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GREEN FIRECRACKERS: AWARENESS AND ATTITUDE OF SENIOR SECONDARYSTUDENTS IN DELHI'S SCHOOLS

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Abstract

Delhi is one of the polluted city in the world. The city is having number of pollutant factors that are badly affecting the health of inhabitants, amongst of them suspended particles in the environment arevery prominent factors along with use of crackers. But in recent time concept of green crackers has created a buzz among youth of the Delhi. This study investigates how the introduction of Green Crackers in the Indian market has affected the celebration of festivities in India. This paper focuses on the awareness of government and private school students at senior secondary level regarding green crackers. The present findings highlight the need of community awareness when we are dealing withenvironmental pollution and our traditions.

Keywords: Green Crackers, Awareness, Attitude, Environment, School Children

Introduction

Fireworks invention is traditionally ascribed to China and over time they have become huge part of celebrations of different festivals in different cultures. In India it has a special significance on the festival of Diwali. The fireworks came into India in about 1400 AD and were quite expensive up to nineteenth century but by nineteenth century, firecrackers had become affordable and easily availablein India for everyone to use. But fireworks come with their own list of issues, including the fact thatthey terrify birds and wildlife as well as pets, they add toxic chemical pollutants to the air, water and land, create explosions that can trigger terror in people suffering from post-traumatic stress disorder. Many previous studies showed the role of fireworks in terms heavy pollution during Diwali days.

However the petition to ban conventional fireworks was filed in September 2015 on behalf of three infants represented by their fathers expressing concern about the health of the children. In response Central Pollution Control Board (CPCB) claimed that pollution level in India has drastically gone down after firecracker ban in 2017 by the Supreme Court of India. The CPCB again filed an affidavitin the Supreme Court regarding the air quality which reported that the air quality did worsen and the reported cases for eye itching and hospital visits increased but the number was not significantly higher. The respiratory related cases were not different during pre and post Diwali. In view of healthhazard, National Green Tribunal has ordered a complete ban on sale and use of any kind of crackersbe it green or regular in the NCR region until 30.Nov.2020. Not only Delhi, many state governments like Rajasthan and Odisha have banned firecrackers bringing forward the Green Crackers. The 'greencrackers' are not as polluting as the conventional types of firecrackers and they contain at least 30 percent less particulate matters such as Sulphur Dioxide and Nitrogen Oxide. But the awareness of green crackers has been very limited. Now Question comes;

How is the awareness and attitude of senior secondary schools students toward green crackers?
A study done in China on eco-friendly fireworks has found that even though the new fireworks release15-65 % less particulate matter than the conventional ones, they still deteriorate air quality significantly. Traditional fireworks use charcoal and sulphur based fuel whereas the eco-friendly fireworks uses clear nitrogen based fuel which leads to less smoke with not much by-products. But the concentration of PM 2.5 during festivities exceeded the approved WHO guidelines which led theresearcher to conclude that the even green fireworks should be limited. A paper written on evolutionfrom conventional fireworks to green fireworks from forensic point of view by Shweta Sinha and Kavita Goyal. They found that the metal ingredient is in very low quantity in green crackers which lead to less ash which in turn has posed problems for examination of post blast residue by forensic scientists. They have also stated that the green crackers have low ignition temperature which can be fire hazard.
There are very few findings or information on awareness regarding Green firecrackers. The study is important in the global environment to find out the strategic trend of green crackers in fireworks industry by measuring the awareness and attitude of Senior Secondary students. With this study we focus on senior secondary level as they are old enough to understand the repercussion of firecrackers on environment and young enough to modify their behaviour and also can influence thesustainability of environment in future.
The article is written with the objective to determine the level of awareness in students regarding green crackers at secondary school level.**The descriptive analytical method has been adopted to conduct the study.** Under it sampling has been done by using random purposive sampling method. A sample of 200 students of senior secondary level from different zones of Delhi was taken. They were chosen in order to understand the awareness attitude, behaviour perception regarding green firecrackers in Delhi. A sample chosen were the eco club members under Delhi Government.

Review of previous work

Since the green fireworks have been developed by India recently, there have not been many studies available related to it and the information available is limited. Given below are the few studies donein India and abroad regarding fireworks and the pollution caused by them.

The definition provided by the CSIR-NEERI (2018) for the eco-friendly firecrackers is Fireworks/firecrackers made with reduction in size of shell, elimination of ash usage etc., reduced usage of raw materials in the compositions, of uniform acceptable quality, and/or use of additives as dust suppressants to reduce emissions with specific reference to particulate matter (PM) leading to reduction by 30 %. Scientists at CSIR-NEERI has developed three types of firecrackers named SAFAL (Safe minimal aluminum cracker), STAR (Safe thermite cracker), SWAS (Safe water release). An article published under times group regarding green fireworks gave information about the launch of green crackers with the focus on logo and QR code. The article helped in identifying green fireworks as it informs about the green logo, QR code and certificate number provided on the box of fireworks. Any other box claiming to be green crackers

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without these three is fake.

Shidong Fan et al. (2021) in their study have asked the question whether green crackers are really ecofriendly. Fireworks are important aspect of celebrations in many countries. This study was done using the data from fireworks display held on Chinese National Day. The researchers found that even though green fireworks emit less PM 2.5 emissions, it still exceeded world health organization guidelines. Researchers concluded that the use of green fireworks should be restricted.

Shweta Sinha and Kavita Goyal (2021) wrote their paper on evolution from conventional fireworks to green fireworks from forensic point of view. They found that the metal ingredient is in very low quantity in green crackers which lead to less ash which in turn has posed problems for examination of post blast residue by forensic scientists. They have also stated that the green crackers have low ignition temperature which can be fire hazard.

National Green Tribunal (NGT) (2020) has ordered a complete ban on sale and use of any kind of crackers be it green or regular in the NCR region until 30 Nov 2020. Not only Delhi, many state governments like Rajasthan and Odisha have banned firecrackers. Karnataka and Andhra Pradesh have allowed green crackers keeping in mind about festivities as well as covid-19 impact.

Sushmita Pakrasi (2020) in her article for Hindustan Times wrote about green crackers that they are made using less polluting raw materials which results in less pollution. Even the sound emitted by green crackers is less than conventional ones by about 40 db. For the manufacturer to make using green crackers using formulation provided by CSIR-NEERI, they have to sign a deal with CSIR. Manufacturer cannot make green crackers using their own formulation.

Polluting chemicals like aluminum, barium, potassium nitrate etc. are used in the making of green crackers as well but they are in less quantities compared to regular crackers which lower the emissionby 30%. In some green crackers the pollutants are not used at all.

Findings and Discussions

1. Ban on Conventional firecrackers.

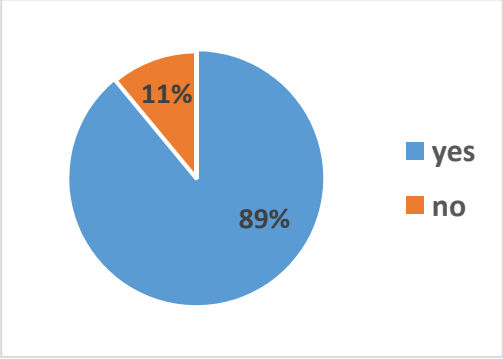

Figure 1. Pie chart representation of ban onConventional fireworks.

Out of the 200 students 89% of the students answered that they are aware about the ban on

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conventional fireworks in the capital whereas only 11% are not aware about the ban. This shows that majority of the senior secondary students are aware about the ban of firecrackers in Delhi.

2. Firecrackers burned during Diwali.

It can be seen from the above table that 52% of the students answered that they did burn whereas 48% did not burn the firecrackers. It suggests that most of the students did burn firecrackers this year. The answers arealmost equally divided. It can also mean that even though more than the half of the students burned the crackers rest of the students are aware about the pollution caused by the crackers and so they did not indulge in burning them.

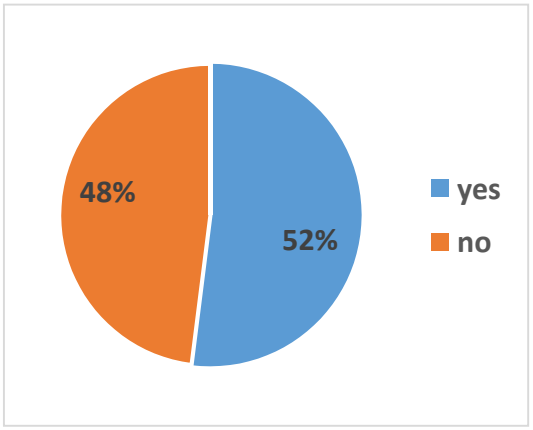

Figure 2. Pie chart representation of numberof students burning fireworks.

3. Reasons for not burning firecrackers.

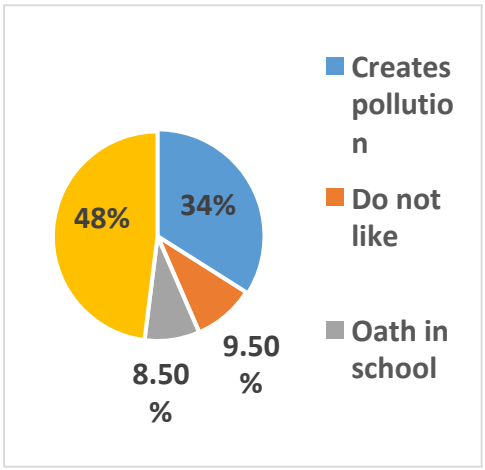

Figure 3. Pie chart representation of reasons for not burningfirecrackers.

Almost half of the students i.e. 48% did not give an answer.34% did not burn fireworks because they create pollution Rest

8.5 % of the students do not like crackers. It can be seen halfof the students are aware about the bad effects

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4. Awareness about green crackers.

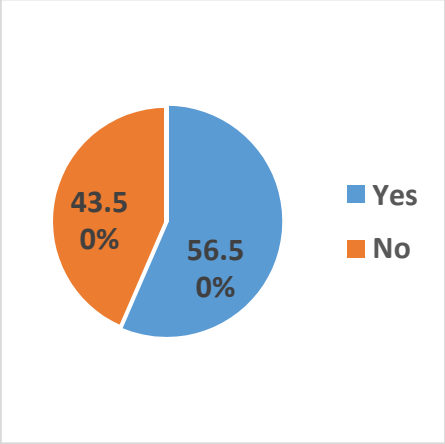

Figure 4. Pie chart representation on awareness about green crackers.

It can be seen from the above graph that the majority of the students know about the green firecrackers. 56.5% of the seniorsecondary level students did know about the green fire crackers and 43.5% did not know about these firecrackers. This goes on to show that most of the students have knowledge about green crackers even though these are new in the market.

5. Information on green crackers.

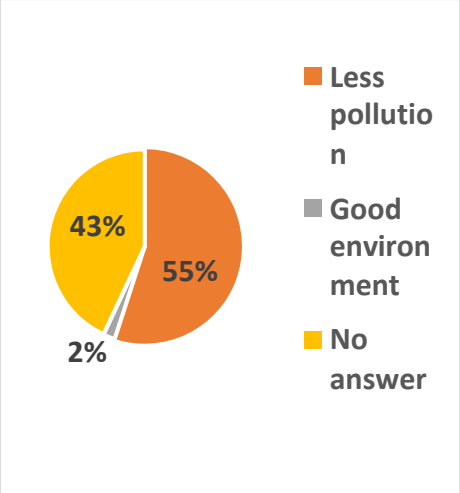

Figure 5. Pie chart representation of green crackers information.

On the question of how green crackers are different from traditional fireworks, 55% of the students answered that green ones cause less pollution than their counterpart. 43% did not answer the question while 2% said green crackers are good forenvironment. This shows that even though majority of students did know about new firecrackers they did not have much knowledge about this new kind. They know that these are betterthan the conventional ones but not much about how.

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6. Preferred type of firecrackers.

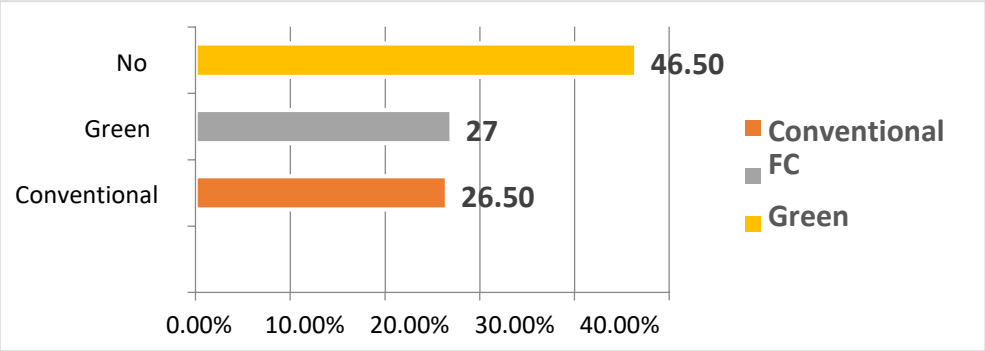

Figure 6. Bar representation of preferred type of crackers.

From the above figure it is evident that just less than half of the learners do not prefer any kind of fireworks. 27% of the students prefer green crackers even though they have not been available in thelocality of most of the students but 26.5% prefer the conventional fireworks. Even though the green crackers are new options available in the market of fireworks, students at senior secondary level are aware.

7. Reasons to buy firecrackers.

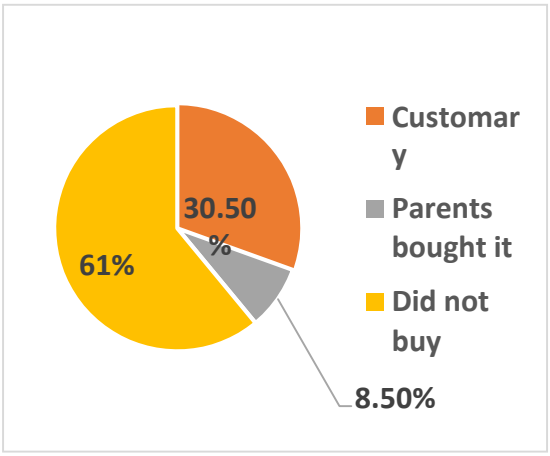

Figure 7. Pie chart representation of reasons of buying firecrackers.

From the above table it can be seen that 61% students did not buy fireworks whereas 30.5% thought that it is customary to buy and burn fireworks during Diwali season.8.5% of the students blamed their parents for buying fireworks. The above data reflects that majority of thestudents do not buy fireworks at all and the few who do, because they think it is customary to burn fireworks on Diwali.

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8. Reasons for fireworks being harmful.

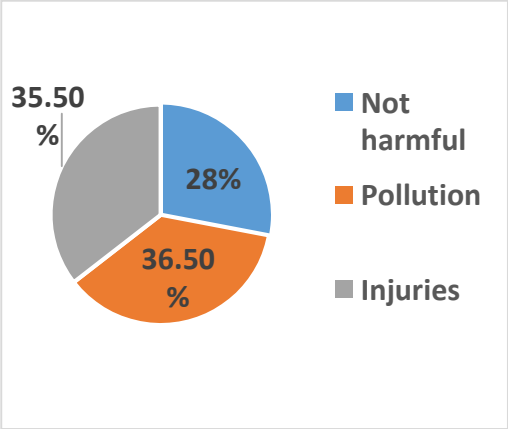

Figure 8. Pie chart representation of reasons of fireworks being harmful.

The above data shows that 36.5% of the students thinkfireworks as the reason of pollution during festivities. 35.5%got injured due to fireworks whereas 28% said that fireworksare not harmful. It can be inferred that majority of thestudents are aware that fireworks cause pollution whereas only 28% of the total number of students did not agree with fireworks as being harmful.

9. Difference between green and conventional crackers.

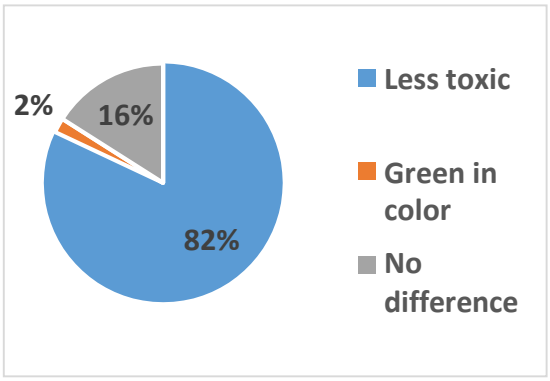

Figure 9. Pie chart representation of difference betweengreen and conventional crackers.

It can be seen from above data that 82% of the students knew that green crackers are less toxic than their counterpart. Few believed that those having green colour are green crackers. But the area of concern was the students who believed that there is no significant difference between green and conventional fireworks. 16% of the total number of the students believed that there is not much difference in the two types of fireworks.

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10. Awareness about the names of green crackers.

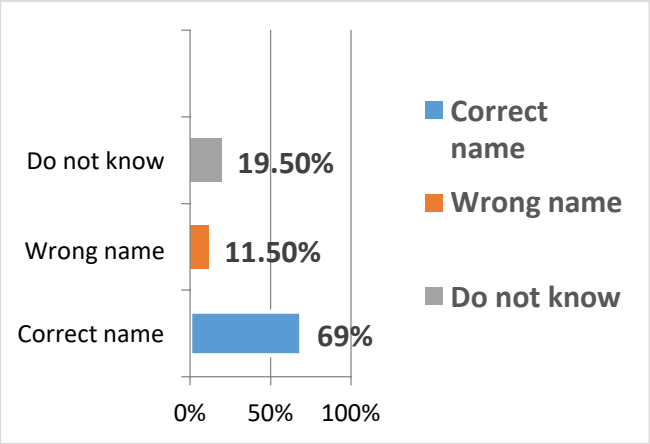

Figure 10. Bar representation of awareness on names of green crackers.

Upon asking about the names of green firecrackers 69% of the total students gave correct name of any one of the green crackers. 19.5% accepted that they do not know the name of green firecracker and 11.5% gave wrong name. It can be inferred that more than half of the total number of students have information about green crackers whereas rest half do not have much idea about them.

11. Time to burn firecrackers on Diwali.

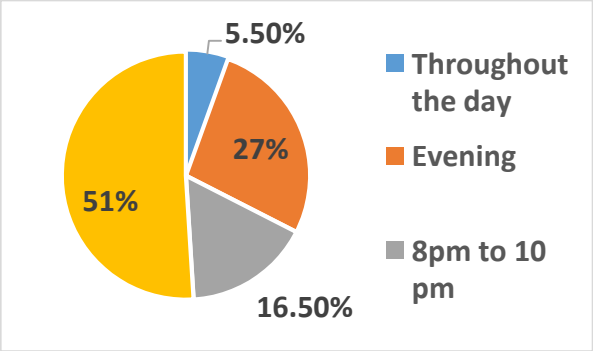

Figure 11. Pie chart representation of time when the firecrackers were burned by the students

When asked about the time set up by the Delhi government, 51% of the students answered that they did not burn firecrackers at all. 27% did not look at the time but believed that it was evening. 5.5% burned the crackers throughout the day. Rest knew about the time constraints set up by the government. This shows that majority of the students are aware that no fireworks is best option for environment while only 16.5% of the students who did burn fireworks are aware about the two hour timeline set up by the government.

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12. Environmental change on the next day of Diwali.

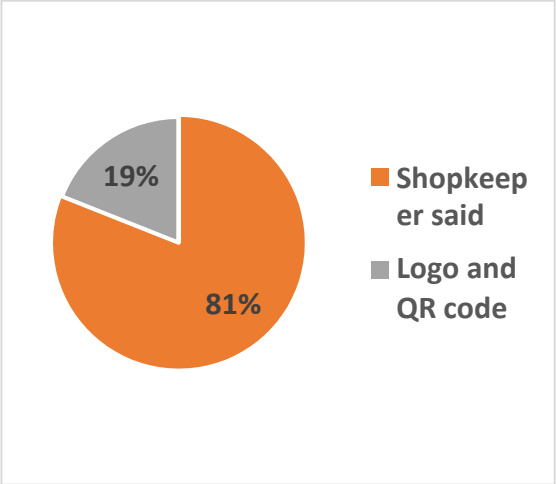

Figure 12. Pie chart representation of environmentalchange after Diwali.

On asking about if the students found any change on the next day of Diwali, 32.5% of the students said that they experienced increase in temperature. 35% said that the saw smog whereas 10.5% experienced no change at all. 24% gavemiscellaneous answers. It can be inferred from the above table that majority experienced rise in temperature and smog. Many of the students replied that they saw too much garbage next day of Diwali

13. **Identification of green firecrackers**.

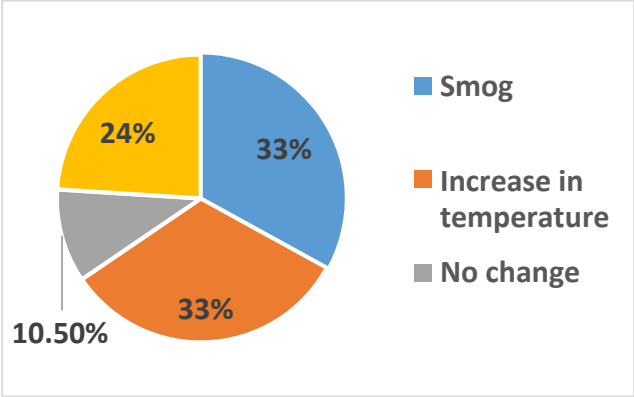

Figure 13. Percentage distribution of identification of green crackers.

Even though it is clear from the above data analysis thatmajority of the students are aware about the greencrackers, 81% of the students said that they believe a shopkeeper if he tells them that the fireworks they bought are green. 19% knew about the logo and QR code provided on the fireworks by CSIR-NEERI. This shows the lack of knowledge among the students regarding green fireworks.

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14. Sensitization workshop in schools.

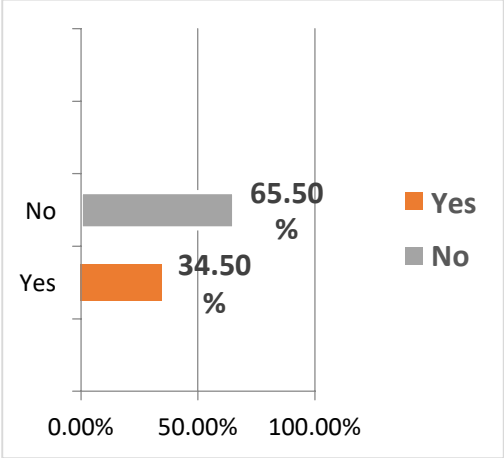

Figure 14. Bar representation of sensitization workshop in schools.

With only two options available, the students were divided upon asking them about any kind of sensitization workshop conducted by school on Diwali. 34.5% replied that workshop regarding eco-friendly celebration of Diwali had been done in their school whereas the 65.5% had no sensitization workshop at all. Even though the school taken in the study were eco schools, majority of the schools had not conducted any workshop prior to Diwali.

15. Different colours in firecrackers.

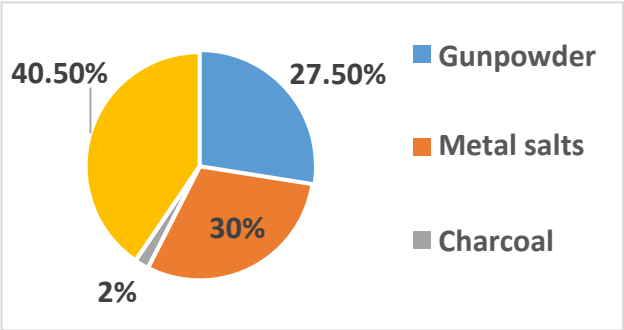

Figure 15. Pie chart representation of colours in fireworks.

It can be seen from the above data that 30% answered that the colour imparted from fireworks is due to metal salts. 40.5% accepted that they do not know what causes colours in fire crackers. 27.5% chose gun powder as the cause of colour in crackers. This shows that most of the students are not aware about how the colours are produced in
the fireworks. One third of them answered metal salts as the reason for different colour production in the burning.

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16. Health problems faced after Diwali.

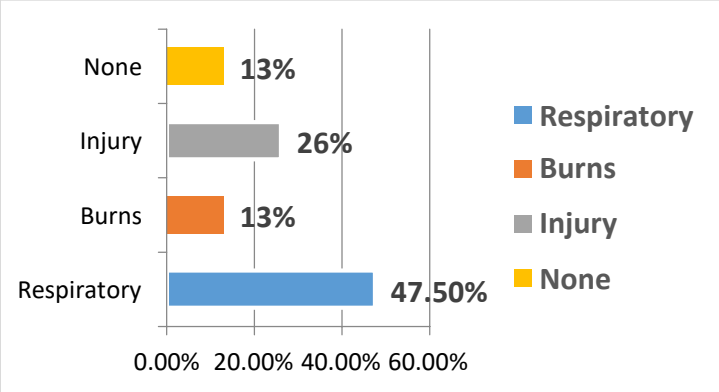

Figure 16. Bar chart representation of health problems faced after Diwali.

With 47.5% of students agreeing that the post Diwali they suffer from respiratory problems, it became the most chosen answer. Next with 26% was injury andthen with 13% was burns. 13.5% answeredthat they experienced no problem after Diwali. It shows that majority of the students experienced difficulty in breathing post Diwali. They believed that fireworks are the reason for this problem.

Conclusion

This study was conducted in various schools of Delhi that are under the Eco-club, an initiative of theGovernment of Environment to make the coming generation aware about the environment and how they can make it better. Green crackers are crackers that do not contain much harmful chemicals andreduce air pollution being eco-friendly. The findings of the present study conclude that majority of the senior secondary students from private schools are aware about the ban of firecrackers in Delhi as well as have knowledge about green crackers. Majority of the students are aware about the bad effects of conventional firecrackers on environment that results in pollution in Delhi. The study also revealed that most of the private school students have knowledge regarding green crackers whereas, majority of the government school students lack any kind of information about the new type of fireworks as there was not much information available on the green crackers and no awareness campaign was conducted by the government. Even though the schools taken up were in eco club, sensitization workshop or guidelines regarding eco-friendly crackers were not given in government schools.

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