Bio-Mechanics of Yoga

Name:

Institution:

Date:

Abstract

Yoga has gained popularity among the modern population as a form of health improvement. As a discipline that has been around for more than 5,000 years, yoga has been adopted by many religions and other communities as a form of strengthening the spirit and the body. It has been touted by yoga practitioners and some physicians as well as researchers, for having extensive health benefits. Yoga practices have been said to target different parts of the human anatomy, without the need for extraneous exercises. Through the practice of yoga, several muscle groups, joints, and articulations are involved in enhancing the strength of a human being, both physically and mentally. Different aspects of yoga affect the body in different ways. There are numerous yoga poses that have been documented, most of which have not been comprehensively studied by researchers. While there are certain benefits to its practice, yoga can also lead to several injuries if not properly practiced. As such, an individual practicing yoga needs to have adequate knowledge to prevent injuries.

Bio-Mechanics of Yoga

An ancient discipline that traces its origins to India, Yoga is both spiritual and physical. It uses meditation, breathing techniques, and exercise to improve health and general levels of happiness. Religions such as Hinduism, Buddhism, and Jainism have adopted yoga practices throughout the centuries. Other religions and atheists, as well, practice yoga. In Sanskrit, the word ‘yoga’ translates to ‘union’. It is commonly held, by the practitioners of yoga, that its practice creates a union between God, the universe, or the real nature of the individual. The author of the Yoga Sutras, Patanjali, explains yoga as the silencing of the inconstancy of the mind. The non-stop internal monologue of the mind serves as the source of suffering, according to the yogic point of view. The mind is calmed through the application of various yoga practices (Borg-Olivier & Machliss, 2013).

The most commonly known aspect of yoga is the stretching and strengthening poses, referred to as ‘Asana’. This is the most focused on discipline for most yoga classes. However, there are more aspects to yoga, including visualization exercises, breathing techniques (pranayama), meditation practices, chanting, selfless service, and the study of yoga philosophy (Borg-Olivier & Machliss, 2013). There are several benefits gained from the practice of yoga. The first benefit is the reduction of stress. Yoga is, perhaps, the most expansive technique for reducing stress ever developed. Yoga offers other psychological benefits, including improved and stable mood, increased concentration abilities, relaxation, and greater equanimity. The physical benefits include improved coordination and balance, weight loss, improved cardiovascular functionality, improved lung function, improved strength and flexibility, and better reaction speeds. Moreover, with better flexibility and strength, yoga also leads to improved posture (Borg-Olivier & Machliss, 2013).

Yoga practices affect the whole body. Unlike working out a specific part of the body on any given day at the gym, regularly practicing yoga will incorporate the entire anatomy at the same time. Even if you choose a specific area of the body to focus on, and tailor your practice to target that area, the impact will still be felt across the entire anatomy. Yoga practices target various joints, including the joints in the vertebral column, the elbows, knees, wrist, and ankles. Yoga frequently targets most types of freely moving joints such as the ball and socket joints in the hips or shoulders, the hinge joints in the knees and elbows, and the pivot joints in the neck. Yoga also targets bone cells and can increase bone cell production through stress-bearing activities, such as asana, which encourages production (Rameshkumar et al., 2018).

The mobility provided by yoga also assists in maintaining joint cartilage health. Yoga has also contributed to keeping synovial fluid in the joints healthy. Aside from joints, yoga practices target different muscle groups. Abdominal muscles including the transversus abdominis, rectus abdominis, external oblique muscles, and internal oblique muscles are all focused on. Yoga targets the sternocleidomastoid, upper trapezius, and levator scapulae muscles in the neck, pectoralis major and minor muscles in the chest, the biceps brachii, the brachialis, and the brachioradialis in the arms, the iliopsoas, the sartorius, the gluteus maximus, and the biceps femoris in the hips, the quadriceps femoris in the knees, and the extensive muscles in the lower legs. Other muscles targeted include the heart and the brain (Rameshkumar et al., 2018).

According to a study which observed eleven yoga poses, several key muscles were activated with each pose. The study examined fourteen muscle groups, including pectoralis major, biceps brachii, triceps brachii, rectus abdominus, biceps femoris, upper and middle trapezius, and tibialis anterior. The muscle groups responded differently during each of the poses (Wang et al., 2013). Another study which examined the biomechanics of the Cobra posture

highlighted the kinesiological analysis and interpreted the joints involved in the posture and their different angles while attempting the posture. The study found that the cobra posture mainly worked the vertebral column the joints in the region of the hip, as well as, other joints to a certain degree. The pose largely involved the extension of the spine, including the extension of the cervical, thoracic, and lumbar vertebra. The study concluded that there are several obstacles to the application of the pose and to an extent the use of other yoga poses. The study suggested that spine related injuries might occur. Without proper application, other injuries might include shoulder injuries, supraspinatus tear or supinator tightness (Zimmermann, van Valderen & Beutler, 2017).

Without proper care, yoga practices can lead to extensive injuries to the wrists, lower back, shoulders, neck, hamstrings, elbows, and knees. A recent study found that yoga-related injuries had almost doubled in the year 2014 compared to 2001 (Swain & McGwin, 2016). To prevent the most common injuries several steps must be taken. The first is warming up. Before starting any of the yoga exercises, it is important, to begin with breathing exercises and light, gentle stretches. Second, it is important to learn the alignment principles in yoga. The practitioner should have adequate knowledge of how to ground their asana with strong lines and a solid base. Without an ideal alignment, there is not only a risk of injury but the practitioner will also not gain maximum benefits from the exercise. Third, throughout the practice, it is important for the practitioner to be aware of their breathing. They should observe their inhales and exhales and adjust them appropriately. Fourth, if the practitioner has a previous injury, they should use props or practice different variations that will not make the injury worse. If the pain is experienced or breathing becomes erratic, it is best to stop, ask for assistance, or seek advice from a professional. Lastly, sometimes it is much healthier to completely stop an exercise for a

period of time to give the body a chance to recover and to get a better knowledge of how best to apply the practice. Competing or overdoing an exercise might end up causing more harm than good (Swain & McGwin, 2016).

References

Borg-Olivier, S., & Machliss, B. (2013). Applied anatomy and physiology of yoga. YogaSynergy.

Rameshkumar, S., Balasundar, G., Sankar, A., & Saraboji, S. (2018). Effects of yogic practices with resistance training on health related physical fitness and selected bio chemical variables of obese boys. International Journal of Emerging Trends in Sports Sciences, 1(1), 4-13.

Swain, T. A., & McGwin, G. (2016). Yoga-Related Injuries in the United States From 2001 to 2014. Orthopaedic Journal of SportsMedicine. https://doi.org/10.1177/2325967116671703

Wang, M. Y., Yu, S. S., Hashish, R., Samarawickrame, S. D., Kazadi, L., Greendale, G. A., & Salem, G. (2013). The biomechanical demands of standing yoga poses in seniors: The Yoga empowers seniors study (YESS). BMC complementary and alternative medicine, 13, 8. doi:10.1186/1472-6882-13-8

Zimmermann, W. O., van Valderen, N., & Beutler, A. I. (2017). Journal of Yoga & Physical Therapy. Age, 25(5), 23-3.