Yoga, as a transitional platform to more active lifestyle: a 6-month pilot study in the USA

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Summary

A 6-month pilot study explored the effects of a yoga program on the physical activity (PA) level of overweight or obese sedentary adults. Fourteen community-dwelling overweight or obese sedentary adults participated in a 6-month program (2-month yoga program and 4-month follow-up) delivered by two types of instruction [the direct guidance of an instructor (face-to-face group) vs. the self-learning method of using a DVD (DVD group)]. Measurements included program adherence (class attendance and home practice; min/week) and level of PA [metabolic equivalent (MET)—hour/week] at baseline, 2, 4 and 6 months. Descriptive statistics and nonparametric tests were used to describe the sample and examine differences by group and time. There were no significant differences in demographic variables by group assigned. Participants showed significant PA changes from baseline to each measurement point. The direct guidance of an instructor was preferred over the self-learning method. At each time interval, the DVD group showed higher levels of PA than the face-to-face group; the only difference that achieved statistical significance occurred at 4 months. The PA level significantly changed over 6 months in the DVD group, but not in the face-to-face group. The results indicate that a yoga program may be utilized as a ‘stepping-stone’ toward regular exercise among overweight sedentary adults. Research with a larger sample is needed to further evaluate the effects of the program on the level of PA among this population.

Key words: physical activities, sedentary behavior, yoga, overweight

INTRODUCTION

Extensive research demonstrates that physical activity (PA) improves general health and lowers the risk of various chronic diseases (Physical Activity Guidelines Advisory Committee, 2008). Even light-intensity PA significantly benefits physical health and well-being (Buman et al., 2010). However, physical inactivity is highly prevalent in all age groups in the USA and worldwide (Haskell et al., 2007; Centers for Disease Control and Prevention, 2010a, b; Schoenborn and Adams, 2010; Lee et al., 2012). Physically inactive or sedentary people may find it especially difficult to adopt and maintain an active lifestyle because baseline PA levels significantly predict initiation and adherence to PA (Arikawa et al., 2012). Weight status has been significantly associated with physical inactivity in children and adults (Young et al., 2009; Dorsey et al., 2011) and serves as a significant barrier to exercise (Napolitano et al., 2011). Sedentary behaviors are...
significantly related to poor health outcomes, including mortality (Thorp et al., 2011). Therefore, encouraging PA among those who are sedentary and overweight requires solutions that overcome barriers to beginning and maintaining a PA routine.

Research suggests that yoga participation and mastery can improve the degree of exercise self-efficacy, and perhaps, lead to adherence in a PA program and its attendant benefits (Oleshansky, 2004). Traditional hatha yoga is a form of light–moderate PA that incorporates relaxation, breathing exercises and various physical postures (Nayak and Shankar, 2004). Postures using the body are called asanas; breathing techniques, combining inhalation, exhalation and suspension are called pranayamas (Raub, 2002). Over the years several styles of yoga have evolved, which include various levels of exertion and different practice outcomes. Yoga uses a holistic approach based on person-centeredness and mind–body connectionism (Hughes, 2008). As a mind–body program with a low intensity level, yoga may be a practical way for physically inactive people to adopt healthier habits and decrease overall sedentary time. In addition, yoga can promote motivation for PA (Zajączek and Schier, 2011), thereby increasing confidence in daily activities (Kinser et al., 2013). One study showed that a 10-week yoga program helped sedentary adults increase their PA level and adherence to PA (Bryan et al., 2012). However, in another 8-week study, a yoga program did not have significant effects on PA (Alexander et al., 2012). There are few studies on the relationship between a mind–body program and general level of PA. This pilot study aimed to explore the effects of a yoga program, using either face-to-face instruction or a home DVD, in changing PA levels among overweight sedentary adults.

METHODS

This study employed a 6-month (2-month yoga program and 4-month follow-up) randomized controlled trial design. Sample size was determined based on the feasibility of recruiting and retaining study participants for 6 months and by estimating descriptive statistics of efficacy endpoints, rather than having sufficient statistical power to formally test hypotheses.

After Human Subjects approval was received, subjects were recruited through announcements in the community newspaper, nearby hospitals and fliers at local bus stops. From February 2011 to March 2011, 38 people responded to recruitment and 35 underwent the prescreening process via telephone. Prospective participants were screened for age, family history of diabetes and medical and/or physical conditions that would prevent them from exercise in order to ensure safety of the intervention. Exclusion criteria included any of the following: morbidly obese [body mass index (BMI) >45 kg/m²]; diagnosis of diabetes (including gestational); psychotic disorder; severe lung or heart disease; unstable high blood pressure or recent changes in blood pressure medication; joint replacement surgery within the past year; pregnancy and any regular exercise within 6 months.

Of the 26 potential participants who met the screening criteria at prescreening, 19 attended the clinical screening (see Figure 1 for screening and enrollment information). The clinical screening measured blood pressure and BMI to confirm eligibility. Prospective participants were excluded if blood pressure was high without taking stable blood pressure lowering medication and/or if BMI was classified either as ‘normal’ or ‘morbidly obese’ (BMI 18.0–24.9; >45 kg/m²). Five people were ineligible after the clinical screening because they did not meet the BMI inclusion criteria. After the clinical screening, 14 people were eligible to participate in the study. An inclusion rate of 36.8% was higher than our previous yoga study in the same population, which required additional lab results such as cholesterol (22.3%; 112 responded to the recruitment and 25 randomized for the study; Yang et al., 2011).

Intervention program

All participants engaged in a yoga program that was delivered by two different instruction types: ‘face to face’ using the direct guidance of a yoga instructor (FTF) or ‘home DVD-based’ using a self-learning method (DVD). Participants were randomly assigned to the instruction type: FTF (n = 7) and DVD (n = 7). Both FTF and DVD covered a 6-month period consisting of 90 min of yoga per week. We chose Vinyasa yoga for this study because it is more fitness-based than traditional hatha yoga and it is commonly practiced in the USA (Gilbert, 1999). Vinyasa yoga combines physical postures (i.e. sun-salutations, standing poses, seated/kneeling poses, counter-poses and relaxation) with various breathing patterns.

FTF participants attended weekly yoga sessions guided by a certified yoga instructor (200 h Registered Yoga Teacher with Yoga Alliance). For 2 months, the sessions were held weekly for 90 min in a private setting, and attendance data were collected. DVD participants practiced yoga at home once per week for 2 months using a pre-selected DVD set containing 90 min of yoga including fundamental poses, awakening practice and quieting practice. DVD participants were also offered two introduction classes where the certified yoga instructor explained how to use and follow the DVD program and provided written...
documentation for daily reference in order to ensure their safety. Before the sessions, the yoga instructor was aware of preexisting conditions that could have affected participants’ safety and instructed participants in basic precautions during the classes. Instructors modified poses as needed to ensure safety throughout the study period (e.g., used props or blankets for kneeling poses). Participants were reminded throughout the practice to listen to their bodies and to report any discomfort or pain.

For both groups, in addition to these sessions (i.e., 90 min every week for the first 2 months), participants were instructed to practice yoga at least twice per week at home. They were asked if and how much yoga they practiced at home in addition to the required yoga practice. To encourage and facilitate home practice, participants in FTF were given the same DVD as the DVD participants. DVD participants were encouraged to keep using the DVD set for home practice.

**Measures**

Height and weight were measured during clinical screening and at 2, 4 and 6 months. Height was measured on a wall-mounted stadiometer with the participant standing in bare feet. Body weight was measured on a Tanita Digital Scale (Tanita BF350 Body Composition Analyzer/Scale) while participants wore light clothing and stood erect with bare feet on the scale, following a 12-h, overnight fast. BMI was used to determine overweight or obesity. BMI was calculated as weight (kg)/height (m)^2.

Using the following questionnaires, we gathered participants’ demographic and co-morbidity data (baseline only), their level of PA (baseline, 2, 4 and 6 months), adherence to the protocol (from baseline for 6 months) and program satisfaction (6 months).

The Demographic Questionnaire and Brief Co-Morbidity Questionnaire, developed by the Center for Research in Chronic Disorders (CRCD) at the University
of Pittsburgh School of Nursing, collects information about age, marital status, race, educational level, employment status, income, menopausal status, smoking status, living arrangements, religion and health insurance. Co-existing diseases such as depression and anxiety were evaluated by asking if they had ever had the condition (yes vs. no).

The Modifiable Activity Questionnaire (MAQ) (Craig et al., 2003) was used to measure level of PA (MET-minutes/week) and sedentary behaviors (e.g. time watching TV) over the past 2 months in both groups (at baseline, 2, 4 and 6 months). Using a comprehensive list, participants were asked to identify all activities they had done in the past 2 months. Then, they estimated the average frequency (number of sessions per month) and duration (minutes per session) of each identified activity. The MAQ has been shown to be both reliable and valid in healthy and overweight adults through comparisons with activity monitors, fitness testing and the doubly labeled water technique (Kriska et al., 1990; Schulz et al., 1994; Pettee Gabriel et al., 2009).

Participants were given an exercise log and instructed to record the number of minutes they practiced yoga at home, daily, during both the 2-month intervention period and the subsequent 4-month follow-up period. The amount of yoga practiced during the 4-month post-intervention follow-up period was used to explore mechanisms related to the effect of the yoga intervention program. Individuals were instructed to record daily so as not to be influenced by recall bias. Class attendance (completed by study staff) and exercise logs and MAQ (completed by the participants) were used to describe adherence to the protocol.

At the end of the program, both groups indicated their willingness to accept the FTF or DVD intervention using the Program Satisfaction Questionnaire. It consisted of five semi-structured questions related to participant satisfaction with and feelings about the programs. The questions addressed overall satisfaction with the program, including what they most liked and least liked about the program.

Statistical analysis
An ‘intent-to-treat’ (ITT) approach was used when addressing the research questions related to program efficacy. Exploratory data analysis was used to describe sociodemographic information. Descriptive statistics summarized participants’ attendance at the yoga sessions and self-reports of yoga practice during and for 4 months following the 2-month intervention period were summarized using descriptive statistics. Descriptive statistics and McNemar’s test were used to describe the sample and examine group differences in demographic variables. Mann-Whitney tests were conducted for between group difference at each time point, and Wilcoxon signed-rank tests were conducted for within group difference between baseline, 2, 4 and 6 months. Data were analyzed using IBM SPSS Statistics 19. Feedback on program satisfaction was categorized by themes using content analysis.

RESULTS
Demographic characteristics
Table 1 summarizes demographic characteristics of the 14 (10 White, 4 Non-white) study participants. The mean age was 58.6 years (SD = 5.4) and 12 (85.7%) were female. The mean years of completed education was 15.0 (SD = 2.1), and 10 (71.4%) reported not having any difficulty paying for their basic needs. The majority of participants practiced some religion (92.9%) and were employed (92.8%). Every participant (100%) had health insurance. The mean BMI was 31.8 ± 5.8 kg/m². No one became ineligible for the study during the intervention due to changes in BMI. Out of 14 participants, seven reported having depression and two of them dropped out of the study. Five reported having anxiety and one of them dropped out of the study. Only one person had both conditions.

Adherence to yoga program and more active lifestyle
The retention rate was 85.7% at 2 months and 71.4% at 6 months (Figure 2). Both groups lost participants: one each at 2 months and two more in DVD only at 6 months. All participants were sedentary at baseline and there was no significant difference in the level of PA by group (mean of MET-hours/week: 2.51 for FTF vs. 2.56 for DVD). For the 2-month active intervention period, FTF practiced yoga more than DVD (75.0 vs. 53.4 min/week). During the 4-month follow-up period, DVD showed better adherence rates to yoga practice than FTF (100 vs. 67%). Participants reported various types of PA, including aerobic dance, swimming, gardening, walking, yoga and dancing. Among those, yoga and walking were the most frequently reported activities. PA patterns did not differ by the group (Figure 2).

During the study period, there were significant changes in PA level from baseline [MET mean: 2.53; median: 0.44; interquartile range (IQR): 5.05] to 2 months (MET mean: 9.26; median: 8.49; IQR: 9.76; p = 0.005), to 4 months (MET mean: 9.33; median: 8.33; IQR: 16.99; p = 0.034), and to 6 months (MET mean: 8.65; median: 6.70; IQR: 13.73; p = 0.008). There were differences in PA by types of instruction. The DVD showed higher levels of PA...
than the FTF at each measurement point (12.06 vs. 6.43, 13.78 vs. 4.88 and 12.74 vs. 4.55 MET-hours/week at 2, 4 and 6 months, respectively); however, statistical significance was shown only at 4 months ($p = 0.034$). The PA level significantly changed over 6 months in the DVD group ($p < 0.05$), not in the FTF group.

There was a decrease in sedentary behavior (e.g. the time watching TV) from the baseline (MET mean: 4.46; median: 3.0; IQR: 2.0) to the end of the study (MET mean: 2.21; median: 2.0; IQR: 0.3). However, significant change was found only with FTF in between baseline and 6 months ($p = 0.042$).

**Program satisfaction**

The FTF group was more satisfied with their instruction method than the DVD group (88.3 vs. 58.3%, $p = 0.013$). Participants enjoyed the supervised yoga and wanted longer, more frequent classes. Participants found yoga to be relaxing and noted that it increased strength, flexibility, balance and mind-body awareness. Throughout the six-month span, DVD participants stated that they enjoyed the yoga DVD and the benefits of practicing (mind-body awareness, mindfulness and boost in spirit). Negative comments included the inability to fit yoga into their daily schedule and initially feeling awkward.

**DISCUSSION**

At baseline, none of the participants met the American College of Sports Medicine recommendation for PA. Through the study period, however, sedentary overweight/
obese participants significantly increased PA levels and initiated new types of PA by adhering to the yoga intervention program. PA levels ranged within the recommended amount (i.e. 8.3–16.6 MET-hours/week). This result supported the Bryan et al. study results (Bryan et al., 2012) by demonstrating that a yoga program can positively affect the increase of PA levels among sedentary adults. Study participants expressed confidence and readiness for an increased level of activity throughout the study period. Our findings suggest that yoga, regardless of delivery method, may be an appropriate form of PA that can be utilized as a ‘stepping-stone’ towards regular exercise in this population.

Data from a national sample showed that exercising independently was more appealing to women 40 years of age and older (King et al., 2000). However, even though the majority of our study participants were women, our participants preferred direct guidance of an instructor (FTF) over the self-learning method (DVD). FTF participants practiced more yoga with a greater sense of satisfaction; however, when asked to practice on their own in the follow-up period, the DVD group reported better adherence to yoga and an active lifestyle by increasing overall levels of PA. Our findings were consistent with the results of previous research (Ashworth et al., 2005), which showed a home-based program resulted in better adherence to exercise.

Our study showed that initially the FTF group enjoyed having the ‘comfort’ of yoga instructors teaching them new skills whereas the DVD group may have felt more awkward trying to do something new without support. However, when it came to overall PA levels, the DVD group was already used to exercising independently while the FTF group was not. It is possible that DVD group had higher levels of PA because they had become accustomed to exercising on their own. Our results indicate that it is important to include both direct guidance (e.g. face to face) and self-learning (e.g. DVD) to improve self-efficacy among sedentary adults and to encourage the gradual build of a regular PA routine. These results are consistent with previous findings that indicate that higher levels of social support (i.e. relationships formed during group exercise, feedback and guidance from the instructor, etc.) are associated with higher levels of self-efficacy during PA (Ayotte et al., 2010).

There was a higher dropout rate in the DVD group (three dropped; 42.7%) than in the FTF group (one dropped; 14.3%). Even though a difference in dropout rates by group is not uncommon (e.g. 30% in the control group vs. 11% in the intervention group) (Yogendra et al., 2004), our study showed a high dropout rate in the DVD group. The FTF dropout could be explained by lack of time or reluctance to practice yoga independently during the follow-up period; whereas, the DVD dropout may be explained by lack of support and guidance. To reduce dropouts in a program using self-learning methods, various strategies, such as telephone or email reminders or text messages, to provide a sense of belonging and facilitate engagement, will be explored. Also, a level-tailored DVD, which matches participants’ level of mastery, would help guide home practice.

This pilot study employed a small sample size with high income and high education level and the findings may reflect a response bias in that persons who were interested in health issues and yoga intervention may have been more likely to participate. However, our sample was limited to sedentary and overweight or obese adults who would benefit the most from the intervention. Randomization provided participants an equal chance of being assigned to either group; however, a simple randomization could not eliminate potential confounding factors (e.g. BMI) in the group assignment. We used a questionnaire that shows reliability and validity in PA measurement; however, there is a possibility that participants over-reported their actual PA level. Additional research with a larger sample and comparison groups (e.g. no yoga or other types of programs) is warranted to further examine the effects of a yoga program on PA level.

CONCLUSION

There is ample evidence that PA both improves general health and lowers the risk of various chronic diseases; however, a substantial proportion of global populations do not meet the recommended PA level. The findings of the study indicate that a yoga program has potential to increase PA level among overweight or obese sedentary adults. Utilization of a yoga program would help overweight or obese adults who lead a sedentary lifestyle move toward a more active lifestyle.

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