SPARKYMAN - LEARNING WITH FUN - AN INTERACTIVE ORAL HEALTH EDUCATION BOARD GAME

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Abstract : *The increasing non communicable disease and oral disease burden and the socioeconomic inequalities in health can be effectively addressed by appropriate health promotion measures, which include health education, among the public through community programs and in health care settings. Different educational methods may be especially suitable for different groups of people depending upon their age, gender, educational qualification, background and nature of job. 'Edutainment' –entertainment with education as a concept, has developed into a multimillion dollar industry in children's' education. In the recent past, health educationists have woken up to the potential benefits of edutainment for health education campaigns. Edutainment has become an important tool for improving health behavior, motivating and supporting lifestyle changes, self-management of illness and chronic diseases. It involves the patient/community in management of his/her health with fun, technology enabled and easier to understand concepts. Edutainment in health promotion has used different media such as videos, soap opera, theatre, board game etc. Board games are great mediums of edutainment. The success of edutainment in various health promotion ventures prompted us to conceptualize, design and develop an interactive board game for 8-12 year old children.*

Sparkyman was designed along the lines of "Monopoly", a popular children's board game. The oral health education imparted contained elements on dentition, disease etiology, prevention and oral health promotion. The game was designed targeting 8-12 year old children and focused on the positives of good oral health and negatives of poor oral health. The game was pilot tested multiple times to assess its effectiveness, acceptance, ease of understanding and entertainment value. Sparkyman was well received by the target population and was found to be effective in improving oral health related KAP. The game needs to be evaluated further and should be introduced in schools catering to children of all socio economic strata.

Utilization of this board game for health education has the potential to reach 50 million children in India and through them, their families. It is sturdy, inexpensive,easy to carry around, fun to play with and does not require much paraphernalia.It should be an integral part of health education program in schools. Game developers, marketing personnel, communication experts and health educationists need to partner together for the full realization of the potential and the far reaching consequences of the game.

Key words : *Edutainment, oral health education, board game, children*

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The increasing non communicable disease and oral disease burden and the socio economic inequalities in health can be effectively addressed by appropriate health promotion measures among the public through community programs and in health care settings. (1)The objective of health education is to improve the health literacy of the individual and the community, thereby empowering them to make informed decisions.(2)

Communication in relation to health education involves different modes like lectures, group or panel discussions, symposia, poster or exhibit presentation etc. Every individual mode of health education has its own merits, drawbacks as well as their own sphere of effectiveness. Different educational methods may be specially suitable for different groups of people depending upon their age, gender, educational qualification, background and nature of job.(3)

'Edutainment' entertainment with education as a concept has been around for millions of years. Parables and fables have been used to deliver social message across generations. Edutainment has developed into a multimillion dollar industry in children's' education. In the recent past, health educationists have woken up to the potential benefits of edutainment for health education campaigns. Edutainment has become an important tool for improving health behavior, motivating and supporting lifestyle changes, self management of illness and chronic diseases. It involves the patient/community in management of his/her health with fun, technology enabled and easier to understand concepts.(4) The success stories of 'Soul City', numerous programs for management of HIV/AIDS, Diabetes , asthma, effective decision making principles etc have spurred other health promotion campaigns using concepts of edutainment.(5)(6)(7)(8) Edutainment in health promotion has used different media such as videos, soap opera, theatre, board game etc.

Board games are great mediums of edutainment. They are sturdy, inexpensive, easy to carry around, fun to play with and does not require much paraphernalia. It is particularly suitable for children in the 9 to 12 year old age group as they have sufficient developmental capacity to comprehend the cause and effect relationship and to perceive themselves as being capable of promoting their health and wellbeing.(9)

Board games have been found to be effective in providing health information about nutrition, dengue hemorrhagic fever etc(10)(11). A board game providing age appropriate, comprehensive oral health information is not available. The Sparkyman Board game has been designed along the lines of 'Monopoly', a popular children's board game. It focuses on concepts of healthy dentition, etiology, prevention and management of common childhood oral diseases. This research looks at the conceptualization and design process of 'Sparkyman- an oral health edutainment board game' for 8 to 12 year old children.

METHODOLOGY : The SPARKYMAN board game designed with the following objectives in mind

1. To kindle interest in oral health among 8 to 12 year olds
2. To create awareness about the various good oral health practices related to oral hygiene, diet, regular dental visits and treatment among 8 to 12 year olds
3. To inculcate a positive attitude in the minds of the 8-12 year old children towards oral health.
4. To bring about a behavior change through reinforcement of the oral health knowledge.

Game designing : The game designing was undertaken in two phases:

I. Phase I : Conceptualization & designing of the game

II. Phase II : Pilot testing of the game and evaluation of its effectiveness in improving the children's oral health related knowledge, attitude and practice.

Phase I : Conceptualization & designing of the game:

a. **Conceptualization of the game :** The game was modeled along the lines of "Monopoly", a popular children's board game. The major oral health information topics 'Sparkyman – The tooth saver' board game were identified following buzz group discussion with oral health educationists, pedodontists and public health dentists. The following components were decided to be the major areas of interest. i. Dentition- types, tooth shedding, tooth eruption. II. Oral diseases and causes-- Caries, Periodontal disease, malocclusion, oral cancer.iii Prevention of oral diseases- Nutrition, oral hygiene, exercise.iv. Oral health promotion.- oral health education, focus on prevention.The contents of the Oral health education on the identified topics was age appropriate, easily comprehensible and packaged attractively to the children.

b. **Designing of the game: Sparkyman** - An Oral health board game was designed for 8-12 year old children. The game can be played by 2-8 people using a dice and set of flash cards and magic lamp cards. Total 28 blocks make the board game, of which 7 are healthy, 7 unhealthy, 11on oral health education and 2 on harmful habits. Each player is given 6 healthy shiny teeth at the beginning of the game as a startup.The players learnt about the importance of brushing twice a day, consuming healthy food like vegetables, milk, eggs, fruits and even regular dental visits, in exchange for which the players got healthy shiny teeth.The players also learnt about the harms of chocolates, soft drinks, pizza, bakery products, smoking and alcohol. If the dice landed in these boxes, the player received unhealthy teeth.First player to get 20 healthy teeth won the game. A visit to the dentist box meant that all unhealthy teeth be replaced by healthy, thereby reinforcing the importance of regular dental visit.

To enhance the curiosity and educational attractiveness of the game, flash cards and magic lamp cards, containing 24 questions each related to oral health was introduced. Magic lamp cards contain commands, instructions for the players to move to assigned blocks/boxes along with healthy information bits. This incentive was for increasing knowledge among the players.

c. **Pilot testing the game :** The game was pilot tested in the department of public health dentistry a minimum of 4 times and each time observations were used for further improvement. Before the actual data collection, the game was pilot tested in 'Premanjali' an orphanage for destitute children. This was done together with 12 kids in age group of 8-12 years. Readability, comprehen-sion, clarity of the pictures and ability to convey the relevant and accurate oral health information

II. Phase 2 : Evaluation of the effectiveness of the board game:

Evaluation of effectiveness of the 'Sparkyman – The tooth saver' board game in bringing about an improvement of oral health related KAPB of 8-12 year old children was done. A Non-randomized experimental study was conducted on 30 children in an English Medium school in Bangalore. All children who were in the desired age group, present on the day of intervention and willing to participate in the board game were included in the study. Children who cannot follow the instructions of the board game and those who cannot understand the language of the board game were excluded. The requisite ethical clearance was obtained from the institutional review board (IRB). Permission was obtained from the headmaster of the institution. Verbal consent from children was taken.

Method of data collection: Questionnaire containing 20 questions (12K + 4A + 4B) was designed in the department of Public Health Dentistry and administered pre-test and post-test. Pre-test questionnaire was given to all children and baseline KAP was obtained.

The 24 children were divided into groups of 3, each group being handled by 2 dentists. The rules of the game were explained to the children before the start of the game. The game was played for duration of 1 hour, the end of which the first team to win 20 healthy teeth was declared as the winner. The winning team was rewarded with a sash which said 'Sparkyprince' and 'Sparkyprincess' along with gifts.

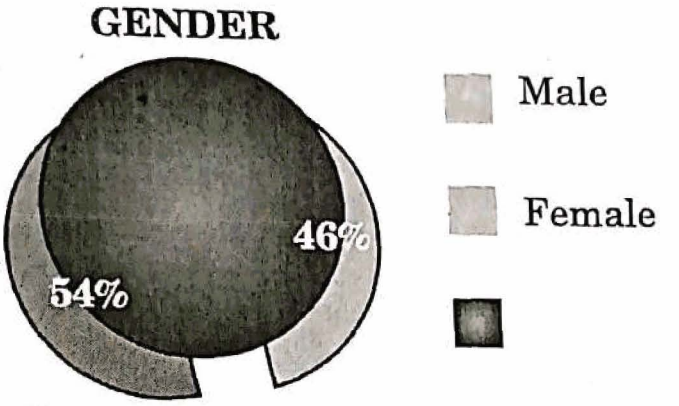
Post-game play : The improvement in KAP was assessed by using a post-test questionnaire.

Statistical Analysis : The data obtained was entered onto an excel sheet and later analysed using SPSS software, descriptive statistics and Chi-square.Paired and unpaired test P was assessed for significance.

Results

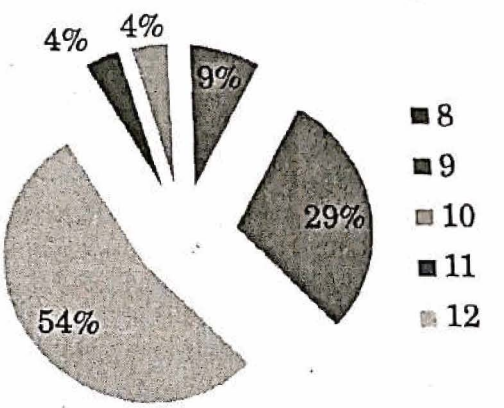
A total of 24 children participated in our study, of which 11 were boys and 13 were girls.

Fig 1: Gender distribution of study participants



They were in the age group of 8-12 years with mean age 9.63±0.88 years.

Fig 2: Age distribution of the participants



The knowledge, attitude and behavior of the children was assessed using Pre test and post test questionnaires. The results of the same are presented in Table 1,2,3. A total of 20 questions were there in the questionnaire of which 11 questions assessed knowledge, 4 questions assessed attitude and 5 questions assessed behavior. A statistically significant improvement in knowledge scores was found post game administration.

Discussion

This research aimed at conceptualizing and developing an 'Oral health education board

game based on princples of edutainment.

Why was a board game selected as a medium to provide oral health education?: Conventionally oral health education has been provided through didactic lectures. We choose to develop an edutainment module because of its inherent attractiveness to kids. Edutainment uses different media such as board game, video, magazines, tv programs etc. In this research project we choose a board game because i. Attractive for a child to play ii. Can be played at the child's own pace iii. A fun filled group activity that promotes better learning iv. Does not require expensive paraphernalia, easy to carry around. V. Played multiple times for reinforcement of information

Our literature search had revealed that an edutainment oral health board game targeting 8-12 year old children has not been designed so far in India. Most of the oral health boardgames available worldwide addresses only one or 2 components of oral health eg. Oral hygiene , tooth decay etc.

This board game provides a comprehensive oral health information covering the major issues of concern for a 8-12 year old.

Conceptualization of the board game: How we went about it?

The board game was conceptualized keeping certain end objectives in mind. i. The type and amount of oral health information provided. ii. Age appropriateness of oral health information provided.iii. Relevance of oral health information provided. iv. Expected comprehension skills for the target age group

Based on the inputs received a framework was developed for designing the board game. This framework document contained information pertaining to the topic identified, method of incorporating the edutainment principle into it and the type of learning domain it probably will influence (affective/ cognitive/psychomotor)

Road blocks faced during conceptualization and how it was overcome:

CHALLENGES FACED	OVERCOME BY
Identification of topics with respect to age appropriateness and relevance	• Literature review • Buzz group discussions • Discussion with the primary school teachers and parents of the targeted age group
Identification of comprehension skills	• Buzz group discussions regarding comprehensive ability of the target group • Discussion with the children / parents
The concept of edutainment was new to us	• Surfing various websites for the edutainment concept • Review of literature • Playing the games already developed in the department

Designing the board game: How we went about it?

The board game was designed to provide factual knowledge, promote skill development, inculcate positive attitude towards oral health. Literature search gave us an idea as to how the different components of oral health information could be incorporated into edutainment.

CHALLENGES FACED	OVERCOME BY
Meeting the comprehensive ability of the children	• Buzz group discussions • Pilot testing among group team members • Pilot tested on targeting children
Balancing education and entertainment	• Buzz group discussions • Ensure each component met the objective • Evaluated the edutainment factors by the child's experience
Identifying and proving weightage for the selected topics	• Evaluating the relevance with the disease profile in that age group • Based on the psychomotor, cognitive and affective domains, a framework was designed • Designing was cross checked with the framework at every step

Effectiveness of the game : As the results showed the game was quite effective in bringing about a statistically significant improvement in the oral health knowledge of school children. Despite the children having a very good baseline in oral health knowledge, the game was effective in bringing about an improvement as evident in the post test results.The game was not very effective in bringing about a difference in the attitude score probably because the children already had an excellent positive baseline attitude towards oral health.Most of the children had an excellent oral health behavior. The change in behavior was not measured as the post test questionnaire was administered immediately after the intervention.

Limitations of the study:

- Restricted only to children with English speaking and reading abilities.
- The board game could have been designed better with a professional's help.

Recommendations

- This board game should be a part of the play activity in schools.
- It can be used in the reception waiting areas of clinics and hospitals to provide oral health information to children.
- It should be marketed to increase the availability of the board game.
- An e-version for access by those with

internet connectivity.

V. PUBLIC HEALTH VALUE

This magazine will have immense potential to educate, empower and capacitate the children in the target group, their families and their communities. Widespread distribution of magazine will enhance dissemination of information. Sharing of oral health information might help the children, their parents and the community as a whole to make informed decisions about oral health. Reaching out to all the target groups, irrespective of their socioeconomic status can help in reducing disparities. Utilization of school teachers in magazine reading sessions will help in decentralization of the role of the oral health educator, thus bringing down the costs.

Business opportunities : Game developers, marketing personnel, communication experts and health educationists need to partner together for the full realization of the potential and the far reaching consequences of the game. This multi sectorial coordination will prove beneficial to all the stake holders concerned.

Conclusion

The **"Sparkyman – The tooth saver"** oral health edutainment module was well received by the children and proven to be effective in improving the oral health related knowledge of 8-12 year old school children. This board game should be integrated into the school health curriculum.

Tables : Table 1: Assessment of oral health related knowledge at base line and immediately after intervention

Que Number	Question	Options	Pre-test percentage	Post-test percentage
Assessment of Knowledge				
1.	When should you brush your teeth?	Once in the morning	21	17
		Both morning and at night	79	83
		Don't know	0	0
2.	How often should we change our toothbrush?	Never	8	4
		Whenever we feel like	21	8
		only when the bristles are frayed	25	50
		Once in 3 months	46	38
		I don't know	0	0
3.	What will happen if you don't brush properly?	Nothing will happen	4	0
		Germs/ tooth monsters will attack your teeth and cause cavities	96	100
		I don't know	0	0
4.	If your permanent teeth falls off, will it grow back?	Yes	88	37
		No	12	63
		Don't Know	0	0

5.	Name the hardest structure in our body?	Bone	42	17
		Muscle	38	4
		Enamel	12	75
		Don't Know	8	4
6.	What bad habits cause oral cancer?	Chewing Gutkha	42	38
		Smoking	42	42
		Alcohol	13	4
		All of the above	4	4
		None of the above	0	4
		Don't know	0	8
7.	Tooth Decay is caused by	Eating fruits & vegetables	8	4
		Eating chocolates	92	92
		Brushing twice a day	0	4
		Don't know	0	0
8.	Bad Breath is due to	Not brushing everyday	50	25
		Not cleaning the tongue	25	21
		Both the above	21	50
		Don't know	4	0
9.	What is the treatment for tooth pain/decay?	No treatment	4	8
		Visit to the dentist	96	88
		Don't know	0	0
10.	Which of the following is good for your health?	Mummy made food	80	88
		Pizza s burgers	20	8
		Carbonated drinks	0	4
		Don't know	0	0

Table 2 : Assessment of oral health related attitude at base line and immediately after intervention.

Assessment of Attitude:				
17.	Dentists are friendly?	Yes	100	100
		No	0	0
		Don't know	0	0
18	I like visiting a dentist?	Yes	88	100
		No	8	0
		Not sure	4	0
19.	I think my teeth are healthy	Yes	88	83
		no	12	17
		Not sure	0	0
20	Treatment of tooth pain is as important as any treating pain in any other part of the body	Yes	100	96
		No	0	4
		Not sure	0	0

Table 3 : Assessment of oral health related behavior at base line and immediately after intervention.

Assessment of Behaviour:				
Que Number	Question	Options	Pre-test percentage	Post-test percentage
13.	How many times do you brush your teeth in a day?	Once in morning	21	88
		Twice, once in morning and once at night	46	12
		More than two times a day	33	0
14.	How often do you eat chocolates and sweets in a week?	Once a week	67	88
		More than 3 times a week	29	12
		More than 5 times a week	4	0
15.	How often do you visit a dentist?	Only when I have tooth pain	63	33
		Once in a year	37	67
		I have never visited a dentist before	0	0
16.	Do you clean your tongue with either a brush /finger /tongue cleaner	yes	100	92
		no	0	8

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