), non-herbal supplements (70.2%) and meditation/relaxation techniques/imagery techniques (57.5%). 4.	
Somani, S et al (2014) [40]	Knowledge, Attitudes, Use	The questionnaire was divided into four sections: (a) demographic; (b) knowledge; (c) experience; and (d) attitude	NR	Overall: 50%	Positive Attitudes:78 %	1.25% 2.NR 3.NR 4.NR	NR
Trail-Mahan, T et al (2013) [22]	Knowledge, Attitude	30 items (knowledge (19 items), attitude(11 items) , CAM resources (16 items), educational interests(34 items)	Cronbach alpha Knowledge: 0.65 and attitude: 0.81	Categorized : good: 49% Poor: 51 %	NR	-	NR
Turker, T et al (2011) [29]	Knowledge, Attitude	The questionnaire contained demo-	NR	Overall: 50%	Positive Attitudes:75	1.NR 2.NR	Television and radio (80.3%),

		graphic questions, and multiple-choice questions Related to, and frequently used CAM therapies.			%	3.hypnosis (59.4%), prayer (58.5%), and herbal therapies (52.6%) 4.NR	internet (69.0%), newspapers and magazines (68.1%), friends 48.6%, and books 32.5%.
van Vliet, M et al (2015) [37]	Attitude, Practice	The questionnaire consisted of 38 questions (demographic data and practice characteristics)	NR	Overall:37%	Positive Attitudes:10-82%	1.NR 2.NR 3. Massage (33%), Aromatherapy (16%), Mind-body therapies (14%) 4. The main obstacles were lack of support (69% to 78%), means (57% to 85%), and time (63% to 70%)	NR
Yildirim, Y et al (2010) [28]	Knowledge, Attitudes, Use	The questionnaire consisted of four parts and nine questions. (socio-demographic, general attitudes towards CAM, sources of CAM information, knowledge of CAM	Approved in other studies	NR But in knowledge about modalities Nursing students appeared to have enough knowledge of prayer (59.2%), massage	Positive Attitudes:38.8%	1.NR 2.NR 3. Prayer therapy (73.4) % 4.NR	Books (20.3%) followed by TV Programs (18.8%) Newspaper/journals (18.4%)

				(56.1%) and imagery (54.0%)			
Yom Y.H et al (2008) [36]	Knowledge, Attitudes,	The questioner developed in four parts including demographic characteristics, knowledge, attitude and practice	Knowledge (0.82) Attitude (0.7)	NR	-	1.27% 2.NR 3.NR 4.NR	
Zanini, A et al (2008) [35]	Knowledge	18 items(two sections(socio demographic characteristics nurses' knowledge about CATs, their use of conventional health care, patients' levels and source of knowledge about CATs, and patients' use of CATs)	NR	Overall: 60.6%	-	1.71.6% 2. To avoid symptoms and side effects of Oncological therapies (59.4%), To improve the quality of life (49.7%) and to control anxiety and fear (39.4). 3.NR 4.NR	Books (60.6%), Healthcare workers (50%, 47/94), the Internet (48.9%, 46/94), workshops and seminars (29.8%, 28/94)
Zoe, R et al (2014) [38]	Knowledge, Attitudes	The first 6 questions referred to the participants' demographic data. The next 14 questions, aimed to reveal the sample's attitudes and	Approved in other study	Overall: 88%	Positive Attitudes:71.4%	1.75.9% 2.NR 3.NR 4.NR	Doctors (34.5%) Nurses (28.7%) Physiotherapists (12.9%)

		knowledge.					
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NR: Non Reported

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Table 4 - Commonly used methods of complementary and alternative medicine among nurses (N=13).

Modality Study	Acupuncture	Aromatherapy	Hypnosis	Herbal Therapies	Homeopathy	Massage	Mind-body Therapies	Spirituality/ Prayer therapy	Non-Herbal Supplements	Meditation/ relaxation techniques	Pressure point therapies	pharmacologic /biologic treatments	Chiropractic	Exercise	Hot and cold application
AVINO (2011) [23]						✓		✓	✓						
Balouchi,A et al (2016) [15]				✓		✓		✓							
Camurdan, C et al (2013) [32]				✓		✓									✓
Cooke, M et al (2012) [31]						✓			✓					✓	
Cutshall, S (2010) [16]						✓	✓	✓							
DeKeyser FG et al (2001) [34]	✓				✓		✓								
Halcón, L. L. (2003) [26]						✓	✓						✓		
Hastings-Tolsma, M et al (2009) [24]				✓			✓					✓			
Hayes, K. M et al (2000)[27]				✓						✓	✓				
Shorofi, S. A et al (2017) [30]						✓			✓	✓					
Turker, T et al (2011) [29]			✓	✓				✓							
van Vliet, M et al (2015) [37]		✓				✓	✓								

Yildirim, Y et al (2010) [28]								✓							
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3.2.5. Barriers to the use of CAM therapies.

In the fourth part, out of 21 studies, 5 studies have examined the barriers to using complementary and alternative therapies. The most important barriers to the use of CAM therapies were lack of trained staff training [16, 23, 26, 31], lack of reimbursement (support) [16, 26, 37] and Lack of evidence (information) for practice [23, 26, 31] (Table 5).

Table 5. Barriers to the use of CAM therapies (N=5).

Barrier	Study (Year)	AVINO (2011) [23]	Cooke, M et al (2012) [31]	Cutshall, S et al (2010) [16]	van Vliet, M et al (2015) [37]	Halcón, L. L et al (2003) [26]
Lack of evidence (information) for practice		✓	✓			✓
Lack of reimbursement(support)				✓	✓	✓
Lack of staff training		✓	✓	✓		✓
Lack of means					✓	
Lack of Time					✓	
Lack of available providers/practitioners		✓		✓		

3.2.6. Information resources

From among the 21 studies, nine studies provided the sources of information about CAM therapies for nurses. The most important information resources across studies were professional peers [16, 23, 26, 29, 31, 32, 38, 39, 41], television/newspaper/journals [16, 23, 26, 28, 29, 31, 32, 39] and the Internet [16, 29, 32, 35, 39]. (Table 6)

Table 6. Nurses' information resources about CAM therapies (N=9).

Source of information Study (Year)	Peer professionals	Books	Internet	workshops and seminars	TV	Newspaper, Journals	Interest groups, extranatural studies	CAM course in the nursing program	Health database	Family	Educational pamphlets	CDs
AVINO (2011) [23]	✓				✓	✓						
Camurdan, C et al (2013) [32]	✓		✓	✓	✓	✓						
Cooke, M et al (2012) [31]	✓				✓	✓	✓					
Cutshall, S et al (2010) [16]	✓	✓	✓	✓	✓		✓				✓	✓
Halcón, L. L et al (2003) [26]	✓				✓	✓						
Holroyd, E et al (2008) [39]	✓	✓	✓		✓	✓	✓	✓	✓	✓		
Turker, T et al (2011) [29]	✓		✓		✓	✓						
Yildirim, Y et al (2010) [28]		✓			✓	✓						
Zanini, A et al (2008) [35]	✓	✓	✓	✓								

4. Discussion

This systematic review was conducted to determine the knowledge, attitude, and practice of nurses regarding CAM therapy. Review of the literature found 21 studies conducted with participation by 5,254 nurses from 13 countries. All instruments used in the included studies were researcher-made questionnaires and were developed based on expert opinion and review of textbooks or other authoritative sources, or were adapted from previously developed questionnaires. In other studies that looked at CAM knowledge, attitude and practice, the research instruments were author-made [42] .

4.1 Knowledge towards CAM therapies

As the largest group of health care providers across the globe, nurses provide care to patients who are using CAM therapies in ever increasing numbers. The knowledge held by nurses regarding CAM is crucial in health promotion and disease prevention [44 ,43]. In the present study, the overall knowledge rate of nurses was moderately high ($\bar{x} = 62.2\%$), range 29.7% - 93.6%). However, the CAM knowledge by nurses found in this systematic review is lower than that found in a scoping review conducted by Chang and Chang [17]. Differences may be attributed to cultural, educational, or clinical experience variations among nurses, as well as methodological differences in the conduct of systematic versus scoping reviews (ref would be good here).

4.2. Attitude toward CAM therapies

Most nurses had positive attitudes toward complementary and alternative medicine, with an overall rate of 38.3% to 95%. The average attitude of nurses was 65.75%, which is similar to work by brown et al [45] . Nurses from the U.S. [26 ,23] and China [39] had a more positive attitude toward CAM use than did nurses from other countries. This finding is contrary to prior research where Canadian (65.5%) and Australian nurses (32%) had a more positive attitude toward CAM use with average at 65.5% and 32%, respectively. better

attitude towards CAM which could be due the existence of various CAM-related training courses in these countries [31 ,25].

4.3. Use of CAM therapies

In the present study, the use of CAM was between 25% and 95.7% ($\bar{x} = 65.9\%$). In other review, The use rate of CAM among nurses and other health care teams were 44.7% and 74.8%, respectively [46]. Rates lower than found in our work. Differences may be explained by increasing rates of CAM use in the general population.

The most important reasons for using CAM in this systematic review were to reduce stress and anxiety and to improve health. These findings are similar to research from Australia which found that the most important reason for the use of CAM by nurses was its close proximity to personal philosophy of life [30]. However, a national study conducted in the U.S. demonstrated that the most important reasons for using CAM were for specific health problems such as back pain, headache and other musculoskeletal problems [7]. Differences in the reason for use of CAM therapies by nurses likely stem from cultural views of health and healing.

The most widely used CAM methods found in this work included massage, herbal medicine, and mind-body therapies. As with the study in Australia, the most important CAM method was massage therapy [30]. Contrary to the present study, the national study in the U.S. found that the most commonly used methods of CAM included the use of nutritional supplements, chiropractic care, and yoga [7]. The possible cause of differences could be due to the historical roots of the current CAM methods in different countries. For example chiropractic in the U.S. and acupuncture in China have historical and social origins in those countries[47]

4.4. Barriers to use and source of information about CAM therapies

The most important barriers to the use of complementary and alternative therapies were lack of reimbursement (support), lack of trained staff and lack of evidence (information) for practice [23, 26, 31]. Findings are largely consistent with other research examining barriers to the use of CAM methods in nursing which were found to be due to cultural barriers (individual experiences, friends' opinions and organizational culture), structural barriers including professional indicators (professional independence, individual knowledge and skills), insufficient resources (time and evidence), and the environment [48].

Finally, the most important sources of information for nurses about CAM therapies were professional colleagues, journals and the Internet. Similar findings were noted by Chang and Chang [17]. But in diabetes patients Knowledge of CAM was gained mainly from friends and neighbors [49].

4.5. Limitations

the limitations of this study were:

- 1- The most important limitation was the use of researcher-made instruments to determine knowledge, attitude and practice of CAM therapies; many failed to report evidence of reliability and validity.
- 2- Only full text, English papers were utilized in this systematic review. Inclusion of other works, such as dissertation studies, may have led to different conclusions.

4.6. Strengths

1. Using a systematic review approach and writing the paper based on predefined registered protocol in PROSPERO and PRISAMA checklist, as well as taking into account all possible dimensions of knowledge, attitude, practice and information sources based on published studies.

2. A defined search strategy was used to search for articles, most of which were of good quality.
3. Use of an established critical appraisal tool to evaluate studies.

5. Conclusions

Given the level of knowledge, attitude and practice use of CAM therapies by nurses found in the current study, there is a clear need for additional knowledge. Access to accurate and reliable information through easy to access sources such as social media and the Internet, may be the most expeditious approach to increasing nurse knowledge and use of CAM therapies.

Considering the use of various investigator developed instruments as well as investigation of the knowledge in a limited number of countries, the use of a systematic approach can help reduce costs and increase the quality of knowledge, attitude and practice regarding CAM. Therefore, it is suggested that a standard, comprehensive and applicable instrument be first designed and tested for use in different cultures. Ongoing systematic investigation of nurse knowledge and use of CAM therapies is needed to address needs in nursing education and practice. Such information will allow for evidence-based curricula and practice which best serves the needs of patients receiving nursing care.

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Highlights

- A systematic review of 21 Cross-sectional studies.
- The average knowledge of CAM therapies by nurses was 62.2% with attitude about use averaging 65.7%.
- Close to two-thirds of nurses reported use of CAM therapies with patients.
- The primary reasons nurses suggested use of CAM were for stress and anxiety reduction and health improvement.
- The most popular method used in studies was massage.
- The most important barriers were the lack of information and resources.
- Colleagues were the most important source of knowledge about CAM by nurses.