A Study of Gonococcal Infections Among Infants and Children

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ACCORDING to a report of the World Health Organization Expert Committee on Gonococcal Infections, a persistent, significant rise has occurred since 1957 in gonorrhea incidence in 53 of the 111 countries studied (*1*). The rise has been most marked among the age group 15–24 years.

In 1957 a study was undertaken by the Los Angeles City Health Department of 1,000 case histories of males with gonorrhea, aged 15–60 years, who were clinic patients from a low socioeconomic section of the city (*2*). The study revealed that their average age at the time of first sexual intercourse was 13 years, and 54 percent of these patients acquired their first gonococcal infection by the age of 16.

Other studies indicate that the incidence of gonorrhea has been rising among teenagers since 1961, especially in urban areas (*3–5*). However, in a 1963 questionnaire survey of New York City pediatricians in private practice, only 2 percent of 421 respondents stated that they had treated venereal disease (*6*).

In view of the increasing teenage and total gonorrhea rates in Los Angeles and many areas of the world, and because pediatricians who ordinarily provide medical care to at least part of the teenage group seldom treat this disease, we thought it desirable to review the extent of the problem in children under 15 years of age and to study some of the characteristics of a group of these children.

Extent of Problem

Figure 1 shows the trend of reported gonococcal infections in the city of Los Angeles for certain specified age groups (age-specific rates) from 1954 to 1963. The rate per 100,000 total population decreased from 324 in 1954 to 261 in 1959.

Since 1959, however, the rate rose steadily to 383 in 1963. The rate of gonococcal infections in children aged 10–14 years decreased from 45 in 1957 to 22 in 1960. Since 1960 there was a constant rise to 36 in 1963. The rate for the 0- to 14-year age group reached a low of 8 in 1959, but it then increased steadily to 13 in 1963. For the under 1-year age group the rate decreased from 13 in 1960 to 3 in 1963.

A comparison of the age-specific rates per 100,000 population of reported gonococcal infections and primary-secondary syphilis cases in the city of Los Angeles during 1962 is shown in figure 2. The rates for both gonorrhea and infectious syphilis increased slightly at 10–14 years of age, then rose sharply to a peak at 20–24 years. The peak rate for syphilis was 135 while the peak for gonorrhea was 1,986. Few cases of gonorrhea were noted in children under 15 years of age and the rates were relatively constant.

Study Groups and Method

Two separate groups of children under 15 years of age who had been diagnosed as having a gonococcal infection were studied. Source material consisted of:

1. Records obtained during a 4-year period

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Figure 1. Trend of reported gonococcal infections 1954–63, by specified age groups, Los Angeles, Calif.

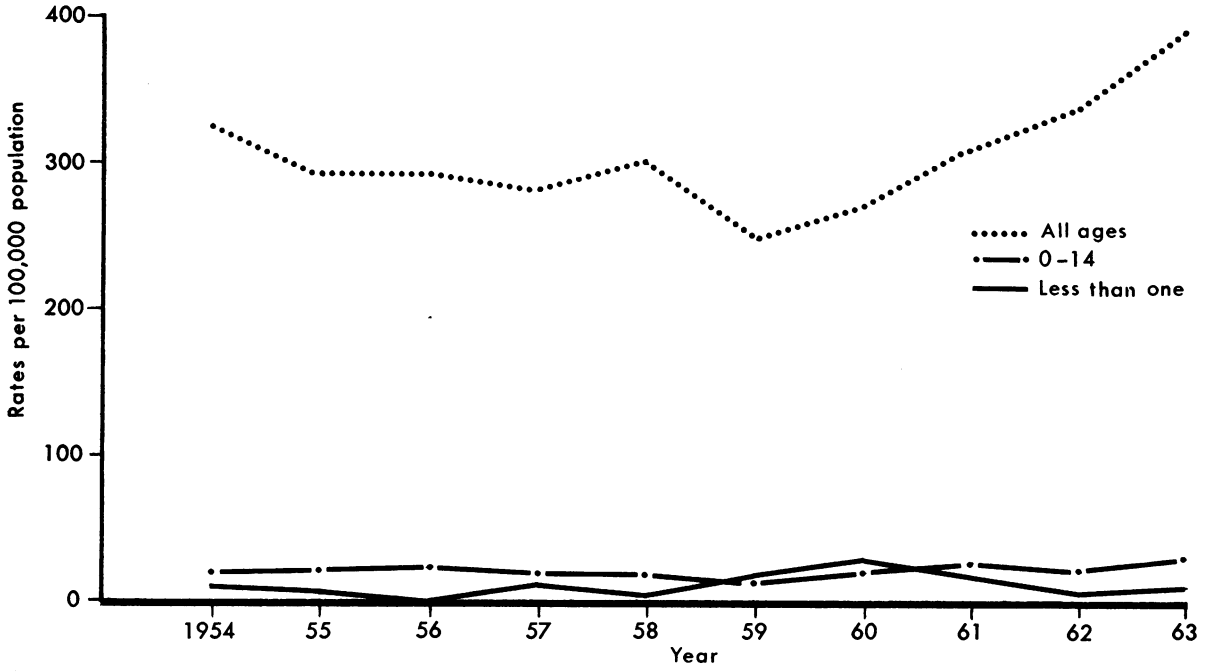
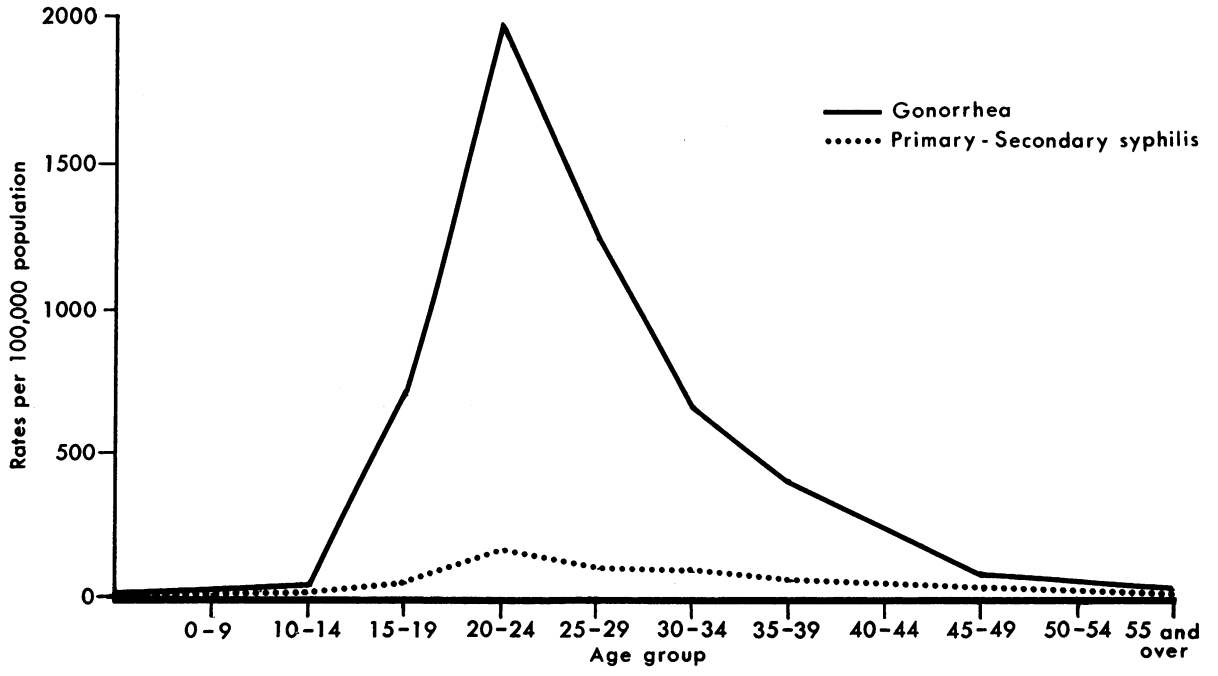


Figure 2. Age-specific rates per 100,000 population of reported gonococcal infections and primary-secondary syphilis, Los Angeles, Calif., 1962



(1960–63), of 61 children admitted to Los Angeles County General Hospital.

2. Notations taken by one of us (R.P.) from 139 infirmary records and interviews of admissions to an official confinement institution.

The same person interviewed the hospital group and the officially confined group. Her method consisted of a personal interview in a closed room with each patient or, if the patient was too young, with the parent.

The interviewer introduced herself as a public health nurse who is interested in helping the patient to understand his condition. The patient was assured of confidentiality. The nurse attempted to find out what the patient knew about his condition and where and how he received the information. This was followed by showing a diagram of the anatomy and explaining the mechanism by which he or she became infected. The nurse then tried to learn something about the patient's background, the place and source of infection, and the contacts and associates. After the interview the patient was dismissed and the nurse recorded her findings.

Each patient was given a physical examination by a physician. The smears were gram stained. All cases in this study were confirmed by cultures, including sugar fermentation tests. Parents of all children 1-year-old and under were examined by culture for gonococcal infection.

Results

Among 200 children examined and interviewed, 180 infected children met the criteria of the study. Their distribution by age, sex, and race is shown in table 1. A total of 172 (95.6 percent) were nonwhite, 155 females and 17 males. Eight were white (4.4 percent), 6 females and 2 males. In the various age groups, 11 children were under 28 days old; 8, 28 days

Table 1. Distribution of 180 children with gonococcal infections, by age group, sex, and race, 1960–63

Sex and race	Under 28 days	28 days, 11 months	1–4 years	5–9 years	10–14 years
1960					
Male:					
White	0	0	0	0	0
Nonwhite	2	1	0	0	0
Female:					
White	0	0	0	1	0
Nonwhite	0	0	4	4	2
1961					
Male:					
White	0	0	0	0	2
Nonwhite	0	1	2	0	2
Female:					
White	0	0	0	0	1
Nonwhite	1	3	7	9	5
1962					
Male:					
White	0	0	0	0	0
Nonwhite	3	0	0	0	1
Female:					
White	0	0	0	0	2
Nonwhite	1	0	3	8	29
1963					
Male:					
White	0	0	0	0	0
Nonwhite	3	0	0	0	2
Female:					
White	0	0	0	0	2
Nonwhite	1	3	4	3	68
Total	11	8	20	25	116

through 11 months; 25, 5–9 years; and 116, 10–14 years.

All of the children from 2–9 years of age were exposed to infection when their mothers were away from home, usually at work. Among those aged 10–14 years, most of the exposures occurred after school or during school vacations when no parental or other supervision was available.

The places of exposure are shown by age groups in table 2. Of the 11 infants under 28 days old, presumably exposed during birth,

Table 2. Place of exposure to gonococcal infections among 180 children, by age groups

Place	Under 28 days	28 days, 11 months	1–4 years	5–9 years	10–14 years	Total
Birth canal	11					11
Own home		8	16	23	15	62
Home of relative			3	2	1	6
Home of friend					44	44
School property					29	29
Motel					15	15
Cafe and bar					3	3
On the beach					2	2
Playground					3	3
Hideaway					1	1
Automobile					2	2
Unknown			1		1	2
Total	11	8	20	25	116	180

Table 3. Modes of transmission of gonococcal infections among 180 children, by age groups

Modes of transmission	Under 28 days	28 days, 11 months	1–4 years	5–9 years	10–14 years	Total
Birth canal	11					11
Contamination		8	1		1	10
Sexual contact			18	24	6	48
Boyfriend-girlfriend relationship				1	72	73
Casual acquaintances					32	32
Prostitution					3	3
Homosexual					2	2
Unknown			1			1
Total	11	8	20	25	116	180

Table 4. Clinical diagnoses of gonococcal infections among 180 children, by age groups

Diagnoses	Under 28 days	28 days, 11 months	1–4 years	5–9 years	10–14 years	Total
Conjunctivitis	11	8				19
Conjunctivitis and vaginitis			1			1
Conjunctivitis and urethritis					1	1
Vulvovaginitis			13	23	105	141
Vulvovaginitis and cervicitis			1			1
Vulvovaginitis and pyarthrosis			1			1
Vaginitis, cervicitis, and salpingitis				1	2	3
Vaginitis and proctitis				1		1
Vaginitis, cervicitis, and urethritis			2		1	3
Urethritis			2		7	9
Total	11	8	20	25	116	180

three developed ophthalmia neonatorum while in the hospital. Their mothers had positive cultures. The other eight were readmitted to the hospital with gonococcal conjunctivitis. All the children aged 2–9 years were exposed in their own homes or the homes of relatives. The majority of those aged 10–14 years were exposed in friends' homes, on school property, in motels, or in their own homes.

Table 3 presents the probable modes of transmission. In the groups from birth to 11 months of age no history of sexual contact could be elicited. Smears and cultures of all mothers were positive. It is assumed that the birth canal, contacted by freshly contaminated hands or possibly fomites, was the mode of transmission.

In the 1–4 and 5–9 age groups a history of sexual contact by relatives within the household was obtained, with one exception. This was a 1-year-old who had a diagnosis of gonococcal vaginitis. Both parents had negative cultures. No history of manipulation or molestation could be elicited.

Of the 10- to 14-year group, 72 children (62.6 percent) participated in sexual activity on a boyfriend-girlfriend basis. Casual acquaintances accounted for 32 (27.5 percent) cases. These patients had recent (1–2 weeks previously) contacts that ranged from 2–6 persons each. Six children were molested, and one of these was raped. Two children became infected after homosexual activity.

Gonorrhea manifested itself differently in different age groups (table 4). Conjunctivitis alone was noted in the 19 children under 1 year of age. One 14-year-old boy had concomitant conjunctivitis and urethritis. One child had conjunctivitis and vaginitis. Vulvovaginitis occurred in most of the children 1 year old and over. One 4-year-old child had vulvovaginitis and gonococcal pyarthrosis. One 9-year-old and two 14-year-old children were diagnosed as having vaginitis, cervicitis, and salpingitis. Three children had vaginitis, cervicitis, and proctitis; one child had vaginitis and proctitis. Nine had urethritis.

The 10- to 14-year-old children had little or no information as to their body functions. They expressed dissatisfaction with their home conditions. Poor parent-child relationships were common in this group. Many came from overcrowded homes in the more thickly populated, low socioeconomic areas of the city. Among this group were five runaways. Five girls suffered two separate infections. One had been infected when she was 7 and again at 13. One, a diabetic, was infected at 13 and again at 14. Two, attending a school for retarded girls, were infected twice in the same year. The other girl came from a family of eight. She was infected at 13 and again at 14.

Discussion

Primary prevention of gonococcal infections during childhood should be aimed at parent education. The parents should be taught how to handle infants and young children. In our study, infected children over 1 year of age had mothers who worked outside the home, and the parent-child relationship was poor for most of these children. Recently Beeston suggested education for family living that would help to produce strong personal family and social structures (*7*). Fairbairn explained that if the parent-child relationship has not been satisfactory, the adolescent becomes egocentric. This, he claimed, is the basis for promiscuity (*8*).

Guthe stated that increase in gonococcal infections is shifting from prostitutes to "good-time" girls (*9*). In our study, boyfriend-girlfriend relationships and casual acquaintances accounted for 90.1 percent of the infection in the sexually active group.

An accurate diagnosis of gonorrhea in the female is frequently difficult to make. A study by Brown and associates (*10*) of teenage girls under close supervision revealed that the delayed fluorescent antibody smear from the urethra was positive even when the patient was asymptomatic and the vaginal smear was negative. Both Brown and associates and Michalowski (*11*) recommended that the vagina, cervix, urethra, and anus be tested to determine the presence of gonorrhea.

Summary and Conclusion

In a study of 180 children under 15 years of age with gonococcal infections, conjunctivitis was observed in all the infants under 1 year of age and infections of the genitals in all the children aged from 1 to 14 years. Complications

involving the conjunctiva, joints, urethra, rectum, or tubes occurred in 6 percent of all the children.

Gonococcal infections in infants under 28 days of age were associated with infections in the birth canal of the mothers. In infants under 1 year old, the infections were attributed to poor personal hygiene practices of the parents. These practices as well as molestation by relatives also accounted for most of the infections in the children under 9 years of age.

Among the children aged 10–14 years, the infections were associated with unsatisfactory parent-child relationships, overcrowded homes, and sexual activity outside the home. Ninety percent of the infections in this age group resulted from boyfriend-girlfriend relationships or casual acquaintances.

The incidence of gonorrhea among children aged 10–14 years has been increasing constantly in Los Angeles since 1960, and this situation is occurring in many other cities. In order to stem the rates of infection among young adults, the infected 10- to 14-year-old children must be helped to understand their condition. The public health liaison nurse can make an effective contribution by providing sex education, which includes an explanation of the mechanism by which they became infected, by obtaining a history of contacts and associates, and by arranging for followup.

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Hudson River Pollution Control

The Public Health Service is cooperating with other Federal agencies and with State, interstate, and local agencies in a long-term water pollution control program for the Hudson River system, the New York Harbor area, and the New Jersey and Connecticut coastal areas.

One of the eight regional pollution control programs being conducted in the nation's major river basins under the provisions of the Federal Water Pollution Control Act, this comprehensive 7-year project will include studies of tidal flows, ground water pollution, and means for protecting water recreation areas and threatened shellfish areas.

The project headquarters are located at the Raritan Arsenal, Metuchen, N.J., and field offices will be opened in Albany to study the river system as far north as the Lake Champlain watershed and on Long Island to conduct ground water studies.