IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 6 Ver. II. (Nov.-Dec.2018), PP 63-78
www.iosrjournals.org

Impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children

Kavya Kriti Kaul[1], Dr. (Mrs.) Himanshu[2]
[1] *(PhD. Scholar (Public Health), Department of Public Health, OPJS University, Churu, Rajasthan, India)*
[2]*(Associate Professor, Department of Microbiology, OPJS University, Churu, Rajasthan, India)*
Corresponding author: Kavya Kriti Kaul

Abstract: ***Objectives:*** *The present study assessed the impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children in two Government and three private schools of Chandigarh, India.* ***Design and methods:*** *This was case control study (intervention study) at class level. Analysis of data was by Chi-square test.* ***Results:*** *The high proportion of school children did vigorous activity (41%), (56.4%) and moderate activity (42%), (56.9%); vigorous sports (68.7%), (57.2%) and moderate sports (58.7%), (53.5%); travelling activity (51.9%), (45.4%); and yoga activity (71.5%), (60.5%) for more than 4 days and 1-2 hours daily in a week respectively. The (98.8%) did not smoke tobacco and consume alcohol; (74.8%) ate fruits and vegetables for more than 4 days a week and (91.2%) had no history of hypertension and diabetes. The BMI improved, sedentary behaviour decreased and there was significant increase in moderate activity (0.4%), vigorous sports (2.8%) and moderate sports (14.2%), travelling activity (16.3%) and yoga activity (15.5%) and measurement and treatment of hypertension (6.3%) and diabetes (5.7%) after an intervention.* ***Conclusion:*** *It can be concluded that there was an overall impact of a package of lifestyle interventions in increasing physical activity index among school children.*

Keywords: *Alcohol and tobacco, Fruits and vegetables, Hypertension and diabetes, Intervention, School children*

Date of Submission: 13-11-2018 Date of acceptance: 28-11-2018

I. Introduction

Many youth are physically inactive today. A large body of research evidence has shown that once a child has become obese, there is a high probability that this obesity will continue into adulthood. Therefore, there is general acceptance that children should be considered the priority population for intervention strategies aimed at treating or, ideally, preventing the onset of obesity. Physical activity must be a major component of interventions designed to prevent or treat childhood obesity. Those studies that have investigated the long-term effects of childhood or adolescent obesity on adult morbidity and mortality have shown greater adult all-cause mortality, coronary heart disease, atherosclerotic vascular brain disease, hypertension, colorectal cancer, diabetes, gout and arthritis, amongst other medical conditions. The rates of morbidity and mortality from these diseases increase with higher degrees of obesity. The key to success in tackling the problem of obesity now lies in understanding, measuring and altering this "obesogenic" environment. In May 2004, a report by the International Obesity Taskforce (IOTF) to the World Health Organization (WHO) highlighted examples of problematic social trends that are believed to be contributing to the childhood obesity epidemic. These included an increase in the use of motorized transport, (i.e. to school); reduced opportunities for recreational physical activity; increased sedentary recreation; multiple TV channels around the clock; greater quantities and variety of energy dense foods available; rising levels of promotion and marketing of energy-dense foods; more frequent and widespread food purchasing opportunities; more use of restaurants and fast food stores and larger portions of food offering better 'value' for money [1].

The children and youth in 2002 represented a joint effort of the Lucknow Society for Exercise Physiology and Health. Two sets of guidelines were published, one for children aged 6–9 years and a second for youth aged 10–14 years. In addition to the physical activity guides, which highlighted the recommended physical activity levels for these two age groups, a number of other promotional and educational packages were developed, including family booklets, teacher booklets, as well as physical activity magazines for children.

The key recommendations within India's child and youth physical activity guides are as follows:

1. Increase the time currently spent on physical activity by 30 mins/d, and progress over approximately 5 months to ‡90 mins/d.
2. Physical activity can be accumulated throughout the day in periods of at least 5–10 mins.

3. The 90 mins increase in physical activity should include 60 mins of moderate activity (e.g., brisk walking, skating, bicycle riding) and 30 mins of vigorous activity (e.g., running, basketball, soccer).
4. Participate in different types of physical activities — endurance, flexibility, and strength — to achieve the best health results.
5. Reduce non-active time spent watching television and videos, playing computer games, and surfing the Internet. Start with 30 min/d less of such activities and progress over the course of approximately 5 months to 90 min/d less [2].

Finally, WHO (World Health Organization) has developed the global physical activity recommendations for children aged 5-17 years. The scientific evidence available for the age group 5–17 years supports the overall conclusion that physical activity provides fundamental health benefits for children and youth. Appropriate levels of physical activity contribute to the development of healthy musculoskeletal tissues (i.e. bones, muscles and joints); healthy cardiovascular system (i.e. heart and lungs); neuromuscular awareness (i.e. coordination and movement control); and it also facilitates maintenance of a healthy body weight. Moreover, physical activity has been associated with psychological benefits in young people by improving their control over symptoms of anxiety and depression; and assisting in social development by providing opportunities for self-expression, building self-confidence, social interaction and integration. For children and young people, physical activity includes play, games, sports, transportation, chores, recreation, physical education or planned exercise in the context of family, school and community activities. The recommendations to improve cardiorespiratory and muscular fitness, bone health, and cardiovascular and metabolic health biomarkers are:

1. Children and youth aged 5-17 years should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.
2. Amounts of physical activity greater than 60 minutes provide additional health benefits.
3. Most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least 3 times per week.

The concept of accumulation refers to meeting the goal of 60 minutes per day by performing activities in multiple shorter bouts spread throughout the day (e.g. 2 bouts of 30 minutes), then adding together the time spent during each of these bouts. These recommendations are applicable for all children and youth irrespective of gender, race, ethnicity, or income level [3].

1.1 Aims and Objectives

1.1.1 To assess the impact of a package of lifestyle interventions in reducing stress and increasing physical activity among school children.

1.1.2 To objectively measure the time spent on daily physical activity and types of daily physical activity done; daily diet taken and tobacco use and alcohol consumption among school children; and motivators and demotivators for school children to engage in physical activity.

1.1.3 To develop a package of lifestyle interventions i.e. health education booklet on various health benefits of proper physical activity and diet daily for school children.

1.1.4 To provide health education on various health benefits of proper physical activity and diet daily through distribution of the health education booklets among school children.

1.1.5 To create awareness about Indian and WHO guidelines of daily physical activity recommendations among school children and teachers.

II. Methods and Material

2.1 Study area: The five schools of Chandigarh were covered as sample size. They were Govt. Model High School, Sector – 38 (West), Chandigarh, Govt. Model High School, Sector – 38-D, Chandigarh, Sri Guru Harkrishan Sr. Secondary School, Sector – 38-D, Chandigarh, Sharda Sarvhitkari Sr. Secondary School, Sector – 40-D, Chandigarh and Kulwant Rai Sarvhitkari School, Sector – 43-B, Chandigarh.

2.2 Study period: Jan 2016 – Sep 2018.

2.3 Study design: Case control study at class level (intervention study).

2.4 Study unit: 283 cases and 283 controls. Cases (with intervention) from Govt. Model High School, Sector – 38 (West), Chandigarh and controls (no intervention) from Govt. Model High School, Sector – 38-D, Chandigarh. Focus Group Discussion and In-Depth Interview will be done in Sri Guru Harkrishan Sr. Secondary School, Sector – 38-D, Chandigarh, Sharda Sarvhitkari Sr. Secondary School, Sector – 40-D, Chandigarh and Kulwant Rai Sarvhitkari School, Sector – 43-B, Chandigarh.

2.5 Data collection: Data was collected by interviewing two hundred and eighty three school children (cases with intervention) and two hundred and eighty three school children (controls with no intervention) of age group of 11-13 years old at class levels $6^{th,}$ 7^{th} and 8^{th} from government schools in Chandigarh of low socio-economic

status for completion of questionnaires. The questionnaires was completed by school children (cases with intervention) at pre-intervention and post-intervention i.e. after three months of this intervention as well as by school children (controls with no intervention) once. The diary log record of duration of three months describing the minutes and type of physical activity done was maintained by school children (cases with intervention) and their diary log record was collected from them after three months of this intervention in this study.

2.6 Analysis: Analysis of data was done by Chi-square test.

2.7 Intervention package: An intervention package of lifestyle interventions was developed for two hundred and eighty three school children (cases with intervention) of age group of 11-13 years old at class levels $6^{th,}$ 7^{th} and 8^{th} from government schools in Chandigarh. This intervention package of lifestyle interventions consisted of a health education booklet on various health benefits of proper physical activity done and daily diet taken by school children as well as Indian guidelines of daily physical activity recommendations. These health education booklets were distributed among two hundred and eighty three school children (cases with intervention) and discussion was done on Indian guidelines and WHO recommendations for daily physical activity and proper diet among them as an intervention to encourage increased daily physical activity and proper diet among them.

2.8 Study tools:

2.8.1 Questionnaire to objectively measure the minutes and types of daily physical activity done i.e. light, moderate or vigorous activity; stress levels, daily diet taken by school children at pre-intervention and post-intervention; and motivators and demotivators for physical activity among school children. Pretested semi-structured questionnaire was taken from STEPS Report of India from WHO website [4].

2.8.2 Focus Group Discussion (FGD) and In-Depth Interview will also be done with government and private school children.

2.8.3 Health education booklet for providing the school children with knowledge on various health benefits of proper physical activity and diet daily as well as Indian guidelines of daily physical activity recommendations for school children.

2.8.4 Diary log record to be maintained by school children (cases with intervention) of the minutes and types of daily physical activity done by them during the duration of three months after the intervention.

III. Results

The outcomes showed that the high proportion of school children did physical activity (vigorous activity (41%) and moderate activity (42%); vigorous sports (68.7%) and moderate sports (58.7%); travelling activity (51.9%); and yoga activity (71.5%)) for more than 4 days a week and (vigorous activity (56.4%) and moderate activity (56.9%); vigorous sports (57.2%) and moderate sports (53.5%); travelling activity (45.4%); and yoga activity (60.5%)) for 1-2 hours daily in a week. The outcomes showed that the high proportion of school children (63.7%) meet the Indian guidelines of daily physical activity recommendations (at least 60 mins of moderate sports and 30 mins of vigorous sports daily) and (98.8%) did not smoke any tobacco products or use smokeless tobacco products and consume any alcoholic products. The outcomes showed that the high proportion of school children (74.8%) ate fruits and vegetables for more than 4 days a week and (59.7%) had servings of fruits for 1-2 times a day and (76.3%) had servings of vegetables for 3-4 times a day and (91.2%) had no history of hypertension and diabetes. The outcomes showed that Body Mass Index (BMI) improved, sedentary behaviour decreased, daily eating habits of fruits and vegetables increased and there was significant increase in moderate activity (0.4%), vigorous sports (2.8%) and moderate sports (14.2%), travelling activity (16.3%) and yoga activity (15.5%) and measurement and treatment of hypertension (6.3%) and diabetes (5.7%) among school children (cases) after an intervention in this study. It can be concluded that there was an overall impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children.

In the Focus Group Discussion and In-Depth Interview among school children of five Government and private schools of Chandigarh, India, it was found that the motivational factors to engage in physical activity were enjoyment, feelings of being in good condition (eg. not overweight), peer involvement, indirect role modelling (eg. professional athlete) and feelings of competence (self-efficacy) and improvement and demotivational factors to engage in physical activity were work pressure, access to facilities and equipment is difficult, unsupportive social environment (peers, teachers, etc.), perception that personal safety is at risk or frequent injuries, physically unfit and mentally tired. The school children said that they did more than two hours of physical activity daily and those physical activities were Badminton, Football, Table-tennis, Cycling, Basketball, Cricket, Baseball, Hockey, Tennis, Kho-kho, Kabaddi, Running, Gymnastics, Yoga, Skating, Karate, Volleyball, ironing, dusting, washing clothes, sweeping and washing windows.

The school children (cases) said that the health education booklet has reduced any stress related to amount of physical activity that they should do daily; health education booklet has increased their knowledge about benefits of daily physical activity and proper diet; health education booklet has encouraged them to increase their daily physical activity and intake of proper diet; health education booklet has given them

knowledge about Indian and WHO physical activity recommendations for school children; and overall, health education booklet has been useful to them.

IV. Discussion

Baby S. Nayak et al. (2016) showed the effectiveness of six months multicomponent intervention on improving the lifestyle practices, reducing the body fat and improving the self esteem of obese children from selected schools of Udupi District, South India. The components of multicomponent intervention were: education provided to the obese children on lifestyle modification, education of the parents and increasing the physical education activity of these children in the form of aerobics under the supervision of physical education teacher. The final sample in the intervention group was 90 and the final sample in the control group was 104. Mixed Method Repeated measures Analysis of Variance (ANOVA) was applied for analysis of data. Results indicated that the intervention was effective in reducing the Body Mass Index (BMI), triceps, biceps, subscapular skin fold thickness of obese children. This relationship has been confirmed in the impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children as 19.1% of cases were underweight during pre-intervention and 15.9% of cases were underweight during post-intervention; 54.1% of cases were normal weight during pre-intervention and 61.5% of cases were normal weight during post-intervention; and 16.6% of cases were overweight during pre-intervention and 12.4% of cases were overweight during post-intervention. Thus, the underweight cases decreased; normal weight cases increased and overweight cases decreased among school children after an intervention in this study [5].

Maartje M van Stralen et al. (2012) reported that in total, 600 primary schoolchildren (aged 9.8 ± 0.7, 51% girls, 13% Dutch ethnicity, 35% overweight) from 9 intervention and 10 control schools were included in the analyses. JUMP-in was effective in improving sport participation after 20 months, but not in improving outdoor play, or reducing TV-viewing or computer time. JUMP-in was not effective in changing hypothesized mediators so no significant mediated effects could be identified. This relationship has been confirmed in the impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children as 84.8% of cases were involved in any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 87.6% of cases were involved in any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention. The 9.6% of cases spent 1-2 days per week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 19.4% of cases spent 1-2 days per week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention; 15% of cases spent 3-4 days per week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 14.5% of cases spent 3-4 days per week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention; and 75.4% of cases spent more than 4 days per week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 66.1% of cases spent more than 4 days per week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention.

The 28.3% of cases spent less than 1 hour per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 7.3% of cases spent less than 1 hour per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention; 55.4% of cases spent 1-2 hours per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 69.4% of cases spent 1-2 hours per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention; 7.5% of cases spent 2-3 hours per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 13.3% of cases spent 2-3 hours per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention; and 8.8% of cases spent more than 3 hours per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 10.1% of cases spent more than 3 hours per day in a week on any vigorous-intensity sports, fitness or recreational (leisure) activities during post-intervention.

The 78.4% of cases were involved in any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 92.6% of cases were involved in any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention. The 12.2% of cases spent 1-2 days per week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 19.5% of cases spent 1-2 days per week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention; 8.6% of cases spent 3-4 days per week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 11.5% of cases spent 3-4 days per week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention; and 79.3% of cases spent more than 4 days per week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 69.1% of cases spent more than 4 days per week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention.

The 22.5% of cases spent less than 1 hour per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 9.9% of cases spent less than 1 hour per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention; 61.7% of cases spent 1-2 hours per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 71% of cases spent 1-2 hours per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention; 13.1% of cases spent 2-3 hours per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 10.7% of cases spent 2-3 hours per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention; and 2.7% of cases spent more than 3 hours per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during pre-intervention and 8.4% of cases spent more than 3 hours per day in a week on any moderate-intensity sports, fitness or recreational (leisure) activities during post-intervention.

The 71.7% of cases were involved in travelling activity during pre-intervention and 88% of cases were involved in travelling activity during post-intervention. The 19.7% of cases spent 1-2 days per week on travelling activity during pre-intervention and 19.3% of cases spent 1-2 days per week on travelling activity during post-intervention; 11.8% of cases spent 3-4 days per week on travelling activity during pre-intervention and 11.2% of cases spent 3-4 days per week on travelling activity during post-intervention; and 68.5% of cases spent more than 4 days per week on travelling activity during pre-intervention and 69.5% of cases spent more than 4 days per week on travelling activity during post-intervention. The 24.6% of cases spent less than 1 hour per day in a week on travelling activity during pre-intervention and 10.8% of cases spent less than 1 hour per day in a week on travelling activity during post-intervention; 63.5% of cases spent 1-2 hours per day in a week on travelling activity during pre-intervention and 68.3% of cases spent 1-2 hours per day in a week on travelling activity during post-intervention; 6.9% of cases spent 2-3 hours per day in a week on travelling activity during pre-intervention and 13.3% of cases spent 2-3 hours per day in a week on travelling activity during post-intervention; and 4.9% of cases spent more than 3 hours per day in a week on travelling activity during pre-intervention and 7.6% of cases spent more than 3 hours per day in a week on travelling activity during post-intervention. Thus, there was increase in their any vigorous-intensity and moderate-intensity sports, fitness or recreational (leisure) activities and travelling activity among school children after an intervention in this study [6].

Sheila Bhave et al. (2016) showed that a non-randomised non-blinded school-based intervention study was conducted in two schools in the cities of Pune and Nasik, India. It was a 5-year multi-intervention programme, covering three domains: physical activity, diet and general health, and including increased extra- and intra-curricular physical activity sessions; daily yoga-based breathing exercises; making physical activity a 'scoring' subject; nutrition education; healthier school meals; removal of fast-food hawkers from the school environment; and health and nutrition education for teachers, pupils and families. The intervention group comprised children attending one Pune school from 7-10 years until 12-15 years of age. Two controls groups comprised (1) children of the same age attending a similar school in Nasik, and (2) children in the Pune intervention school but aged 12-15 years at the start of the study. Results indicated that after five years the intervention children were fitter than controls in running, long-jump, sit-up and push-up tests ($p<0.05$ for all). They reported spending less time sedentary (watching TV and studying), more time actively playing, and eating fruit more often ($p<0.05$). The intervention did not reduce BMI or the prevalence of overweight/ obesity, but waist circumference was lower than in the Pune controls ($p=0.004$) and concluded that it was possible to achieve multiple health-promoting changes in an academically competitive Indian school. This relationship has been confirmed in the impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children as 78.4% of cases did moderate-intensity activity during pre-intervention and 78.8% of cases did moderate-intensity activity during post-intervention.

The 17.1% of cases spent 3-4 days per week on moderate-intensity activity during pre-intervention and 17.5% of cases spent 3-4 days per week on moderate-intensity activity during post-intervention; and 54.5% of cases spent more than 4 days per week on moderate-intensity activity during pre-intervention and 59.6% of cases spent more than 4 days per week on moderate-intensity activity during post-intervention. The 9.9% of cases spent 2-3 hours per day in a week on moderate-intensity activity during pre-intervention and 20.6% of cases spent 2-3 hours per day in a week on moderate-intensity activity during post-intervention; and 0.5% of cases spent more than 3 hours per day in a week on moderate-intensity activity during pre-intervention and 9.9% of cases spent more than 3 hours per day in a week on moderate-intensity activity during post-intervention.

The 55.5% of cases were involved in yoga activities during pre-intervention and 71% of cases were involved in yoga activities during post-intervention. The 19.1 % of cases spent 1-2 days per week on yoga activities during pre-intervention and 18.4% of cases spent 1-2 days per week on yoga activities during post-intervention; 7.6% of cases spent 3-4 days per week on yoga activities during pre-intervention and 10.9% of cases spent 3-4 days per week on yoga activities during post-intervention; and 73.2% of cases spent more than 4

days per week on yoga activities during pre-intervention and 70.6% of cases spent more than 4 days per week on yoga activities during post-intervention. The 25.5% of cases spent 1-2 hours per day in a week on yoga activities during pre-intervention and 34.3% of cases spent 1-2 hours per day in a week on yoga activities during post-intervention; 10.2% of cases spent 2-3 hours per day in a week on yoga activities during pre-intervention and 11.9% of cases spent 2-3 hours per day in a week on yoga activities during post-intervention; and 1.9% of cases spent more than 3 hours per day in a week on yoga activities during pre-intervention and 7.5% of cases spent more than 3 hours per day in a week on yoga activities during post-intervention. The 56.5% of cases spent less than 1 hour per day in a week on sedentary behaviour (sitting or reclining on a typical day) during pre-intervention and 22.3% of cases spent less than 1 hour per day in a week on sedentary behaviour (sitting or reclining on a typical day) during post-intervention; and 11.7% of cases spent 2-3 hours per day in a week on sedentary behaviour (sitting or reclining on a typical day) during pre-intervention and 9.2% of cases spent 2-3 hours per day in a week on sedentary behaviour (sitting or reclining on a typical day) during post-intervention.

The 9.2% of cases ate fruits 1-2 times per day during pre-intervention and 17.7% of cases ate fruits 1-2 times per day during post-intervention; and 32.2% of cases ate fruits more than 6 times per day during pre-intervention and 39.9% of cases ate fruits more than 6 times per day during post-intervention. The 1.4 % of cases ate vegetables 1-2 times per day during pre-intervention and 3.9 % of cases ate vegetables 1-2 times per day during post-intervention; 10.2% of cases ate vegetables 3-4 times per day during pre-intervention and 12.4 % of cases ate vegetables 3-4 times per day during post-intervention; and 8.5% of cases ate vegetables 5-6 times per day during pre-intervention and 11.7% of cases ate vegetables 5-6 times per day during post-intervention. Thus, there was increase in their moderate-intensity activity, yoga activities and eating fruits and vegetables as well as decrease in sedentary time among school children after an intervention in this study [7].

Pranati Panuganti et al. (2017) reported that a school-based intervention, the Obesity Reduction and Awareness of Non-communicable disease through Group Education (ORANGE) Phase II program aimed at healthy lifestyle practices for sixth and seventh grade adolescents (n = 2345) attending private (n = 1811) and government (n = 534) schools was conducted in Chennai, India. During each intervention session, teachers led a classroom discussion on the health topic of interest, and peers facilitated small-group learning activities. It was found that government school students perceived hygienic actions (e.g., drinking clean water, taking baths daily) as healthy habits for preventing diabetes, whereas private school students associated an expensive lifestyle (e.g., eating at restaurants, riding a car) with diabetes prevention. This relationship has been confirmed in the impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children as 8.5% of cases had their blood pressure last measured within past 12 months by a health professional during pre-intervention and 14.8% of cases had their blood pressure last measured within past 12 months by a health professional during post-intervention; 6% of cases had their blood pressure last measured 1-5 years ago by a health professional during pre-intervention and 6.4% of cases had their blood pressure last measured 1-5 years ago by a health professional during post-intervention; 1.4% of cases had their blood pressure last measured more than 5 years ago by a health professional during pre-intervention and 4.6% of cases had their blood pressure last measured more than 5 years ago by a health professional during post-intervention; and 84.1% of cases never had their blood pressure last measured by a health professional during pre-intervention and 74.2% of cases never had their blood pressure last measured by a health professional during post-intervention.

The 4.9% of cases had ever been told by a doctor or other health worker that they have raised blood pressure or hypertension during pre-intervention and 15.2% cases had ever been told by a doctor or other health worker that they have raised blood pressure or hypertension during post-intervention. The 3.2% of cases were currently receiving drugs for high BP prescribed by a doctor or other health worker as well as any advice in the last 2 weeks during pre-intervention and 7.8% of cases were currently receiving drugs for high BP prescribed by a doctor or other health worker as well as any advice in the last 2 weeks during post-intervention. The 5.3% of cases were currently receiving special prescribed diet for high BP prescribed by a doctor or other health worker as well as any advice during pre-intervention and 7.1% of cases were currently receiving special prescribed diet for high BP prescribed by a doctor or other health worker as well as any advice during post-intervention. The 3.5% of cases were currently receiving advice or treatment to lose weight for high BP prescribed by a doctor or other health worker as well as any advice during pre-intervention and 6.4% of cases were currently receiving advice or treatment to lose weight for high BP prescribed by a doctor or other health worker as well as any advice during post-intervention. The 1.8% of cases were currently receiving advice or treatment to stop smoking for high BP prescribed by a doctor or other health worker as well as any advice during pre-intervention and 6.7% of cases were currently receiving advice or treatment to stop smoking for high BP prescribed by a doctor or other health worker as well as any advice during post-intervention. The 3.9% of cases were currently receiving advice to start or do more physical activity for high BP by a doctor or other health worker during pre-intervention and 9.9% of cases were currently receiving advice to start or do more physical activity for high BP by a doctor or other health worker during post-intervention. The 0.7% of cases visited to an AYUSH Practitioner for high BP in last past 12 months during pre-intervention and 5.7% of cases visited to an AYUSH

Practitioner for high BP in last past 12 months during post-intervention. The 0.7% of cases were seeking treatment/ medicine from an AYUSH Practitioner for their high BP during pre-intervention and 2.8% of cases are seeking treatment/ medicine from an AYUSH Practitioner for their high BP during post-intervention. Thus, there was increase in their diagnosis, measurement and treatment of hypertension among school children after an intervention in this study [8].

Katia Cristina Portero McLellan et al. (2014) showed that clinical trials have demonstrated that it is possible to prevent diabetes through lifestyle modification, pharmacological intervention, and surgery. Strategies focusing on intensive lifestyle changes are not only efficient but cost-effective and/ or cost-saving. The translation of diabetes prevention research at a population level, especially finding the most effective methods of preventing T2DM in various societies and cultural settings remains challenging, but must be accomplished to stop this worldwide epidemic. This relationship has been confirmed in the impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children as 1.4% of cases had their blood sugar measured in the last 12 months during pre-intervention and 7.1% of cases had their blood sugar measured in the last 12 months during post-intervention. The 1.1% of cases had ever been told by a doctor or other health worker that they have diabetes during pre-intervention and 5.7% of cases had ever been told by a doctor or other health worker that they have diabetes during post-intervention.

The 0.7% of cases were currently receiving insulin for diabetes prescribed by a doctor or other health worker as well as any advice during pre-intervention and 3.9% of cases were currently receiving insulin for diabetes prescribed by a doctor or other health worker as well as any advice during post-intervention. The 0.4% of cases were currently receiving oral drug for diabetes prescribed by a doctor or other health worker as well as any advice during pre-intervention and 2.8% of cases were currently receiving oral drug for diabetes prescribed by a doctor or other health worker as well as any advice during post-intervention. The 0.4% of cases were currently receiving special prescribed diet by a doctor or other health worker as well as any advice during pre-intervention and 3.5% of cases were currently receiving special prescribed diet by a doctor or other health worker as well as any advice during post-intervention. The 0.4% of cases were currently receiving advice or treatment to lose weight by a doctor or other health worker during pre-intervention and 4.2% of cases were currently receiving advice or treatment to lose weight by a doctor or other health worker during post-intervention. The 0.4% of cases were currently receiving advice to start or do more exercise by a doctor or other health worker during pre-intervention and 3.5% of cases were currently receiving advice to start or do more exercise by a doctor or other health worker during post-intervention. The 0.7% of cases visited/ seen an AYUSH practitioner for diabetes during past 12 months during pre-intervention and 2.5% of cases visited/ seen an AYUSH practitioner for diabetes during past 12 months during post-intervention. The 0.7% of cases were currently taking any treatment/ medicine from an AYUSH practitioner for their diabetes during pre-intervention and 2.8% of cases were currently taking any treatment/ medicine from an AYUSH practitioner for their diabetes during post-intervention. Thus, there was increase in their diagnosis, measurement and treatment of diabetes among school children after an intervention in this study [9].

V. Figures and Tables

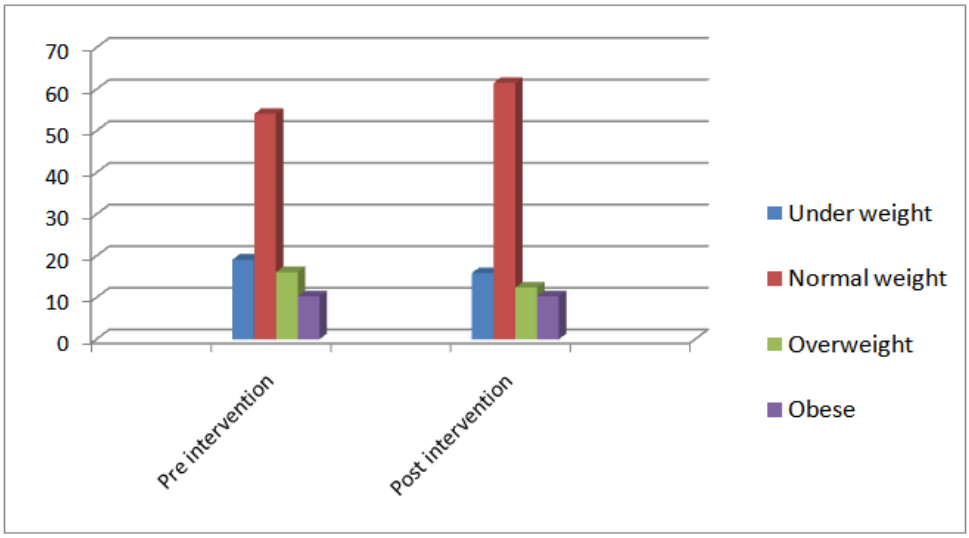

Fig. – 1: The impact of a package of lifestyle interventions on BMI (Body Mass Index) among school children between pre and post interventions.

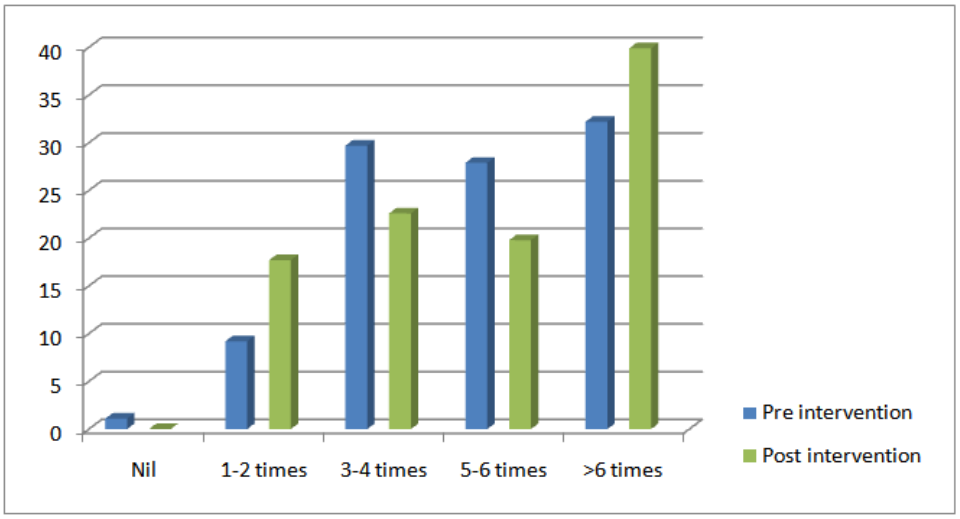

Fig. – 2: The impact of a package of lifestyle interventions on eating habit of fruits among school children between pre and post interventions.

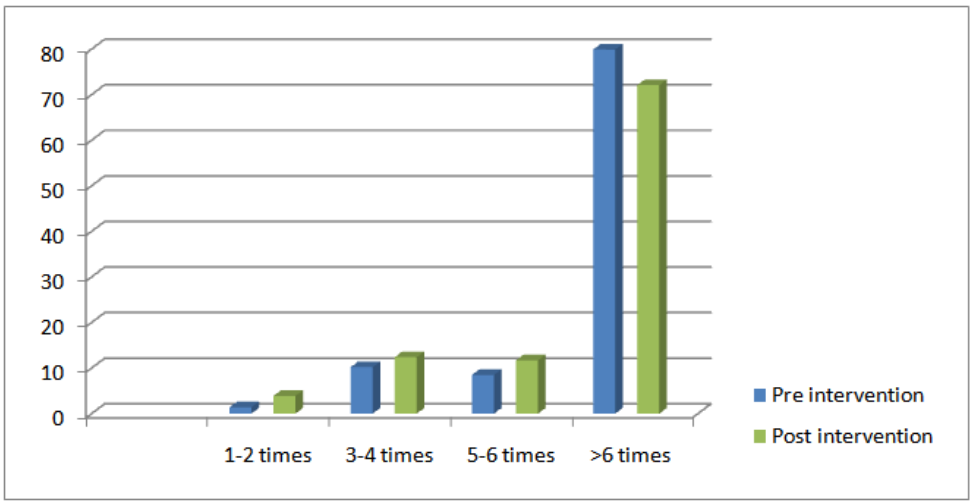

Fig. – 3: The impact of a package of lifestyle interventions on eating habit of vegetables among school children between pre and post interventions.

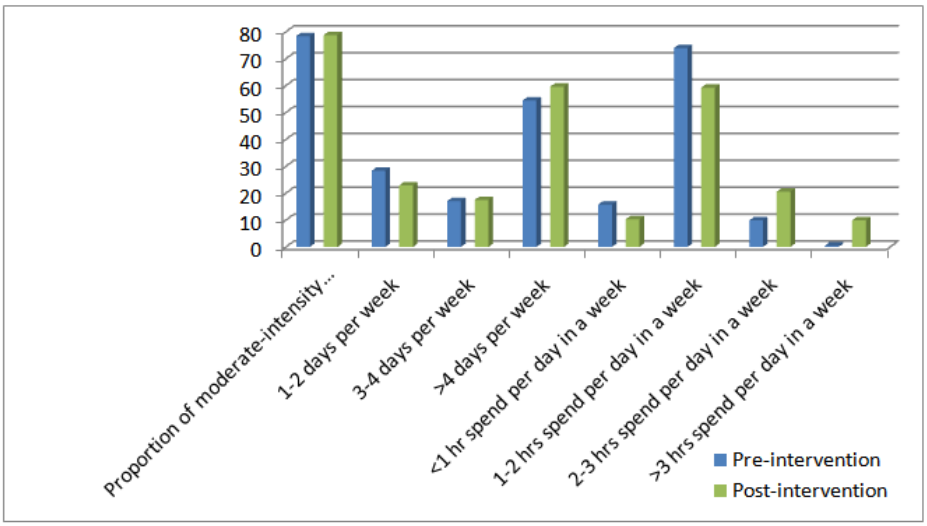

Fig. – 4: The impact of a package of lifestyle interventions on proportion of moderate-intensity activity, average days spend per week and time spend per day in a week among school children between pre and post interventions.

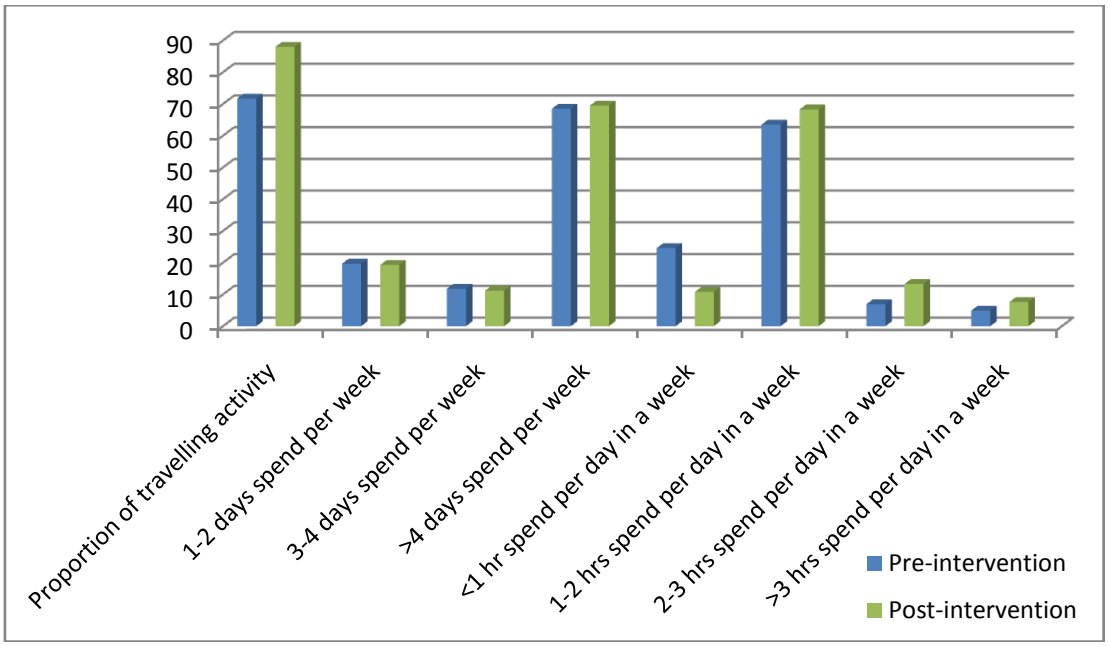

Fig. – 5: The impact of a package of lifestyle interventions on proportion of travelling activity, average days spend per week and time spend per day in a week among school children between pre and post interventions.

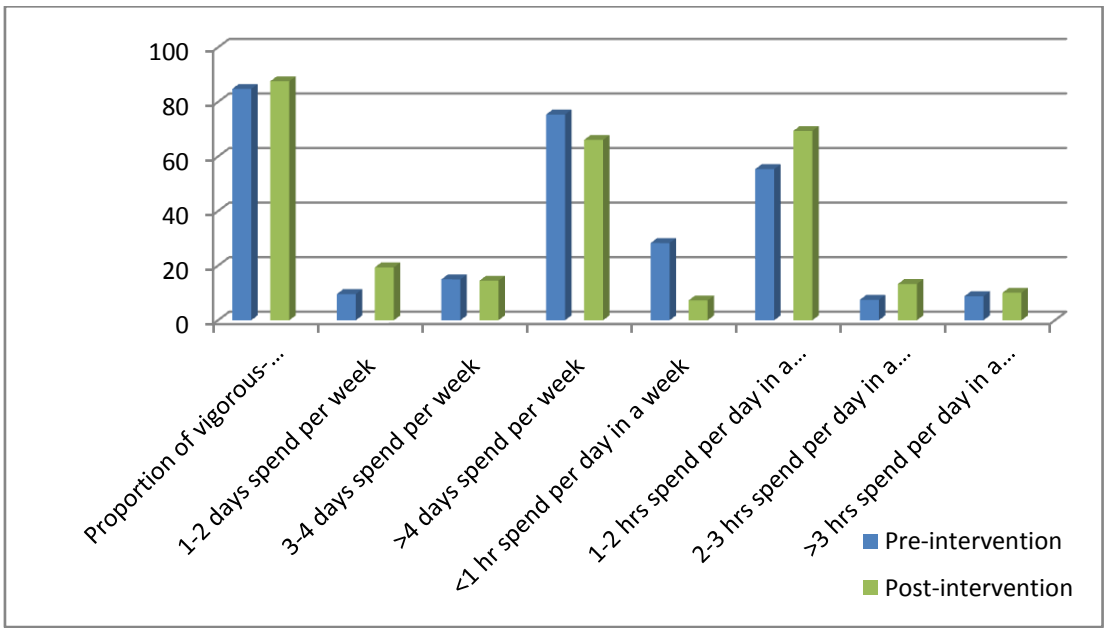

Fig. – 6: The impact of a package of lifestyle interventions on proportion of any vigorous-intensity sports, fitness or recreational (leisure) activities, average days spend per week and time spend per day in a week among school children between pre and post interventions.

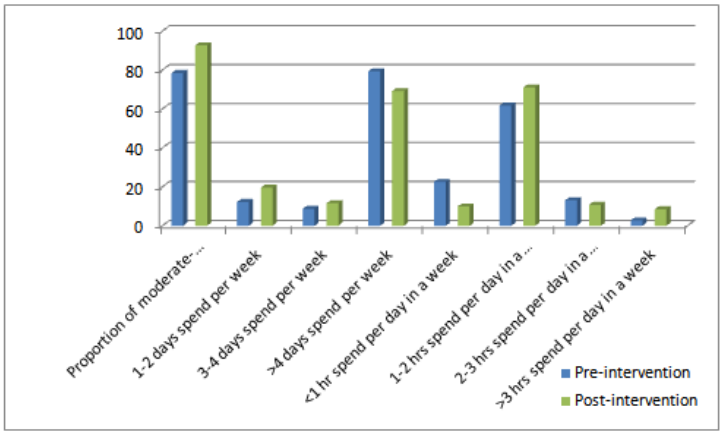

Fig. – 7: The impact of a package of lifestyle intervention on proportion of any moderate-intensity sports, fitness or recreational (leisure) activities, average days spend per week and time spend per day in a week among school children between pre and post interventions.

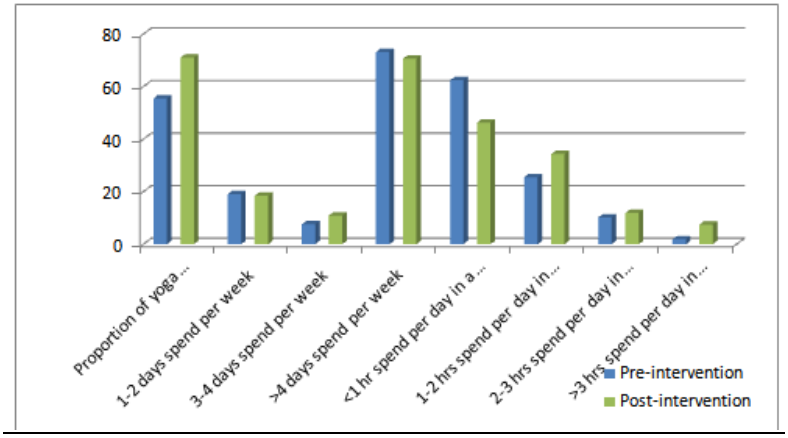

Fig. – 8: The impact of a package of lifestyle interventions on proportion of yoga activities, average days spend per week and time spend per day in a week among school children between pre and post interventions.

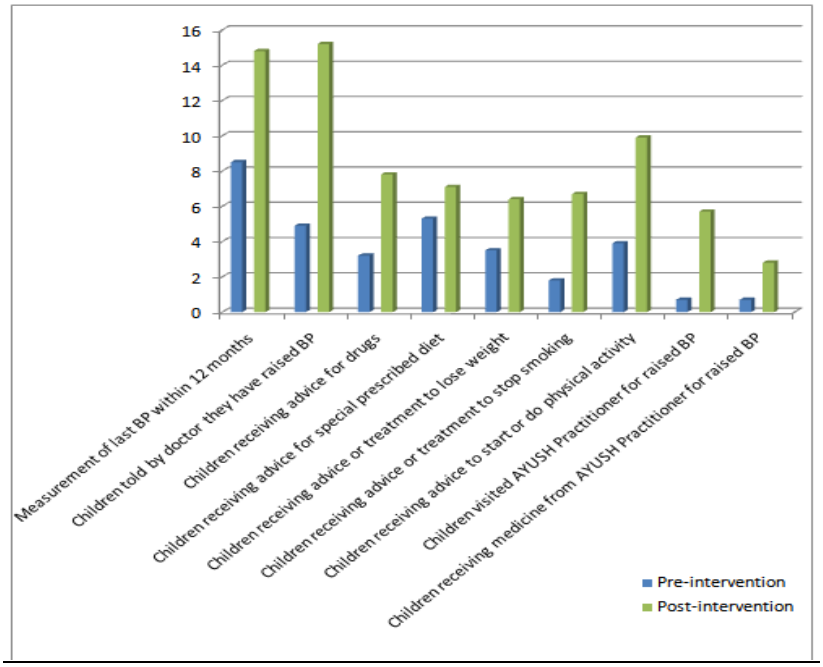

Fig. – 9: The impact of a package of lifestyle interventions on significance of history of blood pressure among school children between pre and post interventions.

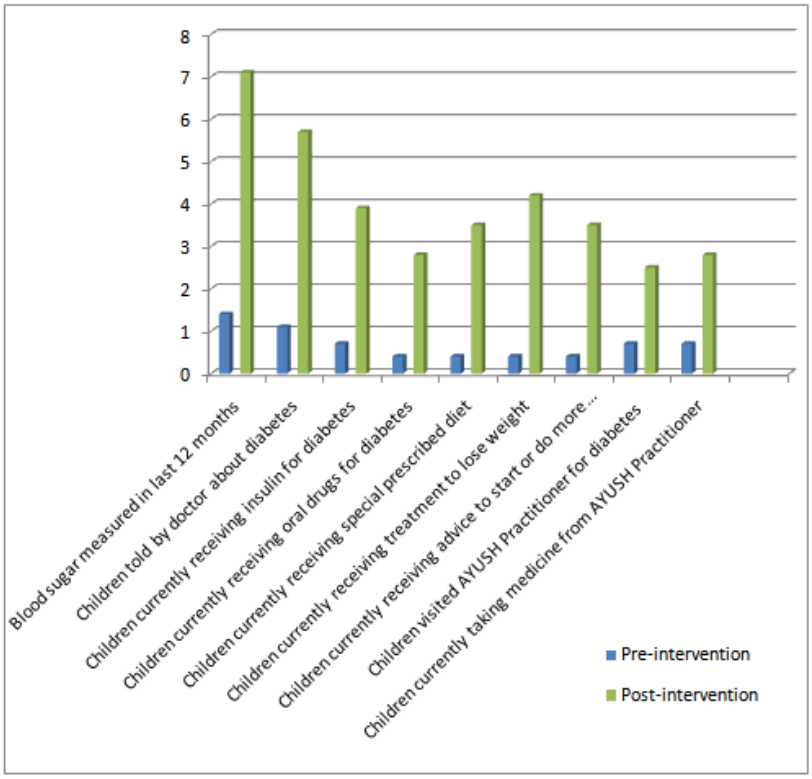

Fig. – 10: The impact of a package of lifestyle interventions on significance of history of diabetes among school children between pre and post interventions.

Table 1: The BMI (Body Mass Index) among school children between pre and post interventions.

	Pre intervention (n=283)	Post intervention (n=283)	Total (n=566)	Chi-square value	df	p value
Under weight	54(19.08)	45(15.9)	99(17.49)	3.92	3	0.27
Normal	153(54.06)	174(61.48)	327(57.77)			
Overweight	47(16.61)	35(12.37)	82(14.49)			
Obese	29(10.25)	29(10.25)	58(10.25)			
Total	283(100)	283(100)	566(100)			

Table 2: The eating habit of fruits and frequency of habit of eating fruits among school children between pre and post interventions.

		Pre intervention (n=283)	Post intervention (n=283)	Total (n=566)	Chi-square value	df	p value
Habit of eating fruits	Nil	3(1.1)	0(0)	3(0.5)	19.6	3	0.00**
	1-2	26(9.2)	50(17.7)	76(13.4)			
	3-4	84(29.7)	64(22.6)	148(26.1)			
	5-6	79(27.9)	56(19.8)	135(23.9)			
	> more 6	91(32.2)	113(39.9)	204(36)			
	Total	283(100)	283(100)	566(100)			
Frequency of habit of eating fruits	Nil	3(1.1)	0(0)	3(0.5)	43.3	3	0.00**
	1-2	144(50.9)	202(71.4)	346(61.1)			
	3-4	116(41)	56(19.8)	172(30.4)			
	5-6	11(3.9)	23(8.1)	34(6)			
	> more 6	9(3.2)	2(0.7)	11(1.9)			
	Total	283(100)	283(100)	566(100)			

**p<0.01 level of significance

Table 3: The eating habit of vegetables and frequency of habit of eating vegetables among school children between pre and post interventions.

		Pre intervention (n=283)	Post intervention (n=283)	Total (n=566)	Chi-square value	df	p value
Habit of	1-2	4(1.4)	11(3.9)	15(2.7)	6.38	3	0.09

eating vegetables	3-4	29(10.2)	35(12.4)	64(11.3)			
	5-6	24(8.5)	33(11.7)	57(10.1)			
	> more 6	226(79.9)	204(72.1)	430(76)			
	Total	283(100)	283(100)	566(100)			
Frequency of habit of eating vegetables	1-2	26(9.19)	63(22.26)	89(15.72)	33.8	3	0.00**
	3-4	251(88.69)	197(69.61)	448(79.15)			
	5-6	1(0.35)	13(4.59)	14(2.47)			
	> more 6	5(1.77)	10(3.53)	15(2.65)			
	Total	283(100)	283(100)	566(100)			

**p<0.01 level of significance

Table 4: The proportion of moderate-intensity activity, average days spend per week and time spend per day in a week among school children between pre and post interventions.

	Pre intervention n (%)	Post intervention n (%)	chi-square value	df	p value
Proportion of moderate-intensity activity among children	222(78.4)	223(78.8)	0.91	1	0.92
Average no. of days per week					
1-2days	63(28.4)	51(22.9)	1.67	2	0.043
3-4day	38(17.1)	39(17.5)			
>4days	121(54.5)	133(59.6)			
Average of time spend per day in a week					
<1 hr	35(15.8)	23(10.3)	33.8	3	0.00**
1-2hrs	164(73.9)	132(59.2)			
2-3hrs	22(9.9)	46(20.6)			
>3hr	1(0.5)	22(9.9)			

p** Significant at 0.01 level

Table 5: The proportion of travelling activity, average days spend per week and time spend per day in a week among school children between pre and post interventions.

	Pre intervention n (%)	Post intervention n (%)	chi-square value	df	p value
Proportion of travelling activity among children	203(71.7)	249(88)	24.45	1	0.00**
Average no. of days per week					
1-2days	40(19.7)	48(19.3)	0.09	2	0.95
3-4days	24(11.8)	28(11.2)			
>4days	139(68.5)	173(69.5)			
Average of time spend per day in a week					
<1 hr	50(24.6)	27(10.8)	18.4	3	0.00**
1-2hrs	129(63.5)	170(68.3)			
2-3hrs	14(6.9)	33(13.3)			
>3hrs	10(4.9)	19(7.6)			

p** Significant at 0.01 level

Table 6: The proportion of any vigorous-intensity sports, fitness or recreational (leisure) activities, average days spend per week and time spend per day in a week among school children between pre and post interventions.

	Pre intervention n (%)	Post intervention n (%)	chi-square value	df	p value
Proportion of vigorous-intensity sports among children	240(84.8)	248(87.6)	0.95	1	0.33
Average no. of days per week					
1-2days	23(9.6)	48(19.4)	9.77	2	0.01**
3-4days	36(15)	36(14.5)			
>4days	181(75.4)	164(66.1)			
Average of time spend per day in a week					
<1 hr	68(28.3)	18(7.3)	38.22	3	0.00**
1-2hrs	133(55.4)	172(69.4)			
2-3hrs	18(7.5)	33(13.3)			
>3hrs	21(8.8)	25(10.1)			

p** Significant at 0.01 level

Table 7: The proportion of any moderate-intensity sports, fitness or recreational (leisure) activities, average days spend per week and time spend per day in a week among school children between pre and post interventions.

	Pre intervention n (%)	Post intervention n (%)	chi-square value	df	p value
Proportion of moderate-intensity sports among children	222(78.4)	262(92.6)	22.8	1	0.00**
Average no. of days per week					
1-2days	27(12.2)	51(19.5)	6.36	2	0.04*
3-4days	19(8.6)	30(11.5)			
>4days	176(79.3)	181(69.1)			
Average of time spend per day in a week					
<1 hr	50(22.5)	26(9.9)	20.9	3	0.00**
1-2hrs	137(61.7)	186(71)			
2-3hrs	29(13.1)	28(10.7)			
>3hrs	6(2.7)	22(8.4)			

p** Significant at 0.01 and * Significant at 0.05 level

Table 8: The proportion of yoga activities and sedentary behaviour, average days spend per week and time spend per day in a week among school children between pre and post interventions.

	Pre intervention n (%)	Post intervention n (%)	chi-square value	df	p value
Proportion of yoga activities among children	157(55.5)	201(71)	14.7	1	0.00**
Average no. of days per week					
1-2days	30(19.1)	37(18.4)	1.12	2	0.57
3-4days	12(7.6)	22(10.9)			
>4days	115(73.2)	142(70.6)			
Average of time spend per day in a week on yoga activity					
<1 hr	98(62.4)	93(46.3)	12.5	3	0.01**
1-2hrs	40(25.5)	69(34.3)			
2-3hrs	16(10.2)	24(11.9)			
>3hrs	3(1.9)	15(7.5)			
Average of time spend per day in a week on Sedentary Behaviour (sitting or reclining on a typical day)					
<1 hr	160(56.5)	63(22.3)	81.1	3	0.00**
1-2hrs	80(28.3)	163(57.6)			
2-3hrs	33(11.7)	26(9.2)			
>3hr	10(3.5)	31(11)			

p** Significant at 0.01 level

Table 9: The significance of history of blood pressure among school children between pre and post interventions.

		Pre intervention n (%)	Post intervention n (%)	p value
Measurement of last blood pressure by a health professional	Within past 12 months	24(8.5)	42(14.8)	0.01**
	1-5 years ago	17(6)	18(6.4)	
	More than 5 years ago	4(1.4)	13(4.6)	
	Never	238(84.1)	210(74.2)	
Proportion of children told by a doctor or other health worker that you have raised blood pressure or hypertension		14(4.9)	43(15.2)	0.00**
Proportion of children receiving advice for drugs (medication) that you have taken in the last 2 weeks		9(3.2)	22(7.8)	0.02*
Proportion of children receiving advice for special prescribed diet		15(5.3)	20(7.1)	0.38
Proportion of children receiving advice or treatment to lose weight		10(3.5)	18(6.4)	0.12
Proportion of children receiving advice or treatment to stop smoking		5(1.8)	19(6.7)	0.00**
Proportion of children receiving advice to start or do more physical activity		11(3.9)	28(9.9)	0.00**
Proportion of children visited to an AYUSH Practitioner for high blood pressure or hypertension in last 12 months		2(0.7)	16(5.7)	0.00**
Proportion of children receiving treatment/ medicine from an AYUSH Practitioner for your high blood pressure		2(0.7)	8(2.8)	0.01**

p** Significant at 0.01 and * Significant at 0.05 level

Table 10: The significance of history of diabetes among school children between pre and post interventions.

		Pre intervention n (%)	Post intervention n (%)	p value
Blood sugar measured in the last 12 months	Yes	4(1.4)	20(7.1)	0.00**
	No	279(98.6)	263(92.9)	
Proportion of children told by a doctor or other health worker about diabetes	Yes	3(1.1)	16(5.7)	0.00**
	No	280(98.9)	267(94.3)	
Proportion of children currently receiving insulin for diabetes prescribed by a doctor or other health worker as well as any advice	Yes	2(0.7)	11(3.9)	0.02*
	No	281(99.3)	272(96.1)	
Proportion of children currently receiving oral drug for diabetes prescribed by a doctor or other health worker as well as any advice	Yes	1(0.4)	8(2.8)	0.02*
	No	282(99.6)	275(97.2)	
Proportion of children currently receiving special prescribed diet by a doctor or other health worker as well as any advice	Yes	1(0.4)	10(3.5)	0.02*
	No	282(99.6)	273(96.5)	
Proportion of children currently receiving advice or treatment to lose weight by a doctor or other health worker	Yes	1(0.4)	12(4.2)	0.00**
	No	282(99.6)	271(95.8)	
Proportion of children currently receiving advice to start or do more exercise by a doctor or other health worker	Yes	1(0.4)	10(3.5)	0.01**
	No	282(99.6)	273(96.5)	
Proportion of children visited/seen an AYUSH Practitioner for diabetes in past 12 months	Yes	2(0.7)	7(2.5)	0.18
	No	281(99.3)	276(97.5)	
Proportion of children currently taking any treatment/medicine from an AYUSH Practitioner for your diabetes	Yes	2(0.7)	8(2.8)	0.11
	No	281(99.3)	275(97.2)	

using Fisher's exact Test, ** $p<0.01$ and * $p<0.05$ level

VI. Conclusion

It was concluded that high proportion of school children had 1-2 physical activity classes weekly in their schools and number of physical activity classes weekly need to be increased in these schools. It was concluded that high proportion of school children's parents were physically active daily for 30 minutes only and daily physical activity of parents need to be increased to one hour daily at least. It was concluded that high proportion of school children consumed butter/ ghee, fried local foods, eggs, chicken, sweetened drinks, pizza/ burgers/ french fries etc., cakes/ pastries/ bakery items and chips, namkeen etc.

It was concluded that high proportion of school children did vigorous-intensity and moderate-intensity activities as part of their work for more than 4 days in a typical week and spent 1-2 hours doing vigorous-intensity and moderate-intensity activities at home/ work on a typical day. Therefore, these observations highlighted the increased levels of total physical activity among school children and showed that high proportion of school children met the WHO (World Health Organisation) daily physical activity recommendations (at least 60 mins of daily physical activity). It was concluded that high proportion of school children walked or bicycled for at least 10 minutes continuously to get to and from places for more than 4 days in a typical week and spent 1-2 hours walking or bicycling for travel on a typical day. It. It was concluded that high proportion of school children were involved in vigorous-intensity and moderate-intensity sports, fitness, or recreational activities for more than 4 days in a typical week and spent 1-2 hours doing vigorous-intensity and moderate-intensity sports, fitness, or recreational activities on a typical day. It was also concluded that high proportion of school children met the Indian guidelines of daily physical activity recommendations (at least 60 minutes of moderate sports and 30 minutes of vigorous sports daily). It was concluded that high proportion of school children regularly practiced yogic exercise/ yogasana for more than 4 days per week and spent less than 1 hour doing yoga in a typical day and high proportion of school children spent 1-2 hours on sedentary behaviour (sitting or reclining on a typical day). These observations highlighted that the high proportion of school children regularly practiced yogic exercise/ yogasana and more efforts are needed to develop strategies to reduce children's sedentary time.

It was concluded that some school children had their measurement, diagnosis and treatment for high blood pressure or hypertension. It was concluded that few school children had their measurement, diagnosis and treatment for diabetes. It can be concluded that underweight cases decreased; normal weight cases increased and overweight cases decreased among school children after an intervention in this study. Due to an intervention in this study, it was possible to achieve multiple health-promoting changes and resulted in improved physical

fitness, and had an impact on the school children's BMI (Body Mass Index) or on the prevalence of overweight/obesity. It can be concluded that the habit of eating fruits daily among school children increased after an intervention in this study. The integration of consistent strategies and messages to children in health education booklet distributed in schools among school children was a critical component of this study, and has shown to be effective, may have a significant impact on educational policies as well as on teaching and parenting practices.

Recommendations

- A well designed and implemented school based health and physical activity intervention can result in a positive influence upon increasing physical activity levels and decreasing sedentary activity. Future interventions should consider a more structured intervention component to obtain significant changes in weight bearing physical activity among school children in schools.
- Effective methods of helping parents address the physical activity recommendations for adults and children should be developed in the context of general parenting programmes.
- Parents should be encouraged to limit the availability of empty-calorie foods and eating outside the home by school children. Follow-up of these school children will be important to determine the role of these differences in diet in the development of risk factors for NCDs (Non-communicable diseases) including body composition. More health professionals trained in a nutrition and physical activity intervention in child care are needed to help reverse the obesity epidemic in India.
- The simple interventions of walking or bicycling to school, which could be adopted in every school, had the potential of initiating a self-sustaining cycle of prevention for childhood obesity, bullying and mental ill health among school children.
- The neighbourhood environmental interventions to increase children's active transport and physical activity can be effective when combined with awareness raising programmes for parents. Also, facilitating independent outdoor play could be a viable intervention strategy to enhance physical activity in children, particularly in girls.
- It may be that more intensive multilevel and multicomponent interventions based on a comprehensive model are needed for school children for increased physical activity and decreased sedentary behaviour among them.
- A programme comprising screening, early detection and health promotion through school health programmes may help prevent future complications of high blood pressure or hypertension and diabetes or blood sugar among school children.
- It is recommended that the integration of consistent strategies and messages to children about physical activity recommendations and proper diet in health education booklet distributed in schools among school children was a critical component of this study, and has shown to be effective, may have a significant impact on educational policies as well as on teaching and parenting practices in reducing obesity or sedentary behaviour among school children.
- It is recommended that there appears to be a gap between State educational policies that promote physical well-being and diet or nutrition among school-going children and actual practice. Being a modifiable risk factor, our study informs setting policy priority and intervention efforts to prevent further complications and Non-communicable diseases among school children and adults.

Strengths of this study:

- Government school children were taken as cases and controls in this study as we wanted to create awareness about physical activity recommendations and proper diet and assess the impact of a package of lifestyle interventions among school children of low Socio-Economic Status (SES) group in India.
- We assessed the impact of a package of lifestyle interventions in reducing stress and increasing physical activity among school children and results suggested that there was a significant increase in physical activity and intake of proper diet among school children after an intervention in this study.
- We objectively measured the time spent on daily physical activity and types of daily physical activity done; daily diet taken and tobacco use and alcohol consumption among school children; and motivators and demotivators for school children to engage in physical activity and results suggested that majority of school children met the Indian guidelines of physical activity recommendations (i.e. 60 mins of moderate sports and 30 mins of vigorous sports daily) and did not smoke or use tobacco and consumed alcohol.
- We were able to develop a package of lifestyle interventions i.e. health education booklet on various health benefits of proper physical activity and diet daily for school children.
- We were able to provide health education on various health benefits of proper physical activity and diet daily through distribution of the health education booklets among school children.

- We were able to create awareness about Indian and WHO guidelines of daily physical activity recommendations among school children and teachers in schools.

Limitations of this study:

- Additional physical activity classes could have been added in the intervention of this study to significantly increase physical activity among school children but due to lack of permission by school authorities for same, it was not done in this intervention study.
- One year or six months gap was not given for assessment of post intervention results in this study due to time constraints and examinations of school children but only three months gap was given for assessment of post intervention results in this intervention study.

Acknowledgements

I wish to express my deepest appreciation and sincere gratitude to everyone who has contributed to this work.
I can't forget to thank with sincere gratitude, respect and indebtedness to my co-guide Dr. Sonu Goel, Additional Professor (Health Management), School of Public Health, PGIMER, Chandigarh, India for his expert guidance and his valuable suggestions which have laid the foundation stone for building up the present study, and for his effort, time, constant encouragement, patience and motivating attitude that have always been a source of inspiration.

I'm exceedingly grateful and immensely thankful with deepest appreciation and indebtedness to Principals and teachers of Govt. Model High School, Sector-38 (West), Chandigarh, India; Govt. Model High School, Sector-38-D, Chandigarh, India; Sri Guru Harikrishan Senior Secondary School, Sector-38-D, Chandigarh, India; Sharda Sarvhitkari Senior Secondary School, Sector-40-D, Chandigarh, India and Kulwant Rai Sarvhitkari School, Sector-43-B, Chandigarh, India for their great help, direction and continuous encouragement throughout this work. And, I would like to thank all students in these schools who so generously offered their experiences and so willingly answered all questions as well as Mr. Saroj Kumar Rana and Dr. Ruby, Statiscians, School of Public Health, PGIMER, Chandigarh, India for helping in this study.

And, also, I would like to offer my sincere prayers to divine almighty for his blessings and I would like to thank my parents for their continuous encouragement and making this a possible venture for me.

References

[1]. Viuda-Serrano, A., González Millán, C., Pérez-González, B., Aznar Laín, S., Luis-Pascual, J.C., Del Coso Garrigós, J., García Aparicio, A., Laguna Nieto, M., Merino Merino, E., Rodríguez Cabrero, M., Burillo Naranjo, P., Gallo Salazar, C., García Pastor, T., García Tardón, B., Herrero González, M.E., López Cerrillo, E., Maestre Rodríguez, J.M., Mediavilla Saldaña, L., Pardo García, R., Ruíz Vicente, D., Salinero Martín, J.J., Soriano Segarra M.L. and Theirs Rodríguez, C.I., Obesity Prevention through Physical Activity in School-Age Children and Adolescents, *http://2-CamiloJoseCelaUniversityStudy-preventionofobesity-final-en.pdf*

[2]. Singh, K. K. and Tripathi, K. N., Physical Activity Guidelines for Children and Youth, *http://ssrn.com/abstract=2308560*

[3]. World Health Organization, Information sheet: global recommendation on physical activity for health 5 - 17 years old, *http://www.who.int/dietphysicalactivity/publications/ recommendations5_17years/en/*

[4]. Integrated Disease Surveillance Project (IDSP), Non Communicable Disease Risk Factors Survey 2007-08 India Phase-1 States, Ministry of Health and Family Welfare, Government of India, *http://2007_STEPS_Report_India_7States.pdf*

[5]. S. B. Nayak and H. V. Bhat, School Based Multicomponent Intervention for Obese Children in Udupi District, South India – A Randomized Controlled Trial, *Journal of Clinical and Diagnostic Research, 10(12)*, 2016, 24-28.

[6]. M. M. V. Stralen, J. D. Meij, S. J. T. Velde, M. F. V. D. Wal, W. V. Mechelen, D. L. Knol and M. J. M. Chinapaw, Mediators of the effect of the JUMP-in intervention on physical activity and sedentary behavior in Dutch primary schoolchildren from disadvantaged neighborhoods, *International Journal of Behavioural Nutrition and Physical Activity*, *9*, 2012, 131.

[7]. S. Bhave, A. Pandit, R. Yeravdekar, V. Madkaikar, T. Chinchwade, N. Shaikh, T. Shaikh, S. Naik, E. Marley-Zagar and C. HD. Fall, Effectiveness of a Five Year School-Based Intervention Programme to Reduce Adiposity and Improve Fitness and Lifestyle in Indian Children; The SYM-KEM Study, *Archives of Disease in Childhood, 101(1)*, 2016, 33–41.

[8]. P. Panuganti, T. S. Mehreen, R. M. Anjana, V. Mohan, E. Mayer-Davis and H. Ranjani, Influence of socio-economic status on knowledge of obesity and diabetes among adolescents in Chennai, South India, *Children (Basel). 4(8)*, 2017, 61.

[9]. K. C. P. McLellan, K. Wyne, E. T. Villagomez and W. A. Hsueh, Therapeutic interventions to reduce the risk of progression from prediabetes to type 2 diabetes mellitus, *Therapeutics and Clinical Risk Management 10*, 2014, 173-188.

Kavya Kriti Kaul. "Impact of a package of lifestyle interventions in reducing stress and increasing physical activity index among school children. " IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.6 , 2018, pp. 63-78.