Comparison between effect of equal intensity training with Suryanamaskar or Physical Education activity or combination of both on Physical fitness in Adolescent Urban School children – A Randomized Control Trial : A Hypothesis

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Abstract: Background: Adolescent Age is the age of maximum physical & mental development. Fitness and Physical activity plays a major role in the growth and development of a child in this age. Physical education (PE) has been considered as a very important step in the growth and development of children. The Global recommendations proposes a minimum of 60 minutes of moderate to vigorous physical activity for children aged 5 – 17 years of age daily. But studies evaluating physical education, comment that the present PE system does not achieve the standards required for maintenance of optimal physical fitness in children and may not be adequate to meet these levels of Physical Activity. Thus a specific programmed physical activity by adding Suryanamaskar training (SN) to the present PE activity is necessary. The study objective is to study the effectiveness of Suryanamaskar Training, Physical Education exercises and combination of both on health and performance related Physical fitness parameters in Adolescent Urban School children of age13-15 years by a Prospective Randomized Single blind Control Trial on 1500 children (500 per group) subjected to Physical Education activity training (I), Suryanamaskar training (II) and combination training of both (III) for 3 days a week for 8 weeks.

Hypothesis: A combination of Suryanamaskar training with general physical education exercises would offer higher benefits in improving physical fitness in School children as compared to only Suryanamaskar training or the physical education activities.

Clinical Importance: Adding a combination of Suryanamaskar to the structured Physical Education components would help enhance the physical fitness of the children thereby helping to make the future generation more healthy and fit and help improving their immunity and reducing/ preventing the risks of non-communicable & communicable diseases

Future Research: Additional benefits of SN training can be studies on all the systems and even on mental and social fitness of the children.

THESIS SUMMARY

Introduction:

Adolescent Age is the age of maximum physical & mental development. Fitness and Physical activity plays a major role in the growth and development of a child in this age. The population based approach of Childhood obesity prevention of World Health Organization (WHO) estimates more than 170 million children of less than 18 years in the upper-middle income (developing) countries to be obese. It proposes that, this rapid change in the number and pattern of obesity will have a serious public health challenge in the 21st century [1]. The Global recommendations for Physical activity and health of WHO proposes a minimum of 60 minutes of moderate to vigorous physical activity for children aged 5 – 17 years of age daily. They propose an aerobic nature of activity for minimum of 3 days per week for maintenance of optimal fitness. This may be achieved by physical

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activities including play, games, sports, planned exercise or Physical education activity [2]. Physical education (PE) has been considered by authors as a very important step in the growth and development of children [3-6, 8-11]. But, studies evaluating physical education, comment that the present PE system does not achieve the standards required for maintenance of optimal physical fitness in children [4-6, 9, 11]. Developed countries have recommended modifications their PE programs to increase the physical activities to moderate – vigorous levels, especially in girls and all the secondary school children [5]. But in developing countries, like India, a steady decline in the level of moderate – to – vigorous Physical activity patterns amongst urban school children has been found, especially in girls [6, 10]. This has resulted in reduction in physical fitness levels amongst urban school children, mainly in girls [6, 7]. Physical training in Indian Schools is restricted to a 30-60 minutes PE activity period once or twice a week wherein students may perform a series of structured physical activities. Further, reduction in the level of moderate to vigorous Physical activities in secondary school children have been attributed primarily to lack of time due to increase in the duration of classes, tuitions, homework, TV/ video viewing, sedentary activities and reduction in sleep time [6]. The activities in the PE class include more of open chain, systematic aerobic activities/ movements. But the intensity of these activities in terms of Exercise Heart rate/ Rate of Perceived exertion has not been measured. Thus, to obtain the moderate to severe level of physical activity, as recommended by WHO, it becomes necessary to evaluate the level of intensity of the present PE programs. As per Center for Disease control (CDC), only around 17 – 39% of children are involved in organized physical activity for at least 60 minutes per day. Recommendations are to increase the intensity of Physical activity in children from 60 minutes per week to 200 minutes per week [12]. CDC expresses the need to increase the levels of Physical Education activities, as well as have a more structured program for enhancement of fitness in school children [8]. Physical Education has been proved to have a significant contribution in the physical activities levels of children. But this can be only achieved if the structure of this PE is planned and delivered considering the moderate – to – vigorous levels of physical activities required by children [9]. Also, focus of Physical activities should not be only on Health related fitness parameters, but also on performance related parameters [10]. But, conventional PE programs may not be adequate to meet these levels of Physical Activity. Thus a specific programmed physical activity is necessary [6, 9-11].

Hypothesis

Suryanamaskar (SN), which is a traditional Indian exercise and health regime, has been well studied for its effectiveness in adults [13] for improvisation of strength, endurance and body composition [14-15]. This exercise involves attainment of a series of yogic postures in succession, coordinating with breathing, and has been found to be effective in improving cardio respiratory functions [16, 18] but with lesser stress on it compared to exercises of similar intensities [17]. SN is slow, sustained, repetitive activity utilizing both the aerobic and the anaerobic systems. It includes closed chain activities, even of the upper limbs, which is optimal for osteogenesis[13].

Effectiveness of SN training has also been observed in children in regards to their ability to help improve the musculoskeletal and cardiorespiratory functioning and thus is a safe process to be introduced in adolescent children [19].

Thus, it becomes necessary to introduce and evaluate a structured program like Suryanamaskar in the PE program in schools and also to increase the intensity of physical activity to obtain a change in the level of physical fitness of children hereafter.

Thus, it is hypothesized that Suryanamaskar training combined with general physical education exercises offers higher benefits in improving physical fitness in School children as compared to only physical education exercises or only Suryanamaskar training.

The present research aims to study the effectiveness of equal exercise intensity training of Suryanamaskar, Physical Education exercises and combination of both on health and performance related Physical fitness parameters in Adolescent Urban School children of age13-15 years. A Prospective Randomized Single blind Control Trial will be performed post ethical approval in schools from an urban region in the state of Maharashtra. The sampling will be done by computer generated block random allocation of 1500 (500 per group) children from schools consenting for participation. This is based on the 2011 census report propagating around 3,21,646 children in the specific urban city between the age group 13 to 15 years. Children who are non-school goers, participating in Professional sports, having Physical deformities or complications inhibiting participation in studyor from Special Schools shall be excluded from the study. The concerned schools and participants, on their assent and parents' consent, will be randomly divided in one of the three groups, also based on the interest of the school management & concerned physical education teachers of the school and on their willingness to introduce Suryanamaskar as part of their physical education component.

The pre study physical fitness parameters will be assessed as per guidelines laid by FITNESSGRAM®[20].

1) Aerobic Capacity will be calculated by the maximal oxygen uptake (VO2 max) by the PACER test using the beep test CD of FITNESSGRAM.

2) Body Composition Analysis shall be done to calculate the percentage body fat by the Skin fold caliper method at the triceps, abdominal & calf regions

3) Flexibility shall be assessed by the Back saver sit & reach test using a standard Sit & reach Box.

4) Strength & Endurance shall be assessed by the 90 degree pushup test & curl up test using a metronome for a set up pace & cadence.

5) Agility will be assessed by the Agility Drill

6) Balance and Coordination will be assessed by the Star Excursion Balance test (SEBT)

7) Power will be assessed by the Vertical Jump Test

8) Speed will be calculated by the number of Laps covered in Shuttle run test of VO2 Max

9) Reaction time shall be measured by the Reaction time analyzer

All the students shall perform exercises for a minimum of 3 times in a week for 8 weeks.

Group I: 12 step Suryanamaskar at a moderate pace, 3 days in a week (alternate days) for 8 weeks. The number of SN shall be as per that achieved in Phase I of the study by a cross-over pilot study wherein the PRE of the present PE activity shall be equated with the number of SN's performed by the students.

The following steps shall be used in SN training [22]:

1. Pranamasan, 2. Hastauttanasan, 3.Hastapadasan, 4.Ashwasanchalanasan5.Parvatasan, 6.Chaturnamaskar, 7.Bhujangasan, 8.Parvatasan, 9.Ashwasanchalanasan, 10.Hastapadasan, 11.Hastauttanasan, 12.Pranamasan

Group II: Students in this group shall perform structured Physical Education exercises (PE) which are routinely followed in the schools. These involve dynamic open chain upper limb & lower limb movements, 3 days in a week (alternate days) for 8 weeks.

Group III: Combination of Suryanamaskar training and Structured Physical Education activities shall be given to this group. Week 1 shall consist of 2 days of SN (e.g. Monday and Friday) and 1 day of PE (e.g. Wednesday) [SN-PE-SN]. Week 2 shall consist of 2 days of PE (e.g. Monday and Friday) and 1 day of SN (e.g. Wednesday) [PE-SN-PE]. This will be repeated for 8 weeks.

Thus all the students will be exposed to minimum of 135 minutes of Physical activity per week for 8 weeks post which the above outcome measures will be assessed and compared using SPSS. Intra Group analysis will be by the paired t test for assessment of Aerobic Capacity, Flexibility, Body Composition, Agility, Balance and Coordination, Power, Speed and Reaction time while Strength & Endurance shall be assessed by Wilcoxon Test.Inter group analysis shall be by Oneway ANOVA for all the parameters except Strength & Endurance which will be assessed by Repeated ANOVA. Alpha shall be set at > 0.05 and level of confidence at 95%.

Discussion

Physical Education and activities regarding Physical education have been studied by researchers globally and all of them have generally narrowed down to the component that the time devoted to PE is extremely less in children as compared to the minimum criteria being laid down by global bodies like WHO, CDC etc. [1-6, 8-12]. Even in India, the same problem exists wherein the level of participation of the children in PE activities in very less in children, more due to the increased level of academic competitions and the rat race that all the children are subjected to[6,10]. This has predisposed children to reduced levels of physical fitness making them susceptible to problems in the early stages of their life[6,7].

Various authors have laid down the importance of a structured PE program for health enhancement in children and also stated that PE programs can be modified to obtain a better result in the fitness of children [5,9,11]. But in country like India, questions have been raised not only on the acceptance of the policy makers to be actively involved in induction of such programs, but also on the financial constraints that will be encountered while trying to induce PE in form of sports at the school levels. We all talk of making our future generation healthy & fit and produce world class athletes, but no efforts are made to ensure that some structured form of fitness programs should be introduced within the curriculum for school children [6].

Suryanamaskar has been researched to be an effective and useful tool for health and fitness enhancement [13-19]. It has also proved in efficacy and ability to be introduced in children for their fitness enhancement [19]. Thus introduction of Suryanamaskar will definitely help in health enhancement in children and can be used as an alternative tool for PE program. Also the time requirement for performance of SN has been found to be lesser compared to other fitness techniques like treadmill or circuit training to achieve the same level of exercise training intensity as measured with their Rate of Perceived Exertion(RPE)[15]. SN uses the component of breathing coordination with exhalation during trunk flexion (rechak) and inspiration during trunk extension (purak) and a hold (kumbhak) during the stage of chaturnamaskar. This coordinated breathing helps in improving the respiratory system as well [15-19].

Thus, SN may surely be a viable solution for exercise prescription in PE, especially in adolescent urban school children from 13-15 years age who are in their 8th to 10th standard and are extremely tied up with their busy schedules of schools, classes, tuitions, study charts etc. to involve them in moderate-to-severe level of physical activities[6].

Although SN is described experts as a complete exercise, it does possess certain drawbacks. SN limbers the spine in alternate flexion and extension movements. But no documented literatures show the presence of trunk rotations in SN. Also the effects and benefits documented are very much dependent on the factor of speed of performance of the namaskar[19]. Also the effect of SN on body composition is controversial as different studies have found different results on body composition with SN [14,15].

Thus combining SN with the Structured PE activity would offer more benefits than SN alone as this would work on both the aerobic and anaerobic systems of the body in terms of enhancement of strength, endurance, flexibility and aerobic capacity.

SN by itself is an extremely coordinated and repetitive activity. It involves a series of aasans (postures) which also can work on development on balance on the child. Combined with the structured PE activity, it can also help in enhancement of the performance related factors of fitness, viz. power, balance, coordination, agility, and speed of the child. A study on yoga on women has demonstrated the beneficial effects of yoga on the cognitive functions of the subjects [23]. SN, as a component of yoga, may also help in improvement of the higher functions, and thereby reaction time, in children as well.

Thus, the study hypothesis states that a combination of Suryanamaskar training with general physical education exercises would offer higher benefits in improving physical fitness in School children as compared to only Suryanamaskar training or the physical education activities.

Clinical Importance

Adding a combination of Suryanamaskar to the structured Physical Education components would help enhance the physical fitness of the children thereby helping to make the future generation more healthy and fit and help improving their immunity and reducing/ preventing the risks of non-communicable & communicable diseases.

Future Direction

Additional benefits of SN training can be studies on all the systems and even on mental and social fitness of the children.

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