Awareness About Various Newer Technologies Applied in The Field of Forensic Medicine and Forensic Odontology in India Among Health Care Workers and Medical Experts

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ABSTRACT

Background Crime rate has been reported to rise drastically from the year 2017-2019 according to police sources. Forensic odontology is a branch of forensic science which helps in investigating and identification of corpses found in natural disasters and homicide conditions.New developments on technology have made milestone achievements in various fields, likewise even in forensic medicine and forensic odontology the new developments have broken the lab controlled limitation by creating scientific measurements, improving efficacy of the judicial system.

Aim: This study aims to determine the awareness about newer technologies over the field of forensic science and odontology among healthcare workers and medical experts.

Materials and methods: A set of self evaluable questions were prepared, validated by the principal investigator and guide. The questionnaire was approved by the institutional review board, saveetha dental college, chennai. The questionnaire prepared was then circulated among the healthcare workers and medical experts in the south indian population. The response data was collected, documented and tabulated. The data was analysed using SPSS statistics and results obtained.

Results and discussion: The percentage distribution of the selected population based on the awareness questions asked were analysed and tabulated. The correlation between their years of practice and their awareness were studied. The statistics from previous studies were compared with the present study findings to enhance the quality of our findings.

Conclusion: There exists a significant level of awareness among the healthcare workers and medical experts. The participants with 0-5 years of practice showed maximum level of awareness and their associations were found to be statistically significant.(p<0.05). Many awareness camps should be held and conducted to increase the knowledge about the recent advances in technologies in the field of forensic sciences and odontology.

Keywords: Technology; awareness; forensic science; innovative technique; odontology; medical experts; healthcare workers; eco friendly.

INTRODUCTION

Crime rate has been reported to rise drastically from the year 2017-2019 according to police sources. Forensic odontology is a branch of forensic science which helps in investigating and identification of corpses found in natural disasters and homicide conditions(1). There are situations where there will be no structures left intact due to drastic trauma and injury, since a tooth is a strong calcified structure, it can withstand major trauma and helps in identification processes.(2). Forensic odontology serves as a new dimension of dental analysis. It plays a major role in forensics in identification of individuals, abuse and solving homicides. There are various specimens that can be collected based on idontology , it helps in age and sex determination based on the collected dental data, also helps in identification of corpse which has underwent major trauma. Bite marks analysis identifies abuses and helps us provide mental care. Facial reconstructions help reinvent facial morphology and help individual identification.(3). There exist contemporary practices in forensic odontology where dental record management plays an important role in identification by comparing the antemortem and postmortem dental records. Ther are various methods for sex determination based on tooth size, dental

radiographs etc. and age estimation based on incremental lines and translucency rate , etc.(3,4)). These processes help us Understand the importance of forensic odontology and medicine in today's world.

New developments on technology have made milestone achievements in various fields, likewise even in forensic medicine and forensic odontology the new developments have broken the lab controlled limitation by creating scientific measurements, improving the efficacy of the judicial system. Finding new technology , checking its efficiency and significance may help improve this field(5)). Various researches have been done to study the impact of new technologies developed in different branches of forensic science. There are improvements in technology of toxicology , primarily GC- ion trap MS and LC-MS technologies, forensic imaging used in post-mortem examination and DNA technology. These have created an impact in the new post-mortem era.(6). New technologies in fingerprinting techniques, forensic DNA analysis, alternative light photography, 3D face reconstruction, ballistics etc. helps to investigate crime and do justice in less time. With these newer advancements there is major scope to analyse and investigate in crime situations.(7).Our team has extensive knowledge and research experience that has translate into high quality publications (8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26),(27)

Understanding the importance of forensic medicine and odontology, the role of healthcare workers and medical experts in this field and the new technologies developed, this study aims to study the awareness about the newer technologies developed in the field of forensic medicine and odontology among the medical experts and health care-workers in India.

MATERIALS AND METHODS

The present study was conducted in 2021 over an online setting among the south indian

population - medical experts and health care workers. The study design was cross sectional questionnaire study. It was approved by the institutional review board of saveetha dental college. It majorly involves 100 active participants of the selected south indian population. A well structured questionnaire consisting of a set of self evaluation questions were prepared to be surveyed among participants. The questionnaire comprises 10 close ended questions. The questions validity checking was done by the faculty members of the institution. The data was uploaded and collected from the survey planet software used. The data manipulated in the survey planet link was analysed and cleaned up to an excel sheet. The method of representation of results are pie charts and bar graphs.

RESULTS

In the present study, the awareness about newer technologies in forensic odontology among health care workers and medical experts were analysed by circulating questionnaires, data collected, documented, analysed using SPSS statistics and results acquired. In this study, the population consists of 53% of females while the remaining 47% were males. Among the participants, 62% of the population has 0-5 years of practice, 24% of the population has 5-10years of practice while the remaining 14% of the population has 10-15 years of practice in the field of medical experts and healthcare workers. Almost the entire study population was aware, 95% of the participants were sure while 5% of them were vaguely sure about the important role of medical experts and healthcare workers in forensic science and odontology. Majority of 88% of the population were aware while the remaining 12% were unaware about the major role of dentists in forensic medicine. Nearly the entire population, 95% of the participants were aware that forensic not only deals with individual identifications but also with mental health and abuses.

About 53% of the population were sure , 33% of the population vaguely believed in new technologies in forensic odontology and sciences while the remaining 14% of them thought it to be unnecessary. About 46% of the population were sure while the remaining 54% of the population vaguely believed that technologies have greater positive effects in improving the field of forensic sciences despite their disadvantages and ill effects. Majority of 89% of the population are aware while 11% of the population are unaware that the new technologies and improvements in technologies in the field of forensic sciences and odontology have gradually reduced the crime rate in recent times. In the present study, about 75% of the population were aware of the different windows software recently developed which helps solving cases in forensic sciences. About 84% of the population were aware while the remaining 25% of the population were unaware of the new technology-DAVID (disaster and victim identification) in mass disaster management. Majority of 78% of the population are aware of ADIS (automated dental identification system) which improves efficiency and ease of work while the remaining 22% of them are unaware of it. About 57% of the population were aware of the latest Windows WinID3 with its salient features- multilingual, adobe shop, etc. while the remaining 43% of the population were not aware of it.

The awareness about the newer technologies in the field of forensic science and odontology was studied correlating with the years of practice in their field of the participants using chi square analysis. In the present study, about 62% of the 0-5 years of practice were aware of their role in forensic science and odontology among healthcare practitioners and medical experts. Participants with 0-5 years of practice showed maximum

awareness which was found to be statistically significant. Majority of 61% of the participants with 0-5 years of practice followed by 14% of 5-10 years of practice were found to be aware of the role of dentists in forensic odontology. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. About 62% of the participants with 0-5 years of practice had maximum awareness about the forensics dealing with mental health cases along with the unknown individual identification. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. The participants with 0-5 years of practice had believed that new technologies improved the efficiency of forensic sciences and odontology. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. Nearly 41% of the participants with 0-5 years of practice thought that new technologies have greater positive effects despite their disadvantages. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant.

In the present study, about 51% of the participants with 0-5 years of practice were aware about the reduction in crime rates due to the recent advances in technology related to forensic sciences and odomtology. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. Majority of 51% of the participants with 0-5 years of practice were aware of the different windows software available for disaster victim identification. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. About 62% of the participants with 0-5 years of practice were aware of the new technology- DAVID used in mass disaster management. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. Majority of 53% of the participants with 0-5 years of practice were aware of the technology- ADIS which improves the field of forensic sciences and odontology. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant. About 52% of the participants were aware of winID3- new windows software developed along with the salient features. Participants with 0-5 years of practice showed maximum awareness which was found to be statistically significant.

On analysing the correlation graphs and results, the participants with 0-5 years of practice in their respective field showed maximum awareness comparing the other participants of the study population.
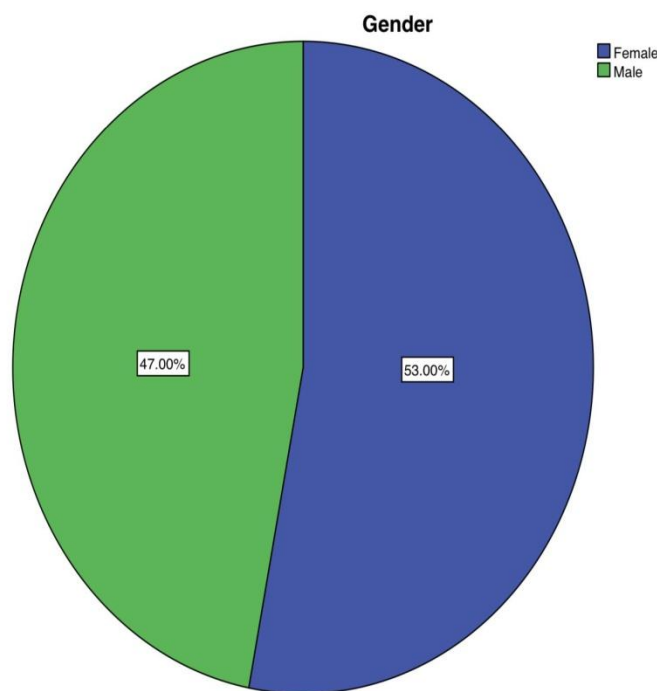

Figure 1- pie chart representing the percentage distribution of the population based on gender. About 53% of the population were females (blue) while the remaining 47% of the population were males(green).
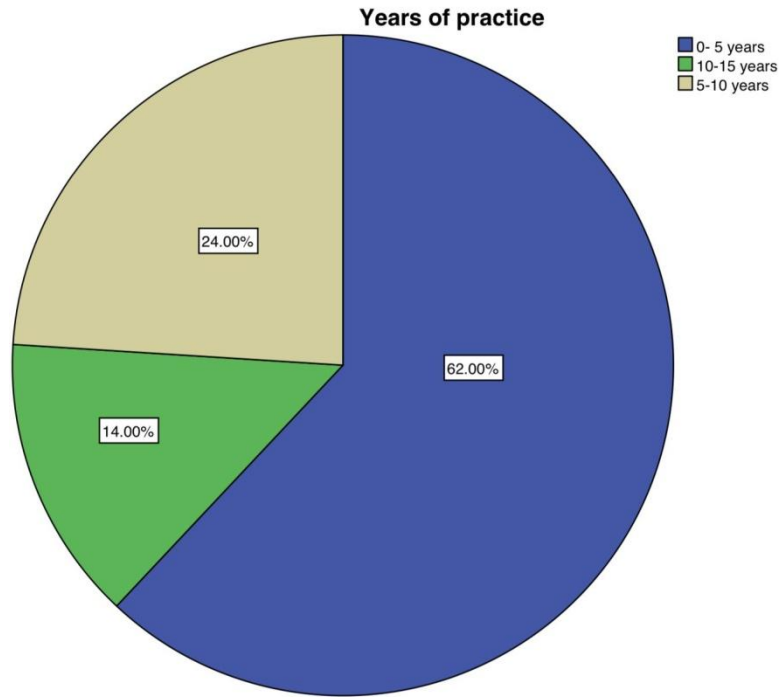
Years of practice

Figure 2- pie chart representing the percentage distribution of the population based on their years of practice in the field of healthcare workers and medical expertise. Majority of 62% of the population had 0-5 years(blue), 24% of the population had 5-10 years(yellow) while the remaining 14% of them had 10-15 years of practice(green) in the field of healthcare workers and medical expertise.
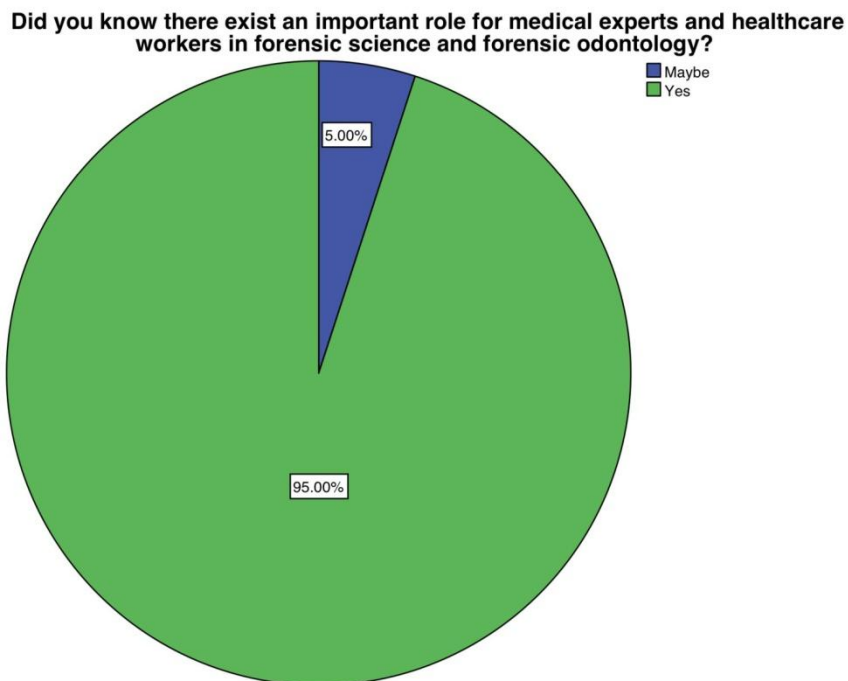
Did you know there exist an important role for medical experts and healthcare workers in forensic science and forensic odontology?

Figure 3- pie chart representing the percentage distribution of the population based on their response about the importance of medicinal experts and healthcare workers in forensic science and odontology. About 95% were sure(green), 5% of them were vaguely sure(blue) about their role in forensic sciences and odontology.
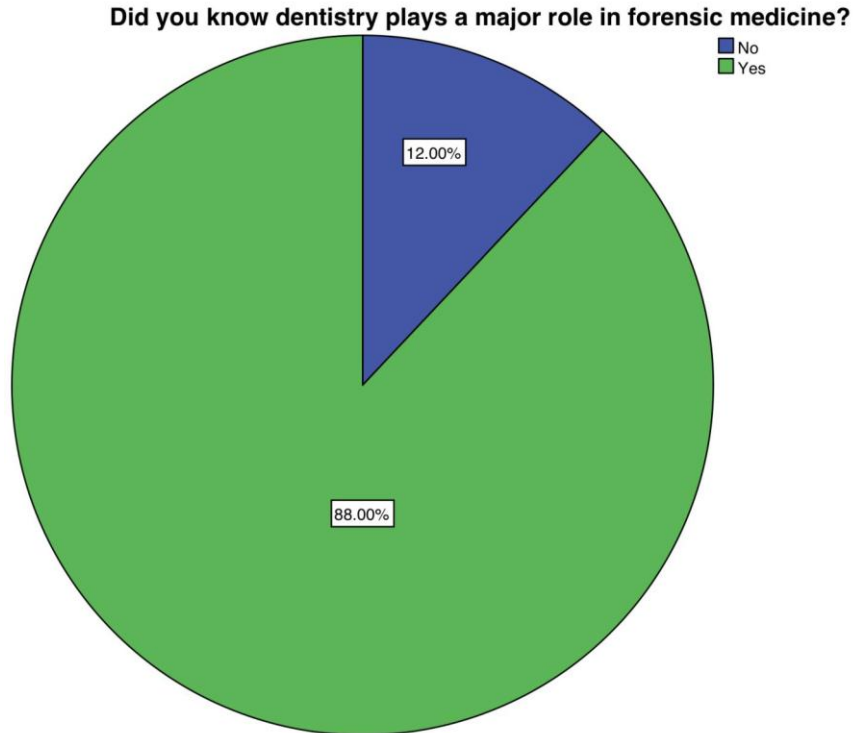
Figure 4- pie chart representing the percentage distribution of the population based on their awareness about the role of dentists in forensic sciences. About 88% of the population are aware(green), 12% of the population were not aware(blue).
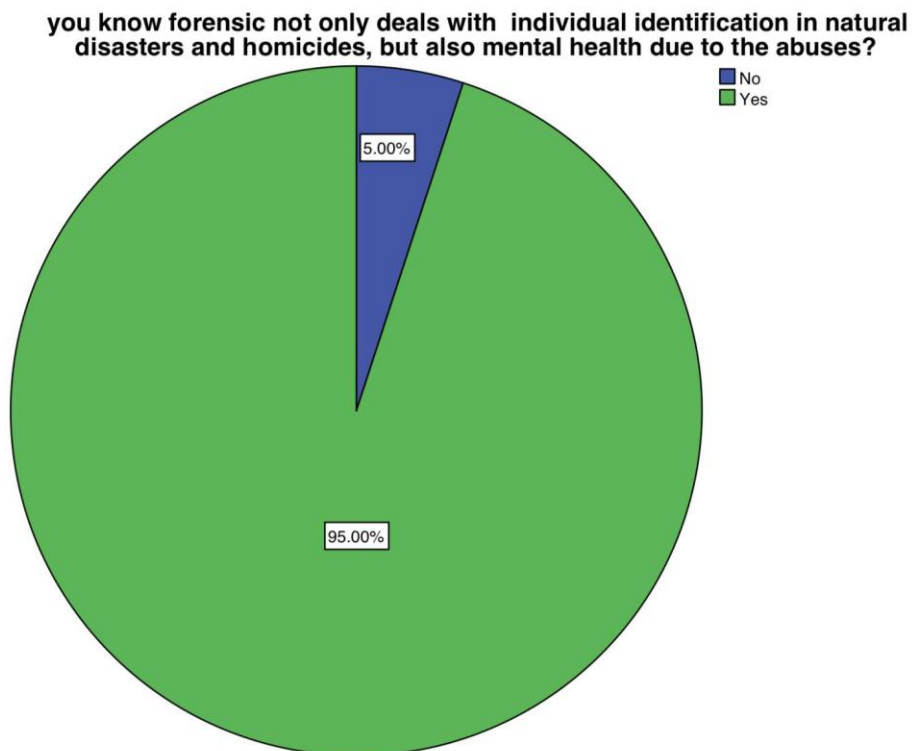

Figure 5- pie chart representing the percentage distribution of the population based on their awareness about the role of forensic sciences in mental health(abuses) along with individuals identification in natural disasters and homicides. About 95% were aware(green) while the remaining 5% were unaware(blue).
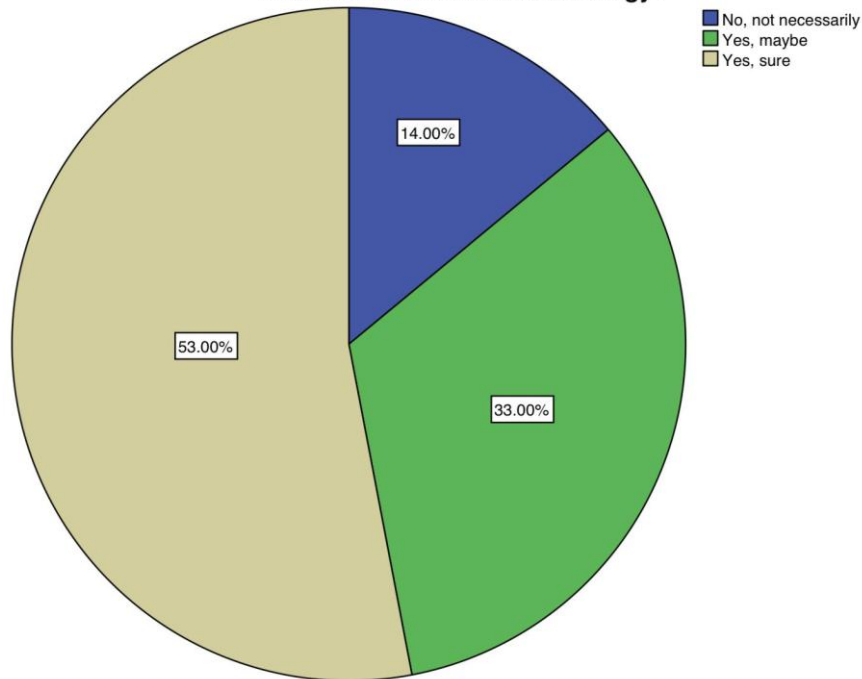
Figure 6- pie chart representing the percentage distribution of the population based on their response about improvement in efficacy of forensic sciences by advances in technologies. About 53% of the population were sure(yellow), 33% of the population vaguely (green) believed in technologies improving the efficacy of forensic sciences.
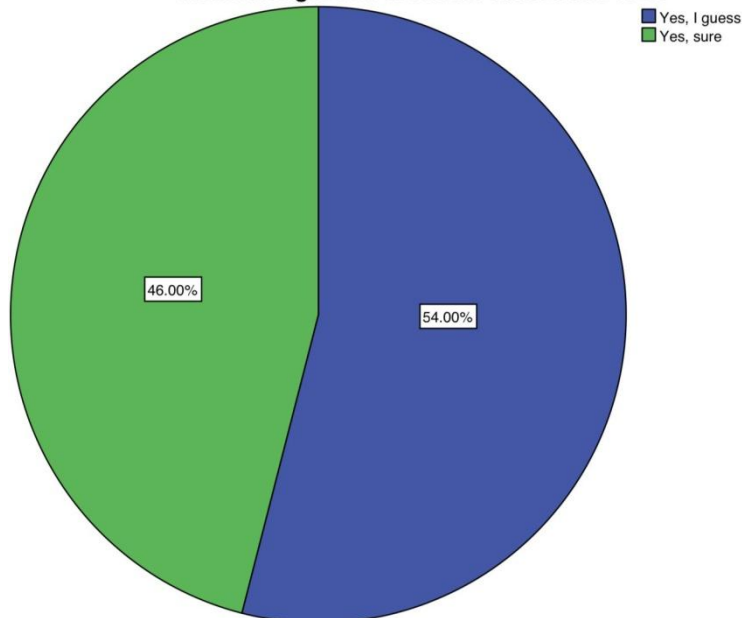

Figure 7- pie chart representing the percentage distribution of the population based on their belief about technologies having greater positive effects despite the disadvantages in forensic sciences. About 46% of the population were sure,(green) 54% of the population vaguely(blue) believed that technologies have greater benefits than their disadvantages.
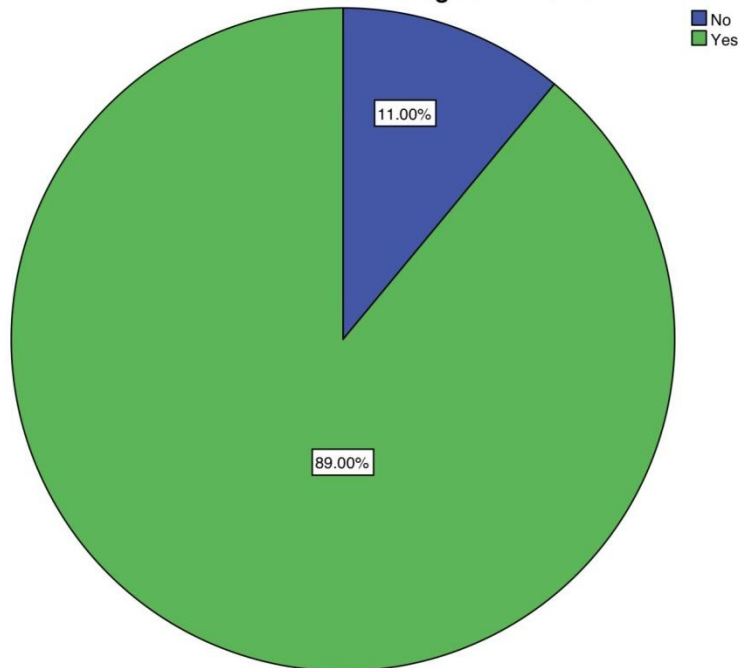
Figure 8- pie chart representing the percentage distribution of the population based on their awareness about reducing crime rate due to the advances in forensic science technologies. About 89% of the population were aware(green) while the remaining 11% of the population were not aware(blue).
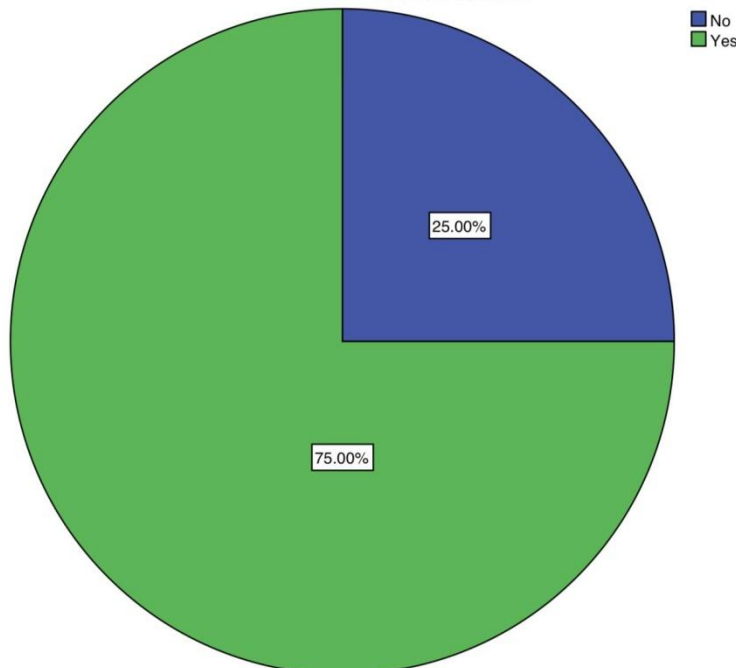

Figure 9- pie chart representing the percentage distribution of the population based on their awareness on different windows software newly developed in individual identification. About 75% of the population were aware(green) while the remaining 25% of the population were not aware(blue) of the new windows software.

Are you aware of the new technology- DAVID(disaster and victim identification) used in high scale victim identification during natural calamities and mass disaster management?
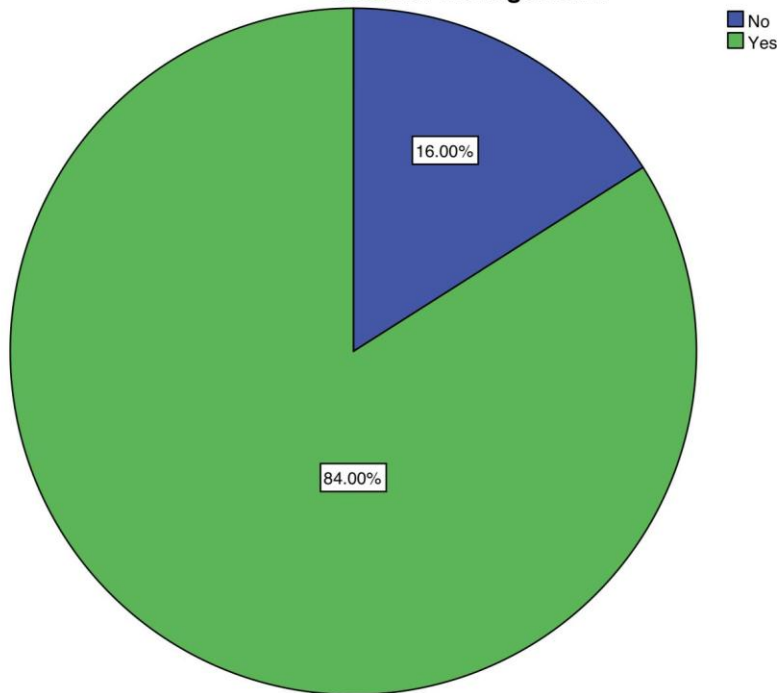
No
Yes

16.00%

84.00%

Figure 10- pie chart representing the percentage distribution of population based on awareness about DAVID used in high scale mass disaster management. About 84% of the population were aware(green), 16% of the population were not aware(blue).

Are you aware of ADIS(automated dental identification system) which eases individual identification, improves efficacy and reduce work time?
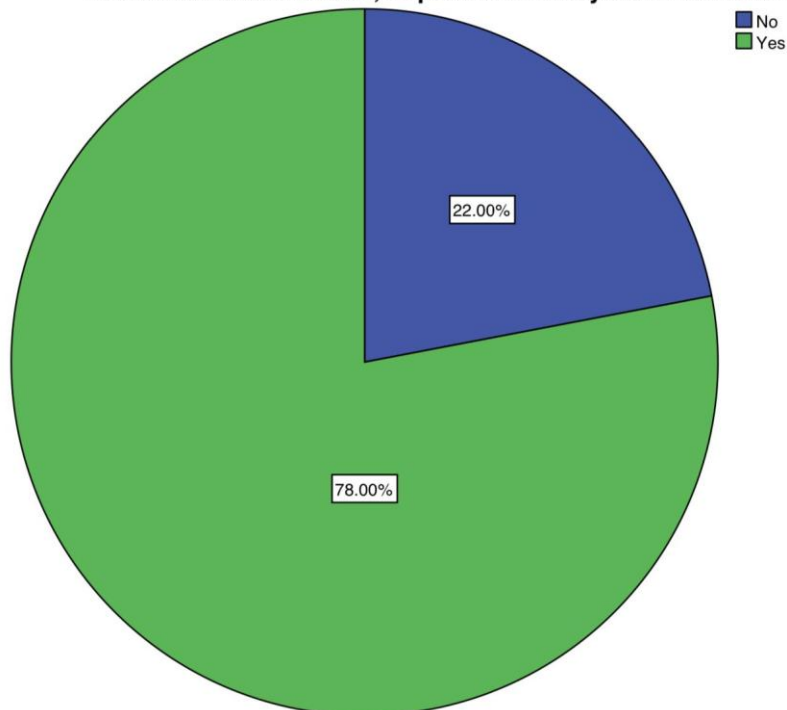
No
Yes

22.00%

78.00%

Figure 11- pie chart representing the percentage distribution of the population based on their awareness about ADIS(automated dental identification system) in forensic sciences technology. About 78% of the population were aware(green) while the remaining 22% of the population were not aware(blue).

Are you aware of the latest windows software WinID3 with various features-multilingual, DEXIS, adobe shop, etc.?
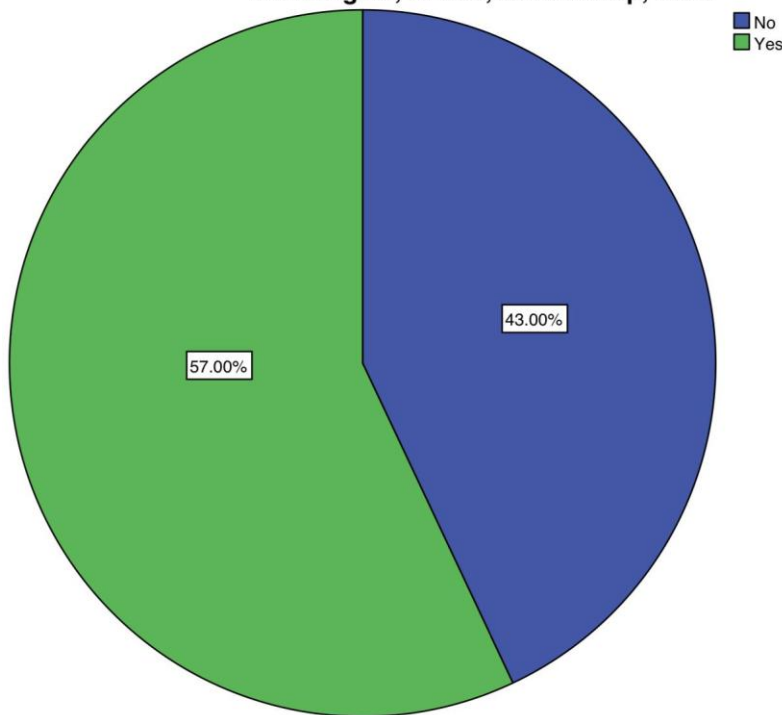
Figure 12- pie chart representing the percentage distribution of the population based on awareness about winID3 latest windows software in forensic technology. About 57% of the population were aware(green) while the remaining 43% of the population were not aware(blue).

Figure 13- bar graph representing the association between years of practice of the participants and their belief about technologies having positive effects despite their disadvantages in the field of forensic sciences.X axis represents the years of practice of the participants. Y axis represents the number of responses by the respondents in which they booted yes sure(green),yes i guess(blue). The association was found to be statistically significant, p value= ,0.0 (p<0.05).

Figure 14- bar graph showing the association between the years of practice of the participants and their awareness about reduction in crime rates due to the advances in forensic sciences and odontology. X axis represents the years of practice of the participants. Y axis represents the number of responses by the respondents in which they opted yes(green),no(blue). The association was found to be statistically significant, p value= 0.023, (p<0.05).
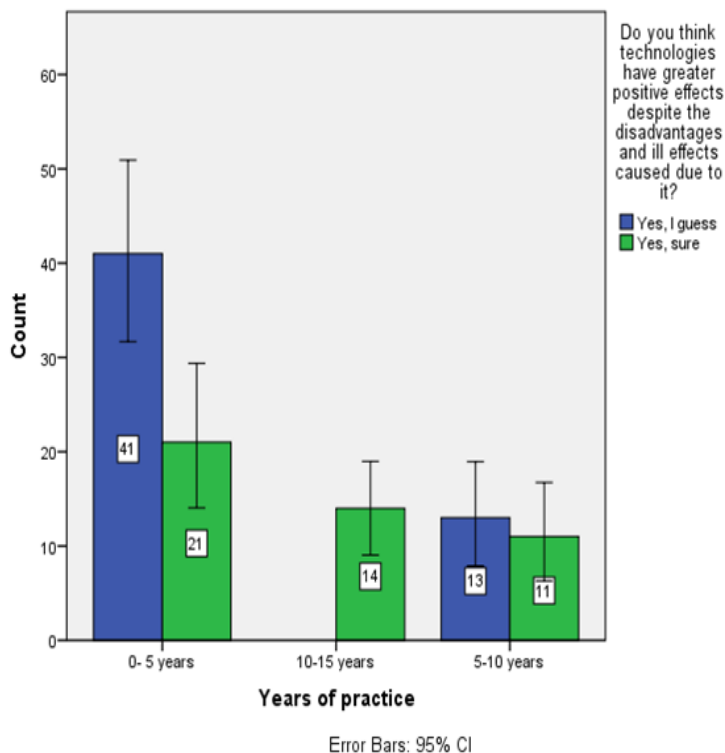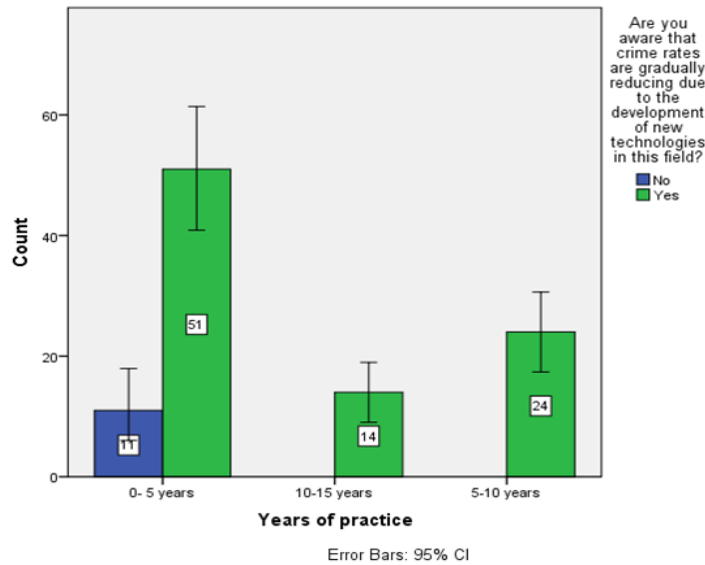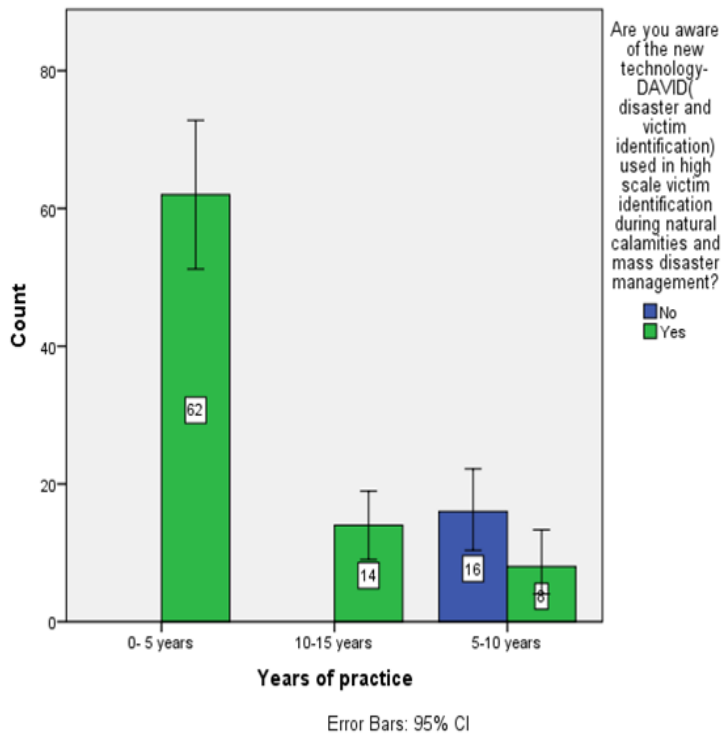

Figure 15- bar graph representing the association between years of practice of the participants and their awareness about new technology- DAVID which helps in mass scale individual identification. X axis represents the years of practice of the participants. Y axis represents the number of responses by the respondents in which they opted yes(green), no(blue). The association was found to be statistically significant, p value= 0.0, (p<0.05).

DISCUSSION

In the present study, the participants(53% females; 47% males) where 62% of the population had 0-5 years, 24% of the population had 5-10, 14% of the population had 10-15 years of practice in the field of healthcare and medicine. Their awareness about newer technologies in the field of forensic science and odontology was studied by collecting the response data via google forms. The data was then tabulated and analysed. Majority of the

study population were aware of their role and a dentist's role in the field of forensic sciences and odontology. They were also aware about the mental health issues(abuses) handled by the forensic sciences along with the individual identification in mass disasters. There was a large percent of the population believing in the newer technologies improving the efficacy of forensic science and having positive effects despite their disadvantages. Almost the entire population was aware of the reduction in crime rates gradually due to the newer technologies developed in the field of forensics. Majority of the population were aware about the new technologies- windows software, winID3, DAVID, ADIS in forensic science and odontology which helps ease the process, increase efficiency and reduce the time taken. These analytical results help us understand their level of awareness in this field. These results show that there exists a significant level of awareness about the newer technologies in the field of forensic sciences and odontology. The association between the years of practice and their awareness were correlated using chi square analysis. The participants with 0-5 years of practice from the study population showed maximum level of awareness about the newer technologies in the field of forensic science and odontology among healthcare workers and medical experts.

There are various survey questionnaires conducted and studies done to determine the importance of forensic science among different field workers, the knowledge about the role of dentists and their importance in forensic science and odontology. In the present study, the majority (95%) of the population were aware of their role in forensic science. Previously, a study was done focusing the awareness about forensic odontology among medical practitioners and it was found that practitioners with more than 15years of practice had maximum knowledge about forensic odontology and forensic sciences.(28). In the present study, about 88% of the population was aware of the dentist's role in forensic medicine. Previously, about only 17% of the population were not aware of the significance of maintaining dental records and evidence in solving crime situations and individual identification.(29) 95% of the population were aware of the teeth being an important source of DNA in forensics)(30). These statistics from previous studies support the findings of this present study enhancing its value. In the present study, about 95% of the participants were aware of the mental,physical abuse cases involved in forensics. Previously, about 61% of the population were not aware of child abuse cases and steps to be taken(31),about 47% of the population were aware of the physical abuse aids but only 34% of them were of the mental neglects, sexual abuse cases aids in the field of forensics opposing this finding. In this present study, about the majority of the population were aware of the new technologies in the field of forensics- windows software(75%) , DAVID(84%), ADIS(78%), winID3(57%). Previously, on studying the knowledge about new technologies it was found that it was more prevalent in medical practitioners with less years of practice and young in the field. (akhila et al,).

There are various studies focusing on the knowledge, attitude and practice of the importance of forensic odontology, their role in this field and their awareness towards it. The knowledge and attitude towards forensic odontology was studied among practicing dentists and it was found that there was adequate knowledge but less actions and steps taken in this field and a large set of variations seen in the practices in these cases among the dentists.(32). A cross sectional study was done among dentists about forensic odontology as a major tool to mass victim identification and it was found that more awareness needs to be provided about their importance and knowledge regarding this field.)(33). These previous studies enhance the need to increase the awareness level about forensic science, forensic odontology, their importance , technologies developed and their impact and practice done in their respective cases and scenarios.

The present study holds certain limitations with limited sample size with participants included in a random sampling method, from a homogenous population, restricted to a specific geographic location. More inclusion and exclusion criteria should be included to increase the quality of the study. In future studies, the awareness along with knowledge, practice and attitude of the dental, general practitioners should be focused with a large sample size and spread awareness about the same.

CONCLUSION

There exists a significant level of awareness about the importance of forensic sciences and odontology, their importance and technologies. The maximum level of awareness was found to be among the participants with 0-5 years of practice among the study population on analysing correlation between the level of awareness and the years of practice of the individuals . Future awareness camps and workshops need to be conducted to keep updating the new advances technologically and their implementation in daily practice knowing their importance.

- Saveetha Institute of Medical and Technical Sciences
- Sarkav Health Services.

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