Original Article

Shedding Light on Forensic Science: Public Awareness and Understanding

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Abstract

Forensic science is the application of scientific disciplines that are directed to the recognition, identification, individualization, and evaluation of physical evidence by applying the principles, technology, and methods of natural sciences for the administration of criminal justice or to serve the law. Improved forensic investigation techniques rely heavily on raising public awareness of forensic science. This study aims to analyze the level of awareness among the community's various age groups by examining their knowledge and perception of forensic science. A survey-based study was conducted over 400 adults of different age groups ranging from 18 to 45 years or above, different professions, and genders. The survey questionnaire was made up in digital format using Google form tool, the questionnaire was designed into two sets of easy and moderate questions to ensure that participants of all age groups could effectively engage and contribute their insights. The study concluded that 92% of participants knew forensic science. The study, comprised of individuals aged 18 years or above, observed that those aged 18 to 30 responded more enthusiastically and efficiently to the survey than those aged 30 and above. Younger participants had more participation and efficiency in their responses. Additionally, sex had no impact on public awareness. However, substantial differences have been observed among age and profession. According to the survey, younger and employed people are more aware of forensic science. Nevertheless, it is too soon to make accurate predictions about awareness, knowledge, and engagement rates, as thorough nationwide surveys have yet to be undertaken. The preliminary research gives initial insights, but substantial data gathering is required to draw more definitive conclusions about public awareness and engagement levels. Launching awareness campaigns about the relevance of forensic Science is critical for creating a more informed community, lowering fears, and addressing knowledge gaps, ultimately helping the discipline and encouraging future participation.

Keywords: Awareness, Forensic Science, Justice system, Evidence

Introduction

Forensic science is a fascinating field that has received widespread attention in popular culture, ranging from television shows like CSI to best-selling crime novels. However, behind the flashy depictions is a complex and important discipline

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that plays a critical part in the criminal justice system. In recent years, there has been an increasing appreciation for the necessity of raising public awareness and comprehension of forensic science. This is not only for amusement or intrigue; it has far-reaching ramifications for the administration of justice, the preservation of individual rights, and the progress of scientific accuracy.[1] Forensic science is a wide range of scientific disciplines utilized for legal issues. From DNA analysis to ballistics, digital forensics to toxicology, it involves employing scientific concepts, techniques, and procedures to investigate crimes, identify criminals, and exonerate the innocent.[2][1] Despite its importance, forensic science is still a vaguely understood and frequently misrepresented topic in the eyes of the general public. One of the biggest causes of forensic science fallacies is the media's sensationalized presentation of the subject. Television shows and movies more often portray forensic professionals as invincible superheroes capable of solving difficult cases in a couple of hours. While these dramatizations provide engaging entertainment, they do little to effectively depict the complexities and limitations of real-world forensic investigation.[3]

Furthermore, a lack of public understanding of forensic science has major implications for the criminal justice system. Media coverage complicates the understanding of forensic science, as laypeople and media professionals with limited scientific knowledge often misinterpret evidence presented in court. Without a solid grasp of forensic methods, they struggle to assess the reliability and relevance of findings. This misunderstanding can mislead public perception and compromise the integrity of the justice process, risking unfair outcomes.[1] Another important feature of public knowledge of forensic science is its role in encouraging confidence and accountability in the criminal justice system. In recent years, famous cases in which forensic evidence was discovered to be wrong or forensic practitioners participated in misconduct have eroded the public's belief in the integrity of forensic science.[5] Building transparency and knowledge of the procedures and practices used in forensic investigations is critical for restoring trust and safeguarding the integrity of criminal proceedings.[6]

Another reason for increasing awareness is to encourage young people to consider forensic science as a viable career option. With greater visibility of the field's diverse applications and its crucial role in the justice system, more students may be inspired to pursue careers in forensic science, recognizing its potential for meaningful and impactful work. Enhanced awareness can also lead to increased enrollment in forensic science programs, fostering a new generation of skilled professionals who are passionate about contributing to the legal and investigative processes.[7] In recent years, attempts to raise public awareness and comprehension of forensic science have gained traction. Educational activities, such as forensic science classes in schools and public outreach programs, are intended to explain the profession and foster scientific literacy.[8] Furthermore, advances in communication technology have made forensic science information more accessible, allowing specialists to interact directly with the public via social media, podcasts, and other digital platforms.[9]

Despite these advances, there is still more work to be done in bridging the gap between forensic science and the general population. Continued investment in educational outreach, collaboration between forensic practitioners and communication professionals, and a dedication to transparency and accountability are critical for fostering a more educated and involved public.[10]

Methodology

Participants: The active participants residing in Uttar Pradesh represented a diverse range of age groups, educational backgrounds, and professions. Demographic information, including gender, age, occupation, and educational level, was collected through a Google Form.

Survey Instrument: The research employed a questionnaire created in English using the Simple Binary Questionnaire Model, designed for easy understanding and response. This digital questionnaire was developed using Google Forms and included 23 questions. These questions were crafted to evaluate participants' knowledge, awareness, and perceptions of forensic science and its advancements, covering various aspects of the field, including its application in criminal investigations.

Data Collection: The digital questionnaire was distributed through various social media platforms, accompanied by a clear explanation of the study's aim, objectives, and significance. This approach ensured the inclusion of a diverse range of participants from different age groups, educational backgrounds, and professions.

Data Analysis: The responses were collected and analyzed to evaluate the awareness and knowledge levels regarding forensic science among the Indian population. The data provided insights into the participants' understanding of forensic science and its role in the justice system.

Results

"During a 1-month internship, a Google form survey was disseminated, yielding responses from 400 active participants. This sample size was calculated to ensure a confidence level of 95% and a margin of error of 4.80 % for the target population. The data collected is statistically robust, providing sufficient power for subsequent inferential analyses and ensuring reliable generalizations within the context of the study." while the information about the residence of people surveyed is anonymous, we received a reasonable amount of data from various places to carry out our research. The individuals involved in this research were of varied genders and various age groups ranging from 18- 45 years and above. The data obtained had men comprising 44% and females 55.5% and 0.5% individuals who prefer not to say about their gender. Regarding their age, the majority of the participants were in their 18-25 year age group that was 69% followed by 19% in the age group between 25-35, and the least number of individuals were from the 35-45 age group with 4.5%(8) in rate, and the second least recorded results were from above 45 age group of individuals with 7.5% rate. While dealing with profession majority were from graduate and postgraduate individuals with 40% and 34% rates respectively, whereas 15.5% of participants were from higher secondary education (12^{th}) and 10.3% of participants were from other professions like employed, unemployed, businessmen, etc. Table 1 represents the participant's detailed characteristics.

Table 1. The participants' detailed demographic data

Characteristics	Participants characteristics	%
Sex	Male	176 (44%)
	Female	222 (55.5)
	Prefer not to say	2 (0.5%)
Age	18-25	276 (69%)
	25-35	76 (19%)
	35-45	18 (4.5%)
	45 above	30 (7.5%)
Profession	Higher secondary education (12^{th})	62 (15.5%)
	Graduate	160 (40%)
	Postgraduate	136 (34%)
	Other (employed, unemployed, etc.)	42 (10.5%)

Table 2 Simple Binary Questionnaire Model for Ease-of-Understanding Questions and its Response.

Questionnaire responses	Yes	No	Maybe
Are you aware of forensic science?	91.4%	8.65	-
Do you think forensic science is accurately portrayed in TV shows & movies?	24.7%	31.1%	44.2%
Are you aware of forensic science and its application in the court of law?	61.7%	17.9%	20.4%
Do you think forensic science can provide justice in the court of law?	85.9%	2.5%	11.6%
Do you think increased awareness of forensic science could benefit society?	91.9%	1.8%	6.3%

Continue.....

Are you aware of any recent advancements in forensic science?	38.5%	50.4%	11.1%
Do you think technological advancement will positively impact the future of forensic science?	87.1%	2.3%	10.6%
Are you aware of the forensic science institutes and the courses under them?	46.8%	36.9%	16.3%
Are you aware of the state and central forensic labs?	44.4%	42.6%	12.9%
Do you think the used techniques for forensic science examination are accurate?	53.6%	7.7%	38.8%
Do you think the results of the forensic examination are reliable?	71.9%	4.3%	23.7%
Do you think the chain of custody is important in forensic evidence?	65%	5.7%	29.3%
Forensic science is a combination of multi-disciplinary branches, do you agree?	76.6%	4.4%	19%
Do you think forensic science will be helpful to the public in solving Cybercrime at present?	67.9%	14.4%	17.7%
Do you think the Government runs a campaign to spread awareness about forensic science?	51.2%	27.4%	21.4%
Do you think that the government should run a campaign to spread awareness about forensic science and its role in the judicial system?	89.2%	2.1%	8.7%

Studies show that the source of knowing about forensic science, 22.9% of the participants got to know from TV, 19.8% of them learned about forensic science from social media, 32.7% of them knew about forensic science from the internet and 24.6% of them knew about forensic science from other offline sources like science magazines, newspaper, etc.

This study revealed that 92.7% of participants know about the definition of forensic science and marked "the application of science to criminal and civil law" as an option, while 3.5% of the participants marked "study of plant" as an option, whereas 1.5% and 2.3% of participants marked "study of animal" and "study of bones" as an option respectively.

Most of the participants believed that improving public understanding of the criminal justice system, promoting trust in the accuracy and reliability of forensic evidence, by empowering individuals to make informed decisions about their rights and responsibilities could help benefit society,77.4% marked all of the above as an option while 22.6%came up with their particular solutions.

The study revealed that most of the participants were aware of the types of evidence analysed in forensic investigation, 81.4% marked all of the above as an option while 18.6% came up with their particular solutions (hair & fiber, handwriting analysis, soil samples).

Participants were also aware of the personnel involved in the investigation of the crime scene 80.9% marked forensic scientist as their answer, while 14.2% marked police, 2.5% marked doctor as an option, and 2.3% participants believed that they were someone else, and marked other as an option.

The observation of research revealed that participants are aware of the contribution of forensic

science in criminal investigation, majority of the participants 63.7% marked "by conducting laboratory analysis of evidence" as an option, while 10.2% believed that forensic science contributes to criminal investigation by solving crime by using intuition, 23% of the participants marked "by providing evidence-based conclusion" and 3.1% think by relying solely on witness testimony contribute in criminal investigation.

The majority of the participants know about the role of forensic scientists in criminal trials, 81.1% of the participants marked "to provide expert testimony based on forensic evidence", while 4.6% believed acting as a judge is the role of forensic scientists in criminal trials, 6.8% believed that they represent the defendant in the court, whereas 7.7% marked none of the above as the answer.

Mostly majority of the participants who were aware of forensic science were the individuals from age group of 18-35, whereas those 45 years or above were less willing to respond still according to the successful responses by this age group we came to know that they were aware, but not that much about the forensic science and the age group of 35-45 was least in number in results as they were not much aware or were not willing to give the responses, in India there is great need of awareness campaigns and programs that should target the specific age group for the awareness among them.

Discussion

In 2019, Bell S. et al. found that public awareness of forensic science was often shaped by media portrayals, leading to misconceptions about its capabilities. Many believed forensic techniques to be infallible and instantaneous. In reality, forensic science has limitations, such as human error, contamination, and time constraints, which the public often overlooks, creating a gap between perception and practice.[11] In a 2021 study, Brewer PR et al. explored how media portrayals impact public perception of forensic science. They found that TV shows, movies, and news reports significantly shape public expectations, often leading to misconceptions. These portrayals tend to oversimplify forensic procedures and exaggerate their accuracy, contributing to unrealistic beliefs about the capabilities and limitations of forensic science.[12]In 2021, Rousseau L. et al. conducted a study exploring educational interventions aimed at improving public understanding of forensic science. They found that various strategies, such as hands-on workshops and media campaigns, effectively enhanced knowledge while dispelling common myths. Notably, specific programs integrating real-world forensic case studies demonstrated the most success in increasing public awareness and correcting misconceptions.[13] In a 2021 study, Edmond G. et al. examined how misconceptions about forensic science impact the legal system. They found that misinterpretations of forensic evidence can lead to biased judicial outcomes, undermining fairness in trials. Overestimating forensic evidence may result in wrongful convictions, while misinterpretation can cast doubt on valid findings, ultimately distorting the pursuit of justice.[14] In a 2019 study, Canela C. et al. highlighted key challenges forensic professionals face when explaining complex scientific concepts to the public and legal professionals. These obstacles include technical jargon, differing levels of understanding, and the oversimplification of findings. To improve, forensic experts can adopt clearer language, use visual aids, and seek interdisciplinary collaboration to bridge communication gaps effectively.[15] In 2023, Chin JM et al. emphasized the critical role of transparency in fostering public trust in forensic science. They argued that openly communicating forensic methods, limitations, and uncertainties is essential for maintaining confidence in forensic evidence. Best practices for ensuring this transparency include clear documentation, rigorous peer review, and public accessibility to forensic reports. By acknowledging uncertainties and potential errors, forensic experts can build a more informed and trusting relationship with the legal system and the public, ultimately improving the credibility of forensic science.[16]

Conclusion

The objective of this research was to assess the comprehension and awareness of forensic science among the Indian population. Although younger, more educated people had a greater awareness of forensic science, there is an urgent need to improve the general public's understanding of legal regulation, basic used technology, and advancements in forensic science. To raise public awareness, this study makes

a few recommendations, including increasing the availability of forensic science in universities, some specialized education programs at schools, improved media participation, and well-organized visits to specific forensic laboratories. However, this survey had various limitations, such as low participation from elderly persons because the questionnaire was in digital form and they might not have been able to grasp it effectively, and because the form was sent to over 800 individuals, only 400 replies were received. Since it is too early for predictions of the amount of awareness and participation rates, nationwide surveys must be conducted. To summarize, massive efforts to raise public knowledge of forensic science in the Indian community are crucial.

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IEC Approval: This research does not involve any human participants, human biological samples, or identifiable personal data. Consequently, this study does not require approval from the Institutional Ethics Committee (IEC). All work has been conducted by relevant guidelines and regulations governing non-human studies.

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