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SCHOOL BASED INTERVENTION ON PREVENTION AND MANAGEMENT OF OBESITY AMONG CHILDREN

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Abstract

The review of study is attempted to explore the school based intervention on prevention and managementofObesity.Literaturewillassistinidentifyingobesityamongchildren aswellas significance role of schools to provide knowledge, Healthy food and physical exercises on prevention of obesity among children. school based data in India demonstrates prevalence of obesityintherangeof5-6%to24%amongchildrenandadolescents.Childrenlearnalotfrom schools, environment and by experience. Whether a child is a member of a family or not it is one'sresponsibilitytohelpthechildtogrowinahealthyway.Theroleofparentalmotivation andparticipationinphysicalactivityprogramassumeparamountsignificance.Effectivepublic healthprogramneedtobeadvocatedineachschooltocombattherisingepidemicofchildhood obesity. Obese children and adolescents suffer from both short-term and long-term health consequences.Themostsignificanthealthconsequencesofchildhoodoverweighta

Introduction:

Childhoodobesityisnowanepidemicin India.With14.4millionobesechildren,Indiahasthe second-highest number of obese children in the world, next to China. The prevalence of overweight andobesityin children is 15%. In private schools catering to upper-income families,theincidencehasshotupto35-40%,indicatingaworryingupwardtrend.According toWHO,childhoodobesityisoneofthemostseriouspublichealthchallengesofthe 21st century. Prevention of childhood obesity is vital, especially since we know that the treatmentofobesityisextremelydifficult.Further,thereshouldbegovernmentregulationson thetypes of foodsand beverages that can beserved in school meals. Provision ofsafepotable drinking water in schools is another basic requirement. Teaching children and parents about healthyeatingandhavinganactivelifestyleshouldbean integralpartofschoolcurriculumat allstages.Cookeryclassinschoolsisanotherwayofteachingbothchildrenandparentsabout healthy food options. Making time in school schedules for play-time, encouraging sports by providingspaceandfacilitiesbothatschoolsandincommunitieswillenablechildrentobephysically active. A mandatory physical education programme is another good option. The government's rolealso includesenforcingban ofsaleofHFSS foods and sweetened drinks in schools and aroundschool premises. Regularhealth check-ups and growth monitoringshould alsobeanintegralpartof schoollife.Childrenwhoareoverweightorobeseshouldhaveeasy access to treatment including psychotherapy, medications for hypertension, diabetes and dyslipidaemia and even bariatric surgery in extreme cases.

Searchstrategies:

Thearticlewasstructuredwithareviewofthearticle,aswellasabstractsofquantitativereview studies connected role of school in prevention of obesity. The published articles between the year of 2013-2023 in English language was considered.

ThesearchengineswereCINAHL,PubMed,GoogleScholar,andMedline.

Enrolmentcriteria:

- StudiespublishedinEnglishlanguage
- Studiesonschoolbasedinterventiononpreventionofobesity
- Systematicreviews relatedobesityamongchildren.
- Studiespublishedbetween2013to 2023

Review of literature

Sr. No.	**Titleofstudy**	**Study design**	**Methodof Data s Collection**	**Study setting and Sample size**	**Majorfindings/ Conclusion**
1	"Effectiveness of a population-scaled, school-based physical activity intervention for the preventionof childhood obesity".	Experim ental study design wasused	Generalized estimatingequations wereusedtoestimate the effects of differinglevels of exposure to the intervention (i.e., from1–5years)on BMIinchildrenwith normal weight, overweight, or obesity at baseline.	More than 34,000 participantsfromover 200 schools were compared with a similar number of nonparticipants from the same schools in Slovenia.	BMI was lower in the intervention group, irrespective of participation duration or baseline weight status. The difference in BMI increased with the program duration, with maximal effects being seen after 3 to 4years of participation, and was consistently larger for children with obesity (peaking at 1.4kg/m^2[95% CI: 1.0–1.9] for girls with obesityandpeakingat 0.9kg/m^2 [95%CI:0.6–1.3] forboys with obesity).
2	"Efficacy of school-based intervention programs in reducing overweight: A randomized trial".	A randomize dcontrolle d trial studydesi gn	The parents completedstructured no validated questionnaires, whichincludedthe eating habits of their children (food frequency questionnaire) and their familiarity with certainfooditems. This questionnaire was administered twicetotheparents ofthechildren,the first time at the beginning of the study and the second timeattheendofthe intervention;inboth cases, 48 h were givenforcompletion.	The sample was composedof194boys and204girls,who wereallocatedtoa control group and a group participating in anintervention(n = 200andn=198, respectively). InSouthernItaly.	In the experimental group, there were significant differencesbetweenthe proportionofchildrenwho were overweight, underweight,normalweight, or obese before and after intervention ($p< 0.05$). The best results were seen in the female sex, and after the intervention, there were no more girls with obesity. Furthermore, there were significant waist circumference decrement effects in the intervention group compared to the control group ($p< 0.05$). Finally, many of the participating children acquired healthy eating habits. Therefore, the quantitative results obtained suggest that a school intervention program represents an effective strategy to prevent and improvetheproblemof childhood overweight and obesity.

3	"A School-Based Intervention UsingHealth Mentors to Address Childhood Obesity by Strengthening School Wellness Policy"	Aquasi-experimentalstudy design was used	In the District of Columbia, KiPOW! medical students assisted school nursingpersonnelin taking pre–post measuresofweight, height, and blood pressure. Themodified HABITS questionnaires were completed by the fifth graders for both the intervention and controlgroupsonthe same days that pre–post study measures were obtained.	Team Kid POWER! (KiPOW!) health mentors (students and traineesinmedicaland health-related fields) in 2 geographically and demographically distinct school districts,theDistrictof Columbia and Orange County, California, deliveredstandardized health curricular modules to fifth grade classrooms, modeled healthy eating behaviors during school lunchtime, and engaged in active play at recess.	KiPOW! Full, but not KiPOW! Lite, was associated with a modest reduction in BMI percentile compared with control (KiPOW!Full,P=.04; KiPOW!Lite,P=.41), especiallyinOrangeCounty (P< .001). Systolic blood pressure improved in Full(P< .046) more than in Lite interventions (P= .11), and diastolic blood pressure improvedinbothFull(P = .02) and Lite (P= .03) interventions.
4	"Effectiveness of School-Based Intervention	randomized clinical trial	interventions included; planet health program which included	five trials included in the review with a total of 3,904 schoolchildren,	Meanageofthestudents (boysandgirls)ranges8.6-12.6 years. Meta-analysis showed a statistical

	Programs in Reducing Prevalenceof Overweight"		teacher training workshops,classroom lessons, physical education material, education programfocusedon improving physical activity and discouraging sedentary lifestyle, program contained classroomactivities, bannersandlogoon water bottles for promoting healthy lifestyle,program promoting healthy dietanddiscouraging consumption of carbonated drinks, andaerobicdance. Although,nostrict criterionappliedfor the control group duringselectionof studies, the usual school curriculum promoting healthy lifestyle was consideredascontrol in found studies.	published between 1995 and 2009. These trials were conducted in England,France, Canada, US and Brazil.	significancebeneficialeffect ofschool-basedintervention programs on obesity status of schoolchildren (risk ratio (RR) 0.58, 95% confidence interval (CI) 0.43-0.78) and suggested 42% reduction in prevalenceofobesityamong schoolchildren through school-based intervention programs
5	"Impactofa school-based intervention program on obesity risk factors in Mexican Children".	A Randomized Control Trial (RCT), design wasused	School environment measures, children's eating and physical activity behaviours, andbodymassindex were assessed four times over a 2-year period.	Atotalof886students from 4^{th} and 5^{th} grades (approximately 32 studentsperschool) from these27schoolswere randomly selected.	childrenwere 9.7yearsold+/-0.7years andhadaBMIof19.8+/- 3.7 kg/m2. Thecombinedprevalence of overweight and obesitywas43%,withno differences across Basic, Plus, andControl groups.
6	"Effect of multi-component school-based program on body mass index, cardiovascula	Experimentdesign	multi-component school-based interventionprogram on obesity, cardiovascular and diabetes risk factors. A physical activity, healtheducationand	Atotalof320children aged 4–12years participated in intervention program; 203underTreatment1 (PAHEPIprogram) and 117, only from Mestizogroups,under	BMIdecreasedsignificantly in children with overweight and obesity, and that TG was improved in all children, especially in those withoverweightandobesity in the three ethnic groups.

	randdiabetes risks in a multi-ethnic study"		parent involvement (PAHEPI) program was developed and applied in six urban (Mestizo ethnic group) and indigenous (Seri and Yaquiethnicgroups) primary schools for 12weeks.	Treatment 2 (PAHEPI+ school meals).	The likely reason for the significantreductioninBMI among those children, as compared to non-overweight children, is that they presented a greater energy imbalance and, thus, greater adjustments were done in a healthy school wide environment by increasingvigorousphysical activity and healthy food intake. Additionally, girls showed marginal greater improvements in BMI than boys.
7	"School Based Multicompon entInterventio n for Obese Children in Udupi District,South India – A Randomized Controlled Trial"	A Randomi zed Controlle d Trial	Thecomponentsof 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 ofaerobicsunderthe supervision of physical education teacher.	120 obese children From selected schools of Udupi District, South India.	Findingsshowsthatinthe interventiongroup,themean BMI has reduced from 24.9 to22.8andinthecontrolgroup mean BMI has increased from 24.2 to 25.1. It is very clear that the BMI ofinterventiongrouphas reduced significantly. However,theincreaseinthe BMIofcontrolgroupwas withinthenormalrangeof their development. When comparedtocontrolgroup, intervention group had significantdecreaseinthe BMI ($p = 0.034$). Therefore, it is concluded that multicomponentintervention waseffectivein reducingtheBMIofobese children.

8	"Implementation and evaluation of the school-based family support Program a Healthy School Start to promote child health and prevent Overweight andobesity".	cluster-randomized controlled trial	The Healthy School Start(HSS)program It includes four intervention components Health information, Motivational interviewing, Classroomactivities with home assignments.	Thirtyschoolsintwo municipalities participated in the studyreachingabout 1400 families per schoolyearinSweden	As a universal prevention program,theHSSreachesall children and parents across the socioeconomic and multicultural spectrum. The program is fully integrated into school routines and is moderately effective in improvingdietaryhabitsand physical activity in children and in one trial BMI in children with obesity was also reduced.
9	"Assessing thesustained impact of a school-based obesity prevention program for adolescent boys: the cluster randomized controlled trial".	cluster randomized controlled trial	Theinterventionwas based on Self-Determination Theory and Social Cognitive Theory and involved: professional development,fitness equipment for schools, teacher-delivered physical activity sessions, lunch-time activity sessions,researcher-led seminars, a smartphone application, and parental strategies.	4secondaryschoolsin low-income communities of New South Wales, Australia. Participants were 361 adolescent boys(aged12–14years)'atrisk'of obesity.	findings demonstrate the potential for school-based programs to provide 'at-risk' adolescents with behavioural (e.g., goal settingandself-monitoring) and movement skills (i.e., resistance training skills) using a targeted program. However,interventionsthat more intensively target the home environment as well as other socio-ecological determinants of obesity are most likely needed for the successful prevention of unhealthy weight gain among this population.
10	"Effectivenes sofschool-basedobesity prevention programme among elementary school children".	quantitati veresearch using a quasi-experimentalnon-equivalentpretest andpost-test control group design	children's knowledge, self-efficacy and behaviours,measured using self-madequestionnaires, andphysicalactivity using the Physical Activity Questionnaire for Older Children	totalof278fourthand fifth-grade elementary schoolstudentsaged9 to 11 years old were recruited and grouped intointerventiongroup (121students)and control group (157 students). This study took place in North Jakarta	Thestudyreporteda significant change between intervention and control groups on knowledge (1.28 vs0.31),attitude(1.85vs 0.06),physicalactivity(0.14 vs -0.32), eating fruits and vegetables(0.02vs-0.78), andBMI(0.33vs0.71).The five-month SEHAT intervention programmeeffectively promoted knowledgeonhealthyeating and physical activity for obesity prevention by increasingphysicalactivity,

					eatingfruitsandvegetables, and maintainingstudents' BMI.
11	"Astudyto Identify the Contributing Factors of Overweight/ Obesity and to Evaluate the Effectiveness of Selected SchoolBased Intervention onLevelof BMI among Children in Selected Schools at Erode."	AQuasi experimentalresearch design with control andstudy group-pre-test andpost-testtime series wasused in this study.	Screening of overweight/obese schoolchildrenusing WHO's Quetlet Index BMI. Structured questionnaire on factors contributing tooverweight/obesity among school children. Structured questionnaire to assessthe knowledge ofparentsregarding overweight/obesity. Diet diary to maintain dietary historyof children forlastoneweek. Rating scale for acceptability to assessthelevelof acceptability of school basedinterv ention	The study was conducted in selected schools at Erode. The Bharathi Vidhya Bhavan (The BVB), Therkkupallam,Erode and Bharathi Vidhya Bhavan Matriculation HigherSecondary School, Thindal, Erode.samplesizeof 126 in control group and 124 in study group. Structured questionnairetoassess the lifestyle practices of overweight/obese school children	school based interventions were effectives in reducing the level of BMI in overweight/ obese School children. School based health promotion activities involving parents, motivate thechildrentocontinuetheir activities and in very effectivemannerinreducing the prevalence of obesity. Children enjoy the group program and perform well. And also should restrict the sedentary behaviour of the children and motivate them to involve in physical activities. Family plays an important role in dietary preferences; hence parents should be the role model for thechildren.Rapidchangein theenvironmentemphasizes the need to identify the risk factors in order to modify and influence both the energyintakeandenergy expenditure.
12	"Astudyto identify the contributory factors and evaluate the efficacy of Multi Component Intervention (MCI) on Obesity among selected school children at Puducherry"	Phase-I Qualitative,non-experimentaldescriptiveresearch design wasused. Phase - II One group, pre-test post-test (Pre experimental	Assessmentoflevel ofobesitybasedon BMI (Body Mass Index)accordingto the WHO growth chart (2007) and Nutritional Assessment. Structured questionnaire to identify the contributory factors leadstoobesity.78 Structured questionnaires to assessthelevelof knowledge on obesity.Performance appraisal on	1062 subjects were selected inPhaseIand II. Recruited 155 subjects from phase I. In that 74 subjects assigned in study group and 81 subjects assigned in control group. Setting of study was Puducherry.	found the effectiveness of MCI among school children with overweight andobesity compared the results with control group. Finally, the efficacy of MCI has been proved with control group. The benefit of MCI implemented in the study provided the benefit for the school children to maintain their weight. There was also a feedback given by the samples of the study group showed a positive of outcome variable. The positive findings of the presentstudyareconsistent withtheassumptionthatthe

		design) Design wasused toassess the knowledge on obesity among the selected school children	management of obesity. Observation check list for Physical exercise		Multi Component Interventions helped the schoolchildrenwithobesity.
13	"Astudyto assess the effectiveness ofEducational Intervention onknowledge, attitude and practice amongobese adolescentsin selected government schools of Kancheepuram District, Tamil Nadu"	Randomized Controlled Trial	Educationonvarious aspects of obesity. Physical activity prescription for the obese adolescents was done within two days of administration of education with the dietary and physical activity prescription in Experimental group. No intervention was given followed only routine practices in control group.	103incontrolgroup and103inexperiment. Settingofstudywas Kancheepuram District, Tamil Nadu	educationalinterventionhad promoted the knowledge, attitudeandlifestylepractice of an adolescent regarding obesity. Educational interventiononobesityinthe form of a booklet is one of the simple, easy, evidence-based and cost-effective methods by which an improved knowledge, life stylepracticesandchangein attitude can be observed within a short duration of time.
14	"Prevalence and perceptionof overweight and obesity, and evaluationof the effectiveness ofaschool-based intervention program on BMI, body composition and selected health-related behavior pattern	cluster randomised controlled trial	Therewere32higher secondary schools in Vellore of which 12 were Government schools,and20 were Private schools	There were 600 adolescents in the interventiongroupand 600 in the control group.Settingofstudy was in Vellore.	The overall perception of parents towards obesity and overweight was correct (89.5%). Obese and overweight children also showed correct perception towardsobesity(85%) Most ofthechildrenregardedafat child as a healthy child (91.5%). More than half of both parents and children were unaware of the influence of parental weight status on the child`s weight status (54.3 & 55.3%). Physical activity in lower classes(6th.7thetc.)islesser thanadolescentsEating habitsareworseinearly

	among adolescentsin Vellore"				rather than late adolescents. The physical activity & eatinghabitsinlowerclasses do not match with lower obesity rates in this age group. There is a significant reductionincalorieandfat distribution post-intervention
15	"School-based systems change for obesity preventionin adolescents: outcomes of the Australian Capital Territory"	Thestudy design was a quasi-experimentalrepeated measures longitudinalstudy with intervention and comparisongroups as defined by specific secondaryschool communities.	Datacollectionfor theprojectincluded objectivelymeasured anthropometry anda self- report questionnaire. The intervention consisted of multiple initiatives at individual, community, and schoolpolicylevelto support healthier nutrition and physical activity. Intervention school-specific objectives related to increasing active transport, increasingtimespent physically active at school, and supportingmental wellbeing.	Schools were on the south side of the Canberra city centre and the comparison schools were north of the city centre.Data werecollectedin2012 and 2014 from 656 students.	Proportions of overweight or obesity were similar over time within the intervention (24.5% baseline and 22.8% follow-up) and comparison groups (31.8% baseline and 30.6% follow-up). Within schools, two of three the interventionschoolsshowed a significant decrease in the prevalence of overweight and obesity (p<0.05). There was some evidence of effectiveness of the systems approach to preventing obesity among adolescents.

DISCUSSION:

school-based interventions; the overall effect is promising in preventing weight gain amongotherwisehealthychildren.Althoughdifficulttocompareoutcomesbetweenthestudies included in this review due to the differing nature of the study design, target population and selected primaryoutcomes, theoutcomeoftheanalysis demonstratesthepotential forschool-basedobesitypreventioninterventions.Nevertheless,itischallengingthatsofewstudieswere successful in increasing PA along with improving nutrition and/or reducing SB. Findings of thereviewshouldbeinterpretedinthecontextasthedetailsofinterventioncharacteristics

varied considerably between interventions. Due to the considerable heterogeneity across paediatric obesity prevention interventions, with regards to certain interventions used (e.g., number, type and length), behavioural targets of the interventions and the measurement of outcomes,itisvitalforauthorstoadoptanappropriateresearchdesign.Authorsshouldprovide adequatedetailabouttheirtreatmentstrategies,theoreticalbasisandcomponentsandintensity of the interventions, as well as any implementation and assessment of programme fidelity, as this may be a promising approach for future intervention attempts. Though school-based interventions have been proposed as being the most promising setting to tackle childhood obesity [15], the observed small effect exemplifies the difficulties and challenges positively impacting children's obesity-related behaviours through the school setting. More research is required in the field on the impact of these interventions for long-term (e.g., more than one academic school year) obesity-related behaviour change. Few studies provided sufficient informationformeta-analysis,andinsomecases,itwasnecessarytorelyonauthors'reporting of significant or non-significant effects on the interventions. Thus, these futurestudies should consider assessing a range of behaviours using validated objective measures and use standardised reporting of key outcomes (e.g., nutrition, sedentary and PA changes). Further research is required of school-based interventions in lower-income countries. From currently availableevidence,itappearsthatlong-termimpact(e.g.,morethanoneacademicschoolyear) of primary school-based interventions on maintenance of obesity-related behaviours needs furtherexaminationalongwithmethodologicalrigorinthedescriptionandmeasurementofthe target behaviours.

CONCLUSION:

School-based interventions are vital in the prevention of the globally rising childhood obesity.Manyinterventionshaveshownpromisingresults,whichweresupportedbyanumber of effective and high-impact strategies. Multiple strategies are used in effective interventions, highlighting the fact that a one-size-fits-all approach is not applicable in childhood obesity prevention intervention programs development and that many different strategies can be effective. However, future school-based obesity prevention interventions should build on alreadysuccessfulinterventionstrategieswhilealsoaddressingandintegratingculturespecific strategies.Includinglong-termfollow-upmeasurementstoassesstheefficacyofschool-based interventions will facilitate the identification of the most effective strategies in the long-term. Further studies are needed to elucidate the effectiveness of specific strategies aiming at long duration interventions. Both the development and the implementation methodology of the research,aswellasthebarriers,challengesandpossiblefacilitatorsshouldbeencouragedto

bethoroughlyrecordedandpublishedinordertoinformthescientificcommunityonthe feasibility and sustainability of implementing interventions in real life situations.

ABBREVIATIONS:

BMI: Bodymassindex

WHO: WorldHealth Organization

HSS: HealthySchool Start

PAHEPI:physicalactivity,healtheducationand parent involvement.

RCT: RandomizedControlTrial

KiPOW:TeamKidPOWER

SEHAT:Smart Eatingand HealthyActivity

PA: Physical Activity

SB:sedentarybehaviour**T**

G: Triglyceride

NCD: Non-communicable diseases**.**

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