

Prevalence of complementary and alternative medicine use in brain tumor patients at King Abdulaziz University Hospital, Jeddah, Saudi Arabia

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ABSTRACT

الأهداف: تهدف من خلال هذه الدراسة إلى الكشف عن مدى انتشار وأنواع الطب التكميلي والبديل المستخدم والعوامل المحتملة التي دفعت إلى استخدام الطب التكميلي والبديل لدى المرضى المصابين بأورام الدماغ.

الطريقة: كانت الدراسة التي أجريتها عبارة عن دراسة مقطعية قائمة على استبيان للمرضى الذين تم تشخيصهم بأورام الدماغ في مستشفى جامعة الملك عبدالعزيز خلال الفترة من يناير 2011 إلى مايو 2018. شملت هذه الدراسة المرضى الذين يعانون من أورام الدماغ الأولية والثانوية. أجري الاستبيان عبر المقابلات الهاتفية بعد الحصول على موافقة المريض.

النتائج: شملت الدراسة 72 مريض. كان متوسط عمر المشاركين $45.89 (\pm 16.52)$ سنة. وجدنا أن مستوى التعليم قد أثر بشكل كبير على استخدام الطب التكميلي والبديل. كان العدد الأقل من مستخدمي الطب التكميلي والبديل حاصلين على درجة البكالوريوس فما فوق، بينما استخدم المرضى الحاصلين على درجات علمية أقل الطب التكميلي والبديل بشكل متكرر ($p=0.027$). كان أكثر أنواع الطب التكميلي والبديل شيوعاً هي ماء زمزم والرقية الشرعية. كان أفراد الأسرة المصدر الأكثر شيوعاً للمعلومات حول استخدام الطب التكميلي والبديل بنسبة (81.6%).

الخلاصة: إن للمستوى التعليمي تأثير كبير على استخدام الطب التكميلي والبديل. كما يلعب الجنس دوراً في نوع الطب التكميلي والبديل المستخدم. يجب أن تركز الأبحاث المستقبلية على الآثار الضارة لبعض علاجات الطب التكميلي والبديل، ومدى فعالية علاجات الطب التكميلي والبديل، والتأثير الذي قد يلعبه الطب التكميلي والبديل في تأخير المرضى عن طلب المشورة الطبية.

الكلمات الدالة: ورم، الطب البديل، سرطان، مخ، علاج، الطب التكميلي.

Objectives: To determine the prevalence and types of complementary and alternative medicine (CAM) being utilized and the possible factors that prompted the use of CAM in patients with brain tumors.

Methods: The study conducted was a questionnaire-based, cross-sectional study of patients diagnosed with brain tumors at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia from January 2011 to May 2018. Patients with primary and secondary brain tumors, were included. Our questionnaire

was conducted via phone interviews after obtaining patient consent.

Results: A total of 72 patients were included. The mean age of the participants was $45.89 (\pm 16.52)$ years. We found that education level significantly affected the use of CAM. Fewer users of CAM held bachelor's degree and patients with lower degrees used CAM more frequently ($p=0.027$). The most frequent types of CAM were Zamzam (holy water) and Ruqya (Quran reading). Family members were the most frequent source of information about the use of CAM (81.6%).

Conclusion: Education level has a significant effect on CAM use. Gender plays a role in the type of CAM used. Future research should focus on the adverse effects of some CAM therapies, how effective CAM therapies are, and the effect CAM may play in delaying patients from seeking medical advice.

Keywords: tumor, alternative medicine, malignancy, brain, treatment, complementary medicine

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Brain tumors have a significant effect on patients and their caregivers as well as on the health system.¹⁻³ Primary brain tumors arise in the brain while secondary tumors originate in distal tissue and spread to the brain.⁴ Although malignant tumors have worse outcomes, benign tumors may produce neurological or systemic symptoms. According to the Cancer Incidence Report issued by the Saudi Cancer Registry, 329 new brain and central nervous system tumor cases occurred in 2014 among Saudis.⁵ Patients tend to explore complementary and alternative medicine (CAM) as a treatment for their tumors or symptoms due to the distressing effects of brain tumor diagnoses or symptoms and treatment side effect.¹ Complementary and alternative medicine is defined as any intervention for treatment other than conventional medicine sought by patients in an attempt to improve their disease progression and prognosis.⁶ There are many types of CAM. The National Center for Complementary and Alternative Medicine, United States of America (USA) listed 5 classes of CAM therapies: alternative medical categories, mind-body interventions, biologically based therapies, manipulation and body-based methods, and energy therapies.⁷ The most common types of CAM used in Saudi Arabia are related to religious beliefs such as Holy Quran, honey, black seed, Myrrh, and cupping therapy.⁸⁻¹⁰ It is in contrast to what is commonly used in western countries such as acupuncture, massage therapy, and yoga.

Existing data showed that 50% of all patients with cancer use CAM, and CAM use has grown in recent years.¹¹ Complementary and alternative medicine use is not limited to adult patients. Sudairy et al¹² studied 41 pediatric oncology patients. All patients used non-dietary CAM such as Quran and more than 80% used supplication. Supplements like honey and black seed used by 95% of the sample. Olive oil in two-thirds and Zamzam water in more than three-quarter. Herbs were used by 29%.¹³

A study in the USA showed that adults spent US \$59 billion on CAM. Another survey in the United Kingdom (UK) revealed that the annual expenditures for CAM were approximately £1.6 billion.¹⁴ In 2013, it was found that the median cost of CAM in patients with diabetes and cardiovascular disease in Australia was approximately AU\$600 yearly.¹⁵ In 2011 a study

was carried out in Qassim, Saudi Arabia revealed that CAM users for various illnesses paid an out-of-pocket US\$650000 on CAM visits and products.¹⁶

Multiple studies have focused on CAM use in patients diagnosed with breast and prostate cancer but few studies have addressed CAM use in patients with brain tumors.^{17,18} In a recent retrospective review on over 19 million cancer patients, the use of CAM independently lowered the 5-year survival.¹⁹⁻²¹ Complementary and alternative medicine use can alter the management plan designed by the medical team, delay treatment or, in some cases, make the patients believe that there is no need for any medical care.²² Currently, there are limited available data on CAM use among brain tumor patients in Saudi Arabia.

We aim to assess the prevalence of CAM use, the types of CAM that are being utilized and the possible factors and reasons that promoted the use of CAM in patients with brain tumors at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia.

Methods. Ethical approval was obtained from the Research Ethics Committee at KAUH. We conducted a questionnaire-based, cross-sectional study of living patients, age 18 or older, with the principle histologic or radiologic diagnosis of benign or malignant (primary or secondary) brain tumor. Patients of the neurosurgery division at KAUH, Jeddah, Saudi Arabia, between January 2011 and May 2018, who matched the mentioned criteria, were invited to participate in this study. King Abdulaziz University Hospital is an 845 bed, university hospital that is a tertiary center, which treats complicated oncology cases with either surgical or medical care. Of the 204 patients identified from the Neurosurgery Department at the time of the study, 89 were deceased, leaving 115 prospective patients. We contacted these prospective patients by phone. Forty-three could not be reached, leaving 72 to compose our convenience sample (62.6% response rate). All participants had been diagnosed with a brain tumor at least one year prior.

Inclusion criteria: age 18 or older, with histologic or radiologic diagnosis of benign or malignant (primary or secondary) brain tumor. Exclusion criteria: age less than 18, deceased patient, or not confirmed diagnosis of brain tumor.

Our questionnaire was conducted via phone interview after obtaining the patients' consents and confirming that enough time was available to finish the questionnaire. Both the nature of the survey and the number of questions were explained. For the purposes of the questionnaire, CAM was defined as: "any treatment

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other than surgery, radiation, or chemotherapy for your tumor.” The questionnaire in this study was translated from a questionnaire conducted by Swisher et al.²³ The questionnaire was translated to English to ensure validity and accuracy. However, some new items were added (for example, financial burden of CAM) and some other items were modified to suit the Saudi Arabian culture, for example, holy water, cauterization, wet cupping, and camel urine. Our questionnaire had 3 parts (**Appendix 1**). The first part included epidemiological information, including age, gender, marital status, educational level, and nationality. The second part in our survey focused on the forms of CAM used by the brain tumor patients, including; herbals, honey, Quran reading therapy (Ruqya), olive oil, camel urine, acupuncture, dietary supplements, Zamzam, Nigella sativa (black seeds), and cauterization. The third part in our survey explored the various reasons patients used CAM, its financial burden and their information source(s) on CAM.

Statistical analysis. We used Statistical Package for Social Sciences, version 21 (IBM SPSS, Armonk, NY, USA) to analyze the data. Percentages, absolute numbers, and frequencies were used to describe categorical variables. Descriptive statistics, mean and standard deviation (SD), were used to describe continuous variables. The chi-square and Fisher exact tests were used to compare qualitative variables. *P*-value <0.05 was considered significant.

Results. In our study, 72 patients participated, there was a slight male predominance (51.4% males versus [vs.] 48.6% females). The mean age of participants was 45.89 (±16.52) years. The education level was primarily high school (41.7%) followed by university bachelor's degree (18.1%). The remaining participants were illiterate. Most participants were married (69.4%) while 23.6% were single and 6.9% were widowed/divorced. Most participants were of non-Saudi (66.7%) nationality, but 33.3% were of Saudi descents. (**Table 1**).

Zamzam (water originating from the holy land in Makkah, 93.9%), Ruqya (Quran reading 85.7%), holy water (Quran read water 73.5%), and honey (69.4%) were the most frequently types of CAM used; while, 6.1% used cauterization and 10.2% used camel urine. The least frequently used CAM was acupuncture, accounting for only 2% (**Figure 1**).

More than two-thirds (68.1%) of the participants appeared to be using CAM. The most common source of information regarding CAM use for our participants were family (81.6%) and friends (55.1%) followed by CAM therapists and Islamic scholars (20.4% each). Of the participants, 12.2% were introduced to CAM use

by the internet. Most CAM users in our study (73.5%) started to use CAM before visiting and consulting with a doctor, while the remaining CAM users began to use CAM after visiting and consulting with a doctor (**Table 2**).

Table 1 - Epidemiological information of the study sample.

| Variables | n (%) |
|------------------------|-----------|
| <i>Age (years)</i> | |
| 18-33 | 19 (26.4) |
| 34-49 | 19 (26.4) |
| 50-65 | 26 (36.1) |
| 66 and above | 8 (11.1) |
| <i>Gender</i> | |
| Male | 37 (51.4) |
| Female | 35 (48.6) |
| <i>Nationality</i> | |
| Saudi | 24 (33.3) |
| Non-Saudi | 48 (66.7) |
| <i>Education level</i> | |
| Illiterate | 10 (13.9) |
| Elementary school | 6 (8.3) |
| Intermediate school | 11 (15.3) |
| High school | 30 (41.7) |
| Bachelor's degree | 13 (18.1) |
| Diploma | 2 (2.8) |
| <i>Marital status</i> | |
| Single | 17 (23.6) |
| Married | 50 (69.4) |
| Divorced/widowed | 5 (6.9) |

Table 2 - Complementary and alternative medicine (CMA) use prevalence and attributes.

| Attributes | n % |
|---|-----------|
| Complementary and alternative medicine use | 49 (68.1) |
| <i>Source of information</i> | |
| Media | 8 (16.3) |
| Internet | 6 (12.2) |
| Friends | 27 (55.1) |
| Family | 40 (81.6) |
| Islamic scholar | 10 (20.4) |
| CAM therapist | 10 (20.4) |
| Doctors | 4 (8.2) |
| Nurse | 0 |
| <i>Approximate cost per year (Saudi Riyals)</i> | |
| <1000 | 35 (71.4) |
| 1000-5000 | 14 (28.6) |
| <i>Time of starting CAM use</i> | |
| Before visiting and consulting with a doctor | 36 (73.5) |
| After visiting and consulting with a doctor | 13 (26.5) |
| <i>Future with CAM</i> | |
| Continue using CAM and visiting the doctor | 33 (67.3) |
| Continue using CAM and stop visiting the doctor | 2 (4.1) |
| Stop using CAM and continue visiting the doctor | 10 (20.4) |
| Stop both | 4 (8.2) |

The expenditure per year for CAM was less than 1000 Saudi Arabian Riyal (SAR) which is equal to US\$266.7 in 71.4% of patients and between 1000 (\$266.7) and 5000 SAR (US\$1333.3) in 28.6% of patients. No one spent more than 5000 SAR (US\$1333.3). When we asked the patients regarding their future use of CAM and conventional medicine, the majority decided to continue using both CAM and conventional medicine (67.3%), while 20.4% preferred to cease using CAM and continue with conventional medicine, 8.2% preferred to discontinue both CAM use and conventional medicine, and a very small group (4.1%) decided to stop the conventional medicine and continue on CAM alone (Table 2).

Patients reported that their most frequent reason for using CAM was, “do good with no harm” (30.6%), while “for generally better health” was the reason provided by 20.4%, followed by “improves psychological well-being” (16.3%) and “try anything to

treat the tumor” and “directly eliminates cancer” (both at 12.2%), (Figure 2).

Table 3 demonstrates the differences in characteristics of CAM and non-CAM users, which are age, gender, educational level, marital status, nationality and tumor type. The only significant difference was in educational level, the percentage of bachelor’s degree holders, and who used CAM was significantly lower than those who held lower degrees ($p=0.027$).

Female CAM users tended to utilize dietary supplements more frequently than males (16.7% vs. 52%, $p=0.022$). There were no other differences between genders in regard to other types of CAM use. However, due to the small sample size it is difficult to say that there is a gender discrepancy in dietary supplement use with high degree of confidence.

Discussion. There are limited number of studies that discuss the use of CAM among brain tumor

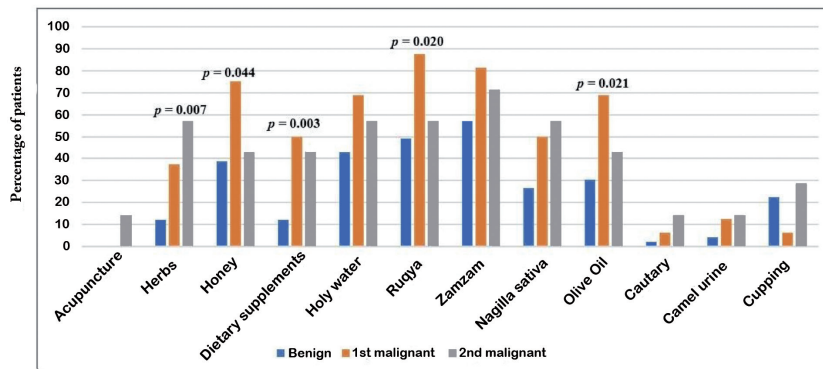


Figure 1 - Types of complementary and alternative medicine used.

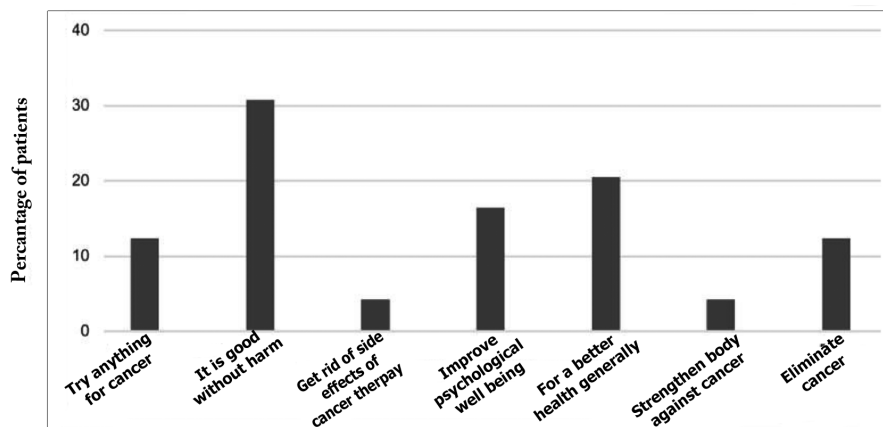


Figure 2 - Reasons to use complementary and alternative medicine.

Table 3 - Comparison between complementary and alternative medicine (CAM) and non-CAM users.

| Variables | Total | CAM users | Non CAM users | Odds ratio (95% CI) | Significance |
|-----------------------------|-------|-----------|---------------|-----------------------|--------------------|
| Total | 72 | 49 (68.1) | 23 (31.9) | - | - |
| <i>Age</i> | | | | | |
| 18-33 | 19 | 12 (63.2) | 7 (36.8) | | 0.380 ^x |
| 34-49 | 19 | 16 (84.2) | 3 (15.2) | | |
| 50-65 | 26 | 16 (61.5) | 10 (38.5) | | |
| 66 and above | 8 | 5 (62.5) | 3 (37.5) | | |
| <i>Gender</i> | | | | | |
| Male | 37 | 24 (64.9) | 13 (35.1) | 1.354 (0.499 - 3.668) | 0.731 [†] |
| Female | 35 | 25 (71.4) | 10 (28.6) | | |
| <i>Educational level</i> | | | | | |
| Illiterate | 10 | 6 (60.0) | 4 (40.0) | | 0.028 [†] |
| Elementary | 6 | 5 (83.3) | 1 (16.7) | | |
| Intermediate | 11 | 6 (54.5) | 5 (45.5) | | |
| High school | 27 | 24 (88.9) | 3 (11.1) | | |
| Bachelor's degree and above | 16 | 7 (43.8) | 9 (56.3) | | |
| Diploma | 2 | 1 (50.0) | 1 (50.0) | | |
| <i>Marital status</i> | | | | | |
| Single | 17 | 13 (76.5) | 4 (23.5) | | 0.694 [†] |
| Married | 50 | 33 (66.0) | 17 (34.0) | | |
| Divorced/widowed | 5 | 3 (60.0) | 2 (40.0) | | |
| <i>Nationality</i> | | | | | |
| Saudi | 24 | 14 (58.3) | 10 (41.7) | 1.923 (0.685 - 5.394) | 0.326 [†] |
| Non-Saudi | 48 | 35 (72.9) | 13 (27.1) | | |
| <i>Tumor type</i> | | | | | |
| Benign | 49 | 33 (67.3) | 16 (32.7) | | 0.727 [†] |
| Primary malignant | 16 | 12 (75.0) | 4 (25.0) | | |
| Secondary malignant | 7 | 4 (57.1) | 3 (42.9) | | |

Values are presented as numbers and percentage (%). Odds ratio were presented for dichotomous sociodemographic variables. CAM: complementary and alternative medicine, CI: confidence interval. ^xChi-square test, [†]Fisher-exact test

patients; although, central nervous system tumor patients are among the highest CAM users in the cancer population.²⁴ Our aim was to assess the prevalence of CAM use and the factors that promote the use of CAM in brain tumor patients at KAUH. The study showed that more than two-thirds of the participants used CAM. This prevalence is higher than that reported in the literature (51%).²⁵ But almost similar to a study which was carried out in Riyadh, Saudi Arabia among patients with solid and hematological malignancies (69.9%).²⁶ Jazieh et al²⁷ studied 453 cancer patients in Riyadh, Saudi Arabia and reported 90.5% CAM use.

We believe that the difference in prevalence between Saudi Arabia and other western countries is attributed to many factors but a major reason is socioreligious differences. In Saudi Arabia, many forms of CAM are derived from religious sources, such as honey, Zamzam water, Ruqya (Quran reading), wet cupping and *Nigella sativa* (black seeds). The definition of CAM is not consistent among studies, which leads to differences in the reported prevalence.²⁸ Variations in data collection tools and whether participants were

asked to freely recall their CAM use or were provided with a standardized list of CAM are also factors that led to differences in prevalence.²⁹ Many differences existed in gender, nationality, and marital status between CAM and non-CAM users. Educational level significantly influenced CAM use; similar results were observed in the USA and Korea. This finding is a reflection of the fact that people with higher educational levels tend to prefer evidence-based medicine more than people with lower educational backgrounds.^{29,30}

The most frequently used types of CAM were Zamzam, Ruqya, and holy water, as these 3 are inexpensive, widely available, noninvasive and easily used. This result is very different than the results of other studies in different countries, as the CAM types used vary according to place, culture, spiritual and religious beliefs. In our study, only 2% used acupuncture in contrast to other regions. Dietary supplements were utilized by 34.7% of participants using CAM. We found a significant difference in the use of dietary supplements between males and females (16.7% males vs. 52% females, $p=0.022$). This difference could be because

females tend to have more concerns on some of the side effects of chemotherapy and radiation therapy, such as hair loss, so they tend to use certain vitamins that have shown positive effects in cancer patients.³¹ However, giving the small sample size it is difficult to say that there is a gender discrepancy in dietary supplement use with high degree of confidence.

A study assessed CAM use and gender difference among patients with chronic illness found higher CAM use among females, (51.5% vs. 44.3%).³² Cupping was used by 28% of the participants, which was lower than the percentage of participants using cupping in a survey conducted with neurological disorders patients in Riyadh, Saudi Arabia (45.4%).³³ In a study among cancer patients in Riyadh, the most frequent types of alternative medicine used showed similar results to our study in regard to the high prevalence of use of religion related CAM such as supplication (94.5%), Quran (88.1%), Zamzam water (84.4%), water read upon Quran (63.3%). Camel urine was used in 15.7% while only 10.2% in our study.

Families were the most frequent source of information on CAM (81.6%). Fifty-five percent of CAM users received information and recommendations from their friends. Family and friends are close and trust-worthy, making them commendable sources for patients. This result is similar to findings in a study conducted by Molassiotis et al²⁴ in multiple European countries in 2004. Complementary and alternative medicine therapists were questioned by 20.4% of CAM users in our study, but only a small proportion listed media and Internet as a source for information, probably because almost two-thirds of our CAM users were aged 40 years or older. Doctors and nurses contribution of CAM information to CAM users was limited, only 8.2% asked their physicians or nurses regarding CAM. This finding could be due to patients' concerns that their medical team might discourage or recommend against the use of CAM.

Most CAM users began to utilize CAM before visiting a physician, and some perhaps before knowing their diagnoses. This practice could be due to the length of the process and difficulty in accessing the health care system. It could also be due to the low cost and widespread availability of CAM, especially common products such as honey and *Nigella sativa*. This finding is important, as certain herbs and foods used in CAM can potentially and undesirably interact with some anti-cancer drugs. For example, St. John's wort contains the active constituent, hyperforin. Hyperforin indirectly increases the expression of metabolizing enzymes and reverses, to different degrees, the antiproliferative effects

of many cytotoxic medications, such as paclitaxel and daunorubicin.^{34,35} Garlic modifies the activity of various CYP isoenzymes.^{36,37} Ginkgo may interfere with the pharmacokinetics of anticancer drugs metabolized by CYP2C19 or CYP3A4.³⁸ Additionally camel products are commonly used as CAM among cancer patients in Saudi Arabia. These products carry risk of brucellosis and were linked to Middle East respiratory syndrome coronavirus (MERS-CoV); MERS.³⁹⁻⁴¹ Thus health care providers must have knowledge on different side effects and drug interactions with CAM particularly anti cancer agents, they should ask their patients regarding CAM use, particularly if patients show less than expected response to the treatment plan.

When CAM users were asked on their future use of CAM, the answers reflected an unpredictable pattern that indicated that the majority of patients desired to continue using both conventional approaches and CAM. The participants' responses did not differ significantly based on gender, age, educational level, or marital status.

Current literature shows that cancer patients use CAM for several reasons, mainly to achieve beneficial outcomes and to satisfy the patient's need to control the disease. In our study, most participants used CAM because it might introduce benefits to them with no harm. This notion is not completely accurate because, as mentioned earlier, specific forms of CAM can interact with some medications. Another frequent reason was to improve their general health. Physicians should be aware of the potential of CAM use among brain tumor patients, facilitate open communications so patients disclose this information and provide guidance on advantages, disadvantages and potential risks of CAM. We believe this study adds to the current literature as it addresses the CAM use among patients with brain tumor. We aim to build on the data used in this study for future prospective studies on patients in our center. This will allow to increase the sample size and minimize recall bias.

Study limitations. The small sample size and the retrospective feature with the potential for recall bias. Reaching patients by phones was difficult, because many patients had received the diagnosis 5 or more years earlier. Some patients were hesitant to disclose their use of CAM, as they thought this would affect their eligibility for health care.

In conclusion, more than two-thirds of patients with brain tumors used CAM. We found that educational level had a significant effect on CAM use. Gender played a role in the type of CAM used. Almost three-quarters of our CAM users started using CAM before visiting their doctors. Future study should focus on the adverse

effects and effectiveness of CAM therapies. More detailed economic evaluation such as cost-effectiveness and cost-utility analysis is needed in the future.

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Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.