**Appendix B Methods used in Tuina manipulation in included studies**

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| **Tuina manipulations** | **Schematic diagram** | **Manipulation method** |
| Palm-pressing |  | Pressing the body surface with either one palm or two, or overlapping palms is known as palm pressing manipulation.  Pressing the body surface with the tip of the thumb or the fleshy part of the fingers is called finger-pressing manipulation.  **Manipulation essentials**:  (1) The direction of pressing should be vertically downwards.  (2) The pressure exerted should be steady and increase from light to heavy, so that the stimulation can reach deeper parts of the body tissue. Never use violent force as this could result in an adverse reaction and increase unnecessary pain for patients.  (3) At the end of the manipulation, it is not advisable to suddenly withdraw the pressure, the pressure should be slowly reduced. |
| Finger-pressing |  |
| Palm Rubbing |  | Palm rubbing manipulation is performed by fixing the palm surface on the treatment site, using the wrist joint as the center of gravity and moving the palm and wrist together with the forearm making rhythmic and circular movements.  **Manipulation essentials**:  (1) The upper limbs, wrists and palms should be relaxed and gently placed on the treatment site.  (2) The forearm drives the wrist and the part exerting force in a circular rotation.  (3) Action should be slow and coordinated.  (4) The pressure should be light but not heavy, and the speed should be slow or not urgent. |
| Thumb Pushing |  | Have the finger, palm or elbow exert force on the treatment site, and push it in a straight line in one direction.  **Manipulation essentials**:  During manipulation, the finger, palm and elbow should touch the body surface, and the pressure should be steady and delivered at a slow and even speed. |
| Palm Pushing |  |
| To-and-fro Rubbing with palms |  | Place the major thenar, the palmar base or the minor thenar on the body surface and move to-and-fro with rubbing movements to generate warm.  **Manipulation essentials**:  (1) Straighten the wrist joint and locate the forearm approximately at the same level with the hand and extend the fingers naturally.  (2) Position the whole palm and all the fingers on the body surface and apply moderate pressure.  (3) The shoulder joint acts as the pivot, the upper arm moves and drives the palm to make to-and-fro or up-and-down movements.  (4) The distance of to-and-fro rubbing should be as long as possible, and the action should be continuous.  (5) The speed should be even and fast. When rubbing, do not scratch the skin. |
| Pinching the Spine |  | **Manipulation essentials**:  (1) Support the skin with the radial aspect of the thumb, press forward with the index and middle fingers. Then grasp and lift the skin up with the three fingers simultaneously. The lifting and pinching operation is carried out using both hands, alternating and moving forwards.  (2) Or using the radial aspect of the middle knuckle of the flexed index finger to support the skin, use the thumb to press forward. Then grasp and lift the skin forcefully with the two fingers and move forward while both hands are alternately doing the manipulation.  (3) Each operation starts from the GV1 (Changqiang), moves up the areas lateral of the spine, and ends at the GV14 (Dazhui). Generally, this manipulation is continuous and performed 4-5 times.  (4) In order to strengthen intensity of the stimulation used in this manipulation, the skin is often grasped and lifted once in every three pinches.  (5) During the manipulation, the wrist should be relaxed and the fleshy part of the finger should be used instead of pinching with the fingertip.  (6) The pressure used for pinching and lifting the skin should not involve a twisting or rotating operation which must be avoided. Pinching, lifting and then loosening the skin should be conducted one after another in a straight line. |
| Grasping Manipulation |  | Use the thumb with the index and middle fingers or other four fingers to lift and pinch the body rhythmically using an opposing force.  **Manipulation essentials**:  (1) The wrist should be relaxed to make the action soft and flexible.  (2) Use the flesh of the finger to exert force, not the fingertips.  (3) The pressure should be from light to heavy, and then from heavy to light. Sudden exertion and sustained grasping should be avoided.  (4) The manipulation should be even, slow, rhythmic and coherent.  (5) Due to the strong stimulation of the grasping manipulation, in clinical practice, rubbing manipulation or kneading manipulation is often followed to ease the stimulation. |
| Kneading Manipulation |  | Palm kneading manipulation is performed by fixing the major thenar or the palmar base on a certain part or point, relaxing the wrist, using the elbow as a pivot, swaying the forearm initiatively and bringing the wrist to sway slowly and softly.  **Manipulation essentials**:  (1) The major thenar or the palmer base should be fixed on the treatment areas, and bring the deep tissue to sway instead of frictional movement on the body surface.  (2) The force should be gentle with less pressure, and its movements should be coordinated and rhythmic at a frequency of 120 to 160 times per minute. |
| Pushing Manipulation with One-finger |  | Exert pressure with the tip or the fleshy part the thumb, and use the force generated by the wrist to swing back and forth to provide pressure on the acupoints. This is known as the pushing manipulation with one-finger.  **Manipulation essentials**:  (1) Drop the shoulder: Relax shoulder joints and the shoulders will sink naturally. Avoid tension and shoulder abduction.  (2) Hang down the elbow naturally: The elbow joint should not be facing outwards or be lower than the wrist joint. Do not tense or adduct the elbow.  (3) Suspend the wrist: The wrist joint flexes naturally so that the thumb is perpendicular to the treatment site.  (4) Clench a hollow fist: All fingers except the thumb and palm should be relaxed.  (5) Exert pressure with the thumb: The exerted pressure by the thumb should be fixed on the treatment site.  (6) Forcefully pushing and move slowly: The sway frequency of the wrist is rapid (120～160 times/min). The thumb should move slowly over the treatment site, and no slippage or friction should occur under the thumb. |
| Rolling Manipulation |  | Rolling Manipulation is a complex movement of flexing, extending the wrist joint and rotating the forearm.  **Manipulation essentials**:  (1) Shoulder joints should be relaxed and dropped, with the elbow flexed to 140°. The distance between the middle section of the forearm and the chest wall is the width of a fist. Relax the wrist, and the flexion of the 2nd to 4th metacarpophalangeal joints increases gradually, and the ring finger and little finger should flex to 90°.  (2) During the manipulation, the flexion and extension of the wrist joint should reach 120°, that is, when the roll is extended forwards to the limit, the flexion of the wrist is about 80°, and when the roll moves backward to the limit, the extension of the wrist is about 40°, so that the 1/2 area of the back of the hand (ulnar) sequentially touches the treated site.  (3) Rolling manipulation could produce alternating rolling stimulation on the body surface. The ratio of the weight of the exerted force of rolling forward and rolling backward is 3:1.  (4) The fixing point should be close to the body surface; hauling, turning and leaping movements should be avoided.  (5) Slowly move on the treatment site while keeping the rolling frequency constant. |
| Separating Manipulation |  | Push from a point laterally with the radial aspect or the fleshy part of the thumbs or the pads of the index and middle fingers.  **Manipulation essentials**:  Exertion of pressure by both hands should be even and coordinated and the movement should be in a straight line. |
| Digital-pressing Manipulation |  | Bend the middle finger or both the index and middle fingers, exert pressure on the treated points with the tip of the proximal interphalangeal joint, increase force and press inward. Keep the action for a long period.  This manipulation evolved from finger-pressing, and the manipulation essentials are almost the same as finger-pressing. |
| Fist percussing manipulation |  | Make a hollow fist, straighten the wrist and hit the body surface with the dorsum of the fist evenly.  **Manipulation essentials**:  (1) The wrist joint should be straightened without flexion and extension.  (2) Use the extension and flexion force of the elbow joint to drive the forearm to exert pressure and percuss.  (3) Make the whole of the back of the fist touch the body surface steadily. |
| Palm-twisting Manipulation |  | The manipulation is performed by holding a certain part of the body with both the palms, exerting pressure in the opposite direction and doing swift, two-way twisting and kneading movements repeatedly. Meanwhile, both hands move up and down.  **Manipulation essentials**:  (1) The exertion of force should be symmetrical during twisting.  (2) The twisting movement should be rapid, but the movement on the body surface should be slow.  (3) It is not advisable to over-tighten the treatment areas during the manipulation. At the same time, the wrist joint should be relaxed to make the twisting movement flexible and consistent. |
| Manipulation of Twisting and Rubbing like Plucking the String |  | Stand behind the patient, twist and rub with both palms the hypochondria under the armpits downward with gentle and coherent movements. The manipulation is similar to plucking the string of a musical instrument. |

Note: The schematic diagrams and manipulation methods have been synthesized from the following monographs:

Fang Min, Song Bailin. Tuina (Textbook for the 13th Five-Year Plan) [M]. Beijing: China Press of Traditional Chinese Medicine. 2016

Jin Hongzhu, Yang Hongying, Pei Huihua, et al. Chinese Tuina (Massage) (English-Chinese) [M]. Shanghai: Publishing House of Shanghai University of Traditional Chinese Medicine. 2002

Wang Zhihong, Yan Juntao. Great achievement of Chinese Tuina [M]. Changchun: Changchun Publishing House. 1994