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Effects of yoga on flexibility of school children: A short summary of reviews

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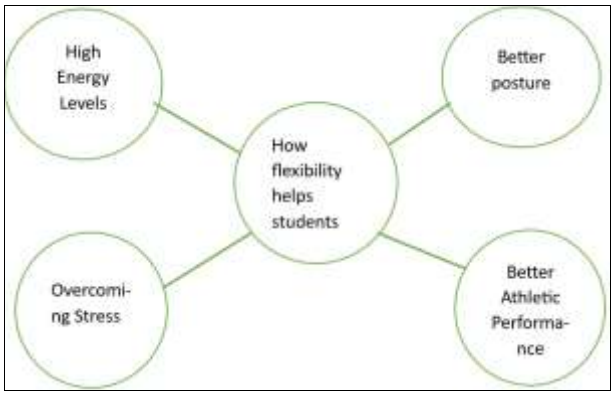
Abstract
The objective of this study is to assess the findings of selected articles regarding the physical effects of yoga and to provide a comprehensive review of the benefits of regular yoga practice for school students. As prolonged sitting hours in school continue to increase, students have corporal, behavioral, cognitive, and psychological symptoms in terms of either frequency or intensity during prolonged sitting in the study seat. Yoga poses help students increase their flexibility, which can be beneficial for various physical activities. A greater range of motion provided by flexibility helps to avoid injuries and stresses to the muscles. Maintaining yoga poses improves general physical fitness by strengthening the muscles. Firm muscles provide stability to the skeletal system, enhancing posture and lowering the possibility of musculoskeletal abnormalities in school students. Students' natural delight can be significantly impacted by the hectic pace of their lives, usually in a negative way. Yoga can assist in reducing these stresses. Students who acquire skills in self-care, relaxation, and inner contentment will find it easier to deal with life's obstacles. Results from this study show that yogic practices enhance muscular strength and body flexibility, and promote and improve the overall performance of the school students. Regular practice of yoga offers much more physical benefits to school students. This study was focused on the physical benefits of yoga.

Keywords: Yoga, flexibility, school students, physical fitness, adolescents

1. Introduction
Muscles can stretch without suffering injury when it is flexible. The definition of flexibility is "capacity to be bent, malleable," and it comes from the Latin word flectere or flexibilis, which means to bend. (Science of flexibility), (Chutia *et al*., 2016) [1] Flexibility is one of the most important components of physical fitness. Flexibility is a factor that influences students' health and physical fitness along with muscle strength and body stability; its optimal level of manifestation reduces the risk of injury and increases motor performance during daily activities, leisure time activities, or sports/competitive activities.
Practicing yoga has been associated with many positive outcomes in various aspects of physical performance and well-being (Polsgrove *et al*., 2016) [9]. Yoga is a form of mind-body fitness that involves a combination of muscular activity and an internally directed mindful focus on awareness of the self, the breath, and energy (Woodyard, 2011) [14]. Yoga is a great way to work on flexibility and strength. Yoga poses work by stretching muscles. It can help us move better and feel less stiff or tired. Yoga and flexibility are interconnected. Yoga postures enhance the flexibility of the school students which helps them to cope with the increased sitting hours in school as well as increase their overall concentration boosting their academic performance.

2. Methods
In order to locate research studies and interventions that examined the effect of yoga on flexibility, databases were searched through Google Scholar via a universities web browser. Initially, the following key words were entered into the database via the advanced search option: ‘yoga and flexibility’. This search was conducted to obtain general information regarding yoga's effects on flexibility in the existing literature. Subsequently, a second search was conducted using the following key words or exact phrases, “yoga and school students,” “yoga for physical fitness,” “yoga and adolescents”.



The following criteria were used for including studies in this review: (1) the article had to be peer reviewed, (2) published between the years 1990 and 2023, (3) the intervention had to incorporate some form of yoga and/ or meditation, and (4) effects of yoga on some outcomes were measured. In order to select the articles included in this manuscript, several steps were taken. First, the title was read. If the article appeared appropriate to the examination of the effects of yoga on flexibility, it was saved to a folder. We selected the papers that described yoga-based therapies to be further reviewed because they addressed specific health outcomes. After that, every selected article was carefully read and evaluated. The articles that were selected cover a wide range of yoga's uses, advantages, and therapeutic effects.

3. Yoga for flexibility

School students who practise yoga can greatly increase their range of motion in their lower back, shoulders, hips, elbows, and knees, as well as the flexibility of their muscles, tendons, and ligaments. This helps students maintain proper posture, enhance their range of motion, and strengthen their bodies.

(Shengcai *et al*., 2023) [13] conducted a study on 30 college students, after 12 weeks of yoga exercises, the body composition of the tested college students improved significantly, increasing both flexibility and physical fitness. Notable changes were also seen in balance and responsiveness, revealing an intrinsic improvement in the students' skeletal muscles.

(Sharma & Parihar, 2018) [12] examined the effects of yogic exercises on the physical fitness in terms of flexibility and endurance and their resultant effects on the academic achievement of high school students.200 students of high school were drawn randomly and were further divided into two groups i.e., experimental and control group each consisting of equal number of students. Yogic exercises were given to the experimental group for a period of three months. Results indicated that flexibility and endurance was improved significantly and thereby improved the academic performance of the students significantly for the experimental group.

(Hosteng *et al*., 2019) [4] concluded that prolonged and uninterrupted sitting during a traditional 2.5-h college lecture is associated with increased levels of self-reported physical discomfort and sleepiness among college students. These findings advance our understanding of the possible impact uninterrupted classroom sitting time has on outcomes related to student performance.

(Hamou *et al*., 2019) [3] used a questionnaire which was applied on a sample of 392 students from four universities to study the effect of prolonged sitting in classrooms. The results indicated that students have corporal, behavioural, cognitive and psychological symptoms in terms of either frequency or intensity during prolonged sitting in the study seat. The findings also demonstrated the variety of strategies kids employ to deal with this extended sitting. It was recommended that university table and seat designs be modified to accommodate students' larger frame sizes. Additionally, it is imperative that study sessions be carefully scheduled and include a variety of appropriate pauses.

(Malhotra & Gupta, 2014) [7] in their study found that there is significant difference in mental health of adolescents before and after practising yoga.

(Jagadeeswari, 2017) [5] did a comparative study on flexibility among yoga and Bharatanatyam practicing student. 20 Yoga practicing students and 20 Bharatanatyam practicing students were selected as sample. The collected data were statistically analysed by 't' test. It was found that the flexibility in the Yoga practicing students were better than the Bharatanatyam practicing students.

(Grabara, 2016) [2] studied the effects of hatha yoga exercises on spine flexibility in young adults. The study comprised 59 male and female first-year students, aged 19–22 years old. The findings of the study indicated that the flexibility of the spine and the hamstring muscles could increase as a result of regular yoga exercises.

(Sereda *et al*., 2020) [11] studied the Impact of Yoga Practice on the development of flexibility among the female students. The experiment was attended by 96 first-year students who were divided into control and experimental groups. The study's findings demonstrated the benefits of yoga for college students' flexibility growth and heightened enthusiasm in this kind of physical activity.

(Kame, n.d.) conducted a study on effect of yoga practices on muscular endurance & flexibility of young adult girls. 30 girls were chosen as sample. Among them 15 girls performed yoga regularly i.e. six days in a week and the rest 15 did not perform any yoga. 15 students who practices yoga on regular basis were the experimental group & the non-Yoga practitioners were the control group. The finding of the results concluded that there was significant improvement existing between experimental and control group on Muscular endurance, Flexibility.

(Palanisamy, n.d.) conducted a study on implication of yogic practices on flexibility of students. 30 students age ranged from 18 to 24 years of age were taken as sample for the study. The selected subjects were divided into one experimental group and a control group with fifteen subjects in each. The result of this study showed that yoga practices groups showed significant improvement in flexibility and endurance when compared with a control group as well as pretest.

(Prasanna *et al*., 2020) [10] studied the effect of yogic practices and physical exercises training on flexibility of urban boys students. Sixty healthy, untrained students were selected. The subject's age ranged from 13 to 15 years. The selected subjects were divided into three groups with twenty subjects in each group. The training periods of experimental groups were six weeks, three alternative days per week with duration of 60 minutes. Control group did not undergo any training program rather than their routine work. Pre tests were conducted for all the 60 subjects on selected flexibility variable. It was concluded from the results of the study that the yogic practices and physical exercises groups showed significant improvement in flexibility when compared with a control group.

4. Discussions

Yoga is one of the six orthodox Indian philosophies. Its philosophical and metaphysical aspects may be accepted, or

denied but there is no doubt about its rewards in the form of better health, vitality and psycho-physical poise. The problem school students facing today are lack of concentration in their studies, poor eye hand co-ordination, poor information processing skills and poor physical health, which results ultimately to poor scholastic achievement. Yoga culture is the dire necessity for bringing psychophysiological equilibrium aiming to achieve positive physical and mental health. Yogic philosophy has always believed in the integration of body and mind.

Rapidly emerging in the Western world as a discipline for integrating the mind and body into union and harmony, when adopted as a way of life, yoga improves physical, mental, intellectual and spiritual health. According to the results of assessment of the level of development of flexibility in students, it is found that inclusion in the program of yoga at school- based education institutions will allow not only to maintain, but also to improve its index, and therefore to have a positive influence on physical fitness.

Regularly practicing Yoga poses for flexibility have many health benefits. Stretching is a great way to increase mobility, improve range of motion and reduce the risk of injury. So, including yogic exercises at an early stage i.e. school level will help students in many ways. It will have numerous benefits either in academic performance or physical fitness. Since Yoga is not mere a physical activity, it will help in overall development of school children.

5. Conclusion

From the above discussion of the results that are obtained as an intensive review of the articles published in the journals indexed in Scopus, Web of Science and other reputed journals, it is found that yoga is a potential measure for increasing the flexibility of the individuals. It is proven by examining the data experimentally. Various studies have been published supporting the claim. But there are some limitations in universalization of the results. More studied should be done in the case of the children.

Yoga is currently being taught to children in studios across the country and is being used as an intervention by physical therapists to improve balance, flexibility and strength in children with impairments. This study supports the use of yoga in the school setting with healthy children and yoga may be a good alternative to sports to allow children to stay active and gain benefits in balance

As there are numerous benefits of the flexibility i.e. good posture, improved physical activity and many more, it can be concluded that Yoga should be an integral part of the curriculum for school children.

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