

# Pediatric Tuina in children with autism spectrum disorder: A study protocol for a randomized controlled trial

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## Research Article

**Keywords:** Autism spectrum disorder, Pediatric Tuina, Randomised controlled trial

**Posted Date:** October 1st, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-558665/v2>

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**Version of Record:** A version of this preprint was published at Trials on January 25th, 2022. See the published version at <https://doi.org/10.1186/s13063-022-06030-4>.

# Abstract

## Background

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterised by repetitive stereotypical behaviour and communication disorders. Currently, it lacks a specific clinical treatment method. Pediatric Tuina is a recent therapy in traditional Chinese medicine; however, there have been studies on the treatment of children with ASD by Tuina. Nonetheless, it remains uncommon given the lack of large-scale evidence-based medical studies. This study aims to compare the efficacy of Tuina and conventional treatment in children with ASD.

## Methods

Eligible children will be randomly divided into the pediatric Tuina plus conventional treatment group or conventional treatment group based on a random table at a ratio of 1:1. Effectiveness will be evaluated using a scale; moreover, the primary outcome will be the Childhood Autism Rating Scale. The secondary outcome will be the Autism Treatment Evaluation Checklist. All participants will be assessed on the scale by a third party not involved in the study. Baseline values of the participants will be determined at the registration time. Outcomes will be evaluated after the 30th treatment session. The follow-up period will last for 6 post-treatment months.

## Discussion

This study will evaluate the effectiveness and safety of Tuina in ASD treatment, which could provide reliable evidence-based findings to improve clinical treatment.

## Trial registration:

Chinese Clinical Trial Registry (ChiCTR), ChiCTR2000040452. Registered on 28 November 2020

## Background

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterised by typical repetitive behaviours and communication difficulties [1]. It has a childhood-onset; moreover, patients with ASD have lifelong difficulties with social interaction, communication, and sensory perception [2]. The aetiology of ASD involves complex and polygenic interactions, as well as possible environmental factors [3]. ASD is a serious public health problem worldwide, with its high morbidity and disability rates garnering increasing attention. Based on epidemiological studies, the ASD incidence rate is > 1–2% [4].

However, there remain no specific agents for ASD treatment, which include behavioural interventions, including early parent-mediated interventions [5–8]; naturalistic behavioural developmental interventions; behavioural and social treatments for school-age children, adolescents, and adults [9–12]; and even medical clowns intervention [13]. These clinical interventions can significantly improve the social adaptability of children with ASD.

Clinical treatment of ASD using evidence-based pharmacology is limited to treating co-occurring behaviour caused by mental illness rather than ASD itself. Risperidone [14–17] and aripiprazole [14, 18, 19] have been approved by the Food and Drug Administration to improve irritability or restlessness in children and adolescents with ASD. However, both drugs can cause adverse effects, including sedation and weight gain after long-term use, which increases the risk of subsequent health problems [19].

To alleviate ASD clinical symptoms and to save medical costs, there are studies on ASD developing traditional therapies with numerous advantages.

Tuina is an important external treatment that plays a crucial role in improving stunting, [20] relaxing physical and mental functions [21], and others. Currently, some Tuina manipulations have been applied as interventions for children with ASD [22, 23], with a certain degree of efficacy [24]. Qigong Tuina, which is a specific Tuina intervention in children with ASD [25, 26], has been shown to improve the symptoms of children with ASD.

Pediatric Tuina is a traditional Chinese medicine (TCM) therapy that acts on specific acupoints on the hands, back, and arms [27], including Wujing acupoints for different fingers. These acupoints target the spleen, liver, heart, lung, and kidney based on the meridian and collateral theory. The order is located on the thread surface of the five fingers in children (the spleen acupoint is located on the thumb). Stimulating different acupoints with particular manipulations results in varying curative effects.

However, there remains no strong evidence regarding the single-use of pediatric Tuina intervention for ASD treatment [28]. Therefore, this study aims to evaluate the efficacy of pediatric Tuina as an additional treatment for children with ASD aged 2–6 years by comparing it with conventional treatment in a standardised clinical research design. This evidence-based clinical trial could facilitate and promote the application of pediatric Tuina for ASD.

## **Methods/design**

### **Study design**

This will be a randomised controlled trial. To meet ethical requirements and the particularity of ASD, this study will not apply a blind design. The trial will be conducted at Hunan University of Chinese Medicine, China, from November 2020 to December 2021. Eligible children will be randomly divided into the pediatric Tuina plus conventional treatment group or conventional treatment group based on a computer-generated random table at a ratio of 1:1. Efficacy will be assessed using the Childhood Autism

Rating Scale (CARS) and Autism Treatment Evaluation Checklist (ATEC). Before study commencement, all participants will be assessed using a scale by a third party not involved in the study. The baseline level of the participants will be determined at the enrolment time; further, the participants will be evaluated again after the 30<sup>th</sup> treatment, with a follow-up period of 6 postoperative months. **Figure 1** shows a flowchart of the study.

## **Participants**

This study will recruit 400 children with ASD from autism organisations certified by the Hunan Disabled Persons' Federation, including Xingxueyuan Education Development Center, Tianxin District, Changsha City.

## **Eligibility criteria**

### ***Inclusion criteria***

1. Children who meet the diagnostic criteria of ASD in the diagnostic and statistical manual of mental disorders (DSM-5)
2. Age: 2–6 years old
3. CARS score  $\geq$  30 points
4. The guardian of the children is aware of the intervention, can cooperate well, and can complete the entire treatment cycle
5. Having not participated in other clinical observations and other intervention methods within the previous 30 days
6. Children with non-critical illnesses and coagulopathy
7. Children without acute or chronic infectious diseases.

### ***Exclusion criteria***

1. Children who do not meet the ASD diagnostic criteria in DSM-5
2. CARS score  $<$  30 points
3. Children who refuse to undergo the intervention massage method and cannot normally complete the intervention cycle
4. Children with mental illness that affect the clinical findings

### ***Elimination criteria***

1. Children who have not completed 30 intervention sessions following the research protocol
2. Children who receive other interventions that affect the study results

### ***Shedding criteria***

1. Children whose cooperation degree during the Tuina intervention was extremely low and could not cooperate
2. Children with serious adverse reactions given their poor health during the Tuina intervention

## **Interventions**

### ***Control group***

Based on the training of the autism organisation, the control group will strictly follow the schedule of five applied behaviour analysis training sessions, five key skill training sessions, five music group training sessions, five oral muscle training sessions, and five sensory training sessions per week. All the teachers will have a background in special education.

### ***Tuina group***

The Tuina group will receive pediatric Tuina, with a total of 30 Tuina sessions, five times a week for 6 weeks, and a follow-up period (the 12<sup>th</sup> week after the end of treatment). From the perspective of humanistic care, to make the child feel safe, the child will be held by the parents or relatives during the session and placed in a sitting position. Tuina doctors will perform face-to-face treatments. When performing acupoint Tuina on the back, the child will lie on his parents or relatives in a prone position.

To standardise the Tuina manipulation, all Tuina doctors will be certified Chinese medicine physicians and will have undergone 3 months of training in Tuina techniques. The acupoint prescriptions are mainly based on the TCM theory of the relationship between *Du Meridian* and *Brain*. After assembling clinical evidence and soliciting the opinions of experienced Tuina experts, we have summarized the following acupoints and manipulation times of Tuina. **Table 1** presents the detailed information.

## **Outcome assessment**

The results will be evaluated by a third party who has no interest in this study. This study will be conducted at the Mental Health Center of the Second Xiangya Hospital of Central South University, Hunan Province, China.

### ***Primary outcomes***

The main efficacy score will be based on the CARS, which covers interpersonal relationships, imitation, and other 15 aspects, with a total score of 60 points. Participants with a score < 30, 30–35, and ≥ 36 are

considered as non-autistic, moderately autistic, and severely autistic, respectively. Compared with baseline, the curative effect will be considered as significant, effective, and invalid by a total score reduction of > 10 points, 5–10 points (including 10 points), and < 5 points, respectively [29].

### ***Secondary outcomes***

The secondary outcome indicators will be mainly evaluated using the ATEC, including four aspects: (1) speech/language/communication, (2) sociability, (3) sensory/cognitive awareness, and (4) health/physical/behaviour [30]. The main purpose of this study is to clarify the improvement in children with ASD after Tuina therapy from different perspectives.

### ***Safety assessment***

Although pediatric Tuina is a green treatment without side effects, it could have some adverse events (AEs) during the treatment process due to improper operation of the doctor. Skin damage is the most common AE during massage. To prevent AE occurrence, this study will perform strict monitoring. Once such a situation occurs, the researchers will record the time and severity of the AE and promptly deal with it.

### **Participant timeline**

We have designed the schedule for the recruitment, intervention, evaluation, and follow-up of the participants, as shown in *Figure 2*.

### **Sample size estimation**

This research is funded by the Hunan Provincial Department of Science and Technology. This research seeks to help more children with ASD; therefore, we set a fixed number of children and did not consider the minimum sample size. However, given the rigour of scientific research and design, a previous study [31] reported that the overall effective rate of Pediatric Tuina for children with ASD is 81.82%. Regarding the calculation of the sample size, considering a significance level of 0.05, power of 0.80, and maximum dropout rate of 10%, the final study will include 400 children with ASD (200 in each group).

### **Data collection and management**

All parents of children with ASD participating in the project will sign the informed consent form and complete the case report form. Finally, a data file will be established, which will be kept and collected by a dedicated person from the Data Committee of the First Affiliated Hospital of the Hunan University of Chinese Medicine. Inspectors will regularly check the informed consent form, research protocol, and evaluation scale to ensure the quality of clinical research. Regarding the authenticity of this study, all involved researchers will be blinded from the data. When the research plan changes, the researcher should promptly submit the new plan, indicate the date, and report to the committee.

Based on the data disclosure requirements of the *CHICTR*, this study will upload data to the Baidu Cloud Disk or the website of the Acupuncture and Tuina College of Hunan University of Chinese Medicine (zjtn.hnucm.edu.cn) within 6 months after study completion, which will be publicly available. The premise is that the main research results will be published. All outsiders should sign an agreement before accessing the research results.

## Statistical analyses

All data will be analysed using SPSS (version 21.0; IBM Corp., Armonk, NY, USA); further, all analyses will be conducted using a two-sided test. Normally and non-normally distributed measurement data will be analysed using the t-test and rank-sum test, respectively. The significance level will be set at 5% [32]. Statistical significance will be set at  $P < 0.05$ .

## Ethics

To protect the legitimate rights and interests of all our project participants, we will apply for a clinical research ethics review. This study has been approved by the Ethics Committee of the First Affiliated Hospital of Hunan University of Chinese Medicine (HN-LL-KY-2020-020-01).

## Discussion

ASD development is irreversible, with some symptoms persisting throughout life. Given that improving the quality of life of children with ASD is the common pursuit of all medicines, we should actively explore traditional and non-traditional medicines to identify the most suitable treatment for ASD.

TCM contains profound wisdom regarding Chinese philosophy and medical knowledge. Consistent with modern medicine, TCM considers the brain to control emotions, consciousness, and thinking. However, in this theory, the brain is not just an organ; rather, it has several other functions. The cause of autism is associated with the brain, which is a common understanding in academic circles. Specific acupoints can improve brain function and promote nerve development. *Du Meridian* is a special meridian. It is closely associated with the physical location and function of the brain [33]. A large part of the Du Meridian is located on the midline of the back and front of the head; further, it is directly connected to the brain and gathers the Yang qi of the whole body. Du Meridian is an important way for the output of Jing qi [34] as a bridge between the brain and other meridians for communicating qi and blood [35]. Therefore, the normal operation of the function of the Du Meridian can improve the role of the brain; further, children with ASD have problems with obstruction. Under these conditions, external stimulation can be performed through the Tuina. The formulation of this study protocol will be conducted under the guidance of Du Meridian.

The acupoints and treatment plan for Tuina will be based on the TCM. There are several fixed routines in Chinese pediatric Tuina, including starting from the head first, which is known as Kaiqiao, for unblocking the body. There are four fixed acupuncture points: Tianmen, Kangong, Taiyang (Temple), and Wangu

(GB12). The number of operations for each acupuncture point is 24, which corresponds to the Chinese 24 solar terms. The Du meridian is also distributed on the head, with the four representative ones including Yamen (GV15), Fengfu (GV16), Baihui (GV20), and Shuigou (GV26). Therefore, they were chosen as the main Tuina parts. The back, from the thoracic spine to the sacral spine, is the main circulation part of the Du meridian and main stimulation point. Three methods are used for stimulation: pressing-kneading, pinching, and grassing with the finger. The last step is Grasping Jianjing (GB21), also known as Guanqiao, which relaxes the body.

However, the efficacy of Tuina in ASD treatment requires further investigation. This clinical randomised controlled trial will compare the effects of Tuina combined with behavioural and single education interventions on the rehabilitation effect of children with ASD. The CARS will be used to evaluate efficacy. Although our goal is to improve the core ASD symptoms in children, there may be other gains in further clinical research, including intestinal symptoms. This research plan could yield a strong evidence-based basis for the treatment of children with ASD by massage, which could allow more people to benefit from this treatment.

### **Study limitations**

First, this study will not diagnose children with ASD using the Autism Diagnostic Interview-Revised or Autism Diagnostic Observation Scale due to copyright restrictions; instead, the DSM-IV will be used for the diagnosis of ASD.

Regarding evaluation, there are no objective biomarkers for evaluating the ASD treatment efficacy. This study will perform a scale assessment to evaluate the efficacy of the ASD treatment, which yields certain subjective errors.

Additionally, it is impossible to blindly perform Tuina therapy. Furthermore, the standardisation of massage techniques and stimulation amount varies from person to person. There will inevitably be some differences in specific operations. To reduce such errors, all participating Tuina therapists have undergone rigorous training and have professional qualifications to ensure standard treatment.

Finally, given the ethical requirements, it is impossible to prohibit all children from stopping other education or behavioural interventions. Therefore, a single Tuina intervention trial cannot be used for clinical observation.

### **Trial status**

Currently, this clinical trial is still recruiting patients, which started in November 2020 and will end in September 2021. The trial was registered in the Chinese Clinical Trial Registry on 28 November 2020 (registration number: ChiCTR2000040452).

## **Declarations**



## **Ethics approval and consent to participate**

Ethics approval was requested from and granted by the Ethics Committee of the First Affiliated Hospital of Hunan University of Chinese Medicine (HN-LL-KY-2020-020-01).

## **Consent for publication**

All authors read and approved the final manuscript.

## **Availability of data and materials**

The results of this trial will be presented in peer-reviewed journals.

## **Competing interests**

The authors declare that they have no competing interests.

## **Funding**

This study was funded by the Research and Development Program in Key Areas of Hunan Province (No.2019SK2081). Research and Innovation Project for Graduate Students of Hunan Province (No.CX2018B487), Science and Technology Project of Changsha City (No.kq1901093).

## **Authors' contributions**

XF planned the study protocol and drafted then revised the manuscript.

JY participated in designing the trial and helped to prepare the manuscript.

WL was the study coordinator.

TL was responsible for generating and distributing the random numbers.

QRJ participated in collecting clinical data.

YXZ recruited and screened eligible participants in the outpatient department.

WW carried out the Tuina interventions of patients.

JSL managed the study.

All authors read and approved the final manuscript.

## **Acknowledgements**

Our deep appreciation is extended to Di Zhang at the first affiliated hospital of Hunan University of Chinese Medicine for his immense contribution to this study,

We gratefully acknowledge the contribution of the Mental Health Center of the Second Xiangya Hospital of Central South University.

### Authors' information

All authors come from School of Acupuncture-Moxibustion and Tuina, Hunan University of Chinese Medicine, engaged in Tuina teaching and scientific research.

## Abbreviations

AE, adverse event; ASD, autism spectrum disorder; ATEC, Autism Treatment Evaluation Checklist; CARS, Childhood Autism Rating Scale; DSM-5, diagnostic and statistical manual of mental disorders; TCM, traditional Chinese medicine

## References

1. American Psychiatric A. Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub; 2013.
2. Baio J, Wiggins L, Christensen DL, et al. Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2014. *MMWR Surveill Summ.* 2018;67(6):1–23.
3. Sullivan PF, Geschwind DH. Defining the genetic, genomic, cellular, and diagnostic architectures of psychiatric disorders. *Cell.* 2019;177(1):162–83.
4. Siafis S, Çıray O, Schneider-Thoma J, et al. Placebo response in pharmacological and dietary supplement trials of autism spectrum disorder (ASD): systematic review and meta-regression analysis. *Mol Autism.* 2020;11(1):66.
5. Sealy J, Glovinsky IP. Strengthening the reflective functioning capacities of parents who have a child with a neurodevelopmental disability through a brief, relationship-focused intervention. *Infant Ment Health J.* 2016;37(2):115–24.
6. Palmer M, Tarver J, Paris Perez J, et al. A novel group parenting intervention to reduce emotional and behavioural difficulties in young autistic children: protocol for the autism spectrum treatment and resilience pilot randomised controlled trial. *BMJ Open.* 2019;9(6):e029959.
7. Peña M, Ng Y, Ripat J, Anagnostou E. Brief report: parent perspectives on sensory-based interventions for children with autism spectrum disorder. *J Autism Dev Disord.* 2020.
8. Althoff CE, Dammann CP, Hope SJ, Ausderau KK. Parent-mediated interventions for children with autism spectrum disorder: A systematic review. *Am J Occup Ther.* 2019;73(3):7303205010p1–13.
9. Scherf KS, Griffin JW, Judy B, et al. Improving sensitivity to eye gaze cues in autism using serious game technology: study protocol for a phase I randomised controlled trial. *BMJ Open.* 2018;8(9):e023682.

10. Kent C, Cordier R, Joosten A, Wilkes-Gillan S, Bundy A. Can we play together? A closer look at the peers of a peer-mediated intervention to improve play in children with autism spectrum disorder. *J Autism Dev Disord.* 2020;50(8):2860–73.
11. Corbett BA, Ioannou S, Key AP, et al. Treatment effects in social cognition and behavior following a Theater-based intervention for youth with autism. *Dev Neuropsychol.* 2019;44(7):481–94.
12. Vause T, Jaksic H, Neil N, et al. Functional behavior-based cognitive-behavioral therapy for obsessive compulsive behavior in children with autism spectrum disorder: A randomized controlled trial. *J Autism Dev Disord.* 2020;50(7):2375–88.
13. Shefer S, Leon Attia O, Rosenan R, et al. Benefits of medical clowning in the treatment of young children with autism spectrum disorder. *Eur J Pediatr.* 2019;178(8):1283–9.
14. DeVane CL, Charles JM, Abramson RK, et al. Pharmacotherapy of autism spectrum disorder: Results from the randomized BAART clinical trial. *Pharmacotherapy.* 2019;39(6):626–35.
15. Behmanesh H, Moghaddam HS, Mohammadi MR, et al. Risperidone combination therapy with propentofylline for treatment of irritability in autism spectrum disorders: A randomized, double-blind, placebo-controlled clinical trial. *Clin Neuropharmacol.* 2019;42(6):189–96.
16. Kent JM, Kushner S, Ning X, et al. Risperidone dosing in children and adolescents with autistic disorder: a double-blind, placebo-controlled study. *J Autism Dev Disord.* 2013;43(8):1773–83.
17. Fung LK, Mahajan R, Nozzolillo A, et al. Pharmacologic treatment of severe irritability and problem behaviors in autism: A systematic review and meta-analysis. *Pediatrics.* 2016;137(Suppl 2):124-35.
18. Ichikawa H, Hiratani M, Yasuhara A, et al. An open-label extension long-term study of the safety and efficacy of aripiprazole for irritability in children and adolescents with autistic disorder in Japan. *Psychiatry Clin Neurosci.* 2018;72(2):84–94.
19. Shafiq S, Pringsheim T. Using antipsychotics for behavioral problems in children. *Expert Opin Pharmacother.* 2018;19(13):1475–88.
20. Lu WP, Tsai WH, Lin LY, et al. The beneficial effects of massage on motor development and sensory processing in young children with developmental delay: A randomized control trial study. *Dev Neurorehabil.* 2019;22(7):487–95.
21. Meier M, Unternaehrer E, Dimitroff SJ, et al. Standardized massage interventions as protocols for the induction of psychophysiological relaxation in the laboratory: a block randomized, controlled trial. *Sci Rep.* 2020;10(1):14774.
22. Konuk Sener D, Karaca A. Use of complementary and alternative medicine treatments by mothers of children with developmental disabilities: a cross sectional study. *Nurs Health Sci.* 2020;22(2):328–38.
23. Lee MS, Kim JI, Ernst E. Massage therapy for children with autism spectrum disorders: a systematic review. *J Clin Psychiatry.* 2011;72(3):406–11.
24. Emtiazy M, Abrishamkar M. The effect of massage therapy on children's learning process: A review. *Iran J Med Sci.* 2016;41(3 Suppl):64.

25. Rodrigues JM, Mestre M, Fredes LI. Qigong in the treatment of children with autism spectrum disorder: A systematic review. *J Integr Med.* 2019;17(4):250–60.
26. Silva LM, Schalock M, Ayres R, Bunse C, et al. Qigong massage treatment for sensory and self-regulation problems in young children with autism: a randomized controlled trial. *Am J Occup Ther.* 2009;63(4):423–32.
27. Lu T, Zhang H, Yin L, et al. Chinese pediatric Tuina on children with acute diarrhea: study protocol for a randomized sham-controlled trial. *Trials.* 2019;20(1):689.
28. Brondino N, Fusar-Poli L, Rocchetti M, et al. Complementary and Alternative Therapies for Autism Spectrum Disorder. *Evid Based Complement Alternat Med.* 2015. 2015: 258589.
29. Qing Y, Zhifeng W, Ruichao W, et al. Observation on the therapeutic effect of acupuncture treatment of autism children[in Chinese]. *J Acupuncture Research.* 2009;34(03):183–7.
30. Mahapatra S, Vyshedsky D, Martinez S, et al. Autism Treatment Evaluation Checklist (ATEC) Norms: A "Growth Chart" for ATEC Score Changes as a Function of Age. *Children (Basel).* 2018. 5(2).
31. Xiang F. Investigation of the clinical observation of massage intervention in children with autism spectrum disorder based on The theory of Five Internal Organs Communicating[in Chinese]. Master Degree. Hunan university of Chinese Medicine; 2020.
32. Zhang S, Kong L, Zhu Q, et al. Efficacy of Tuina in patients with chronic low back pain: study protocol for a randomized controlled trial. *Trials.* 2020;21(1):271.
33. Hongwei L, Xuelei J, Xiaojian Z, et al. Based on the theory of Du Meridian Connecting with Brain, and its practical significance in the treatment of encephalopathy in traditional Chinese medicine[in Chinese]. *J of Integrated Traditional Chinese and Western Medicine on Cardio-cerebral Vascular Diseases.* 2021. 19(03): 515–518.
34. Jiankui Z, Xianhe J, Bingxiang M, et al. Effects of naprapathy to Du Meridian and Jiaji Point on core stability of children with cerebral palsy[in Chinese]. *Chinese J of Rehabilitation Medicine,*2019,34(9):1038–1042.
35. Jisheng L, Hong Z, Ming X, et al. Discussion on effects of spinal cord injury on brain and its treatment based on the theory of Du Meridian is meridian of brain[in Chinese]. *Chinese J of Traditional Chinese Medicine.* 2016;31(08):2968–71.

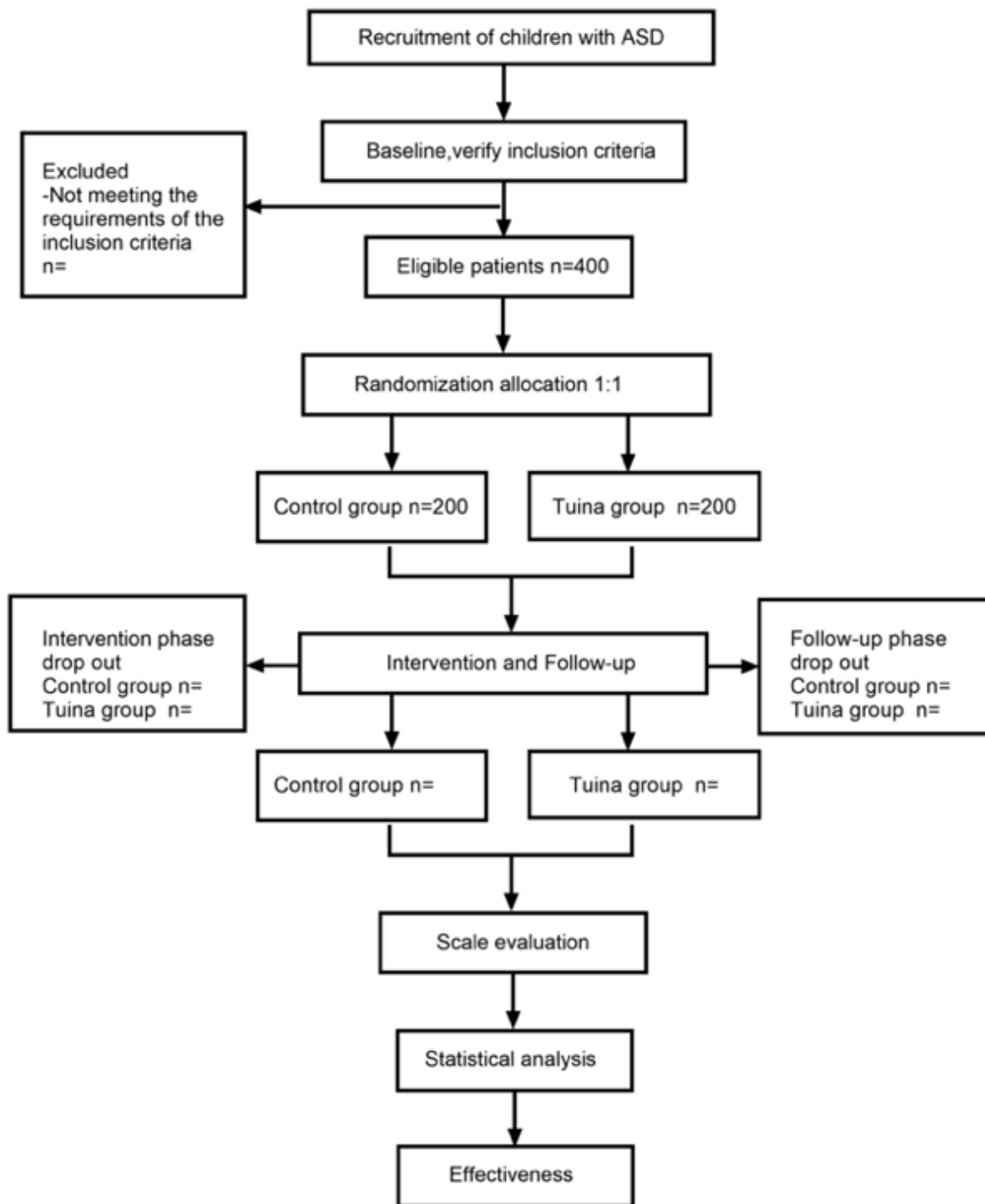
## Table 1

*Table 1. Tuina acupoints, manipulation times, and methods*

## Figures

ACUPONITS	LOCATION	METHODS	TIMES
Tianmen	Located from the middle of the eyebrows to the front hairline in a straight line	Linear-pushing with the finger	24
Kangong	Located on a horizontal line connecting both brows	Wiping with the finger	24
Taiyang(temple)	Flat part at each side of the forehead	Pressing-kneading with the finger	24
Wangu(GB12)	Located in the posterior inferior depression of the mastoid behind the ear and above the attachment of the sternocleidomastoid muscle		24
Yamen(GV15)	Located on the nape, 0.5 Cun above the middle of the posterior hairline, and below the first cervical vertebra.		100
Fengfu(GV16)	Located on the nape, when the posterior hairline is straight up 1 Cun, the extraoccipital protuberance is straight down, and the depression between the trapezius muscles		100
Baihui(GV20)	Located on the head, 5 Cun above the middle of the front hairline.		100
Shuigou(GV26)	Located on the face, at the intersection of the upper 1/3 and middle 1/3 of the sulcus		100
Du Meridian	Located on the midline of the back. Tuina therapy is mainly performed from the thoracic spine to the sacral spine.	Pressing-kneading with the finger	20
		Pinching with the finger	20
		Scrubbing with the finger	30
Jianjing(GB21)	Located under the spinous process of the seventh cervical vertebra, on the midpoint of the line with the acromion.	Grasping with the finger	5

**Figure 1. Flowchart of the study.**



**Figure 1**

Flowchart of the study. A total of 400 participants will be randomized to the two groups. The interventions will last for 25 min and will be conducted two times per week for 6 weeks. After treatment, 6month follow-up. The main efficacy score will be based on the CARS, the secondary outcome indicators will be mainly evaluated using the ATEC.

**Figure 2. Study schedule for recruitment, interventions, outcome measurements.**

STUDY PERIOD	Enrollment	Allocation	Post-allocation		Follow-up	
TIMEPOINT (weeks)	-1	0	3	6	9	12
<b>ENROLLMENT</b>						
Eligibility screen	×					
Informed consent	×					
Medical history	×					
Randomization		×				
Allocation		×				
<b>INTERVENTION</b>						
Tuina and education intervention			↔			
Education intervention			↔			
<b>ASSESSMENTS</b>						
CARS	×	×		×		×
ATEC		×		×		×
Adverse events		↔				

**Figure 2**

Study schedule for recruitment, interventions, outcome measurements.

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