

## Complementary and alternative medicine in Brazilian children and adolescents with type 1 diabetes mellitus

Medycyna dodatkowa i alternatywna stosowana u dzieci i młodzieży z cukrzycą typu 1 w Brazylii

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### Abstract

**Introduction.** Patients with type 1 diabetes mellitus (T1DM) resort to complementary and alternative medicine (CAM) for symptomatic relief, to inhibit progression or to reduce side effects associated with conventional therapy. **Objectives.** Build a profile and assess the prevalence of the use of CAM in Brazilian children and adolescents with T1DM under conventional treatment. **Methods.** Cross-sectional study with interviews with the legal representatives of patients with T1DM (of both gender, aged 2-17 years). The profile of users of CAM was built based on the percentage of patients that use or did not use CAM, frequency ratio and multiple correspondence analysis. **Results.** Seventy patients ( $10.7 \pm 3.8$  years, 34 girls and 36 boys) were assessed. Among them, 41.5% used CAM. Most of them (69%) did not inform their doctors on this use. The main reasons for the use of the CAM were the desire to improve blood sugar levels and cure the disease. The most widely used methods were medicinal plants, acupuncture, and prayer. Positive associations between the use of CAM and sociodemographic characteristics were also found. **Conclusions.** The construction of the profile revealed a group of patients that deserve a special attention by health professionals because they are more prone to adopt behaviors that impair the success of the treatment, such as not counting carbohydrates and not informing the doctor about the use of CAM.

### Key words

diabetes mellitus; complementary and alternative medicine; prevalence

### Streszczenie

**Wstęp.** Pacjenci z cukrzycą typu 1 (T1DM) zwracają się w stronę dodatkowych i alternatywnych metod (CAM, *ang. complimentary and alternative medicine*), wierząc w zahamowanie progresji choroby i zmniejszenie niekorzystnych objawów związanych z terapią konwencjonalną. **Cele.** Stworzenie profilu i ocena skali stosowania CAM u brazylijskich dzieci i młodzieży z cukrzycą typu 1 poddanych terapii konwencjonalnej. **Metody.** Przeprowadzono wywiady z prawnymi opiekunami pacjentów z cukrzycą typu 1 (obu płci, w wieku 2–17 lat). Stworzono profil stosowania metod CAM na podstawie częstości używania i nieużywania przez pacjentów CAM oraz złożonej analizy korespondencji. **Wyniki.** Badaniu poddano 77 pacjentów ( $10,7 \pm 3,8$  lat, 34 dziewczęta i 36 chłopców). Spośród badanych 41,5% stosowało CAM, przy czym większość (69%) nie poinformowała o tym lekarza prowadzącego. Głównym powodem stosowania CAM była chęć poprawy wartości glikemii w zamiarze wyleczenia się z choroby. Najczęściej stosowane były rośliny lecznicze, akupunktura oraz modlitwa. Stwierdzono dodatni związek pomiędzy stosowaniem CAM a socjodemograficzną charakterystyką badanych. **Wnioski.** Stworzenie profilu ujawniło istnienie grupy pacjentów wymagającej szczególnej uwagi ze strony personelu medycznego z powodu skłonności do adaptowania zachowań wpływających na pogorszenie wyników leczenia, poprzez m.in. nieliczenie wymienników węglowodanowych czy nieinformowanie lekarza o stosowaniu metod medycyny alternatywnej i dodatkowych.

### Słowa kluczowe

cukrzyca, dodatkowa i alternatywna medycyna, występowanie

## Introduction

Type 1 diabetes mellitus 1 (T1DM) is an autoimmune disease characterized by a failure in the normal mechanisms of self-tolerance, which results in an immune response against insulin-producing  $\beta$  cells within the islets of Langerhans, in the pancreas [1]. This failure to produce insulin is the result of a complex interaction of genetic, immunological and environmental factors [2].

Despite conventional treatment which consists in the combination of a healthy eating plan, physical activity, insulin therapy, monitoring of glucose and information on the disease, the T1DM can develop into chronic complications such as retinopathy, nephropathy and diabetic neuropathy [3].

The complementary and alternative medicine (CAM) involves a wide range of procedures and therapies that are usually outside the sphere of public health policies, being defined as a group of several medical and healthcare systems, practices and programs that are not generally considered part of conventional medicine, which can be categorized into natural products (vitamins, herbal products, dietetic products and supplements); "mind-body" medicine (yoga, meditation, deep breathing techniques, acupuncture); handling and bodily practices (massage therapy, spinal manipulation); and others (energy fields, movement therapies, traditional healers) [4]. The main therapies used as CAM are: herbs, vitamins, antioxidants, yoga, meditation, bioenergy, acupuncture, aromatherapy, and prayers [5–7].

The prevalence and type of therapy vary according to social, cultural and religious customs, as well as the customs prevalent in the community associated with the social, physical and mental well being [8]. Children with chronic illnesses are three times more likely to use this kind of therapy [9], and the use in the developing countries tends to be higher than in developed countries [10–12].

The use of CAM is motivated by a desire to prevent, cure or limit diabetes progression, or improve the quality of life, and to make it possible for patients to take a more active role in their healthcare process [10,12–14].

In Brazil, there are no data on the use of this type of therapy in pediatric patients with T1DM, although the use of medicinal plants is popular in the country and plays a key role in primary health care [15,16]. Therefore, this study aimed to assess the epidemiology of CAM use in children and adolescents with T1DM, as well as building a profile of those users.

## Methods

Cross-sectional study with children and adolescents with T1DM, defined according to the criteria of the American Diabetes Association [1]. Age range 2–17 years old, accompanied by their parents or guardians, in a university referral center for T1DM. This study was submitted and approved by the Research Ethics Committee of the participating institution (No. 103.598).

Complementary and alternative medicine (CAM) were defined as any procedure and/or therapy, except vitamins and supplements, which are not usually included in conventional medical practices. The use of this alternative practice was investigated in patients undergoing a conventional treatment, through interviews with parents and/or guardians, through the application of semi-structured questionnaires complemented with medical information concerning T1DM obtained from standard medical records from the hospital.

The questionnaire included questions about socio-demographic characteristics of participants and their guardians, such as gender, age, education (less or more than 5 years), income (higher or lower than the minimum wage), ethnic group (white, black, brown or Amerindian), religion, among others. Other questions: when was the alternative therapy initiated, reason for use and/or suspending this therapy, sources that indicated this use, frequency, method used, association between the use of these therapies and the occurrence of complications, and whether the medical team was informed about the use of such alternative therapies.

Statistical analysis was performed in two stages. The first stage included the description of socioeconomic and demographic characteristics, by estimating the proportion of patients with T1DM who used and did not use CAM, and the frequency ratio between them. Then, we sought to explore the joint relationships between the characteristics of users, through multiple correspondence analysis, with eigenvalue decomposition in Burt matrix, for building the profile of users.

## Results

The average age of patients (36 boys and 34 girls) was 10.7 years  $\pm$  3.8 years. Of the 70 individuals, 64% (n=45) were diagnosed with T1DM less than 5 years ago, 21.5% (n=15) between 5-10 years ago and 14.5% (n=10) more than 10 years ago.

All patients were using subcutaneous insulin in combination with one or two doses of basal insulin and prandial insulin, in 2 to 3 daily doses. Carbohydrate count was not followed by 61.4% (n=43).

Concerning the parents/guardians of the 70 children and adolescents with T1DM, 87% (n=61) were mothers, 4.5% (n=3) fathers and 8.5% (n=6) legal guardians.

Approximately 41.5% (n=29) of the patients used some complementary therapy. Of the group that reported the use of CAM, 35% (n= 10) used this type of therapy during the first 3 months after the diagnosis of the disease, 27% (n=8) between 4–12 months after the diagnosis and other 38% (n=11) during the first year after the onset of the disease. The parents who chose this treatment for their children have done so motivated by the desire to try alternative therapies to lower glucose levels: 80% (n=23); cure of disease: 14% (n=4) and decrease in complications arising from the disease: 6% (n=2).

Most respondents (75.8%; n=22) said they were not currently using CAM (at the time of the interview), although 59%

(n=17) believed that these therapies were effective and improved the quality of patients' life. These patients reported the improvement in glucose measurements (94%) and the decrease in the number of visits to health facilities (6%).

Approximately 69% of the participants did not inform their doctors on their use of alternative treatment alongside with conventional treatment. Among the reasons given by respondents for not informing the doctor on the use of alternative therapies, the following were identified: possible lack of understanding on the part of the doctor who would disapprove the use of CAM (40%); the participant did not find it necessary or important to tell the doctor about such use (25%); the doctor did not ask about the use of alternative therapies (20%) or because they feared that the doctor would tell them to stop the use of the mentioned-referred therapies or would disapprove the attitude of the guardian to submit the patient to CAM (15%).

All participants said that the use of this method did not cause them any side effects and 82.7% (n = 24) affirmed they had previously used alternative treatment. The most important source of information on CAM was friends (48%) and family members (27%).

The frequency of use was: 48.2% (n=14), once a day; 27.5% (n=8), twice a day; 17.3% (n=5), three or more times a day; and 6.8% (n=2), twice or three times a week.

The most commonly used therapies were medicinal plants (90%), acupuncture (4%) and prayers (6%). The most frequently used plants were: "Pata de vaca" (*Bauhinia forficata*) (31%), vegetable insulin (*Cissus sicyoides* L.) (17.3%), passion flower (*Passiflora* sp) (10.3%) and a compound of various herbs (41.4%). The herbs were administered in the form of teas (86%), infusion (7%) or raw (7%) and the most commonly used parts were the leaves (76%), followed by the fruit (11%).

The results of correspondence analysis showed that the first two dimensions explain 52% of the total variability (contribution of the variability of all the variables together. The variables are described in the two lower squares in figure 1).

Figure 1 shows the graphical representation of the categories of variables together, with their projected dimensions. Associations between categories of variables and formation of clusters were assessed by analyzing the proximity of the points in figure 1 and by creating three groups: I, II and III.

Group I, located at the center of the upper quadrant of figure 1 used CAM with the purpose of reducing glucose levels. This group included patients aged over 14 years, diagnosed with the disease more than 10 years ago, higher family income (more than one minimum wage), male gender, who informed the doctor on the use of alternative therapies, counts carbohydrates and uses herbs as CAM because this was suggested by family members.

Group II, located in the lower left quadrant of figure 1, used alternative therapies to reduce complications caused by DM. Most of the participants in this group were females, aged up to 8 years of age, diagnosed with T1DM less than five years ago, parents with more than five years of schooling, who were advised by friends to use herbs and acupuncture and who affirmed that they obtained positive results with

the use of the method, with consequent improvement in the quality of life.

Group III, located in the lower right quadrant of figure 1, was mainly composed of users who sought healing with the use of CAM. Aged 9–14 years, diagnosed with the disease 5 to 10 years ago, income lower than 1 minimum wage, do not count carbohydrates, use herbs and pray as CAM advised by individuals other than friends or family members (media or church).

In the upper right quadrant and in the lower left quadrant there are four conditions that did not directly relate to the previously established groups, but are closer to the group that sought alternative therapies with the purpose of curing T1DM (Group III).

## Discussion

A prevalence rate of 41.5% of the use of CAM was detected in children and adolescents with T1DM, with the definition of CAM excluding vitamins and dietary supplements. This prevalence is similar to the one found in other studies and shows that the use of alternative therapies is smaller in percentage terms in the developed countries compared to the developing ones [9,11,12,17–19]. This may be the result of similar cultural and financial aspects.

The most widely used CAM was the administration of herbs in the form of teas, which is consistent with the findings of studies reported in the USA [6,20,21], Turkey [11,18,22] and other countries [9,12,19,23–26].

The most commonly used herbs were "pata de vaca" (*Bauhinia forficata* L.), vegetable insulin (*Cissus sicyoides* L.), passion flower (*Passiflora* sp) and a compound of several herbs. As each country has its native flora, the herbs used routinely in the diabetes treatment vary from country to country [3,8,15,27–29]. In Brazil, "pata de vaca" and insulin are widely spread as CAM for diabetes [15,29]. For "pata de vaca", the studies are contradictory regarding the reduction of blood sugar levels [30,31].

Only three patients in our study had used acupuncture or prayers, which are methods that are more popular in other countries [18,22,32]. The high cost of these practices, which concerns acupuncture, may be the reason why these methods are not so widely used in our country.

Socio-demographic characteristics such as place of residence and higher parental education level were associated in this study to a higher probability of use of CAM [10,11,13,20,23], but that differ from others where these factors had no significant effect [6,19,24].

It was also observed that most parents had been informed about alternative therapies by friends and family members, which is consistent with the studies of Haliloglu et al. [11], Waizaif et al. [10] and Hasan et al. [13] where the most cited sources of information were friends and relatives.

There were no gender differences regarding the patients who used or did not use CAM, which is similar to the findings

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|--|---|---|
| q91- intended use: cure<br>q93- intended use: reduce blood glucose<br>q95- intended use: decrease complications<br>q191- information using PIC to the doctor: yes<br>q192- information using PIC to the doctor: no<br>rd0- income: high<br>rd1- income: low<br>q331- carbohydrate counting: yes<br>q333- carbohydrate counting: no | fx1- age group: ≤ 8 years<br>fx2- age group: 9-12 years<br>fx3- age group: 12-14 years<br>fx4- age group: > 14 years<br>td1- time of diagnosis: < 5 years<br>td2- time of diagnosis: 5-10 years<br>td3- time of diagnosis > 10 years<br>q151- improvement in quality of life: yes<br>q152- improvement in quality of life: no | q221- Type CAM: herb<br>q222- Type CAM: herb+prayer<br>q223- Type CAM: herb+acupuncture<br>es0- schooling < 5 years<br>es1- schooling > 5 years<br>qi0- indication: "other"<br>qi1- indication: friends<br>qi2- indication: family<br>q261- Gender: male<br>q262- Gender: female<br>q161- positive result with the use of pic: yes<br>q162- positive result with the use of pic: no |
|--|---|---|

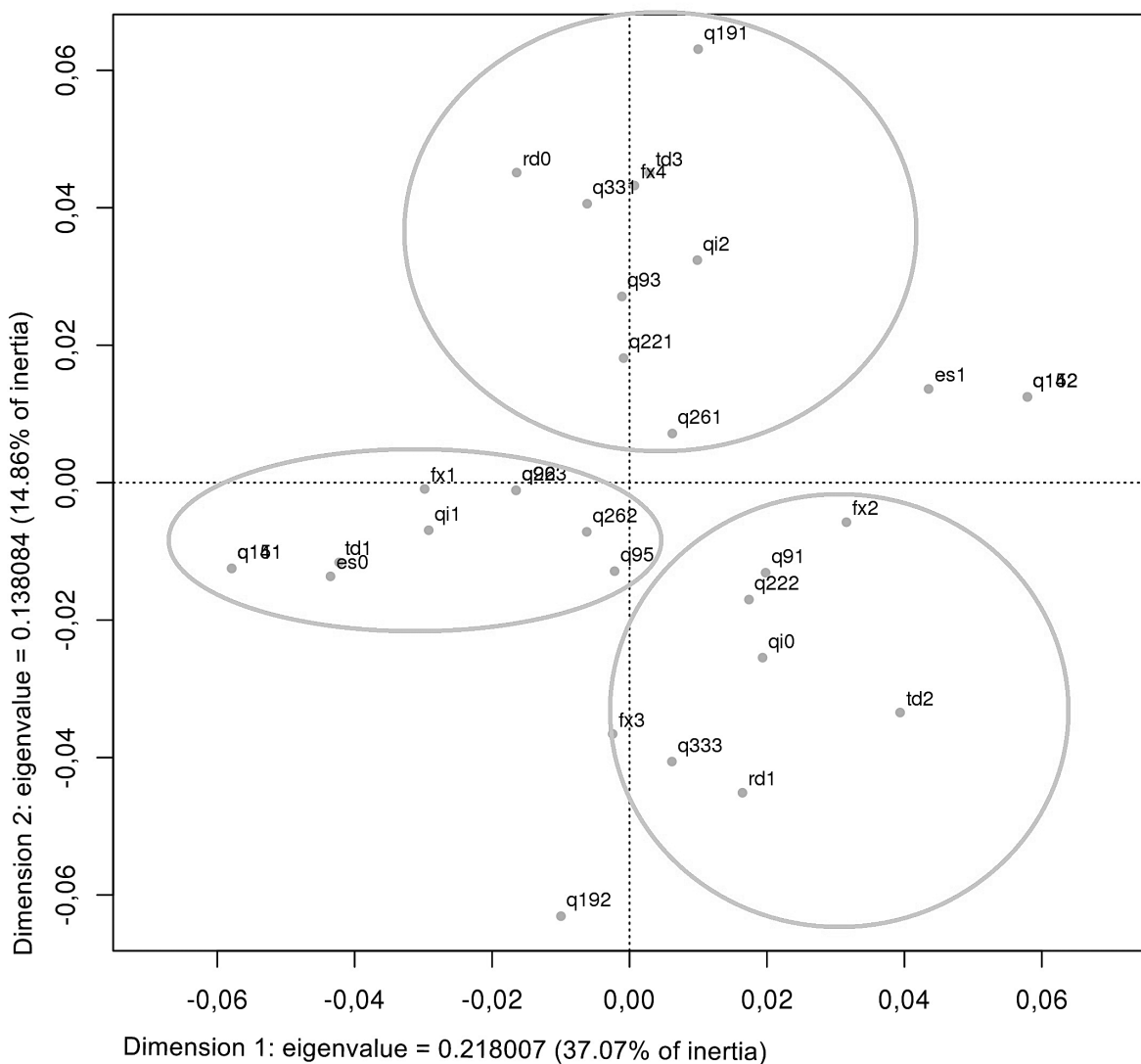


Fig. 1. Multiple correspondence analysis map of the patients using CAM (Complementary and Alternative Medicine). Groups correspond to variables that relate. Variables investigated are depicted in the box below

obtained by Arykan et al. [18] and Haliloglu et al. [11], and different from the results of the study of Hasan et al. [13], where male patients were more likely to use alternative therapies.

The comparison of CAM users and non-users showed that the frequency of use of CAM increased with increasing age of the individuals, which was similar to the findings of Lemay et al. [19] e McCarty et al. [20].

It is a matter of concern that the parents/guardians of patients did not inform the doctor on the use of CAM by the patients (69%), which is similar to the results of the other studies (11,13-4,18,23). The diabetics that use this alternative therapy have difficulty telling doctors about such use [33]. The failure to communicate the use of CAM may indicate a lack of awareness of these guardians/parents on the risks of an un supervised use of drugs and/or herbs concomitantly with insulin.

Among the reasons given for not informing the doctor on the use of these therapies, the ones worth mentioning are: a possible lack of understanding on the part of the doctor who would disapprove the use of CAM, the fact that parents did not find it important to reveal such use to the doctor and because doctors did not ask about the use of alternative therapies. This finding is consistent with a study by Haliloglu et al. [11] and Dannemann et al. [9].

These data raise questions about the way doctors address the use of alternative treatments in their consultations, since it is known that self-administration of herbs with conventional medication, without the knowledge of health professionals, may result in an inefficient and adverse management of the diabetic treatment, although in this particular study, no side effect was related to the use of CAM methods.

More than half of the parents (59%) who treated their children with CAM, answered that they believed the use of these therapies was effective, contributing to a better quality of life for the patients. This percentage is similar to the one observed in other studies [9,11,13,18,19,23].

Most of the parents (62%; n = 18) who adopted CAM in their children, used in the first 12 months after the diagnosis. The remission period (honeymoon phase) after initiating the insulin therapy usually occurs approximately 3 months after initiation of therapy according to Sokolowska et al. [34] This fact indicates that some of the improvement perceived by the parents could be the result of the T1DM honeymoon phase.

In almost all studies, this improvement in the quality of life was assessed by the perception of the family and not through more reliable and valid forms of measurement. McCarty et al. [20], found no association between the general use of alternative therapies and the quality of life.

The patients' informants who used CAM were not satisfied with conventional treatment, but used alternative treatment

motivated by the desire to try alternatives that could help improving glucose levels and cure the disease. Similar data were obtained by Odegard et al. [21].

There were no differences in the hemoglobin A1c levels in CAM users and non-users. Since the CAM was used very early after the diagnosis it was not possible to compare its effects on the glycemic control before and after the initiation of the insulin therapy.

The proposed method of multiple correspondence analysis of this study through the characteristics of patients that use CAM and their parents/guardians, has established a specific profile of these patients regarding the use of those alternative practices. We noticed that attributes such as age range of patients, parental education and the purpose of therapy use are the main characteristics that guide the other behaviors in the groups.

Group I, which includes the oldest patients and those who were diagnosed with T1DM for a longer period of time, showed better understanding of the complications caused by the disease and were more careful in its control, even seeking alternative methods (e.g. herbs) with the purpose of lowering blood sugar levels.

Group II included the youngest children, diagnosed for a shorter period of time. The complications of T1DM, although known as expected by the parents, may not yet have occurred, and the use of CAM had the main purpose of reducing such complications.

In Group III, where the parents attempted to cure T1DM with the use of CAM, we can suggest that lower schooling may explain the lower understanding of the serious consequences that may result from an inappropriate treatment of T1DM. Thus, we observed harmful behaviors such as not counting carbohydrates, not informing the doctor on the use of CAM and the search for the clinical manifestations cure, which was scientifically impossible so far.

The construction of the profile shows the need for greater attention by the team of health professionals, both regarding the care and information on the use of alternative therapies, as regarding the guidance on the changes of lifestyle for the parents of children with characteristics indicated in group III. According to this profile analysis, these parents showed a greater tendency to neglect their children's treatment, e.g. not counting carbohydrates and not informing the doctors on the use of CAM. The construction of this profile showed patients and parents/guardians characteristics that deserve greater concern from health professionals regarding preventive measures.



## References

1. American Diabetes Association: *Standards of medical care in diabetes – 2013*. Diabetes Care. 2013; 36:S11-S66.
2. Van Den Driessche A, Eenkhoorn V, Van Gaal L, De Block C. *Type 1 diabetes and autoimmune polyglandular syndrome: a clinical review*. Neth J Med. 2009; 67:376-387.
3. Afolayan AJ, Sunmonu TO. *In vivo studies on antidiabetic plants in South African herbal medicine*. J Clin Biochem Nutr. 2010; 47:98-106.
4. National Institutes of Health. National Center for Complementary and Alternative Medicine (NCCAM). *What Is Complementary and Alternative Medicine*, 2008. Disponível em: <<http://nccam.nih.gov/health/whatiscam>> Acesso em: 05 set. 2012.
5. Wong, KH, Li GQ, Li KM, Razmovski-Naumovski V, Chan K. *Kudzu root: traditional uses and potential medicinal benefits in diabetes and cardiovascular diseases*. J Ethnopharmacol. 2011; 134:584-607.
6. Miller JL, Cao D, Miller JG, Lipton RB. *Correlates of complementary and alternative medicine (CAM) use in Chicago area children with diabetes (DM)*. Prim Care Diabetes. 2009; 3:149-156.
7. Samdup DZ, Smith RG, Il Song S. *The use of complementary and alternative medicine in children with chronic medical conditions*. Am J Phys Med Rehabil. 2006;85:842-846.
8. Abo KA, Fred-Jaiyesimi AA, Jaiyesimi AEA. *Ethonobotanical studies of medicinal plants used in the management of diabetes mellitus in South Western Nigéria*. J Ethnopharmacol. 2008; 115:67-71.
9. Dannemann K, Hecker W, Haberland H et al. *Use of complementary and alternative medicine in children with type 1 diabetes mellitus – prevalence, patterns of use and costs*. Pediatr Diabetes 2008; 9:228-235.
10. Wazaify M, Afifi FU, El-Khateeb M, Ajlouni K. *Complementary and alternative medicine use among Jordanian patients with diabetes*. Complement Therapies Clin Pract. 2011;17:71-75.
11. Haliloglu B, Isguven P, Yildiz M, Arslanoglu L, Ergüven M. *Complementary and alternative medicine in children with type 1 diabetes mellitus*. J Clin Res Pediatr Endocrinol.2001; 3: 139-143.
12. Fabian E, Toscher S, Elmadafa I, Pieber TR. *Use of complementary and alternative medicine supplements in patients with diabetes mellitus*. Ann Nutr Metab. 2011; 58:101-108.
13. Hasan SS, Loon WC, Ahmadi K, Ahmed SI, Bukhari NI. *Reasons, perceived efficacy and factors associated with complementary and alternative medicine use among Malaysian patients with diabetes mellitus*. Br J Diabetes Vasc Dis. 2011;11:92-98.
14. Villa-Caballero L, Morello CM, Chynoweth ME et al. *Ethnic differences in complementary and alternative medicine use among patients with diabetes*. Complement Ther Med. 2010;18(6):241-248.
15. Silva MI, Sousa FC, Gondim AP. *Herbal therapy in primary health care in Maracanaú, Ceará, Brazil*. Ann Pharmacother. 2005; 39:1336-1341.
16. BRASIL. Ministério da Saúde. Portaria no. 971, de 03 de maio de 2006. *Aprova a Política Nacional de Práticas Integrativas e Complementares (PNPIC) no Sistema Único de Saúde*. Brasília:Ministério da Saúde, 2006. 92 p. Disponível em: <<http://www.telessaudebrasil.org.br/lildbi/docsonline/3/1/113-Politica Nacional de Praticas Integrativas e ComplementaresSUS.pdf>>. Accessed: Nov. 23, 2013.
17. Miller JL, Binns HJ, Brickman WJ. *Complementary and alternative medicine use in children with type 1 diabetes: a pilot survey of parents*. Explore. 2008; 4-5:311-314.
18. Arikian D, Sivrikaya SK, Olgun N. *Complementary alternative medicine use in children with type 1 diabetes mellitus in Erzurum, Turkey*. J Clin Nurs. 2009;18:2136-2144.
19. Lemay JF, Amin A, Pacaud D. *Complementary and alternative medicine use in children and adolescents with type 1 diabetes*. Paediatr Child Health. 2011; 16:468-472.
20. McCarty RL, Weber WJ, Loots B, et al. *Complementary and alternative medicine use and quality of life in pediatric diabetes*. J Altern Complement Med. 2010; 16:165-173.
21. Odegard PS, Janci MM, Foeppel MP, Beach JR, Trence DL. *Prevalence and correlates of dietary supplement use in individuals with diabetes mellitus at an academic diabetes care clinic*. Diabetes Educ. 2011;37:419-425.
22. Ceylan S, Azal O, Taslipinar A, Turker T, Acikel CH, Gulec M. *Complementary and alternative medicine use among Turkish diabetic patients*. Complement Ther Med. 2009; 17:78-83.
23. Ali-shtayah M, Jamous RM, Jamous RM. *Complementary and alternative medicine use amongst Palestinian diabetic patients*. Complement Ther Clin Pract. 2012; 18:16-21.
24. Manya K, Champion B, Dunning T. *The use of complementary and alternative medicine among people living with diabetes in Sydney*. BMC Complement Altern Med. 2012; 12:1-5.
25. Chang HY, Wallis M, Tiralongo E. *Use of complementary and alternative medicine among people living with diabetes: literature review*. J Adv Nurs. 2007; 58:307-319.
26. Kumar D, Bajaj S, Mehtotra R. *Knowledge, attitude and practice of complementary and alternative medicines for diabetes*. Public Health. 2006;120: 705-711.
27. Dièye AM, Sarr A, Diop AN et al. *Medicinal plants and the treatment of diabetes in Senegal: survey with patients*. Fundam Clin Pharmacol. 2008; 22:211-216.
28. Gbolade AA. *Inventory of antidiabetic plants in selected districts of Lagos State, Nigeria*. J Ethnopharmacol. 2009, 121:135-139.
29. Matheka DC, Alkizim FA. *Complementary and alternative medicine for type 2 diabetes mellitus: Role of medicinal herbs*. J Diabetes Endocrinol. 2012, 3:44-56.
30. Lino CS, Diógenes JP, Pereira BA et al. *Antidiabetic activity of Bauhinia forficata extracts in alloxan-diabetic rats*. Biol Pharm Bull. 2004; 27: 125-127.
31. Volpato GT, Damasceno DC, Rudge MV, Padovani CR, Calderon IM. *Effect of Bauhinia forficata aqueous extract on the maternal-fetal outcome and oxidative stress biomarkers of streptozotocin-induced diabetic rats*. J Ethnopharmacol. 2008; 116: 131-137.
32. Peplow PV, Baxter GD. *Electroacupuncture for control of blood glucose in diabetes: Literature review*. J Acupunct Meridian Stud. 2012; 5:1-10.
33. Dinardo MM, Gibson JM, Siminerio L, Morell AR, Lee ES. *Complementary and alternative medicine in diabetes care*. Curr Diab Rep. 2012; 12:1-13.
34. Sokolowska M, Chobot A, Jarosz-Chobot P. *The honeymoon phase – what we know today about the factors that can modulate the remission period in type 1 diabetes*. Pediatr Endocrinol Diabetes Metab. 2016; 22, 2:66-70.