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Practicing Yoga, Preventing Disease

As we move farther into the 21st century, the baby-boom generation is moving right along into the 65+ age range. This group comprises 78 million people who will hit this milestone age beginning in 2011[13]. As a generation that has participated in the "fitness craze" and has given birth to step classes, cycling classes, kickboxing classes and marathons for the masses, they are increasingly interested in maintaining fitness in order to avoid age-related disabilities and diseases. As such, they are looking for workouts that have minimal impact on previously stressed joints. Yoga is one avenue that many are pursuing to maintain strength and flexibility as they age. Yoga's benefits include improved cardiorespiratory function[1], quality-of-life measurements[2], sleep patterns[3], reduced serum cholesterol, improved HDL/LDL ratios[7], reduced joint pain[10], increased strength and flexibility[11] and reduced risk factors for coronary heart disease (CHD)[12].

Research Question: The purpose of this study was to review the current literature regarding practicing yoga and to determine if this practice decreases the risk factors for developing chronic disease as one ages.

Annotated Bibliography

1. Harinath K, Malhotra ASM, Pal K, Prasad R, Kumar R, Kain TC, Rai L, Sawhney, RC. Effects of hatha yoga and omkar meditation on cardiorespiratory performance, psychologic profile, and melatonin secretion. *The Journal of Alternative and Complementary Medicine.* 2004;10(2):261-268.

   This study focuses on the how the practice of Hatha yoga and Omkar meditation (meditation practice in which "Om" [pronounced "aah-ooh-mmm"] is repeated aloud by practitioners) affects cardiorespiratory performance, psychologic profile and melatonin secretion. Subjects were 30 healthy male army soldiers 25-35 years old who were randomly assigned to two groups of 15 each. They did not have previous yoga or meditation experience. The study ran for three months with one group practicing yoga postures (asanas) and breathing exercises (pranayama) and the control group doing flexibility exercises and running. The soldiers practicing yoga showed significant improvements in cardiorespiratory performance (measured using a computer-automated portable vitalograph) and psychologic profile (measured using IPAT Anxiety Scale questionnaire and Minnesota Multiphasic Personality Inventory questionnaire). The psychologic profile improvement was attributed in part to an increase in the plasma melatonin levels.

   Changes in sleep patterns become more of a problem as we age. Interruptions in the sleep cycle can alter one's perception of overall well-being, can effect mood throughout the day and alter our normal biological cycles. This study indicates that practicing yoga influences plasma melatonin levels, improving sleep patterns, which may lead to an increase in overall sense of well-being. Measuring melatonin level and its relationship to

healthy sleep patterns is a unique study topic and could be especially useful with an older population as sleep patterns are often interrupted as we age.

2. Oken BS, Dajdel D, Kishiyama S, Flegal K, Dehen C, Haas M, Kraemer DF, Lawrence J, Leyva J. Randomized, controlled, six-month trial of yoga in healthy seniors: effects on cognition and quality of life. *Alternative Therapy Health Med.* 2006.

This study investigated the effect of Yoga on cognitive function, fatigue, mood and perceived quality of life in generally healthy men and women aged 65-85 years. Most subjects were somewhat active, but were also excluded if they engaged in more than 210 minutes of exercise per week.

The experimental (yoga) group experienced significant improvements in physical measures (forward bend flexibility, balancing on one leg and the ability to stand and sit 5 times) and an increased sense of well-being, higher energy levels and less fatigue than the control group. No changes were noted, however, in cognitive functioning.

Most of the researchers in this study are from Oregon Health and Science University (OHSU), Oregon State University or Western States Chiropractic College. Others in the group include an Iyengar-trained Yoga instructor and an RN from Providence Health Systems, Portland who is also a personal trainer.

This study is one of the few randomized controlled studies conducted specifically among the senior population that I was able to find. The researchers also note that this study is the largest and most well-controlled study of the benefits of practicing yoga to date.

3. Manjunath NK, Telles S. Influence of yoga & ayurveda on self-rated sleep in a geriatric population. *Indian Journal of Medical Research.* 2005;121:683-690.

Asana and Ayurveda are two aspects of yoga. Asana refers to the physical practice and Ayurveda refers to herbal preparations that are believed to benefit the body. This study compared the effects of practicing asana with using Ayurvedic preparations and then with a control group which received no intervention, on self-rated sleep patterns in an elderly population. Subjects were 69 residents of a home for the aged in Bangalore, India.

The yoga group showed the most improvement in sleep patterns. Improvement was defined as shorter time to fall asleep and greater number of hours slept as well as experiencing an enhanced feeling of being rested upon wakening in the morning.

This study, combined with the previous two studies, indicate that practicing yoga asana and pranayama combine to improve sleep patterns and encourage an overall sense of well-being in practitioners. This effect is experienced even when subjects practice for a short time (studies were no longer than 3 months in duration) and is not specific to leading a yogic lifestyle. These improvements in sleep patterns and generally "feeling good" may influence one's susceptibility to disease.

4. McDermott AY, Mernitz H. Exercise and older patients: prescribing guidelines. *American Family Physician*. 2006;74(3):437-444.

This is not a clinical study, but rather an article from *American Family Physician*. This article suggests that regular physical activity in the form of a combination of aerobic activity, strength and flexibility training is beneficial to older Americans. The article

goes on to recommend a variety of exercise activities from walking and swimming to yoga and tai-chi.

The objective of the article is to encourage family physicians to prescribe exercise to their aging patients. The article defines the clinical recommendations using standard guidelines (prescribing frequency, intensity, time, and type of exercise, personalizing the workout to the individual's abilities). It defines exercise terminology and gives recommended target heart rate ranges for adults form age 60-75.

One of the recommendations highlighted in the recommended exercise prescription is an introductory yoga video. The recommendation is that the video be 60 minutes in length, done once per week for one month and then the patient is to re-visit their physician to assess progress.

This journal is written by and for an audience of American family physicians. Specifically adding yoga to a recommended exercise prescription for older adults represents an incorporation of yoga into the mainstream of western medicine.

5. Harris-Kojetin L, Kiefer K, Joseph A, Arch M, Zimring C. Encouraging physical activity among retirement community residents: the role of campus commitment, programming, staffing, promotion, financing and accreditation. *Seniors Housing & Care Journal.* 2005;13(1).

This study takes the previous article one step further, examining what makes physical activity programs successful in Continuing Care Retirement Communities (CCRCs).

These communities cater to older Americans in three types of living conditions: independent, assisted, and nursing care. The study acknowledged some limitations, including: (1) Results are reported by staff and community managers, not by the residents themselves. Many of these facilities offer physical activities off-campus (e.g., tennis, golf, yoga), so staff/management may not be fully aware of participation of their residents. (2) Physical activity is defined as at least 30 minutes/day, 3 days/week…a high bar to set for the adult population, and more difficult to attain among older adults. Lower physical activity levels were not recorded for this study. (3) The study focused on more structured/organized activities (e.g., class participation, game participation) and less on activities conducted individually (e.g., gardening, bicycling).

The researchers concluded that campuses with more physical activity opportunities either "on-campus" or "off-campus" (in the local community) had more physically active residents. Generally "on-campus" activities had better attendance records. One exception to this, however, is yoga, which had a greater participation rate when offered in the local community. Coupling this study with the previous one, as family physicians begin to recommend physical activity generally and yoga specifically, more CCRCs will offer these opportunities and more seniors will experience the benefits of practicing yoga.

6. Ades PA, Savage PD, Brochu M, Tischler MD, Lee NM, Poehlman ET. Resistance training increases total daily energy expenditure in disabled older women with coronary heart disease. *Journal of Applied Physiology.* 2005;98:1280-1285.

This study differs from the others in that yoga is not the focus of the research but serves as the control for the experimental group which focuses on resistance training. The study

found that progressive strength training, even in a fairly fragile group of older women with coronary heart disease (CHD) and physical limitations, resulted in improved physical activity energy expenditure (PAEE) and total energy expenditure (TEE) versus the control (yoga) group.

Neither group experienced a significant change in body weight, BMI, body-fat percentage, fat mass, fat-free mass, appendicular muscle mass, bone mineral density or Geriatric Depression Score. Resistance training was shown to increase measures of physical functional performance for a variety of activities of daily living (ADLs), flexibility, VO_2 max and coordination compared with the control group.

The study does not detail the yoga practice involved or the type of deep breathing that participants practiced. Yoga encourages a wide variety of breathing practices. The study does not directly contradict other positive findings associated with yoga. It also does not cite a single yoga-oriented study in the reference list at the end of the report. It is, however, the only study that I could find which did not indicate an improvement in general sense of well-being among the yoga group as indicated in the first three studies.

7. Prasad KVV, Sunita M, Sitarama Raju P, Venkata Reddy M., Sahay, BK, Murthy KJR. Impact of pranayama and yoga on lipid profile in normal healthy volunteers, *Journal of Exercise Physiology online.* 2006;9(1).

This study evaluated the impact of yoga pranayama and asana on blood lipid profiles. Subjects were not elderly, but the information contained in the study is applicable to

adults generally and can be applied to anyone wanting to prevent cardiovascular problems as s/he ages.

Stage 1 of the study consisted of pranayama solely and stage 2 added asana to the pranayama practice. Stage 1 lasted 30 days and Stage 2 was an additional 60 days. There was no control group used in this study. Male participants demonstrated a significant reduction in serum triglycerides, free fatty acids (FFA) and very low density lipoprotein (VLDL) following stage 1. High density lipoprotein (HDL) and FFA counts significantly increased following stage 1 & 2. Female participants experienced a significant reduction in FFA at the end of stage 1 & 2. Cholesterol, triglycerides, LDL and VLDL had significant falls at the end of Stage 2. No changes were noted in HDL in either stage.

Blood screenings have become a standard piece of diagnostic data in the effort to prevent CHD. The ability to improve these numbers without the use of pharmacological aids is appealing to the elderly as many find themselves on a fixed-income budget following retirement.

8. Gauchard GC, Jeandel C, Tessier A, Perrin P. Beneficial effect of proprioceptive physical activities on balance control in elderly human subjects. *Neuroscience Letters.* 1999;273:81-84.

This study examined different types of exercise to determine which type might prove most beneficial to retain or regain proper balance. All participants were over 60 years

old, divided into 3 groups. Group 1: regularly practiced proprioceptive physical activities (yoga or soft gymnastics) *n*=7. Group 2: regularly practiced bioenergetic physical activities (swimming, cycling, jogging) *n*=12. Group 3: control group, walking on a regular basis. *n*=21.

Group 1 individuals who regularly practiced proprioceptive physical activities had better balance control than either group 2 or the control group. Group 2 demonstrated greater power/strength development, but balance was not as good. Balance is affected as people age by an increased dependence on visual cuing and a decrease in perception of proprioceptive or vestibular cues. Activities such as yoga and soft gymnastics greatly improve sensitivity to these cues.

One limitation to this study was that the sample was very small with only 3 participants practicing yoga in Group 1. The study does, however, make the statistical correlation between proprioceptive practices and balance improvements in the over 60 population. Improvements in balance in the elderly may lead to a decreased risk of falling (which often leads to bone fractures due to the progression of osteoporosis) and prevent additional complications of hospital stays or depression due to injury.

9. Petrofsky J, Cuneo M, Dial R, Morris, A. Muscle activity during yoga breathing exercise compared to abdominal crunches. *The Journal of Applied Research* 2005;5(3).

This study investigated the workload differences between abdominal crunches and yoga breathing practices and found that one yoga breathing exercise is the equivalent of five

abdominal crunches. Great news for anyone who is bored to death with doing crunches. This is also an important finding for the elderly, obese and disabled. Yoga breathing practices provided 2.5 times more workload for the rectus abdominus and six times more workload for the obliques. For anyone who cannot make their way comfortably to the floor or lie in a supine position, yoga breathing exercises present an alternative way to get an even better workout.

The muscles of the trunk have come to be known as "the core" muscles. Conditioning of these core muscles has been shown to increase balance and stability. Yoga breathing exercises can provide a more accessible way for an aging and/or obese population to train core muscles, improving balance and preventing future falls.

10. Kolasinkski SL, Garfinkel M, Gilden A, Matz W, VanDyke A, Schumacher HR. Iyengar yoga for treating symptoms of osteoarthritis of the knees: a pilot study. *The Journal of* Al*ternative and Complementary Medicine*. 2005;11(4):689-693.

This was a small pilot study with only 11 participants enrolled. As a pilot study, its objective was to establish the safety of practicing yoga for patients with symptomatic osteoarthritis in the knee. The goal was to inspire a larger, randomized controlled trial. Of the 11 patients enrolled, only 7 participated in 5 or more sessions (sessions were held only once weekly for 60-90 minutes). Subjects were sedentary, over 50, suffering symptoms of osteoarthritis and had never practiced yoga previously. They were probably typical of the "average" American over 50 years of age. Even with the small size of the study and the limited participation, subjects showed statistically significant improvement in symptoms of osteoarthritis and ability to function normally. These improvements may

be attributable to increasing body awareness and learning how to properly position the body. Having said that, participants experienced a statistically significant (46%) reduction in pain after only 6-8 classes over an eight week period. The researchers recommend that future research include a control group and a larger sample size. They also recommend comparing yoga with other forms of exercise thought to improve osteoarthritis symptoms (e.g., swimming, quadriceps strengthening, patient education). In 2006, nearly 1 in 5 adults has been affected by arthritis[14]. Yoga may be a valuable non-pharmaceutical alternative for relieving the pain of osteoarthritis in the knees.

11. Innes K, Bourguignon C, Taylor AG. Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: a systematic review. *Journal of the Board of American Family Practitioners.* 2005;(18):491-519.

This study is a comprehensive review of the literature published regarding yoga. The review covers original studies published from 1970 to 2004 and includes western as well as Indian medical journals and articles. The review includes randomized controlled trials (RCTs), non-randomized controlled trials, uncontrolled clinical trials and observational studies. Bottom line for this study is that yoga may reduce insulin-resistance syndrome indices of cardiovascular (CVD) risk. Even at this late date (study was published in 2005), there are not many well-controlled RCTs supporting a direct link between the practice of yoga and the benefits shown in the studies. These benefits include improvements in “glucose tolerance, insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation and cardiovagal function.”

Insulin Resistance Syndrome (also known as Syndrome X) and CVD are becoming more prevalent in the American population daily, especially in adults over 50. Syndrome X is considered a precursor to Type II diabetes which has seen explosive growth as our population both ages and increases its obesity numbers. This study supports the use of yoga as a potential non-pharmaceutical intervention in these illnesses, which in turn may have a tremendous impact on the American health care system as the largest generation in history (baby-boomers) approaches the sixth decade of their life.

12. Raub JA. Psychophysiologic effects of hatha yoga on musculoskeletal and cardiopulmonary function: a review of the literature. *The Journal of Alternative and Complementary Medicine.* 2002;8(6):797-812.

This study is also a comprehensive review of the literature (1985 to 2002), but differs from the previous review in that it specifically summarizes studies "for healthy people and for people compromised by musculoskeletal and cardiopulmonary disease." Areas of study included the effect of yoga practice on osteoarthritis (hands) and carpal tunnel syndrome, lung function and cardiovascular endurance in healthy adults, chronic bronchitis and asthma, patients with CVD and high blood pressure.

This study agrees with the previous one in supporting the practice of yoga as a non-pharmaceutical alternative for improving health. Benefits range from decreased pain for arthritis and carpal tunnel syndrome sufferers to increased lung function, improvements in asthma symptoms, musculoskeletal-related pain management and cardiopulmonary endurance. It also acknowledges the lack of RCTs and recommends future investigations be conducted in this style.

13. United States Census Bureau press release page. U.S. Census Bureau website. Available at: http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/006105.html. Accessed December 1, 2006.

14. The Facts about Arthritis web page. Arthritis Foundation website. Available at: http://www.arthritis.org/resources/gettingstarted/default.asp. Accessed December 1, 2006.

Clinical Implications

Yoga is a physical/spiritual, mind-body practice that has been in existence for over 5,000 years. Introduced *en masse* to the west in the 1970s, Yoga has recently seen a huge boom in its popularity as a fitness alternative for both the active and sedentary aging population here in the United States. While much mysticism, superstition and religion is often associated with the practice, its true nature is the improvement of physical health through learning to control the mind. Control is established via breathing exercises (pranayama) and physical movement (asana), along with meditation practices.

None of us has the ability to escape the aging process. The evidence suggests that with the practice of yoga, we may be able to decrease some of the negative physical issues associated with the aging process. The aforementioned studies consistently demonstrate health benefits that may be experienced through the practice of yoga. These benefits include reduction in serum cholesterol levels, increased ability to maintain balance, reduction of joint and musculoskeletal pain, improvements in sleep patterns, perception of quality of life, energy levels and reduction in fatigue. As the research increases, mainstream physicians and local retirement communities are recommending yoga to help “regular” people stay healthy far into the future.

Conclusions

Yoga will continue to grow in popularity as the research expands and more thoroughly documents its benefits. Many Americans of the "baby-boom" generation have been active for a large portion of their lives and are interested in continuing this lifestyle. Yoga presents a low-impact alternative for these folks. Looking at the "other side" of the over-50 population, Americans are increasingly susceptible to obesity, type II diabetes and musculoskeletal issues due to inactivity. Yoga can also benefit this segment of the population as it is a low- or no-impact form of exercise that may be adapted to suit any body.

With yoga's benefits ranging from improvements in blood lipid panels to reduction in the pain experienced from osteoarthritis, it may become a viable alternative to prescription drugs for the relief of pain and other symptoms of aging. Yoga will continue to grow in popularity as a larger portion of the American population reaches an age at which these issues become a major concern. This study focused on benefits for an aging population, however, yoga benefits may be reaped by practitioners of any age and the earlier the practice is begun, the potentially greater the benefits.

Future Research

Perhaps the greatest hindrance to yoga's being more widely embraced is the lack of randomized controlled trials to support the non-randomized, uncontrolled, observational and anecdotal evidence of the benefits associated with its practice. Future research

should focus on increasing the number of randomized controlled clinical trials regarding the benefits of yoga and comparing yoga benefits to more “traditional” forms of exercise.