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Therapeutic effects of Yoga on Thyroid Disorders

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College of Nursing and Professional Disciplines

Title: Therapeutic effects of Yoga on Thyroid Disorders

Department: Nursing

Degree: Master of Science

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Date: *April 10, 2019*

Abstract

More than 30 percent of adults in the United States are likely to use approaches to healthcare that are not in line with traditional medicine, as revealed in the 2012 National Survey (NCCIH, 2016), with the use of yoga to improve physical fitness and enhance quality of life by preventing disease process (Maske & Barnwal, 2016) as an option sought by nearly 31 million adults (Cramer, Ward, Steel, Lauche, Dobos & Zhang, 2016). A case study is presented as a way of introducing yogic practices to be explored to treat thyroid dysfunction. DM is a 65 year old newly diagnosed with hyperthyroid disorder who desires to use complementary medical approaches to treat her condition. An investigative literature search for articles studying yogic practices in the treatment of thyroid disorders was conducted. Yogic practices that make positive changes in the secretion of bodily hormones affecting the thyroid gland was not consistently supported in the literature, but unrefuted in the literature are studies (Singh et al., 2011; Tripathi et al., 2018; Gupta et al., 2006; Pascoe & Bauer, 2015; Mody, 2016) that support the practice of yoga to manage the side effects of thyroid disorders such as stress, anxiety, sleep disturbances, irritability negative emotions and clouded mental capacity (Mondal, Kuhu & Saha, 2015). These symptoms declined over time with regular yoga practice while positive emotions increased and emotional balance was restored. It remains vital that practitioners work in close collaboration with patients with thyroid dysfunction desiring to use complementary approaches to disease management, to sift through conflicting reports to discern a best approach plan for optimal health outcomes.

Background

An estimated one in eight women will develop a thyroid disorder at some point in her life, according to the American Thyroid Association [(ATA), 2017]. Approximately 20 million Americans, more women than men, are afflicted, so it is essential to have a basic understanding of what this gland does and recognize symptoms that could point to its dysfunction (ATA, 2017). The thyroid is a relatively small (5 x 3 x 2 cm) shield or butterfly-shaped hormone-producing gland in the middle of the lower neck. It secretes hormones that regulate metabolism, the rate the body produces energy from nutrients and oxygen (Dunphy, Winland-Brown, Porter, & Thomas, 2015). It also plays a role in determining the speed of oxygen use, protein synthesis and the body's response to circulating hormones (Dunphy et al., 2015).

There is not a cell in the body that is not influenced in some way by this gland, and there is a delicate balance of hormone production carried out in a healthy thyroid. Too much thyroid hormone (hyperthyroidism) if left untreated can lead to symptoms of irritability, nervousness, muscle weakness, tremor, unexplained weight loss, sleep disturbances, vision problems, eye irritation, neuropsychiatric symptoms and rarely cardiovascular collapse and death (Ross, Burch, Cooper, Greenlee, Laurberg, Maia, Rivkees, Samuels, Sosa, Stan & Walter, 2016), and can have significant long term effects of the cardiovascular system and eyes in particular. Graves' disease is a genetic autoimmune disease that is a type of hyperthyroidism, affecting nearly one percent of the population (American Thyroid Association, 2017). Thyroid hormone plays a part in tissue thermogenesis, basal metabolic rate, serum cholesterol levels and systemic vascular resistance (Ross et al. 2016).

Attention to symptom relief and medication treatments are vital to the long term functioning of the body to maximize longevity with conditions of thyroid disorder. Due to the

multiple important systems this gland affects, management of a neutral state of hormone production is an essential feature to overall health. This can be managed with a pharmacological response, but there is a growing body of evidence that supports complementary therapy use for the regulation of hormone levels alone or in thyroid disease (Chatterjee and Mondal, 2016).

The National Institutes of Health National Center for Complementary and Alternative Medicine (NIH NCCAM) defines complementary medicine as those therapies that are used along with standard medical treatments (2017), which should not be confused with the definition of alternative medicine, which are therapies used in place of conventional medicine. More than 30 percent of adults in the United States are likely to use approaches to healthcare that are not in line with traditional ‘western medicine’, as revealed in the United States Department of Health and Human Services National Institutes of Health report in the 2012 national survey (National Center for Complementary and Integrative Health [(NCCIC), 2016]. Yoga is one of the complementary medicine approaches that has been observed to have some long term benefit in treating patients with thyroid conditions who practice it regularly, and yogic practices are capable of making changes in the secretions of bodily hormones (Maske & Barnwal, 2016). Yoga has gained popularity as a form of physical exercise to improve physical fitness and enhance the quality of life, as it works to help one maintain the healthy condition of the body and mind and prevents disease process (Maske & Barnwal, 2016).

Case Report

DM is a 65-year-old female who presented with a chief complaint of a 6-week history of not being able to stay asleep after falling asleep quickly and feeling tired and drowsy during the day. She also reported a ten-pound weight loss over the past six weeks and not being able to concentrate as her usual. She admits to not being able to do the normal crossword puzzles, word

searches and writing in her journal that is her normal and she describes this as “being cloudy, like the word is just out of reach”. She describes hot flashes and a ‘racing heart at times”. Her past medical history reveals a schedule of annual well visits with no acute findings; she has two adult children and describes a history of benign positional vertigo but hasn't had a flare up of this for over five years. She states that how she is feeling now is not like her previous symptoms. DM has no allergies and is only taking calcium and a multivitamin and occasional Tylenol for infrequent headaches. Her family history is positive for her father with diabetes and her mother for Alzheimer's and heart disease for which a stent was placed. She denies smoking, illicit drug use or alcohol use. She is very active with her husband of 38 years, stating that they are out walking with their dogs and hiking most days of the week and she enjoys biking and gardening. She does report that a few weeks ago she did a lot of snow shoveling and wonders if she's just tired from overdoing it then. She denies recent travel.

A review of systems revealed a ten-pound unintentional weight loss, even though she has had a good appetite. She denies fever and chills or recent illnesses. She does admit to being tired during the day. She denies changes to HEENT, states her heart races at times, denies shortness of breath, GI or GU changes, denies changes to her bowel and bladder pattern, and she denies changes to her skin and musculoskeletal systems. In terms of her psychiatric system review, she did report disturbed sleep and decreased energy and does report some new anxiety and irritableness that she thinks is related to her frustration over her tiredness. She states she went through menopause without ‘much trouble at all’ and has never had any discussions with her primary provider about diabetes concerns.

A thorough physical exam of DM revealed a cooperative well-groomed woman in mild distress. Her head was normocephalic, atraumatic without masses. Her skin was normal color,

warm, dry and intact, without rashes, bruising, or masses. Her pupils were bilaterally equally round and reactive to light with normal accommodation, with normal sclera and conjunctiva. Her hearing was normal, as were her tympanic membranes, her nasal mucosa, oropharynx, tongue, gums and dentition. There were no signs of exudate or erythema. Her neck was supple with no cervical or supraclavicular lymphadenopathy, her trachea was midline and she did not have a palpable thyroid mass. In terms of her cardiac and respiratory assessment, her heart rate was regular, with normal S1 and S2 and no murmurs or regurgitation, and her lungs were clear without wheezes, rales or rhonchi. Her abdominal exam was completely normal as was her musculoskeletal exam. Her cranial nerves II-X11 were intact, and her cerebellar function was normal. There were virtually no acute findings whatsoever outside of her temperature being 99.4 with no discernable cause.

Based on her history and subsequent findings upon physical examination, the consideration of differential diagnoses was DM Anxiety, Hyperthyroidism, Insomnia (disturbed sleep), Palpitations, and Sleep apnea. A urinalysis, an EKG, and TSH, Free T4, and T3 levels were obtained. Her urinalysis was normal as was the EKG. Her thyroid studies revealed a decreased TSH and elevated Free T4 and T3 levels. These findings supported a diagnosis of Hyperthyroidism, and this was discussed with DM. She expressed her concern that she wanted to trial as many 'non-drug' options for controlling this as possible. A recommendation for a Beta-blocker and referred for follow up with Endocrinology was given.

DM expressed she wanted to consider what she can do with her diet and other alternative therapies to help with her new condition. She voiced concern that current pharmacological treatment methods may not be what she would want to start with as she was concerned with deleterious side effects. A frank discussion about medications, their side effects and the

anticipated onset of action took place, and DM persisted in asking if there were safer and more effective treatment methods more in line with her active life and desire to keep medications at bay. She specifically asked about what increasing her exercise regime or adding something to it would help with her new diagnosis of hyperthyroidism. At the time of exam and discussion, this practitioner had not yet completed a comprehensive literature analysis to support this practice but would deem it worth investigating for further discussion. DM agreed to the use of a Beta-blocker for her condition while awaiting her referral to Endocrinology, and a thorough investigation into the use of yoga as a means to decrease both DM's disease and side effects from her disease ensued.

Literature Review

Although Yoga has not historically been associated as a cure for hyperthyroidism, researchers have observed it as a viable option for treatment (Maske & Barnwal, 2016; Chatterjee and Mondal; and Singh & Barnwal, 2014) of thyroid disorders and the sequelae of associated symptoms often associated with these disorders. An investigative literature search was carried out via the University of North Dakota's Harley French Library website, which included PubMed (MEDLINE) and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) as initial article databases in a quest for articles studying yoga practices in the treatment of thyroid disorders. Inclusion criteria were original articles in peer-reviewed journals, English language, and research that listed yoga specifically in its framework. Exclusion criteria included articles in Chinese, which warrants mention, as there was a substantial number inaccessible to this researcher due to the language barrier. Search terms were yoga, thyroid disorders, hyperthyroidism, hypothyroidism, complementary and alternative medicine.

According to the 2015 National Health Statistics report (Clarke, Black, Stussman, Barnes & Nahin, 2015), the use of yoad, tai chi, and qi gong have increased from 5.8% in 2002 to 10.1% in 2012, and yoga accounted for nearly 80% of the prevalence. There are many studies that conclude Yogic practices were effective in some cases to balance the secretions of the bodily hormones for the treatment of both hyperthyroidism and hypothyroidism (Maske & Barnwal, 2016; Chatterjee and Mondal, 2017; and Singh & Barnwal, 2014).

Offering a historical perspective on the use of yoga and a detailed description of the many different types of yoga is outside the scope of this report. Suffice it to say, yoga is a set of principles and practices seen in archeological depictions of figures in yoga-like poses from temple walls in India dating to 300 BCE, designed to foster health and well-being by integrating the breath with the mind and body (Hayes, 2010). Yoga had its beginnings in the late 19th and early 20th centuries, but a stronghold did not take root until in the 1940 to 1950s. Now the practice of yoga has erupted across the western landscape with diverse philosophies, teachers and styles capturing subgroups of ardent followers (Hayes, 2010).

In the "Yoga in America" survey of 2008, one of the most recent US markers of the practice of yoga, 15.8 million people indicated they practiced some sort of yoga, with an additional 9.4 million stating they were likely to try some sort of yoga within the next year (Hayes, 2010). Not just patients alone, but interestingly nearly 50% of practitioners declared they practiced yoga themselves as a means of maintaining their overall fitness. More than 6% of the Americans who did practice yoga said it was recommended therapy by either their doctor or therapist (Hayes, 2010). According to researchers Cramer, Ward, Steel, Lauche, Dobos and Zhang, (2016) who used cross-sectional data from the 2012 National Health Interview Survey (NHIS) Family Core, Sample Adult Core, and Adult Complementary and Alternative Medicine

questionnaires, almost 31 million US adults had ever used yoga, and about 21 million had practiced yoga in the twelve months prior to the survey. Of those who practiced in the past twelve months, approximately 90% used breathing exercises, more than 51% attended classes and nearly 55% used meditation (Cramer et al. 2016). It was reported that nearly 79% practice yoga for general wellness or disease prevention, 66% practice to improve energy and nearly 50% to improve immune function (Cramer et al.).

According to researchers, yoga therapy has proven successful to make changes in the secretions of bodily hormones. Chatterjee and Mondal (2017) studied the effects of daily yoga on subjects' hormone levels. They followed 45 subjects split into two groups, one control group who carried out their daily routines without change compared to a group who practiced daily yoga for 30 to 60 minutes, at least six days per week for twelve weeks. This team of researchers (2017) discovered a progressive decrease in serum THS, but they saw no change in triiodothyronine (T3) or thyroxin (T4) levels. Other researchers finding yoga as beneficial for hyperthyroid disorders were Maske and Barnwal (2016). This team enrolled subjects into two groups, a control group and a group who practiced yoga for 90 days for 30 minutes daily. Maske and Barnwal (2016) saw a significant decrease in the level of T4 in the group who practiced yoga. In direct contrast to this study, however, and even cited in this study mentioned above, Singh & Barnwal (2014) observed a significant increase in the level of T3 in hypothyroid patients with a daily practice of yoga for the exact same timeframe. These studies seem contradictory in nature in terms of the efficacy of yoga on endocrine activity, wherein one study finds yoga lowers T4 and one raises T3, both of which are elevated in hyperthyroidism and the goal of treatment is to lower both levels.

This more recent research directly contradicts research in the late 1980's and 1990's (Werner, Wallace, Janssen, Stryker & Chamers, 1986, Mclean, Walton, Wenneberg, Levitsky, Mandarino, Waziri, Hillis & Schneider, 1997) that reported yogic practices decreased serum TSH levels and had no change in T3 and T4 levels at all. Additionally, Gorden et al. (2008) showed there was no advantageous decrease in the level of TSH, T3 or T4 after their subjects practiced in a yoga regime. Limited studies looked at the effects of yoga on the treatment of hyperthyroidism within the last five years outside those done by Chatterjee and Mondal (2017), Maske and Barnwal (2016), and Singh & Barnwal (2014) with consistent results. As the needed response for treatment of hyperthyroidism is a decrease in circulating levels of T4, it is prudent to make ultimate conclusions for patients like DM to count on yoga as the sole modality in her treatment plan. Additionally, these few studies are limited in numerous and significant ways; the small numbers enrolled in the studies, the limit to the country of India for subjects and the seemingly same pool of research scientists actually doing the research. Most above mentioned authors were part of multiple projects in close geographical proximity to each other. These limitations compel this author to take heed in support of the findings and bring this to the attention of DM in further discussions of alternative therapy modalities for the treatment of her hyperthyroidism.

There exists a collective of researchers who support the use of yogic practices in the treatment of sequelae of hypothyroidism while clearly outlining that the effect of yoga in single or combined interventions such as transcendental meditation seldom leads to cures in hypothyroidism. Chaterjee and Mondal (2017) followed a group of 45 men and women between the ages of 35 and 55 split into a control group and study group to examine the impact of a graded yoga program on the basal level of thyroid hormones in healthy middle-aged adults. The

recruited study group trained and then participated in suryanamaskar (postures that flow one to the next), asanas (still poses), kriyas (practices with cleansing deep breathing), pranayams (breath control), and dhyana (meditation), for 12 weeks for 45 minutes in the initial weeks but progressed to one hour 45 minutes by the end of the 12 week session. Approximately 85% of participants practiced six days per week, with focused instruction in the combined therapies described above as led by class instructors (Chatterjee & Mondal, 2017). The control group carried about their daily routine but also attended a one day per week class in “health and positive mental attitude awareness” (Chatterjee & Mondal, 2017). At the study’s conclusion, researchers found the basal level of serum TSH increased significantly in the yogic men, but no increase was seen in the women’s level and there was no increase in either gender in the control group (2017). Researchers saw a 10.45% reduction in the men and a 27.42% reduction in the women of the basal T3 level and a 4.23% decline in the men and a 9.34% decline in the basal T4 after twelve week but no change in either basal T3 or T4 levels in either gender in the control group (2017).

These findings were similar to earlier studies (Werner, Wallace, Janssen, Stryker & Chalmers, 1986; Gorden, Morrison, McGrowder, Renas, Samora, Garwood, Alexander-Lindo, & Irving, 2008;) that show TSH levels were impacted by yoga in combination with transcendental meditation (the first study) or physical training exercises (the later study). None of the studies across this span of time from thirty years ago to the one conducted in 2017 show any statistically relevant change to the basal T3 or T4 levels of the study groups. Again, the limited findings of success of yogic practices to actually change thyroid function would compel this author to not be in support of the use of yoga to treat thyroid disorders, as DM hints at.

Not refuted in the research around yogic practices is the positive impact it has on reduction in the perceived sequelae of thyroid disorders such as stress, tiredness, cloudy thought and mood changes (Poonam, Singh, Dave, Udainiya, 2011; Tripathi, Kalantri, Mishra, Kumar, Chitnis, Chitnes, Kalantri & Bhatt, 2018; Gupta, Khera, Vempati, Sharma, & Bijlani, 2006; Pascoe & Bauer, 2015; Mody, 2016). Less is understood, however, about really what is happening on a neurobiological level. Mondal, Kundu and Saha (2018) studied twenty-three elderly sedentary women (55-70 years old) to measure the impact of yoga on blood levels important to diabetes management. Mondal et al. (2018) reported patients showed significant improvements, and although they presented easily replicable work, their bold statement about the beneficial effects of yogic interventions on blood sugar and lipid profile in elderly women seems wrought with issues. Simply in terms of sample size and because they do not speak at all to how else these women changed their lifestyles while participating in the study, their research seems questionable. They discussed mood improvements only in a few sentences in their research without providing robust self-evaluation tools to systematically compare a before and after picture.

Many people find yoga more appealing than pharmacological therapies as it allows them to be active participants in treatment as they can practice yoga at periods of high stress or anxiety and it makes them feel empowered (Pascoe & Bauer, 2015). As well, people see it as something that isn't going to interfere with their body's natural attempt to heal itself like they see medications doing. Pascoe and Bauer (2015) compiled data on twenty-five RCTs specific to biological outcomes of mood-related measures and found that the practice of yoga appears to improve positive affect and decrease depressive and anxious symptomology in diverse study groups. They clearly point out, though, that many of these studies had small sample sizes, no

follow up and there wasn't any consistency in how the yogic practices were used which makes it very difficult to replicate and subsequently carry out comparative analysis studies (Pascoe & Bauer, 2015).

Yoga seems to improve psychological conditions to manage stress, reduce negative emotions and anxiety while simultaneously raising positive emotions and the ultimate improvement of emotional balance (Mondal, Kuhu, & Saha, 2018). These researchers state that yogic practices improve stress management ability as well, which will enhance several indices of importance in the management of the side effects thyroid disorders (Mondal et al. 2018). Given the increased prevalence on patients' desire to consider and explore non-pharmacological treatment options for many health conditions, it is imperative for practitioners to make a commitment to study this burgeoning field of medicine to more aptly speak to evidence-based practices that could augment the treatment modalities and regimes they have in mind to share with their patients.

Learning points

Practitioners must be self-aware of their thoughts around the use of alternative/complementary therapies their clients may use. The more the nurse practitioner is self-aware, the more the therapeutic environment will be enhanced, which will lead to both personal success and success in managing patient care (Rasheed, 2016). Self-awareness is a vital concept that lays the groundwork for all encounters within the care setting (Rasheed, 2016). A non-judgmental approach to discussions with patients about all the thoughts they bring forth will lay the groundwork for a trusting relationship built on collaboration. Once the practitioner is aware of personal feelings around an issue, one can be open to hearing alternative viewpoints and can offer a personal impression from a therapeutic and understanding perspective of the

safety and efficacy of the intended alternative therapy. If this groundwork is in place, a discussion can springboard if the provider feels strongly about the risk-benefit ratio being not in favor of trialing this alternative therapy. It is hoped the strength and trust built up over time that will show the patient the emphasis the provider is placing on steering the patient from the therapy. Ultimately it is the patient who will be making the decision, but it is likely that the patient won't go the route that is not recommended or supported by the practitioner.

Practitioners need to be aware of the prevalence of use of complementary therapies within their patient population. When 30% of Americans will utilize some sort of complementary or alternative medicine across all ethnic groups and socioeconomic levels (NCCIH, 2016), practitioners need to know this and investigate therapies most likely utilized in their practice area. This knowledge will make for better preparedness and frank discussion about the researched benefits and risks of therapies the patient may consider. Investigating the therapies most often sought within the patient population of the practitioner's community is vital to the safety of patients. For patients like DM, knowing that Google searches will be done by those seeking complementary and alternative medicine practices to treat or cure thyroid disorders, the practitioner can weigh in with thoughtful discussion about the efficacy of this.

Practitioners need to ask their patients about the use of CAM. Despite the high prevalence and now increasing use of CAM by patients, in a frequently cited, albeit earlier landmark study, Kemper, Amata-Kynvi, Dvorkin, Whelan, Woolf, Samuels, and Hibberd (2003) purport that fewer than half of patients will usually discuss this with their provider. On the other hand, they reveal (2003) that health care professionals do not consistently ask about this use or record this in the patient's medical record. Frank discussions done in a therapeutic tone will lay the foundation of a trusting, collaborative relationship between provider and patient.

Practitioners must be discerning in their review of research surrounding complementary and alternative treatment modalities to be ready when patients present therapies they've heard about from friends or the Internet. Armed with substantial evidence to support or refute therapies patients wish to trial will bring about the robust discussion so that ultimately the patient can make the best most informed decision about the course of their treatment as possible.

Practitioners need to anticipate these conversations so that we can educate patients, families, and communities so that a collaborative approach can be manifest. DM is likely to benefit from this robust discovery and way of practitioner practice.

References

- American Thyroid Association (2017). What you need to know about the thyroid. [Brochure]. Retrieved March 16, 2019 <https://www.thyroid.org/wp-content/uploads/patients/brochures/ata-hyperthyroidism-brochure.pdf>
- American Thyroid Association (2017). Complementary and alternative medicine in thyroid disease (CAM). [Brochure]. Retrieved March 16, 2019 https://www.thyroid.org/wp-content/uploads/patients/brochures/CAM_brochure.pdf
- Chatterjee, S. & Mondal, S. (2017). Effect of combined yoga programme on blood levels of thyroid hormones: a quasi-experimental study. *Indian Journal of Traditional Knowledge*, 16, S 9- S16.
- Clarke, T. C., Black, L. I., Stussman, B. J., Barnes, P. M. & Nahin, R. L. (2015). Trends in the use of complementary health approaches among adults: United States, 2001-2012. *National Health Statistics Report*, 10(79), 1-16.
- Cramer, H., Ward, L., Steel, A., Lauche, R., Dobos, G. & Zhang, Y. (2016). Prevalence, patterns, and predictors of yoga use: results of a U. S. nationally representative survey. *American Journal of Preventive Medicine*, 50(2), 230-235.
- Dunphy, L. M., Winland-Brown, J. E., Porter, B. O., & Thomas, J. E. (2015). *Primary care: The art and science of advanced practice nursing*, (4th ed). Philadelphia: F. A. Davis
- Gordon, L., Morrison, E. Y., McGrowder, D., Penas, Y. E., Zamoraz, E. M., Garwood, D., Alexander-Lindo, R., & Irving, R. (2008). Effect of yoga and traditional physical exercise on hormones and percentage insulin binding receptor in patients with type 2 diabetes. *American Journal of Biotechnology & Biochemistry*, 4(1), 35-42.

Gupta, N., Khera, S., Vempati, R. P., Sharma, R., & Bijlani, R. L. (2006). Effect of yoga based lifestyle intervention on state and trait anxiety. *Indian Journal of Physiology and Pharmacology*, 50(1), 41-47.

Hayes, M. & Chase, S. (2010). Prescribing yoga. Primary Care: *Clinics in Office Practice*, 37, 31-47.

Kemper, K. J., Amata-Kynvi, A., Dvorkin, L., Whelan, J. S., Woolf, A., Samuels, R. C., & Hibberd, P (2003). Herbs and other dietary supplements: healthcare professionals' knowledge, attitudes, and practices. *Alternative Therapies in Health and Medicine*, 9(3), 42-49.

MacLean, C. R., Walton, K. G., Wenneberg, S. R., Levitsky, D. K., Mandarino, J. P., Waziri, R., Hillis, S., Schneider, R., J. (1997). Effects of the Transcendental Meditation program on adaptive mechanisms: Changes in hormone levels and responses to stress after 4 months of practice. *Psychoneuroendocrinology*, 22(4), 277-95. Retrieved March 12, 2019, from <https://www.ncbi.nlm.nih.gov/pubmed/9226731/>

Maske, U. & Barnwal, S. (2016) Effect of hatha yogic practices on the level of triiodothyronine (T3) in patients of hyperthyroidism. *International Journal of Applied Research*, 2(7), 754-757.

Mody, B. S. (2011). Acute effects of surya namaskar on the cardiovascular & metabolic system. *Journal of Bodywork and Movement Therapies*, 15(3), 343-347

Mondal, S., Kundu B., & Saha, S. (2018). Yoga as therapeutic intervention for the management of type 2 diabetes mellitus. *International Journal of Yoga*, 11(2), 129-138.

National Center for Complementary and Integrative Health, (2016). Complementary, alternative, or integrative health: What's in a name? Retrieved from https://nccih.nih.gov/sites/nccam.nih.gov/files/Whats_In_A_Name_06-16-2016.pdf

Rasheed, S. P. (2015). Self-awareness as a therapeutic tool for nurse/client relationship. *International Journal of Caring Sciences*, 8(1), 211-216.

Ross, D. S., Burch, H. B., Cooper, D. S., Greenlee, M. C., Laurberg, P., Maia, A. L., Rivkees, S. A., Samuels, M., Sosa, J. A., Stan, M. N. & Walter, M. A. (2016). *Thyroid*, 26(10), 1343-1433. Retrieved March 15, 2019, from <https://www.liebertpub.com/doi/full/10.1089/thy.2016.0229>

Singh, S. & Barnwal, S. (2014). To study the impact of yogic package on triiodothyronine (T3) hormone of hypothyroidism patients. *AMASS Multilateral Research Journal*, 6(2), 31-36.

Singh, P., Singh, B., Dave, R., Udainiya, R. (2011). The impact of yoga upon female patients suffering from hypothyroidism. *Complementary Therapies in Clinical Practice*, 17(3), 132-34.

Tripathi, D., Kalantri, Y., Mishra, H., Kumar, G., Chitnis, V., Chitnis, S., Kalantri, R. C., & Bhatt, J. K. (2018). Effect of yoga hand mudra on hypothyroid patients. *Research Journal of Recent Sciences* &(2), 1-5. Retrieved March 20, 2019 from <http://www.isca.in/rjrs/archive/v7/i2/1.ISCA-RJRS-2018-001.pdf>

Werner, O., Wallace, R. K., Charles, B., Janssen, G., Stryker, T., & Chalmers, R. A. (1986). Long-term endocrinologic changes in subjects practicing the transcendental meditation and TM sidhi program. *Psychosomatic Medicine*, 48(1-2), 59-65.