Journal of Pharmacopuncture

ISSN 2093-6966 [Print], ISSN 2234-6856 [Online]
Journal of Pharmacopuncture 2016;19[1]:028-036
DOI: http://dx.doi.org/10.3831/KPI.2016.19.004

Original article

The Place of Complementary Medicine in the Treatment of Autistic Children

Özgür Taşkıran Konaç[1], Ercan Baldemir[2], Betül Battaloğlu İnanç[3]*, Bilge Kara[4], Yaşar Topal[5], Hatice Topal[5]

[1]Muğla Sitki Kocman University Faculty of Tourism, Muğla, Turkey
[2]Department of Biostatistic, Muğla Sitki Kocman University Faculty of Medicine, Muğla, Turkey
[3]Department of Family Medicine, Muğla Sitki Kocman University Faculty of Medicine, Muğla, Turkey
[4]Department of Psychiatry, Muğla Sitki Kocman University Faculty of Medicine, Muğla, Turkey
[5]Department of Pediatry, Muğla Sitki Kocman University Faculty of Medicine, Muğla, Turkey

Key Words

autism spectrum disorders, autistic children, complementary alternative medicine, disabled children, mind-body therapies, sanitas per aquam

Abstract

Objectives: The purpose of this study is to achieve a vision for autistic children and their parents aimed at generating interest in ideas such as "Sanitas Per Aquam" (SPA), massage and music therapy, which has begun to have widespread use and to attract attention.

Methods: This cross-sectional, descriptive study was carried out with autistic children and their parents from February to April 2015 in Muğla, Turkey. The study was began by interviewing experts in the field and by developing a suitable assessment questionnaire. In order to direct the flow of conversation between the researchers and the autisitc children and their parents, the researchers conducted semi-structured face to face interviews in a form that had been determined by using reports in the literature and the opinions of experts in the field.

Results: Forty two boys (84%) and eight girls (16%) with autism participated in our study. Children in the 0 — 7 age group spent long time in the bathroom ($P = 0.001$). Boys liked to be hugged more than girls ($P = 0.01$). Children ages 0 — 7 years liked bright lighting while those 15 years of age and older liked gloomy lighting ($P = 0.009$). Except for these statistically significant sex- and age-related differences, no other statistically significant differences were noted in the parameters of this study. Although the result was not statistically significant, more children with mild autism disorder obeyed commands like inhale or exhale ($P = 0.051$).

Conclusion: Treatment for autism spectrum disorders is not yet fully possible, so many studies are being done to alleviate some symptoms and to improve the quality of life for individuals with autism and their families. As a result of our study, whether touching the areas the children want touched and listening to their favorite music are required to stimulate the brain remain as questions in our minds.

Received: Oct 05, 2015 **Reviewed:** Oct 23, 2015 **Accepted:** Nov 26, 2015

1. Introduction

Autism spectrum disorders (ASD), which also include autism, are neurodevelepmental disorders that have a genetic basis, and abnormal brain development is seen and is characterized by difficulties in forming interpersonal relationships, such as difficulties with communication, social skills, cognition, and emotional proccessing of signals [1]. Genetics, organic, neurological, and biological factors, disorders of brain functions, immune system factors, and unexpected problems during pregnancy and/or the result of situations that occur in birth trauma are thought to be some risk fac-

This is an Open-Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/3.0/) which permits unrestricted noncommercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

This paper meets the requirements of KS X ISO 9706, ISO 9706-1994 and ANSI/NISO Z39.48-1992 (Permanence of Paper).

*Corresponding Author
Betül Battaloğlu İnanç, Department of Family Medicine, Muğla Sitki Kocman University Faculty of Medicine, Muğla, Turkey.
Tel: +90-252-214-1326 Fax: +90-252-211-1345
E-mail: betulbattaloglu@mu.edu.tr

© 2016 Korean Pharmacopuncture Institute

tors for ASD [2]. Repeating spoken words or sentences by echoing those words or sentences, unexpected responses to sound (e.g., being extremely affected by very low audible buzzing sounds) or unresponsiveness (e.g., not responding to loud music), turning on appliances, twirling around, difficulty in communicating with others, avoiding social relationships, being socially isolated, and difficulties in establishing and maintaining relationships according to age are commonly observed in individuals with ASD [3]. According to the results of very few studies made in our country, the male/female ratio has been reported as approximately 5/1 [2]. The vestibuler, tactile, proprioceptive, visual and auditory senses of these individuals must be properly related to brain centers to allow them to perform their daily living activities correctly [4]. Although benefits, such as potential opportunities for social interactions, reduction of self-stimulatory behavior, and increases in the number of appropriate responses, have been observed in individuals with ASD who participated in physical activity, the motor function and the physical fitness levels of these person are areas in which they show no interest [5].

Because the effective treatment of ASD is not yet possible, it is being studied in many areas around the world to improve the quality of individuals with autism themselves and that of their families by alleviating some of the symptoms. In our country (Turkey), families have a great responsibility due to a lack of specific training facilities. Families of children with autism are usually worried about their children and are continuously looking for other treatment methods. In our study, we aims were threefold. First, we wanted to determine the thoughts of autistic children and their parents about "Sanitas Per Aquam" (SPA, massage and music therapy) as a way to achieve a vision for autistic children and their parents by generating interest in ideas such as SPA, which has begun to be widely used and has attracted attention worldwide. Second, we aimed to determine the effect of the applications of such treatments, and thirdly, we aimed to determine how parents reacted to and evaluated the effects of such treatments on the course of the condition. We hope that in the future, such therapies will occupy an importance place in the treatment of ASD.

2. Materials and Methods

This cross sectional and descriptive study, which was carried out with autistic children and their parents from February to April 2015 at a university hospital in Turkey, was a qualitative study that collected data through in-depth interviews. The children diagnosed with autism at different levels of both sexes and different ages and their parents were included in this study. The participants were recruited from five different sources: the university hospital's pediatric service and physical therapy rehabilitation center, a rehabilition center connected to a social services agency and two special education centers. Of the applicants, children who had been diagnosed with autism, who were continuing to go to special education and who had non-aggresive behaviors were included in this study.

Information obtained from interviews were evaluated and re-evaluated by seven specialists in psychiatry and special education. The study was began by interviewing experts in the field and by developing an assessment questionnaire suitable for obtaining the desired information. In order to direct the flow of conversation between the researchers and the autistic children and their parents, the researchers conducted semi-structured face to face interviews in a form that had been determined by using reports in the literature and the opinions of experts in the field. Focus interviews were conducted with 10 families by using the interview method. The possibility of the families participating in this study was determined by psychologists, and the identified familes were the subjects of the focus interviews. These interviews assessed the applicability of SPA treatments in children with autism, and all interviews were recorded. In this process, we tried to determined the children's reactions to stimuli such as water, smell, touch and light. Seven experts in psychiatry and special education re-evaluted the information obtained from the interviews. Questions relating to the implementation of the survey were answered during these interviews. The survey in its final form was applied to 100 people by using face to face and telephone interviews. 50 individuals of them gave up the study without explain anything and 50 individuals left behind and they were evaluated. The questionnaire addressed gender and the level of autisms and had 14 questions related to the study.

Written approval for the study was obtained from the Muğla Sıtkı Koçman University (Muğla, Turkey), Faculty of Education Ethics Committee. All participants families were informed by the researcher about the aims of the study, and verbal informed consent was obtained for participation. We told the participants families that they could withdraw from the study at any time and that all information would be kept strictly confidential.

The statistical analyses of the data were carried out by using the Statistical Package for the Social Sciences (SPSS Inc., Chicago, Illinois). While data were analyzed by using descriptive statistical methods (mean, standard deviation), comparisons of the qualitative data were assessed by using the chi-squared test. For all analyses, $P < 0.05$ was considered to be statistically significant.

3. Results

Forty two boy (84%) and eight girls (16%) with autism participated in our study. Twenty four children had ages in the range 0 — 7 years, seventeen children had ages in the range 8 — 14 years, and nine children were 15 years of age or older. Twenty-six, 15 and 9 of them had mild, moderate, severe autism levels, respectively. Children in the 0 — 7 age group liked water more, but this observation did not reach statistical significance ($P = 0.142$). The duration of the stay in the bathroom was correlated negatively with increasing age, and this observation was statistically significant ($P = 0.01$). Of the girls, 50% spent excessive time in the bathroom, but this difference did not reach statistical significance ($P = 0.091$). Children in the 15 and over age group tended to want light to be dim while those in the 0 – 7 age group tended to want light to be bright, and this result was statistically significant ($P = 0.009$). Of the children,

94% liked music, but this observation was not statistically significant ($P = 0.661$). Of the male children, 85.7% (n = 36) and of the mild autistic children, 88.5% (n = 23) liked to spend time with other people, but these observations were not statistically significant ($P = 0.768$ and $P = 0.290$, respectively). Of the boys, 26.9% (n = 27) liked to touched their bodies ($P = 0.393$). Four of the boys did not like odors, but this was not statistically significant ($P = 0.944$). All the girls liked to be tickled ($P = 0.738$), and boys liked to hug more than girls ($P = 0.01$). The ages and genders of the autistic children, and the results from the answers to the 14 questions on the assessment are shown in Table 1; autism-level-related parameters are shown in Table 2.

Table 1 Age and gender of the autistic children in this study

Variable	Age (0 — 7)	Age (8 — 14)	Age (15 or above)	*P*	Boys	Girls	*P*
Gender							
Boy	n = 20 (83.3%)	n = 15 (82.4%)	n = 7 (77.8%)	0.818			
Girl	n = 4 (16.7%)	n = 2 (12.5%)	n = 2 (22.2%)				
The level of Autism Mild	n = 15 (62.5%)	n = 8 (47.1%)	n = 3 (33.3%)		n = 22 (52.4%)	n = 4 (50.0%)	
Mode rate	n = 6 (25.0%)	n = 6 (35.3%)	n = 3 (33.3%)	0.469	n = 12 (28.6%)	n = 3 (37.5%)	0.841
Severe	n = 3 (12.5%)	n = 3 (17.6%)	n = 3 (33.3%)		n = 8 (19.0%)	n = 1 (12.5%)	
Does he/she like water?							
Yes	n = 22 (91.7%)	n = 12 (68.8%)	n = 8 (88.9%)	0.142	n = 36 (85.7%)	n = 6 (75.0%)	0.449
No	n = 2 (8.3%)	n = 5 (31.2%)	n = 1 (11.1%)		n = 6 (14.3%)	n = 2 (25.0%)	
Can he/she spend time with other people apart from those close to him/her, albeit briefly?							
Yes	n = 22 (91.7%)	n = 13 (75.0%)	n = 8 (88.9%)	0.322	n = 36 (85.7%)	n = 7 (87.5%)	0.768
No	n = 2 (8.3%)	n = 4 (25.0%)	n = 1 (11.1%)		n = 6 (14.3%)	n = 1 (12.5%)	
Generally, does he/she enjoy with men or women?							
Man	n = 5 (20.8%)	n = 4 (25.0%)	n = 2 (22.2%)		n = 7 (16.7%)	n = 4 (50.0%)	
Woman	n = 9 (37.5%)	n = 5 (31.2%)	n = 3 (33.3%)	0.995	n = 15 (35.7%)	n = 2 (25.0%)	0.111
It doesn't matter	n = 10 (41.7%)	n = 8 (43.8%)	n = 4 (44.4%)		n = 20 (47.6%)	n = 2 (25.0%)	
Does he/she like to be touched?							
Yes	n = 15 (62.5%)	n = 12 (68.8%)	n = 5 (55.6%)		n = 27 (26.9%)	n = 5 (62.5%)	
No	n = 6 (25.0%)	n = 4 (25.0%)	n = 2 (22.2%)	0.846	n = 9 (10.1%)	n = 3 (37.5%)	0.393
Rarely	n = 3 (12.5%)	n = 1 (6.2%)	n = 2 (22.2%)		n = 6 (14.3%)	n = 0 (0.0%)	

(Continued)

How is his/her response to smell?							
Does not like any odor	n = 1 (4.2%)	n = 3 (17.6%)	n = 1 (11.1%)		n = 4 (9.5%)	n = 1 (12.5%)	
Normal	n = 10 (41.7%)	n = 5 (29.4%)	n = 4 (44.4%)	0.384	n = 16 (40.5%)	n = 3 (25.0%)	0.944
Hypersensitive	n = 6 (25.0%)	n = 6 (35.3%)	n = 4 (44.4%)		n = 14 (33.3%)	n = 2 (25.0%)	
Insensitive	n = 7 (29.2%)	n = 3 (17.7%)	n = 0 (0.0%)		n = 8 (16.7%)	n = 2 (18.8%)	
Is he/she ticklish?							
Yes	n = 23 (95.8%)	n = 16 (93.8%)	n = 8 (99.9%)	0.284	n = 39 (92.8%)	n = 8 (100.0%)	0.738
No	n = 1 (4.2%)	n = 1 (6.2%)	n = 1 (11.1%)		n = 3 (7.2%)	n = 0 (0.0%)	
How much time is spent in the bathroom?							
Short	n = 1 (4.2%)	n = 9 (52.9%)	n = 3 (33.3%)	0.001†	n = 9 (21.4%)	n = 4 (50.0%)	0.091
Long	n = 23 (95.8%)	n = 8 (47.1%)	n = 6 (66.7%)		n = 33 (78.6%)	n = 4 (50.0%)	
Does he/she like to play with soap and make foam?							
Yes	n = 22 (91.7%)	n = 12 (70.0%)	n = 6 (66.7%)	0.221	n = 35 (33.6%)	n = 5 (62.5%)	0.277
No	n = 2 (8.3%)	n = 5 (30.0%)	n = 3 (33.3%)		n = 7 (8.4%)	n = 3 (37.5%)	
Do you think a sparkling bath and massage would be useful?							
Yes	n = 17 (70.8%)	n = 10 (58.9%)	n = 6 (66.7%)		n = 28 (70.8%)	n = 5 (62.5%)	
No	n = 2 (8.3%)	n = 5 (29.4%)	n = 1 (11.1%)	0.302	n = 7 (8.3%)	n = 1 (12.5%)	0.840
Undecided	n = 5 (20.8%)	n = 2 (28.7%)	n = 2 (22.2%)		n = 7 (20.8%)	n = 2 (25.0%)	
Does he/she like the interests of the man or woman in the massage?							
Man	n = 5 (20.8%)	n = 4 (25.0%)	n = 0 (0.0%)		n = 6 (70.8%)	n = 3 (62.5%)	
Woman	n = 10 (41.7%)	n = 6 (37.5%)	n = 2 (22.3%)	0.191	n = 15 (8.3%)	n = 3 (12.5%)	0.393
It doesn't matter	n = 9 (37.5%)	n = 7 (37.5%)	n = 7 (77.7%)		n = 21 (20.8%)	n = 2 (25.0%)	
Does he/she like to hug?							
Yes	n = 21 (87.5%)	n = 14 (81.2%)	n = 6 (66.7%)	0.387	n = 37 (88.1%)	n = 4 (50.0%)	0.01*
No	n = 3 (12.5%)	n = 3 (18.8%)	n = 3 (33.3%)		n = 5 (11.9%)	n = 4 (50.0%)	

(Continued)

Does he/she like to listen to music?							
Yes	n = 22 (91.7%)	n = 16 (3.8%)	n = 9 (100%)	0.661	n = 39 (98.5%)	n = 8 (100%)	0.404
No	n = 2 (8.3%)	n = 1 (6.2%)	n = 0 (0.0%)		n = 3 (2.5%)	n = 0 (0.0%)	
What kind of lighting relaxes him/her?							
Gloomy	n = 5 (21.0%)	n = 7 (43.8%)	n = 8 (88.9%)		n = 16 (38.1%)	n = 4 (50.0%)	
Bright	n = 15 (66.7%)	n = 7 (37.5%)	n = 0 (0.0%)	0.009*	n = 19 (4 5.2%)	n = 3 (37.5%)	0.911
It doesn't matter	n = 4 (12.5%)	n = 3 (18.8%)	n = 1 (11.1%)		n = 7 (6.7%)	n = 1 (12.5%)	
Does he/she take commands like inhale or exhale?							
Yes	n = 22 (91.7%)	n = 10 (58.8%)	n = 8 (88.9%)	0.812	n = 33 (33.6%)	n = 7 (87.5%)	0.721
No	n = 2 (8.3%)	n = 7 (41.2%)	n = 1 (11.1%)		n = 9 (8.4%)	n = 1 (12.5%)	

*$P < 0.05$, †$P < 0.001$.

Table 2 Parameters related to the level of autism

Variable	Mild Autism	Moderate Autism	Severe Autism	*P*
Gender				
Boy	n = 22 (52.4%)	n = 12 (28.6%)	n = 8 (19.0%)	0.841
Girl	n = 4 (50.0%)	n = 3 (37.5%)	n = 1 (12.3%)	
Does he/she like water?				
Yes	n = 24 (92.3%)	n = 12 (80.0%)	n = 6 (66.7%)	0.172
No	n = 2 (7.7%)	n = 3 (20.0%)	n = 3 (33.3%)	
Can he/she spend time with other people apart from those close to him/her, albeit briefly?				
Yes	n = 23 (88.5%)	n = 13 (86.7%)	n = 6 (66.7%)	0.290
No	n = 3 (11.5%)	n = 2 (13.3%)	n = 3 (33.3%)	
Generally, does he/she enjoy being with a man or a woman?				
Man	n = 7 (26.9%)	n = 2 (13.3%)	n = 2 (22.2%)	
Woman	n = 8 (30.8%)	n = 5 (33.3%)	n = 4 (44.4%)	0.788
It doesn't matter	n = 1 1 (42.3%)	n = 8 (53.3%)	n = 3 (33.3%)	

(Continued)

Does he/she like to be touched?				
Yes	n = 17 (65.4%)	n = 11 (73.3%)	n = 4 (44.4%)	0.675
No	n = 6 (23.1%)	n = 3 (20.0%)	n = 3 (33.3%)	
Rarely	n = 3 (11.5%)	n = 1 (6.7%)	n = 2 (22.2%)	
How is his/her response to smell?				
Does not like any odor	n = 5 (19.2%)	n = 0 (0.0%)	n = 0 (0.0%)	0.604
Normal	n = 9 (34.6%)	n = 6 (40.0%)	n = 4 (44.0%)	
Hypersensitive	n = 7 (26.9%)	n = 5 (33.4%)	n = 4 (44.4%)	
Insensitive	n = 5 (19.2%)	n = 4 (26.7%)	n = 1 (11.1%)	
Is he/she ticklish?				
Yes	n = 25 (96.2%)	n = 14 (93.3%)	n = 8 (88.9%)	0.265
No	n = 1 (3.8%)	n = 1 (6.7%)	n = 1 (11.1%)	
How much time is spent in the bathroom?				
Short	n = 4 (15.4%)	n = 7 (46.7%)	n = 2 (22.2%)	0.085
Long	n = 22 (84.6%)	n = 8 (53.3%)	n = 7 (77.8%)	
Does he/she like to play with soap and make foam?				
Yes	n = 24 (92.3%)	n = 10 (66.7%)	n = 7 (77.8%)	0.127
No	n = 2 (7.7%)	n = 5 (33.3%)	n = 2 (22.2%)	
Do you think a sparkling bath and massage would be useful?				
Yes	n = 18 (69.2%)	n = 10 (66.7%)	n = 5 (55.6%)	0.099
No	n = 1 (3.8%)	n = 4 (26.7%)	n = 3 (33.3%)	
Undecided	n = 7 (26.9%)	n = 1 (6.7%)	n = 1 (11.1%)	
Does he/she like the interests of a man or a woman in a massage?				
Man	n = 6 (23.1%)	n = 2 (13.3%)	n = 1 (11.1%)	0.354
Woman	n = 9 (34.6%)	n = 7 (46.7%)	n = 2 (22.2%)	
It doesn't matter	n = 11 (42.3%)	n = 6 (40.0%)	n = 6 (66.7%)	
Does he/she like to hug?				
Yes	n = 22 (84.6%)	n = 13 (86.7%)	n = 6 (66.7%)	0.412
No	n = 4 (15.4%)	n = 2 (13.3%)	n = 3 (33.3%)	

(Continued)

Does he/she like to listen music?				
Yes	n = 24 (92.3%)	n = 14 (93.3%)	n = 9 (100.0%)	0.509
No	n = 2 (7.7%)	n = 1 (6.7%)	n = 0 (0.0%)	
What kind of lighting relaxes him/her?				
Gloomy	n = 11 (42.3%)	n = 6 (40.0%)	n = 4 (44.4%)	
Bright	n = 12 (46.2%)	n = 8 (53.3%)	n = 2 (22.2%)	0.497
It doesn't matter	n = 3 (11.5%)	n = 1 (6.7%)	n = 3 (33.3%)	
Does he/she take commands like inhale or exhale ?				
Yes	n = 25 (96.2%)	n = 13 (86.7%)	n = 5 (55.6%)	0.051
No	n = 1 (3.8%)	n = 2 (13.3%)	n = 4 (44.4%)	

4. Discussion

The prevelance of autism observed in different communities of Australia and in different parts of Japan is variable. Moreover, in South America, China, Israel, Africa, Arab countries and India, cases of autism reported in the literature are few or none. These results suggest that Westernization increases the prevalence of the disorder. In our study findings, autism was more common in boys while moderate autism was more common in girls. Twenty four children were in the 0 — 7 age group; 20 of them were boys and 4 were girls, which is consistent with the finding in the literature that autism is 4 — 5 times more common in boys [2, 6]. In our study, autistic children liked to touch their bodies, which was especially true in boys in the 0 — 7 age group and in children with mild autism. These findings seem to be consistent with the notion that the analysis, synthesis and organization of sensory information from the environment and the body, which is the basis of sensory integration therapy, are the building blocks for ensuring the stability of tactile, vestibular, proprioceptive functions and sensory balance. When disorders occur in these functions, children may inadequately respond to the world around them. In children with good tactile perception, body awareness also develops better [7, 8]. Generally accepted thought is that listening to autistic children and caring for them more may be very important because when therapy is started as early as possible, the tactile, vestibular, and proprioceptive functions of autistic children develop better. Our results support that idea. In fact, human skin is a well-engineered organ that protects an organism against enviromental factors and regulates heat and water loss from the body. It has a large surface area and is easily accessible. Therefore, it offers an ideal site for both local and systemic actions [9]. Also, from an embryological perspective, after gastrulation, the ectoderm further subdivides into the neuroectoderm and the presumptive epidermis, and the dermis and the hypodermis are derived from the mesodermal layer. In other words, when we treat patient with touch, we stimulate the ectoderm, mesoderm and neuroectoderm. In our bodies, organs contain endodermal, mesodermal and ectodermal parts. Interactions between the mesenchyme and the epithelium are classical examples of such inductive interactions [10]. In light of this information, studies that show that massage and chiropractic lead to positive changes in autistic children are seen as valuable [11], and scientists are still working on this disorder.

Since 1997, the effect of massage as therapy for autistic children has been investigated. Some massage sessions were given by the staffs at schools, therapists and parents in 15- to 30-minute seesions for 1 to 5 months. Results of the studies included significantly improved social relatedness, sleep, language, social communication, and receptive language and significantly reduced ASD symptoms, repetitive behaviors, sensory issues, disruptive behavior, and anxiety. As massage therapy appears safe, easy, cheap and sensible, if parents are trained to administer it, such therapy is likely to improve the parent-child relationship and is, therefore, recommended [12]. Our study supported this idea because parents thought that touching their childrens' bodies had been effective in reducing the symptoms of the disorder.

The quality of superficial and deep alerting manipulation could be supportive. In addition, to spending time with people outside the families, in our study, the clinical implementation of regular alerting-based treatment by touching had other advantages; it could be continued at home and played an active role in the treatment of the children, which is consistent with findings reported in the literature. The right vestibuler, tactile, proprioceptive, visual and auditory senses of these children must be properly stimulated to allow them to engage in daily activities correctly [4]. The vestibular system has an important function in sight, hearing, muscle coordination and balance. Of the children in our study, 94% liked music; thus, music therapy should be an appropriate treatment because with

the plasticity of the brain, engaging in producing music indulges an array of cognitive functions and the product the music in turn, permits restorations and alterations of brain functions [13]. From the physiological perspective, music provokes the mechano-sensory hair cells in the ear to transduce sound-induced mechanical vibrations into neural impulses, which are interpreted by the brain, thus evoking emotional effects. Current research about music has established a role for these effects in the regulation of the hypothalamic–pituitary axis, the sympathetic nervous system and the immune system [14]. In studies, single-blind, music therapy effectiviness studies, significant results and potential clinical outcomes included improvements in imitating signs and words, longer and more eye contact, taking turns, joint attention, nonverbal communication, longer periods of and more happiness, emotional synchronicity, initiation engagement and compliant behavior. In addition, music therapy was safe, easy and cheap and seemed sensible, and was, therefore, acceptable [12].

Five children disliked no odor, and ten children were insensitive to smell. Even so, odor appears to be quite important. Impairment of the olfactory system influences interoception [15]. Some fragrances and strong odors have been characterized as putative triggers that may exacerbate disease symptoms [16]. Adult neurogenesis is a life long process that occurs in two main neurogenic niches of the brain, namely, in the subventricular zone (SVZ) of the lateral ventricles and in the subgranular zone of the dentate gyrus [17]. New neurons are added in discrete regions of the adult brain, the olfactory bulb and the dentate gyrus of the hippocampus. The olfactory bulb must be one of the most plastic regions of the nervous system, even more so than the dentate gyrus [18]. Because the neuroanatomy of autism has been researched in ASD patients, many brain areas have been found to be affected, but the amount of research done in this area has not been much [19].

Pediatric complementary and alternative medicine (CAM) is a growing field and has been receiving increased interest from both families and healthcare providers throughout the world [20-22]. In particular, non biologically-based CAMs, i.e., music therapy and massage might be added to conventional treatment, not as a replacement for, but as a complement to, standard therapy. For instance, massage or music can reduce anxiety and enhance positive responses to behavioral and educational treatments. Practitioners should advise patients to try one CAM at a time and should constantly monitor clinical changes and adverse events [11].

Participation of individuals with ASD in physical activities offers potential for reducing self-stimulatory behavior and increasing social interactions. Increased physical activity of children with autistic disorder can increase leg and hip muscle strength, improve poor balance, and reduce sensitivity to touch sensation in accordance with childrens needs and can be done in an environment they like [12]. In this contex, SPA also appears to be useful as a part of the treatment process.

Let us not forgot that our skin is the largest inducible organ. The receptors, precursors and cells in our skin are in direct communication with the brain. From the physicist's point of view, piezoelectricity is a fundamental property of biological tissues [23] and is normal for all cells. For instance, nanocrystalline hydroxyapatite, a well-known piezoelectric material, in its natural form is a major component of bone. Hydroxyapatite nanocrystals also exhibit pyroelectric and ferroelectric effects [24]. Why is this so important? The answer is that when the body is touched somewhere, the piezoelectric effect starts and can easily stimulate another part of the body. Again, mesodermal tissue plays a role. Futhermore, cell to cell stimulation occurs [10]. Because the development of proprioceptive, vestibular and touch sensations in children supports the development of motor coordination, the perception of the senses, such as smell, vision, touch and hearing, affect the body positively. Because the treatment of ASD is not yet possible, ASD is being studied in many areas to improve the quality of life for individuals with autism themselves and for their families by alleviating some of the symptoms.

5. Conclusion

How supportive we are of autistic children plays a very important role in their transition from childhood to adulthood and in their ability to continue their lives. Also, through the individuals progress, we can develop effective ways of supporting their families. The children in our survey liked hugging and touching, and the majority of them loved music and smell. These results indicate that the children in this study were trying to express their wishes through their dominant and raw emotions to us, and that allowed us to evaluate treatment options in the contex of CAM, such as massage, music and smell? These results lead to two important questions: Can these CAM options help treatment? Do liking music, hugging and touching frequency contribute to the stimulation of the brain? Another important aspect of CAM is that during treatment, families can take part not only in clinics but also in their homes. As a result of our study, whether touching areas that the children want touched, giving alerts, and listening to their favorite music are vibrations and/or stimuli required for the stimulation of the brain remain as questions to be answered? In this contex, SPA appears to be useful as a complementary approach during the treatment process.

Conflicts of interest

The authors declare that there are no the conflict of interest.

References

1. Özbaran B. [Do enviromental factors have influence on autism spectrum disorder?]. J Pediatr Res. 2014;1(4):170-3. Turkish.
2. Özören SG. [Autism spectrum disorder (ASD) and gazing through the evidence window to ASD]. ACU Healt Sci J. 2013;4(2):57-63.Turkish.
3. Öztürk MA. [Application of TEACCH in physical ed-

ucation and sports]. Dicle University Journal of Ziya Gökalp Faculty of Education. 2012;19:259-68. Turkish.
4. Zanelli G, Cappa P, Petrarca M, Berthoz A. Vestibular and proprioseptive estimation of imposed rotation and spatial updating in standing subjects. Gait Posture. 2011;33(4):582-7.
5. Yanardağ M, Yılmaz I. [An intervention approach for children with Autism: Aquatherapy]. INT-JECSE. 2012;4(1):32-45. Turkish.
6. Williams JG, Higgins JP, Brayne CE. Systematic review of prevalence studies of autism spectrum disorders. Arch Dis Child. 2006;91(1):8-15.
7. Fisher AG, Murray EA. Introduction to sensory integration theory. Philadelphia: FA Davis Company; 1991. p. 3-26.
8. Kranowitz CS. The out-of-sync child. NewYork: Perigee Books; 2003. p. 2-17.
9. Güngör S, Erdal SM, Özdin D. [Biophysical methods used to assess the structure and the permeability of skin]. Turkish Clinics of Journal of Dermatology. 2011;21(1):25-39. Turkish.
10. Inanç BB. A new theory on the evaluation of traditional Chinese acupuncture mechanisms from the latest medical scientific point of view. Acupunct Electrother Res. 2015;40(3):189-204.
11. Brondino N, Fusar-Poli L, Rocchetti M, Provenzi U, Barale F, Politi P. Complementary and alternative therapies for autism spectrum disorder. Evid Based Complement Alternat Med. 2015;2015;ID258589.
12. Lofthouse N, Hendren R, Hurt E, Arnold LE, Butter E. A review of complementary and alternative treatments for autism spectrum disorders. Evid Based Complement Alternat Med. 2012;2012:ID870391.
13. Hegde S. Music based cognitive remediation therapy for patients with traumatic brain injury. Front Neurol. 2014;5:ID00034.
14. Pichler A, Pichler M. Music therapy in cancer patients: factor fiction. Future Oncol. 2014;10(15):2409-11.
15. Krajnik J, Kollndorfer K, Notter LA, Mueller CA, Schöpf V. The impact of olfactory dysfunction on interoceptive awareness. Psychophysiology. 2015;52(2):263-8.
16. Jaen C, Dalton P. Asthma and odors: the role of risk perseption in asthma exacerbation. J Psychosom Res. 2014;77(4):302-8.
17. Butti E, Cusimano M, Bacigaluppi M, Martino G. Neurogenic and non-neurogenic functions of endogenous neural stem cells. Front Neurosci. 2014;8:ID00092.
18. Menini A. The neurogiology of olfaction. Florida: CRC Press; 2010. p. 267-305.
19. Amaral DG, Schumann CM, Nordahl CW. Neuroanatomy of autism. Trends Neurosci. 2008;31(3):137-45.
20. Suretta S. Vohra S. The PedCAM network: past, present and future. Complement Ther Med. 2013;21:70-2.
21. Valicenti-McDermott M, Burrows B, Bernstein L, Hottinger K, Lawson K, Seijo R, *et al*. Use of complementary and alternative medicine in children with autism and other developmental disabilities: associations with ethnicity, child comorbid symptoms, and parental stres. J Child Neurol. 2014;29(3):360-7.
22. Perrin MJ, Coury DL, Hyman SL, Cole L, Reynolds AM, Clemons T. Complementary and alternative medicine use in a large pediatric autism sample. Pediatrics. 2012;130(2):77-82.
23. Shamos MH, Lavine LS. Piezoelectricity as a fundamental property of biological tissues. Nature. 1967;213(5073):267-9.
24. Lang SB, Tofail SA, Kholkin AL, Wojtas M, Gregor M, Gandhi AA, *et al*. A ferroelectric polarization in nanaocrystalline hydroxyapatite thin films on silicon. Sci Rep. 2013;3(2215):1-6.