

# Primordial Prevention: Promoting Preparedness for Ebola Virus Disease

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## ABSTRACT

**Background:** India may face a danger of immediate spread of Ebola Virus Disease (EVD) if it enters the subcontinent. Preparedness for such a condition is a part of its prevention. Dentists form a sizeable chunk of healthcare in India and may help in augmenting the health care team at the time of such outbreaks. This paper details the development and evaluation of a specially tailored program for dental students and faculty for imparting knowledge on EVD and its prevention strategies.

**Aim:** To assess the knowledge score for EVD and its prevention after attending a specially tailored program.

**Materials and Methods:** A multidisciplinary team was selected for content development and providing an insight on the topic.

The program was attended by students and faculty members of Manav Rachna Dental College. The knowledge of the attendees about EVD was assessed at the end of the program through a structured questionnaire. The response rate was 96%.

**Result:** According to the knowledge score attained, 52.4% of the participant had good knowledge level and 2.8% had poor knowledge level. There was no significant difference in knowledge scores between the participants having prior knowledge and those having no previous knowledge about the disease ( $p = 0.135$ ).

**Conclusion:** High response rate and good knowledge level attained by most of the participants established evidence of a successful program.

**Keywords:** Dental students, Knowledge, Program evaluation

## INTRODUCTION

The outbreak of Ebola Virus Disease (EVD) in 2014 has been unlike the others. It was the 25<sup>th</sup> known outbreak and occurred in areas that were not previously the prime centers of occurrence of the disease [1]. It has claimed more lives than all the previous epidemics combined. Previous outbreaks were geographically restricted and effectively contained through routine public health measures. However, interplay of various cultural, political and healthcare factors resulted in the monstrous form that the current epidemic has acquired [2].

Ebola virus belongs to the *Filoviridae* family and is RNA virus. The virulence of the virus is almost entirely due to the surface membrane glycoproteins [3]. Initially, macrophages are infected, triggering lymphocytic apoptosis [4] followed by invasion of endothelial system [5,6] and reduction in immune response [7]. The reservoir for the virus seems to be the fruit bats and the disease once contracted by humans is transmissible through blood and body fluids [6].

India has so far been spared from the EVD. However, the subcontinent is one of the native areas of the fruit bats that are reservoirs of the disease. Fruit bats from Bangladesh have been tested serologically positive [7]. Further, with increase in air travel between India and Africa; it has become important to prepare ourselves with any eventuality. Being a highly populated country with deficient sanitary and healthcare facilities, India faces a danger of immediate spread of the disease at a higher scale as compared to Africa if it enters. Preparedness for such a condition is a part of its prevention.

Dentists form a sizeable chunk of healthcare providers in India, working at all the levels of healthcare. Both health care education and provision of specialised healthcare are important parts of a dentist's work. Further, dentists can be used to augment the health care team in the time of disasters.

The current epidemic has once again proven the need of new approaches towards handling public health emergencies [1]. However, our present approach should be preventing the danger of the epidemic from spiralling out of control [1]. Proper knowledge

of EVD is important for both long term and short term handling of the epidemic.

A specially tailored program was developed and conducted in a dental teaching university in India. This program was unique because, in addition to providing knowledge, it aimed at strengthening the concept of healthy lifestyle and creating manpower trained for promotion of healthy practices to defend the population from EVD. It also served as a platform for improving understanding and inclination of both the students and faculty towards their responsibility as health promotion practitioners. The present paper aims at evaluation of a specially tailored program for dental students and faculty for imparting knowledge on preparedness and prevention towards EVD.

## MATERIALS AND METHODS

During communication with the authors, most of the dental students expressed unwillingness to attempt an EVD related questionnaire. This program was, therefore developed to impart EVD related knowledge. The program was conducted on 28<sup>th</sup> October, 2014 at the Manav Rachna International University auditorium. It was attended by 271 students and faculty members. Approval to conduct the program was taken from the institutional authorities. Participants were drawn from a finite subject pool (students and faculty of dental college) for this previously nonexistent program. Participation was voluntary therefore it was not possible to predict the rate of participation. With this in mind, a more descriptive approach was taken and no power calculations were done to define a requisite sample size.

### Program Development

A multidisciplinary team was selected for content development and providing an insight on the topic. As EVD is a viral disease; an understanding of its pathogenesis depends on understanding of microbiological aspects of the disease. The content on these aspects was developed by a microbiologist. A Public Health Dentist was chosen to develop the epidemiological part of the course and

current preparedness for EVD in India. Pathogenic and clinical aspects of the disease were covered by an Oral Pathologist, while the preventive aspects were covered by the specialist of Oral Medicine.

The resource faculty were asked to prepare the program content independently on their topics through an electronic multimedia presentation. After completion of the preparation, a meeting of the resource faculty and authors was conducted where notes were compared and further changes were done in the program content. The content was finalized after review by the authors regarding completeness and relevance of information provided in the course. An interactive session was planned and knowledge level of participants was to be assessed at the end of the program from students and faculty who attended the program and consented to participate in the study.

### Evaluation Tool

A self-administered questionnaire was prepared in English by the authors. Questionnaire consisted of 20 questions related to knowledge and sources of knowledge about EVD. The questionnaire consisted of 18 questions on knowledge and 2 questions on source of knowledge about EVD. The questions covered epidemiological, clinical, and pathological as well as preventive and public health aspects of the disease.

Face validity of the questionnaire was determined by administering the questionnaire to 5 experts from the field of medicine and microbiology.

### Program Evaluation

Evaluation was done after the program. Out of the 271 attendees, 260 filled the evaluative questionnaire. The Response rate was 96%. A total of eight students were excluded from the evaluation as they did not fill the questionnaire form completely or filled more than one choice for the questions. Hence, the results of the study were based on data from 252 participants.

Assessment was done by giving appropriate response a score 1 while incorrect or inappropriate response was given a score of 0. Scores for correct responses were summed up to determine individual score. The score ranged from 0 to 18, further coded as poor (0-6), fair (7-12) and good (13-18).

## STATISTICAL ANALYSIS

Statistical analysis was done using SPSS software Version 19. Significant difference in knowledge according to various demographic factors was determined by applying independent T- test. P-value of < 0.05 was considered statistically significant for all analysis.

## RESULTS

A total of 252 participants were included for data analysis out of which 74.2% (n= 187) were females. The average score for the participants was 12.34±2.5 which was above the average category. Faculty members had the highest average score (13.56) while second year BDS participants had the lowest average score (9.58) [Table/Fig-1]. According to the knowledge level attained, 52.4% (n=132) of the participants had good knowledge, 44.8% (n=113) had fair knowledge and 2.8% (n=7) had poor knowledge [Table/Fig-2]. For the undergraduate students, highest percentage of correct answers was observed in questions about epidemiological aspect of the disease and lowest percentage of correct answers was observed in the clinical and pathological part of the questionnaire. A high score was also observed in preventive and public health aspect questions among all the years. In case of interns, post graduate students, faculty and staff members; the highest percentage of correct answers was in preventive and public health aspect of the disease, while the lowest was in clinical and pathological aspect. The number of correct responses in epidemiological aspect questions was also

Variable	Year	Frequency	Average Score±Standard Deviation
Education	I yr	84	12.75±2.12
	II yr	12	9.58±4.42
	III yr	43	12.02±2.23
	IV yr	38	11.32±.53
	Intern	17	12.76±1.89
	PG student	31	12.68±2.43
	Faculty	27	13.56±1.78
	Total	252	

[Table/Fig-1]: Average knowledge scores among groups of participants

Knowledge Level	No. of Participants
Good	132 (52.4%)
Fair	113(44.8%)
Poor	7(2.8%)
Total	252

[Table/Fig-2]: Number of participants according to knowledge level attained

Year	Epidemiological Aspect (%)	Clinical and Pathological Aspect(%)	Preventive and Public Health(%)	Responses
I yr	76.87	56.67	76	Correct
	19.04	30.95	15.48	Incorrect
	4.08	12.14	7.14	Don't Know
II yr	55.95	50	53.52	Correct
	23.8	13.33	12.68	Incorrect
	20.24	36.67	33.80	Don't Know
III yr	70.33	52.80	74.81	Correct
	24.33	28.04	10.08	Incorrect
	5.33	19.16	9.30	Don't Know
IV yr	69.17	52.11	64.47	Correct
	21.80	33.68	16.67	Incorrect
	9.02	14.21	18.86	Don't Know
Intern	72.27	60	78.43	Correct
	25.21	36.47	13.73	Incorrect
	2.52	3.53	7.84	Don't Know
PG Students	67.28	61.69	81.72	Correct
	23.50	25.97	11.83	Incorrect
	9.22	12.34	6.45	Don't Know
Faculty	73.02	62.96	88.27	Correct
	21.69	25.93	6.17	Incorrect
	5.291	11.11	5.56	Don't Know

[Table/Fig-3]: Year wise distribution of responses among three aspects of the disease (percentages)

found to be high among faculty, postgraduate students and interns [Table/Fig-3].

Based on two tailed t-test to find significant difference between knowledge scores among various participant groups it was found that there was a significant difference among knowledge scores between faculty and undergraduate students. No such difference could be observed between the faculty and postgraduate students as well as interns. Statistically significant difference was also observed between knowledge scores of second year students and all other educational groups except third and final year students. A statistically significant difference was also seen between final year score and interns as well as post graduate students' knowledge score [Table/Fig-4]. There was no significant difference in knowledge scores between those for whom the program was first source of knowledge and those who had previous knowledge on the subject groups (p = 0.1345).

Base Variable	Comparative Variable	df	p (Two- tail)	t-Critical two tail
1 yr	2 yr	12	0.037*	2.178
	3 yr	81	0.081	1.990
	4 yr	61	0.003*	1.999
	Intern	25	0.977	2.059
	PG	48	0.883	2.010
	Faculty	52	0.056	2.007
2 yr	3 yr	12	0.102	2.179
	4 yr	13	0.236	2.160
	Intern	14	0.041*	2.145
	PG	13	0.046*	2.160
	Faculty	12	0.014*	2.179
3 yr	4 yr	74	0.188	1.992
	Intern	35	0.202	2.030
	PG	61	0.241	1.999
	Faculty	64	0.002*	1.997
4 yr	Intern	41	0.023*	2.019
	PG	65	0.026*	1.997
	Faculty	63	0.001*	1.998
Intern	PG	40	0.890	2.021
	Faculty	33	0.176	2.034
PG	Faculty	55	0.119	2.004

**[Table/Fig-4]:** Comparison of difference in knowledge levels among groups  
 p Significant at < 0.05 \* Shows statistically significant value

## DISCUSSION

In the authors' knowledge, the present study was the first known preparedness program of its kind about EVD in dental teaching hospital. The courses and training modules for EVD preparedness have been introduced by Centre for Disease Control and Prevention, USA and Johns Hopkins [8] that is scheduled to be held in months of February and March 2015. World Health Organization, have released a training module on EVD and held a special session on Ebola at 136<sup>th</sup> executive board on 25<sup>th</sup> January 2015 [9]. Medecins Sans Frontiers had conducted a training the trainers program against EVD reported in Ebola crises update on 13<sup>th</sup> January 2014 and started a dedicated EVD hotline for community [10]. EVD preparedness has been emphasized worldwide and in countries away from the centres of the disease [11-13]. Even though, the preventive measures and spread of this disease had been discussed earlier [13,14], there was little interest in disease preparedness till the current outbreak. Seriousness about disease preparedness regarding EVD and other similar diseases is therefore important for containing and preventing the spread of current epidemic as well as for any future epidemics. Present program successfully contributed in preparedness about the disease in a significant group of health care population.

The good attendance of program and response rate for evaluation measure indicated the willingness of the population and relevance of the program. The response rate of the program was 96% as compared to 93.4% for a program preparing dental students for HIV/AIDS patients in a dental school in the USA [15]. A large amount of population that was earlier reluctant in attempting the questionnaire answered the questionnaire at the end of the program. This indicated that the program was able to induce confidence among the participants about their knowledge regarding EVD.

A higher percentage of participants were able to achieve high knowledge scores as compared to high scores achieved in a program in dental students for HIV/AIDS conducted in a dental school in USA [15] where 30.4% achieved high scores as compared to 52.4% in the present program. The percentage of participants achieving poor scores was however similar in both the programs.

Average scores show that the program was effective in providing a reasonable level of knowledge to the participants. High knowledge level was attained by the senior students and faculty members. This could be due to greater relevance of the topic to their clinical practice and day to day work. However, the first year students were able to attain a reasonably high level of knowledge. This confirmed that program was comprehended by even those in the early level of dental education. Simplicity of content of the program and its usefulness among varied education levels can hence be endorsed.

High number of correct answers was observed for knowledge questions about epidemiological as well as preventive and public health aspects of the disease. However, the knowledge level about pathological and clinical aspects of the disease was lower. This could be attributed to a greater complexity in these aspects and need for reinforcement of knowledge. Highest number of correct answers was seen in epidemiological aspect of disease in undergraduate students; preventive and public health aspects of disease in interns, post graduates and faculty. The difference in knowledge levels of various groups of participants may also be due to difference in attitude and values among students in various stages of education during their course [16]. The program was further able to cover the population that had previous exposure to knowledge about EVD from other sources as well as those who had no knowledge about EVD equally.

## Impact of the program

The motivation of students was evident. A group of motivated students identified the need of reinforcing the infection prevention protocol in daily clinics in order to prevent spread of infection in dental hospitals. They prepared posters outlining the infection prevention protocol to be installed in clinical area of the institution.

Another group of students and faculty members formed an 'Ebola update' group after the program. This group discussed the current situation of epidemic on weekly basis and posted information regarding EVD on the institutional notice board regularly. These activities show activation of participants and success of program in bringing about the desirable behaviour change in the participating individuals.

## LIMITATION

Ebola related stigma in the society has been equated to stigma of HIV/ AIDS [17] and is particularly important. The present program only addressed the lack of knowledge among the participants and not the attitude development. However, attitude development can be difficult and time consuming and cannot be considered in the scope of a one day long course for a disease that has not affected the people around the participants.

## CONCLUSION

There has been a recent debate on ethics of quarantining health care workers arriving from Ebola affected regions. Proper knowledge and practices regarding EVD and infection preventive measures can be the key to safety. When we are sure about the standards of knowledge and practices adopted by our professionals, we do not need to react to their services in disease affected regions with panic. The present program ensured this by providing the health care professionals with much needed information about a new disease and defence against it in order to be efficient and safe. High response rate and good knowledge level attained by most of the participants established evidence of a successful program.

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