Wisdom of Tree Pose

Tree pose is a beginning balance asana in yoga. It's one of the few balance poses you will find on the menu for senior yoga classes. In the YESS, Yoga Empowers Seniors Study, we investigated the risks/rewards of 3 versions of tree. In its simplest form, C., students faced a wall and placed their fingertips on the wall for balance. Students also kept the ball of the foot on the bent leg pressing into the floor with the heel pressing into the inseam of the standing leg. This allowed students to use both feet on the floor to create more stability in a closed chain for both legs. We "advanced" the pose in B. by dragging the heel of the bent leg up the inseam of the leg and onto the calf in a more traditional version of the pose. Students still used the fingertips on the wall to steady their balance. And in the final version, A., students took their hands off the wall to balance with the shoulders in 30 degrees of abduction with straight arms.

In the lab, a plexiglass "wall" was created to allow the cameras to record the biomechanical measurements. What we discovered is that the hip abductor activation (termed "moments") on the standing leg, which are crucial to balance, were the same whether hands were on the wall or off the wall. In reality, if students are unsteady without the support of the wall, they tend to jut the hip out in the coronal/frontal plane or let the hip collapse forward in the sagittal plane. So that in reality, often students will get more strength from using support of a wall, chair or something else to steady themselves. Of course, to a degree, they will miss the opportunity to cultivate more balance. But for many older adults, it still feels like a challenge to balance while using the hands on support. And the truth is that any time balance is challenged in a safe way, having better alignment trumps being hands free.

And we know that when balance is unsteady, students tend to lock their knees without even realizing it. In addition, the study found lateral pressure (in the frontal plane) on the standing knee when one foot was off the floor. So for students who have knee OA, osteoarthritis – and there are many older who do! – the simple version with both feet on the floor may build the most strength with the least risk. Note that for most older adults, the foot of the lifted leg is on the calf and not the inner thigh. This explains the lateral pressure on the knee. Experienced, flexible – and dare I say "advanced" – students who can place the lifted foot all the way up to the groin may not have this same lateral pressure on the knee of the standing leg.

One of the challenges of teaching older adults is to make it challenging and safe. One key is to start with the simple version and feel the work in the legs and the strength you building. Feel the power and stability of the pose. You can increase the difficulty by adding arm movements on the breath. I also like to have students place a foam block on their head while they get into the pose. This really teaches the inner wisdom that we all have to find center and be steady. Plus, it's sure to lighten the mood and make it more playful.

For a closer look at the scientific results, read “Conventional Wisdom regarding Yoga Pose Modification may not Benefit healthy Older Adults: Examining the Modified Tree Pose.

CONVENTIONAL WISDOM REGARDING YOGA POSE MODIFICATION MAY NOT BENEFIT HEALTHY OLDER ADULTS: EXAMINING THE MODIFIED TREE POSE

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INTRODUCTION

Yoga is widely accepted as a beneficial exercise activity for older adults because of its relatively smooth movements and low resistance, and its purported associated improvements in strength, muscular endurance, flexibility, and balance [1, 2]. Conventional wisdom suggests, however, that the traditional poses (asanas) used in older-adult programs should be modified in order to increase senior participation and prevent injury. One pose traditionally incorporated into these programs is the Tree (Vrksasana; Fig. 1a). Common modifications of the pose include the use of a wall for balance (TreeW; Fig. 1b) and placement of the contralateral foot on the floor (TreeWF; Fig. 1c). In this study we sought to better understand the biomechanical demands of the tree pose and its modifications by examining the lower extremity joint moments engendered during their performance by senior participants.

METHODS

Two male and eight female, healthy older adult participants (71.5 ± 5.0 yr.) were recruited from the greater Los Angeles area. Participants had limited exposure to Yoga and were free from neurological and musculoskeletal disorders prior to participating in the study.

For the study, a yoga program was specifically developed for older adults and implemented with several traditional Yoga asanas at a beginner's level. In order to become familiar with the poses, the participants practiced yoga under the guidance of an experienced yoga instructor twice weekly for 16 weeks.

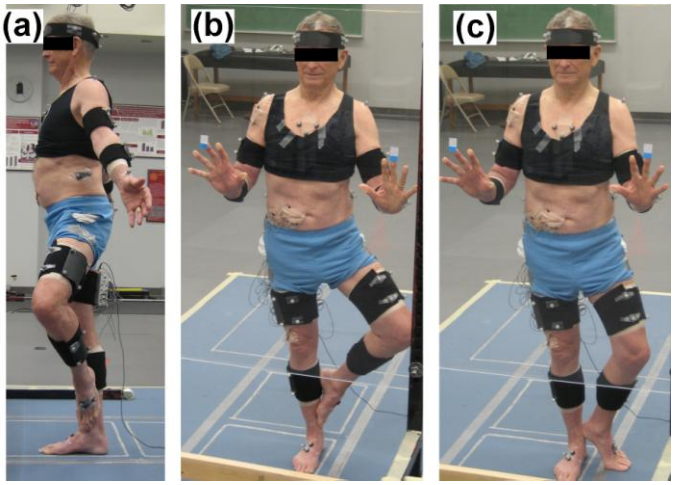

Figure 1: Variations of yoga Tree pose. (a) Tree: the traditional Tree pose with single leg stance only; (b) TreeW: single leg stance with lateral support from hands; (c) TreeWF: full support from both feet and hands.

After the yoga sessions, the participants were instrumented for biomechanical analysis in a laboratory setting. Each of the three Tree pose variations were performed with two repetitions while the yoga instructor provided standard positioning and movement cues. Under instructions from the yoga instructor, the participants positioned a pose, held it for a full breathe and then returned to relaxed position. Kinematic and kinetic data were collected over 3 seconds during the static portion of the pose.

Joint moment of force (JMOF) of the dominant knee and hip in the frontal plane, and the support moment [3] were chosen as dependent variables and averaged over the full duration of each trial and both repetitions. They were also normalized by the participant's body weight. Repeated measures ANOVA and Tukey HSD post hoc tests were used

to examine the differences in the outcome variables across variations of the Tree pose.

RESULTS AND DISCUSSION

The internal moment differences across the Tree variations are illustrated in Fig. 2.

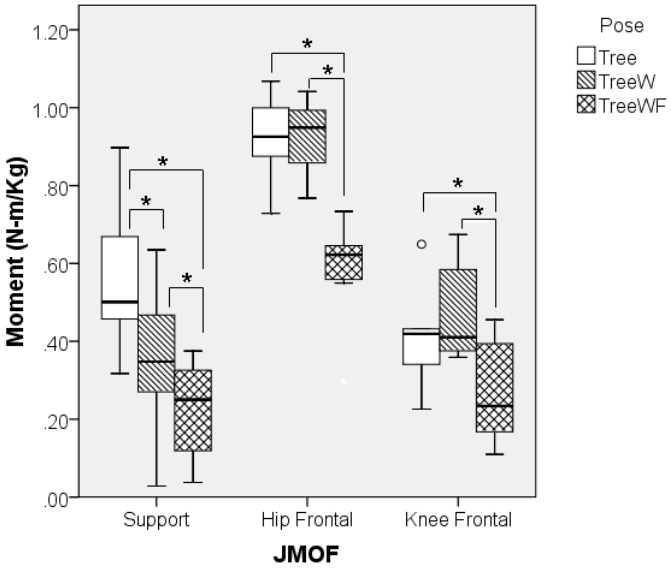

Figure 2: Comparison of JMOF for Yoga pose variations –Tree, TreeW, and TreeWF. (* $p \leq 0.01$)

Support moment for the traditional Tree pose was significantly larger than both of its variations (Table 1). In addition, TreeW was also significantly larger than TreeWF. These findings suggest an increasing physical demand from the double support to single-support position (TreeWF to TreeW) and from wall support to unsupported pose (TreeW to Tree).

Surprisingly, the hip abductor moment did not differ between the Tree and TreeW; however, both single-support poses produced a hip abductor moment that was greater than the double-support pose. Thus, it appears the hip abductor moment associated with the two single-support Tree poses is not affected by wall support and both of these forms of the pose are likely to have a similar effect on hip abductor adaptation.

Similarly, the knee abductor moment for the Tree and TreeW were significantly greater than TreeWF. There was no significant difference between Tree and TreeW. Since high knee frontal moments may be detrimental to the knee joint, both single-support Tree poses appear to expose the same risk level of injury and osteoarthritis(OA) [4] in this population, independent of wall support.

CONCLUSIONS

Traditional perspectives related to the modification of yoga poses may not lead to safer or more effective positions for older practitioners. This study demonstrated that using a wall for support during performance of the Tree does not reduce knee or hip frontal plane moments. With regard to hip strengthening, it is observed that both single-support Tree poses are likely to be equally effective at targeting the hip abductors. Thus, instructors need not insist on a free-standing Tree pose for this training purpose and older adults with balance limitations can be encouraged to use a wall for support. Conversely, using a wall for support in order to reduce the risk of injury or deteriorating OA associated with performance of the Tree pose, is not likely to be helpful. In this case, the double-support Tree variation may be more appropriate, although the effects of this modification on hip abductor adaptations and overall LE strengthening/fatigue resistance, are likely to be reduced.

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ACKNOWLEDGEMENTS

Supported by NIH Grant ROI-AT004869-01.

Table 1: JMOF and Support Moments Across Tree variations

JMOF (N-m/Kg)	Average across subjects			Mean difference ± Std error		
	Tree	TreeW	TreeWF	Tree-TreeW	Tree-TreeWF	TreeW-TreeWF
Support Moment	0.55 ± 0.19	0.38 ± 0.23	0.26 ± 0.20	0.17 ± 0.04*	0.29 ± 0.04*	0.12 ± 0.04*
Hip Frontal Moment	0.92 ± 0.11	0.93 ± 0.09	0.59 ± 0.12	-0.01 ± 0.04	0.33 ± 0.04*	0.34 ± 0.04*
Knee Frontal Moment	0.44 ± 0.16	0.47 ± 0.12	0.27 ± 0.13	-0.03 ± 0.03	0.17 ± 0.03*	0.20 ± 0.03*

*: The mean difference is significant at $p < 0.01$.