

Effects of Yoga and Plant-based Diet on VTE

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Abstract

- Yoga, a practice that unites the body, mind, and soul, strengthens both the muscles and the mind and promotes optimal cell health. Focusing the mind on the breath and energy, it creates a balanced system in the body, with positive impacts on the body, including reducing the risk and mitigating the effects of VTE. We researched the specifics of how yoga and a plant-based diet can both prevent and manage VTE. Yoga helps reduce inflammation through reducing circulation of proinflammatory cytokines and through its positive effect on the parasympathetic system; it also helps manage varicose veins, another association of VTE. Yoga also helps reduce the effects of VTE through its effect on chronic pain as well as through its breathing aspect, known as pranayama. A plant-based diet helps prevent VTE since it provides many phytochemicals, which help prevent certain types of cancer (a cause of VTE). The anthocyanins that many naturally-pigmented foods provide significantly reduce thrombus growth, which helps manage VTE. We conclude that Yoga and a plant-based diet achieve a deeper level of health, and should be considered in the management of patients with PE.

Introduction

- VTE is a large issue that GTF exposes to the public, and many may not know that non-medication management is another way to reduce the risk of VTE.
- We researched the benefits of yoga and a plant-based diet in the management of VTE and to help reduce the risk of developing VTE in the future.

What is VTE?

- Venous thromboembolism is a blood clot that starts in a vein.
- Third leading vascular diagnosis, affecting between 300,000 to 600,000 Americans every year.
- DVT and PE are life-threatening conditions that require medical care.
- Two types of VTE: deep vein thrombosis and pulmonary embolism.
- DVT is a clot in a deep vein, normally in the leg.
- DVT affects the arm or other veins.
- Pulmonary embolism happens when a clot breaks free from a vein wall and blocks the blood supply.



Causes/Risk Factors and Symptoms of VTE

Causes/Risk Factors:

- Surgery, cancer, or hospitalization.
- Forms when something slows or changes the flow of blood.
- Pregnancy and use of hormones
- Certain groups are at higher risk for clotting
- Genetic causes of excessive blood clotting

Symptoms:

- Swelling and tenderness in the body
- Pain and redness of the skin.
- Difficulty breathing
- Irregular heartbeat
- increase of heart rate
- Discomfort/ pain in the chest
- Hemoptysis
- Low blood pressure
- Lightheadedness or fainting



Statistical Data

- Blood clots are a very large issue that does not cross the public mind as a serious condition. More than 900,000 people in the US experience blood clots every year (Figure 1).
- Also, almost 100,000 people die from VTE every year which is 6x more than the number of deaths for HIV every year (Figure 2).

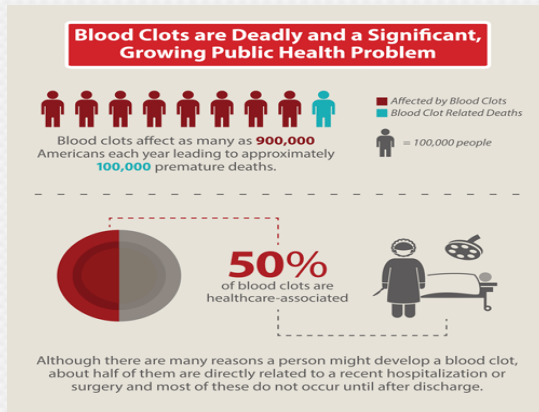


Figure 1



Figure 2



Long-Term Effects and Prevention of VTE

Long-Term Effects:

- Some long term effects that VTE can cause is recurrent VTE, chronic pain, swelling, constant discomfort, darkened skin, and Post Thrombotic Syndrome

Prevention:

- The prevention of VTE that includes taking medication are blood thinners and anticoagulants. Some people may use compression stockings, wear loose clothing, change diets, and get involved in exercises such as Yoga.



Yoga and its Benefits

- The very definition of yoga is “union,” for it unites the body, mind, and soul.
- Yoga strengthens both muscles and mind.
- Improves physical and mental energies; it creates a lifestyle which increases optimal cell health and therefore physiological health. ‘
- Can also help prevent certain ailments in the body, such as VTE, and holistically improve the body’s overall wellbeing by enhancing physical fitness and reducing stress levels.
- Involves the integration of physical activity that strengthens the muscles and focused mindset on the breath and energy.
- Specifically, this practice creates balanced energy, which is essential for the immune system to function optimally.
 - Restrains the areas in the brain that lead to fear, anger, and aggressiveness and enhances the areas responsible for peace and happiness.
 - This shift of emotions leads to lower anxiety levels and blood pressure, two factors contributing to VTE.



Is Yoga Safe to Practice While Diagnosed with Thrombosis?

- A systematic review by Susan Kahn and her colleagues called “Physical activity in patients with deep venous thrombosis” was performed to determine benefits/risks of physical activity in patients with acute/previous DVT in leg
 - After 7 randomized trials, authors concluded that **walking exercise was safe in acute deep venous thrombosis (DVT) and may improve acute symptoms.**
- Another study conducted by the 3 authors “Six-month exercise training program to treat post-thrombotic syndrome: a randomized controlled two-centre trial”
 - Results of their trial suggested this **training program designed to increase leg strength, flexibility, and overall fitness can be an effective treatment for post-thrombotic syndrome** because it improved venous disease-specific quality of life and severity of post-thrombotic symptoms



How Is Walking Related to Yoga?

- In an article published by Susan Mayor (<https://www.bmj.com/content/349/bmj.g7713>), the results of 37 trials show how **yoga and aerobic activities (walking, bicycling, etc) have similar impacts on the body** because they can both significantly reduce cardiovascular risk factors (body mass index, blood pressure, and LDL cholesterol)
- *Through these 3 studies, we can conclude that yoga, which has similar effects as walking, is safe to practice while having blood clots*



How Yoga Can Reduce Risk of VTE

- Inflammation- one factor involved in thrombotic disorders (VTE)
 - Can lead to a hypercoagulable state and endothelial damage.
 - Can be especially common after surgery, which creates an internal environment prone to thrombosis.
- Yoga offers to help reduce inflammation- alternate way to reduce the circulation of pro-inflammatory cytokines (interleukin-6 (IL-6) and C-reactive protein (CRP)).
- Two studies that explored the effects of Yoga in heart failure (a possible consequence of VTE) proved that this mind-body practice significantly reduced these cytokines and augmented levels of an antioxidant enzyme superoxide dismutase (believed to help protect the cardiovascular system).



How Yoga Can Reduce Risk of VTE (cont.)

- Can also help reduce inflammation and therefore VTE through its effect on the sympathetic and parasympathetic nervous systems.
 - Yoga has beneficial effect on the parasympathetic system- responsible for “rest and digest”.
 - Can reduce sympathetic activity- responsible for the “fight or flight” response.
- Because yoga holds both components of exercise and relaxation, it is especially effective in reducing inflammation and consequently decreased blood clot tendencies.



How Yoga Can Reduce Risk of VTE (cont.)

- When veins become enlarged and overfilled with blood due to increased blood pressure (as in varicose veins), they are believed to be associated with VTE, since they result in inflammation.
 - Patients with varicose veins have been shown to have higher levels of inflammatory markers.
- One can practice several yoga poses, especially ones that involve elevating the legs, to help improve circulation and remove pressure from the veins (Figure 3, 4, 5).



Mountain Pose (Tadasana)

Strengthens the leg muscles and relieves the veins from stress by forcing the body to remain in this posture for a few breaths



Figure 3



Standing Forward Bend (Uttanasana)

Improves blood circulation and
will help reduce leg pain with
regular practice.



Figure 4



Fish Pose (Matsyasana)

Allows the legs to relax and
causes blood flow to be
regulated



Figure 5



How Yoga Can Help with Effects of VTE

- Many people mistakenly believe that after they are diagnosed with VTE, there is no turning back.
- However, one can use yoga to aid with chronic pain (a significant long-term effect of VTE)
 - As already mentioned, it can decrease sympathetic activity
 - Has also been proved to decrease activity of the HPA- major regulators of the body's stress response
 - Stress is a major factor in chronic pain.
 - Ultimately, yoga's effect on chronic pain can be seen through the resilience it builds in a person, so that he/she can mitigate their pain psychologically (some chronic pains depend on how the mind perceives them to be)



How Yoga Can Help with Effects of VTE (cont.)

- Yoga is generally seen as simply exercise but stretching the body is just one aspect of yoga.
- *Pranayama* (breathing control)- another important aspect
 - Control of inspiration and expiration increases chest wall expansion & leads to some extent of bronchodilation
 - Enhances the intake of oxygen in alveoli and corrects abnormal breathing patterns.
 - Increased levels of oxygen can then help mitigate the symptoms of VTE, since blood clots block normal blood flow and result in low oxygen levels and damage to lungs



Combining Yoga and Aerobic Exercise

- According to an article called “Yoga and Aerobic Exercise Together May Improve Heart-Disease Risk Factors”, research that was conducted in collaboration with American College of Cardiology and that was presented at 8th Emirates Cardiac Society Congress **showed significant improvement in heart health when patients practice both activities**
 - Heart disease patients who practice yoga in addition to aerobic exercise saw twice the reduction in blood pressure, body mass index and cholesterol levels when compared to patients who practiced either Indian yoga or aerobic exercise alone
- *Important reminder: the best results of yoga can be seen in the body when practiced regularly (at least 3 times per week, if not daily)*



Plant-Based Diet and Its Benefits

- Stretching muscles isn't the only way to promote optimal cell health and reach our full potential
 - Our food intake and diet play just as much as a vital role in a healthy lifestyle.
 - A plant-based diet holds numerous benefits, including but not limited to, supporting the immune system, reducing inflammation, and reducing the risk for CVDs. This risk reduction is due to the rich sources of fiber, vital micronutrients, and bioactive compounds found in plants.



How Plant-Based Diet Can Help with Risks of VTE

- Reduction in inflammation can be seen in plant-based dieters because of abundance of anti-inflammatory molecules in plant foods or the avoidance of pro-inflammatory molecules from animal-derived foods
 - Particularly important in patients with obesity, a common risk factor for VTE
 - Examples of anti-inflammatory foods- green leafy vegetables, nuts and fruits
- Provides many phytochemicals
 - Can help hinder the formation of potential carcinogens and prevent certain types of cancer (reduces risk of VTE)
 - Ex: carotenoids, which are found in colorful foods (spinach, cantaloupe, carrots) and isothiocyanates, which are in cruciferous vegetables (broccoli, brussel sprouts, cauliflower)
 - Other groups of phytochemicals include flavonoids, antioxidants, and anthocyanins.
 - However, it is imperative to understand that taking phytochemical supplements will not provide the full benefits that eating whole fruits and vegetables will give. It is best to consume food from the true source of nature, since the body will be able to absorb the nutrients in an effective manner.



How Plant-Based Diet Can Help with Effects of VTE

- Anthocyanins- natural pigments responsible for the blue, purple, red, and orange colors of fruits and vegetables (blueberries, blackberries, cherries, pomegranate, red cabbage).
 - Improve endothelial function and plasma lipid profiles
 - Protect against oxidative stress.
 - Several studies have explored how Delphinidin-3-glucoside (Dp-3-g)- a predominant active bio-compound of anthocyanins- stops platelet activation and aggregation (reduces VTE effects)
 - Reduces thrombus growth, helps with thrombi destabilization, and prolongs time needed for thrombus formation.



Conclusion

- Daily practice of yoga can increase blood circulation, reduce stress levels, and balance the physical and mental energies in order to enrich the health of the body.
 - It reduces inflammation, helps with varicose veins, decreases sympathetic activity, aids in chronic pain, and maximizes the intake of oxygen.
- A plant-based diet provides phytochemicals that can help prevent some cancers and anthocyanins to reduce oxidative stress and reduce thrombus growth.
- Daily yoga practice and a plant-based diet can truly allow one to achieve a deeper level of health, especially for cardiovascular patients.

Acknowledgements

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References

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3193654/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4624298/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7961591/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6700894/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6517077/>
- <https://www.veinclinics.com/blog/7-yoga-poses-help-manage-your-varicose-veins/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5838574/>
- https://www.breastcancer.org/tips/nutrition/reduce_risk/foods/phytochem
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4316242/>
- <https://www.bmj.com/content/349/bmj.g7713.full>
- <https://pubmed.ncbi.nlm.nih.gov/18078981/>
- <https://pubmed.ncbi.nlm.nih.gov/21098066/>

Second Rajan Memorial Lecture: January 9, 2022

Venue: Dr. and Mrs. Raina's residence, Duluth, GA

1. Introduction Jawed Fareed, Ph.D. / Atul Laddu, MD, Ph.D.: 5 min

2. Clinical challenges in the management of PE in younger population:

Samuel Goldhaber, MD: 20 min

2.1. 1200-1230 h: Meet and greet Dr. Goldhaber: one on one with GTF students:

2.2. 1230 h: Lunch will be served

3. Pathophysiology of PE, diagnosis, risk stratification, and management (Bulent: Advisor):

3.1. Anushka Bhate, Rohan Pai, and Ashay Bongirwar

3.2. Anushka- Pathophysiology, and pathogenesis of PE, risk stratification, and management. Role of d-Dimer, CRP for inflammation, and PAI-1

3.3. Ashay- Clinical management of PE and prophylaxis of PE

3.4. Rohan- Coagulation process, diagnosis of PE, and incidence of PE

4. Yoga, another option to manage the patients with VTE: Neha Koganti, Diya Pise, and Ria Chokshi: 10 min

5. COVID-19 and PE: Bulent Kantarcioglu, MD: 10 min

6. Concluding remarks by Dr. Jawed Fareed: 5 min

Slides 1-3: Neha

Slides 4-5: Diya

Slides 6-7: Ria

Slides 8-19: Neha

Slides 20-22: Diya

Slides 23-25: Ria