

AWARENESS OF BUBONIC PLAGUE AND ITS COMPLICATIONS

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ABSTRACT:

The aim of the study is to analyze the knowledge and awareness of bubonic plague and its complication among dental students. Bubonic plague is a bacterial disease caused by *Yersinia pestis*, symptoms of which are fever, headache, vomiting. It is spread through infected fleas. No vaccination has been discovered but can be treated with antibiotics such as gentamicin, streptomycin etc. This study involved 100 participants in the age group of 18-25 years. A well structured questionnaire comprising 10 questions covering socio-demographic information, knowledge, attitude, perception was framed and administered to the participants through online google forms link. In the current study 52.88 % of dental students were aware of bubonic plague. 54.81% students were aware that it was transmitted through infected fleas. 39.6% were aware that bubonic plague is a bacterial disease. 72% of students responded that probability is more for treating bubonic plague with antibiotics. 51% of students were aware that bubonic plague was caused by *Yersinia pestis*. 51% of dental students had responded that swollen lymph nodes are the major symptom of Bubonic plague. 49% of dental students responded that France was the first country to be affected with bubonic plague. 44.2% students were aware that bubonic plague affects the lymphatic system. 52.9% participants responded that the probability of transmission of plague from dead animals is more. 51% of students responded that the probability of transmission from human to human is more. In 2018 Bland et al had done a study reporting that human ectoparasites such as fleas can transmit Bubonic plague caused by *Yersinia pestis* whereas in the current study 54.8% students were aware that bubonic plague transmitted through fleas. In 2008 Nils Stenst et al had done a study reporting Bubonic plague can be treated with antibiotics whereas in the current study 19.3% participants were aware that it can be treated with antibiotics. The current study was to analyse the knowledge and awareness of bubonic plague and its complication. This study shows 45% of dental students were aware about bubonic plague.

KEYWORDS: Bubonic plague; fleas, plague; swollen lymph nodes; *Yersinia pestis*

INTRODUCTION:

There are three types of plague among one is the bubonic plague which is the common form of plague. It is a bacterial disease caused by *Yersinia pestis*. The symptoms of bubonic plague are fever, headache, vomiting, swollen lymph nodes, muscle pain and seizures. The symptoms develop in 1-7 days from the

onset of bacteria. Bacteria enter the skin causing inflamed lymph nodes. The yersinia pestis bacteria causes the degradation of phagocytes present in the body which leads to the swollen lymph nodes. Fluid samples are taken from the swollen lymph nodes for diagnosis which is called buboes. Mode of transmission is fleas. It is diagnosed by detecting bacteria in blood or sputum etc... No vaccination has been discovered but it can be treated with antibiotics such as streptomycin, gentamicin effectively. It is prevalent among people handling the dead animals. Worldwide from 2010-2015, 3248 people died because of the disease. It is also called Black death because in the middle ages, the plague caused nearly 60% of death in Europe. In 14 century Asia, Europe and Africa lost 50 million lives due to this plague. It is culpable to Justinian plague, in the 6th century China and India were affected in 1855. Swift diagnosis is the essential for reduction of liability of death (Stenseth *et al.*, 2008). Plague can cause pharyngitis and meningitis (Dillard and Juergens, 2019). Consultation with a health physician can reduce the risk (Dillard and Juergens, 2019) . Human ectoparasite is the reason for the transmission of bubonic plague and was detected in a recent study done by Bland DM et al (Bland, no date). Plague was found in all continents except oceania. The preventive measure of the study was considered to be cautious against fleas bites.

Outbreaks of the plague have become reduced but many pandemics are evolving throughout the world which seems to be a necessity for each individual to have knowledge about the diseases and its preventive measure to protect themselves from it. Inorganic fleas bite can be the bite of death (Dillard and Juergens, 2019). The disease is probably considered to be seasonal acquired in the late spring to early fall (Perry and Fetherston, 1997). Minimum number of studies reported on bubonic plague. People are not fetched with adequate knowledge which can be fatal. It is an exclusive survey study done to analyze the knowledge of preventive measures and complications of bubonic plague. More studies must be done to make the corresponding result generalized. The aim of the current study is to analyze the knowledge and awareness of bubonic plague and its complication among dental students.

MATERIALS AND METHODS:

Self-administered standardized questionnaires were designed based on the knowledge and awareness of bubonic plague and its complication among dental students. The questionnaire was distributed through online google forms link, the study population included 100 dental students. The study was done in chennai. The participants were explained about the purpose of the study in detail. The questions were carefully studied and the corresponding answers were marked by the participants. The data was collected and statistically analysed in SPSS. Chi-Square analysis was performed and $p < 0.05$ was considered as statistically significant.

RESULTS AND DISCUSSION:

In the current study 52.88% of dental students were aware of bubonic plague (Figure 1). On association of responses on awareness of bubonic plague with gender in Chi square , statistical not significance was analyzed as the P value was 0.540 ($p > 0.05$) (Figure 2). 54.81% of participants were aware that bubonic plague is a bacterial disease (Figure 3). 72% of students responded that probability is more for treating bubonic plague with antibiotics (Figure 4). When the percentage of distribution of responses were compared with gender no statistical significance was analyzed in Chi square test as the P value was 0.560 ($p < 0.05$) (Figure 5). 51% of students were aware that bubonic plague was caused by Yersinia pestis (Figure 6). 49% of dental students responded that France was the first country to be affected with bubonic plague (Figure 7). When the percentage of distribution of responses were correlated with gender in the Chisquare test it was analyzed to be statistically not significant ($p < 0.05$) (Figure 8). 51% of dental students had responded that swollen lymph nodes are the major symptom of Bubonic plague (Figure 9). On correlating the responses on awareness of symptoms with gender it was analyzed to be statistically not

significant with P value=0.234 (Figure 10). 44.2% students were aware that bubonic plague affects the lymphatic system (Figure 11). 52.9% participants responded that the probability of transmission of plague from dead animals is more (Figure 12). 72% of students responded that they were not aware of transmission from human to human is more (Figure 13).

Based on survey responses, the awareness bubonic plague and its complication among dental students was detected. As per previous study done reported that human ectoparasites such as fleas can be the mode of transmission of bubonic plague similarly in the current study 54.5% of dental students were aware of its mode of transmission (Bland, 2018). In another study done by Kugeler et al the clinical feature of the Bubonic plague is fever and swollen lymph nodes and 51% students were aware about bubonic plague symptoms in current study (Benedictow, 2019).

Though people are aware about plague they are not completely fetched with its complication and fatality rate. In a recent study reported, Bubonic plague can be treated with antibiotics comparatively, only 19.3% of dental students are sure that it can be treated with antibiotics in the current study (Stenseth *et al.*, 2008).

According to the studies done by Perry and Fetherston et al in 1997 and Zhao et al, declares that bubonic plague is caused by *Yersinia pestis* which is a bacteria, comparatively in current study 51% were aware that bubonic plague is caused by *Yersinia pestis* (Perry and Fetherston, 1997) (Zhao and Sun, 2018)

Based on recent study done by illankazhai et al 2016 reports that as age increases the immune system becomes weaker which can lead to diseases and even lack of sleep or snoring disorder will be found which can be prevented by physical exercises and acupuncture as suggested by other studies done by David et al., 2019; Shruti et al., 2018; Choudhri et al., 2016; Swathy et al., 2015; Rj and R, 2016; David *et al.*, 2019; Shruthi and Preetha., 2018; R and Sethu, 2018; Swathy and Gowri Sethu, 2015; Timothy, Gayatri Devi and Jothi Priya, 2019.

There are several limitations of the study such as increase in sample size, inclusion of more criteria, survey fatigue, homogenous population and response bias. Future scope of the study is that awareness about the disease can help people to prevent themselves from the disease and scientific approach in medicine can be done to avoid complications.

CONCLUSION:

The current study was to analyse the knowledge and awareness of bubonic plague and its complication. This study shows 45% of dental students were aware about bubonic plague. Based on the results of the study the dental students were not fully fetched with the knowledge of preventive measures and complications of Bubonic plague. More and more studies should be done to spread the awareness of black death (bubonic plague) as well as to generalize the result of current study.

AUTHOR CONTRIBUTION:

Tahoora Taskeen L carried out the structuring of the study design and data collection. Jothi Priya and Lakshminarayanan Arivarasu analyzed the statistical significance using SPSS and approved the final manuscript. Lavanya prathap tabulated the result and drafted the manuscript.

CONFLICT OF INTEREST:

The author declares that there was no conflict of interest in the present study.

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TOPIC: AWARENESS OF BUBONIC PLAGUE AND ITS COMPLICATION

SUBJECT: PHYSIOLOGY GUIDE: Dr. JOTHI PRIYA

Figure 1: shows the percentage of awareness of bubonic plague among dental students

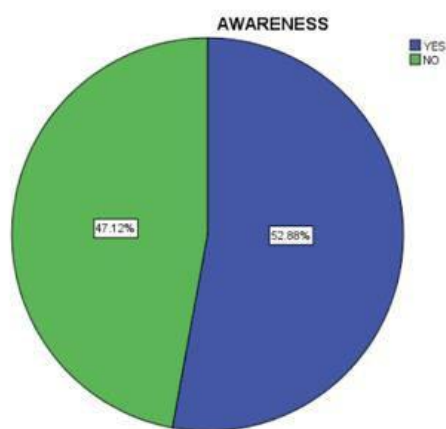


Figure 1: Pie chart showing the percentage distribution of response on awareness of bubonic plague among dental students. About 47.12 % -yes (green) and 52.8 % - no (blue). Majority of participants were not aware about bubonic plague (52.8%). However the difference in response is less.

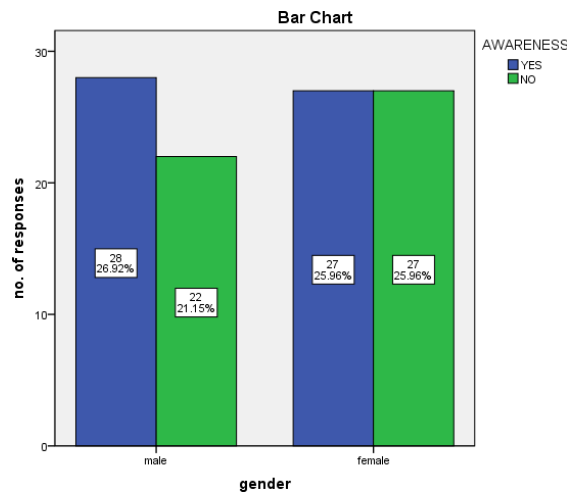


Figure 2: Bar graph showing the association between the response on the gender and the awareness of bubonic plague. The X axis represents the gender and the Y Axis represents the no.of responses of which blue colour indicates yes and green colour indicates no. Majority of males were more aware about bubonic plague than females. However the difference is not statistically significant (Pearson’s Chi square value = .375 , P= .540 (p>0.05), hence statistically not significant.

Figure 2:shows the percentage of awareness of node of transmission for bubonic plague

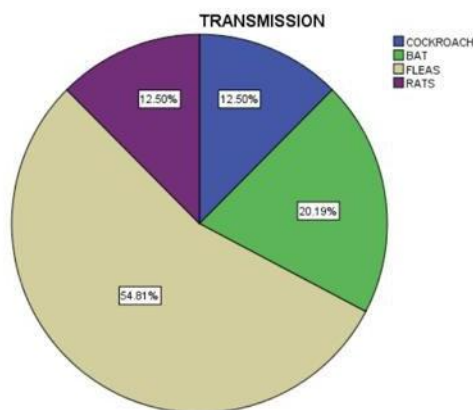


Figure 3: Pie chart showing the percentage distribution of response on awareness of mode of transmission for bubonic plague.About 20.19 % -bat (green), 12.5 % - cockroach (blue), 12.50 % - rats (purple), 54.81 % -fleas (mustard). Majority of respondents reported fleas (54.81%).

Figure 3: shows the percentage of awareness of bubonic plague as a bacterial disease

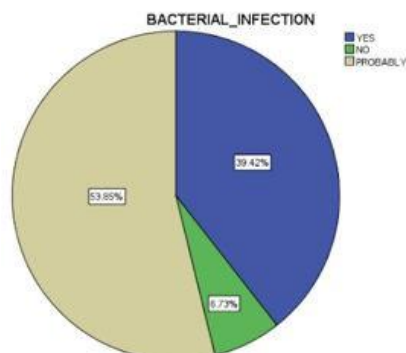


Figure 4: Pie chart showing the percentage distribution of response on awareness of bubonic plague as a bacterial disease . About 4.7 %-no (green), 39.4 %- yes (blue), and 53 %-probably (mustard). Majority of respondents reported probably (53.85 %).

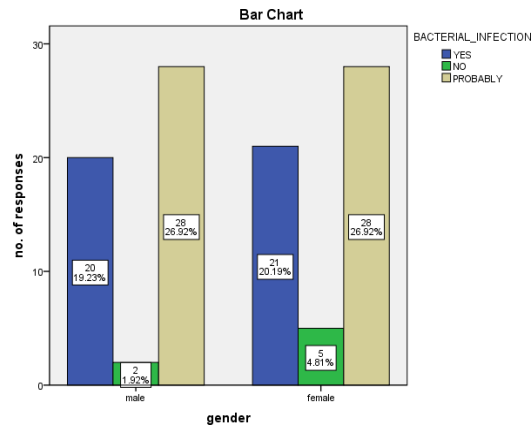


Figure 5: Bar graph showing the association between the gender and the response on awareness of bubonic plague as a bacterial disease. The X axis represents the gender and the Y Axis represents no. of participants of which blue colour indicates yes, green colour indicates no and beige colour indicates probable. Higher number (26.92%) of males and females had reported it. However the difference is not statistically significant, (Pearson’s Chi square value =1.158 ,P=.560 (p>0.05), hence statistically not significant.

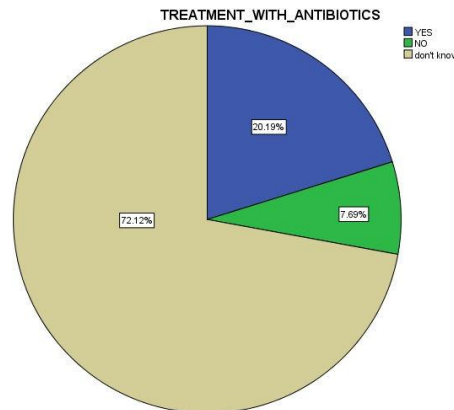


Figure 6: Pie chart showing the percentage distribution of response on awareness on the treatment of bubonic plague . About 7.8 %-no (green), 20.19 %- yes (blue), and 72.1 %-Don’t know (mustard). Majority of participants reported don’t know (72.1%).

Figure 5. Shows the percentage of awareness of causation agent of bubonic plague

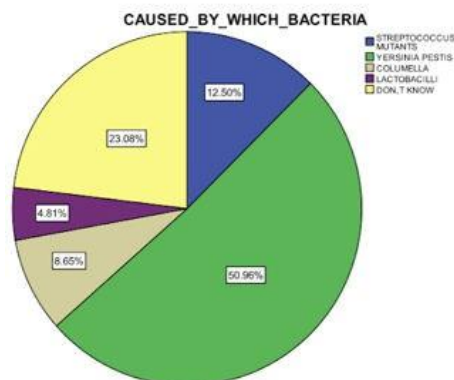


Figure 7: Pie chart representing the percentage distribution of response on the causative agent of bubonic plague. About 50.96 % - yersinia pestis (green), 12.19 % - streptococcus mutans (blue), 8.06 % - columella (mustard), 4.8 % -lactobacilli (purple) and 23.08 % - don’t know (yellow). Majority of respondents responded to yersinia pestis (50.96%).

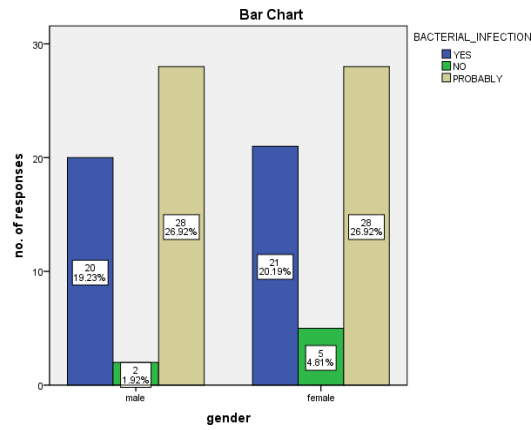


Figure 8: Bar graph representing the association between the gender and the response on causative agent of bubonic plague. The X axis represents the gender of participants and the Y Axis represents the no.of participants. Majority of males (25.96%) had reported Yersinia pestis . Blue color denotes streptococcus mutans , green color denotes yersinia pestis , mustard color denotes columella, purple denotes lactobacilli and yellow denotes don't know. However the difference is not statistically significant (Pearson's Chi square value = 8.069, P=.089 (p>.05), hence statistically not significant.

Figure 6: shows the percentage of awareness of symptoms of bubonic plague

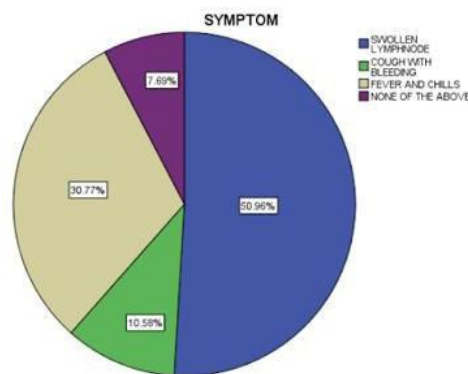


Figure 9: Pie chart showing the percentage distribution of response awareness of symptoms of bubonic plague About 50.96 % - swollen lymph node (blue),10.58 % - cough with bleeding (green), 30.77% - fever and chills (mustard) and 7.69 % - don't know (purple). Majority of participants responded to swollen lymph nodes (50.96 %).

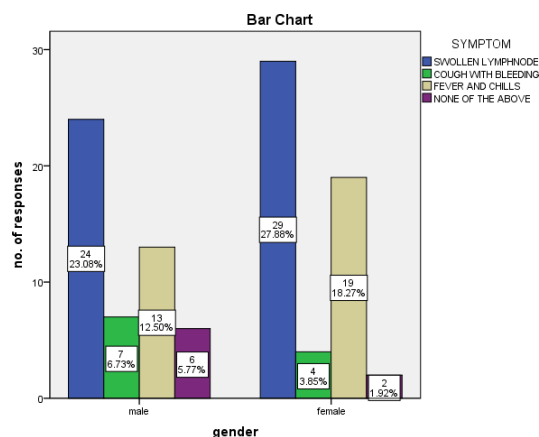


Figure 10: Bar graph representing the association between the gender and the response awareness of symptoms of bubonic plague. The X axis represents the gender of participants and the Y Axis represents response awareness of symptoms of bubonic plague. Majority of females (27.88%) had

reported swollen lymph nodes . Blue color denotes swollen lymph node, green color denotes cough with bleeding , mustard color denotes fever and chills, purple denotes none of the above. However the difference is not statistically significant (Pearson’s Chi square value =4.267, P=.234 ($p>0.05$), hence statistically not significant.

Figure 7: shows the percentage of response on first affected country due to bubonic plague

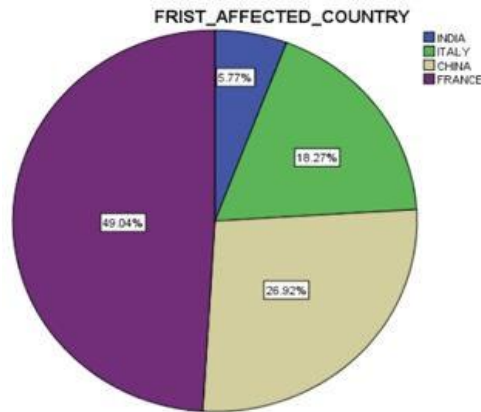


Figure 11: Pie chart showing the percentage distribution of response first affected the country due to bubonic plague. About 49.04%-france (purple), 5.77% - India (blue), 10.27% - italy (green) and 26.02% - China (mustard). Majority of students responded to France (49.04). However the difference in responses is less.

Figure 8: shows the percentage of awareness on affected body system due to bubonic plague

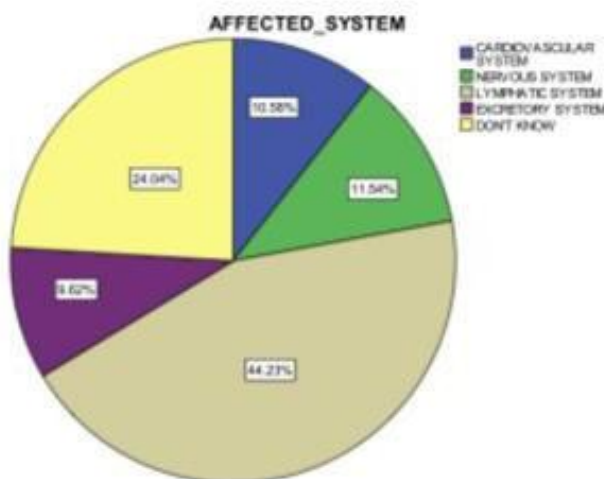


Figure 12: Pie chart showing the percentage distribution of response on awareness on affected body systems due to bubonic plague. About 44.27% - lymphatic system (mustard), 24.04% - Don’t know (yellow), 11.54% - nervous system (green) and 9.5% - excretory system (purple). Majority of participants responded lymphatic system (44.27%).

Figure 9: shows percentage of response on the spread of *Yersinia pestis* bacteria from dead animal to human

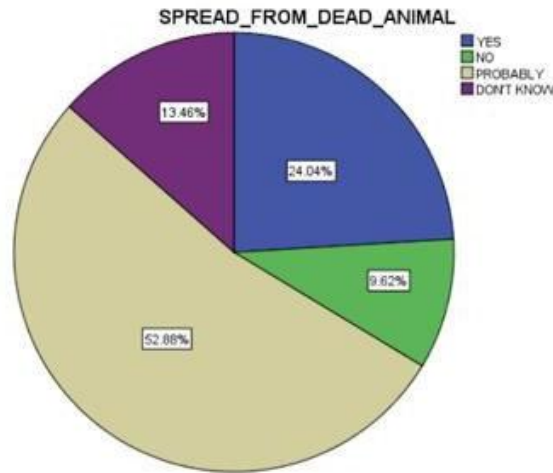


Figure 13: Pie chart showing the percentage distribution of response to the spread of *Yersinia pestis* bacteria from dead animals to humans. About 13.46% - don't know (purple), 24.04% - yes (blue), 9.82% - no (green) and 52.8% - don't know (mustard). Majority of participants responded probably (52.88%).

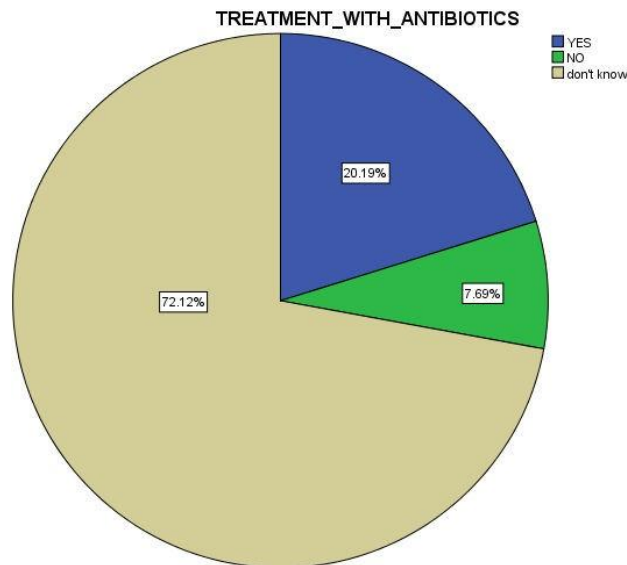


Figure 14: Pie chart showing the percentage distribution of response on human to human transmission of bubonic plague. About 72.12% - don't know (mustard), 20.19% - yes (blue), 7.89% - no (green). Majority of participants reported don't know (72.1%).