# Acupuncture in adolescents with juvenile fibromyalgia

*Acupuntura em adolescentes com fibromialgia juvenil*

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## ABSTRACT

**Objective:** To describe the use of acupuncture in the treatment of adolescents with juvenile fibromyalgia.

**Methods:** Retrospective study of patients with juvenile fibromyalgia (American College of Rheumatology criteria) submitted at least to 11 weekly sections of acupuncture. The evaluations before and after acupuncture included: demographic data, musculoskeletal pain findings, pain visual analog scale (VAS), algometry, and myalgic index (MI). These patients could be treated with analgesics, amitriptyline and aerobic physical activity. The results before and after acupuncture were compared by non-parametric Wilcoxon test.

**Results:** 38 patients had juvenile fibromyalgia in eight consecutive years, 13 had all information in their medical and acupuncture records. Seven of the 13 patients improved in three parameters (number of tender points, pain VAS and MI). The median number of tender points and VAS was significantly higher before than after treatment with acupuncture sections [14 (11-18) vs. 10 (0-15), $p$=0.005; 6 (2-10) vs. 3 (0-10), $p$=0.045; respectively]. In contrast, the median MI was significantly lower before treatment [3.4 (2.49-4.39) vs. 4.2 (2.71-5.99), $p$=0.02]. None of the patients with juvenile fibromyalgia had adverse events associated with acupuncture.

**Conclusions:** Acupuncture is a traditional chinese medicine modality that can be used in pediatric patients with fibromyalgia. Future controlled studies are necessary.


**Key-words:** fibromyalgia; adolescent; acupuncture; therapeutics.


## RESUMO

**Objetivo:** Descrever a utilização da acupuntura em adolescentes com fibromialgia juvenil.

**Métodos:** Estudo retrospectivo realizado em pacientes com fibromialgia juvenil (critérios do Colégio Americano de Reumatologia) submetidos a, pelo menos, 11 sessões semanais de acupuntura. As avaliações antes e após acupuntura incluíram dados demográficos, características da dor musculoesquelética, número de pontos dolorosos (NPD), escala



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visual analógica (EVA) de dor, algiometria e índice miálgico (IM). Durante o estudo, os pacientes puderam usar analgésicos, amitriptilina e foram orientados a praticar atividade física aeróbica. Os resultados antes e após acupuntura foram comparados pelo teste não paramétrico de Wilcoxon.

**Resultados:** Dos 38 pacientes com fibromialgia juvenil acompanhados em oito anos consecutivos, 13 tinham todas as informações nos prontuários e nas fichas de acupuntura e foram avaliados. Destes 13, sete obtiveram melhora nos três parâmetros analisados (número de pontos dolorosos, EVA de dor e IM). As medianas do número de pontos dolorosos e da EVA de dor foram significativamente maiores antes do tratamento quando comparados ao final do tratamento com as sessões de acupuntura [14 (11-18) *versus* 10 (0-15), $p$=0,005; 6 (2-10) *versus* 3 (0-10), $p$=0,045; respectivamente]. Em contraste, a mediana do IM foi significativamente menor antes do tratamento [3,4 (2,49-4,39) *versus* 4,2 (2,71-5,99), $p$=0,02]. Nenhum dos pacientes com fibromialgia juvenil apresentou eventos adversos associados à acupuntura.

**Conclusões:** Acupuntura é uma modalidade de Medicina Tradicional Chinesa que pode ser utilizada nos pacientes pediátricos com fibromialgia. Futuros estudos controlados serão necessários.

**Palavras-chave:** fibromialgia; adolescente; acupuntura; terapêutica.

**RESUMEN**

**Objetivo:** Describir el uso de acupuntura en adolescentes con fibromialgia juvenil.

**Métodos:** Estudio retrospectivo realizado en pacientes con fibromialgia juvenil (criterios del Colegio Americano de Reumatología) sometidos a al menos 11 sesiones semanales de acupuntura. Las evaluaciones antes y después de la acupuntura incluyeron datos demográficos, características del dolor musculoesquelético, número de puntos dolorosos (NPD), escala visual analógica (EVA) de dolor, algiometría e índice de mialgia (IM). Durante el estudio, los pacientes pudieron usar analgésicos, amitriptilina, y fueron orientados a practicar actividad física aeróbica. Los resultados antes y después de la acupuntura fueron comparados por la prueba no paramétrica de Wilcoxon.

**Resultados:** De los 38 pacientes con fibromialgia juvenil acompañados en ocho años consecutivos, 13 tenían todas las informaciones en los prontuarios y en las fichas de acupuntura y fueron evaluados. De estos 13, siete obtuvieron mejora en los tres parámetros analizados (número de puntos dolorosos, EVA de dolor e IM). Las medianas del número de puntos dolorosos y del EVA de dolor fueron significativamente mayores antes del tratamiento cuando comparados al final del tratamiento con las sesiones de acupuntura [14 (11-18) vs. 10 (0-15), $p$=0,005; 6 (2-10) vs. 3 (0-10), $p$=0,045; respectivamente]. Por otra parte, la mediana del IM fue significativamente menor antes del tratamiento [3,4 (2,49-4,39) vs. 4,2 (2,71-5,99), $p$=0,02]. Ninguno de los pacientes con fibromialgia juvenil presentó eventos adversos asociados a la acupuntura.

**Conclusiones:** Acupuntura es una modalidad de la Medicina Tradicional China que puede ser utilizada en los pacientes pediátricos con fibromialgia. Futuros estudios controlados serán necesarios.

**Palabras clave:** fibromialgia; adolescente; acupuntura; terapéutica.

## Introduction

Juvenile fibromyalgia is a chronic musculoskeletal pain syndrome that affects more females than males and is of unknown etiopathogenesis. The syndrome is characterized by widespread musculoskeletal pain and by the presence of specific points that are tender when touched[1-3]. Prevalence in the pediatric age group ranges from 1.2 to 6.2%[2-6].

Juvenile fibromyalgia is treated with one or more treatments such as physical exercises, psychotherapy, medications and physiatrics[1,6,7] and has rarely been studied in the pediatric population. A recent 12-week pilot study with controls found that children and adolescents with juvenile fibromyalgia suffered less pain after taking part in a program of aerobic exercise[8]. Nevertheless, despite scientific evidence that physical exercises can lead to improvements, it is known that many patients with fibromyalgia cannot tolerate or do not engage in sport.

Another treatment method of relevance to fibromyalgia is acupuncture, as stated in an international consensus on the applications of acupuncture (based on level A and B evidence)[9]. Indeed, adult patients treated with this Traditional Chinese Medicine method exhibit reductions in the number of tender points and improvements in pain scores, when compared with conventional treatments, and these results have been confirmed by a recent systematic review of controlled studies (level A evidence)[10-14]. However, another meta-analysis (level A evidence), which was also conducted recently and assessed the efficacy of acupuncture

for fibromyalgia treatment, did not find evidence that acupuncture provided greater benefits than placebo[15].

At the Instituto da Criança's Pediatric Rheumatology Unit, acupuncture has been used to treat children and adolescents with musculoskeletal syndromes that are not inflammatory or chronic, such as complex regional pain syndrome[16]. To date, however, no studies have been conducted of adolescents with fibromyalgia treated with acupuncture.

Therefore, the objective of this retrospective study is to describe the use of acupuncture with adolescents with juvenile fibromyalgia.

## Method

This was a retrospective study based on analysis of medical records and routine assessment results from acupuncture treatment charts, for children and adolescents with juvenile fibromyalgia. Over an 8-year period, 38 patients aged 10 to 18 were seen with a diagnosis of juvenile fibromyalgia at the Instituto da Criança's Pediatric Rheumatology Unit at the Universidade de São Paulo (USP) Medical Faculty's Hospital das Clínicas. They were referred for acupuncture treatment of juvenile fibromyalgia to the Acupuncture Clinic, which is in the Pain and Palliative Care Unit of the Instituto da Criança at the USP Medical Faculty's Hospital das Clínicas.

Only patients who met the criteria defined by the American College of Rheumatology (ACR) were recruited: a history of chronic (pain lasting more than 3 months) widespread musculoskeletal pain (affecting all regions of the locomotor and axial apparatus) and associated with tenderness to the touch in a minimum of 11 of the 18 specific points. These specific points are considered positive for tenderness if digital palpation with a force of 4kg causes pain and all are assessed bilaterally[17]. The points are as follows: occiput (at the suboccipital muscle insertions), low cervical (bilateral, at the anterior aspects of the intertransverse spaces at C5-C7), trapezius (at the midpoint of the upper border), supraspinatus: (at origins, above the scapula spine near the medial border), second ribs (at the second costochondral junctions), lateral epicondyles of elbows (2cm distal to the epicondyles), gluteal (in upper outer quadrants of buttocks ), greater trochanters (posterior to the trochanteric prominences) and knees (at the medial fat pad proximal to the joint line).

During the study period patients were allowed to take analgesics (paracetamol every 8 hours, if necessary) and were instructed to engage in unsupervised aerobic physical activity. Amitriptyline (25mg/day) was considered for cases in which patients did not improve for 2 consecutive months. None of the patients required psychological care.

The original total of 38 patients with juvenile fibromyalgia was reduced by 23 because of incomplete medical record data and by a further 2 patients who were lost to follow-up when they moved to other states in Brazil. No participants were lost because of intolerance of needles. Seven of the 23 patients whose data were incomplete also had secondary juvenile fibromyalgia: juvenile idiopathic arthritis (n=1), premature puberty (n=1), autoimmune hepatitis (n=1), epilepsy (n=1), Henoch-Schönlein purpura (n=1), adrenal hyperplasia (n=1) and Hashimoto's thyroiditis (n=1). Therefore, 13 patients completed the acupuncture treatment and are analyzed here.

This retrospective study was approved by the Research Ethics Committee at the USP Medical Faculty's Hospital das Clínicas (protocol nº 0519/10).

Patients were treated with due care and consideration and before treatment they received explanations about the acupuncture method, about safety, use of sterile, disposable needles, the need to attend weekly and the likely duration of the treatment. Acupuncture was only initiated if the patients and a guardian both gave written consent.

The acupuncture treatment began by applying from two to four needles at the least painful points, with a progressive increase in needles during the second and third sessions until the pattern of points was totally complete by the fourth session. During the first session, anxious patients were treated with a device developed by Han[18], which makes it possible to stimulate the classic acupuncture points without using needles. This electro-stimulation device has two pairs of adhesive plates through which intermittent electrical currents are passed. The frequency used was 2/100 Hz at an intensity tolerated by the patient and the session lasted 30 minutes.

Acupuncture sessions were conducted by three acupuncturists (MHPD, EA and DTYT), once a week, using a total of 14 points (eight ventral points and six dorsal points)[19] alternating between the ventral pattern 1 week and the dorsal the next.

The following ventral points were used[20]: 1) EX-HN3 – on the forehead, on the medial anterior line at the midpoint between the eyebrows; 2) LI-11 – with the elbow bent, located at the end of the crease, at the midpoint of

a line joining the crease on the radial side of the biceps brachii tendon to the epilateral condyle; 3) TE-6 – on the dorsal side of the forearm and on the line connecting the dorsal crease of the wrist and the tip of the olecranon, 3 *cuns* proximal to the dorsal crease of the wrist, between the ulna and radius; 4) LI-4 – on the dorsal surface of the hand, between the 1st and 2nd metacarpal bones, on the radial border of the mid-point of the 2nd metacarpal bone; 5) CV-12 – on the upper abdomen, along the anterior medial line, four *cuns* above the center of the umbilical scar; 6) ST-36 – on the anterior surface of the lower leg, three *cuns* below the lower edge of the kneecap, 1 *cun* lateral to the anterior crest of the tibia; 7) GB-34 – located on the side of the leg, in a depression anterior and inferior to the head of the fibula; 8) LR-3 – on the top of the foot, in the depression at the posterior end of the joint of the 1st and 2nd metatarsal bones, two *cuns* above the junction of the 1st and 2nd toes. The measurement unit "*cun*" is the width of the patient's thumb.

The following dorsal points were used[20]: 1) B-11 (BL-11) – below the spinous process of the 1st thoracic vertebra, 1.5 *cuns* lateral to the posterior midline; 2) B-15 (BL-15) – below the spinous process of the 5th thoracic vertebra, 1.5 *cuns* lateral to the posterior midline; B-17 (BL-15) – below the spinous process of the 7th thoracic vertebra, 1.5 *cuns* lateral to the posterior midline; 3) B-18 (BL-18) – below the spinous process of the 9th thoracic vertebra, 1.5 *cuns* lateral to the posterior midline; 4) B-20 (BL-20) – below the spinous process of the 11th thoracic vertebra, 1.5 *cuns* lateral to the posterior midline; 5) B-23 (BL-23) – below the spinous process of the 2nd lumbar vertebra, 1.5 *cuns* lateral to the posterior midline.

With the exception of EX-HN3 and CV-12, all of these points were needled bilaterally.

Each patient had at least 11 acupuncture sessions in consecutive weeks. They were assessed for possible adverse events associated with acupuncture, such as: pain, fainting, dizziness, nausea, pallor and diaphoresis, among other possibilities.

Each patient underwent two systematic pain assessments (baseline and final). These assessments covered: demographic data and musculoskeletal pain indicators – number of fibromyalgia points (NFP) by digital pressure, algometry of the same points to calculate a myalgic index (MI) and an analogue visual pain scale (AVPS) with a range from 0 (no pain) to 10 (intense pain – maximum). Algometry was conducted using Fischer's pressure algometer[21]. A myalgic index (MI) was also calculated from the mean algometry results. An increase in MI represents a fall in pain level[13].

The sample was selected by convenience. Data are summarized in tables and graphs showing not only median (range), but also mean and standard deviation for each variable, in order to provide a better illustration of the central tendency and of the dispersion of results, since, for this sample, variables exhibited normal distribution according to the Kolmogorov-Smirnov test. Nevertheless, in view of the small sample size, all of the variables were analyzed using Wilcoxon's nonparametric test for repeated measures with the $\alpha$ significance level set at 0.05. For categorical variables, Fisher's exact test was used with the same significance level.

## Results

Mean and median ages of the 13 patients with juvenile fibromyalgia at the outset of treatment with acupuncture were 13.7±2.5 and 14 (10.4-18) years, respectively. Mean and median total number of acupuncture sessions were 11.5±1.1 and 11 (11-15), respectively. Just one of the 13 adolescents was male. Just two cases required amitriptyline.

Table 1 lists demographic data, pain assessment indicators and total number of acupuncture sessions. It will be observed that these parameters differ across the patient sample. Seven of the 13 patients had improvements in all three parameters analyzed, four had improvements in two parameters and one patient had improvement in one parameter. Just one of the patients deteriorated, with no change to one parameter and deterioration in the other two.

It was also observed that, in this pilot study, although eight patients were still reporting pain in the final week, in seven of these it had improved from generalized to localized pain and only one patient was still complaining of generalized pain.

One noteworthy feature of this study is that the medians for the number of tender points and for AVPS were significantly greater at the start of treatment when compared with after the course of acupuncture treatment (14 [11-18] vs. 10 [0-15], $p$=0.005; 6 [2-10] vs. 3 [0-10], $p$=0.045; respectively). In counterpoint, median MI was significantly lower at the start than at the end of treatment (3.4 [2.49-4.39] vs. 4.2 [2.71-5.99], $p$=0.02) (Table 2). It will also be observed, from Table 2, that symptoms associated with fibromyalgia such as headaches and tiredness exhibited statistically significant differences

**Table 1 -** Demographic data, change in pain assessment indicators and total number of acupuncture sessions for 13 adolescents with juvenile fibromyalgia

| Patients | Age (years) | number of tender points | | myalgic index* | | AVPS** | | total number of sessions |
|---|---|---|---|---|---|---|---|---|
| | | baseline | final | baseline | final | baseline | final | |
| 1 | 14.0 | 14 | 15 | 3.1 | 4.0 | 10 | 1 | 11 |
| 2 | 18.0 | 13 | 14 | 3.5 | 2.7 | 6 | 4 | 11 |
| 3 | 15.4 | 13 | 4 | 3.3 | 5.1 | 6 | 0 | 11 |
| 4 | 13.2 | 15 | 0 | 2.5 | 6.0 | 6 | 0 | 11 |
| 5 | 17.0 | 18 | 10 | 3.5 | 4.2 | 8 | 3 | 11 |
| 6 | 14.0 | 11 | 4 | 4.4 | 5.7 | 4 | 0 | 11 |
| 7 | 11.2 | 11 | 11 | 3.9 | 2.8 | 4 | 6 | 11 |
| 8 | 16.2 | 17 | 13 | 3.4 | 4.6 | 4 | 6 | 12 |
| 9 | 10.4 | 13 | 6 | 3.5 | 4.0 | 9 | 5 | 15 |
| 10 | 10.3 | 18 | 14 | 3.3 | 3.8 | 10 | 0 | 12 |
| 11 | 10.5 | 16 | 2 | 4.2 | 5.1 | 2 | 10 | 11 |
| 12 | 13.3 | 12 | 4 | 3.3 | 4.4 | 6 | 6 | 11 |
| 13 | 15.3 | 15 | 11 | 3.1 | 3.3 | 9 | 0 | 11 |

AVPS: analogue visual pain scale. *Mean for tender points as measured with a Fischer algometer. **Score reported by patient for week prior to assessment.

**Table 2 -** Results of the statistical analysis of change in pain assessment indicators and associated symptoms, from baseline to end of acupuncture treatment, in 13 adolescents with juvenile fibromyalgia

| | Baseline (n=13) | Final (n=13) | *p*-value* |
|---|---|---|---|
| Number of tender points | 14 (11-18) | 10 (0-15) | 0.005 |
| Myalgic index | 3.4 (2.5-4.4) | 4.2 (2.7-6.0) | 0.020 |
| AVPS | 6 (2-10) | 3 (0-10) | 0.045 |
| **Associated symptoms** | **n (%)** | **n (%)** | ***p*-value**** |
| Headache | 13 (100) | 4 (31) | 0.0005 |
| Sleep that does not refresh | 7 (54) | 2 (15) | 0.0890 |
| Tiredness | 12 (92) | 3 (23) | 0.0003 |

Results are expressed as median (range). AVPS: analogue visual pain scale. *Wilcoxon test; **Fisher's test.

when before and after treatment are compared. However, the same was not true of quality of sleep.

After treatment, two patients were free from pain, nine had localized pain and two had widespread pain. None of the patients with fibromyalgia suffered adverse events related to acupuncture.

## Discussion

This retrospective study found evidence that acupuncture was a beneficial treatment for some patients with juvenile fibromyalgia. Furthermore, it was well-tolerated and accepted by the young fibromyalgia patients seen at a tertiary pediatric hospital.

Juvenile fibromyalgia is a common cause of chronic widespread pain in the Brazilian population of children and adolescents. Our team recently assessed 791 well-nourished adolescents in the city of São Paulo and found chronic widespread pain in 4% and fibromyalgia in 1%[2,3]. The syndrome is more prevalent among females, which was also observed in the present study[1-3,5,6].

For the purposes of this study, the fibromyalgia criteria proposed by the ACR for adults were used, since they have previously been used with adolescents with this syndrome[2,3]. Notwithstanding, other systems have been proposed for the pediatric age group[22-24] and some authors have used the Yunus and Masi criteria[22]. In this study two different reliable methods of assessing fibromyalgia were employed:

the analogue visual pain scale and the MI based on Fisher algometry. Both are routinely used both in pediatric studies[23,24] and in research into adults[13] with this chronic pain syndrome.

Patients with fibromyalgia very often suffer from pain of moderate to strong intensity, reducing their health-related quality of life, and that of their relatives, and possibly causing absenteeism from school[25]. The patients in this study all had elevated results for the pain indicators (high NFP, low MI and high AVPS score), which underscores their need for prompt treatment.

Treatment for fibromyalgia includes medications (analgesics and antidepressants), psychotherapy, scaled aerobic exercises and acupuncture[26]. The medications offer a modest and short-lasting benefit and psychotherapy (combined with other treatments) has moderate efficacy over the medium and long terms[26,27]. Additionally, education of the family and the adolescent and interventions that reduce pain and stress and improve the quality of sleep are of fundamental importance[26-27]. None of the patients in this study required referral to a psychologist.

To date, routine and unsupervised aerobic exercise has proven the best treatment option for juvenile fibromyalgia[7,8]. However, adolescents with fibromyalgia may have low rates of compliance with physical exercise regimes and so need to be supervised and stimulated daily, as was shown recently in a study of chronic cervical and lumbar pain[27].

In the retrospective study described here, the children and adolescents had good compliance with the acupuncture treatment and suffered no significant adverse events, indicating that acupuncture can be combined with the other treatments for juvenile fibromyalgia. The Instituto da Criança is a pioneer in this movement and has been using acupuncture for 14 years consecutively, including to treat patients with chronic musculoskeletal incapacitating and intense pain due to other etiologies[16].

Even so, the efficacy of acupuncture and the number of sessions needed when treating adults with fibromyalgia are still under debate. A controlled study[11] and a meta-analysis demonstrated improvements over placebo[14]; but another meta-analysis – which included analysis of true acupuncture, sham acupuncture (acupuncture with needling to a minimal depth) and electroacupuncture – found no benefit from its use[15]. Acupuncture appears to improve health-related quality of life in adults with fibromyalgia, as shown in a randomized study conducted at the USP Medical Faculty[13]. Nevertheless, new studies with significantly larger populations of cases and uniform methodology are still required.

Another relevant feature of acupuncture is that many patients feel a sensation of relaxation like mild drowsiness during and/or after the sessions, which undoubtedly improves compliance with the treatment. Subjectively, they also form relationships with the acupuncturists involving closeness and wellbeing. However, since this was a retrospective study, no attempt was made to ensure that there was only one treating physician and a total of three physicians divided the work between them.

It is possible that some of the patients were still experiencing a certain degree of pain because a moderate number of acupuncture sessions were administered (11 sessions). Indeed, Targino *et al*[13]. found evidence of greater efficacy after 20 sessions. Another relevant factor is that efficacy may be increased by using two sessions per week, as has been observed in the past with adults with fibromyalgia[13].

One criticism to which this study is open is that it is based on retrospective analysis of a small population of patients with juvenile fibromyalgia from which many subjects were excluded. Additionally, neither compliance with other treatments (such as physical exercise) nor health-related quality of life of patients and their families were systematically analyzed. A randomized study is currently being conducted of acupuncture for juvenile fibromyalgia at three pediatric rheumatology centers in the city of São Paulo and includes a control group and a wide-ranging assessment of pain and of health-related quality of life.

Acupuncture is therefore a method from Traditional Chinese Medicine that can be used as a treatment option for pediatric patients with fibromyalgia. Further studies are needed with large patient populations and control groups.

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## References


1. Buskila D. Pediatric fibromyalgia. Rheum Dis Clin North Am 2009;35:253-61.
2. Zapata AL, Moraes AJ, Leone C, Doria-Filho U, Silva CA. Pain and musculoskeletal pain syndromes in adolescents. J Adolesc Health 2006;38:769-71.
3. Zapata AL, Moraes AJ, Leone C, Doria-Filho U, Silva CA. Pain and musculoskeletal pain syndromes related to computer and video game use in adolescents. Eur J Pediatr 2006;165:408-14.
4. Buskila D, Press J, Gedalia A, Klein M, Neumann L, Boehm R *et al*. Assessment of nonarticular tenderness and prevalence of fibromyalgia in children. J Rheumatol 1993;20:368-70.
5. Mikkelsson M. One year outcome of preadolescents with fibromyalgia. J Rheumatol 1999;26:674-82.
6. Baldursdóttir S. Juvenile primary fibromyalgia syndrome – review. Laeknabladid 2008;94:463-72.
7. Gualano B, Sá Pinto AL, Perondi B, Leite Prado DM, Omori C, Almeida RT *et al*. Evidence for prescribing exercise as treatment in pediatric rheumatic diseases. Autoimmun Rev 2010;9:569-73.
8. Stephens S, Feldman BM, Bradley N, Schneiderman J, Wright V, Singh-Grewal D *et al*. Feasibility and effectiveness of an aerobic exercise program in children with fibromyalgia: results of a randomized controlled pilot trial. Arthritis Rheum 2008;59:1399-406.
9. Autoria não referida. NIH Consensus Conference. Acupuncture. JAMA 1998;280:1518-24.
10. Harris RE, Tian X, Williams DA, Tian TX, Cupps TR, Petzke F *et al*. Treatment of fibromyalgia with formula acupuncture: investigation of needle placement, needle stimulation, and treatment frequency. J Altern Complement Med 2005;11:663-71.
11. Martin DP, Sletten CD, Williams BA, Berger IH. Improvement in fibromyalgia symptoms with acupuncture: results of a randomized controlled trial. Mayo Clin Proc 2006;81:749-57.
12. Lundeberg T, Lund I. Are reviews based on sham acupuncture procedures in fibromyalgia syndrome (FMS) valid? Acupunct Med 2007;25:100-6.
13. Targino RA, Imamura M, Kaziyama HH, Souza LP, Hsing WT, Furlan AD *et al*. A randomized controlled trial of acupuncture added to usual treatment for fibromyalgia. J Rehabil Med 2008;40:582-8.
14. Cao H, Liu J, Lewith GT. Traditional Chinese Medicine for treatment of fibromyalgia: a systematic review of randomized controlled trials. J Altern Complement Med 2010;16:397-409.
15. Martin-Sanchez E, Torralba E, Díaz-Domínguez E, Barriga A, Martin JL. Efficacy of acupuncture for the treatment of fibromyalgia: systematic review and meta-analysis of randomized trials. Open Rheumatol J 2009;3:25-9.
16. Lotito AP, Campos LM, Dias MH, Silva CA. Reflex sympathetic dystrophy. J Pediatr (Rio J) 2004;80:159-62.
17. Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL *et al*. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Report of the Multicenter Criteria Committee. Arthritis Rheum 1990;33:160-72.
18. Han JS. Acupuncture: neuropeptide release produced by electrical stimulation of different frequencies. Trends Neurosci 2003;26:17-22.
19. World Health Organization. A proposed standard international acupuncture nomenclature: Report of a Who Scientific Group. Geneva: WHO; 1991.
20. Liu G (ed). Tratado contemporâneo de acupuntura e moxibustão. São Paulo: Roca; 2004.
21. Fischer AA. Pressure threshold meter: its use for quantification of tender spots. Arch Phys Med Rehabil 1986;67:836-8.
22. Yunus MB, Masi AT. Juvenile primary fibromyalgia syndrome. A clinical study of thirty-three patients and matched normal controls. Arthritis Rheum 1985;28:138-45.
23. Kashikar-Zuck S, Flowers SR, Verkamp E, Ting TV, Lynch-Jordan AM, Graham TB *et al*. Actigraphy-based physical activity monitoring in adolescents with juvenile primary fibromyalgia syndrome. J Pain 2010;11:885-93.
24. Kashikar-Zuck S, Johnston M, Ting TV, Graham BT, Lynch-Jordan AM, Verkamp E *et al*. Relationship between school absenteeism and depressive symptoms among adolescents with juvenile fibromyalgia. J Pediatr Psychol 2010;35:996-1004.
25. Liphaus BL, Campos LM, Silva CA, Kiss MH. Fibromyalgia syndrome in children and adolescents clinical features of 34 cases. Rev Bras Reumatol 2001;41:71-4.
26. Silva CA. Fibromialgia. In: Espada G, Malagón C, Rosé CD, editors. Manual práctico de reumatologia pediátrica. Bueno Aires: Nobuko; 2005. p. 367-73.
27. Medina-Mirapeix F, Escolar-Reina P, Gascón-Cánovas JJ, Montilla-Herrador J, Jimeno-Serrano FJ, Collins SM. Predictive factors of adherence to frequency and duration components in home exercise programs for neck and low back pain: an observational study. BMC Musculoskelet Disord 2009;10:155.