



## Professional Perception on Criminal Identification through Bitemarks in Portugal

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### Abstract

This study is aimed at examining the judgment of Portuguese criminal justice professionals on the importance of bitemarks for human identification in a crime context. It describes the results of a survey published in the Google Forms platform, in which 65 individuals took part. We were able to conclude that, in general, the respondents agree that bitemarks are important for human identification and should be used frequently in legal settings. The results obtained in this study suggest that those who've worked in crimes involving bitemarks attach more importance to the forensic analysis of these injuries than those who don't have experience in these cases.

**Keywords:** Human Bitemarks; Human Identification; Criminal Identification; Forensic Dentistry; Forensic Criminal Investigation; Forensic Study

### Introduction

Bitemarks are defined as patterns on the skin, food or objects resulting from the force applied by the teeth and oral structures involved in the act of biting by an adult, child or animal. This type of injuries is usually associated with violent crimes, thus the identification of the criminal is essential to prevent these crimes from happening again, judge them fairly and protect the victim. The identity of the criminal can be supported by scientifically deducing if the intentional bitemark belongs or not to a certain suspect or by the presence of a bitemark in the aggressor resulting from an attempt at self-defense from the victim, which ended with the victim leaving his/her dental information on the criminal [1,2].

Human identification through bitemarks is processed by way of a comparative analysis of bitemarks. Therefore, the study of these injuries depends on the existence of dental information from a

suspect, which will enable a comparison between the injury's pattern and his dental record. This method of analysis allows only to exclude or not to exclude suspects - it cannot guarantee, with absolute certainty, that a certain suspect is responsible for the injury. The purpose of this forensic analysis is to elaborate a report that may serve as additional evidence in a crime proceeding and perhaps support the findings of other areas with regard to such crime [1,3,4].

As a matter of fact, human identification through bitemarks is a procedure developed long ago; however, its worthiness in court has raised some questions and debates among the scientific community. The several publications on the topic indicate different opinions among forensic medicine authors regarding its contribution in crime contexts, and if it should or should not be regarded as valid at a legal level [4-7].

Following this, we were given a chance to study the opinion of criminal justice professionals in Portugal, in order to understand if they consider this piece of evidence as important for the identification of criminals. After conducting a bibliographic research, we found that no such studies had ever been published.

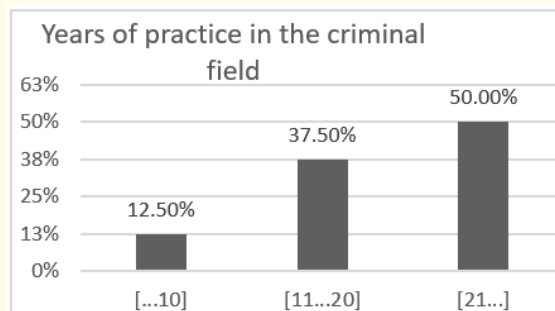
### Research Methodology

We created a survey in Portuguese and then we published it in the Google Forms platform on the 19<sup>th</sup> of January 2020. The survey was targeted at those who work in the criminal field, such as lawyers, judges and security forces performing their duties in Portugal, and was available online for one month. By the 19<sup>th</sup> of February 2020, 65 respondents had answered the survey: 55 men and 10 women. The answers were then collected and pre-processed with MS-Excel. The data analysis was made using the Orange3 and the SPSS v26 tools. The hypothesis tests had a 95% confidence interval, i.e. the extrapolation of results for this sample was considered only in cases where p-value was inferior to 0.05.

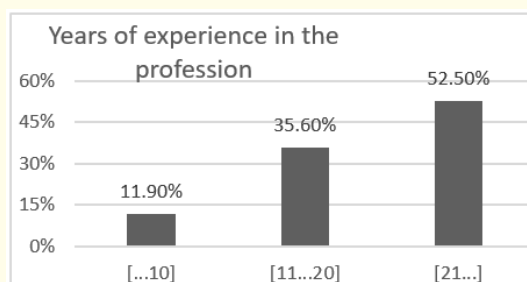
### Results and Discussion

The results of this article derive from the analysis and study of data obtained from the answers to the survey published in the Google Forms platform. The discussion and integration of the answers into this article’s topic enabled a very positive and coherent assessment of the opinion of criminal justice professionals working in Portugal. Despite the small sample size, the results proved to be consistent and pertinent with regard to the drawing of assumptions and conclusions on the studied topics.

The first questions of the survey were aimed at characterizing the sample. In this regard, 65 Portuguese individuals were questioned, namely 55 men and 10 women. Subjects from all the districts of the country took part. The sample characterization questions included: “How long have you been practicing your profession in Portugal?” and “How long have you been working in the criminal area in Portugal?”, which had the following response possibilities: “less than 10 years”, “between 11 and 20 years” and “more than 21 years”. 52.5% of the respondents declared having “more than 21 years” of professional experience, and 50% affirmed working for “more than 21 years” in the criminal area. Therefore, the sample of this study can be described as being mostly formed by male individuals with more than 21 years’ experience who work in the criminal field for more than 21 years in Portugal. Graph 1 and 2 show how these individuals are distributed by the three categories defined for their working years.

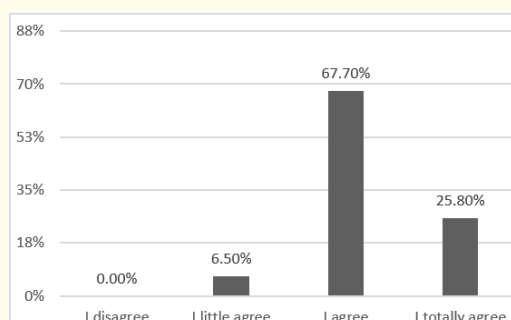


Graph 1: Years of practice in the criminal field of the survey participants.



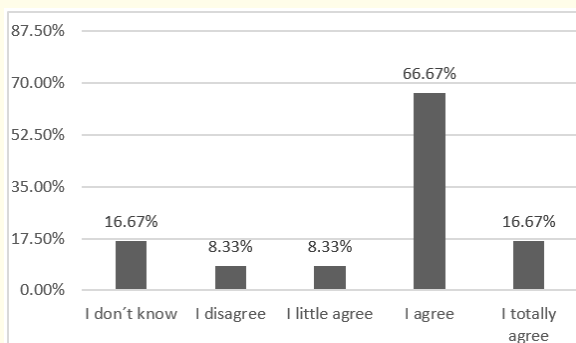
Graph 2: Years of experience in the profession of the survey participants.

The statement “Bitemarks are important for human identification” was included in the survey, with the objective of analyzing the opinion of the participants regarding the importance of bitemark studies in human identification. A valid percentage of 67.7% agree with such premise, whereas 25.8% totally agree. Only 6.5% of the respondents answered “I agree a little”, and 0% “I disagree”. Thus, the data suggest that the participants of this study tend to agree about the importance of bitemarks to human identification (Graph 3).



Graph 3: Results obtained from the opinion on the statement “Bitemarks are important for human identification”.

The next questions of the survey were intended to assess the utility of bitemarks in cases where the respondents had worked. For this assessment, the questions “Have you ever worked on a case where a bitemark was used as evidence of a crime?” and the statement “Bitemarks were important for the outcome of the proceeding” proved to be the most useful. The question “Have you ever worked on a case where a bitemark was used as evidence of a crime?” had a valid percentage of 35.9% of affirmative responses and 64.1% of negative responses. The opinions on the statement “Bitemarks were important for the outcome of the proceeding” reveal that the degree of agreement remains high in relation to importance, with 47.1% answering “I agree” and 11.8% marking “I totally agree”. However, we noticed that three of the answers to this question were given by individuals who had no experience in crime situations involving bitemarks. This was going to affect data reliability, so we chose to exclude these three specific answers and consider only those of the respondents who had previous experience in crimes involving bitemarks. As a result, 66.67% said they agree with the fact that bitemarks were important to end the case, while 16.67% manifested total agreement. The exclusion of these answers provided results with stronger agreement rates towards the importance of bitemarks (Graph 4).

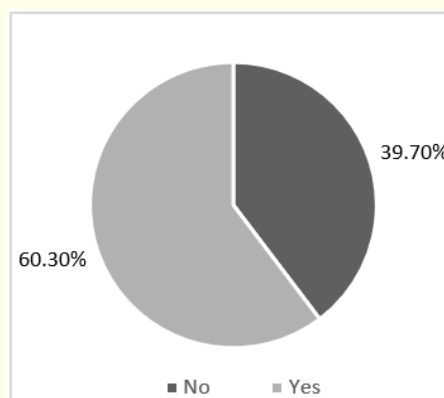


**Graph 4:** Valid results obtained to the question “Were bitemarks important to the outcome of the proceeding?”.

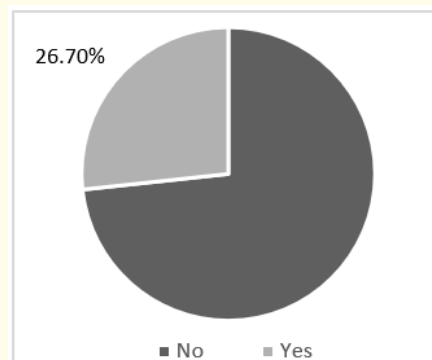
The data collected reveal that the place where bitemark injuries are found more often is the skin. In a valid percentage of 77.5%, the respondents answered “skin” to the question “In the crime situations that you’ve worked on (the ones where bitemark evidence was collected), bitemarks were found more often in (...)” with the answering options being: “skin”, “apple”, “chocolate”, “cheese”, “chewing gum”, “other foods” and “objects”. 12.5% of the participants marked the “other foods” option, 5% “objects”, 2.5% “chew-

ing gum”, 2.5% “cheese” and none of the respondents chose the options “chocolate” and “chewing gum”.

As for the bite receptor, the data suggest that, in most cases, the participants of the survey worked in crimes where bitemarks were present in the victims. This topic was studied by interpreting the answers to the questions: “Have you ever worked on a case where the victim was bitten?” and “Have you ever worked on a case where the aggressor was bitten?”. Most professionals answered “Yes” to the former, in a valid frequency of 60.3% (Graph 5), while only 26.7% answered “Yes” to the latter (Graph 6). These data suggest that bitemark injuries are found more often in victims, as a sign of the perpetrator’s aggressive behavior and his need or wish to demonstrate power and control over the victim.



**Graph 5:** Percentage of individuals who worked on cases where the victim was bitten.



**Graph 6:** Percentage of individuals who worked on cases where the aggressor was bitten.

The data processing allowed us to establish a correlation between the answers obtained in the survey in order to test the elements that might influence the respondents' judgment on the topic. This was achieved with the ANOVA (Analysis of Variance) test, which was used to assess if the years of practice and experience in the criminal field in Portugal influence the perception on the importance of bitemarks as an element of identification capable of being used in an investigation and as a piece of evidence. The results regarding the influence of the years of experience in the criminal field in Portugal are presented in table 1 and the results of the test regarding the years of practice of the Portuguese respondents are presented in table 2.

	p-value
Human bitemarks are an important element for human identification.	0,916
Bitemarks were important to the outcome of the proceeding when they were used as a valid physical sample.	0,366
The use of bitemarks as an element of identification should be more frequent.	0,117
Bitemarks were important to the outcome of proceedings in cases where you worked with valid marks registered by health professionals.	0,947
Bitemarks were important to the outcome of proceedings in cases where the aggressor had bitemarks on him.	0,087

**Table 1:** ANOVA test results regarding the years of professional experience in the criminal field in Portugal.

	p-value
Human bitemarks are an important element for human identification.	0.706
Bitemarks were important to the outcome of the proceeding when they were used as a valid physical sample.	0.358
The use of bitemarks as an element of identification should be more frequent.	0.336
Bitemarks were important to the outcome of proceedings in cases where you worked with valid marks registered by health professionals.	0.658
Bitemarks were important to the outcome of proceedings in cases where the aggressor had bitemarks on him.	0.110

**Table 2:** ANOVA test results regarding the years of practice in the criminal field of the survey participants.

The analysis of the results presented above allows us to conclude that there is no evidence that the number of years in the profession or the number of years of experience in the criminal field have influence on the perception of the five studied variables regarding the importance of bitemarks. However, we should reinforce that, in relation to the years of experience in the criminal field, the importance attributed to bitemarks tends to increase in the same proportion as the years of experience.

The respondents' judgment on the importance of bitemarks was also tested by establishing a correlation between the answers to the question "Have you ever worked on a case where bitemarks were used as a valid physical sample?" and the opinions on the statement "Bitemarks were important to the outcome of the proceeding". The results of this statistical inference are in accordance with the conclusions made before, since having worked in cases with bitemarks proved to be a factor that alters the professional's perception on the importance of this forensic analysis. These results reveal that the respondents who've worked in cases involving bitemarks attach more importance to the need of using bitemarks more often for purposes of human identification in legal contexts. The same happens with individuals who've worked in cases where bitemarks were used as evidence of a crime; however, in relation to them, there is a different pattern on how often bitemarks should be used. There is also a change in the perception of their importance, in that those who have never worked in such cases still perceive this feature as important, according to their high proportion of "I agree" answers.

While working on this article, and bearing in mind the purpose of this study, we raised the following hypothetical question: "Do those who've worked in cases involving bitemarks have a different perception on the importance of bitemarks to human identification?". It was possible to answer this question by analyzing and correlating the data to the questions and statements: "Have you ever worked on a case where a bitemark was used as evidence of a crime?", "Have you ever worked on a case where the victim was bitten?", "Bitemarks are an important element for human identification" and "The use of bitemarks as an element of identification should be more frequent". In view of this, we decided to carry out a chi-square test to assess such hypothesis. The results can be found in table 3.

		Have you ever worked on a case where the victim was bitten?		Have you ever worked on a case where bitemarks were used as evidence of a crime?	
		No(A)	Yes(B)	No(A)	Yes(B)
Human bitemarks are an important element for human identification.	I Don't know				
	I disagree				
	I agree a little				
	I agree				
	I totally agree		A		A
The use of bitemarks as an element of identification should be more frequent.	I don't know				
	I disagree				
	I agree a little				
	I agree			B	
	I totally agree				A

**Table 3:** Results of chi-square test to assess the hypothesis “Do those who’ve worked in cases involving bitemarks have a different perception on the importance of bitemarks to human identification?”.

The results of the chi-square test reveal that the agreement is not dependent on the participation or non-participation of the respondents in situations involving bitemarks; however, this aspect interferes with their full agreement, since only those who have actual experience in this context marked the option “I totally agree” in relation to the value of bitemark injury analyses.

Thus, the results show that, despite the importance placed on bitemarks not being related to the years of experience and practice, it proved to be related to the participation of the respondents in a specific criminal context involving bitemarks. However, the analysis and correlation of results raises some questions, since those who have already worked on cases involving bitemarks tend to attach more importance to this forensic study as a piece of evidence; all of them fully agree that it should be used more frequently, but then again it is possible to conjecture the reason of not existing full agreement on these injuries being important to the outcome of proceedings. Is it due to the level of importance attributed to human identification through this means in a legal context? Is it because the evidence didn't have enough quality to be considered for the outcome of a proceeding? It might be interesting and necessary to approach these questions in a clearer way in a further study.

More studies should be conducted on this topic, with a larger sample and, if possible, a longer online availability. This scientific study can be improved, in that the answers should all have been

required, in a way to make data processing easier. More direct and clearer questions on the outcome of proceedings will be made in a future survey. It might also be interesting to question the participants on the nature of the bitemark-related crimes in which they've worked, in order to understand in which situations it is more common to find physical injuries [8-12].

**Conclusion**

In general, the respondents agree that bitemarks are important to human identification and should be used frequently in a legal context. The perception on the legal importance of bitemarks proved to be unrelated to the years of experience and practice in the criminal area; however, there is a tendency among those who've worked in crimes involving bitemarks to attach more importance to bitemark studies. The skin proved to be the most common substrate to these injuries, which, according to our results, are found more often in crime victims than in the aggressors. More studies should be conducted on this topic.

**Conflict of Interest**

The authors have no conflicts of interest to declare.

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