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Cocaine and Homicide in Memphis and Shelby County: An Epidemic of Violence

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ABSTRACT: In Memphis and the surrounding county, there were a record number of homicides (179) in 1986. During the same year, there was a marked increase in medical examiner cases where tests were positive for cocaine or its metabolites. Review of medical examiner and toxicology records from 1980 to 1986 found 87 cocaine related deaths; 46 of these were homicides. In 1986 alone, there were 53 cocaine related deaths, all manners, and 31 cocaine related homicides. In this year, 17.3% of the homicides were positive for cocaine or metabolite. The cocaine related homicides were similar to other homicides in terms of age, race, sex, blood ethanol concentration, and cause of death being due most often to firearms. In homicide cases in which an abuse drug was detected, cocaine accounted for the entire increase in 1986. Police records indicated that cocaine directly contributed to the homicide in 39% of the cases in which the drug was found. In other cases, we speculate that cocaine altered behavior may have contributed to the victim's being murdered either during the drug "high" or during the post euphoric depression or withdrawal phase.

KEYWORDS: criminalistics, cocaine, homicide

The increasing incidence of cocaine abuse, especially with the relatively recent introduction of the free-base formulation known as "crack," is producing enormous social and medical consequences in the United States. According to estimates from the Drug Enforcement Administration and the National Institute on Drug Abuse, of the 22 million Americans who have tried cocaine, there were 5.8 million current users in 1985. At least 1 million Americans have used free-base forms, including "crack," and 30% of all college students use cocaine at least once before they graduate. Between 1981 and 1985, cocaine overdose deaths in 25 major metropolitan centers more than doubled, and cocaine related emergency room visits tripled. It is thought that 150 tons (136 Mg) of cocaine were smuggled into the U.S. during 1986; this is twice the 1985 level [1].³ Increased availability of more potent forms of the drug, decreasing price, and abundant supply have made cocaine attractive to less affluent and younger buyers so that it now competes with Acquired Immunodeficiency Syndrome (AIDS) for the title of "Scourge of the 1980's" [2].

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³"Reports on Drug Abuse Trends" (personal communications), Division of Epidemiology and Statistical Analysis, National Institute on Drug Abuse, Washington, DC, 1987.

Law enforcement agencies report that the rising popularity of "crack" is paralleled by a proportionate increase in crime including burglary, armed robbery, and homicide [3]. Regional outbreaks of violence associated with the cocaine trade have been noted [4,5]. In Memphis and Shelby County in 1986, there was a dramatic increase in the number of cases referred to the medical examiner in which the decedent tested positive for cocaine. In this same year, Memphis and Shelby County recorded an all-time record in the annual homicide rate. To assess cocaine's contribution to the homicide rate, we reviewed all medical examiner cases over the last seven years in which cocaine was detected in body fluids. For those in which homicide was the manner of death, we evaluated police records for details of the incident in which the person was killed.

The term "cocaine related death" is used in this report as defined previously [6] to refer to any fatality in which cocaine or its metabolites or both were detected in postmortem blood, urine, or other specimens, regardless of whether cocaine was the actual cause of death. Similarly, we use the term "cocaine related homicide" for those homicides in which cocaine or metabolite was detected in the body fluids.

Methods and Materials

Drug Screening Procedures and Toxicology Methods

Over the time period of this study, toxicology procedures have remained constant: thus, changes in drug detection rate do reflect real phenomena. All deaths in Memphis and Shelby County as a result of violence, accidents, suspicious or unnatural means, as well as those medically unattended, are referred to the medical examiner to determine the cause of death. Regardless of whether an autopsy is performed, toxicological analyses are performed on blood, urine, and often vitreous humor for essentially all deaths under the age of 60, for all deaths as a result of trauma, and for those suspected of resulting from unnatural circumstances. In addition, alcohol determinations are performed on all urine and blood samples by a headspace gas chromatographic technique. By this method, ethanol, methanol, isopropanol, and acetone are identified and quantitated.

For the methods used in this laboratory, urine is the preferred fluid for drug screening. This is screened directly using the Enzyme Multiplied Immunoassay Technique (EMIT[®]), for which reagents are obtained from Syva, at a lower sensitivity level of 300 $\mu\text{g}/\text{L}$. The urine samples are also extracted with chloroform/isopropanol (4:1) after buffering to pH 9.3; this allows the extraction of most acidic, neutral, and basic compounds. Thin-layer chromatography is performed on the concentrated extracts, and cocaine and its metabolites are visualized on the chromatogram of the basic plate by spraying with acidified iodoplatinate. Other drugs are detected by similar methods.

If the urine is positive or if no urine is available, the blood is screened by first extracting for acidic and neutral drugs and treating this extract as described for the urine. In addition, blood is extracted with *n*-butyl chloride for basic compounds. The concentrated extract is injected into a gas chromatograph with a 2-m SP-2100 packed column and flame ionization detector. Preliminary identification of cocaine or metabolite in a suspected sample is made by rechromatographing on a 15-m DB-1 narrow bore capillary column and by comparing the measured retention indices with library data. Final confirmation of drug or metabolite is established by gas chromatography/mass spectrometry (GC/MS). This procedure will not include benzoylecgonine for which a separate, more involved procedure is used only in special circumstances.

Concentration of cocaine in blood is determined by gas chromatography using an internal standard on a 15-m DB-5 narrow bore capillary column equipped with a flame ionization detector. This allows a sensitivity of 50 $\mu\text{g}/\text{L}$ (165 nmol/L). More recently, greater sensitivity in quantitation is achieved with selected ion monitoring, using cocaine- d_3 and benzo-

ylecgonine-d₃ as internal standards [7]. While all blood cocaine concentrations are determined, benzoylecgonine blood concentrations are determined only for investigation of suspected cocaine overdose deaths that are negative for or have very low levels of cocaine in the blood.

Review of Records

Toxicology records on computer file at the Shelby County Medical Examiner's Office were searched for all medical examiner cases in which cocaine was detected in postmortem body fluid analysis for the inclusive years 1980 through 1986. From those records, age, race, sex, manner of death, and cause of death were tabulated. From the corresponding toxicology reports, the following were recorded: blood cocaine concentration; presence of cocaine in urine or other fluids; presence of cocaine metabolites, ecgonine methyl ester, ethylbenzoylecgonine, or benzoylecgonine; blood ethanol concentration; and presence and identity of other drugs in blood or urine. For the cocaine positive homicide cases, police records in the Violent Crimes Bureau of the Shelby County Criminal Justice Center were examined and details of the incidents were summarized.

Other medical examiner and toxicology records were examined to define three control groups. For the first, all homicides from 1980 to 1986 were reviewed, and the age, race, and sex for each case were tabulated. The number of these homicides in which firearms caused death were counted. For the second group, all homicides within the same time period that had a blood alcohol concentration greater than 100 mg/dL (22 mmol/L) were enumerated. For the third, all homicides within the same seven-year period with a positive urine or blood drug screen were reviewed, and the particular drugs found were compiled.

Results

Yearly totals for cocaine related fatalities in Memphis and Shelby County are shown graphically in Fig. 1. The total number over the period of study was 87. Of these, homicide constituted the largest category of manner of death, accounting for 46 (53%) of all cocaine related fatalities. Of the cocaine-related deaths 53 occurred in 1986, and 31 of these were

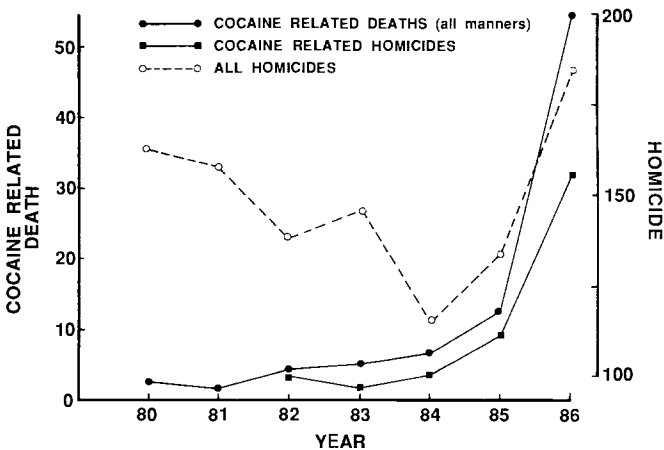


FIG. 1—Cocaine related deaths, all manners, are shown graphically for comparison with annual homicide rate and number of homicides in which cocaine was detected in the decedent. Broken line refers to all homicides; its scale is to the right. Solid lines refer to the scale on the left.

homicides. All but 4 of the cocaine related homicides were the result of firearms: 2 were the result of stabbings and 2 of beatings. For comparison, the yearly homicide rate is shown on the same graph. The grand total of homicides was 1051, with 179 in 1986 as the maximum and 120 in 1984 as the minimum.

Table 1 presents the age distribution of cases for all homicides and for those homicides in which cocaine was detected. The cocaine related homicide contribution to the total, in percentages, are included at each age interval. The maximum percentage was for the age group 30 to 34, in which cocaine related homicides constituted 11% of that total. On the other hand, there were no cocaine related homicides in the age group 50 and above.

The sex ratio for cocaine related homicides was 43 males to 3 females, and the racial distribution was 41 blacks to 5 whites. Firearms were the murder weapons in 42 cases. For comparison, in homicides overall the sex ratio was 860 males to 191 females; and for race, 791 blacks to 260 whites. Firearms caused the death in 734 of the 1051 cases.

Ethanol was present in the blood in greater than trace amounts in 32 of the 46 cocaine related homicides. This concentration was greater than 100 mg/dL (22 mmol/L) in 16 cases (35%). The percentage of cases with ethanol concentrations greater than 100 mg/dL (22 mmol/L) for all homicides, calculated on a yearly basis, ranged from 27 to 37%.

Of the 46 cocaine related homicides, 30 had no detectable cocaine in the blood at our sensitivity limits of 50 $\mu\text{g/L}$ (165 nmol/L). In these cases, cocaine or a metabolite was found only in the urine. Of these 30, 6 were positive by EMIT only; in these cases, the urine contained no free cocaine or other readily confirmed metabolite. The confirmation of benzoylecgonine, which triggers the EMIT at a level of 300 $\mu\text{g/L}$ requires a separate extraction and derivatization procedure and is not routinely performed for urine. Of the 16 cases with positive blood cocaine concentrations, blood levels ranged from 0.05 to 1.30 mg/L (165 to 4290 nmol/L) with an average level of 0.22 mg/L (725 nmol/L).

Table 2 lists the most common drugs of abuse found in the total homicide population from 1980 to 1986. Other drugs that were detected, such as lidocaine or other agents that may have been administered during attempted resuscitation, are omitted from this list. Likewise, the following drugs are not considered: anticonvulsants other than phenobarbital, tricyclics and phenothiazines, antihistamines other than tripeleminamine, decongestants, salicylates, and acetaminophen. The entries for "Opiates" include morphine, codeine, methadone, hydrocodone, and meperidine. Phenmetrazine is included because often it has been present in levels indicating that it was being abused. The table also shows the number of cases in which two or more drugs of the list were present in the same body, as well as the total number of times any drug on the list was detected in the homicide cases. As is apparent from the table, cocaine alone accounts for the sharp increase in homicide cases in which drugs were detected in 1986. Certain drugs, such as amphetamines and methaqualone, are infrequently detected now, as compared to the past, whereas others, such as tripeleminamine and pentazocine, have shown an increase and rank behind cocaine as those most frequently appearing. From our

TABLE 1—Age distribution for homicides, all years combined.

| Age Range | All Homicides | Cocaine Related Homicides (% of All Homicides) |
|-----------|---------------|--|
| 20-24 | 159 | 6 (3.8%) |
| 25-29 | 188 | 15 (8.0%) |
| 30-34 | 155 | 17 (11.0%) |
| 35-39 | 104 | 4 (3.8%) |
| 40-44 | 74 | 2 (2.7%) |
| 45-49 | 60 | 2 (3.3%) |
| 50+ | 192 | 0 (0%) |

TABLE 2—*Drugs detected in homicide cases, by year.*

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|------------------|------|------|------|------|------|------|------|
| Cocaine | 0 | 0 | 3 | 1 | 3 | 8 | 31 |
| Barbiturates | 6 | 1 | 4 | 5 | 2 | 4 | 4 |
| Benzodiazepines | 6 | 1 | 6 | 3 | 2 | 3 | 4 |
| Meth/amphetamine | 2 | 0 | 2 | 0 | 1 | 1 | 0 |
| Methaqualone | 5 | 1 | 2 | 0 | 1 | 0 | 0 |
| Opiates | 2 | 4 | 2 | 2 | 4 | 2 | 0 |
| Pentazocine | 1 | 0 | 3 | 5 | 2 | 3 | 8 |
| Phenmetrazine | 1 | 4 | 0 | 2 | 0 | 1 | 0 |
| Propoxyphene | 0 | 2 | 1 | 0 | 0 | 0 | 1 |
| Tripelennamine | 0 | 0 | 2 | 4 | 2 | 2 | 7 |
| Multiple | 4 | 2 | 4 | 6 | 4 | 3 | 8 |
| Total | 23 | 13 | 25 | 22 | 17 | 24 | 55 |

own observations, these latter two drugs are also those most often seen in combination with cocaine.

The circumstances of the cocaine related homicides in which police records indicated that cocaine was directly involved are summarized in Table 3. Age, race, and sex are given as well as a brief description of the incident.

Discussion

These statistics from the Shelby County Medical Examiner's Office indicate that there has been a dramatic increase in cocaine related fatalities in the Memphis area, especially within the past two years. Although all manners of death have shown an increase, homicide constituted the greatest proportion of cases (53%) as well as showing the most rapid increase.

Cocaine related homicides were similar to the control groups of all homicides with respect to age, race, and sex distribution. The most frequent victims of homicide, regardless of the

TABLE 3—*Police records of homicides in which cocaine was directly involved.*

| Victim | | | Description of Incident |
|--------|------|-----|--|
| Age | Race | Sex | |
| 25 | W | M | robbed of cocaine and shot |
| 23 | B | M | shot by dealer secondary to debt |
| 31 | B | M | shot during argument over drugs |
| 27 | B | M | shot during argument over drugs |
| 49 | W | M | robbed of cocaine and shot |
| 43 | B | M | shot by dealer secondary to debt |
| 32 | B | M | dealer shot during transaction |
| 31 | B | M | dealer shot by competing dealer |
| 36 | B | M | dealer robbed of cocaine and shot |
| 30 | B | M | shot by dealer secondary to debt |
| 28 | W | M | shot while purchasing cocaine |
| 40 | B | F | beaten by cocaine dealer |
| 33 | B | M | shot by cocaine dealer |
| 30 | B | M | shot while purchasing cocaine |
| 31 | B | M | dealer shot after selling sheetrock instead of cocaine |
| 25 | B | M | robbed of cocaine and shot |
| 22 | B | M | shot while purchasing cocaine |
| 29 | B | M | dealer shot trying to collect debt |

presence or absence of cocaine, are black males between the ages of 20 and 35 years. Those victims between the ages of 25 and 34 years were particularly likely to be involved in a cocaine related homicide. Cocaine was not found in murder victims of age 50 years and greater. Firearms, as they are in all homicides, were the usual instrument of death in the cocaine related homicides. Also, ethanol was detected at blood levels greater than 100 mg/dL (22 mmol/L) in the cocaine related homicides as frequently as in homicides overall.

Police records indicated that in a high proportion (39%) of the homicides, the victim was murdered during a cocaine transaction or during some dispute over the drug itself. Cases in which cocaine directly contributed to the homicide involved one or more of the following:

- subject killed by dealer (four cases) because of debt (three cases),
- dealer killed (five cases),
- subject robbed of cocaine and killed (four cases),
- subject shot while purchasing drugs (three cases), and
- subject killed during an unspecified argument regarding cocaine (four cases).

Other homicides that were not obviously direct results of cocaine transactions or disputes frequently occurred as culminations of domestic arguments between individuals who knew each other well. This pattern is similar to homicides in general, both in this city as well as in others [8,9].

The figures in Table 2 showing the frequency with which different drugs of abuse have been detected in homicide cases in part reflect changing drug usage patterns. However, the most important observation is that cocaine alone accounts for the sharp increase in homicides in which drugs were found in the decedent. This indicates that cocaine may somehow contribute to the person being murdered, even if the incident does not directly involve a drug transaction or dispute. Much of this could be environmental or situational, in that a person using the drug may be more likely to be in a place where violence could erupt. Other factors might include drug altered behavior of persons under its influence, especially when combined with the effects of ethanol or other drugs or both.

It is known that chronic cocaine users may develop toxic psychoses, irrationality, paranoia, and proneness to violence; and when not "high" on the drug, they may suffer severe depression and dysphoria [10,11]. Conceivably, any of these adverse effects of cocaine abuse could result in irrational or aggressive behavior or both, leading to circumstances in which he/she was murdered. In our cocaine related homicides, 64% of the cases had no detectable blood cocaine, and cocaine or metabolite was found only in the urine. This *suggests* that the cocaine user may become even more at risk for being murdered during the post euphoric depression or withdrawal phase, possibly because of aggressive drug seeking behavior.

In conclusion, cocaine related homicides have increased at an alarming rate within the past two years, and there is evidence that cocaine directly contributed to the all-time record number of homicides occurring in Memphis in 1986. Moreover, our data, which indicate the drug status of the victims of homicide but not of the assailants, cannot reflect the full contribution of cocaine to violent crime. Although homicide is only one of the mechanisms by which cocaine contributes to death, it is the most common and fastest growing manner of cocaine related death. Overall, cocaine related homicides constituted 4.4% of the total homicides in the seven-year period but climbed to 17.3% of the homicides in 1986.

In a high proportion of cases (39%), cocaine contributed directly to the homicide, as through a drug dealing activity or dispute. In other cases, cocaine intoxication or withdrawal may have affected behavioral changes that resulted in circumstances leading to the homicide.

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The authors wish to dedicate this publication to the memory of our colleague James Spencer Bell, M.D., who recently died unexpectedly. His contributions and intellectual enthusiasm for forensic science, pathology, death investigation, and toxicology will remain an inspiration to us all.

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