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### 2. Keputusan: Revisi Artikel

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The following message is being delivered on behalf of International Journal of Public Health Science (IJPHS).

Anita Joelliantina:

We have reached a decision regarding your submission to International Journal of Public Health Science (IJPHS). "Determinant Analysis and Conceptual Models of the Use of Complementary and Alternative Medicine for Diabetes Mellitus Patients".

Our decision is: Revisions Required  
- Extend the paper with 17 journal papers

Dr. Lina Handayani  
Universitas Ahmad Dahlan  
Phone +62274379418  
Fax +62274381523  
[linafkm@gmail.com](mailto:linafkm@gmail.com)

### 3. Revisi tanggal 4 Februari 2019

## A Literature Review of Complementary and Alternative Medicine Used among Diabetes Mellitus Patients

Anita Joeliantina<sup>1</sup>, Oedojo Soedirham<sup>2</sup>, Mangestuti Agil<sup>3</sup>, M. Bagus Qomaruddin<sup>2</sup>, Kusnanto<sup>4</sup>,

<sup>1</sup>Department of Nursing, Health Polytechnic Ministry of Health, 60282 Surabaya, Indonesia

<sup>2</sup>Faculty of Public Health, Airlangga University, 60115 Surabaya, Indonesia

<sup>3</sup>Faculty of Pharmacy, Airlangga University, 60115 Surabaya, Indonesia

<sup>4</sup>Faculty of Nursing, Airlangga University, 60115 Surabaya, Indonesia

Article Info	ABSTRACT (10 PT)
<p><b>Article history:</b></p> <p>Received xxxx xx 20xx Revised xxxx xx 20xx Accepted xxxx xx 20xx</p> <p><b>Keyword:</b></p> <p>Diabetes mellitus, Complementary and alternative medicine, Traditional medicine Pattern use CAM</p>	<p>Diabetes is a chronic disease that requires regular and sustainable health management that involves proper treatment. Some diabetic patients use CAM, as well as conventional medicine, to maintain their health and control their blood sugar. This literature review aimed to 1) determine the prevalence of CAM used by patients with diabetes, summarize and evaluate the CAM use that includes: characteristics, patterns, types and reasons, 2) propose a conceptual model associated with CAM used by patients with diabetes. A Literature review was searched using an electronic database and published between 2005 and 2015 by using specific keywords. The number of literature review obtained as a search result is 17 articles from 14 countries. The prevalence of CAM used by patients with diabetes ranged from 16.6% to 76%. Determinants associated with the CAM use were age, gender, family income, occupation, residence, and the characteristics of the disease, such as the length of time since diagnosed and complications. Most patients used CAM, along with the conventional treatment, and did not inform health professionals about the CAM use. The CAM use by patients with diabetes was relatively high and the confidence of patients believed the benefits of CAM. Therefore, integration with health professionals to develop CAM management is highly required.</p> <p style="text-align: right;"><i>Copyright © 2018 Institute of Advanced Engineering and Science. All rights reserved.</i></p>

#### Corresponding Author:

Anita Joeliantina  
Nursing Program at Health Polytechnic Ministry of Health Surabaya,  
Jl. Mayjend. Prof. Dr. Moestopo No 8 C Surabaya, Indonesia.  
E-mail address: [nita.mukhlash@gmail.com](mailto:nita.mukhlash@gmail.com)

### 1. INTRODUCTION

Diabetes Mellitus (DM), as a chronic disease, is a group of metabolic diseases with a hyperglycemia characteristic that occurs due to abnormalities in insulin secretion, insulin action, or both [1] [2]. DM is a major cause of morbidity and mortality worldwide and the prevalence keeps increasing. The prevalence of diabetes in the world for adults (aged 20-79 years) was 6.4% or about 285 million adults in 2010, and will increase to 7.7%, approximately 439 million adults in 2030. Between 2010 and in 2030, there is a 69% increase in the number of adults with diabetes in developing countries and 20% increase in developed countries [3].

The main danger of DM is that it causes either acute or chronic complications. Acute complications include hypoglycemia, ketoacidosis, and a diabetic coma. Chronic complications are caused by high levels of blood glucose (hyperglycemia), including microvascular and macrovascular complications. Microvascular complications include nephropathy, retinopathy, and neuropathy, while macrovascular complications include atherosclerosis and cardiac ischemia that can create the risk of morbidity, mortality, and disability by 2-4 times in patients with diabetes mellitus [1] [4]. Approximately 70-80 percent of patients with diabetes mellitus died of vascular disease as a complication of diabetes [2].

Treatment for type 2 diabetes should be conducted in a sustainable manner for a long period. Patients with type 2 diabetes can take not only conventional medicine, but also complementary medicine as a

complement of the conventional treatments that have been carried out. There is a tendency growing all over the world that patients with type 2 diabetes use or choose Complementary and Alternative Medicine (CAM) in order to improve their health status. Complementary medicine is often used in conjunction with conventional medicine but not as a substitute for conventional medicine. Meanwhile, alternative medicine is used as replacement of conventional treatment [4] [5] [6] [7] [8]. Of the patients who suffer from chronic diseases, diabetes is the highest CAM users which are 63%, followed by 42.7% of RA, 26.2% of HIV, and 7.7% of epilepsy [9]. Patients with diabetes are ranked as the second for CAM users, which is 62.1% after hypertension (63.8%), followed by migraine, chronic obstructive disease, gastrointestinal tract disease, and rheumatoid arthritis in using CAM [10].

NCCIH categorizes CAM into three main domains: natural products, mind and body practices, and other complementary health approaches. Natural products include a variety of products, such as herbs (also known as botanicals), vitamins and minerals, and probiotics. They are widely marketed, available to consumers, and often sold as a dietary supplement. The mind and body practices include a large and diverse group of procedures or techniques that are given or taught by trained practitioners or instructors, such as: yoga, chiropractic and osteopathic manipulation, meditation, massage therapy, acupuncture, and relaxation techniques. Other approaches to complementary medicine comprise the traditional medicine practices, Ayurvedic medicine, Chinese traditional medicine, homeopathy, and naturopathy [11].

The objectives of this article are to (1) determine the prevalence, summarize, and explore to the behavior of using complementary and alternative medicine including: characteristics, patterns, types and reasons for the use in patients with type 2 diabetes based on various theories and research, (2) propose a conceptual model associated with the use complementary and alternative medicine by patients with diabetes.

## 2. RESEARCH METHOD

This literature review was searched by using an electronic database such as Pro-Quest, Google Scholar, PubMed, Science-Direct, and hand-searching. The literature review used are articles published from 2005-2015. Keywords used to search were complementary and alternative medicine, diabetes mellitus, traditional medicine, and the pattern of complementary and alternative medicine. Literature works collected were as many as 280 abstracts subsequently selected according to inclusion criteria preset to compile this literature review. The inclusion criteria in this study were studies that explored CAM use by diabetic patients published between 2005-2015. Exclusion criteria were studies published before 2005, not using English, and types of qualitative research. From the search found 17 articles corresponding quantitative research. The review selection process can be seen in Figure 1.

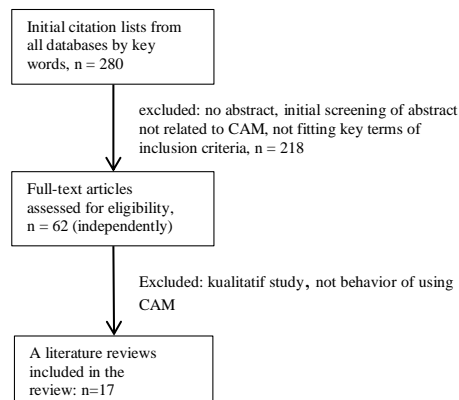


Figure 1 Selection process of literature review

## 3. LIMITATIONS of REVIEW

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This review includes research that focuses on the behavior of CAM use by diabetics. This review is not a literature review of active compounds from herbs, the efficacy and safety of CAM, but only research on the behavior of diabetic patients in using CAM. Formal quality assessment to determine which research was used independently. Some studies that shown design bias, selection and measurement were included because they provide useful insights both in terms of definitions of terms or because they provide information about disclosing the behavior of diabetic patients using CAM.

## 4. RESULTS AND ANALYSIS

### 4.1 The prevalence of cam use

The results of this literature review describe the prevalence of CAM use of various countries. Most studies used cross-sectional study/survey with various periods, ranging from 1 month to 2 years. The prevalence of CAM use still varies, ranging from 16.6% in Jordan up to 76% in the Srilangka [4] [8]. This variation is due to many factors that influence CAM use by patients with diabetes, the definition of CAM, and the survey method used by researchers.

Figure 1 shows the prevalence of diabetic patients who use CAM from 14 countries, where the prevalence of the CAM use by patients with diabetes was over 40% in 12 countries so that it can be said that the prevalence of the CAM use by patients with diabetes is relatively high [4], [5], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21]. The prevalence of CAM use in this literature review is consistent with other literature reviews showing that the range of the prevalence of CAM use by patients with diabetes is from 17% up to 72.8% [22].

### 4.2 CAM use patterns

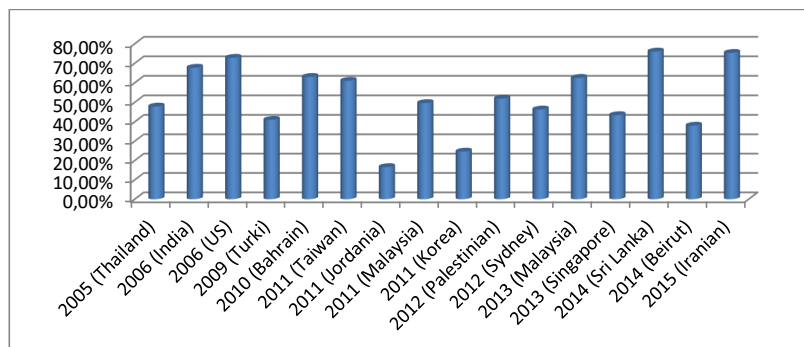
CAM use patterns are behaviors that show a tendency to diabetic patients using CAM as a complement to conventional treatment being undertaken. In this literature review, the patterns of CAM use shown by diabetic patients are, (1) Mostly, CAM is used in conjunction with conventional medicine/allopahy; (2) it does not change their treatment, both in the treatment schedule or doses, (3) reducing one dose or more of conventional treatment, (4) using conventional medicine and CAM in different times, and (5) stopping taking the conventional medicine when using CAM [12],[13],[18],[23],[24],[25]. Diabetic patients, most use CAM as a complementary or supplementary to their conventional treatment [8], [23], [26], and small percentage use CAM only [8].

Diabetic patients use at least one type of CAM modalities, or combining two or more of the CAM modalities [15], [19], [22], [23]. Of all patients with diabetes in Sri Lanka using CAM, 49 patients used one type of CAM, 86 patients used the two types, 52 used three types, and 6 patients used more than 3 different types [4].

Over 60% of patients with diabetes who used CAM modalities did not inform their doctors or health professionals. Only 24.6% - 45% did so [12], [16], [18], [20], [22], [25], [26]. This statement is in accordance with the Birdee (2010) who states that at least 63% of the general population does not disclose the CAM use therapies to their doctors because: 1) they have never thought of it; 2) they feel the CAM use is secure, so there is no need to discuss its use; 3) health care professionals do not ask about their using CAM; 4) health professional will prevent the CAM use; 5) there is not enough time to discuss the CAM use; 6) health professionals do not have adequate knowledge about CAM [13]. Meanwhile, patients with diabetes who informed their decision to use CAM have received relatively negative responses from health professionals, namely 1) they state that it is entirely patients business and offers not to comment on the CAM use; 2) they warn the possible side effects of the CAM use; 3) they discourage patients to consume; 4) just few health professionals encourage them to use CAM [22], [27].

### 4.3 Individual characteristics

Gender, age, education, income, religion, marital status, and family size are the determinants predicted to affect diabetic patients to use CAM. Table 1 shows that female respondents use CAM more than men, but as many as six research shows that gender is not significantly associated with the CAM use [12], [15], [18], [19], [22], [23]. Meanwhile, 5 studies show a significant relationship between sex and the CAM use [4], [5], [14], [16], [20]. The patients with diabetes at age in this review were mostly over 40 years old. The age category varies from each study. The age of diabetic patients showing a significant effect on the CAM use was only found in the two studies, namely, in Taiwan and in the US [14], [22].



**Diagram 1** Prevalence of Use of CAM by Diabetic Patients from Several Countries

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These results illustrate that age is not a dominant factor that affects a person on CAM use. Only four studies showed that education that has a significant influence on CAM use by patients with diabetes [13], [14], [15], [26]. Likewise, high income also showed a significant effect only in 4 studies [5], [12], [20], [26].

Characteristic of the disease in this literature is limited only to the suffering duration and complications. Suffering duration is not significantly associated with CAM use. It can be seen in studies conducted to Iranian  $p = 0.64$ , Sydney  $p = 0.603$ , Palestinian  $p = 0.874$ , and  $p = 0.64$  Thailand [12], [18], [19], [23]. Meanwhile, the study results showing a significant relationship between suffering duration of diabetes and the CAM use were a study in Bahrain ( $p = 0.008$ ), Turkey ( $p = 0.0001$ ), and Beirut ( $p =$ ) [15], [16], [27]. The suffering duration is associated with the CAM use because, suffering a chronic disease, the patients might get bored with conventional medicine. The relationship between diabetes complications and the CAM use has been inconsistent. There are two studies showing a relationship between complications and the CAM use, in Iranian ( $p = 0.05$ ) and Bahrain ( $p = 0.00002$ ) [16], [23]. Three studies show that there is no relationship between the diabetes complications and the CAM use [4], [18], [19]. Diabetes complications are significantly related to the CAM use, based on studies conducted in Beirut, Lebanon [27]. Patients with neuropathic complications use CAM more than those without neuropathy [28].

**Table 1:** Research report on the use of CAM by patients with diabetes

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Moolasarn and Ms, 2005) Thailand	159	Cross sectional survey,	December 2003 to January 2004	47.8% (N=76)	Past 3 months	Yoga 46%, Unchanged form of herbal medicine 42.1%, changed form of herbal medicine 25%, Acupuncture /Acupressure 10.5%, Mental therapy 7.9%, diet supplementary 5.3%, oil massage 2.6%, others 1.3%
(Kumar, Bajaj and Mehrotra, 2006), India	493	Cross sectional study, systematic sampling	1999- 2001	67.7% (N=334)	aware of CAM, and currently using CAM	Naturopathy 97.3% (n=325), Ayurveda 16.2% (n=54), Homeopathy 12.9% (n=43), Acupressure 2.7% (n=9), others 3.0% (n=10)
(Bell <i>et al.</i> , 2006), US	31.004 DM 2.479, No DM, 28.526	Data from NHIS	Data from NHIS 2002	72.8% (N = 1.781)	within the past year	Self- prayer 61.2%, other prayer 39%, prayer group 16.2%, natural product 15.7%, massage 3.1%, relaxation techniques 12.7%, others

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Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Ceylan <i>et al.</i> , 2009), Turkey	371	Cross sectional study, survey questionnaire	January 2006 to December 2006	41% (N = 152 F=104 M=48)	NM	Herbal preparation 88.1%, Acupuncture and meditation practises 5.3%, herbal preparation and folk medicine practices 3.3%, herbal preparation and acupuncture medication 3.3%
(Khalaf & Withord, 2010), Bahrain	402	Cross sectional study, convenience sampling	NM	63% (N = 252 F=149 M=103)	The previous 12 months	Natural product Natural product with using: - alternative and medical practices n=80, 32%, - mind-body interventions n=24, 10% - manipulative and body based n=78, 31% - energy therapy n=8, 3%
(Hasan, <i>et al.</i> , 2011), Malaysia	230	Case-control study, random sampling	NM	49.6% N= 144 F=54 M=60	NM	Vitamin 57.9%, ginseng 12.3%, yoga 7.9%
(Hsiao-yun, Wallis and Tiralongo, 2011), Taiwan	326	A cross sectional survey, structure interview, simple random sampling	July 2006 and February 2007	Before: 22.7% (N=74) After: 61% (N=197)	The previous 12 months	Use of CREAM after being diagnosed with diabetes: Acupuncture 6.7%, chines herbal medicines 27.9%, nutritional supplement 41.1%, diet modification 13.2%, non -chines herbs 3.4%, cupping, scraping 6.4%, manipulative-based therapy 13.5%, folk therapies 0.6%, bio-field therapy 9.2%, bio-electromagnetic based therapies 10.1%, supernatural healings 11.0%, mind-body therapies 3.7%
(Wazaify, <i>et al.</i> , 2011), Jordan	1000	Cross-sectional survey, random sampling	March 2009 to September 2009	16.6% N=166 F=99 M=67	NM	Herbal 93.4%, the plants in the form of infusion 93.9% (green tea, aniseed, ginger, chamomile, sage, fenugreek, nigella, black-seed, white lupin, germander, garlic, cinnamon, olive leaves)
(Kim, <i>et al.</i> , 2011), KNDP, Korea	2752	Cross sectional study, hospital electronic database	KNDP 2005 and 2009	24.6% (N = 677 F=290 M= 387)	The past 1 year up until the time of their initial enrollment	Red ginseng, herbal medicine, silkworm, others
(Ali-Stayeh, Jamous and Jamous, 2012), Palestinian	1883	Cross-sectional study, random sampling	August 2010 until May 2011	51.9% N = 977 F=519 M=457	NM	The main herb as CAM: Trigonella berythea 19.6% (n=191), Rosmarinus officinalis 13.5% (n=132), Teucrium capitatum 11.4% (n=111), Cinnamomun zeylanicum 10.8% (n=105), others plan 44.7% (n=438) Other CAM modalities: Prayer 70% (n=684), vitamins and mineral 9.9% (n=97), exercise 9.2% (n=90), others (n=11)

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Manya, Champion and Dunning, 2012), Sydney	69	A cross-sectional survey, two stage sampling design	June and August 2008	46.3% N = 32 F=15 M=17	NM	The most commonly used CAM to treat diabetes: Multivitamin 40%, Cinnamon 25%, Co-enzyme Q10 25%, Prayer 25%, others
(Ching <i>et al.</i> , 2013), Malaysia	240	A cross-sectional study, random sampling method	May 2011	62.5% N = 150 F=96 M=54	NM	Biological based therapy like herbal products 80% (n=120), manipulative and body-based systems 14.7% (n=22), alternative medical system 7.3% (n=11), energy therapies 14% (n=21), mind-body interventions 2.7% (n=4)
(Fan <i>et al.</i> , 2013), Singapore	304	A Cross-sectional descriptive design, convenience sampling	NM	43.4% N = 132 F=67 M=64	NM	Nutritional supplements 55.3% (n=73), Chinese herbal medicine 29.5% (n=39), massage 28% (n=37)
(Mitha, <i>et al.</i> , 2013), Malaysia	256	Cross-sectional study, convenience sampling	August 2012 to October 2012	N = 256 F=164 M=92	The past 3 months	TCM 31%, supplement 18%, TIM 14%, Faith healing 10%, Nutritional therapy 9%, others
(Medagama <i>et al.</i> , 2014), Sri Lanka	252	A cross, sectional survey, randomly selected	April and August 2012	76% N = 192 F=139 M=53	NM	Bitter gourd 50.8% (n=128), Ivy gourd leaves 44.8% (n=113), crepe ginger leaves 36.5% (n=92), salacia reticulate 6.7% (n=17), fenugreek 2% (n=5)
(Naja, <i>et al.</i> , 2014), Beirut	333	Cross-sectional study	August 2010 and January 2011	38% N = 127	NM	Folk food and herbal 81%, natural product 28%, spiritual healing 11.8%, vitamin and mineral 3%
(Hashempur <i>et al.</i> , 2015), Iranian	239	Cross sectional study, convenient sampling	June to September 2011	75.3% N = 180 F=123 M=56	The last year	Herbal preparations 97.7% (n=176), cupping 8.3% (n=15), Acupuncture 2.7% (n=5), mind-body 0.55% (n=1)

n = number of sample, NM = not mentioned, F = female, M = male

#### 4.4 Types of CAM

CAM widely used by patients with diabetes and found in this literature review, as shown in Table 1, are herbs, vitamins, and prayers. In the US, the most widely used CAM by patients with diabetes are herbs, supplements (vitamins and minerals), and mind body therapies [7]. Overall, Table 1 shows the types of CAM used by many diabetic patients in many countries. In Turkey many uses herbal preparations such as *Origanum vulgare*, pomegranate syrup, stinging nettle (nettle leaf), dog rose (*rosa canina*), Chervil, Cinnamon, and bitter almond [15]. In Bahrain, the natural ingredients used are garlic, bitter melon, cinnamon, and fenugreek. *Trigonella berythea*, *Rosmarinus officinalis*, *Teucrium capitatum*, and *Cinnamomum zeylanicum* are four main herbs that are widely used by patients with diabetes in Palestine, out of 100 plants from 44 botanical families. In Sydney, herbs used are cinnamon, garlic, *gymnena slyveste*, fenugreek, and American ginseng. Herb used in Malaysia is bitter gourd, cat's whiskers, garlic, Sabah snake grass, basil leaf, and ginseng. Bitter gourd, crepe ginger, ivy gourd, fenugreek, and *Salacia reticulate* are herbs used by patients with diabetes in Sri Lanka. In Iranian, 4 main herbs used are cinnamon, ginger, fenugreek, and *camellia sinensis*. From these studies, it can be concluded that the most widely used herbs are cinnamon, garlic, bitter gourd, ginseng, fenugreek, ginger, and and nutritional supplements [4], [5], [15], [16], [18], [19], [23]. Chronic diseases, such as diabetes, are associated with decreasing quality of life, and psychological problems, such as anxiety and depression. Mind-body therapies have a psychological effect that can help patients cope with the disease and improve their mood and quality of life. Patients with diabetes, based on the clinical trials, have shown improved quality of life and stress reduction with yoga and tai chi. The intensity of yoga and tai chi practices has been categorized as a low

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to medium intensity. During the clinical trials with controls, either yoga or tai chi consistently shows a significant long-term improvement in controlling blood glucose or A1C [7]. The safety CAM use is important for patients who take these medications, as well as for health care professionals, especially because of the growing popularity of CAM use by diabetics. A considerable percentage of diabetes patients who used CAM in conjunction with conventional medicine rather than as a substitute. This situation allows for side effects interactions of CAM with medical treatment, so this should be considered [28].

#### 4.5 Resources of CAM

The informational beliefs are due to the direct, positive experiences of information sources about the CAM use. Information sources about the CAM use, mostly obtained from a friend, are shown by 5 studies, namely, the one in Beirut, another in Singapore (57.44%), another in Malaysia (32.1%), and the other in India (36.4%) [5], [13], [20], [26], [27]. Meanwhile, the information sources that come mostly from families are shown by 3 studies, namely, one study in Palestine (40.2%), another in Jordan (41%), and the other in Taiwan (36%) [18], [21], [22]. Other sources of information are obtained from the media and CAM practices. Conclusion derived from the sources of information is that friends are the main source of information that can affect diabetic patients to use CAM.

#### 4.6 Reason for using CAM

CAM users expressed a variety of reasons why they are using CAM. This literature review will outline those various reasons. According to Hasan *et al.*, (2011) diabetic patients' reasons on using CAM is the quality and safety of CAM (63.2%), an additional treatment for their diabetes (53.5%), family history in using CAM (21.9%), fewer side effects of CAM (20.2%), allopathic treatment failure (16.7%), and some other reasons. A belief that CAM can control diabetes, the good example of other CAM users, the ease of getting CAM, and the affordable price are also the reasons for diabetic patients to use CAM [5]. Mitha *et al.*, 2013, shows that the diabetic patients' strongest belief in using is that CAM is safer ( $n = 178$ , 69.5%); CAM has few side effects ( $n = 201$ , 78.5%); CAM will maintain their health ( $n = 212$ , 82.8%); and CAM is chosen because allopathic medicine is less effective. There is also a belief that CAM has a synergistic effect with conventional medicine [23]. Chang *et al.*, 2011, explains that the reasons for diabetic patients using CAM are to control diabetes (24.9%), to treat complications (3.2%), and, mostly, (71.9%) other conditions associated with health.

### 5. DISCUSSION

Diabetes is a chronic condition that requires both lifestyle and knowledge modification in order to acquire and apply skills that will enable effective self-care activities on a long-term basis. Type 2 diabetes is a chronic disease that requires regular and sustainable health management that involves proper treatment [22], [29]. Patients with diabetes, besides using conventional treatments, also use complementary and alternative medicine to supplement the medication. There is a worldwide growing trend that diabetic patients use complementary and alternative medicine in order to improve their health status.

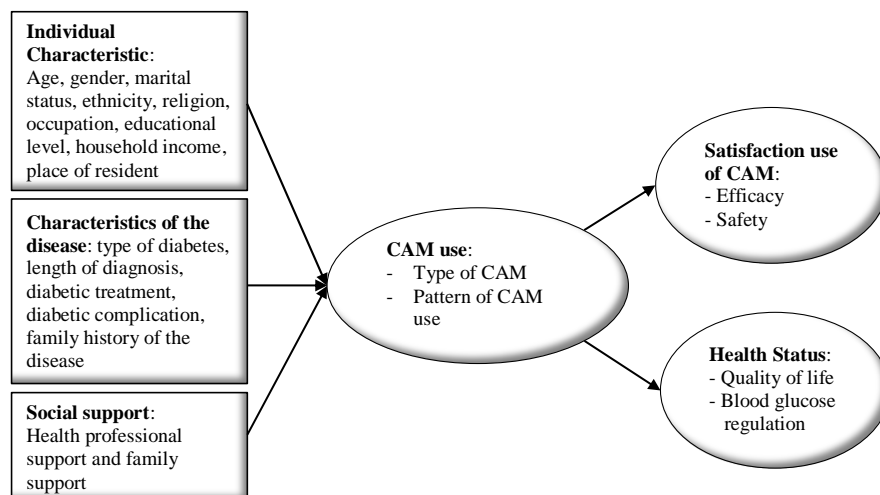
The results of the analysis of several studies in this review shows that there are several determinants associated with the CAM use, namely, the characteristics of the individuals (age, gender, marital status, ethnicity, education level, family income, place of residence, and sources of information) and the characteristics of diabetes (types of diabetes, duration of diagnosis, complications, complaints, and family history). The CAM use by patients with diabetes as an attempt to improve their health status can be evaluated from the types of medicine selected, patterns of use, and the reasons for using CAM. The types of CAM selected refer to NCCIH (2015) stating that they are a product of nature, mind and body practices, and other complementary health approaches. CAM patterns of use include the first time of using CAM (before / after diagnosis), the number of the types of CAM used, schedule of CAM use, and a notification to healthcare officers [20], [22].

The reasons for using CAM by patients with diabetes vary such as the impact on health status, benefits, side effects, ease access and costs, the development of the incidence of complications, and experiences of the previous treatment [5], [26], [27], [30]. The health status of diabetic patients showing efficacy of the CAM use was evaluated on a satisfaction using CAM and the patient's health status. Patients' satisfaction in using the CAM includes efficacy and safety of CAM selected. Health status includes the quality of life and the regulation of blood glucose (blood sugar levels and A1C). Schematically, the relationship between the determinants and the CAM use by patients with diabetes can be seen in figure 2.

According to Chang's research (2011), factors of social support and individual beliefs affect diabetic patients in deciding whether to use CAM or not. It is generally believed that social support is crucial to



encourage someone to have positive health behavior and conduct an effective treatment in acute and chronic diseases [31]. Family support also influences a person to choose complementary and alternative medicine on the types of biological treatment and the manipulation of the body [32]. Family support for T2DM patients who use herbs is to give permission to use herbs, remind time of health control, provide information about herbs, and help prepare herbal preparations [33]. People with positive attitudes toward CAM and those with high family support are more likely to use CAM and more involved in self-care behaviors [22].



**Figure 2** Conceptual Model of the Use of CAM by Patients with Diabetes

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This literature review illustrates that the CAM is used as a complementary treatment. Although the prevalence of CAM users still vary, it remains necessary to have enough information about the efficacy, safety, and ways of presentation for CAM users. The majority of diabetic patients who use CAM do not tell doctors or health workers. The reasons why diabetic patients CAM users do so are that health professionals would prevent the CAM use and that they do not have adequate knowledge about CAM. From those reasons, it is necessary for the government to set health policy on the CAM use in health facilities [22].

This literature review still has various limitations. The limitation is that this review is based on a variety of research using sampling techniques and sample size varied, so that the significance level obtained is very relative influenced by both. The absence of variable that shows how much social support especially from families and health professionals in the use of CAM, so that patients can determine or make decisions appropriately in using both CAM type, frequency, and time use. Evaluation of the use of CAM is required to determine the effectiveness of using CAM. Such an evaluation can be seen in terms of the satisfaction of the use of CAM or the health status of patients using CAM.

## 6. IMPLICATION

The CAM use by patients with diabetes can have implications for either the patient as an individual, healthcare professionals and government as a decision maker. Complementary and alternative medicine in Indonesia has been regulated in the Regulation of the Minister of Health of the Republic of Indonesia number 1109 / MENKES / PER / IX / 2007 concerning the Implementation of Alternative-Complementary Medicine in Health Service Facilities. CAM is categorized as complementary, alternative, and integrative, depending on how a person uses the CAM. If someone is using CAM in conjunction with conventional treatment, they will use complementary medicine.

This literature review illustrates that the CAM is used as a complementary treatment. Although the prevalence of CAM users still vary, it remains necessary to have enough information about the efficacy, safety, and ways of presentation for CAM users. The majority of diabetic patients who use CAM do not tell doctors or health workers. The reasons why diabetic patients CAM users do so are that health professionals would prevent the CAM use and that they do not have adequate knowledge about CAM. From those reasons, it is necessary for the government to set health policy on the CAM use in health facilities [17]. It is also necessary

to improve health professionals' knowledge of integrative medicine. The Integration of various practices, therapies, and beliefs in CAM with conventional healthcare provides great potential for a better healthcare system, such as expanding treatment options, increasing the satisfaction of patients and providers, and providing better therapies [35]. The combination of conventional and complementary medicine often produces better results than conventional therapy alone, especially the reduction of negative side effects from the treatment. Synergy on integrative treatments in many clinical situations would offer various benefits, including the acceleration of the recovery from surgery, reduction on the dependency on drugs, and the reduction of side effects [35].

## 7. CONCLUSION

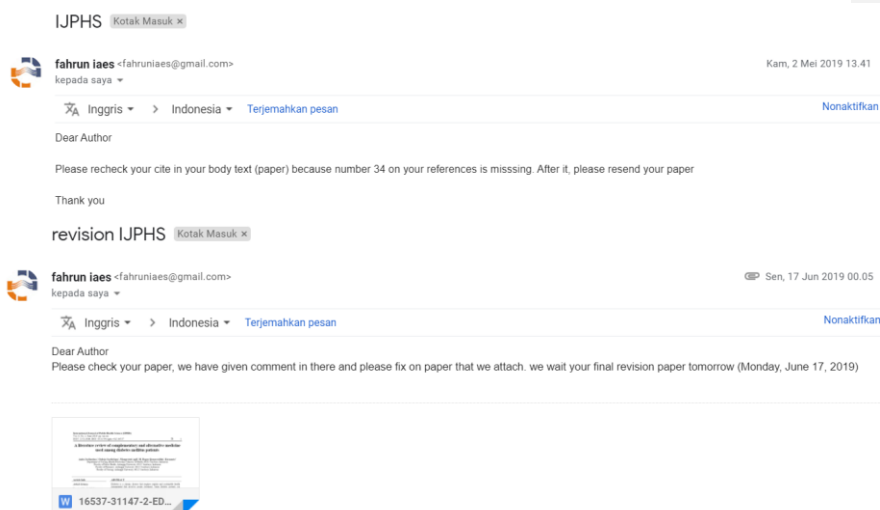
CAM can be defined as complementary medicine, alternative, and integrative depending on the patients that use it. CAM is widely used by people with chronic diseases. Diabetes mellitus as a chronic disease requires special attention in terms of treatment and management. One treatment that is chosen by the patient with diabetes is CAM. In this review, the diabetic patients use CAM as complementary and alternative medicine, but not as integrative medicine. Further research is needed on CAM as an integrative treatment in diabetic patients. Medical pluralism gives an insight into the use of conventional treatments and CAM systems that are widely used by patients with chronic diseases. CAM widely used by patients with diabetes is natural products. Therefore, further research is required to reveal the efficacy and safety of the CAM use. The successful use of CAM can be evaluated on the regulation of blood glucose. Furthermore, CAM management as an integrative treatment by healthcare professionals is also required. For this purpose, this literature review offers a conceptual model as a framework for further research on the CAM use.

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#### 4. Revisi tanggal 2 Mei 2019



## 5. Revisi tanggal 14 Juni 2019

### A literature review of complementary and alternative medicine used among diabetes mellitus patients

Anita Joelianтина<sup>1</sup>, Oedojo Soedirham<sup>2</sup>, Mangestuti Agil<sup>3</sup>, M. Bagus Qomaruddin<sup>2</sup>, Kusnanto<sup>4</sup>

<sup>1</sup>Department of Nursing, Health Polytechnic Ministry of Health, 60282 Surabaya, Indonesia

<sup>2</sup>Faculty of Public Health, Airlangga University, 60115 Surabaya, Indonesia

<sup>3</sup>Faculty of Pharmacy, Airlangga University, 60115 Surabaya, Indonesia

<sup>4</sup>Faculty of Nursing, Airlangga University, 60115 Surabaya, Indonesia

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#### ABSTRACT

Diabetes is a chronic disease that requires regular and sustainable health management that involves proper treatment. Some diabetic patients use CAM, as well as conventional medicine, to maintain their health and control their blood sugar. This literature review aimed to 1) determine the prevalence of CAM used by patients with diabetes, summarize and evaluate the CAM use that includes: characteristics, patterns, types and reasons, 2) propose a conceptual model associated with CAM used by patients with diabetes. A Literature review was searched using an electronic database and published between 2005 and 2015 by using specific keywords. The number of literature review obtained as a search result is 17 articles from 14 countries. The prevalence of CAM used by patients with diabetes ranged from 16.6% to 76%. Determinants associated with the CAM use were age, gender, family income, occupation, residence, and the characteristics of the disease, such as the length of time since diagnosed and complications. Most patients used CAM, along with the conventional treatment, and did not inform health professionals about the CAM use. The CAM use by patients with diabetes was relatively high and the confidence of patients believed the benefits of CAM. Therefore, integration with health professionals to develop CAM management is highly required.

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#### Corresponding Author:

Anita Joelianтина  
Nursing Program at Health Polytechnic Ministry of Health Surabaya,  
Jl. Mayjend. Prof. Dr. Moestopo No 8 C Surabaya, Indonesia.  
E-mail address: [nita.mukhlash@gmail.com](mailto:nita.mukhlash@gmail.com)

## 9. INTRODUCTION

Diabetes Mellitus (DM), as a chronic disease, is a group of metabolic diseases with a hyperglycemia characteristic that occurs due to abnormalities in insulin secretion, insulin action, or both [1] [2]. DM is a major cause of morbidity and mortality worldwide and the prevalence keeps increasing. The prevalence of diabetes in the world for adults (aged 20-79 years) was 6.4% or about 285 million adults in 2010, and will increase to 7.7%, approximately 439 million adults in 2030. Between 2010 and in 2030, there is a 69% increase in the number of adults with diabetes in developing countries and 20% increase in developed countries [3].

The main danger of DM is that it causes either acute or chronic complications. Acute complications include hypoglycemia, ketoacidosis, and a diabetic coma. Chronic complications are caused by high levels of blood glucose (hyperglycemia), including microvascular and macrovascular complications. Microvascular complications include nephropathy, retinopathy, and neuropathy, while macrovascular complications include atherosclerosis and cardiac ischemia that can create the risk of morbidity, mortality, and disability by 2-4 times in patients with diabetes mellitus [1] [4]. Approximately 70-80 percent of patients with diabetes mellitus died of vascular disease as a complication of diabetes [2].

*Title of manuscript is short and clear, implies research results (First Author)*

Treatment for type 2 diabetes should be conducted in a sustainable manner for a long period. Patients with type 2 diabetes can take not only conventional medicine, but also complementary medicine as a complement of the conventional treatments that have been carried out. There is a tendency growing all over the world that patients with type 2 diabetes use or choose Complementary and Alternative Medicine (CAM) in order to improve their health status. Complementary medicine is often used in conjunction with conventional medicine but not as a substitute for conventional medicine. Meanwhile, alternative medicine is used as replacement of conventional treatment [4] [5] [6] [7] [8]. Of the patients who suffer from chronic diseases, diabetes is the highest CAM users which are 63%, followed by 42.7% of RA, 26.2% of HIV, and 7.7% of epilepsy [9]. Patients with diabetes are ranked as the second for CAM users, which is 62.1% after hypertension (63.8%), followed by migraine, chronic obstructive disease, gastrointestinal tract disease, and rheumatoid arthritis in using CAM [10].

NCCIH categorizes CAM into three main domains: natural products, mind and body practices, and other complementary health approaches. Natural products include a variety of products, such as herbs (also known as botanicals), vitamins and minerals, and probiotics. They are widely marketed, available to consumers, and often sold as a dietary supplement. The mind and body practices include a large and diverse group of procedures or techniques that are given or taught by trained practitioners or instructors, such as: yoga, chiropractic and osteopathic manipulation, meditation, massage therapy, acupuncture, and relaxation techniques. Other approaches to complementary medicine comprise the traditional medicine practices, Ayurvedic medicine, Chinese traditional medicine, homeopathy, and naturopathy [11].

The objectives of this article are to (1) determine the prevalence, summarize, and explore to the behavior of using complementary and alternative medicine including: characteristics, patterns, types and reasons for the use in patients with type 2 diabetes based on various theories and research, (2) propose a conceptual model associated with the use complementary and alternative medicine by patients with diabetes.

## 10. RESEARCH METHOD

This literature review was searched by using an electronic database such as Pro-Quest, Google Scholar, PubMed, Science-Direct, and hand-searching. The literature review used are articles published from 2005-2015. Keywords used to search were complementary and alternative medicine, diabetes mellitus, traditional medicine, and the pattern of complementary and alternative medicine. Literature works collected were as many as 280 abstracts subsequently selected according to inclusion criteria preset to compile this literature review. The inclusion criteria in this study were studies that explored CAM use by diabetic patients published between 2005-2015. Exclusion criteria were studies published before 2005, not using English, and types of qualitative research. From the search found 17 articles corresponding quantitative research. The review selection process can be seen in Figure 1.

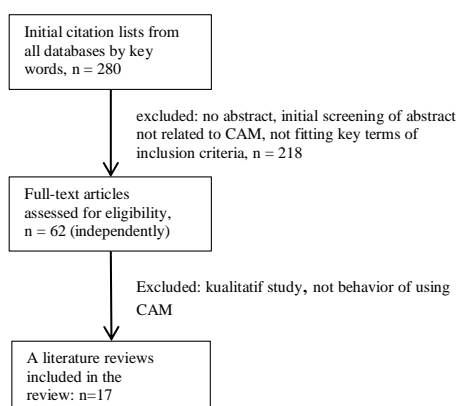


Figure 1 Selection process of literature review

## 11. LIMITATIONS of REVIEW

This review includes research that focuses on the behavior of CAM use by diabetics. This review is not a literature review of active compounds from herbs, the efficacy and safety of CAM, but only research on the behavior of diabetic patients in using CAM. Formal quality assessment to determine which research was used independently. Some studies that shown design bias, selection and measurement were included because they provide useful insights both in terms of definitions of terms or because they provide information about disclosing the behavior of diabetic patients using CAM.

## 12. RESULTS AND ANALYSIS

### 4.1. The prevalence of cam use

The results of this literature review describe the prevalence of CAM use of various countries. Most studies used cross-sectional study/survey with various periods, ranging from 1 month to 2 years. The prevalence of CAM use still varies, ranging from 16.6% in Jordan up to 76% in the Srilangka [4] [8]. This variation is due to many factors that influence CAM use by patients with diabetes, the definition of CAM, and the survey method used by researchers.

Figure 1 shows the prevalence of diabetic patients who use CAM from 14 countries, where the prevalence of the CAM use by patients with diabetes was over 40% in 12 countries so that it can be said that the prevalence of the CAM use by patients with diabetes is relatively high [4], [5], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21]. The prevalence of CAM use in this literature review is consistent with other literature reviews showing that the range of the prevalence of CAM use by patients with diabetes is from 17% up to 72.8% [22].

### 4.2. CAM use patterns

CAM use patterns are behaviors that show a tendency to diabetic patients using CAM as a complement to conventional treatment being undertaken. In this literature review, the patterns of CAM use shown by diabetic patients are, (1) Mostly, CAM is used in conjunction with conventional medicine/allopathy; (2) it does not change their treatment, both in the treatment schedule or doses, (3) reducing one dose or more of conventional treatment, (4) using conventional medicine and CAM in different times, and (5) stopping taking the conventional medicine when using CAM [12],[13],[18],[23],[24],[25]. Diabetic patients, most use CAM as a complementary or supplementary to their conventional treatment [8], [23], [26], and small percentage use CAM only [8].

Diabetic patients use at least one type of CAM modalities, or combining two or more of the CAM modalities [15], [19], [22], [23]. Of all patients with diabetes in Sri Lanka using CAM, 49 patients used one type of CAM, 86 patients used the two types, 52 used three types, and 6 patients used more than 3 different types [4].

Over 60% of patients with diabetes who used CAM modalities did not inform their doctors or health professionals. Only 24.6% - 45% did so [12], [16], [18], [20], [22], [25], [26]. This statement is in accordance with the Birdee (2010) who states that at least 63% of the general population does not disclose the CAM use therapies to their doctors because: 1) they have never thought of it; 2) they feel the CAM use is secure, so there is no need to discuss its use; 3) health care professionals do not ask about their using CAM; 4) health professional will prevent the CAM use; 5) there is not enough time to discuss the CAM use; 6) health professionals do not have adequate knowledge about CAM [13]. Meanwhile, patients with diabetes who informed their decision to use CAM have received relatively negative responses from health professionals, namely 1) they state that it is entirely patients business and offers not to comment on the CAM use; 2) they warn the possible side effects of the CAM use; 3) they discourage patients to consume; 4) just few health professionals encourage them to use CAM [22], [27].

### 4.3. Individual characteristics

Gender, age, education, income, religion, marital status, and family size are the determinants predicted to affect diabetic patients to use CAM. Table 1 shows that female respondents use CAM more than men, but as many as six research shows that gender is not significantly associated with the CAM use [12], [15], [18], [19], [22], [23]. Meanwhile, 5 studies show a significant relationship between sex and the CAM use [4], [5], [14], [16], [20]. The patients with diabetes at age in this review were mostly over 40 years old. The age category varies from each study. The age of diabetic patients showing a significant effect on the CAM use was only found in the two studies, namely, in Taiwan and in the US [14], [22].

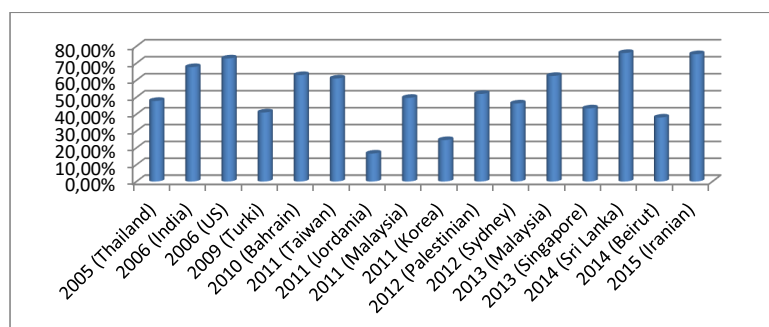


Figure 2. Prevalence of use of CAM by diabetic patients from several countries

These results illustrate that age is not a dominant factor that affects a person on CAM use. Only four studies showed that education that has a significant influence on CAM use by patients with diabetes [13], [14], [15], [26]. Likewise, high income also showed a significant effect only in 4 studies [5], [12], [20], [26]. Characteristic of the disease in this literature is limited only to the suffering duration and complications. Suffering duration is not significantly associated with CAM use. It can be seen in studies conducted to Iranian  $p = 0.64$ , Sydney  $p = 0.603$ , Palestinian  $p = 0.874$ , and  $p = 0.64$  Thailand [12], [18], [19], [23]. Meanwhile, the study results showing a significant relationship between suffering duration of diabetes and the CAM use were a study in Bahrain ( $p = 0.008$ ), Turkey ( $p = 0.0001$ ), and Beirut ( $p =$ ) [15], [16], [27]. The suffering duration is associated with the CAM use because, suffering a chronic disease, the patients might get bored with conventional medicine. The relationship between diabetes complications and the CAM use has been inconsistent. There are two studies showing a relationship between complications and the CAM use, in Iranian ( $p = 0.05$ ) and Bahrain ( $p = 0.00002$ ) [16], [23]. Three studies show that there is no relationship between the diabetes complications and the CAM use [4], [18], [19]. Diabetes complications are significantly related to the CAM use, based on studies conducted in Beirut, Lebanon [27]. Patients with neuropathic complications use CAM more than those without neuropathy [28].

Table 1. Research report on the use of CAM by patients with diabetes

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Moolasarn and Ms, 2005) Thailand	159	Cross sectional survey,	December 2003 to January 2004	47.8% (N=76)	Past 3 months	Yoga 46%, Unchanged form of herbal medicine 42.1%, changed form of herbal medicine 25%, Acupuncture /Acupressure 10.5%, Mental therapy 7.9%, diet supplementary 5.3%, oil massage 2.6%, others 1.3%
(Kumar, Bajaj and Mehrotra, 2006), India	493	Cross sectional study, systematic sampling	1999- 2001	67.7% (N=334)	aware of CAM, and currently using CAM	Naturopathy 97.3% (n=325), Ayurveda 16.2% (n=54), Homeopathy 12.9% (n=43), Acupressure 2.7% (n=9), others 3.0% (n=10)
(Bell <i>et al.</i> , 2006), US	31.004 DM 2.479, No DM, 28.526	Data from NHIS	Data from NHIS 2002	72.8% (N = 1.781)	within the past year	Self- prayer 61.2%, other prayer 39%, prayer group 16.2%, natural product 15.7%, massage 3.1%, relaxation techniques 12.7%, others
(Ceylan <i>et al.</i> , 2009), Turkey	371	Cross sectional study, survey questionnaire	January 2006 to December 2006	41% (N = 152 F=104 M=48)	NM	Herbal preparation 88.1%, Acupuncture and meditation practises 5.3%, herbal preparation and folk medicine practices 3.3%, herbal preparation and acupuncture medication 3.3%



Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Khalaf & Withord, 2010), Bahrain	402	Cross sectional study, convenience sampling	NM	63% (N = 252 F=149 M=103)	The previous 12 months	Natural product Natural product with using: - alternative and medical practices n=80, 32%, - mind-body interventions n=24, 10% - manipulative and body based n=78, 31% - energy therapy n=8, 3%
(Hasan, <i>et al.</i> , 2011), Malaysia	230	Case-control study, random sampling	NM	49.6% N= 144 F=54 M=60	NM	Vitamin 57.9%, ginseng 12.3%, yoga 7.9%
(Hsiao-yun, Wallis and Tiralongo, 2011), Taiwan	326	A cross sectional survey, structure interview, simple random sampling	July 2006 and February 2007	Before: 22.7% (N=74) After: 61% (N=197)	The previous 12 months	Use of CREAM after being diagnosed with diabetes: Acupuncture 6.7%, chines herbal medicines 27.9%, nutritional supplement 41.1%, diet modification 13.2%, non -chines herbs 3.4%, cupping, scraping 6.4%, manipulative-based therapy 13.5%, folk therapies 0.6%, bio-field therapy 9.2%, bio-electromagnetic based therapies 10.1%, supernatural healings 11.0%, mind-body therapies 3.7% Herbal 93.4%, the plants in the form of infusion 93.9% (green tea, aniseed, ginger, chamomile, sage, fenugreek, nigella, black-seed, white lupin, germander, garlic, cinnamon, olive leaves)
(Wazaify, <i>et al.</i> , 2011), Jordan	1000	Cross-sectional survey, random sampling	March 2009 to September 2009	16.6% N=166 F=99 M=67	NM	
(Kim, <i>et al.</i> , 2011), KNDP, Korea	2752	Cross sectional study, hospital electronic database	KNDP 2005 and 2009	24.6% (N = 677 F=290 M= 387)	The past 1 year up until the time of their initial enrollment	Red ginseng, herbal medicine, silkworm, others
(Ali-Stayeh, Jamous and Jamous, 2012), Palestinian	1883	Cross-sectional study, random sampling	August 2010 until May 2011	51.9% N = 977 F=519 M=457	NM	The main herb as CAM: Trigonella berythea 19.6% (n=191), Rosmarinus officinalis 13.5% (n=132), Teucrium capitatum 11.4% (n=111), Cinnamomun zeylanicum 10.8% (n=105), others plan 44.7% (n=438) Other CAM modalities: Prayer 70% (n=684), vitamins and mineral 9.9% (n=97), exercise 9.2% (n=90), others (n=11)
(Manya, Champion and Dunning, 2012), Sydney	69	A cross-sectional survey, two stage sampling design	June and August 2008	46.3% N = 32 F=15 M=17	NM	The most commonly used CAM to treat diabetes: Multivitamin 40%, Cinnamon 25%, Co-enzyme Q10 25%, Prayer 25%, others
(Ching <i>et al.</i> , 2013), Malaysia	240	A cross-sectional study, random sampling method	May 2011	62.5% N = 150 F=96 M=54	NM	Biological based therapy like herbal products 80% (n=120), manipulative and body-based systems 14.7%(n=22), alternative medical system 7.3% (n=11), energy therapies 14% (n=21), mind-body interventions 2.7% (n=4)
(Fan <i>et al.</i> , 2013), Singapore	304	A Cross-sectional descriptive design, convenience sampling	NM	43.4% N = 132 F=67 M=64	NM	Nutritional supplements 55.3% (n=73), Chinese herbal medicine 29.5% (n=39), massage 28% (n=37)
(Mitha, <i>et al.</i> , 2013), Malaysia	256	Cross-sectional study, convenience sampling	August 2012 to October 2012	N = 256 F=164 M=92	The past 3 months	TCM 31%, supplement 18%, TIM 14%, Faith healing 10%, Nutritional therapy 9%, others
(Medagama <i>et al.</i> , 2014), Sri Lanka	252	A cross, sectional survey,	April and August 2012	76% N = 192 F=139	NM	Bitter gourd 50.8% (n=128), Ivy gourd leaves 44.8% (n=113), crepe ginger

*Title of manuscript is short and clear, implies research results (First Author)*

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
		randomly selected		M=53		leaves 36.5% (n=92), salacia reticulate 6.7% (n=17), fenugreek 2% (n=5)
(Naja, <i>et al.</i> , 2014), Beirut	333	Cross-sectional study	August 2010 and January 2011	38% N = 127	NM	Folk food and herbal 81%, natural product 28%, spiritual healing 11.8%, vitamin and mineral 3%
(Hashempur <i>et al.</i> , 2015), Iranian	239	Cross sectional study, convenient sampling	June to September 2011	75.3% N = 180 F=123 M=56	The last year	Herbal preparations 97.7% (n=176), cupping 8.3% (n=15), Acupuncture 2.7% (n=5), mind-body 0.55% (n=1)

n = number of sample, NM = not mentioned, F = female, M = male

#### 4.4. Types of CAM

CAM widely used by patients with diabetes and found in this literature review, as shown in Table 1, are herbs, vitamins, and prayers. In the US, the most widely used CAM by patients with diabetes are herbs, supplements (vitamins and minerals), and mind body therapies [7]. Overall, Table 1 shows the types of CAM used by many diabetic patients in many countries. In Turkey many uses herbal preparations such as *Origanum vulgare*, pomegranate syrup, stinging nettle (nettle leaf), dog rose (*rosa canina*), Chervil, Cinnamon, and bitter almond [15]. In Bahrain, the natural ingredients used are garlic, bitter melon, cinnamon, and fenugreek. *Trigonella berythea*, *Rosmarinus officinalis*, *Teucrium capitatum*, and *Cinnamomum zeylanicum* are four main herbs that are widely used by patients with diabetes in Palestine, out of 100 plants from 44 botanical families. In Sydney, herbs used are cinnamon, garlic, *gymnena sylveste*, fenugreek, and American ginseng. Herb used in Malaysia is bitter gourd, cat's whiskers, garlic, Sabah snake grass, basil leaf, and ginseng. Bitter gourd, crepe ginger, ivy gourd, fenugreek, and *Salacia reticulate* are herbs used by patients with diabetes in Sri Lanka. In Iranian, 4 main herbs used are cinnamon, ginger, fenugreek, and *camellia sinensis*. From these studies, it can be concluded that the most widely used herbs are cinnamon, garlic, bitter gourd, ginseng, fenugreek, ginger, and and nutritional supplements [4], [5], [15], [16], [18], [19], [23]. Chronic diseases, such as diabetes, are associated with decreasing quality of life, and psychological problems, such as anxiety and depression. Mind-body therapies have a psychological effect that can help patients cope with the disease and improve their mood and quality of life. Patients with diabetes, based on the clinical trials, have shown improved quality of life and stress reduction with yoga and tai chi. The intensity of yoga and tai chi practices has been categorized as a low to medium intensity. During the clinical trials with controls, either yoga or tai chi consistently shows a significant long-term improvement in controlling blood glucose or A1C [7]. The safety CAM use is important for patients who take these medications, as well as for health care professionals, especially because of the growing popularity of CAM use by diabetics. A considerable percentage of diabetes patients who used CAM in conjunction with conventional medicine rather than as a substitute. This situation allows for side effects interactions of CAM with medical treatment, so this should be considered [28].

#### 4.5. Resources of CAM

The informational beliefs are due to the direct, positive experiences of information sources about the CAM use. Information sources about the CAM use, mostly obtained from a friend, are shown by 5 studies, namely, the one in Beirut, another in Singapore (57.44%), another in Malaysia (32.1%), and the other in India (36.4%) [5], [13], [20], [26], [27]. Meanwhile, the information sources that come mostly from families are shown by 3 studies, namely, one study in Palestine (40.2%), another in Jordan (41%), and the other in Taiwan (36%) [18], [21], [22]. Other sources of information are obtained from the media and CAM practices. Conclusion derived from the sources of information is that friends are the main source of information that can affect diabetic patients to use CAM.

#### 4.6. Reason for using CAM

CAM users expressed a variety of reasons why they are using CAM. This literature review will outline those various reasons. According to Hasan *et al.*, (2011) diabetic patients' reasons on using CAM is the quality and safety of CAM (63.2%), an additional treatment for their diabetes (53.5%), family history in using CAM (21, 9%), fewer side effects of CAM (20.2%), allopathic treatment failure (16.7%), and some other reasons. A belief that CAM can control diabetes, the good example of other CAM users, the ease of getting CAM, and the affordable price are also the reasons for diabetic patients to use CAM [5]. Mitha *et al.*, 2013, shows that the diabetic patients' strongest belief in using is that CAM is safer (n = 178, 69.5%); CAM has few side effects (n = 201, 78.5%); CAM will maintain their health (n = 212, 82.8%); and CAM is chosen because allopathic medicine is less effective. There is also a belief that CAM has a synergistic effect with conventional medicine

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[23]. [Chang et al., 2011](#) explains that the reasons for diabetic patients using CAM are to control diabetes (24.9%), to treat complications (3.2%), and, mostly, (71.9%) other conditions associated with health.

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### 13. DISCUSSION

Diabetes is a chronic condition that requires both lifestyle and knowledge modification in order to acquire and apply skills that will enable effective self-care activities on a long-term basis. Type 2 diabetes is a chronic disease that requires regular and sustainable health management that involves proper treatment [22], [29]. Patients with diabetes, besides using conventional treatments, also use complementary and alternative medicine to supplement the medication. There is a worldwide growing trend that diabetic patients use complementary and alternative medicine in order to improve their health status.

The results of the analysis of several studies in this review shows that there are several determinants associated with the CAM use, namely, the characteristics of the individuals (age, gender, marital status, ethnicity, education level, family income, place of residence, and sources of information) and the characteristics of diabetes (types of diabetes, duration of diagnosis, complications, complaints, and family history). The CAM use by patients with diabetes as an attempt to improve their health status can be evaluated from the types of medicine selected, patterns of use, and the reasons for using CAM. The types of CAM selected refer to NCCIH (2015) stating that they are a product of nature, mind and body practices, and other complementary health approaches. CAM patterns of use include the first time of using CAM (before / after diagnosis), the number of the types of CAM used, schedule of CAM use, and a notification to healthcare officers [20], [22].

The reasons for using CAM by patients with diabetes vary such as the impact on health status, benefits, side effects, ease access and costs, the development of the incidence of complications, and experiences of the previous treatment [5], [26], [27], [30]. The health status of diabetic patients showing efficacy of the CAM use was evaluated on a satisfaction using CAM and the patient's health status. Patients' satisfaction in using the CAM includes efficacy and safety of CAM selected. Health status includes the quality of life and the regulation of blood glucose (blood sugar levels and A1C). Schematically, the relationship between the determinants and the CAM use by patients with diabetes can be seen in figure 2.

According to Chang's research (2011), factors of social support and individual beliefs affect diabetic patients in deciding whether to use CAM or not. It is generally believed that social support is crucial to encourage someone to have positive health behavior and conduct an effective treatment in acute and chronic diseases [31]. Family support also influences a person to choose complementary and alternative medicine on the types of biological treatment and the manipulation of the body [32]. Family support for T2DM patients who use herbs is to give permission to use herbs, remind time of health control, provide information about herbs, and help prepare herbal preparations [33]. People with positive attitudes toward CAM and those with high family support are more likely to use CAM and more involved in self-care behaviors [22].

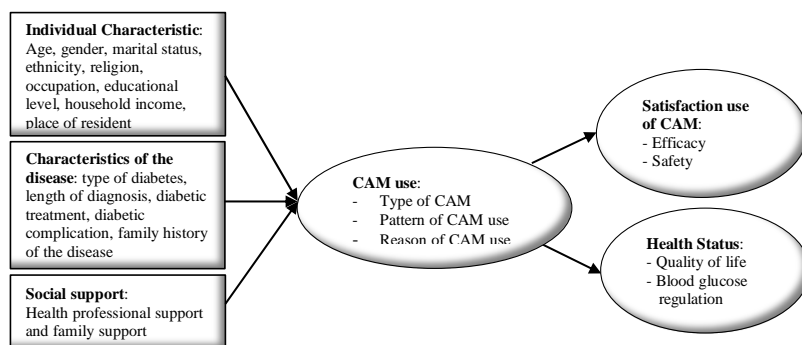


Figure 3. Conceptual Model of the Use of CAM by Patients with Diabetes

This literature review illustrates that the CAM is used as a complementary treatment. Although the prevalence of CAM users still vary, it remains necessary to have enough information about the efficacy, safety, and ways of presentation for CAM users. The majority of diabetic patients who use CAM do not tell doctors or health workers. The reasons why diabetic patients CAM users do so are that health professionals would

prevent the CAM use and that they do not have adequate knowledge about CAM. From those reasons, it is necessary for the government to set health policy on the CAM use in health facilities [22].

This literature review still has various limitations. The limitation is that this review is based on a variety of research using sampling techniques and sample size varied, so that the significance level obtained is very relative influenced by both. The absence of variable that shows how much social support especially from families and health professionals in the use of CAM, so that patients can determine or make decisions appropriately in using both CAM type, frequency, and time use. Evaluation of the use of CAM is required to determine the effectiveness of using CAM. Such an evaluation can be seen in terms of the satisfaction of the use of CAM or the health status of patients using CAM.

#### 14. IMPLICATION

The CAM use by patients with diabetes can have implications for either the patient as an individual, healthcare professionals and government as a decision maker. Complementary and alternative medicine in Indonesia has been regulated in the Regulation of the Minister of Health of the Republic of Indonesia number 1109 / MENKES / PER / IX / 2007 concerning the Implementation of Alternative-Complementary Medicine in Health Service Facilities. CAM is categorized as complementary, alternative, and integrative, depending on how a person uses the CAM. If someone is using CAM in conjunction with conventional treatment, they will use complementary medicine.

This literature review illustrates that the CAM is used as a complementary treatment. Although the prevalence of CAM users still vary, it remains necessary to have enough information about the efficacy, safety, and ways of presentation for CAM users. The majority of diabetic patients who use CAM do not tell doctors or health workers. The reasons why diabetic patients CAM users do so are that health professionals would prevent the CAM use and that they do not have adequate knowledge about CAM. From those reasons, it is necessary for the government to set health policy on the CAM use in health facilities [17]. It is also necessary to improve health professionals' knowledge of integrative medicine. The Integration of various practices, therapies, and beliefs in CAM with conventional healthcare provides great potential for a better healthcare system, such as expanding treatment options, increasing the satisfaction of patients and providers, and providing better therapies [35]. The combination of conventional and complementary medicine often produces better results than conventional therapy alone, especially the reduction of negative side effects from the treatment. Synergy on integrative treatments in many clinical situations would offer various benefits, including the acceleration of the recovery from surgery, reduction on the dependency on drugs, and the reduction of side effects [35].

#### 15. CONCLUSION

CAM can be defined as complementary medicine, alternative, and integrative depending on the patients that use it. CAM is widely used by people with chronic diseases. Diabetes mellitus as a chronic disease requires special attention in terms of treatment and management. One treatment that is chosen by the patient with diabetes is CAM. In this review, the diabetic patients use CAM as complementary and alternative medicine, but not as integrative medicine. Further research is needed on CAM as an integrative treatment in diabetic patients. Medical pluralism gives an insight into the use of conventional treatments and CAM systems that are widely used by patients with chronic diseases. CAM widely used by patients with diabetes is natural products. Therefore, further research is required to reveal the efficacy and safety of the CAM use. The successful use of CAM can be evaluated on the regulation of blood glucose. Furthermore, CAM management as an integrative treatment by healthcare professionals is also required. For this purpose, this literature review offers a conceptual model as a framework for further research on the CAM use.

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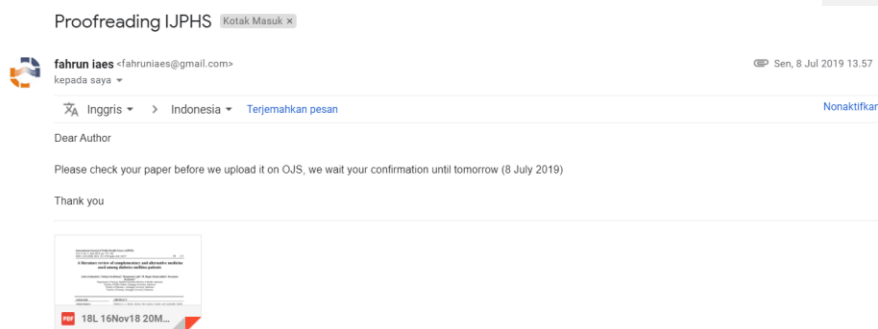
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## 6. Revisi tanggal 8 Juli



## 7. Revisi 19 Agustus 2019

### A literature review of complementary and alternative medicine used among diabetes mellitus patients

Anita Joelianina<sup>1</sup>, Oedojo Soedirham<sup>2</sup>, Mangestuti Agil<sup>3</sup>, M. Bagus Qomaruddin<sup>2</sup>,  
Kusnanto Kusnanto<sup>4</sup>

<sup>1</sup>Department of Nursing, Health Polytechnic Ministry of Health, Indonesia

<sup>2</sup>Faculty of Public Health, Airlangga University, Indonesia

<sup>3</sup>Faculty of Pharmacy, Airlangga University, Indonesia

<sup>4</sup>Faculty of Nursing, Airlangga University, Indonesia

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#### ABSTRACT

Diabetes is a chronic disease that requires regular and sustainable health management that involves proper treatment. Some diabetic patients use complementary and alternative medicine (CAM), as well as conventional medicine, to maintain their health and control their blood sugar. This literature review aimed to 1) Determine the prevalence of CAM used by patients with diabetes, summarize and evaluate the CAM use that includes: characteristics, patterns, types and reasons. 2) Propose a conceptual model associated with CAM used by patients with diabetes. A Literature review was searched using an electronic database and published between 2005 and 2015 by using specific keywords. The number of literature review obtained as a search result is 17 articles from 14 countries. The prevalence of CAM used by patients with diabetes ranged from 16.6% to 76%. Determinants associated with the CAM use were age, gender, family income, occupation, residence, and the characteristics of the disease, such as the length of time since diagnosed and complications. Most patients used CAM, along with the conventional treatment, and did not inform health professionals about the CAM use. The CAM use by patients with diabetes was relatively high and the confidence of patients believed the benefits of CAM. Therefore, integration with health professionals to develop CAM management is highly required.

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#### Corresponding Author:

Anita Joelianina,  
Nursing Program at Health Polytechnic Ministry of Health Surabaya,  
Jl. Mayjend. Prof. Dr. Moestopo No 8 C Surabaya, Indonesia.  
E-mail address: nita.mukhlash@gmail.com

## 16. INTRODUCTION

Diabetes Mellitus (DM), as a chronic disease, is a group of metabolic diseases with a hyperglycemia characteristic that occurs due to abnormalities in insulin secretion, insulin action, or both [1-2]. DM is a major cause of morbidity and mortality worldwide and the prevalence keeps increasing. The prevalence of diabetes in the world for adults (aged 20-79 years) was 6.4% or about 285 million adults in 2010, and will increase to 7.7%, approximately 439 million adults in 2030. Between 2010 and in 2030, there is a 69% increase in the number of adults with diabetes in developing countries and 20% increase in developed countries [3].

The main danger of DM is that it causes either acute or chronic complications. Acute complications include hypoglycemia, ketoacidosis, and a diabetic coma. Chronic complications are caused by high levels of blood glucose (hyperglycemia), including microvascular and macrovascular complications. Microvascular complications include nephropathy, retinopathy, and neuropathy, while macrovascular complications include atherosclerosis and cardiac ischemia that can create the risk of morbidity, mortality, and

*Title of manuscript is short and clear, implies research results (First Author)*

disability by 2-4 times in patients with diabetes mellitus [1, 4]. Approximately 70-80 percent of patients with diabetes mellitus died of vascular disease as a complication of diabetes [2].

Treatment for type 2 diabetes should be conducted in a sustainable manner for a long period. Patients with type 2 diabetes can take not only conventional medicine, but also complementary medicine as a complement of the conventional treatments that have been carried out. There is a tendency growing all over the world that patients with type 2 diabetes use or choose Complementary and Alternative Medicine (CAM) in order to improve their health status. Complementary medicine is often used in conjunction with conventional medicine but not as a substitute for conventional medicine. Meanwhile, alternative medicine is used as replacement of conventional treatment [4-8]. Of the patients who suffer from chronic diseases, diabetes is the highest CAM users which are 63%, followed by 42.7% of RA, 26.2% of HIV, and 7.7% of epilepsy [9]. Patients with diabetes are ranked as the second for CAM users, which is 62.1% after hypertension (63.8%), followed by migraine, chronic obstructive disease, gastrointestinal tract disease, and rheumatoid arthritis in using CAM [10].

NCCIH categorizes CAM into three main domains: natural products, mind and body practices, and other complementary health approaches. Natural products include a variety of products, such as herbs (also known as botanicals), vitamins and minerals, and probiotics. They are widely marketed, available to consumers, and often sold as a dietary supplement. The mind and body practices include a large and diverse group of procedures or techniques that are given or taught by trained practitioners or instructors, such as: yoga, chiropractic and osteopathic manipulation, meditation, massage therapy, acupuncture, and relaxation techniques. Other approaches to complementary medicine comprise the traditional medicine practices, Ayurvedic medicine, Chinese traditional medicine, homeopathy, and naturopathy [11]. The objectives of this article are to (a) Determine the prevalence, summarize, and explore to the behavior of using complementary and alternative medicine including: characteristics, patterns, types and reasons for the use in patients with type 2 diabetes based on various theories and research. (b) Propose a conceptual model associated with the use complementary and alternative medicine by patients with diabetes.

## 17. RESEARCH METHOD

This literature review was searched by using an electronic database such as Pro-Quest, Google Scholar, PubMed, Science-Direct, and hand-searching. The literature review used are articles published from 2005-2015. Keywords used to search were complementary and alternative medicine, diabetes mellitus, traditional medicine, and the pattern of complementary and alternative medicine. Literature works collected were as many as 280 abstracts subsequently selected according to inclusion criteria preset to compile this literature review. The inclusion criteria in this study were studies that explored CAM use by diabetic patients published between 2005-2015. Exclusion criteria were studies published before 2005, not using English, and types of qualitative research. From the search found 17 articles corresponding quantitative research. The review selection process can be seen in Figure 1.

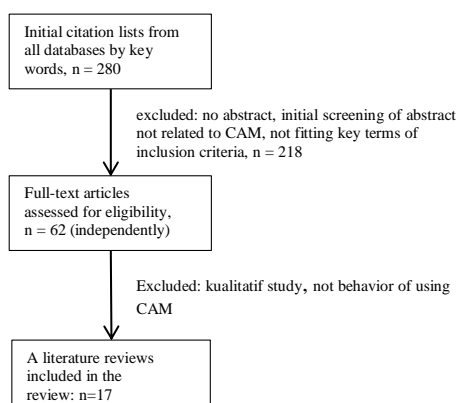


Figure 1. Selection process of literature review

## 18. LIMITATIONS of REVIEW



This review includes research that focuses on the behavior of CAM use by diabetics. This review is not a literature review of active compounds from herbs, the efficacy and safety of CAM, but only research on the behavior of diabetic patients in using CAM. Formal quality assessment to determine which research was used independently. Some studies that shown design bias, selection and measurement were included because they provide useful insights both in terms of definitions of terms or because they provide information about disclosing the behavior of diabetic patients using CAM.

## 19. RESULTS AND ANALYSIS

### 4.1. The prevalence of cam use

The results of this literature review describe the prevalence of CAM use of various countries. Most studies used cross-sectional study/survey with various periods, ranging from 1 month to 2 years. The prevalence of CAM use still varies, ranging from 16.6% in Jordan up to 76% in the Srilangka [4, 8]. This variation is due to many factors that influence CAM use by patients with diabetes, the definition of CAM, and the survey method used by researchers.

Figure 1 shows the prevalence of diabetic patients who use CAM from 14 countries, where the prevalence of the CAM use by patients with diabetes was over 40% in 12 countries so that it can be said that the prevalence of the CAM use by patients with diabetes is relatively high [4-5, 12-21]. The prevalence of CAM use in this literature review is consistent with other literature reviews showing that the range of the prevalence of CAM use by patients with diabetes is from 17% up to 72.8% [22].

### 4.2. CAM use patterns

CAM use patterns are behaviors that show a tendency to diabetic patients using CAM as a complement to conventional treatment being undertaken. In this literature review, the patterns of CAM use shown by diabetic patients are: (a) Mostly, CAM is used in conjunction with conventional medicine/allopahy. (b) It does not change their treatment, both in the treatment schedule or doses. (c) Reducing one dose or more of conventional treatment. (d) Using conventional medicine and CAM in different times, and (e) Stopping taking the conventional medicine when using CAM [12-13, 18, 23-25]. Diabetic patients, most use CAM as a complementary or supplementary to their conventional treatment [8, 23, 26], and small percentage use CAM only [8]. Diabetic patients use at least one type of CAM modalities, or combining two or more of the CAM modalities [15, 19, 22-23]. Of all patients with diabetes in Sri Lanka using CAM, 49 patients used one type of CAM, 86 patients used the two types, 52 used three types, and 6 patients used more than 3 different types [4].

Over 60% of patients with diabetes who used CAM modalities did not inform their doctors or health professionals. Only 24.6% - 45% did so [12, 16, 18, 20, 22, 25-26]. Someone who states that at least 63% of the general population does not disclose the CAM use therapies to their doctors because: a) They have never thought of it. b) They feel the CAM use is secure, so there is no need to discuss its use. c) Health care professionals do not ask about their using CAM. d) Health professional will prevent the CAM use. e) There is not enough time to discuss the CAM use. f) Health professionals do not have adequate knowledge about CAM [7, 13]. Meanwhile, patients with diabetes who informed their decision to use CAM have received relatively negative responses from health professionals, namely a) They state that it is entirely patients business and offers not to comment on the CAM use. b) They warn the possible side effects of the CAM use. c) They discourage patients to consume. d) Just few health professionals encourage them to use CAM [22, 27].

### 4.3. Individual characteristics

Gender, age, education, income, religion, marital status, and family size are the determinants predicted to affect diabetic patients to use CAM. Table 1 shows that female respondents use CAM more than men, but as many as six research shows that gender is not significantly associated with the CAM use [12, 15, 18-19, 22-23]. Meanwhile, 5 studies show a significant relationship between sex and the CAM use [4-5, 14, 16, 20]. The patients with diabetes at age in this review were mostly over 40 years old. The age category varies from each study. The age of diabetic patients showing a significant effect on the CAM use was only found in the two studies, namely, in Taiwan and in the US [14, 22]. Prevalence of use of CAM by diabetic patients from several countries shown in Figure 2.

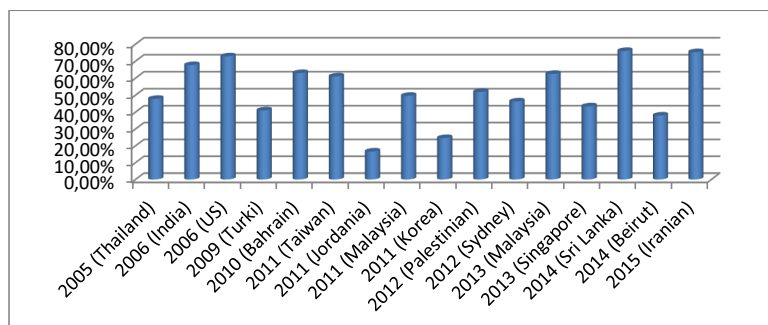


Figure 2. Prevalence of use of CAM by diabetic patients from several countries

These results illustrate that age is not a dominant factor that affects a person on CAM use. Only four studies showed that education that has a significant influence on CAM use by patients with diabetes [13-15, 26]. Likewise, high income also showed a significant effect only in 4 studies [5, 12, 20, 26]. Characteristic of the disease in this literature is limited only to the suffering duration and complications. Suffering duration is not significantly associated with CAM use. It can be seen in studies conducted to Iranian  $p=0.64$ , Sydney  $p=0.603$ , Palestinian  $p=0.874$ , and  $p=0.64$  Thailand [12, 18-19, 23]. Meanwhile, the study results showing a significant relationship between suffering duration of diabetes and the CAM use were a study in Bahrain ( $p=0.008$ ), Turkey ( $p=0.0001$ ), and Beirut ( $p=$ ) [15-16, 27]. The suffering duration is associated with the CAM use because, suffering a chronic disease, the patients might get bored with conventional medicine. The relationship between diabetes complications and the CAM use has been inconsistent. There are two studies showing a relationship between complications and the CAM use, in Iranian ( $p=0.05$ ) and Bahrain ( $p=0.00002$ ) [16, 23]. Three studies show that there is no relationship between the diabetes complications and the CAM use [4, 18-19]. Diabetes complications are significantly related to the CAM use, based on studies conducted in Beirut, Lebanon [27]. Patients with neuropathic complications use CAM more than those without neuropathy [28].

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Table 1. Research report on the use of CAM by patients with diabetes

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Moolasarn and Ms, 2005) Thailand	159	Cross sectional survey,	December 2003 to January 2004	47.8% (N=76)	Past 3 months	Yoga 46%, Unchanged form of herbal medicine 42.1%, changed form of herbal medicine 25%, Acupuncture /Acupressure 10.5%, Mental therapy 7.9%, diet supplementary 5.3%, oil massage 2.6%, others 1.3%
(Kumar, Bajaj and Mehrotra, 2006), India	493	Cross sectional study, systematic sampling	1999- 2001	67.7% (N=334)	aware of CAM, and currently using CAM	Naturopathy 97.3% (n=325), Ayurveda 16.2% (n=54), Homeopathy 12.9% (n=43), Acupressure 2.7% (n=9), others 3.0% (n=10)
(Bell <i>et al.</i> , 2006), US	31.004 DM 2.479, No DM, 28.526	Data from NHIS	Data from NHIS 2002	72.8% (N=1.781)	within the past year	Self- prayer 61.2%, other prayer 39%, prayer group 16.2%, natural product 15.7%, massage 3.1%, relaxation techniques 12.7%, others
(Ceylan <i>et al.</i> , 2009), Turkey	371	Cross sectional study, survey questionnaire	January 2006 to December 2006	41% (N=152 F=104 M=48)	NM	Herbal preparation 88.1%, Acupuncture and meditation practises 5.3%, herbal preparation and folk medicine practices 3.3%, herbal preparation and acupuncture medication 3.3%

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
(Khalaf & Withord, 2010), Bahrain	402	Cross sectional study, convenience sampling	NM	63% (N=252 F=149 M=103)	The previous 12 months	Natural product Natural product with using: - alternative and medical practices n=80.32%, - mind-body interventions n=24.10% - manipulative and body based n=78.31% - energy therapy n=8.3%
(Hasan, <i>et al.</i> , 2011), Malaysia	230	Case-control study, random sampling	NM	49.6% N=144 F=54 M=60	NM	Vitamin 57.9%, ginseng 12.3%, yoga 7.9%
(Hsiao-yun, Wallis and Tiralongo, 2011), Taiwan	326	A cross sectional survey, structure interview, simple random sampling	July 2006 and February 2007	Before: 22.7% (N=74) After: 61% (N=197)	The previous 12 months	Use of CREAM after being diagnosed with diabetes: Acupuncture 6.7%, chines herbal medicines 27.9%, nutritional supplement 41.1%, diet modification 13.2%, non -chines herbs 3.4%, cupping, scraping 6.4%, manipulative-based therapy 13.5%, folk therapies 0.6%, bio-field therapy 9.2%, bio-electromagnetic based therapies 10.1%, supernatural healings 11.0%, mind-body therapies 3.7% Herbal 93.4%, the plants in the form of infusion 93.9% (green tea, aniseed, ginger, chamomile, sage, fenugreek, nigella, black-seed, white lupin, germander, garlic, cinnamon, olive leaves)
(Wazaify, <i>et al.</i> , 2011), Jordan	1000	Cross-sectional survey, random sampling	March 2009 to September 2009	16.6% N=166 F=99 M=67	NM	
(Kim, <i>et al.</i> , 2011), KNDP, Korea	2752	Cross sectional study, hospital electronic database	KNDP 2005 and 2009	24.6% (N=677 F=290 M= 387)	The past 1 year up until the time of their initial enrollment	Red ginseng, herbal medicine, silkworm, others
(Ali-Stayeh, Jamous and Jamous, 2012), Palestinian	1883	Cross-sectional study, random sampling	August 2010 until May 2011	51.9% N= 977 F=519 M=457	NM	The main herb as CAM: Trigonella berythea 19.6% (n=191), Rosmarinus officinalis 13.5% (n=132), Teucrium capitatum 11.4% (n=111), Cinnamomun zeylanicum 10.8% (n=105), others plan 44.7% (n=438) Other CAM modalities: Prayer 70% (n=684), vitamins and mineral 9.9% (n=97), exercise 9.2% (n=90), others (n=11)
(Manya, Champion and Dunning, 2012), Sydney	69	A cross-sectional survey, two stage sampling design	June and August 2008	46.3% N=32 F=15 M=17	NM	The most commonly used CAM to treat diabetes: Multivitamin 40%, Cinnamon 25%, Co-enzyme Q10 25%, Prayer 25%, others
(Ching <i>et al.</i> , 2013), Malaysia	240	A cross-sectional study, random sampling method	May 2011	62.5% N=150 F=96 M=54	NM	Biological based therapy like herbal products 80% (n=120), manipulative and body-based systems 14.7%(n=22), alternative medical system 7.3% (n=11), energy therapies 14% (n=21), mind-body interventions 2.7% (n=4)
(Fan <i>et al.</i> , 2013), Singapore	304	A Cross-sectional descriptive design, convenience sampling	NM	43.4% N=132 F=67 M=64	NM	Nutritional supplements 55.3% (n=73), Chinese herbal medicine 29.5% (n=39), massage 28% (n=37)
(Mitha, <i>et al.</i> , 2013), Malaysia	256	Cross-sectional study, convenience sampling	August 2012 to October 2012	N=256 F=164 M=92	The past 3 months	TCM 31%, supplement 18%, TIM 14%, Faith healing 10%, Nutritional therapy 9%, others
(Medagama <i>et al.</i> , 2014), Sri Lanka	252	A cross, sectional survey,	April and August 2012	76% N=192 F=139	NM	Bitter gourd 50.8% (n=128), Ivy gourd leaves 44.8% (n=113), crepe ginger

*Title of manuscript is short and clear, implies research results (First Author)*

Author, Country	N	Method & sampling design	Time frame	Prevalence of CAM use	Use rate of CAM	Type of CAM
		randomly selected		M=53		leaves 36.5% (n=92), salacia reticulate 6.7% (n=17), fenugreek 2% (n=5)
(Naja, <i>et al.</i> , 2014), Beirut	333	Cross-sectional study	August 2010 and January 2011	38% N=127	NM	Folk food and herbal 81%, natural product 28%, spiritual healing 11.8%, vitamin and mineral 3%
(Hashempur <i>et al.</i> , 2015), Iranian	239	Cross sectional study, convenient sampling	June to September 2011	75.3% N=180 F=123 M=56	The last year	Herbal preparations 97.7% (n=176), cupping 8.3% (n=15), Acupuncture 2.7% (n=5), mind-body 0.55% (n=1)

n = number of sample, NM = not mentioned, F = female, M = male

#### 4.4. Types of CAM

CAM widely used by patients with diabetes and found in this literature review, as shown in Table 1, are herbs, vitamins, and prayers. In the US, the most widely used CAM by patients with diabetes are herbs, supplements (vitamins and minerals), and mind body therapies [7]. Overall, Table 1 shows the types of CAM used by many diabetic patients in many countries. In Turkey many uses herbal preparations such as *Origanum vulgare*, pomegranate syrup, stinging nettle (nettle leaf), dog rose (*rosa canina*), Chervil, Cinnamon, and bitter almond [15]. In Bahrain, the natural ingredients used are garlic, bitter melon, cinnamon, and fenugreek. *Trigonella berythea*, *Rosmarinus officinalis*, *Teucrium capitatum*, and *Cinnamomum zeylanicum* are four main herbs that are widely used by patients with diabetes in Palestine, out of 100 plants from 44 botanical families. In Sydney, herbs used are cinnamon, garlic, *gymnema slyveste*, fenugreek, and American ginseng. Herb used in Malaysia is bitter gourd, cat's whiskers, garlic, Sabah snake grass, basil leaf, and ginseng. Bitter gourd, crepe ginger, ivy gourd, fenugreek, and *Salacia reticulate* are herbs used by patients with diabetes in Sri Lanka. In Iranian, 4 main herbs used are cinnamon, ginger, fenugreek, and *camellia sinensis*. From these studies, it can be concluded that the most widely used herbs are cinnamon, garlic, bitter gourd, ginseng, fenugreek, ginger, and and nutritional supplements [4-5, 15-16, 18-19, 23]. Chronic diseases, such as diabetes, are associated with decreasing quality of life, and psychological problems, such as anxiety and depression. Mind-body therapies have a psychological effect that can help patients cope with the disease and improve their mood and quality of life. Patients with diabetes, based on the clinical trials, have shown improved quality of life and stress reduction with yoga and tai chi. The intensity of yoga and tai chi practices has been categorized as a low to medium intensity. During the clinical trials with controls, either yoga or tai chi consistently shows a significant long-term improvement in controlling blood glucose or A1C [7]. The safety CAM use is important for patients who take these medications, as well as for health care professionals, especially because of the growing popularity of CAM use by diabetics. A considerable percentage of diabetes patients who used CAM in conjunction with conventional medicine rather than as a substitute. This situation allows for side effects interactions of CAM with medical treatment, so this should be considered [28].

#### 4.5. Resources of CAM

The informational beliefs are due to the direct, positive experiences of information sources about the CAM use. Information sources about the CAM use, mostly obtained from a friend, are shown by 5 studies, namely, the one in Beirut, another in Singapore (57.44%), another in Malaysia (32.1%), and the other in India (36.4%) [5, 13, 20, 26-27]. Meanwhile, the information sources that come mostly from families are shown by 3 studies, namely, one study in Palestine (40.2%), another in Jordan (41%), and the other in Taiwan (36%) [18, 21-22]. Other sources of information are obtained from the media and CAM practices. Conclusion derived from the sources of information is that friends are the main source of information that can affect diabetic patients to use CAM.

#### 4.6. Reason for using CAM

CAM users expressed a variety of reasons why they are using CAM. This literature review will outline those various reasons. Diabetic patients' reasons on using CAM is the quality and safety of CAM (63.2%), an additional treatment for their diabetes (53.5%), family history in using CAM (21.9%), fewer side effects of CAM (20.2%), allopathic treatment failure (16.7%), and some other reasons [26]. A belief that CAM can control diabetes, the good example of other CAM users, the ease of getting CAM, and the affordable price are also the reasons for diabetic patients to use CAM [5]. The diabetic patients' strongest belief in using is that CAM is safer (n=178, 69.5%); CAM has few side effects (n=201, 78.5%); CAM will maintain their health (n=212, 82.8%), and CAM is chosen because allopathic medicine is less effective [31]. There is also a belief

that CAM has a synergistic effect with conventional medicine [23]. Explains that the reasons for diabetic patients using CAM are to control diabetes (24.9%), to treat complications (3.2%), and mostly, (71.9%) other conditions associated with health [22].

## 20. DISCUSSION

Diabetes is a chronic condition that requires both lifestyle and knowledge modification in order to acquire and apply skills that will enable effective self-care activities on a long-term basis. Type 2 diabetes is a chronic disease that requires regular and sustainable health management that involves proper treatment [22, 29]. Patients with diabetes, besides using conventional treatments, also use complementary and alternative medicine to supplement the medication. There is a worldwide growing trend that diabetic patients use complementary and alternative medicine in order to improve their health status.

The results of the analysis of several studies in this review shows that there are several determinants associated with the CAM use, namely, the characteristics of the individuals (age, gender, marital status, ethnicity, education level, family income, place of residence, and sources of information) and the characteristics of diabetes (types of diabetes, duration of diagnosis, complications, complaints, and family history). The CAM use by patients with diabetes as an attempt to improve their health status can be evaluated from the types of medicine selected, patterns of use, and the reasons for using CAM. The types of CAM selected refer to NCCIH (2015) stating that they are a product of nature, mind and body practices, and other complementary health approaches. CAM patterns of use include the first time of using CAM (before/after diagnosis), the number of the types of CAM used, schedule of CAM use, and a notification to healthcare officers [20, 22].

The reasons for using CAM by patients with diabetes vary such as the impact on health status, benefits, side effects, ease access and costs, the development of the incidence of complications, and experiences of the previous treatment [5, 26-27, 30]. The health status of diabetic patients showing efficacy of the CAM use was evaluated on a satisfaction using CAM and the patient's health status. Patients' satisfaction in using the CAM includes efficacy and safety of CAM selected. Health status includes the quality of life and the regulation of blood glucose (blood sugar levels and A1C). Schematically, the relationship between the determinants and the CAM use by patients with diabetes can be seen in Figure 2.

Factors of social support and individual beliefs affect diabetic patients in deciding whether to use CAM or not [22]. It is generally believed that social support is crucial to encourage someone to have positive health behavior and conduct an effective treatment in acute and chronic diseases [31]. Family support also influences a person to choose complementary and alternative medicine on the types of biological treatment and the manipulation of the body [32]. Family support for T2DM patients who use herbs is to give permission to use herbs, remind time of health control, provide information about herbs, and help prepare herbal preparations [33]. People with positive attitudes toward CAM and those with high family support are more likely to use CAM and more involved in self-care behaviors [22].

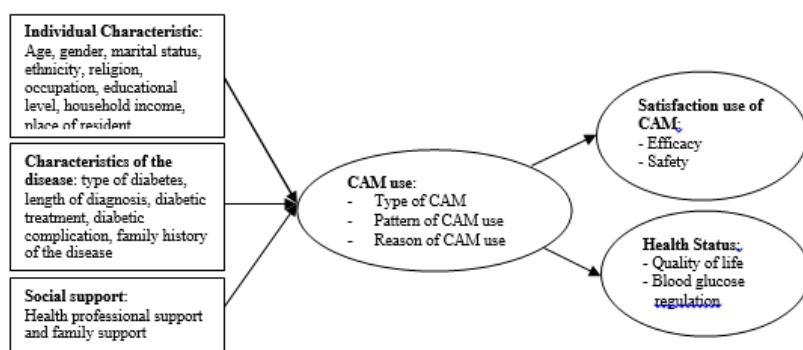


Figure 3. Conceptual model of the use of CAM by patients with diabetes

This literature review illustrates that the CAM is used as a complementary treatment. Although the prevalence of CAM users still vary, it remains necessary to have enough information about the efficacy, safety, and ways of presentation for CAM users. The majority of diabetic patients who use CAM do not tell doctors or health workers. The reasons why diabetic patients CAM users do so are that health professionals would prevent the CAM use and that they do not have adequate knowledge about CAM. From those reasons, it is necessary for the government to set health policy on the CAM use in health facilities [22].

This literature review still has various limitations. The limitation is that this review is based on a variety of research using sampling techniques and sample size varied, so that the significance level obtained is very relative influenced by both. The absence of variable that shows how much social support especially from families and health professionals in the use of CAM, so that patients can determine or make decisions appropriately in using both CAM type, frequency, and time use. Evaluation of the use of CAM is required to determine the effectiveness of using CAM. Such an evaluation can be seen in terms of the satisfaction of the use of CAM or the health status of patients using CAM.

## 21. IMPLICATION

The CAM use by patients with diabetes can have implications for either the patient as an individual, healthcare professionals and government as a decision maker. Complementary and alternative medicine in Indonesia has been regulated in the Regulation of the Minister of Health of the Republic of Indonesia number 1109 / MENKES / PER / IX / 2007 concerning the Implementation of Alternative-Complementary Medicine in Health Service Facilities. CAM is categorized as complementary, alternative, and integrative, depending on how a person uses the CAM. If someone is using CAM in conjunction with conventional treatment, they will use complementary medicine.

This literature review illustrates that the CAM is used as a complementary treatment. Although the prevalence of CAM users still vary, it remains necessary to have enough information about the efficacy, safety, and ways of presentation for CAM users. The majority of diabetic patients who use CAM do not tell doctors or health workers. The reasons why diabetic patients CAM users do so are that health professionals would prevent the CAM use and that they do not have adequate knowledge about CAM. From those reasons, it is necessary for the government to set health policy on the CAM use in health facilities [17]. It is also necessary to improve health professionals' knowledge of integrative medicine. The Integration of various practices, therapies, and beliefs in CAM with conventional healthcare provides great potential for a better healthcare system, such as expanding treatment options, increasing the satisfaction of patients and providers, and providing better therapies [34]. The combination of conventional and complementary medicine often produces better results than conventional therapy alone, especially the reduction of negative side effects from the treatment. Synergy on integrative treatments in many clinical situations would offer various benefits, including the acceleration of the recovery from surgery, reduction on the dependency on drugs, and the reduction of side effects [34].

## 22. CONCLUSION

CAM can be defined as complementary medicine, alternative, and integrative depending on the patients that use it. CAM is widely used by people with chronic diseases. Diabetes mellitus as a chronic disease requires special attention in terms of treatment and management. One treatment that is chosen by the patient with diabetes is CAM. In this review, the diabetic patients use CAM as complementary and alternative medicine, but not as integrative medicine. Further research is needed on CAM as an integrative treatment in diabetic patients. Medical pluralism gives an insight into the use of conventional treatments and CAM systems that are widely used by patients with chronic diseases. CAM widely used by patients with diabetes is natural products. Therefore, further research is required to reveal the efficacy and safety of the CAM use. The successful use of CAM can be evaluated on the regulation of blood glucose. Furthermore, CAM management as an integrative treatment by healthcare professionals is also required. For this purpose, this literature review offers a conceptual model as a framework for further research on the CAM use.

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