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## THE ROLE OF WOMEN IN FORENSIC ODONTOLOGY

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### Forensic dentistry

#### THE ROLE OF WOMEN IN FORENSIC ODONTOLOGY.

##### *O papel da mulher na Odontologia Forense.*

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#### ABSTRACT

This literature review aims to name the influential female pioneers who broke the conservative barriers in place for their gender and set the standards for those who followed in their paths as either dentists or forensic odontologists, with the purpose of increasing the visibility of their identities, feats, and positions of authority, hence, diminishing the states of exclusion that may be still practiced towards the recognition of their contributions to dentistry. It is our expectation that contemporary female forensic dentists can, by accessing this reading, acknowledge and promote the female performance in the forensic field, from its beginning to the present time, and be reassured of the representation and the excellence of women in it. We anticipate that all these professionals' names will not be mentioned due to lack of information from sound resources or unawareness. We also hope to witness similar literature reviews in the future.

#### KEYWORDS

Forensic odontology; History of dentistry; Women in science.

#### INTRODUCTION

Female participation in labour market has generally increased throughout the 20th and 21st centuries, with few exceptions in certain countries. Aspects that have contributed to these changes

according to different theoretical models<sup>1</sup> for understanding female labour supply, are

<sup>1</sup> It is important to keep in mind that this compilation of factors does not intend to synthesise findings that tackle the increase of female participation in the labour market as if there were no dissimilarities between countries, or between interpretations that aimed to interpret its possibilities for occurrence. There is undoubtedly a broad diversity between countries when targeting this issue, however, the scope of this article

derived from non-economic and economic factors, including: 1. Religious beliefs and practices, 2. Political ideologies; 3. Gender expectations and shifts in sex-role attitudes 4. Growth in women's educational attainment; 5. Insufficiency of resources available to families in which the management of the household was provided by a single income; 6. Increase in external help to organise caring responsibilities that were mainly attributed to women 7. Existence and sharing of parental resources available to women when considering their families of origin 8. Differences between the urban or rural nature of their geo-physical spaces of existence; 9. Migratory movements; 10. Their countries' stages of economic development, and respective occupation demands; and 11. Differences in public, tax, and family policies among countries, that may or may not aim at promoting and ensuring equal opportunities for women in the labour market, anti-discrimination laws, corporate board quotas, and incentivizing workplace flexible and/or reduced hours.

Among all these aforementioned factors, it is essential to comprehend that the process of industrialisation had a profound impact on women's possibility of working. Some scholars (starting from Kraditor, 1968, and Lerner, 1969) argue that this was motivated not only by the so called growing of the separation of the private and public spheres, which meant to explain that the manufacturing of goods within the grounds of factories gradually stimulated and/or 'forced' lower class women to move away from that which has

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has no objective of covering a detailed scrutiny of each existing local, situated experience.

conventionally been their space of industry, that is, the home, the domestic environment, and occupy the external, outer world, which had previously been a task expected from men, as if rupturing the until then gender coded spheres<sup>1</sup>. Instead, this discussion more than highlights what could have been seen as either 'liberating' and/or 'pushing' trend in the process of women's emancipation speaks of their use as cheap labour, being overworked within appalling working conditions in the factories' environment, where '*they remained untrained, casual labour and were soon, by custom, relegated to the lowest paid, least skilled jobs*' (p. 11)<sup>2</sup>. However, even among all these difficulties, it is, from a broad perspective, necessary to state that slowly and gradually this ability of women to accrue financial resources had challenged the imbalance of power between men and women which was previously in place and moved toward a fairer gender parity.

It is also in this sense that, in discussing the access of women to opportunities for engaging in schemes of apprenticeship and/or formalized institutes of higher virtual education it must also be encompassed the analysis of correlated phenomena that influence[d] the envisioning of this possibility, and its accomplishment, such as family sociology, marriage, fertility, childcare [including the access to supportive social networks for migrant mothers], eldercare, divorce [and the continuity or not of spousal support], the distribution of family earnings and male-female wage discrepancies. These are variables that must be observed to

understand both the underrepresentation of women in certain work scenarios, or the abandonment of their career paths, for the still more or less generalised societal orientation of cultural groups that consider women's social role as primarily responsible for household management, which implies that the duties for family caretaking insist to fall disproportionately on women.

This investigation, while observing the dental profession, from its beginning, as being almost exclusively male-dominated<sup>2</sup>, aims to name the female pioneers especially for the fact that women are, since the 1970's<sup>3</sup>, worldly and steadily entering dentistry in larger numbers, promoting a process of feminisation in it<sup>4-7</sup>. In considering a brief overview of the already highly published contributions that men had provided to the advancement of dentistry, we would like to emphasise the large quantity of 'Fathers' of specialisations within the field - Pierre Fauchard (1678-1761) is considered the Father of modern dentistry<sup>8</sup>, Robert Bunon (1702-1748) is referred as the Father of Dental Hygiene and Paediatric Dentistry<sup>9</sup>; Edward Hartley Angle (1855-1930) the Father of modern Orthodontics<sup>10</sup>, Wilhelm Conrad Röntgen (1845-1923) the Father of Radiographic Diagnosis<sup>11</sup> and Louis I Grossman (1901-1988) the Father of Endodontics<sup>12</sup>, among others. It is also

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<sup>2</sup> It must be observed that 'within health care, there has long been a gender division of professional labour: men have predominated in higher-status, higher-paying professions like medicine and dentistry, while women's health care work has been clustered in so-called support occupations such as nursing'. Adams TL. Gender and Feminization in Health Care Professions. *Sociology Compass* (2010); 4:454-65.

worth stating that the first dental school - the Baltimore College of Dental Surgery - was founded in the year 1840, by two men, Horace Hayden and Chapin Harris, which established the Doctor of Dental Surgery (DDS) degree<sup>13</sup>.

In this way, it is important to note that the societies where dentistry initially developed were patriarchal, both in Europe and America, and that in these socio-historic contexts women would hardly have had the opportunity to play a leading role in the medical sciences in the 19th century. However, this literature review opts for publicizing the personality and the scientific achievements of 'mothers of forensic dentistry', which were not conceptualized in this manner, because even though their names are poorly mentioned in a historical context, they highly contributed to the field.

#### **FIRST WOMEN IN ODONTOLOGY, A SHORT SUMMARY**

In the past, the involvement of women in Dentistry started as a supporting role in dental practice, that is, the "first dentists" were wives of dentists who "learned" the profession through observation and had to exercise it to provide for the family, in the absence of her husband. At that time, few women had the condition and "audacity" to question the professional training system and claim a chance to graduate and work lawfully as a dentist. In this context, the following women stood out: Amalia Assur (1852) became the first female dentist in Sweden<sup>14</sup>; Emeline Roberts Jones (1855) became the first woman to practice dentistry in the United States; Lucy Hobbs Taylor (1866) was an

American school teacher and a dentist, known for being the first woman to graduate from dental school (Ohio College of Dental Surgery)<sup>15</sup>; Margarita Chorné y Salazar (1886) was the first female dentist in Mexico; Ida Gray Rollins (1890) was the first African-American woman to earn a dental degree in the United States; Lilian Lindsay (1895) became the first licensed female dentist in Britain; M. Evangeline Jordan (1898) was one of the first to limit her practice to children and was a founder of paedodontics; Josefina Pecotche (1899) was the first female dentist in Argentina<sup>16</sup>; and Isabella von Sydow (1899) was the first Brazilian female dentist<sup>17</sup>.

In 1920, the American Dental Association (ADA) admitted their first female delegate, Maude Tanner. Also, Helen E. Myers (1951) was commissioned as the first female dental officer of the U.S. Army Dental Corps'. The number increased gradually from 1950 to 1980s but it was still rare to come across a practicing woman dentist. Post 1980, the number of women in dentistry increased exponentially around the world. After the 2000s, the number of men and women in dentistry was almost equal and the number of women pursuing dentistry exceeds men in some countries<sup>18</sup>.

#### **THE BEGINNING OF FORENSIC ODONTOLOGY - ANY FEMALE CONTRIBUTION?**

Historically, most of the female names mentioned in Forensic Odontology cases were of victims such as Lollia Paulina (49 AD), the first dental identification case recorded, Janet MacAlister (1814), the earliest known use of a dentist as an expert

witness, Mrs. Durand-Deacon (1949) whose denture was used to prove her identity and other numerous female victims from serial killers such as the American Ted Bundy who kidnapped, raped, and murdered young ladies during the 1970s<sup>19,20</sup>.

In the 20th century, there was a greater participation of women in Dentistry and, eventually, some women were inclined to get involved with Forensic Dentistry such as in academic education, scientific research and publication or as expert witnesses. A few female representatives exercised leadership by actively being part of prestigious national and international boards of scientific associations.

Specifically about forensic dentistry, there is also a strong male role in this specialty, where Oscar Amoedo y Valdes (1863-1945) is worldly considered to be the Father of Forensic Dentistry for his studies and report on the dental identification of victims of the fire at the Bazaar of Charity in Paris (1897) and also for the publication of his thesis entitled "*L'Arte Dentaire en Médecine Légale*" (Dental Art in Legal Medicine) (1898)<sup>21</sup>; however, the title of pioneer in Forensic Dentistry is also claimed to Paul Revere (1735-1818) who established the identity of General Joseph Warren which was the first dental identification for military purposes in the USA<sup>8</sup>.

#### **Female forensic dentists in the Americas, Europe and Africa**

Although the pioneering of Forensic Dentistry took place in Europe and North America, the expression Forensic Dentistry

or Forensic Odontology, translated in Spanish as *Odontología Legal*, first appeared in Argentina, South America (1921), through the work of Joaquín V. Gnecco (1868-1925), being considered the 'Father of Forensic Dentistry' in this country. Also, Prof. Dr. Juan Ubaldo Carrea contributed to the field by conducting research and teaching Orthodontics concurrently with Forensic Dentistry at the Buenos Aires Dentistry School<sup>22</sup>. It is important to mention that the Argentinian Dr Elida N. Briñón, a female pioneer, has been an expert in the courts of Buenos Aires for many years and has published two textbooks: a) "*Odontología Legal y Práctica Forense*" (Forensic Odontology and Practice) (1983)<sup>23</sup> and "*Lesiones e Iatrogenias en Odontología Legal*" (Injuries and Iatrogenesis in Forensic Odontology) (2006)<sup>24,25</sup> as seen in figure 1.

In addition, Dr. Marta Beatriz Maldonado is the dental expert of the Forensic Medical Commission of National Justice and the coordinator of the Department of Legal Dentistry of the Supreme court of Argentina<sup>26</sup>. Interestingly, the Argentine Society of Legal Dentistry (SADOL) was created in 1977 and the first board was composed of three women among the nine members. In 2015, Dr. María Isabel Ferrari was appointed as the first female president of SADOL but she already chaired the annual Congress of Forensic Dentistry in 2008<sup>27</sup>.

In Brazil, in 1924, the first textbook entitled *Odontologia Legal* (Forensic Dentistry) was written by Luiz Lustosa da Silva (1897-1974) also known as the 'Father of Forensic Dentistry in Brazil'<sup>28</sup>;

however, data about women actively working in the early 1900s is inexistent but the situation changed through time. According to the Brazilian Federal Dental Council (CFO), the most current data indicates that 858 dentists are qualified in Forensic Dentistry, being 503 (58.6%) women<sup>29</sup> as shown in Figure 2.

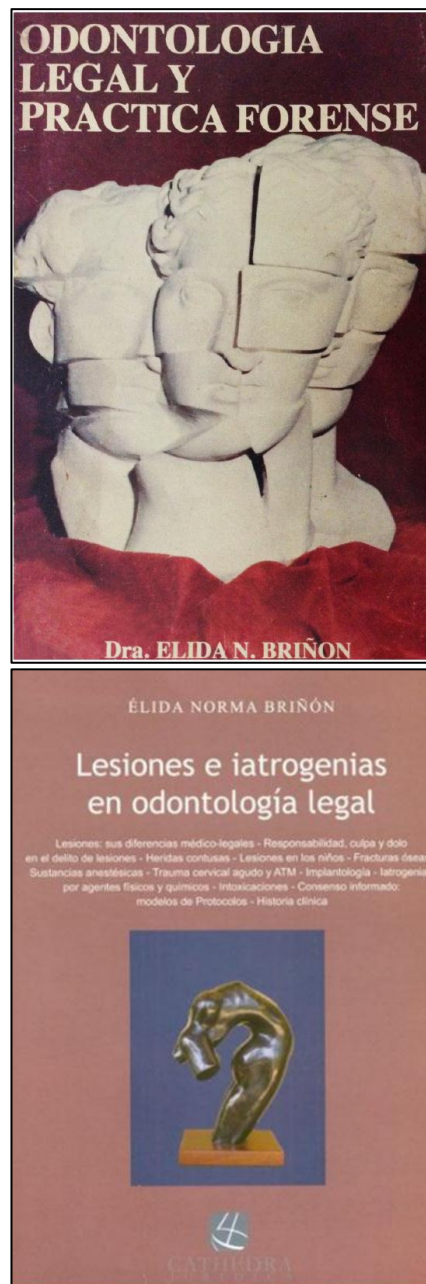


Figure 1 – Covers of the two textbooks written by Dr Elida N. Briñón (Argentina).

It is important to note that there is a great number of Brazilian researchers nationally and internationally recognized; for instance, Professors Hilda Ferreira Cardoso [University of São Paulo (USP), since 1980], Maria Ercília de Araújo (University of São Paulo (USP), since 1988), Beatriz Helena Sottile França (Federal University of Paraná, since 1990) stand out for pioneering. Following, Prof Maria Gabriela Haye Biazevic from University of São Paulo (USP) is an active

academic and author who published a variety of peer-reviewed scientific papers including dental age estimation<sup>30</sup> and sex dimorphism<sup>31</sup>. Prof Scheila Mânica from the University of Dundee, United Kingdom, is the first Brazilian woman qualified and working internationally on the field since 2009 with main interests in the quality of teaching and innovations in the field<sup>32</sup>. She was also the Academic Advisor to the British Association of Forensic Odontology (BAFO) from 2017 to 2021.

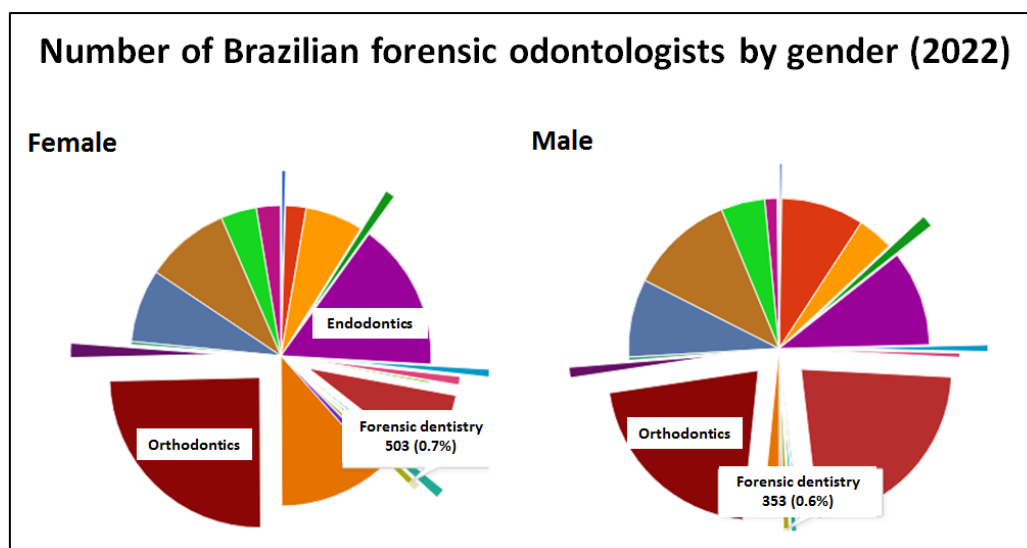


Figure 2. Number of Brazilian female forensic odontologists (503) in official database of Brazilian Federal Dental Council – accessed in March 5, 2022.

In the Brazilian Medical-Legal Institutes, we highlight the pioneering performances of Maria do Socorro Dantas de Araújo (state of Paraíba, since 1982) and Prof. Márcia Pereira Simões (state of Rio de Janeiro, since 1991).

The Brazilian Association of Ethics and Legal Dentistry (ABOL) emerged in 1996 where women held board positions, but they have yet to held the position of president<sup>33</sup>.

In 2010, the Association of Forensic Dentists of South America was created, which later became the Association of Forensic Dentists of Latin America being Dr. Ana Maria Carlos Erazo (Peru) and Dr. Alícia Picapedra (Uruguay) past Presidents.

In Bolivia, Dr. Maria del Rosario Rovira Gomez published three textbooks: “*Parâmetros para la valoración del daño estomatológico*” (Parameters used for the assessment of stomatological damage) (2008)<sup>26</sup>; *La responsabilidad profesional del*



*odontólogo boliviano* (The professional responsibility of the Bolivian dentist) (2009)<sup>34</sup>; and *Odontología Legal y Odontología Forense* (Legal Dentistry and Forensic Dentistry) (2010)<sup>35</sup> as shown in figure 3. In Colombia, in 2011, Prof. Yolanda M. Guerra Garcia published a textbook for introductory knowledge entitled *Odontología Forense* (Forensic Odontology) (2001)<sup>36</sup> as seen in figure 4.

The Peruvians Prof Ana Maria Carlos Erazo and Prof Ymelda Wendy Velezmore Montes are responsible for the Forensic Dentistry Specialty of the Southern Scientific University (UnicSur), Peru and actively work as forensic dentists for the Forensic Stomatology of the Institute of Legal Medicine and Forensic Sciences of the Public Ministry of Peru. Prof Erazo is the founder of the specialization and also the President of the Peruvian Association of Forensic Dentistry (*Asociacion Peruana de Odontología Forense*) (APOFOR) from 2010 to date. More recently, Prof Ymelda started to build bridges with experts beyond Latin America and her students will potentially present ground-breaking studies worldwide<sup>37</sup>.

In the United States of America (USA), Dr. Carmen M. Nolla (1923-2007) who was a professor at the University of Michigan between 1952-57 published a pioneering work on stages of tooth development in 1960<sup>38</sup> as shown in figure 5.

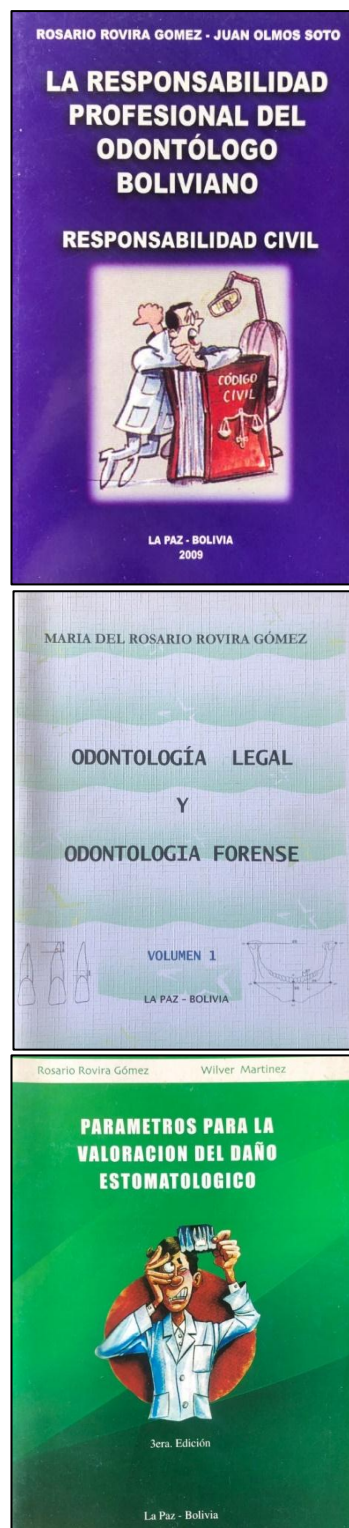


Figure 3 – Covers of the three textbooks written by Dr. Maria del Rosario Rovira Gomez (Bolivia).



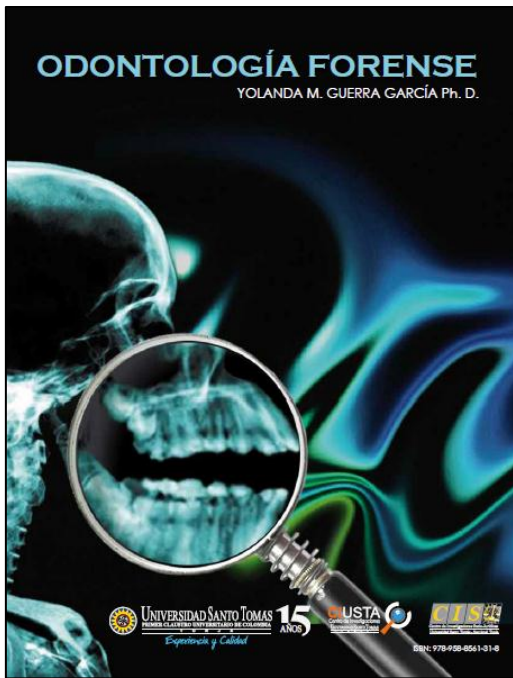


Figure 4 – Image of the textbook singly written by Prof. Yolanda M. Guerra Garcia (Colombia).

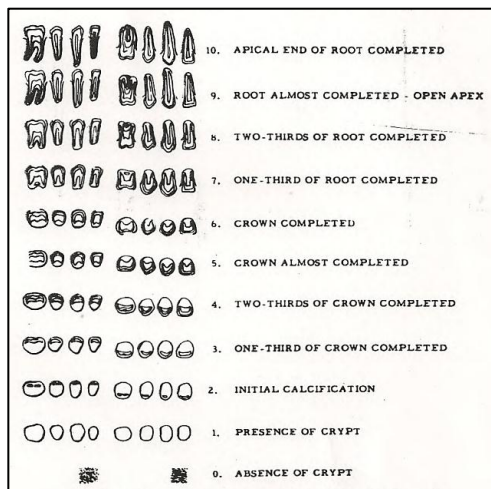


Figure 5 - Stages of development of mandibular and maxillary teeth (after Nolla, 1960).

Women also participated in Associations such as the American Society of Forensic Odontology (ASFO) founded in 1970<sup>39</sup> but only in 2010 e 2011 two female were elected President: Dr Denise C. Murmann e Dr Mary A. Bush respectively<sup>40</sup>. We highlight three most recent female

ASFO board members: Dr. Joe Adserias Garriga (President 2022-2023), Dr. Phyllis Ho (Immediate Past President) and Amber Riley, MS, RDH (President-Elect 2022-2023 Director of social media).

In the mid-seventies, the potential role of dental evidence in personal identification and Criminalistics was recognized by police agencies and the courts. The National Institute of Law Enforcement and Criminal Justice and the Law Enforcement Assistance Administration of the Department of Justice of the USA gave grants to the Forensic Sciences Foundation, Inc., in 1973, in order a) to establish certifying boards in various forensic disciplines, including forensic odontology and b) to identify and certify experts in their respective fields. As a result, in 1976, with the initial sponsorship of the American Academy of Forensic Sciences (AAFS) and the encouragement and assistance of the National Association of Medical Examiners (NAME), the American Board of Forensic Odontology (ABFO) was formed. The role of women in the ABFO management positions was only exercised from 1992, by Dr. Ann Norrlander, as secretary, and it was only in 1996 that this same forensic dentist was elected president of ABFO. The second and latest woman president of ABFO was Paula Brumit, appointed in 2017, with no other female presidency in this entity in its 44-year history<sup>41</sup>.

In France, Dr. Gwénola Drogou is the President of the French Association of Odontological Identification (*Association Française d'Identification Odontologique* - AFIO). Dr Lise Malfroy Camine from the

Swiss Human Institute of Forensic Taphonomy, University Centre of Legal Medicine Lausanne Geneva, Switzerland is one of the youngest female forensic dentists contributing to the field<sup>42</sup>. It is important to mention that in 1937, the textbook: *La pratique légale de l'art dentaire en France et aux Colonies* (The legal practice of dentistry in France and the Colonies), authored by Suzanne Grinberg, a lawyer at the Court of Paris, certainly contributed to the development of legal dentistry and served as a stimulus for other women to study, discuss and publish within the framework of dental jurisprudence<sup>43</sup> as seen in figure 6.

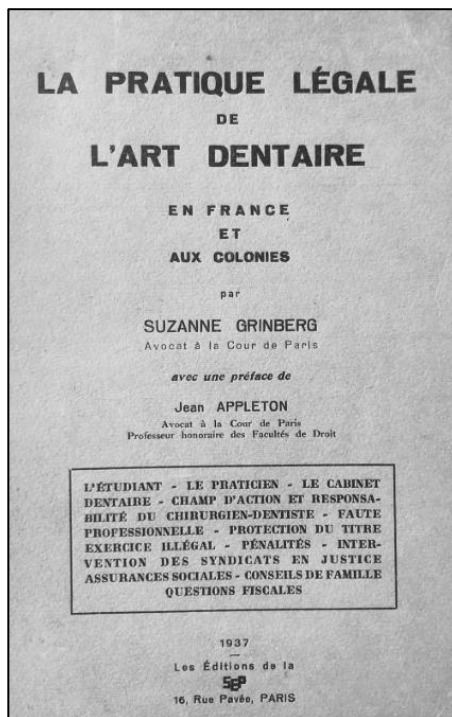


Figure 6 – Image of the textbook authored by Suzanne Grinberg (France).

In the United Kingdom (UK), Dr Catherine Adams and Romina Carabott were the first female authors to write a textbook on Forensic Dentistry/Odontology

entitled '*Forensic Odontology: An Essential Guide*' in 2013<sup>44</sup> as shown in figure 7. Both delivered high-quality master's degree programmes in Wales since early 2000's. Even though they are not active in the field anymore, they left a legacy. Prof Helen Liversidge, originally from South Africa, is a Professor of Dental Anthropology at Queen Mary University of London, UK. Prof Liversidge teaches undergraduate and postgraduate dental students in clinical paediatric dentistry and has supervised numerous postgraduate research projects that resulted in worldly recognized peer-reviewed publications. The most important ones relate to tooth formation and estimating age from developing teeth<sup>45</sup>. She also contributed with chapters of textbooks such as 'Dental age revisited In: Technique and Application in Dental Anthropology' (2008)<sup>46</sup> and 'Dentition In: Developmental Juvenile Osteology (2<sup>nd</sup> Ed) (2016)<sup>47</sup>.

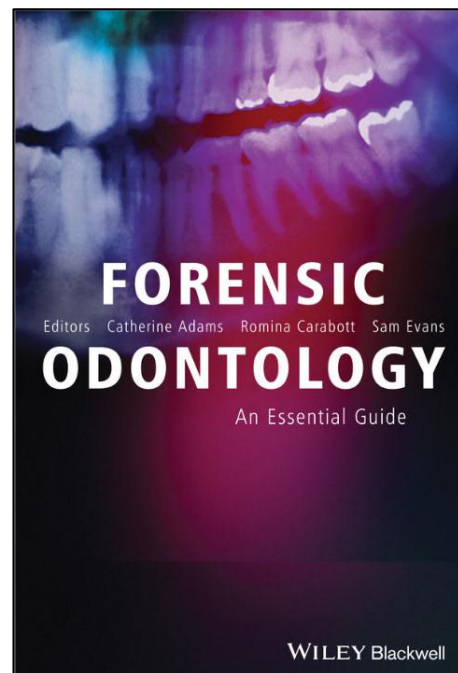


Figure 7 – Image of the textbook '*Forensic Odontology: An Essential Guide*' (UK).

Judith Hinchliffe is a well-known forensic dentist actively involved with research<sup>48</sup> and training. She is the only female who served two terms as the President of the British Association for Forensic Odontology (BAFO) from 1996 to 2000<sup>49</sup>. The late Dr Jane Marion Reece (1954-2017†) was not only a very active forensic dentist but lectured widely to professional audiences and including the University of Kent, the Kent Police Force, the Royal Military Police, the Defence Dental Services, and the British Dental Association (BDA) from 1999 to 2017<sup>50</sup>.

Croatia is represented by Dr Jelena Dumančić an Associate Professor at the Department of Dental Anthropology, School of Dental Medicine, University of Zagreb, Croatia. She has been actively contributing to the field on the practical and academic matters<sup>51</sup>. Prof Anastasia Mitsea is an Assistant Professor at the Department of Oral Diagnosis and Radiology, and she is also the Head of the Forensic Odontology Unit, Dental School, National and Kapodistrian University of Athens, Greece. Her outstanding list of peer-reviewed scientific papers addresses themes such as human identification<sup>52</sup>, sex estimation<sup>53</sup> and developmental dental anomalies<sup>54</sup>.

In Norway, Prof Sigrid Kvaal, an Associate Professor at the Faculty of Dentistry, University of Oslo, is one of the pioneers of non-destructive techniques for age estimation observing secondary dentine deposition on radiographs and calculating ratios by tooth and pulp measurements. Modifications of these techniques such as pulp tooth area or

volume ratios are accepted and widely being used for dental age estimation in medico-legal issues globally<sup>55</sup>. The author is also a very experienced professional in disaster victim identification operations<sup>56</sup> and continues to train dentists worldwide.

Prof Cristiana Palmela Pereira from the University of Lisbon, Faculty of Dental Medicine, represents Portugal with an excellent record of academic production internationally cited, including topics from human identification<sup>57</sup> and dental age estimation<sup>58</sup>. In 2012, she published the textbook named '*Medicina Dentária Forense*' (Forensic Dental medicine) (2012), a very comprehensive textbook written in Portuguese<sup>59</sup> – figure 8. After, another illustrious Portuguese, Professor Ana Corte-Real co-authored the textbook intitled '*Identificação em Medicina Dentária Forense*' (Identification in Forensic Dental medicine) (2015)<sup>60</sup> as seen in figure 9.

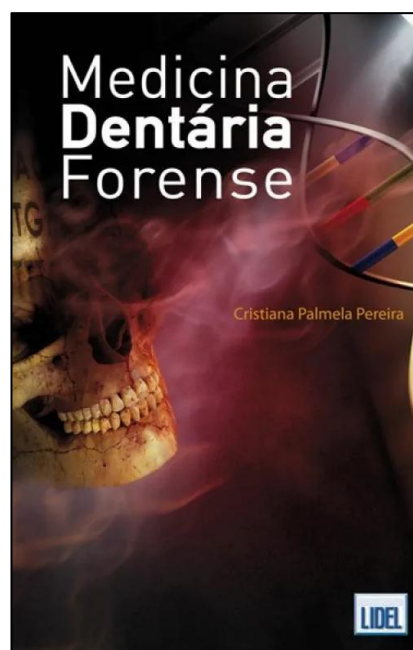


Figure 8 – Cover of textbook written by Dr. Cristiana Palmela Pereira (Portugal).



**Figure 9 – Cover of textbook coordinated by Dr. Ana Corte Real and Duarte Nuno Vieira (Portugal).**

Prof Vilma Pinchi is an Associate Professor of Legal Medicine at Forensic Medical Sciences section of Sciences of Health Department of University of Firenze, Italy. She is an active expert witness, an outstanding author<sup>61,62</sup>, tutor since early 90s and Past President of the International Organisation for Forensic Odonto-Stomatology (IOFOS) during two trienniums (2011/14 and 2014/17)<sup>63,64</sup>. Prof Cristina Cattaneo, a full Professor of Legal Medicine at the University of Milan, Italy is a forensic anthropologist, author of several publications including aspects of Forensic Odontology<sup>65</sup>.

Spanish forensic dentists with international recognition include names such as Ana Belén Márquez Ruiz and Aurora Valenzuela Garach, both from the Department of Legal Medicine, Toxicology and Physical Anthropology, University of

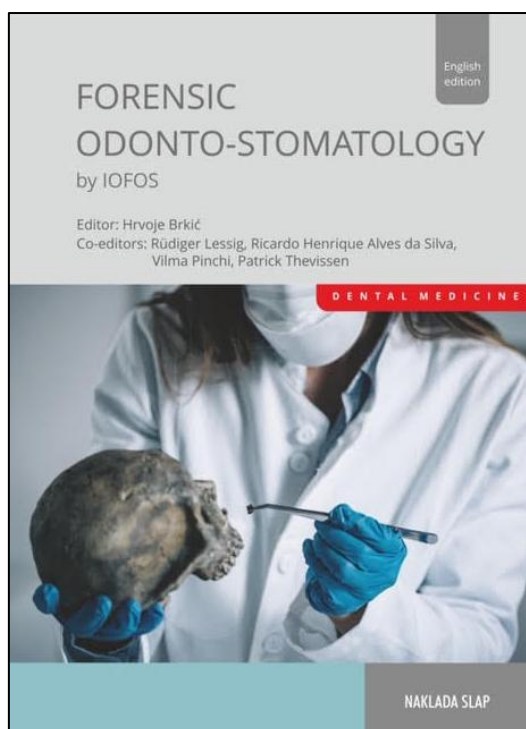
Granada and Stella Martín de las Heras from the University of Malaga. Those professors have contributed to the scientific community from the 90s to date<sup>66,67</sup>. Prof Joe Adserias Garriga, originally from Spain, is an Assistant Professor in the Department of Applied Forensic Sciences at the Mercyhurst University, Pennsylvania, United States. She contributes to both fields: Forensic anthropology and Dentistry on the teaching and authorship aspects. The textbook entitled *Age Estimation: A Multidisciplinary Approach* (2019), edited by Dr Garriga, is a sound reference of all aspects of age estimation: aging the living and the dead, human rights, and skeletal, dental, histological and biochemical techniques and methods available<sup>68</sup>.

The most recent textbook published by the International Organization for Forensic Odonto-Stomatology (IOFOS) (2021) contains 17 chapters and respective (sub)chapters written by 28 male and 15 female authors – figure 10. Despite the fact that not all international academic leads have contributed, women were the leading authors and the only author of seven and four (sub)chapters respectively<sup>64</sup>.

In the African continent, forensic dentistry seems to have started in South Africa, when C. W. van Wyk was appointed Honorary Consultant Forensic Odontologist to the South African Police in 1966<sup>20</sup>. By that time, the services of a forensic dentist were mainly requested in cases of mass disaster, such as the air accident in Windhoek (1968)<sup>69</sup>. Nowadays, forensic dentistry is still at its infancy in the vast majority of African countries; however, mention should be made about Kizzie



Shako who is the only female police surgeon in Kenya. She is also the founder and director of 'Vunja Kimya' Foundation, an association against sexual assault and child abuse<sup>70</sup>.



**Figure 10 – Cover of IOFOS textbook co-edited by Dr. Vilma Pinchi (Italy).**

### **Female forensic dentists in Asia and Australia**

In Japan, the first textbook on the subject, entitled 'Dental Jurisprudence' was published in 1894. This was a translation by Dr. Yasutami Kojimahara of the 'American System of Dentistry'. Between 1903 and 1904 Professor Sadanori Mita conducted a correspondence course which focused the teaching on methods of examination, evaluation and classification of bite marks and the differences between ante- and post-mortem injuries<sup>71</sup>. There is barely any mention of women forensic odontologists in Japan during the 19th or 20th centuries in

literature available. Dr. Akiko Kumagai, associate professor at Iwate Medical University is a forensic odontologist who worked on dental identification of victims of the Great East Japan Earthquake in 2011 and still continues to confirm the identities of victims of this disaster even nine years on<sup>72</sup>. One of her earliest publications in the field of forensics was in 2007<sup>73</sup>.

The Forensic Odontology Group of Hong Kong was set up in response to a shipwreck DVI (Disaster Victim Identification) operation in the South China Sea in 1983 by Prof Ron Fearnhead, the Founding Professor of Oral Anatomy of Hong Kong University<sup>74</sup>. Although China has a long history of forensic medicine, with the first standard text published in 1247<sup>75</sup>, there is extremely sparse and unverifiable information available regarding the history, formal training/education, department or laboratories dedicated to forensic odontology in Hong Kong or Mainland China. It is assumed that Forensic Odontology is taught as a module of Forensic Medicine. A report published in 2008, in Dental Bulletin of The Hong Kong Medical Diary, mentions that forensic dentistry is not regarded as a branch of dentistry and that any person could perform required tasks if need arises<sup>74</sup>.

Dr Maythinee Petju from the dental department of Phangnga Provincial Health Office in Thailand was among the women dentists who were heavily involved in dental identification of victims during the Tsunami disaster in Thailand in 2004. She later published a scientific paper on the importance of dental records for victim identification<sup>76</sup>. In 2019, Wanwisah

Namwonga from the Department of Dentistry, Police General Hospital, Bangkok published one of the very few scientific papers testing dental age methodologies in Thai subjects<sup>77</sup>.

Dr. Samantha Thakur trained in forensic odontology and started teaching the subject as a part of undergraduate curriculum in India in 2006 with continuous contributions to the academic community<sup>78</sup>. Dr. Hemlata Pandey graduated in 2011 and is the first female forensic odontologist in India to become actively involved with State Police and Central investigating agencies to provide forensic odontology expertise. She established the first forensic odontology and human identification laboratory at a government hospital with one of the largest autopsy centres in India and routinely involved in identification of human remains, assessment in cases of violence against women and children, age estimation, DVI and reconstructive identification methods such as forensic facial reconstruction. She is the President of the Association Forensic Odontology for Human Rights (2021-2023). She is also an author, being two of her publications on sexual assault<sup>79,80</sup>. Since 2016, several female dentists from India completed the MSc Forensic Dentistry and the Forensic Odontology MFOdont programmes from the University of Dundee, UK.

The first female forensic odontologist in Sri Lanka is Dr. Jayanie Weeratna who has been actively involved in identifications, age assessments, bitemark analysis, DVI, and teaching forensic odontology since 2009. One of her interesting publications discuss about

Forensic age estimation in anti-piracy trials in Seychelles<sup>81</sup>. Dr. Samarika Dahal is the first female forensic odontologist in Nepal to complete formal training at the University of Dundee, UK in 2016. She assisted with dental identifications in DVI operations during the US-Bangla Airlines Flight 211 crash in 2018 and Ethiopian Airlines flight ET-302 crash in 2019<sup>82</sup>.

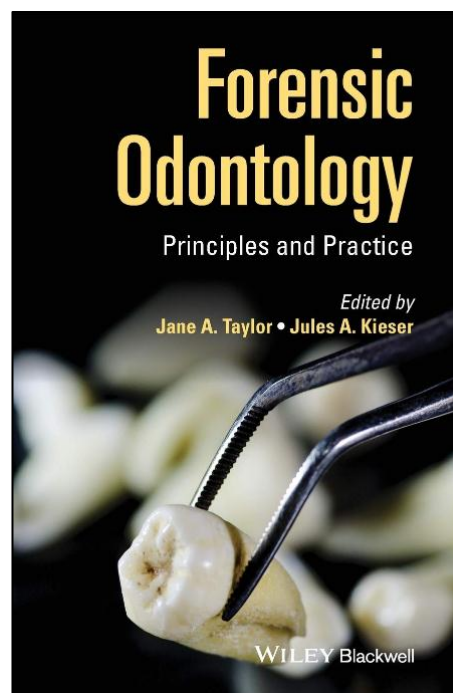
Dr. Astiti Handayani has worked as a forensic odontologist with Indonesian National Police since 2005, and she was the first woman to officially get trained from the University of Adelaide in 2011. Dr. Handayani along with Dr. Nurtami Soedarsono are among the first women forensic odontologists in Indonesia and were deployed for identifying human remains in DVI operation during Sukhoi Superjet 100 (SSJ-100) air crash in May 2012. Dr. Lisda Cancer was chief of dental clinic, policewomen academy during 1995-2003 and was the Chief of Forensic Odontology Section of Medical and Health services of Indonesian National Police from 2003-2005. She is head of DVI department of Indonesian National Police since 2017 and has led or been part of several DVI operations Lion Air Crash, Java Island, 2018; Earthquake and Tsunami, Palu, 2018; Phoenix Operation, Victoria Bushfire, Australia, 2009; Garuda Air Crash, Yogyakarta, 2007; Australian Embassy Bomb Blast, 2004 and many more. Dr. Azyyati Zikir studied forensic odontology and formally graduated from the University of Dundee, UK in 2018. She carried out a research study on disaster victim identification (DVI) in Indonesia which was eventually published<sup>83</sup>.



Dr Norhayati Jaffar, Head of Forensic Odontology Service, Ministry of Health, Kuala Lumpur Hospital Malaysia is a key person that has been working tirelessly to lead experts in several aspects including organizing the training overseas and nationally. She also contributed to the scientific community<sup>84</sup>. Dr Noraliza Mohd Nor and Dharshini Naidu Ragupathy Naidu completed a Master degree from the University of Dundee, UK. The latter has published a research paper on selfies.

Dr. Jane Taylor was involved in DVI operations in the 2002 Bali Bombing, the 2004 Boxing Day Tsunami in Thailand and the Victorian Bushfires of 2009. With a career spanning across the UK and Australia, she has been awarded a medal of the Order of Australia in 2003. She is Deputy Chair – Scientific to Australasian Disaster Victim Identification Committee since 2001. One of earliest publications in the field of forensic odontology is a case report published in Journal of Forensic Odonto-Stomatology in 1994<sup>85</sup>. In 2016, Dr Taylor published the textbook '*Forensic Odontology: Principles and Practice*'<sup>86</sup> (figure 11).

Dr Selina Leow is the Deputy Chairperson at INTERPOL DVI Committee (Forensic Odontology Sub-working group) and regularly attends the INTERPOL DVI meetings each year as an Australian delegate. She has been involved with DVI teams locally and participated in multiple DVI training exercises being part of the New South Wales Forensic Odontology Team in Australia for many years which is the largest Forensic medicine facility in Australia.



**Figure 11 – Image of the textbook ‘Forensic Odontology: Principles and Practice (Australia)**

#### **PRESENCE OF WOMEN IN SCIENTIFIC EVENTS**

In 1920, the *Federación Odontológica Latinoamericana* (Latin American Dental Federation) (FOLA) hosted the I International Latin American Congress in the city of Montevideo (Uruguay). Only one of the 78 scientific papers accepted was presented by a woman (Angela Chao - Uruguay): *El rol de las clínicas dentárias escolares* (The role of dental School clinics). It is important to highlight that topics related to forensic dentistry were discussed and included such as Dental ethics and professional responsibility, important themes in many Latin American countries. Other topics included: dental records; dental service at the police in Santiago (Chile); and the role of dentists assisting forensic medicine. Very

importantly, the discussion about a proposal of teaching Forensic Odontology for 100 didactic hours in the dental curricula<sup>87</sup>.

In 1946, the 1st Pan American Congress of Forensic Medicine, Forensic Dentistry and Criminology took place in the city of Havana (Cuba) with the participation of 19 countries. The female participation was still inexpressive in this event, with no women among the 10 members of honour. Only one woman (Aida Illueca, Department of Health - Panama) was part of the 50 delegates who spoke and represented the member countries<sup>88</sup>.

It appears that the female participation in forensic dentistry events, both as attendees and as speakers has increased significantly over the years. Female participation stood out in the last two conferences of the International Organization for Forensic Odonto-Stomatology (IOFOS) and the one held in Italy (2013) was hosted by a female president, Dr. Vilma Pinchi. The last conference in Belgium (2017) was composed of approximately 25 women from the total of 55 international speakers. Another example is the 14th edition of the Brazilian Congress of Odontology (2018), where out of the 55 speakers, 28 (50.9%) were female with diverse academic and technical backgrounds (forensic dentists, lecturers in forensic Odontology) hosted by a female President, Dr. Patricia Moreira Rabello<sup>89</sup>.

## **DISCUSSION**

According to Reese and Lipton (1990) the main motivators that attract

women to decide for a career in dentistry are 'the desire to be a part of the delivery of healthcare in the community; independence and the opportunity to develop individual expression of career goals; and a career that is compatible with the demands of a family' (abstract)<sup>90</sup>. Women traditionally assume the commitment to care for children and home, making it difficult to fully exercise the profession so they opt for only part time, taking the children to work or leaving them in the care of their parents. Previous studies also reported a stronger female preference in Paediatric Dentistry and Social Dentistry possibly because of the greater concern with the community and, they tend to be gentler and more delicate to deal with elderly patients and children. The same occurs in relation to the providing of services for children (and adults) with special health care needs<sup>91</sup>.

In considering university entry numbers of women who opt for dentistry as a career, and their participation in the workforce, Pallavi and Rajkumar (2011) state that 'dental student enrolment in the United States is now 42% women, and in Finland, 75% of practicing dentists are women. Women dentists in Russia constitute 48% of the dental workforce. Fifty percent of new entrants to dental undergraduate courses in the United Kingdom are female, and by 2020, more than 50% of all practicing dentists will be female', and 'and about 50 to 60% of students in all dental schools in India are female'<sup>92</sup>. Garrido et al. (2019) affirm that 'dentists in Brazil are predominantly female. However, in some specialties there are more men than women'<sup>5</sup>, and data from

2016 contained in the ADA [American Dental Association] Masterfile listed that from the totality of professionally active dentists in the US 70.2% were male and 29.8% were female<sup>93</sup>. In relation to the academic advancement of their careers, Pallavi and Rajkumar (2011) mention that 'the United Kingdom has its first woman dental dean, China and Germany have women dental deans, and nine of the 56 U.S. dental deans are women. India is also following the trend, and about 15% of the deans in dental schools across the country are female'<sup>92</sup>.

In analysing differences between male and female dental practitioners in certain aspects of their expectations during their university educational process a research conducted in Brazil 'revealed that men desire learning that is more technical, besides knowledge on business management, whereas women still complain of current prejudices in the personal relationships that exist with teaching staff and colleagues'<sup>94</sup>. These authors rationalise that most likely 'the teaching process, based on the technique driven biomedical model, has not reached an ideal standard for the female gender in terms of training, which would be a model based on empathy and good relationships with human beings' (Ibid.).

In considering male and female differences when focusing on their working practice within dentistry it can be stated that 'more women than men take career breaks, [...] women take longer career breaks on average' and that women's necessities for these breaks are associated with their commitments toward child rearing. It must

also be said that 'male dental practitioners are more likely than female dental practitioners to report reading professional journals'<sup>95</sup>. In addition, it is also reported by the literature review of McKay and Quiñonez (2012) that approached the reality of Canada, that there is 'less practice ownership by women; women work 4–6 fewer hours/week and see fewer patients; there is a pay differential; female generalists and specialists appear more likely to work in urban centres; and women are less prominent in the specialties, academia and leadership roles' (p.10)<sup>6</sup>.

According to Stewart and Drummond (2000) who speak of their experience within the UK, 'in the hospital service significant numbers of women complain privately that they are not given the same training opportunities as men'<sup>4</sup>. On paper there may be equity, but sometimes subtle processes seem to be employed to keep, for example, the women SHO [Senior House Officer, the most junior hospital post] busy on the clinic while her male counterpart is given study leave to help prepare for the postgraduate qualifications required for his promotion' (p. 8). These same authors also advise that every aspect of dentistry should be examined to ensure that an equal opportunity exists for women dentists to pursue a career as fully as they wish, and that this responsibility should be fully embraced by those who generally are at the top of the profession, that is, males and over 50's.

The study of Rajeh et al. (2017)<sup>96</sup> shows that 'in Saudi Arabia, women usually occupy lower ranked positions than men in

the Saudi public sector, and they are, therefore, paid less than their male counterparts', being that the alleged reasons for this phenomenon are influenced by 'family-related challenges, sociocultural challenges, workplace challenges, and transportation issues' (abstract). In relation to the European context, the main difficulties for the reaching of gender equality in the healthcare sector is the triple burden of domestic, clinical and leadership roles, which result in higher burnout rates, and poor career management<sup>97</sup>.

Most likely the advancement of women in academic and research careers requires global attention and strategies for 'although the profile of the dental profession has [globally] changed, the career paths in dentistry are still gender-biased. Horizontal and vertical gender segregation can be discernible [being that the former] is evident from the differences in choice of specialty, with female dentist preferring pediatric dentistry and are less interested in some dental specialties than their male counterparts, specifically oral surgery [while the later] is reflected in the dental hierarchy [most higher positions are still occupied by men]<sup>92</sup>.

Data from the European Parliament (2015) reveals that whereas women represent 59% of the graduate pool within the EU-28, the number of women drops to 18% when it comes to the pool of academics holding full professorship at universities<sup>98</sup>. The study of Kay and Shipman (2018) reports that, in some occasions, it is also due to a lack of confidence in the woman herself that

prevents her from advancing in her career, as it has been spotted that women will not apply for certain jobs if they have not matched all the criteria in the job description, whereas men will apply for the job even if they do not have any of the job description requirement. However, it must conversely be pondered whether this occurrence is due to an intrinsic stronger honesty to the self-judgement that women apply toward their competencies, while men might overestimate their capacities<sup>99</sup>.

A very useful and complex research conducted by Kalaitzi et al. (2017), which analysed 1329 articles (with European coverage ranging from 2000 to 2015) to map the difficulties that prevent women from reaching leadership in healthcare, academia and business, has developed a Barriers Thematic Map (BTM) with quantitative logic and a prevalence chart, that identified twenty-six barriers across the aforementioned sectors<sup>100</sup>. These barriers are as follows: gender gap, lack of career advancement opportunities, stereotypes, work/life balance, lack of mentoring, lack of flexible working environment, gender bias, lack of confidence, leadership skills, lack of networking, glass ceiling [invisible barriers based on prejudice, European Parliament, 2015], glass cliff ['female leaders .... are more often assigned to risky, precarious positions, with few material and social resources', [p.50]<sup>101</sup>, culture, gender pay gap, race discrimination, lack of social support, personal health, family (espouse) support, lack of role models, sexual harassment, queen bee syndrome ['the reluctance of successful females to support other women, Ibid.], tokenism ['one woman

or two women (a few tokens) to at least three women (directors) (consistent minority)', [p. 299], age, isolation, lack of executive sponsor, limited succession planning<sup>102</sup>.

In analysing the specific particularities confronted by female forensic odontologists it must be observed that Forensic Odontology is still at a nascent stage in many countries and addressing the challenges that women face in it is a multifaceted issue. Women in leadership and mentoring roles for budding female forensic odontologists could provide more varied networking opportunities and an understanding of work-life balance, since in sharing the difficulties and challenges they faced to establish themselves within this field could act as an inspirational and realistic narrative for those women who aim to opt for forensic odontology as a career or are initiating their practices in it. Interestingly, as per survey conducted by Dawley et al. (2014), in the United States, among all STEM (science, technology, engineering, and mathematics) statistics and forensic science fields, forensic science is the only one that has a majority in female graduates<sup>103</sup>. In addition, in 2019 a survey explored the profile of lecturers in Forensic Odontology worldwide. Results indicated that the number of male lecturers in Forensic Odontology is predominant, and females represented only 28% of the total number. Important to note that all females were postgraduate which indicates the commitment with training in the field<sup>32</sup>.

For women, education is the key prerequisite for equality and empowerment; only then women are more prone to access

well-paid and formal sector jobs. In the last years, changes in the society contributed to an ever-increasing interest towards forensic sciences from women, traditionally devoted to other activities. However, in considering the high level of education and a strong aptitude and willingness to work many hours, the difference of salary is a reality as women are underpaid by almost 20% compared with men<sup>70</sup>.

## FINAL CONSIDERATIONS

Even though literature has dealt extensively with the description of the majority of barriers hindering gender equality and inclusion, as we have observed through the arguments of this discussion, there are still fewer academic writings that address the supposed initiatives and recommendations to systematically tackle them. According to Kalaitzi et al. (2019), 'policymakers may be better informed by a comprehensive, evidenced-based approach responsive to country's sociocultural specificity and may develop policies and practices resonating to actual gendered needs and gaps' (p. 54)<sup>104</sup>. The more information circulates among women that reaffirm to them the previous and current agency of women who reach[ed] positions of authority in spite of gender inequalities in workplaces, and that teaches them in depth leadership skills, more encouragement will be ingrained in their personalities. It must also be reminded that any initiative that aims to reduce political loopholes for gender biases must involve the complementary and active participation of men and women in their

domestic, professional and socio-historic spheres.

In the public arena, more and better planned family-friendly policies should be implemented globally, yet that consider the national contexts, to establish a good enough work-life balance, creating strategic mechanisms to develop, enhance, and support gender equity in public and private sectors of employment. In this sense, more attention should be given to the improvement of the guidelines that regulate employee take-up of leave and dependent care policies, employer supported access to childcare, alternative work scheduling, such as working from home - when applicable, part-time work, and flex time. Female professionals should also be educated on how and where to report workplace discrimination, specifically sex-based discrimination to include sexual harassment. In relation to wage inequality, one of the most visible and practised forms of gender inequality, women should be educated on improving the assertiveness of their communications, so that they judge themselves capable of negotiating a higher wage. This continued education should be allied to the implementations of protocols within workplaces that formalise systematic monitoring and evaluation of their professionals, assuming transparency in these processes, in a way that has and promotes gender audit - to assess if the mass of females is being attained, which could increase the number of females in positions of leadership.

The practice of highlighting and publicizing this paper which claims for a 'space of motherhood' within forensic

dentistry serves as to support the honouring of those females who, as founding social and professional agents, provided either the first significant contributions to and/or delineation of the field, in an attitude that sees the protagonist of women also as a force within forensic dentistry, for, in essence, the very act of creation generally, and so far, still demands the mutual presence and/or active cooperation between masculine and feminine elements, so that the envisioning, generation, and rearing of a 'child' is established.

We confirm that we tried to publish the most accurate information possible. Not all names of great profess are not mentioned due to lack of information from sound resources or unawareness. The authors expect to acknowledge more information in the future which will turn out to be the other part of this publication.

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## RESUMO

Esta revisão de literatura tem como objetivo nomear as influentes pioneiras que romperam as barreiras conservadoras de gênero e estabeleceram os padrões para aquelas que seguiram seus caminhos como dentistas forenses ou odontologistas, com o objetivo de aumentar a visibilidade de suas identidades, feitos e posições de autoridade, diminuindo, assim, os estados de exclusão que ainda podem ser praticados para o reconhecimento de suas contribuições para a Odontologia. É nossa expectativa que as odontologistas contemporâneas possam, ao acessar essa leitura, reconhecer e promover a atuação feminina no campo forense, desde o seu início até os dias atuais e ter a certeza da representação e da excelência da mulher nela. É possível que outros nomes não foram mencionados por falta de informação segura ou desconhecimento. Também esperamos testemunhar revisões de literatura semelhantes no futuro.

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Odontologia legal; História da odontologia; Mulheres na ciência.

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