Does Tai Chi/Qi Gong help patients with Multiple Sclerosis?

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Abstract Tai Chi posture, has recently been shown in a number of random controlled trials to improve balance, posture, vigour and general well-being in a variety of client groups. These are problems commonly encountered by people with Multiple Sclerosis. The present study was therefore designed as a pilot evaluation of the usefulness of Tai Chi/Qi Gong for people with Multiple Sclerosis. Eight individuals with Multiple Sclerosis were monitored over a 2-month baseline and 2-month intervention. Statistically significant pre to post improvements for the group as a whole were achieved on measures of depression and balance. A 21-item symptom check-list indicated small improvements over a broad range of other self-rated symptoms.

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Introduction

Multiple Sclerosis is a disorder characterized by spasticity of muscles, loss of sensation in the periphery, incontinence, loss of balance, fatigue and cognitive dysfunction (Rao 1990). Dysfunction may occur in the form of acute episodes against a background of residual disability or may follow a more chronic progressive pattern. There is evidence to suggest that the disorder is caused by the immune system attacking tissue in the central nervous system causing inflammation and destruction of the myelin sheath (Rao 1990).

There is at present no known cure for Multiple Sclerosis although some drug therapies may help with the management of symptoms (Holliday & Benfield 1997). A combination of occupational therapy, psychological support and physiotherapy has also been shown to be useful for reducing fatigue and the severity of the symptoms (Di Fabio et al 1998). However, most health authorities are not able to provide such a comprehensive programme on an ongoing basis. Tai Chi is becoming increasingly available to the general public. Tai Chi pays attention to both physical functioning and psychological attitude. Classes are now advertised in most towns in the U.K. In the USA there have recently been some major research trials utilizing random controlled methodology to asses the usefulness of Tai Chi for a range of disorders. Tai Chi has been shown to significantly improve balance, posture, flexibility, vigour, diastolic blood pressure, muscle strength and general well-being (Jacobson et al

1997, Charner et al 1996, Wolf et al 1997, Lan et al 1998).

This pilot study attempted to provide some preliminary data on the usefulness of Tai Chi/Qi Gong for people with Multiple Sclerosis.

Method

An intervention programme was developed based on exercises that are fundamental to most Tai Chi training programmes. The programme did not attempt to teach the complex 'forms' associated with long-term practise, but rather focused on the fundamental principles of balance, movement, sensory awareness and breathing that underly Tai Chi as described by Frantzis (1993). These principles are known as 'Qi Gong' which literally, translated means the 'cultivation of energy'. The programme also included brief tuition in Qi Gong self massage called 'Tui Na' (Mercati 1997). Particular attention was given to the development of a relaxed and compassionate attitude to the body. This aspect of the intervention is described more fully by Mills (1999).

The intervention was designed to be brief (six individual sessions) but to be supplemented with teaching aids that would encourage continued practise. Each participant was supplied with a videotape of the exercises, audio-taped instructions and a printed handout. Participants were encouraged to make a commitment to a daily homework practise of at least 30 minutes.

Each participant was required to fill in an assesment battery on three occasions: 2 months prior to the intervention, immediately prior to the intervention and immediately after the intervention.

The assessment battery included:

(i) The Profile of Mood States
      (POMS)
This scale was developed by McNair, Lorr and Droppleman

(1971) by means of repeated factor analyses. The Profile of Mood States is composed of 65 adjectives, each of which is rated on a 5-point scale. The adjectives are keyed to yield six affective states: Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-Inertia, Confusion-Bewilderment. Internal consistency coefficients for the POMS range from 0.84 to 0.95. Test-retest reliability for the six factors from 0.61 to 0.69 based on a 1 month interval. Predictive validity has been demonstrated in a number of studies (e.g. McNair 1974). The scale is particularly relevant for studies involving Multiple Sclerosis as it includes physical ratings of fatigue and vigor as well as the affective ratings. The POMS has been used in a prior study on stress management in Multiple Sclerosis by Crawford and McIvor (1987).

(ii) Check-list of physical symptoms
       relevant to Multiple Sclerosis
The check-list was derived from recent work by Gulick (1998) and Joyce and Richardson (1997). It listed 21 symptoms typically experienced by Multiple Sclerosis sufferers. Participants were asked to rate on a 5-point scale whether they felt there had been an improvement or a deterioration on any of the items over the previous 2 months. The measure was only given post intervention so no baseline comparison is available. The check-list was also given to a friend or relative. They were asked to fill it in using their own judgement as far as possible, i.e. without conferring with the participant.

(iii) Balance
A single leg-standing test was used to assess balance. This test has been used widely in various clinical situations, for example in neurological examination (Potuin & Tourtellote 1975) as well as research studies (Lee et al. 1988). It has been used specifically to assess the

benefits of Tai Chi for the elderly by Tse and Bailey (1991). In this study, resources were not available for independent assessment. Participants were therefore asked to enrol a friend or relative with a stopwatch or watch with a second hand. The observer timed from moment of lifted leg leaving floor to moment of leg returning to floor. Participants' eyes were kept open at all times.

Participants were also asked to keep a record of frequency of duration of homework practise. Participants all completed a minimum of a 2-month baseline. For some participants this was as long as 6 months as they were waiting for a place to become available in the treatment programme. Intervention took place over a 2-month period.

Participants

Participants were recruited through local physiotherapists and general practitioners. All participants had a diagnosis of Multiple Sclerosis by a Consultant Neurologist. Table 1 gives a description of the participants. The extent of disability was assessed by The Activities of Daily Living Questionnaire (ADL) (Staples & Lincoln 1979). The ADL measures a broad range of functional impairment. It consists of 42 items representing the following functional impairment domains: mobility (10 items), communication (4 items), personal care (5 items), domestic activities (18 items), education (1 item), Employment (1 item) and social activities (3 items). Each item is scored on a 1 to 3 scale, with lower scores representing less impairment (0 low disability, 84 total disability). Impairment on this scale (all items except education and employment) correlates with memory impairment indices across all modalities and stages of acquisition

Table 1 Characteristics of participants

Subject number	ADL score	Type of Multiple Sclerosis	Year of diagnosis	Age	Sex	Marital status	Occupation
1	24	Secondary Progressive	1972	56	Male	Married	Retired
2	1	Secondary Progressive	1978	50	Male	Married	Self-employed
3	10	Secondary Progressive	N.A.	56	Male	Married	Self-employed
4	17	Secondary Progressive	N.A.	43	Female	Single	Employed
5	2	Secondary Progressive	1976	42	Female	Single	Unemployed
6	28	Secondary Progressive	1975	43	Female	Separated	Unemployed
7	3	Secondary Progressive	1980	50	Female	Married	Unemployed
8	3	Secondary Progressive	1974	43	Female	Single	Employed

and recall, with the exception of verbal immediate memory span (Kessler et al. 1992). The ADL is not designed to be sensitive to change; it was included in this study to give an estimate of whether level of disability affected responsiveness to the intervention. The level of disability of participants in the study covered a wide range from permanently in a wheel chair (ADL score 28), to occassional use of a wheel chair, to completely independent of walking aids (ADL score 3).

To be accepted into the study participants had to be able to make their own way to the hospital, they had to be capable of filling in the questionnaires and they had to be prepared to make a commitment to regular practise. Participants also had to experience, on an ongoing basis, at least one symptom attributable to their Multiple Sclerosis. Twelve patients were initially entered into the study. Eight of these completed the intervention. One suffered a bereavement and so didn't feel able to continue, two found they didn't like the exercises and so discontinued and one did not complete her symptom diaries and so was not able to be entered into the analysis.

Results

Profile of Mood States (POMS)

Comparisons of the POMS scores for base-pre-post assessments were made using two-way anovas. The results are presented in Table 2.

Student's t tests confirm that significant change occurred for the Depression-Dejection factor between pre(6.25)-post(3.00) measures ($t = 2.07(7)$, $P < 0.04$ (one tailed). A significant pre(13.88)-post(11.25) decrease in Fatigue-Inertia was obtained ($t = 2.317(7)$, $P < 0.03$ (one tailed)). However, this difference ceases to be significant when the variability of base pre scores are also included in the analysis.

Check-list of physical symptoms relevant to Multiple Sclerosis

A summary of the participants' rating of each symptom are presented in Table 3a according to whether the symptoms improved, worsened or remained unchanged. Participants were asked to indicate improvement on a 3-point scale 'little', 'some' or 'a lot'. Proportion of the participants improvement responses (as percentage of total response rate) were as follows, 'little: 16%; some: 9%; lot: 7%'. In Table 3A these three ratings have been combined into one category. 'improved'. A summary of a friend/ relatives' independent rating of the same symptoms are also presented in Table 3B. Proportions of the responses noting improving were as follows: 'little 12%; Some 8%; Lot: 7%'. Participant and friend/family member ratings of overall symptom change and are presented as percentage of symptoms in Table 3C. Using a Chi-square Test of Association significant evidence was found for an association between participants and friend/family members differential rating of

Table 2 Profile of mood states

	Base	Pre	Post	Significance
Anxiety-Tension	6.63	6.63	5.75	–
Depression-Dejection	7.38	6.25	3.00	F = 5.89 (2,14) $P < 0.01$
Anger-Hostility	8.75	6.13	6.50	–
Vigor-Activity	11.88	12.38	12.75	–
Fatigue-Inertia	12.50	13.88	11.25	N.B. see text
Confusion-Bewilderment	5.88	5.50	5.88	–

Table 3A Symptom Check-list. Participants own ratings

	Number of Participants reporting:			
	Symptoms	**Improved**	**Worsened**	**No Change**
Walking distance	8	4	–	4
Walking steadiness	8	3	–	5
Ability to stand	8	3	–	5
Balance	6	2	–	4
Pins and needles	4	2	–	2
Tremor	4	1	–	3
Spasms	4	2	–	2
Bladder	7	4	1	2
Stiffness in Joints	8	5	1	2
General Well-being	8	5	–	3
Fatigue	8	3	–	5
Depression	4	1	–	3
Anxiety	5	1	–	4
Concentration	5	2	1	2
Numbness in Fingers/Feet	7	3	–	4
Fine Motor Control	8	2	1	5
Ability to move legs	8	3	1	4
Co-ordination	8	2	–	6
Sleep	7	1	-	6
Constipation	6	3	1	2
Pain	6	3	–	4

overall symptom change (Chi = 10.13 (2) $P < 0.001$).

Balance

Comparison of length of time (seconds) of balance whilst standing on one leg in pre-post measures were made and are presented in Table 4. A student's t tests shows that there is a significant change occurring between pre(5.63)-post(11.88) measures ($t = 1.96(7)$, $P < 0.05$ one tailed).

Participant feedback

At the end of the intervention participants were sent a feedback form rating the usefulness of the different components of the Tai Chi/ Qi Gong programme. This was returned to the researcher, not the practitioner, and the results are presented in Tables 5A and B.

Homework practise time

Participants were asked to keep a weekly record of how much time they spent doing individual practise. The results are presented in Table 6. It is notable that participant number 6 who practised for the least amount of time was also the most disabled as assessed by the ADL. This participant also reported the least improvement as measured by the 21-item symptom check-list and was the only subject who did not improve in balance (Table 4).

Discussion

Multiple Sclerosis is usually thought of as a progressive deteriorating condition. Recent drug studies utilizing interferon (Holliday & Benfield 1997) have not expected to show any improvements in functioning but rather a slower rate of disease progression. The fact that this pilot study appears to show improvements in functioning in specific areas points strongly to the need for replication with a larger study and extensive follow-up. Multiple Sclerosis has an unpredictable course and this factor makes it a very difficult disease in which to evaluate treatment efficacy. At present there is not one recognized outcome measure that reflects the broad spectrum of symptoms associated with this disorder (Thomson & Hobart 1987). This study therefore had to develop its own symptom rating scale. Since this is a pilot study there was no opportunity to carry out extensive checks as to the reliability and validity of this scale. The authors understand that there is currently some development work being carried out on the standardization of a sensitive symptom rating scale by Thomson and colleagues (1998). Hopefully a future study will have the advantage of being able to utilize such a scale.

Not withstanding these difficulties some interesting patterns have emerged from this study which deserve replication. Firstly, is the finding that depression shows a significant improvement. This would be expected from the non-specific factor of 'doing something', thus giving a sense of mastery. None-the-less, the fact that a significant improvement was obtained with a sample size of only eight is indicative of the strength of

Table 3B Symptom check-list friend/relatives version

	Number of participants reporting:			
	Symptoms	**Improved**	**Worsened**	**No Change**
Walking distance	7	3	–	4
Walking steadiness	7	4	–	3
Ability to stand	7	4	–	3
Balance	6	3	–	3
Pins and needles	5	3	–	2
Tremor	4	2	–	2
Spasms	3	2	–	1
Bladder	5	1	–	4
Stiffness in joints	7	3	–	4
General well-being	7	3	–	4
Fatigue	6	2	–	4
Depression	5	0	–	5
Anxiety	5	1	–	4
Concentration	6	0	1	5
Numbness in fingers/feet	5	1	–	4
Fine motor control	5	1	–	4
Ability to move legs	7	2	1	4
Co-ordination	5	1	–	4
Sleep	6	1	–	5
Constipation	5	2	1	2
Pain	6	1	1	4

Table 3C Percentage of symptoms. Participants and friends/family members rated as improving, worsening and remaining unchanged

	% Symptoms ($n = 21$):		
	Improved	**No Change**	**Worsened**
Participant	31.29	43.54	4.08
Friend/family member	27.21	51.02	2.72

Table 4 Assessment of length of time of balance (seconds) while standing on one leg

Subject number	pre	post
1	5	10
2	5	10
3	5	10
4	5	10
5	15	40
6	3	3
7	2	4
8	5	8
Average	5.63	11.88

exercises did emphasize shifting weight in a controlled way from one leg to the other (See Box 1 for the details). This improvement in balance was accompanied by an improvement in walking as rated by the symptom check-list for distance (four participants) and steadiness (three participants). Difficulties in walking may be determined by factors other than balance, including fatigue as well as afferent and efferent nerve transmission.

These factors may well have been more important than balance for the participants reporting no improvement. The participants who felt their spasms and numbness had improved felt they had benefited in particular from the form of self massage, Tui Na (Mercati 1997). Tui Na massage involves the participant making tiny manipulations of the fingers and toes (see Box 2 for further details). Two participants felt this had been the most useful part of the whole programme as it enabled them to bring sensation back to their extremities, reducing numbness. Table 5 indicates other participants' comments as to which aspects of the programme they found to be most useful. The variety of comments here and the ratings in Table 5A suggest that there is not

the effect. Previous studies utilizing cognitive-behavioural therapy have also produced improvements in levels of depression (e.g. Crawford & McIvor 1987). However this involved considerably more time input, 13 group sessions compared to the six sessions of this study. Specific changes in physical functioning are harder to explain

away by a non-specific effect. Improvements in balance, as measured by the one leg-standing assessment, were obtained by seven of the eight participants. Most participants doubled the amount of time they were able to stand on one leg. Standing on one leg was not part of the Tai Chi/Qi Gong routine, although two of the

Table 5A Participant feedback

	No. of subjects	Very useful	Fairly useful	Not at all useful
Handouts				
1. Introduction	8	6	2	0
2. Summary of key points	8	5	3	0
3. Diagrams	8	4	3	1
Audio tape				
Side A: Tai Chi exercises	7	6	1	0
Side B: Hands-on self healing	7	6	1	0
Video tape	8	6	2	0
Specific exercises				
Warm ups	8	7	1	0
Advice on breathing	8	7	1	0
Advice on posture	8	7	1	0
Advice on walking	7	5	2	0
Spinal stretch	8	5	1	2
Cloud hands	7	4	2	1
First swing	6	4	1	0
Advice on all movement carried				
Out with centredness	8	6	2	0
Self massage	8	6	1	1
Massage by therapist	3	3	0	0

Table 5B Comments as to the most helpful intervention

Helpful advice gained from individual sessions

Subject comment

1. Advice on walking and correcting movement advice

3. Advice on walking, fine motor control and correcting posture

5. Foot massage and correction on walking

7 Advice on breathing

8. Advice concerning balance when walking corrected by stance.

Reported ability to gain immediate or temporary relief from symptoms related to exercises

Subject Comment

1. Exercise routine produces general overall improvement for an hour or more

3. Hand stretch produces improvement in writing

5. Heel-to-toe walking helps balance and spasm

7. Cloud hands improves fatigue for 30–40 min

one aspect of the programme in particular which could be identified as being solely responsible for improvement. The programme as a whole, (including handouts, audio tape, videotape and individual instruction on exercises) seemed to be valued in its entirety.

Conclusion

This pilot study found that an intervention of six sessions of individual Tai Chi/Qi Gong instruction, supplemented by audio and video teaching aides produced significant improvements in depression and balance across the group as a whole. Specific improvements for individuals were also reported on a range of other symptoms including spasms, numbness, bladder control and walking.

Proponents of Tai Chi/Qi Gong suggest that benefits often only accrue after sustained practise over a period of months. It would therefore be important to collect further follow-up data. The authors hope to publish follow-up results in the near future as well as

Table 6 Homework practice time (minutes/week)

Subject Number	1	2	3	4	5	6	7	8
Practice time (mins/week)	210	210	420	315	105	52.5	315	140

Box 1 Learning to shift weight without falling

One of the most common problems encountered by people with Multiple Sclerosis is losing balance. This can result in falls and serious injuries. Learning to shift weight in a controlled way is therefore of vital importance Tai Chi/Qi Gong has specific exercises for this problem.

First Phase: Developing the sense of being aligned, centred and grounded.

(1) Stand with feet slightly wider than shoulder width apart.
(2) Have the feeling that your weight is going down through the back of your legs, into the centre of your knees, down into the centre of your feet and then down towards the centre of the earth. Your knees should be slightly bent.
(3) Ensure your pelvis is 'tucked under', not pushed forward or back but free to float or swing. Keep your belly soft and relaxed to ensure your centre of gravity is as low as possible (Fig. 1A).
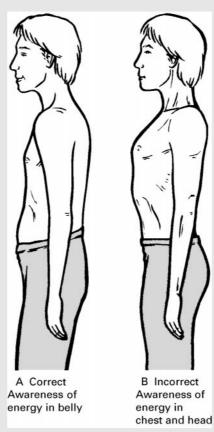

A Correct Awareness of energy in belly

B Incorrect Awareness of energy in chest and head

Fig. 1 The Standing Posture. Centred, aligned and grounded versus tense and off-balance.

(4) Gaze as if resting your eyes on the horizon. Have the feeling that the skull is like a balloon lifting up towards the sky.
(5) Let long breaths out, making sure your belly stays soft, encourage a sense of 'aliveness' in the belly.
(6) Imagine a line going through your hips, this line is going to stay parallel with the floor as you slowly move your weight from one leg to the other (Fig. 2).
(7) As your weight shifts over to one leg notice how you can breathe out and feel a sense of connection with the earth – as if roots were extending down from the centre of your feet.
(8) You are now in effect balancing on one leg. The unweighted leg, if desired, can be lifted off the ground. Shift your weight from side to side several times, ensuring your hips stay parallel to the floor, your breathing is relaxed, your knees are bent and your weight goes down into the centre of your feet. Once this has been mastered you are ready to apply the same principles to walking.
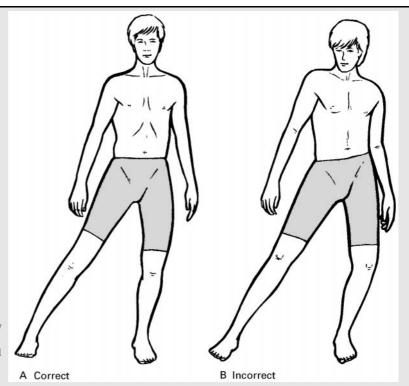
Fig. 2 Shifting weight from side to side. (A) Body aligned and grounded versus misaligned and off-balance. (B) Body misaligned (head, shoulders and pelvis at different angles), therefore, ungrounded and unbalanced.

A Correct   B Incorrect

Second Phase: Tai Chi Walking
When walking, people with Multiple Sclerosis often drag their legs along behind them and then 'topple-over'. So the first rule is: 'shifting of weight only occurs when a foot is in place ready to receive the weight. This can be practised as follows:

(1) Stand as in previous exercise (side-to-side weight shifting). When weight is fully over one leg, bring the unweighted leg up to meet it. Encourage the feeling that all movements of the legs are initiated from the waist.
(2) Keep the weight going down through the 'rooted' leg and move the unweighted leg forward and hip width out and a small pace forward, landing with a heel 'strike' (Fig. 3).

Fig. 3 Placing the leg before shifting the weight.

(3) Only then shift weight onto this leg, letting the foot roll down so that the weight goes down into the centre of the foot. When this leg is 'rooted' then bring the other leg up to it and repeat the whole process. You are now doing Tai Chi Walking!
(4) This procedure may seem contrived but slowing the whole process down encourages mind-body co-ordination and eventually the process can be taken into a faster more 'normal' walk but with a greater sense of balance and security.

Box 2 Bringing sensation back into the extremities: Tui Na Massage

Many people with Multiple Sclerosis experience loss of sensation and fine motor control in their fingers and toes. This makes it difficult to manipulate small objects or engage in small movements such as those required by handwriting. Tui Na massage was found to be very effective in this study to help with these problems.

Self-help exercises for the hands

1. Stretch the hands out wide, spacing the fingers apart then bring back into a fist, repeat several times in quick succession.

2. Give the hands a shake as if trying to shake off loose water.

3. Make gentle rotating movements with the wrists of each hand.

4. Make small circular movements with the index finger and thumb of one hand over the back and front of the other hand including the fingers (Fig. 4).

5. Lightly hold a finger between the thumb and two fingers of the other hand. Hold the finger just above where it joins the hand. Make small elliptical movements gently spacing the fingers away from the hand. Repeat for all five digits, change hands (Fig. 5).

6. Finish with one hand lightly placed in the other. Both hands resting lightly over the 'Tantien' (just below the navel). Imagine all the muscles in the hands unwinding, the blood vessels dilating, the nerves making a stronger connection to the brain. Feel your breath flowing into and out of the hands (Fig. 6).
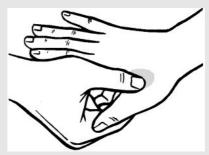
Fig. 4 Self massage of the hands.

Fig. 5 Easing apart the joints of the fingers to encourage circulation and the flow of 'chi'.

Fig. 6 Encouraging a sense of connection between the periphery and the centre.

comparison details with a control group. In addition it is thought that the trends shown in this pilot study warrant a replication, utilizing both a larger sample and assessed with the newly developed asesssment scales of Thompson et al (1998).

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