Intervention for Healthy Lifestyle of Adolescents; A Systematic Descriptive Review

Soyuz John, R. Dhanasekara Pandian, E. Aravind Raj

Abstract-Prevalence of health related behaviours such as smoking, alcohol, physical inactivity and unhealthy diet practices which are risk factors for Non-Communicable Diseases (NCDs) including mental illness are very common among adolescents. However comprehensive intervention studies addressing these lifestyle practices are yet to be initiated especially in developing countries. This systematic descriptive review aims to identify types of interventions, elements and components of interventions addressing lifestyle of adolescents in published literature and propose implication for further research. The primary data search was carried out with predefined protocol in PubMed and additional hand search was one in other electronic data sources. The search resulted in 192 titles. After screening with inclusion and exclusion criteria, fifteen studies were included in the final review. The results are discussed under two categories; lifestyle intervention components and study characteristics. Intervention components emerged from the review were categorized into adolescent focused, parents and family focused and teachers and school focused. Adolescents' focused intervention components were again subdivided into counseling, theory classes, behaviour and behaviour modification techniques, handbook and text materials, mobile and internet and skill building. Dearth of literature in the area from developing countries and limitations in the existing literature demand for further research.

Index terms-adolescents, food habit, physical exercise, alcohol, smoking, lifestyle, health related behaviours

1. INTRODUCTION

World Health Organization (WHO) defines adolescence as the period between 10 to 19 years of age. Young people are generally regarded as healthy. But adolescence and young adulthood have major changes which can determine their health in the later life [1]. Many risk factors such as tobacco, alcohol and illicit substance misuse, obesity and lack of physical activity, normally emerge around this time [2]. Risks for non-communicable disease are increasing at an alarming rate, with highest rates of tobacco use and overweight and lowest rates of physical activity, predominantly in adolescent living in low-income and middle-income countries[3].

According to Global Youth Tobacco Survey India (2006), smoking of cigarette before the age of 10 among 'ever cigarette smokers' was 36.9%. Percentage of 'current aggregate smoking' among students between 13-15 years of age was 4.2%. Use of tobacco products other than cigarette among students was 11.9%. Any tobacco use by students in the age group of 13-15 years of age was 14% [4]-[5]. According to Global School Based Student Health Survey (GSHS), India-2007, 10.8% of students were overweight and 2.1% were obese. Only 30.2% of students were involved in some physical activities for a total of at least 60 minutes per day and there were 23.2% of students who spent three or more hours in a day sitting and watch television, playing computer games, talking with friends, or doing sitting activities[6]. WHO recognized that the adolescence period as the beginning of health related behaviours and stressed the importance of healthy life style of adolescents in the Mental Health Action Plan 2013-2020[7]. It proposed to develop school based promotion and prevention programmes including life skill programme, program to counter bullying, violence, raising awareness on the benefits of healthy lifestyle and the risks of substance abuse[8]. The vision of National Youth Policy India (2014), emphasized and encouraged the youth to adopt healthy life styles and ask partners to take up targeted awareness programme for youth which should cover nutrition choices and leading a healthy life style, benefits of preventive health care, and ill effect of drug/substance abuse. In this context, the researcher decided to develop a school based intervention package addressing lifestyle risks of adolescents. A systematic review of intervention studies which explored the lifestyle of adolescents was carried out to see available intervention programmes and strategies, to find the existing gap and to formulate a new intervention programme for the adolescents.

2. MATERIALS AND METHOD

The major objective of the systematic review was to analysis the available interventions, elements and components of interventions for healthy lifestyle of adolescents in published articles. Studies focusing two or more health related behaviours such as exercise, food-habit and eating, smoking and alcohol were considered as studies addressing lifestyle of adolescents.

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2.1 Selection Criteria

The studies were included for the review based on the pre-determined inclusion and exclusion criteria.

2.2 Inclusion Criteria

1. Studies focusing two or more health related behaviours such as exercise, food-habit and eating, smoking and alcohol of adolescents
2. Studies done in school setting
3. Studies published from 2005 to 2015
4. Full text English articles

2.3 Exclusion Criteria

5. Narrative reviews
6. Research protocols
7. Conference abstracts and proceedings
8. Studies focusing on topics other than healthy lifestyle of adolescents

2.4 Search Strategy

The primary electronic data search was carried out in PubMed data sources and hand search was done in other data sources like EBSCOhost in the month of June 2015. The search was finished on 9th June 2015. The search was executed in PubMed using the combination of four search terms, which were predefined, by using PubMed Advanced Search Builder. To get appropriate titles and abstracts, the truncation (*) symbol was added to the most basic word and phrases were quoted to get all the associated terms, while preforming the search. The search was restricted to titles and abstracts of publications, using "tiab" PubMed search tag. 'Lifestyle', 'adolescent', 'intervention' and 'school' are the search terms used for the electronic data search.

2.5 Study Selection

As mentioned in the inclusion criteria, studies focused either on healthy lifestyle of adolescents, or studies focused two or more than two health related behaviours or studies conducted in school settings were included in the review. The PubMed search and other hand search resulted in 192 studies. After removing one duplicate, titles and abstracts of 191 studies were screened. 117 studies were excluded because they didn't meet the inclusion criteria. Then 74 studies reminded for next stage review. Out of those 74 studies, 59 studies were excluded for various reasons (ref. Fig. I). Finally 15 studies specifically focusing on the healthy lifestyle of adolescents were selected for the detailed systematic review.

2.6 Data Extraction and Analysis

Data extracted in the final stage of the review is given in the Table No1. Extracted information is subdivided into sub-headings such as authors and year of publication, settings and place of study, population which includes number of samples, age of the adolescents, research design, objective of the research, description of interventions, components of intervention and study duration. Intervention components were summarized in Table No 2. Since the major objective of the review was to find out the intervention components, other review findings were not included in the final report.

Figure No. 1. Flow chart of selection process.

Table 1. Summary of study methods and findings

Table No. 2. Intervention components of healthy lifestyle of adolescents

3. RESULT

Results from the review of the fifteen articles in the table are presented under two categories;1) study characteristics, 2) components of lifestyle intervention.

3.1 Sample and Study Characteristics

Out of 15 studies, six studies were from India[9], [10], [11],[12],[13], [14] two studies from USA[15]-[16] and one each from Israel[17], Norvey[18], Australia[19], Spain[20], Columbus [21], UK [22] and France [23]. All studies were done in school settings. Both boys and girls were included in all the studies except one[19]which specifically focused specifically adolescent girls. Age of the children ranged from minimum 6 years to maximum 19 years.

Out of these studies, one study was particularly on obese adolescents [17]. All other studies were carried out with adolescents who didn't have any specific risk conditions. In the sampling process, schools or divisions in the schools were randomly selected rather than selecting each student randomly.

3.2 Findings on the components of intervention for healthy lifestyle of adolescents

Fifteen studies were reviewed which focused on healthy life style of adolescents. The intervention components were classified into three categories namely adolescents focused, parents and family focused and school focused. Adolescent focused intervention elements were again subdivided into other six categories. The categories were counseling, theory classes, handbook, text and materials, mobile and internet based interventions, behaviour training and behaviour modification techniques and skill building.

Individual and group counseling focused on health and healthy coping strategies. Class room sessions, seminars, workshops, teachers led classes, nurses led classes, peer led classes, power point presentations and focused groups discussions were the strategies used to teach theoretical aspects of healthy lifestyle for adolescents.

Most of the interventions gave direct training for adolescents on health related behaviours such as running, physical activity training, swimming, cycling, cooking,

healthy snack making, hand washing etc. Behaviour modification strategies were also used to teach healthy behaviours to adolescents. The strategies were poster making, masks, cards and cartoons, school plays, debates, extempore, quizzes, health board setups and collage making. Few intervention programmes provided student handbook, diary for daily writing, and tool kits for facilitating the behaviours.Mobile messages, online discussion forum, downloadable materials were also provided as part of the intervention.

Another category of intervention components for adolescents was skill building. Self-esteem, coping with stress, problem-solving, goal setting, self-awareness, managing emotions, autonomy and decision-making were some of the skills focused in the intervention.

Most of the intervention added family focused components also. Parents were periodically educated about the importance of healthy lifestyle and guidance on helping children to follow healthy lifestyle through parents meeting, booklets for parents and parent-child interactions.

School targeted interventions were also part of many of interventions. Curriculum modification, teachers training, food and vegetable garden, certificate training programme for teachers, teachers meeting, teachers manual, posters in school and health camps in school were some of the school focused intervention components.

4. DISCUSSION

The primary aim of the review was to find out the intervention strategies deployed in different intervention programmes for the healthy lifestyle of adolescents. It was very important to know the existing literature in the process of making an effective intervention programme.

Majority of the studies were carried out in developed countries. Intervention studies on healthy lifestyle from the developing countries are minimal. But prevalence studies on health related behaviours from developing countries give the indication of increase in the prevalence rate[3]-[24]. Another interesting finding from the developing countries like India is that overweight, obesity, malnutrition and underweight are equally found among children[24]. It highlights the importance of taking up intervention programmes in developing countries.

Another important finding is about the population and sampling followed in the studies. Almost all studies selected all students in a school or all students in a particular class or division. Both boys and girls were selected for the studies[12], [17], [18]. Large sample size increased the power of the study. It also didn't divide students like boys and girls, intervention group and non-intervention group so that ambiguity, confusion and discrimination among students could be avoided. Programme only for risk group like obese, smokers and drinkers might increase the stigma towards those risk group.

The review found that interventions for healthy lifestyle of adolescents targeted adolescents, parents, schools and teachers. Parents and teachers focused interventions were addressing the knowledge and tried imparting information to them. Adolescent focused interventions laid emphasis on behaviour training, imparting knowledge, and skill building in the form of managing emotions, improving self-esteem, listening skill and communication skills. So it can be inferred that most of the interventions were trying to bring changes in health related behaviours through bringing changes in knowledge, skill building to deal with risk situations and turning family and school into protective factors. Researches have shown that health related behaviour of an individual is determined by multiple factors like social, economic and political atmosphere, socio demographic background, family, peers and neighborhood [25], [26],[27], [28]. The review gives a direction that programme for healthy life style should be multi-factorial and multi-dimensional integrating individual, family and other social factors.

The structural and proximal factors which determine the health and health related behaviours are very difficult to change or need national and interventional policy changes. In this context, social cognitive theories are found to be very useful. Social cognitive theories deal with health cognitions. Health cognitions are the thoughts and feelings that an individual associate with health related behaviours[29]. These health cognitions are good predictors of health related behaviours.Meta-analyses have shown that among different constructs; intention, self-efficacy and perceived behaviour control account for more than 50 per cent of the variance in health behaviors[30]. These strong predictors of behaviours are not well studied and not well addressed in the researches reviewed. Knowledge and attitude are the most studied health cognition over many years and over many studies. So future intervention studies can focus more on other health cognitions which have more predictability over health related behaviours.

The review have few limitations. The primary electronic data search was carried out primarily in PubMed. Search in other data sources might have yielded more articles. Data extraction from a single article was carried out by a single individual. Cross checking by another individual would have improved the objectivity of the data extracted.

5. CONCLUSION

Researches have started focusing on the health related behaviours of adolescents. Interventions are initiated across countries to modify the lifestyles of adolescents. Theinterventionsfocused majorly on modifying knowledge and attitude of adolescents, modifying school atmosphere,

family atmosphere and teach adolescents ways of healthy cooking, eating and exercises. Further studies can focus on considering different health cognitions, longitudinal studies and age specific studies.

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FIG. NO. 1

FLOW CHART OF SELECTION PROCESS. HEALTHY LIFESTYLE OF ADOLESCENTS

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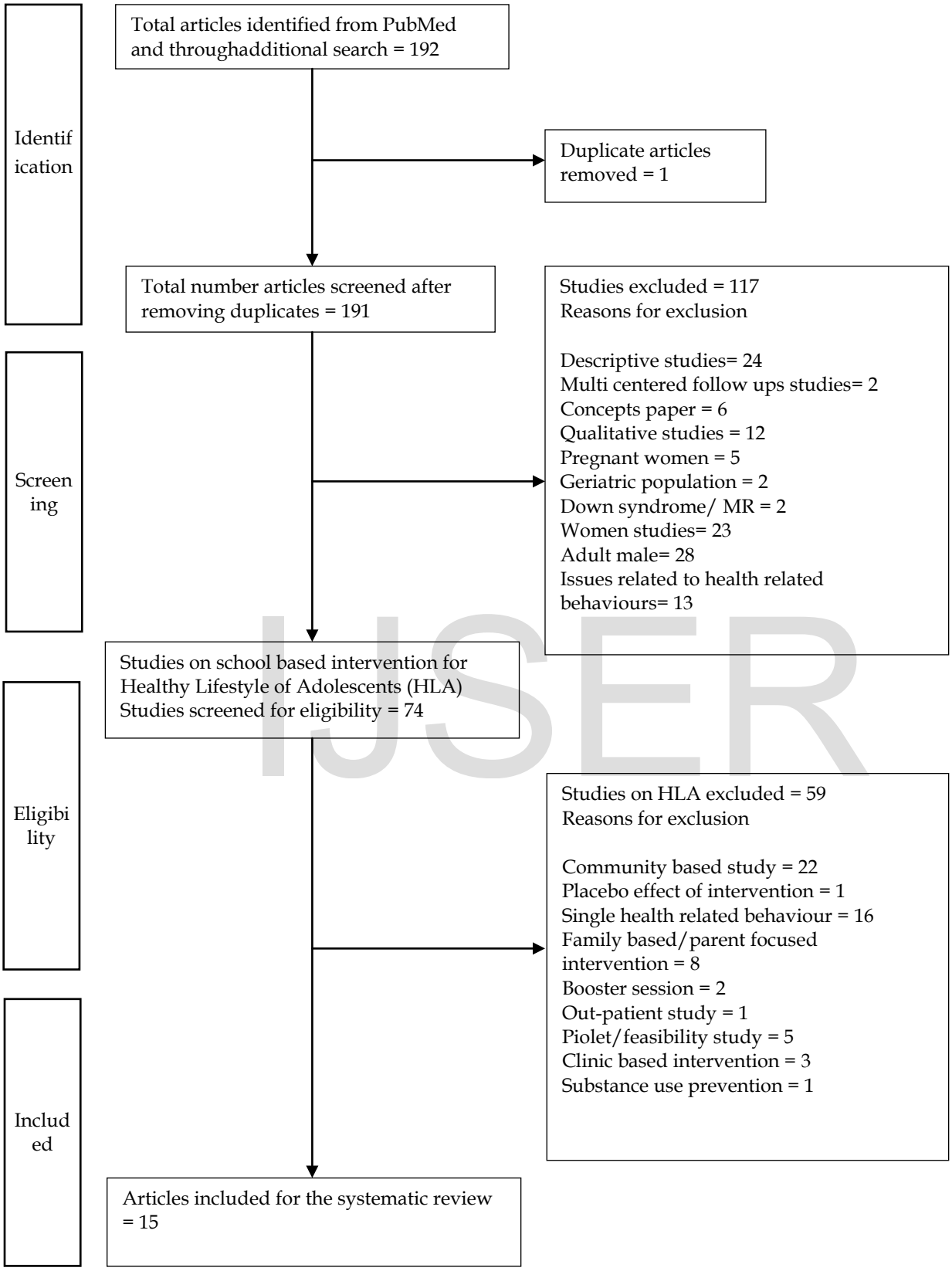
Identif ication
Total articles identified from PubMed and throughadditional search = 192
Duplicate articles removed = 1
Screen ing
Total number articles screened after removing duplicates = 191
Studies excluded = 117
Reasons for exclusion
Descriptive studies= 24
Multi centered follow ups studies= 2
Concepts paper = 6
Qualitative studies = 12
Pregnant women = 5
Geriatric population = 2
Down syndrome/ MR = 2
Women studies= 23
Adult male= 28
Issues related to health related behaviours= 13
Eligibi lity
Studies on school based intervention for Healthy Lifestyle of Adolescents (HLA)
Studies screened for eligibility = 74
Studies on HLA excluded = 59
Reasons for exclusion
Community based study = 22
Placebo effect of intervention = 1
Single health related behaviour = 16
Family based/parent focused intervention = 8
Booster session = 2
Out-patient study = 1
Piolet/feasibility study = 5
Clinic based intervention = 3
Substance use prevention = 1
Includ ed
Articles included for the systematic review = 15

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TABLE 1

SUMMARY OF STUDY METHODS AND FINDINGS

Author	Setting/ location	Population	Design	Intervention aim	Description of intervention	Intervention strategies	Duration
(Abu-Kishk et al., 2014)[17]	Dormitory school, Israel	36 obese adolescents aged between 12-18	Experimental prospective longitudinal study	Effectiveness of lifestyle intervention on obesity and diet practice	Blood pressure, pulse, weight and height, hemoglobin, creatinine, liver enzymes	Lifestyle modification counseling, diet counselling, exercise regimen	6 months
(Bergh et al., 2012)[18]	Schools in Norvey	2165 6th grade students and their parents	A cluster randomized experimental design	Effectiveness of intervention on physical activity and sedentary behaviour	Enjoyment, self-efficacy, perceived social support from parents and teachers are some social determinants studied	Individual, group and environmental strategies like theory class, physical activities, activity box, facts sheets for parents and inspirational course for teachers	20 months
(Burguera et al., 2011) [20]	School based intervention Spain	90 students from 7,8 &9th std	Randomized control trial	Effectiveness of the intervention in promoting physical activity and healthy lifestyles	Cell blood count, biochemistry, fasting glucose and hormonal determinations insulin, testosterone or estrogens	Nutritional advice, behavioral modification, physical activity sessions. Rewards for attending exercises and lectures	6 months
(Dewar et al., 2014) [19]	School setting in Australia	357 adolescent girls from 12 secondary schools	Group randomized controlled trial	Effectiveness of intervention on physical activity and sedentary behaviours of adolescent girls	Physical activity, sedentary behaviour, and social cognition mediators were the outcome measures	Enhanced school sport, lunch-time physical activity, seminars, student handbooks, workshops, pedometers, parent newsletters and text messages	12 months
(Hollar et al., 2010) [15]	School based intervention in USA	3769 elementary school students	Quasi-experimental design (four intervention schools and one control school)	Reduce over weight and increase physical activity	Dietary component, curriculum components and physical activity components were the majors aspects	Multi-center and multi-agency collaboration, school dietary menu modification, nutrition and healthy lifestyle management programme, kit and materials for schools, fruit and vegetable gardens, desk-side physical activity	Two years
(Hoying, Melnyk, &Arcoleo,	School based intervention,	11 schools were randomly assigned for	Quasi-experimental research	Bring changes in over-weight, physical activity,	15 sessions of interventions done by trained teachers focusing	Classroom sessions, interactive sessions, case based examples, nutrition	

2015)[21]	Columbus	intervention	design	substance use and mental health problems	on nutrition, physical activity and cognitive behaviour techniques	and physical activity sessions	
(Kapadia-Kundu et al., 2014) [9]	School based, Uttar Pradesh	11-14 years of adolescent girls	Randomized control cluster trial	Aimed at improvement of nutrition, health seeking behaviour, reproductive health and hygiene	Health cognition theory, cognitive theory and behaviour theories were used to form the intervention package and strategies	Diary, daily hand washing, daily genital washing for students, intergenerational strategies like preparing meals with mother, shopping with father, teaching book for teachers community awareness programme	2 years
(Kyle, Nicoll, Forbat, & Hubbard, 2013) [22]	School based study in UK	478 adolescents between 11-17 years of age	Quasi-experimental design	Awareness creation about cancer and health related behaviours	Healthy eating, physical exercise and avoid smoking and alcohol consumption	One hour oral presentation by a single person in class room or assembly meeting	4 weeks
(Simon et al., 2014) [23]	School setting (France)	Six grade students 1048	Randomized controlled trial. Followed them up for 4 years	Reduce obesity and increase physical activity	Three 50 minutes physical education sessions per week. Educational components were included. Family, peers and environment were targeted	Sporting events, cycling to school, media diffusion, physical activity session, enjoyment of participation through reinforcement	4 years
(Wright, Giger, Norris, &Suro, 2013) [16]	School setting US	251 school children aged between 8-12 years	Parallel group, randomized controlled trial	To evaluate the effectiveness of school based intervention on physical activity and BMI	Nurse directed, family involved and culturally sensitive intervention and community participation	Weekly nutrition and structured physical activity, counseling services, staff professional development, parental education newsletters, provision of healthy foods at the school.	6 weeks intervention and one year follow up
(Saraf et al., 2012) [10]	School based. Ballabgarh North India	6th and 7th grade school children	Randomized control trial	Improve knowledge and behaviour related to physical activity, diet and tobacco	Knowledge and behavioral changes in physical activity, diet and tobacco were the main outcome measures.	School component, classroom component & family component	2 years
(Shah et al., 2010) [11]	Class room based, New Delhi	Children between 8-18 years of age	Randomized control trial	Evaluate the impact of a school-based health and	Health, nutrition, physical activity, non-communicable diseases	Age specific intervention. Dyadic presentation, making posters, masks,	Unspecified

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				nutritional education programme on knowledge and behaviour	and healthy cooking practices	cards and cartoons, school plays, debates, extempore, posters and cooking competitions, paragraph writing, quizzes, health board setups, collage making, healthy recipe writing, slogan and poem writing	
(Balajiwt al., 2011) [12]	Community based. Goa	Youth14-16 years of age	Randomizer control trail	Bring changes in reproductive and sexual health, violence, mental health, substance use, and help seeking for health concerns	Community based intervention comprised of educational institution-based peer education and teacher training, community peer education, and health information materials	To evaluate the acceptability, feasibility, and effectiveness of a population-based intervention to promote health of youth	18 months
(Singhal et al., 2010) [13]	School based. Delhi North India	11 grade students 15-17 years of age	Randomized control cluster trail	Test effectiveness of nutrition and life style education	Knowledge, attitude, lifestyle practices, body image were targeted though school based intervention	Lectures, focused group discussions, individual counseling, policy level change in school and physical activities	6 months
(Sonya et al., 2010) [14]	School & community based, Chennai	Children aged 6-19 years	Randomizer control trial	To study NCDs among adolescents & raise awareness about non communicable diseases	Compared the effect between school based and community based groups	Pamphlets, posters, flip charts, educational labels, health-based jingles, health cards, an NCDs prevention booklet and CDs, quiz, skit, game show, cookery, collage, drawing ,and poster competitions	Unspecified

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TABLE NO. 2

INTERVENTION COMPONENTS OF HEALTHY LIFESTYLE OF ADOLESCENTS

Components	
Adolescent focused	
Counseling	Small Group Counselling [17], Health counseling [16], Individual counseling and group counseling [13].
Theory classes	Class-room lesson over 90 minutes, [18] nutritional interactive seminars[20], workshop, [19]multi-media educational material[15], talk by one person in assembly meeting [9], physical education session [23], nutrition education classes [16], teachers led classes, nurses led classes [10]-[14], dyadic power point presentation [11], peer education, teachers training, community peer education [12], focused group discussions[13].
Behaviour and Behaviour modification techniques	Daily hand washing, daily washing of genitals [9]-[10]. Making posters, masks, cards and cartoons, school plays, debates, extempore, cooking competitions, healthy snack making, paragraph writing, healthy tiffin day, quizzes, health board setups, collage making, healthy recipe writing, slogan and poem writing [9], [11], [13], aerobic and anaerobic exercise like running, basketball and exercises [12], [17], [18] physical activity training [15]-[19] cycling [16]-[23]. Point rewards for physical activity and attendance of exercise which can be exchanged for [20]. Facility to enjoy the intervention [23].
Handbook, text & materials	Student handbook[19], dairy and daily dairy writing, activity box, physical activity kit[9].
Mobile and internet	Mobile messages [19], downloadable e-materials, online forum to discuss about interventions and doubts[22], telephonically contact of parents
Skill building	Cognitive-behavioral skills building, self-esteem, coping with stress, problem-solving, and goal setting [21], self-awareness, self-esteem, managing emotions, autonomy, decision-making, acceptance and respect for others and their differences, listening skills and communication skill[12]-[22].
Parents focused	Fact sheets for parents [18], parent newsletters [15]-[19], parent child interactive activities[10], parents meeting, inter-generational communication like shopping with father, cooking with mother [9]-[11].
Teachers and schools focused	Campaigns, inspirational course for teachers [18], modification of breakfast and lunch menu of schools, curriculum modification, teachers training, food and vegetable garden[15], certificate training programme for teachers [14], teachers meeting [17], teachers manual [20], posters in school, health camps in school and community [9], health camp in school for parents and teachers, and student volunteers programme.

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