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Effect of oral health initiatives on reduction in oral morbidities in Ashram schools of Wardha district– A cluster randomized trial

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ABSTRACT

Ashram schools are residential schools developed for underprivileged groups of society who are weak in organizations and economically poor. In general, in all the states, the major obstacle is lack of provision of capacity building and teachers training in serving of the Ashram schools. 8 ashram schools were then randomly divided into control group and intervention group. In the control group, end line oral health assessment using the WHO assessment form 2013 was carried out without any health promotion program. In the intervention group, the oral health care module specifically designed for ashram schools, were implemented. In this group, end line oral health assessments were carried out. Treatments of the minor ailment, oral health program, behaviour change communication model for the schools were implemented. The need-based oral health module was developed for tribal students. The effect size for the intervention was 17.3% indicating 17.3% reduction in dental caries due to intervention (95%CI: -12.3% to-21.62%). The effect was statistically significant. The effect size for the intervention was -43.2 %. Indicating 43.2 % reduction in periodontal diseases due to intervention(95%CI: (-50.7% to -34.1%). The effect was statistically significant. The magnitude of fluorosis in the control group increased by 4.8 % from 28.85% to 33.64 %. During the same time, the magnitude in intervention arm decreases by 3.5% from 47.71 % to 44.20 %. The success of the school-based oral health program depends on the repetition and reinforcement of the program, independent of the dentists, peer leaders and the teachers. It was concluded from this study that the presence of teachers and peers, can influence the study majorly.

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INTRODUCTION

Ashram schools are residential schools developed for underprivileged groups of society who are weak in organizations and economically poor. The main occupation of these tribes is farming and also wants to keep their children to be in the same occupation. Most of the parents of these children are daily wages workers and have a single source of income. (Sujatha, 1990)

There is the exclusion of poor tribal child in regards to getting home support, including family, peers and siblings. In general, no parents ensure the education of the child. None of the family mem-

bers checks whether the child is regular at school, his attendance, classwork, and homework. (Panda, 2008) The parents rarely meet the teachers or go for parent-teacher meeting so as to appreciate the performance of their children. The parents generally avoid interaction with the teachers, as most of them do not have minimum literacy to be aware of what is being taught in the school. Here commence the cycle of prohibition among the tribal children. (Panda, 1996) The other problem is their belief in supernatural power, ghost, and black magic. Almost all health issues are addressed as witchcraft and black magic by the elders in the family. (Chatterjee, 2018)

The study was carried out in ashram schools. In general, in all the states, the major obstacle is lack of provision of capacity building and teachers training in serving of the Ashram schools. The Education Departments of a variety of states have made no provision of guidance and orientation of the heads and the teachers of Ashram schools. The department of Tribal Development has not produced such structures and services. (Patel, 1991)

The major reasons for this are the inadequate educational infrastructure accessible in tribal areas due to their remoteness; tribal hamlets being far from main villages by geographic characteristics; the problems encountered by children living in small habitations in accessing existing formal schools; and so on. Another reason for small school enrolment amongst Scheduled Tribe children involves the reluctance of Scheduled Tribe families to teach their children. Various problems of oral health are preventable and their early onset irreparable. However, a significant number of children, their parents and teachers have inadequate information about the various cause and prevention of oral diseases. (Wierzbicka *et al.*, 2002) So, this study deals with oral health promotion and behaviour change management amongst the ashram school children.

MATERIALS AND METHODS

After obtaining ethical clearance (IEC Clearance No: DMIMS (DU)/IEC/2015-16/1577- Annexure-1) the 700 children of 5-12 years from Ashram school in Wardha district were selected. The duration of the study was August 2016-August 2017. A total of 8 ashram schools were selected for the study, and informed content was obtained from the headmaster of school (Annexure-2). These eight ashram schools were then randomly divided into control group and intervention group.

Control group (n=350)

In the control group, end line oral health assessment using the WHO assessment form 2013 was carried out without any health promotion program.

Intervention group (n=350)

In this group, the oral health care module designed explicitly for ashram schools were implemented. In this group, end line oral health assessments were carried out. Treatments of the minor ailment, oral health program, behaviour change communication model for the schools were implemented. The need-based oral health module was developed for tribal students.

Oral Health cares Intervention module: On the basis of this specially designed module, the following task has been carried out. A Survey to do need base Analysis which will be helpful in Developing or Designing the Oral Health Orientation Programme.

Preparatory phase I

During this phase, advocacy meetings with the school management, and school teachers and parents were carried out to build the rapport. The purpose of the meeting was conveyed to the attendees of the meeting. The purpose was to obtain written informed consent for study from the parents /school teachers of the school. Awareness of dental health among students and its need in the current national context has been discussed in the meeting. The school management was requested to provide demographic data of students for study as an authority. Various committees like Task committee, Reinforcing committee, Monitoring committee, their members and functions were planned. Objectives of the study and methodology needed for the study was thoroughly discussed with the committee members. Parents were made aware of the risks and benefits of the study, along with ethical principles.

Phase II: Intervention module

Behaviour Change Communication

Integrated Model of Communication for Social Change: The Integrated Model of Communication for Social Change (IMCFSC) explains the interactive process in which community or peoples talks about the problem and takes a collective action to bring social change. This model is utilized in social and behaviour change communication (SBCC). The different components of this model are Catalyst: "The model starts with a catalyst that can be internal or external to the community."

Community dialogue

"Once the issue is identified, an organized effort must be made to collectively agree upon and assess the problem, then determine a plan of action". Collective action: "This aspect of the model provides

steps to effectively execute the action plan and evaluate its outcomes." Frequent catalysts include recruited and trained community members to provide as internal change agents, community measures that maintain small group performance ran by local, community-based organizations, and mass media programs that emphasize the concerns experienced by community members

Behaviour Change Communication (BCC) is the basis of health promotion. In this positive behaviours are promoted and negative behaviours are replaced by the healthy ones. BCC was implemented using the IEC material developed indigenously by the chief investigator and dental interns and with the help of school oral health committee.

The repetitions of the video demonstrations on brushing techniques, healthy diet and harmful diet and role plays were performed by the ashram schools children's on various oral health issues like the effect of tobacco addiction, how to give first aid in case of oral trauma. Each school was visited once a month by the chief investigator to oversee and facilitate the activities of the school committee. There was daily activity charting for the committee.

Development of Information, Education and Communication aids (IEC)

Various educational materials were designed in Marathi and Hindi language which includes

1. Posters exhibiting Oro-dental Diseases in Children
2. Oral Health Information Pamphlets for Parent
3. Oral Health Promotion manual for Teacher

For the school teachers, a pictorial instruction manual for Oral Health Promotion Training was prepared. Baseline findings were used for developing IEC materials. All the developed material was implemented in the intervention group.

This formation of committees leads to educating the parents and students about oral health, development of conducive environment and to supervise the programme at the school level. Table 1

An orientation program was taken for the committee members to brief about the oral health needs and the guidelines for the development of a school oral health plan. They were also being trained in health promotion and use of IEC material.

The School Oral Health Plan was developed by the School Oral Health Committee and was facilitated by the investigator. The plan was developed by using participatory methods such as focus group discussion.

Sensitization and Training of the Committees

The committee members were trained on various issues of oral health, behaviour change communication and various issues of program monitoring. A school oral health instruction manual book was received by all teachers which were developed in collaboration of department of public health dentistry. The instruction manual incorporated information on structure and function of tooth, the cause and progress of dental caries and gingivitis, methods for teeth brushing, and the effect of fluoride on caries.

The video on tooth cleaning, what to eat, what not to eat, the harmful effect of tobacco, and how to avoid them was developed in the Sharad Pawar dental college. The oral anatomy, the cause, progression, and management of dental and periodontal diseases, as well as the application of fluoride and emergency oral care, were taught to teachers at school. The specific emphasis was set on oral hygiene procedures and protection of first permanent molar, as well as the advantages of fluoride, among the teachers the one-day workshop incorporated of in-depth discussions and an exchange of program experience.

Phase III: Implementation Phase (Intervention Group)

A one-year oral health education program incorporated the following

The 15-minute oral health education instructions for children were given by school teachers' biweekly for one year. The instructions included structure and function of tooth, the cause and progress of dental caries and gingivitis, methods for teeth brushing, and the effect of fluoride on caries.

An oral health education manual for children that included the information on the etiology and prevention of dental caries and gingivitis, and complete information on where and when to visit dentist.

Oral health education posters were presented, both in the classroom and the school yard regarding oral hygiene maintenance, healthy diet, and adverse effect of tobacco use (role-play)

Contests on oral health knowledge, e.g. Crossword, supervising brushing technique was conducted.

Once a year, an oral assessment by dentists in the classrooms was carried out, informing teachers and parents about the children's dental health condition and treatment advice.

Provision of preventive and curative care, including sealing of pits and fissures, removal of calculus,

Table 1: Formation of the committees

Sr.no	Committees	Members	Function
1.	A School oral health committee (apical committee)	1. Principal, 2. Superintendent (male and female) 3. Class teacher, 4. Five students.	1. Administration 2. Supervision and capacity 3. Building
2.	Task committee	1. Class teacher, 2. Physical education teacher, 3. Superintendent (male and female) 4. Five students	1. Ensured active participation of the students in various oral health promotion activities 2. Capacity building
3.	Reinforcing committee	1. Kitchen cook, 2. Sweeper, 3. Class teacher, 4. Superintendent (male and female) 5. Five students	1. Ensured whatever instruction given by the task committee has been performed during the non-school hours 2. Feedback
4.	Monitoringcommittee	1. Class teachers 2. Superintendent (male and female) 3. Five students	1. Monitor and supervised the implementation of the module 2. Provide Feedback

cavity restoration with ART. The students required advance treatment were referred to Sharad Pawar Dental College.

Assessment

After one year, a qualitative and quantitative (survey) methods was undertaken for end line assessment. For evaluation, the methodology used by the baseline was used. In which assessment of post interventional caries index, assessment of periodontal and gingival health status, and assessment of the use of tobacco and other deleterious habits. Along with that In-depth interview of key members of the school oral health committee was carried out to get a better insight into the program and learning of that year can be used to modify the program. So that more success rate is attained and the program becomes sustainable.

Statistical analysis

Proportions were expressed for oral health conditions and behaviours along with their 95% CI. Absolute and relative effect measures were reported along with their 95%CI. Content analysis of qualitative data was done.

The software used in the analysis was SPSS 22.0, and Graph Pad Prism 5.0 version and $p<0.05$ is considered as the level of significance. The statistical tests used for the analysis of the result was the Chi-square test. On the basis of the finding of the oral health assessment survey (WHO assessment form and questionnaire, 2013) poor oral health, harmful dietary habits, addiction to tobacco and related products were observed. Hence, it was decided to focus on interventions. The following interventions were carried out.

RESULTS

Table 2 shows that the screening and treatment were done biennially however, the oral hygiene instructions were given by the teachers in the class biweekly. Meetings were planned monthly. Health education material activities planned and mobilized monthly. The activities include increasing uptake of leafy vegetables as a part of healthy dietary practices, counselling regarding the adverse effect of tobacco and supervising brushing.

Table 3 shows that during baseline assessment, a total of 700 students were included, out of which 327 were male and 373 were female. In the intervention group, a total of 350 subjects were included out of which 188 were male and 162 were female.

Table 2: School oral health plan in ashram schools

Interventions	Total number	Frequency
Screening and treatment	2	Biennially
Oral Hygiene instructions given by the teachers	14	Biweekly
Meetings conducted	7	Monthly
Health education material developed and mobilize	10	Monthly
Counselling regarding Increase in uptake of healthy dietary habits	14	Biweekly
Counselling regarding addiction to tobacco(role-play, crossword)	10	Monthly
Supervising brushing technique	10	Monthly

Table 3: Gender wise distribution of Ashram school students in the control and intervention group

		Control (N %)	Intervention (N %)	P value	Pearson chi2
Sex	Male	139 (39.72%)	188(53.72%)	p>0.05	2.73
	Female	211 (60.28%)	162 (46.28%)		
Total		350	350		

Table 4: Mean of age in intervention and control group

Group	Observed	Mean	Std. Dev.	[95%CI)	T	P
Intervention	350	11.15143	3.512962	11.52074	3.0605	p>0.0023
Control	350	10.31714	9.928492	10.70579		

Table 5: Comparison of presence and absence of caries during baseline and end line in control group and intervention group

Time point	Control			Intervention			Effect size (difference in difference)
	Baseline (n%)	Endline (n%)	Difference	Baseline (n%)	Endline (n%)	Difference	
Yes	112 (32%)	128 (39.50%)	7.5 (0.27-14.66)	121 (34.5%)	88 (26.8%)	-10.2 (-16.6 to - 3.3)	-17.3 (-12.3-21.62)
No	238 (68%)	196 (60.49%)		229 (65.4%)	240 (73.1%)		
Total	350	324		350	328		

Table 6: Comparison of presence and absence of periodontal condition during baseline and end line in control group and intervention group

Timepoint	Control			Intervention			Effect size
	Baseline (n%)	Endline (n%)	Difference	Baseline (n%)	Endline (n%)	Difference	
Yes	201 (57.42%)	206 (63.58%)	6.2 (-1.2 - 13.4)	268 (76.57%)	128 (39.02%)	-37.6 (-44.1 -30.4)	-43.2 (-50.7 – 34.1)
No	149 (42.57%	201 (62.03%)		82 (23.42%)	200 (60.97%)		
Total	350	324		350	328		

Table 7: Comparison of presence and absence of fluorosis during baseline and end line in control group and intervention group

Time point	Control			Intervention			Effect size
	Baseline (n%)	Endline (n%)	Difference	Baseline (n%)	Endline (n%)	Difference	
Yes	101 (28.85%)	109 (33.64%)	4.8 (-2.2 - 11.7)	167 (47.71%)	145 (44.20%)	-3.5 (-10.9– 3.9)	-8.6(-11.9 – 5.2)
No	249 (71.14%)	215 (66.35%)		183 (52.28%)	183 (55.79%)		
Total	350	324		350	328		

Table 8: Comparison of presence and absence of oral trauma during baseline and end line in control group and intervention group

Time point	Control			Intervention			Effect size
	Baseline (n%)	Endline (n%)	Difference	Baseline (n%)	Endline (n%)	Difference	
Yes	34 (9.71%)	36 (11.11%)	1.4 (-3.2 – 6.1)	30 (8.57%)	10 (3.08%)	-5.5 (-9.2-2.0)	-7(-9.9 -3.6)
No	316 (90.28%)	288 (88.88%)		320 (91.42%)	318 (96.95 %)		
Total	350	324		350	328		

Table 9: Comparison of Baseline and end line finding of Dietary habits patterns of the students in the control group and intervention group on the basis of the WHO questionnaire

Type and nature of the diet	Control group		Intervention group	
	Baseline	Endline	Baseline	Endline
Fresh fruits	75 (21.42%)	75 (23.15%)	95 (27.14%)	256 (78.05%)
Biscuits, bread	171 (48.85%)	175 (54.01%)	288 (82.28%)	145 (44.20%)
Sweets	188 (53.17%)	190 (58.64%)	158(45.14%)	56 (17.07%)
Sugary candies/toffees	257 (73.43%)	231 (71.29%)	281 (80.28%)	98 (29.88%)
Milk	236 (67.42%)	240 (74.07%)	264 (75.42%)	300 (91.46%)
Tea	325 (92.86%)	321 (99.07%)	323 (92.28%)	285 (86.89%)

In the control group, a total of 350 subjects were included out of which 139 were male and 211 were female. The gender-wise distribution is statically significant (p-0.000).

Table 4 shows the age-wise distribution in the intervention and control group total of 350 students were evaluated in each baseline. Mean age in the intervention group was 11 years and a standard deviation of 3.5 years was seen. Whereas in control group mean age was ten years and a standard deviation of 3.6 years was seen.

Table 5 shows the magnitude of dental caries in the control group increased by 7.5% from 32% to 39.50%. During the same time the magnitude in intervention arm decreases by 10.2 % from 34.5% to 26.8%. The effect size for the intervention was 17.3%. Indicating 17.3% reduction in dental caries due to intervention(95%CI: -12.3% to-21.62%). The effect was statistically significant.

Table 6 shows the magnitude of periodontal diseases in the control group increased by 6.2% from 57.42% to 63.58 %.during the same time the magnitude in intervention arm decreases by 37.6% from 76.57 % to 39.02 %. The effect size for the intervention was -43.2 %.indicating 43.2 % reduction in periodontal diseases due to intervention(95%CI: (-50.7% to -34.1%). the effect was statistically significant.

Table 7 shows the magnitude of fluorosis in the control group increased by 4.8% from 28.85% to

Table 10: Comparison of Baseline data and end line data based on WHO questionnaire for Addiction to tobacco in the control and intervention group

Consumption of Tobacco	Control group			Intervention group			Effect size Difference in difference
	Baseline	Endline	Difference	Baseline	Endline	Difference	
Use of nus for teeth cleaning	252 (72%)	274 (84.56%)	12.5 (6.4 –18.6)	268 (76.57%)	128 (39.02%)	-37.5 (-44.1– 30.4)	-49.9 (-57.8 - 40.5)
Kharra	170 (40.57%)	208 (64.19%)	15.6 (8.1 - -22.8)	195 (55.71%)	80 (24.39%)	-31.3 (-38- -24.1)	-46.5 (53.8 - 37.8)
Gutkha	126 (36%)	194 (59.87%)	11.8 (4.4 –19.1)	162 (46.28%)	76 (23.17%)	-23.1 (-29.8 - -16.0)	-34.9 (-41.2 - 27.5)
Dry tobacco	146 (41.71%)	194 (59.87%)	18.2 (10.6 - -25.4)	179 (51.14%)	71 (21.64%)	-29.5 (-36.1 - -22.4)	-47.9 (-55.2 - 39.3)

33.64%. During the same time the magnitude in intervention arm decreases by 3.5% from 47.71 % to 44.20 %. The effect size for the intervention was 8.6% indicating 8.6% reduction in periodontal diseases due to intervention.

Table 8 shows the magnitude of oral trauma in the control group increased by1.4% from 9.71% to 11.11 %. during the same time the magnitude in intervention arm decreases by -7% from 8.57 % to 10%. The effect size for the intervention was -7% indicating a 7% reduction in trauma due to intervention.

Table 9 shows the magnitude of carbohydrate intake, particularly for sugary food, in the intervention group, it decreased from 80.28% to 29.88%. The effect size for the intervention was 50.4% indicating 50.4% change in the dietary pattern due to intervention.

Table 10 shows the magnitude of use of nus in the control group increased by 12.5% from 72% to 84.56 %.during the same time the magnitude in intervention arm decreases by 37.5% from 76.57 % to 39.02 %. The effect size for the intervention was 49.9%.indicating 49.9% reduction in the use of nus due to intervention(95%CI: -57.8% to -40.5%). the effect was statistically significant.

The magnitude of consumption of kharra in the control group increased by 15.6% from 40.57% to 64.19 %.during the same time the magnitude in intervention arm decreases by 31.3% from 55.71% to 24.39%. The effect size for the intervention was -46.5%. Indicating 46.5% reduction in the consumption kharra due to intervention (95%CI: -53.8% to -37.8%). The effect was statistically significant.

The magnitude of consumption of gutkha in the control group increased by 11 % from 36% to 59.87 %.during the same time the magnitude in intervention arm decreases by 23.1% from 46.28 % to 23.17%. The effect size for the intervention was -34.9%.indicating 34.9% reduction in the consumption kharra due to intervention (95%CI: -41.2 % to -27.5%). the effect was statistically significant.

The magnitude of consumption of dry tobacco in the control group increased by 18.2% from 41.71% to 59.87 %.during the same time the magnitude in intervention arm decreases by 29.5% from 51.14 % to 21.64%. The effect size for the intervention was -47.9% indicating 47.9% reduction in the consumption kharra due to intervention (95%CI: -55.2 % to -39.3 %). The effect was statistically significant.

DISCUSSION

This study initiates the thought-provoking response for the dental educators who carry out camps in different setups and different population. They need to initiate more dental awareness program for parents and their children at the preschool set up to assess as well as to spread the oral health awareness in Indian society. The school curriculum has topics on oral health and its importance. Teachers can be considered to educate and motivate school children

in maintaining their oral health.

Oral health promotion and behaviour change communication

An oral health education session on personal oral hygiene and tobacco addiction was conducted for all school children. A session included the information on the importance of deciduous teeth, dietary habits, and first aid treatment protocol for the teachers, development of Information, Education and Communication aids was done on basis of health-promoting schools guidelines providing education on oral health leads to develop knowledge, skills and attitude to maintain the oral hygiene. It also promotes a positive attitude and healthy behaviour. Oral health promotion may require a conducive environment of the school teacher and other staff. (Basakhetre *et al.*, 2017)

Socio-cultural factors like low living standard, poor education, deficiency of spiritual belief related to oral health are at relatively high risk for oral diseases. High risk of caries is seen in societies with deficient exposure to fluorides. High prone elements to oral and general health are lack of availability to pure water and poor sanitary provisions. Approachability of oral health system act as a regulatory factor for oral disease. (Gondivkar *et al.*, 2018) The occurrence of disease can only be minimized when services are available for primary health care and precludement. This model focuses towards the role of intermediary and varying high prone factors. Factors like maintenance of oral hygiene, sweet intake, and tobacco usage & liquor consumption. These practices affect both oral health and general health. (World Health Organization, 2003)

However, another group (control) showed a remarkable rise for caries rate, periodontal status at end line as compare to the baseline survey. There is markedly increased in the need in treatment as compare to the baseline. This is in conformity to the peter arrow who found significant relation among diseases of oral cavity & diet habit, mainly tooth caries. Moreover, relationship among tooth decay & nursing dietary habit was seen in age group of 10 – 19 years. Common factors related to oral & general health and nursing dietary habit should be taken in consideration while promoting oral health to achieve various goals at early age of child. (Arrow *et al.*, 2013)

Oral health promotion, capacity building and behaviour change communication

According to Nutbeam et al. there are 4 levels for evaluation of oral interventions: health promotion Action, health promotion outcomes, intermediate health outcomes & health and social outcomes. (Aljafari *et al.*, 2015)

Present study will disclose method of practising to expertise school teachers & health workers for promoting oral health care in ashram school. It will also ensure ability of health care worker towards oral health counselling to decrease incidence for childhood caries. This method has ability to improvise oral health for small children irrespective of their food habit and other related factor. This study shall also take in consideration pre-school children & develop programme for ashram children who usually fail to take care of oral health. (Arrow *et al.*, 2013)

The teachers and the students benefited from the oral health education at school level. Their practice, knowledge and attitude improved because of program. This study had a positive impact on the oral health behavior. This will be the first study to be conducted for the oral health program in the Ashrams. (Angelopoulou *et al.*, 2015) The experience and the teaching skills of the teachers who are going to implement the program are exploited. The teacher should be able to participate and monitor to successfully implement the program. The seminar was organized for the participating teachers. This program will help in proper training of the students and the teacher who are going to participate in program. (Raina *et al.*, 2017)

Limitations

Duration of this project was short so as to monitor the prognosis of the treatment done. Financial support and local health department, play a major role in the availability of the preventive and curative care, compared to other interventions. The promotion of the child health care program depends on the cost and long term effectiveness of the program. Also, future clinical studies are assessed by it. The cost of the program will be reduced by using the school personnel.

CONCLUSIONS

The success of the school based oral health program depends on the repetition and reinforcement of the program, independent of the dentists, peer leaders and the teachers. It was concluded from this study that the presence of teachers and the peers, can influence the study majorly. Also, there repetitive efforts to conduct the oral health program will be of a huge benefit.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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