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## Anatomical Distribution of Human Bite Marks in a Series of 67 Cases

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**ABSTRACT:** A study was made of the anatomical distribution of human bite marks, as well as their distribution by age of victim and type of crime involved. Bite marks in this study occurred primarily in sex-related crimes, child abuse cases, and cases involving other types of physical altercations. Bite marks were found on virtually all areas of the body, with more than one bite mark on 40% of the victims. Female victims were most commonly bitten on the breasts, arms, and legs, while male victims were most commonly bitten on the arms and shoulders.

**KEYWORDS:** odontology, bite marks

Well-defined bite marks can provide important information about the dentition of the person making the bite (Fig. 1). This information may help to establish that the suspect in a case was present at the scene of the crime and that the suspect was in violent contact with the victim (Figs. 2 and 3). Consequently, when good bite marks are available, they can be crucial evidence in determining a suspect's guilt or innocence, and can be a very powerful and persuasive tool in the courtroom.

Bite mark evidence is now a legally admissible form of evidence in many civilian jurisdictions and in the military courts [1,2]. However, despite the importance of bite marks, they have sometimes been overlooked at the crime scene, and even in the autopsy room, resulting in unnecessary exhumations or the loss of important evidence. In educating law enforcement personnel, coroner's investigators, pathologists, and dentists to detect and properly document bite marks, it is valuable to know where these marks are most likely to be found.

Presently available information on the anatomical distribution of bite marks comes from two sources (hospital studies and coroner's cases), and the findings are somewhat in conflict. Thus, Lowry [3] reported on 122 human bites observed in a New York hospital; 93 were on hands and fingers, ten on the face and head, and 19 on other parts. Similarly, Speirs [4] reported 114 cases in Kansas, which included 27 bites on fingers, two on the palm, 14 on knuckles, 18 on the arm, two on the shoulder, four on the forehead, twelve on the lip, four on the nose, 13 on the cheek, five on the ear, seven on the breast, two on the abdomen, one on the back, and three on the thigh. Marr [5] reported a more recent New York study with

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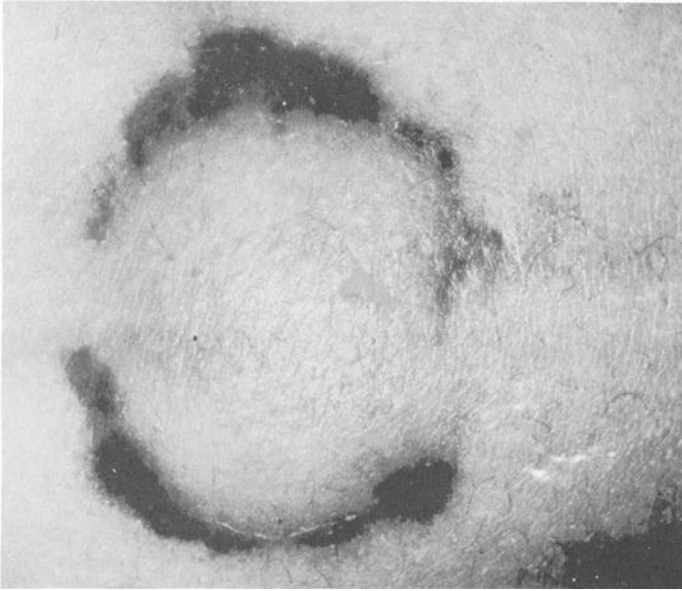


FIG. 1—Bite mark on shoulder of male homicide victim showing the round to ovoid contused pattern often associated with bite marks. Maxillary teeth caused upper portion of mark, as demonstrated by greater mesiodistal width of central incisor marks compared to adjacent teeth.

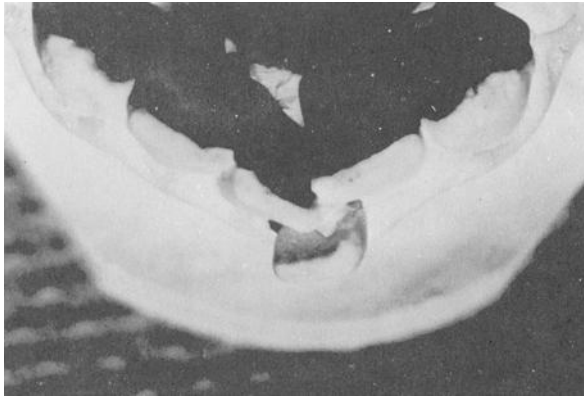


FIG. 2—Unusual V-shaped alignment of suspect's lower teeth, with one incisor completely crowded out of alignment, corresponds to bite mark shown in Fig. 3.

133 bites on the head and neck, 103 on the trunk, 546 on the upper extremities, 33 on the lower extremities, and 77 unknown.

Although the hospital-based studies indicate that it is the upper extremities (particularly the hands and fingers) that are most commonly bitten, information in the forensic science literature is to the contrary. Thus, the British researcher Harvey [6] reported a total of 74 bite marks studied by Furness, Simpson, and Harvey. He stated, "It can be seen that most of these bites occurred on the breast." Specifically, 23 bites occurred on the breast, twelve on the face or head, and only ten on the hand or arm.



FIG. 3—Lower portion of bite mark on six-year-old female victim displays a reverse image of suspect's unusual dental alignment (Fig. 2). Bite mark evidence was a significant factor in obtaining a murder conviction.

### **Statement of Purpose**

Because of the increasing use of bite mark evidence in the courts and the substantial number of bite marks now seen by our office, the present study was undertaken to independently assess the anatomical distribution of human bite marks. It was hoped that this might provide a useful body of information for reference in training and case study, and that it might help to resolve the apparent conflict in presently existing information on this subject.

### **Material and Methods**

The records of 92 consecutive bite mark investigations conducted by forensic dentists associated with the Los Angeles County Medical Examiner-Coroner's office over a twelve-year period (1970 through 1981) were reviewed and analyzed. Eighteen cases that ultimately proved either equivocal or negative for human bite marks were eliminated. Also eliminated were four cases involving foodstuffs and three cases in which the bites were inflicted by animals. The remaining 67 were cases involving one or more human bite marks. Twenty-

seven (40.3%) of these cases involved multiple bite marks, with a range of two to 16 bite marks per case. A total of 164 bite marks were included in the study.

Fifty-three of the victims studied were deceased. Forty-two of these were Los Angeles County cases and eleven were from other jurisdictions. Fourteen cases involved living victims, referred by police agencies and district attorneys' and public defenders' offices. Eleven of these were from Los Angeles and three were from other jurisdictions. The ethnic mix was substantially Hispanics and blacks. The balance were white and Asian. Ages ranged from an infant of several months to a 73-year-old sex crime victim. The largest proportion of victims (nine males and 15 females) were in the 21 to 30 age bracket, representing 35.8% of the 67 victims (Table 1).

The available material was analyzed as to anatomical distribution by case and also anatomical distribution by individual bite marks. The results were classified according to the system used by Harvey [6] and compared with the British findings. The California cases were then separated as to sex of the victim, and males and females were re-examined separately. The material was also analyzed with regard to combinations of bite marks occurring in the same case. As a corollary to the main purpose of the study, an effort was made to assess the proportion of cases related respectively to child abuse, sexual abuse, or other physical altercations.

## Discussion of Findings

### *Analysis of Cases*

By far the highest percentage of cases (37.3%) involved bite marks on the arms (Fig. 4). Indeed, if hands and fingers are included, bite marks were found on the upper extremities in nearly twice as many cases (43.3%) as on the breasts (22.4%). Also, bite marks on the legs occurred in nearly as high a percentage of cases (19.4%) as the breasts. The abdomen, back, face/head, shoulders, buttocks, and the area surrounding the vagina were closely grouped in terms of frequency. In general, these findings are rather consistent with the hospital studies (showing numerous bites on hands and fingers, few on the breasts), but inconsistent with the Harvey [6] report (showing the reverse).

TABLE 1—*Age distribution of victims.*

Ages	Number of Cases	
	Male	Female
0-5	4	6
6-10	...	...
11-15	1	2
16-20	1	5
21-25	6	5
26-30	3	10
31-35	2	6
36-40	2	1
41-45	2	2
46-50	...	...
51-55	...	1
56-60	1	...
61-65	2	1
65+	1	3
Total	25	42

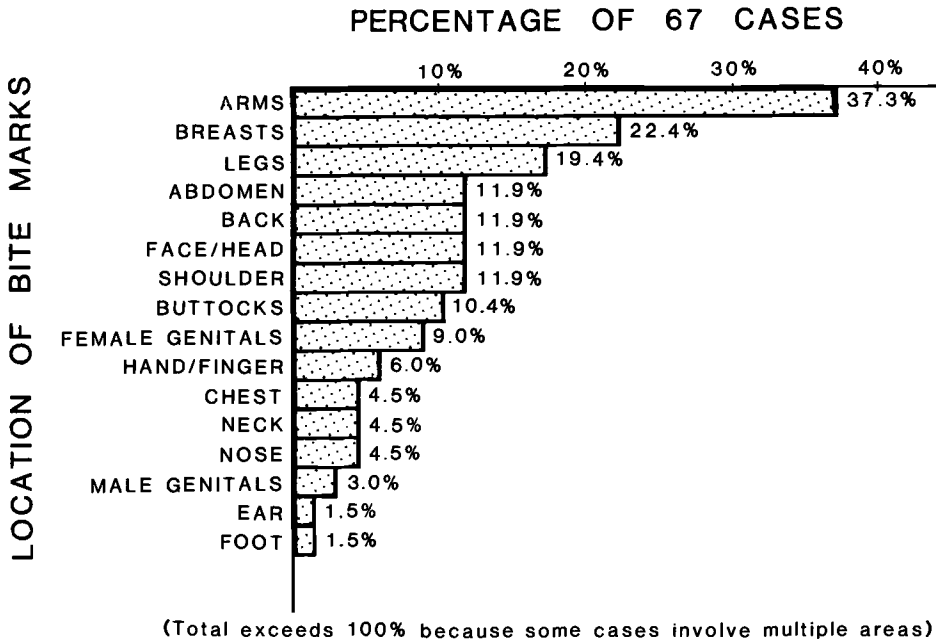


FIG. 4—Location of bite marks in 67 verified cases.

#### *Analysis of Individual Marks*

When the 164 individual bite marks are analyzed (Fig. 5), the findings differ somewhat from the analysis based on *cases*. This is because some cases exhibited numerous bite marks on the same area. Thus, one victim had at least ten bites on the legs and another had twelve bites on the back. Consequently, the analysis by bite marks shows an even greater percentage of bite marks on the extremities (and back) and an even smaller percentage on the breasts than in the case-by-case analysis.

When compared with the British [6] experience (Table 2), our overall results show a far smaller percentage of breast cases and a far higher percentage of extremity cases.

#### *Analysis by Sex of Victim*

Of the bite mark victims, 62.7% were female and 37.3% were male. When the 42 female victims are separated from the 25 male victims, sex-related differences become quite apparent.

By far the highest percentage of male victims had bite marks on the arms (36.7% of cases) or shoulders (16.7% of cases) (Fig. 6). When the female victims are analyzed on a case-by-case basis (Fig. 7), by far the highest percentage of bite marks occurred on the breasts (19.2% of cases), the arms (15.1% of cases), and the legs (11.0% of cases). When individual bite marks are considered (Fig. 8), the ranking changes to arms, legs, and breasts. This is due to a higher proportion of multiple marks on arms and legs and a statistical distortion resulting from a single case with at least ten bite marks on the legs.

It is noted that when female victims only are considered, the disparity between our results and those reported by Harvey [6] are slightly diminished. Even so, among our female vic-

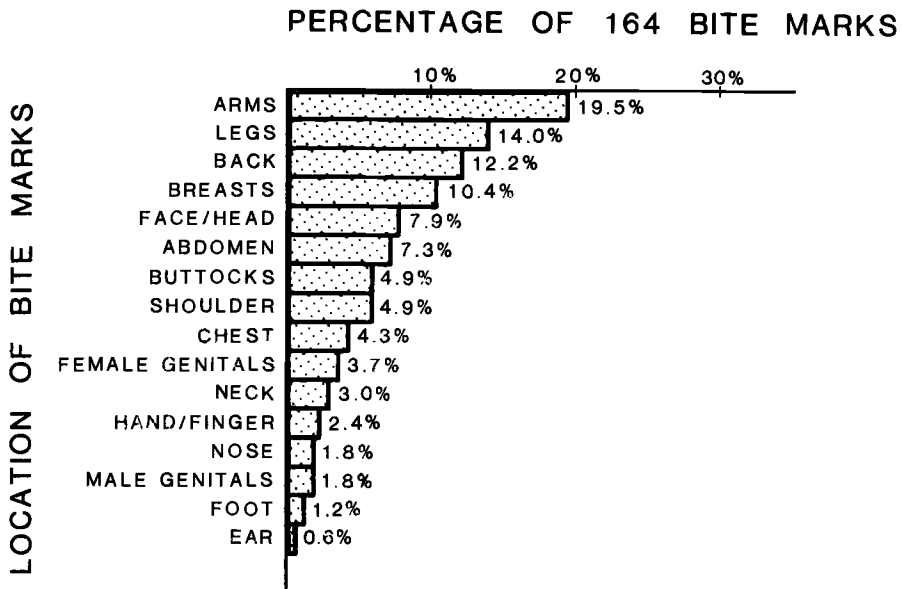


FIG. 5—Analysis of findings based on the number of individual bite marks.

TABLE 2—Results of current study compared with British findings.

Anatomical Site	California		British <sup>a</sup>	
	Number of Bite Marks	Percent of 164 Marks	Number of Bite Marks	Percent of 71 Marks
Face or head	13	7.9	12	16.9
Ear	1	0.6	1	1.4
Nose	3	1.8	1	1.4
Neck	5	3.0	1	1.4
Shoulder	8	4.9	6	8.4
Chest	7	4.3	0	0.0
Breast	17	10.4	23	32.4
Arms	32	19.5	5	7.0
Hands/Fingers	4	2.4	5	7.0
Abdomen	12	7.3	10	14.1
Buttocks	8	4.9	3	4.2
Female genitals	6	3.7	2	2.8
Male genitals	3	1.8	1	1.4
Legs	23	14.0	1	1.4
Foot	2	1.2	0	0.0
Back	20	12.2	0	0.0
Totals	164	99.9	71	99.8

<sup>a</sup>Calculated from data published by Harvey [6].

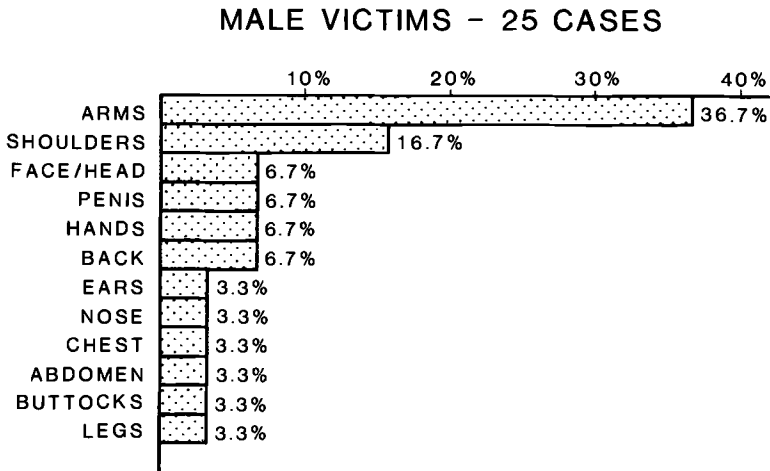


FIG. 6—Location of bite marks on male victims. Number of cases exceeds number of victims because of multiple bite marks on some victims.

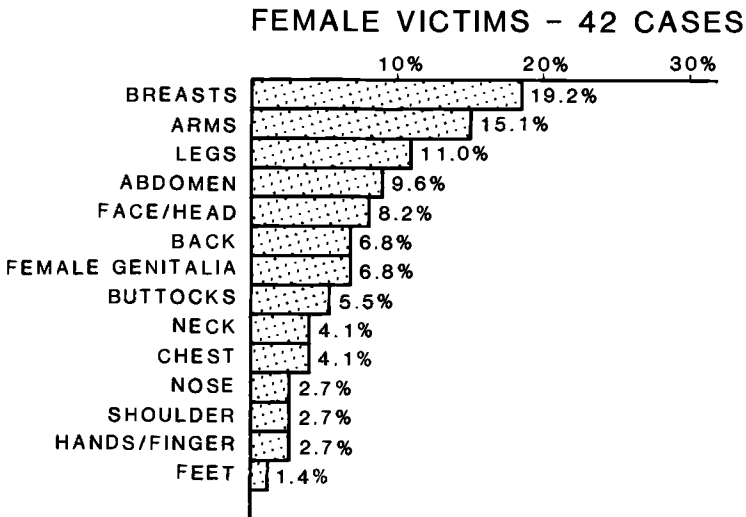


FIG. 7—Location of bite marks on females, analyzed by individual cases.

tims, bite marks on the breasts represent only 19.2% of the cases, compared to the 32.4% in the cases reported by Harvey. Also, our female population had bite marks on the arms in 15.1% of the cases—more than twice the percentage calculated from the British findings.

#### Combinations of Bite Marks

As noted above, some cases involved multiple bites to the same area. In addition, 15 of the 67 cases (22.4%) had bite marks involving at least two and as many as six different parts of the body. For example one infant had bite marks on the face, arm, hand, leg, foot, and but-

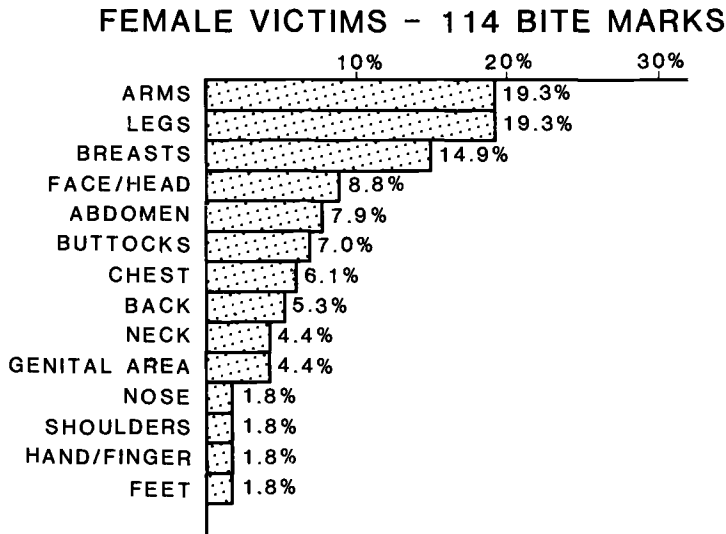


FIG. 8—Location of bite marks on female victims, analyzed by individual bite marks.

tocks. The most frequently found combination was the arm and back (three cases). However, the number of cases involved in this portion of the study is too small for statistical comparison.

Since 22.4% of the cases involved bite marks in more than one anatomical area, it should be emphasized that whenever a single bite mark is found, the entire body should be examined carefully for other bite marks.

#### *Crimes Involved*

Thirty-two of the cases (47.8%) involved sex-related crimes and nine cases (13.4%) involved child abuse. Thirteen cases (19.4%) involved other crimes and altercations including robbery, battery, domestic disputes, barroom fights, and so on. In 13 cases (19.4%), this information was not known at the time the data were collected.

#### **Conclusions and Comments**

1. The bite marks in this study occurred primarily in sex-related crimes, child abuse cases, and cases involving physical altercations of various types. Law enforcement officers and health workers, as well as coroner's investigators and pathologists, should be on the alert for the presence of bite marks in all cases in these categories.

2. Bite marks were found on virtually all portions of the human anatomy. Therefore a search for bite marks must include the entire body.

3. Over 40% of the victims received more than one bite mark and many had bite marks on more than one part of the body. Therefore when a single bite mark is discovered, particular care must be taken to determine if any other part of the body was bitten.

4. Overall, bite marks were found most commonly on arms, legs, and breasts. However, female victims were most commonly bitten on the breasts, arms, and legs. Male victims were most commonly bitten on the arms and shoulders.



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