

Yoga as an Experimental Intervention for Cognition in Multiple Sclerosis

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Abstract

In order to study the possible effects of Yoga on cognitive function in multiple sclerosis (MS), we have set up six-month-long classes that meet for 90 minutes once a week. The format for the class follows the Iyengar approach to Hatha-Yoga, which utilizes “props” such as chairs, blankets, or straps that aid the less supple/strong body in achieving the Yoga poses. In particular, people with MS can suffer from balance problems, limb weakness, numbness, and fatigue. Iyengar Yoga thus lends itself particularly well to formulating a class for students with MS. This paper describes the actual Yoga intervention for people with MS and discusses some of the problems in experimental design and logistics encountered in setting up the study.

Introduction

The Oregon Center for Complementary and Alternative Medicine in Neurological Disorders (www.ohsu.edu/orccamind) was established at Oregon Health & Science University (OHSU), Portland, Oregon, through funding from the National Center for Complementary and Alternative Medicine at the National Institutes of Health. Our study, “The Effects of Yoga on Attention in MS,” was one of four initially funded research projects. It is a neurophysiological and cognitive study of MS.

MS is a common neurological disease of uncertain etiology. The disease affects the white matter of the brain and spinal cord. The disease process causes inflamma-

tion, demyelination, and eventually sclerosis (scarring). The immune system has a major role in the disease and MS is considered an autoimmune disease. The disease onset is probably related to an environmental event although there is a genetic predisposition with higher than expected incidence rates among family members of people with MS. MS is more common in latitudes farther from the equator, more common among women, and more common among white populations.

The disease usually begins in early adulthood (ages 20–40 years) but cases can begin in early childhood or after age 65. The disease can be relatively benign or cause rapidly progressive disability. The most common form of the disease is characterized by exacerbations or episodes of worsening neurological impairment that may improve (relapsing-remitting). Other variants include progressive forms (either from disease onset or after a period of relapsing-remitting symptoms).

The clinical diagnosis of the disease is based on documenting at least two brain or spinal cord lesions separated in both time and space.¹ The white matter pathology may affect the optic nerves (optic neuritis), spinal cord (transverse myelitis), cerebrum, cerebellum, or brain stem. To assist with the clinical diagnosis, the MRI scan is used to document white matter lesions that may not be producing clinical symptoms. Cerebrospinal fluid analysis is used to document inflammation in the central nervous system, and evoked potential studies are used to document slowing of central nervous system conduction velocity due to demyelination. In our study, time and care were taken to review the neurologist’s records of documentation, and when necessary were sup-

plemented with the intake exam and medical history. Only those with a confirmed diagnosis were eligible for the study.

Current treatments for MS are either targeted to shortening the

After diagnosis, [Eric Small] investigated Yoga and felt so strongly that Yoga ameliorated his symptoms he became a certified teacher of Iyengar Yoga himself.

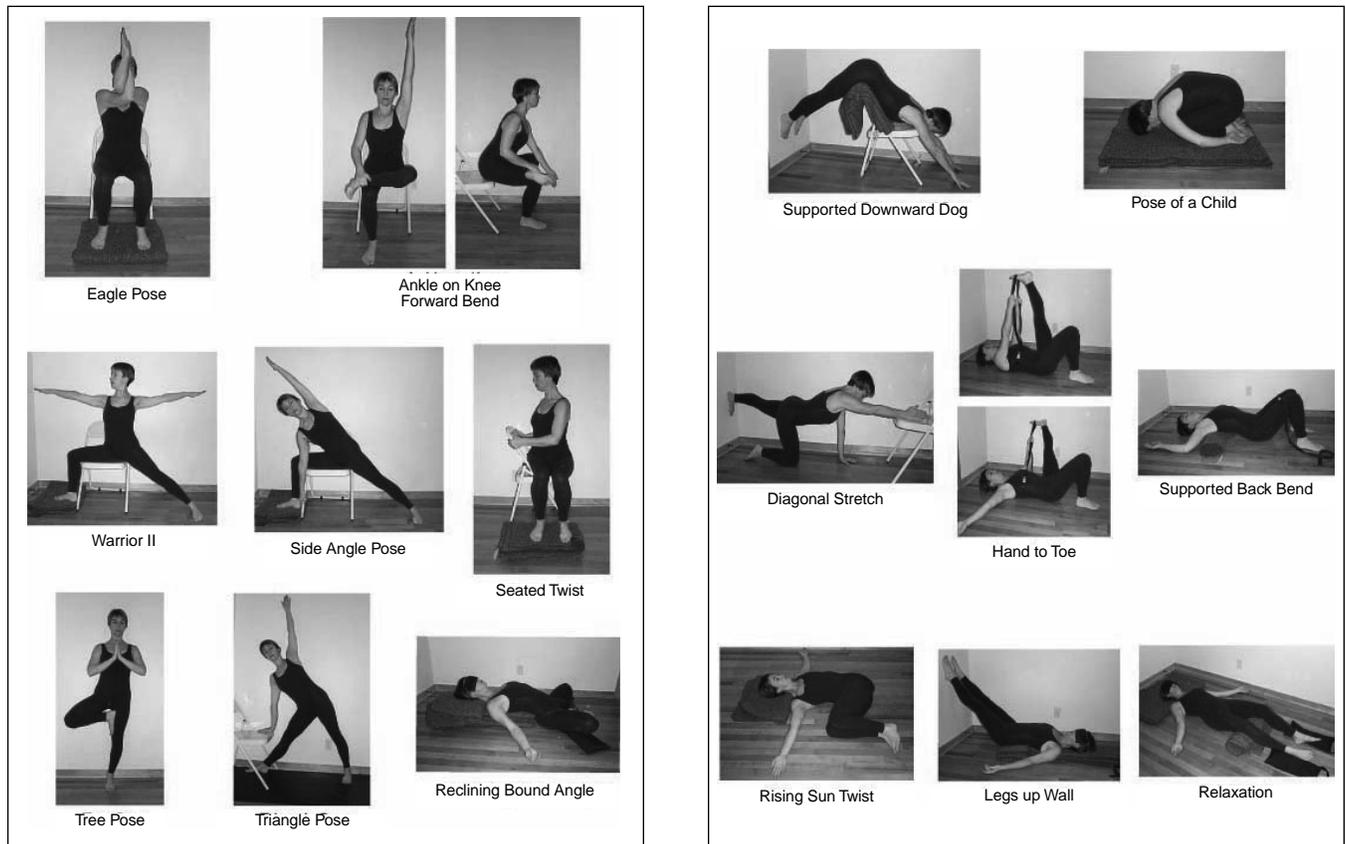
duration of the exacerbations (methylprednisolone) or preventing exacerbations (interferon, glatiramer acetate, and mitoxantrone). These treatments are all given via injections and have significant side

effects. Other treatments are targeted to specific symptoms of the disease (e.g., spasticity, pain, fatigue, bladder dysfunction, and depression). Exercise, diet, antioxidants, botanicals, and other alternative therapies are often advocated but their role has not been fully evaluated.

Symptoms sometimes seen in MS relevant to the Yoga practice include weakness or loss of sensation in the limbs, ataxia, spasticity, hyperreflexia, double vision, bladder dysfunction with urinary urgency and frequency, depression, fatigue, and tremor. Symptoms secondary to MS may be worsened by increased temperature. Cognitive dysfunction also occurs. The most prominent deficits are in speed of processing and attention, although deficits may be seen in other cognitive areas, such as memory and visuospatial processing.^{2, 3, 4}

In this study, our primary outcome measures will be changes in alertness as measured by electroencephalography and ability to focus attention.⁵ Secondary outcome measures will be ability to divide attention,⁶ ability to shift spatial attention,⁷ ability to shift attentional set,⁸ visual processing speed,⁹ ability to sustain attention, memory as assessed by a word list recall task,¹⁰ working memory as assessed by Letter Digit Sequencing,¹¹ attention and vigilance as assessed by the Paced Auditory Serial Addition Test,¹² mood as assessed by Profile of Mood States,¹³ stress as assessed by the State Trait Anxiety Inventory,¹⁴ quality of life as assessed by SF-36,¹⁵ one-legged balance, and ability to bend forward while in a seated position.¹⁶

The purpose of our study is to generate data from a large enough



Figures 1 and 2 show poses from the Yoga booklet handout. Note how the wall stabilizes the student in tree pose and the student's leg in hand to toe.

Subject #	1	2	3	4	5	Mean
Percent of study days Yoga was practiced	45.8%	92.1%	73.2%	32.1%	41.6%	56.9%
Average minutes of Yoga practice/ day	39.8	21.1	34.9	35.1	37.8	33.8

This table shows compliance data from the five subjects who completed the first Yoga class. The percentage is based on all days that each subject did Yoga over the study period.

completed a 6-month Yoga class, and 19 more are currently in classes.

Class is held at a Yoga studio that opens at street level with no stairs. The necessary props are 1 folding chair, 3 blankets, 2 sandbags, 1 sticky mat, 1 eye bag, and 1 D-ring strap for each student. The chairs address the fatigability issue, allowing support of the body while still benefiting from stretching (e.g., warrior II), and the sandbags are useful to help counteract spasticity. If possible, a sturdy (to support the weight of the sandbags) rolling cart is handy for quick and easy distribution of props. In the home, the student is encouraged to improvise, e.g., by doing supported downward dog off the edge of the bed, or by substituting ties or old belts for the D-ring strap.

The aspects of Hatha-Yoga taught usually in the same order, but not necessarily at every class are:

- Breath work
- Mountain pose (seated), *tadâsana*
- Arms overhead stretches
- Eagle pose, *garudâsana*
- Ankle on knee forward bend
- Warrior II on chair, *vîrabhadrâsana II*
- Side angle pose, *parshvakonâsana*
- Seated twist, *bharadvajâsana I*
- Tree pose, *vrikshâsana*
- Triangle pose, *trikonâsana*
- Reclining bound angle, *suptabaddha-konâsana*
- Supported downward dog, *adhomukha-shvanâsana*
- Cat pose

- Pose of a child, *balâsana*
- Table pose to diagonal stretch
- Hand to toe, *supta-padângushthâsana*
- Supported back bend
- Rising sun twist, variation of *jathara-parivartanâsana*
- Legs up the wall, *viparîta-karanîmudrâ*
- Relaxation pose, *shavâsana*

The class is designed to intersperse restorative poses among the more strenuous poses. Some kind of mild inversion is always included.

The participants are given a booklet of these poses (compiled in Figures 1 and 2) and a log with the above list juxtaposed to days and dates, providing a grid to record practice (Figure 3). The booklet and log are teaching instruments for practice away from class. The log also becomes a source of compliance data

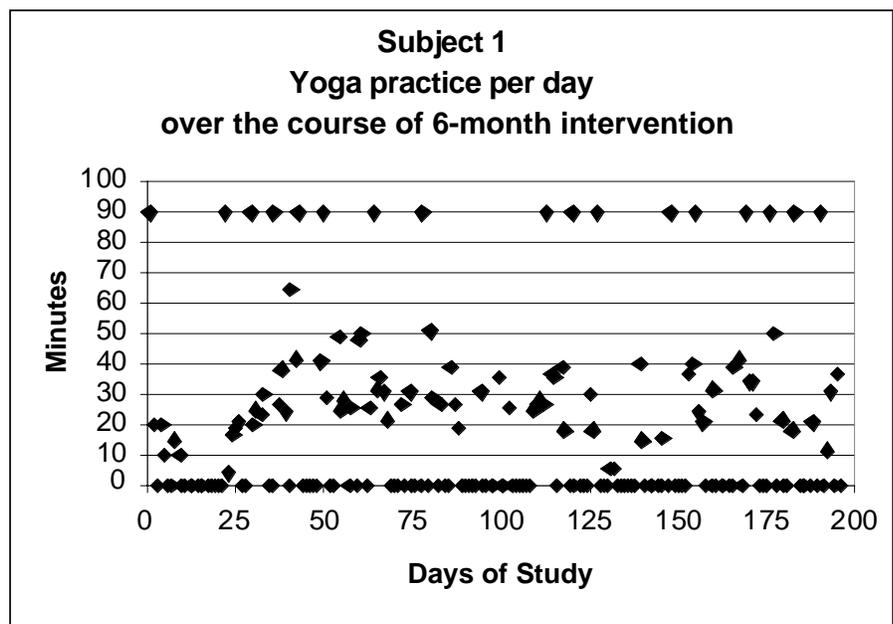
for the study. These are sent in once a month to the study coordinator.

The data from each person's log is entered into a spreadsheet and then become part of the study database. The compliance log data from the five subjects who have completed the Yoga class are presented in the table, and an individual profile of Subject #1 is also presented (Figure 4).

Discussion

While the basic class structure is implicit in the above list of poses, more must be said of the Yoga class process. Our Yoga teacher has over five years of teaching experience after having trained with an Iyengar-certified teacher. This level of qualification is necessary to guide the student into and out of each pose safely and to maximize the intended benefit.

Teachers should also be knowledgeable about problems common to the person with MS. To accommodate the symptom of fatigability, we feel that poses should not be held longer than a count to 10, and ample rest and restorative poses should



occur throughout the class. To accommodate memory problems, repetition is key to teaching: Repeat the instructions, repeat the demonstration, and have the student repeat the poses. Regarding student vulnerability to heat, the temperature of the room must be cooler than for the usual class.

Our teacher facilitates sharing at the beginning of each class and gives “homework.” She instructs students that the Yoga class is *not* to be treated as “a pill to be taken,” but

We experienced a higher dropout rate across our experimental MS groups than for another similar study on Yoga effects in healthy elders.

rather as a means to building awareness of their own body’s needs. She may also give them specific poses for individual problems—hence the empty spaces at the bottom of the class log list where they can write down these extra poses. When MS exacerbations occur, students are encouraged to maintain a practice as allowed. This would include breath work and restorative poses, and inversions if possible. To summarize, participants are encouraged to use the class as a springboard to enter their own proactive Yoga practice in handling the symptoms that arise from MS.

From our experience in setting up the study, we offer several recommendations for Yoga classes designed for people with MS, whether the classes be research or community-service oriented. The site must be accessible to people with disabilities, with parking close by so that a student does not get

fatigued just getting to class. The bathroom must be readily accessible, and multiple bathrooms would be ideal to handle the common bladder urgency and frequency symptoms associated with MS. The site should have air conditioning or adequately cooling ventilation because heat is debilitating for many with MS. Not holding classes during summer should be seriously considered.

As noted previously, people with MS span the young to old and have marked variations in degree of disability. They may still be working outside the home, or they may have stopped working due to disability. Class scheduling must take this into account as well as the significant issue of fatigue. Many who have MS feel they cannot schedule activities during the evening or early morning. Class size is limited due to the increased need for individual attention. This can be alleviated with the use of an aide(s) in the class, perhaps someone in teacher training.

Other issues relate specifically to the use of Yoga in research. We experienced a higher dropout rate across our experimental MS groups than for another similar study on Yoga effects in healthy elders. Researchers thus need to incorporate a larger than expected percentage dropout rate in their recruitment plans. In our first group, 23 people were randomized and 7 dropped out of the study for a 30.4% dropout rate. Reasons for dropping out appear to be diverse. The teacher and/or research staff should be prepared for troubleshooting various problems such as transportation and mobility. Additionally, psychological and cognitive problems such as depression, memory, confusion, and lack of a supportive social milieu can interfere with getting to the class and practicing at home. To avoid dropouts due to disappointment at not

getting assigned to the Yoga class group, prospective participants must be well informed about random assignment. They should even be discouraged from participating in the study if they so strongly favor the Yoga class that they may not be able to accept random assignment into the other groups.

Other research issues involve “blinding” the testing staff to the group assignment of each individual so that outcome measures are taken without any expectations. Objective outcome measures can diminish the effect of unblinded expectations by the testing staff, but care should still be taken to remind the participant not to divulge assignment information. This is difficult because the assignment is of great interest and ready conversation for the testing context. Moreover, one of the research staff must be unblinded in order to facilitate class setup.

Design of the control group must take into consideration several aspects besides the pure physical activity. First of all, the social aspect that a Yoga class engenders is considerable in before- and after-class conversations. In our first group, lasting friendships were established. Besides each other, the teacher also becomes an important mentoring figure in the Yoga students’ lives. To control for this interpersonal dynamic, we sought out a physical therapist to lead the weekly exercise class. She is an MS expert and well known to the community. Ideally, the waiting-list, no-treatment control group would also have had some weekly social meeting not centered around a physical activity to better control for the possible benefit of social stimulation. Lastly, the activity control group must compete on an interest level given the popularity and attention that Yoga has received from the popular media.

Researchers at OHSU²¹ recently surveyed the MS patient population. One item dealt with the use of Yoga and subjective satisfaction. A preliminary analysis of 505 out of 1,980 respondents shows that 31% have taken Yoga, and of these 49% report Yoga as being “very beneficial.” This high level of satisfaction merits attention by the research community and more importantly Yoga teachers who may be able to serve people with MS.

Not only do we intend this report on the Yoga class as part of our publication of the study (please note that the final analyses and reports from the study will be forthcoming at the end of 2002/beginning of 2003), we also wish to respond to the many inquiries from beyond the study locale. The interest in Yoga and its effects on MS is very high among patients, health practitioners, researchers, and teachers. We hope this paper adds to complementary and alternative medicine resources available to this community.

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Endnotes

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