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Ethical Reflections on Respect of the Body in Forensic Identification Practice

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Working with the dead is a very specific kind of work. In the biomedical context, the dead human body is an invaluable resource for research and teaching. In many, if not most, countries worldwide, medical and dental students learn anatomy by dissecting a human body, and questions of ethics have become a focus of attention in many of them. The autopsy is another time when medical and dental students face with a dead body, in diagnosing the cause of death and in personal identification procedures. Not everyone maintains that the rights of the personality also apply to the dead, some argue that the human corpse is a thing in the legal sense. The question is if and how you can harm a dead person. Especially in mass disasters, forensic pathologists and odontologists are mostly faced with remains that barely retain the appearance of a human body. These tragic events are aggravated by the need to act quickly in search of identities and trapped in repetitive and highly technical gestures, which risk canceling the emotional component. A dignified handling of corpses should be central in the daily practice of forensic medicine. This presentation intends to guide forensic staff toward thinking about the ethical dimension of human corpses in spite of their regular confrontation with the dead. A review of the literature is undertaken in an attempt to emphasize the respect for the dead during identification practice, both in the

context of medical training and in the conduct of professional activity.

Key Words: *Autopsy, ethics for the dead, human dignity, personal identification, respect for the dead*

Cone-Beam Computed Tomography-Based Dental Age Estimation: A Systematic Review and Meta-Analysis

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This study aimed to examine the usage of cone-beam computed tomography (CBCT) in dental age estimation through method reproducibility and reliability via systematic review and meta-analysis. An electronic search was performed in six databases (PubMed, Scopus, LILACS, Web of Science, SciELO, and OATD). Observational studies with an outcome of interest of quantified reproducibility of the method (Kappa Statistics and Intraclass Correlation Coefficient) and correlation value (r) between chronological and age-related variables were selected. A random-effect three-level meta-analysis was conducted with an additional *a priori* selected moderator analysis: methods, arch (maxillary/mandibular), population, and dental root (monoradicular/multiradicular). From 671 studies, 39 fulfilled

the inclusion criteria, with one study reporting two different methods. The methods used in the studies were divided into metric ($n = 17$), volumetric ($n = 20$), staging ($n = 2$), and atlas ($n = 1$). All studies reported high reproducibility. Thirty-three studies were included in the meta-analysis. Group 1 (metric and volumetric) provided a high inverse weighted r ($\delta = -0.71$, CI $[-0.79, -0.61]$), and Group 2 (staging) provided a medium-weighted r ($\delta = 0.49$, CI $[0.44, 0.53]$). Moderator analysis on Group 1 resulted in “no significant difference” between methods, tooth position, and arch. An exception was detected in the analysis based on population (Southeast Asia, $\delta = -0.89$, CI $[-0.94, -0.81]$). The usage of CBCT in dental age estimation significantly improves the accuracy of results in adults. Further research needs to be conducted in the staging and atlas methods in order to investigate the performance. High reproducibility and r -value indicated that dental age estimation methods using CBCT images were both applicable and reliable.

Key Words: *Age determination by teeth, cone-beam computed tomography, forensic dentistry, radiology, systematic review*

Assessing Ethnicity of Indian Population Using Tooth Crown Nonmetric Traits

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Evaluation of tooth crown nonmetric traits benefits to assess the biological distance between populations. It is well known that these traits are characterized by a high inter-population differentiation, low sexual dimorphism, and their recording is loaded by relatively small intra and interobserver error. The dental morphological traits are successfully used in the description and explanation of the micro evolutionary and ethnogenetic processes. This article presents the results of the permanent maxillary dentition tooth crown trait differentiation of human populations from Bengaluru. The comparative analysis was carried out on the basis of four groups for five tooth crown nonmetric traits in maxillary permanent dentition using Arizona State University Dental Anthropology System for morphological scoring system of each trait and each score was charted on Osteoware Dental Morphology software Version 1.8, developed by ASUDAS. The study analyzed 400 dental casts from four different ethnic groups. Trait winging, shoveling, lingual tubercle showed the highest expression in Iranians, while Cusp of Carabelli's trait expression showed 87% of prevalence in the surveyed group, but the hypocone trait showed the highest expression in Muslims. Traits of human dentition can be a valuable diagnostic tool for anthropological studies in classifying and characterizing different ethnic groups. According to the results obtained from this study, it can be said that the groups Hindus, Muslims, and Christians (Indians) belong to Sundonts, while Iranians fall under Sinodonts population group.

Key Words: *Dental anthropology, forensic odontology, maxillary permanent dentition, nonmetric traits*

Determination of After Effects of Using Hand Sanitizers and Hand Cream on Development of Latent Fingerprints with Time Gap

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Nowadays, many skin formulations, such as hand sanitizers and hand cream, are widely used. The most important subject that stands here is the impact of these formulations on the development of latent fingerprints. Each fingerprint contains a complex aggregate of chemical substances, which might be variable and dependent on many factors. These consist of exogenous compounds such as cosmetics, hand creams, or hand sanitizers. The present study is aimed to evaluate a range of different skin protective formulations to determine whether or not the application of these, prior to fingerprint deposition, influences the subsequent physical and chemical detection of fingerprints. In this study, 560 latent fingerprint samples were collected for the analysis. These samples were grouped in seven timeline-based categories (without any application as standard, after application – gap of 10 min, gap of 15 days, gap of 1 month, gap of 2 months, gap of 4 months, and gap of 6 months) consisting eighty samples each. Each seven timeline base categories were further subdivided into two groups, i.e., forty samples of hand sanitizers and forty samples of hand creams, respectively. The four different conventional methods of examination utilized were ninhydrin, silver nitrate, iodine fuming, and cyanoacrylate. This research highlights the fact that so far, only limited effort has been put into exploring and understanding the effect of hand sanitizer and hand cream on the development of fingerprints. Thus, it is apparent that more studies are required to propose a suitable standard method for the development of fingerprints after the application of certain skin protective formulations. It is also important to notice whether there be any effect on the components of sweat present in the fingerprints.

Key Words: *Cyanoacrylate method, hand creams, hand sanitizers, iodine fuming method, latent fingerprints, ninhydrin method, silver nitrate method*

Use of Arm-Span Length for Estimation of Height of the Person in Khatri Population of Delhi

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For identification of a person, many characteristics are taken into account. Age, sex, and stature are some of the primary characteristics for identifying the individual. However, in cases where the dead body is highly decomposed or mutilated/attacked by animals, mass disasters, etc., where only part(s) of body is/are available, anthropometry becomes

an important tool for identification of such dead bodies. The stature prediction occupies relatively a central position in anthropometric research as every body part bears more or less a constant relationship with height of an individual. To estimate the stature from arm span length and predict the regression equation. The study was carried out on one hundred healthy male individuals aged 18–45 years. Arm span length was taken by using measuring tape and stature by the anthropometric rod. The data were subjected to statistical analysis using SPSS v23 software Version 1.8, developed by ASUDAS. We found that the males with stature 167.7 ± 8.73 cm had an arm span of 172.2 ± 8.61 cm. The correlation between stature and arm span was positive and significant ($r = 0.967$ $P < 0.01$). The predicted regression equation for stature was $0.981 \times \text{arm span length} + (-1.112)$. The stature calculated using the regression equation was 167.8 ± 8.44 cm. Estimation of stature forms an important parameter to reach the partial identification of an unidentified body and dismembered remains. The study indicates that the arm span length can be efficiently used for estimation of stature. Most authors have underlined the need for population-specific stature estimation formulae. In this study, we derived a separate regression equation to estimate stature from arm span length for population. This study is very helpful for those who work in this area, especially in the various medical disciplines, anthropologists, and security experts.

Key Words: *Anthropometry, arm span length, identification, regression equation, stature*

Digital Analysis in Human Bite mark Investigation

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Bite mark evidence has gained importance and is used in the justice system. The analysis of bite marks in forensic odontology focuses on the criteria that anterior teeth causing the bite are characteristic, and these characteristic features are recorded significantly in the bitten materials such as human skin, food substances, pencils, and bottle top. The incisal surfaces of upper and lower anterior teeth can be arranged in a 1.36×10^{26} nonidentical manner. Hence, forensic odontologists use this property of anterior teeth and bitten material to do bite mark comparison and present it in court for the interest of justice. During the process of evaluation of bite mark analysis as an evidence, impression of bite marks using vinyl polysiloxane impression materials was used to record the bite mark injury for comparison with the suspect's dentition. But with the advent of new technologies, bite mark investigation entered into the digital era. Thus for the purpose of investigation, this patterned injury on the skin or on other surfaces and biting facets of anterior teeth can be analyzed digitally in a computer. Laser scanners can digitize discrete biting surfaces of anterior teeth and dental cast for the analysis in the computer without tampering with the evidence. In this way, we can convince scientific community, advocates, judges, and government to rely on bite mark digital analysis. The

results of these digital analyses supported the individuality of human anterior dentition, cautions about the dentition recorded on human skin, food substances as a better medium for bite mark investigation, and further about the accuracy of bite mark overlays. The overall view showed a reduction in match rates when using three-dimensional analysis. In conclusion, digital analysis is faster, easy, and with less bias.

Key Words: *Anterior teeth, bite mark, digital analysis, forensic odontology, human skin*

Role of Various Dental Disciplines in Forensic Odontology – A New Insight

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Dental science comprises nine specialities and has much importance on law enforcement in crime and person's identification and its solution. Forensic odontology needs an interdisciplinary knowledge, awareness, and approach of dental fraternity. Primarily, the role of forensic odontologist is to establish missing person's identity. Dental evidence (tooth), with physiologic variations, pathoses, and effects of therapy, record its finding, which remains throughout life and beyond, may also be used as weapons under certain circumstances and may leave information about the identity of the biter. Forensic odontology also has an additional role in recognition of abuse among persons of different age groups. Dental professionals have a primary essential role to play in keeping accurate antemortem dental records and help all necessary information so that legal authorities may recognize malpractice, negligence, fraud, or abuse, and identify unknown humans.

Key Words: *Dental evidence, forensic odontology, tooth sequence*

Virtopsy: A Noble Approach toward Mankind

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In the midst of the COVID-19 pandemic, various transformations have occurred in the IT sector, work from home is the term which is much in use these days, in the health sector too, and tele-consultations are being performed. Similarly in forensic field, we need to switch from the traditional autopsy during postmortem to virtual autopsy. The conventional postmortem method is not the proper dignified way and is a violation of human rights. India also has a special force to manage disasters, also known as NDRF (National Disaster Response Force). It is a type of rescue team working in difficult situations and during the crisis phase, this type of rescue team is only found in India. But still, there are certain reformations required in our system and the introduction of virtual autopsy is one of them. Virtual autopsy is less time consuming and is gaining importance in the field of medicolegal cases. However, it is at its infant stage in forensic

odontology but with constant efforts of forensic odontologists will mark its own importance in the digitalized era.

Key Words: *Disaster victim identification, forensic dentistry, forensic odontology, virtual autopsy*

Effect of Duration on Quantity and Quality of DNA Obtained from Saliva on Glass Surface

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DNA analysis from saliva has attained popularity in forensic because of its ease of access, ease of handling, its noninvasive collection, its close relationship with plasma, and cost-effective analysis. Saliva contains oral desquamated cells, which can be a rich source of DNA. The present study is designed to assess DNA retrieval from dried saliva samples at varied time intervals and compare DNA yield with increased time interval on glass surfaces. The study was conducted on saliva samples obtained from twenty healthy individuals aged between 20 and 40 years. Saliva samples were collected in a 10 ml sterile polypropylene tube and stored at room temperature.

1.5 ml of saliva from each sample was transferred to three glass slides, after which they were allowed to dry at room temperature. The samples were subjected to DNA extraction at three different intervals at the end of 2 h, 3 days, and 7 days using the double-swab technique and phenol-chloroform method. DNA was quantified using nanodrop and gel electrophoresis. There was no significant difference observed in the quantity and quality from the day 1 to the day 7. Therefore, dried salivary samples found on the glass surface can be utilized for forensic investigations. Forensic laboratories are required to have automated settings for saliva, as is routinely done for blood or urine. Safety in its handling, the ease and noninvasive methods of saliva collection make it a viable option for forensic investigations.

Key Words: *DNA, electrophoresis, plasma, polypropylene, saliva*

Age Estimation in an Indian Population Using the Foti's Method

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Not even a single day passes in our country without the news of abuse and abduction of children, especially the females. In a developing country like India, a large number of people are illiterate and have no knowledge or records of their date of birth which is required by law enforcing agencies in matters such as criminal responsibilities, identification, judicial punishment, consent, rape, criminal abortion, employment, attainment of majority, kidnapping, and prostitution. Hence, it is the need of the hour to estimate the age by a simple,

easiest, fastest, and reliable method. Dental age estimation can serve as a very important tool in the identification of a person as the times of eruption of primary and permanent teeth are fairly constant. This article depicts an original study in which orthopantomograms (OPGs) were used to identify the age of a person. Bruno Foti *et al.* proposed a mathematical model to calculate the age using the number of erupted and unerupted teeth. A similar study was done by De Souza *et al.* comparing tooth eruption with chronological age using Foti's method. The aim of my study was to evaluate the efficacy of Foti's method of dental age estimation using erupted permanent mandibular teeth in an Indian population. The study design was quantitative and retrospective. OPG images were viewed and measured using GNU Image Manipulation Program (GIMP) software version 2.10. Version 1.8, developed by ASUDAS. It was found that the number of erupted second molars and third molars contributed most to age estimation. The study concluded that Foti's method has a moderate correlation to age in the examined Indian population. This study has put forward a new formula, probably the first formula for age estimation not only for an Indian population but also for a global population using eruption state in radiographs.

Key Words: *Age estimation, children, Foti's method, Indian population, orthopantomogram*

In Contemporary Era of Epidemic – Rescue Rights and Dignity of the Dead

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The deadly COVID-19 pandemic has claimed over 4.4 lakh lives in India as of September 2021. This brings to mind a pertinent yet troubling question about the rescue rights and the dignity of the dead. The World Health Organization (WHO) declared COVID-19 as a pandemic on March 11, 2020. The world witnessed a staggering loss of human life unlike any other calamity so far. Various international and national organizations including the WHO and the Ministry of Health and Family Welfare have issued several safety and health guidelines but have failed to address the problem at hand – the dignity and rights of the deceased and their families. The countless reports about inhumane treatment of the dead have raised heart-wrenching concerns among human rights activities, the judiciary, and the citizens alike. This seems like an unfair compromise in the time of the ongoing crisis. The dead not only has a right but deserves a decent funeral according to the provisions enshrined within Articles 21 and 25 of the Indian Constitution. The severe restrictions and violations of these rights of the deceased and their families is one problem that we can no longer turn a blind eye toward. This article provides insights into the chaos that has descended when it comes to the last rites of the dead, human rights jurisprudence on this amply neglected issue, and steps that can be taken to rectify this situation.

Key Words: *Dignity, fundamental rights, health, International and National Organizations, violations*

Challenge for the Training Model Construction to Make Awareness Reformations of the Responders to Disaster Victims in Japan

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Many people witnessed to “death” through the Great East Japan earthquake in 2011. Finally, activities dealing with the mental health care of the bereaved families of disaster victims began. However, mental health care for those responding to the dead and their bereaved families at the morgue remains postponed. Ten years have passed since the disaster, without a public debate on the psychological trauma of such responders. As the philosophy of the Association of Forensic Odontology for Human Right’s suggests, appropriate and correct identification leads to the respect for the dignity of the dead and, further still, that of the bereaved. Therefore, the mental training of nonexpert dentists who deal with dead bodies in the event of a disaster in Japan is very important. This shows empathy for the bereaved family and offers due consideration for their feelings. Therefore, we focused on measures that those who come into contact with “death” should take in their responses, and launched an initiative aimed at establishing a disaster response model to eliminate the gap in mental support for the bereaved family waiting for the identification of the body on the site. The ultimate goal is the completion of a virtual training model that can examine ideal response methods in Japan where there is no disaster victim identification team. In the symposium, I introduced an annual disaster prevention training sponsored by Iwate Prefecture in Japan, which is attended by those in various occupations, and which serves as a base for our efforts.

Key Words: *bereaved families, disaster, forensic odontology, mental support, responders*

Progress of Forensic Odontology in Syria

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Despite the important role of forensic dentistry with the judicial authorities and in identifying the unknown bodies and determining the fate of the missing, there is no one among the Arab countries and the countries of the Middle East who qualifies dentists and grants them certificates of specialization

except Syria, through the residency system in the hospitals and centers of the Ministry of Health.

Many challenges that have faced and still face this jurisdiction in general across the world and in particular in Syria, whether through studies and updates related to methods of determining sex, estimating age and height and other topics, or through some difficult judicial cases that need to spread awareness among the judicial authorities about the importance of this specialty which is completely new to them.

Thus, it is of great importance for the specialist in this field to engage in international groups to exchange experiences and develop skills in various fields.

In this article, I review the beginning of forensic dentistry in Syria and some of the scientific studies to develop the scientific methods used, and then present three unique practical cases that stand out, on the one hand, the importance of the specialization, and on the other hand, the currently limited capabilities, sometimes, for this science, and then I talk about Association Forensic Odontology for Human Rights.

As a global group, it includes many experts and joint projects in this field.

Key Words: *Dental evidence, forensic odontology, tooth sequence*

The Armchair Forensic Odontologist: A Clear and Present Danger to the Speciality in India

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The dentist who lacks exposure in handling and solving real-life forensic odontology cases but speaks on the subject as an expert in the field is an “Armchair Forensic Odontologist.” Such dentists may have relatively good theoretical knowledge of forensic dentistry but lack real-world case exposure. Since such dentists have not actually handled a single police case, it precludes them from being a specialist in the field. Consequently, they can severely undermine case analysis and training in forensic odontology. To mitigate the problem, the Dental Council of India must recognize a pool of properly trained and experienced forensic dentists and lay down minimum requirements for institutions organizing courses in forensic odontology. Institutions imparting programs in forensic dentistry must also ensure they have a tie-up with law enforcement for a steady flow of cases and employ only certified and experienced specialists and trainers.

Key Words: *Dental evidence, forensic odontology, tooth sequence*

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