

Epidemic of Gynecomastia Among Illegal Haitian Entrants

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Synopsis

Gynecomastia may occur as a normal physiologic development at certain ages or as a result of a variety of pathological conditions. An outbreak of gynecomastia was investigated at two processing centers of the Immigration and Naturalization Service (INS) between De-

cember 2, 1981, and May 14, 1982. At the Fort Allen Service Processing Center, Puerto Rico, gynecomastia was initially detected in 77 of 540 Haitian male entrants (14 percent) and in only 6 of 186 male employees of the center (3 percent) who were 18–50 years old; the difference in prevalence was statistically significant. At the Krome North Service Processing Center in Miami, Fla., gynecomastia was initially detected in 52 of 512 Haitian males 18–50 years old (10 percent).

Two case-control studies did not demonstrate an association between gynecomastia and a number of factors that might have been related to an exogenous estrogen or to a substance with an estrogenic effect. Estrogen or estrogen-like substances were not found in food, water, or environmental samples. When the populations were rescreened several months later, 76 of the persons with gynecomastia detected in the first screening had had total or partial remission. Persons with remission had arrived earlier—a mean of 21.6 days for those at Fort Allen and 36.7 for those at Krome—than did those with newly detected gynecomastia and those with continuing cases. The difference in arrival dates was significant ($P < .005$ for Fort Allen and $P < .001$ for Krome). These results, in view of nutritional deprivation in Haiti, suggest that these cases may have been an outbreak of refeeding gynecomastia.

GYNECOMASTIA, OR BREAST ENLARGEMENT in males, may occur as a normal physiologic development at certain ages (newborn, adolescent, elderly) or as a result of a variety of pathological conditions (1). Previous studies of outbreaks of gynecomastia have implicated milk (2), poultry or veal (3), and environmental dust samples containing mestranol, an estrogenic agent (4).

One type of gynecomastia, “refeeding,” occurs during recovery from malnutrition. It was first recognized shortly after World War II in American soldiers who had been released from prisoner-of-war camps (5–7). The disorder’s exact cause is unknown, but it is thought to be related to a resumption of pituitary gonadotropin secretion after pituitary shutdown during protein deprivation, producing a second puberty (8).

Between June and November 1981, many Haitians illegally entered the United States. On November 30, 1981, the Centers for Disease Control received a request from the Immigration and Naturalization Service (INS) and the Public Health Service to investigate a cluster of

suspected gynecomastia cases in Haitian males at the INS Fort Allen Service Processing Center in Puerto Rico. After our initial investigation, we received reports of cases of gynecomastia at the INS Krome North Service Processing Center, Miami, Fla., which we then investigated. Our findings suggest that refeeding may have caused this outbreak of gynecomastia.

Background

The INS maintained the Fort Allen and Krome facilities as holding centers for illegal Haitian entrants being processed for return to Haiti. When apprehended, the Haitians were first detained at Krome, where they were medically examined, given a skin test for tuberculosis, immunized if appropriate, and treated with lindane, a miticide. Clothes and bedding were sprayed with an insecticide containing the active ingredient 3-phenoxybenzyl d-cis and trans-2, 2-dimethyl-3-(2-methylpropenyl) cyclopropanecarboxylate (phe-

nothin). Weight and height measurements of Haitians detained at the two centers were not recorded.

Each facility restricted the Haitians to a limited, fenced area. At Fort Allen, male Haitians lived in three separate enclaves, whereas at Krome they lived in a single building. Food and water supplies at Krome and Fort Allen were independent of one another. At Fort Allen, a caterer prepared food for the Haitians in the enclaves and also supplied the food for the holding center's employees, who ate at a separate cafeteria there. Water for both the employees and the Haitians came from the same source through recently installed pipes made of polyvinyl chloride. At Krome, a caterer prepared the food outside the facility and distributed it at a separate cafeteria to the Haitians only. In January 1982, the center at Krome changed caterers. Water from the Miami aquifer was supplied to both the Haitians and employees at Krome, but the employees drank mostly bottled water.

Methods and Materials

We defined a case of gynecomastia as the development in any male, 18–50 years of age, of a palpable, firm, discoid, discrete, subareolar, unilateral or bilateral breast mass. Nydick's classification of gynecomastia (9) was modified as follows: 0 = absent; 1+ = less than 5 mm in diameter; 2+ = 5–15 mm; 3+ = 16–49 mm; and 4+ = greater than 50 mm. Dr. Enrique Carter and Dr. Ernst Moise, medical officers, Public Health Service, assisted in detection of gynecomastia.

At Fort Allen, we examined 540 of 562 male Haitian entrants (96 percent) aged 18–50 years. To obtain a background level of gynecomastia and to determine that the outbreak was limited to the Haitians being detained and was not a campwide problem, we also sampled from INS employee rosters at Fort Allen. Using a table of random numbers to select one-third of all male employees 18–50 years old, we examined 186 of the 210 selected (89 percent). We interviewed all men with cases to determine age, date of symptom onset, occupation, education, and place of residence.

We then conducted a case-control study among the Haitians detained at Fort Allen. The cases studied were of the 61 male Haitians who developed gynecomastia after entering the United States. The 61 controls, Haitians who did not have gynecomastia, were selected from INS entrant rosters at Fort Allen, using a table of random numbers. Controls were matched by age \pm 5 years, date of arrival \pm 2 weeks, and housing area. Twelve case-control pairs were excluded because of our inability to interview one or both of the pair, leaving 49 matched cases and controls. A coinvestigator, who spoke Creole and who had recently lived in Haiti, instructed Creole-speaking interviewers in the administration of the ques-

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tionnaires. We obtained information on the following potential risk factors:

- In Haiti—the diet, occupation, place of residence, socioeconomic status, pubertal development, family history, and date and place of embarkation,
- During voyage—the island stopovers, length of voyage, and medication or drugs taken,
- At Krome or Fort Allen—the water, milk, flavored drinks, food, herbs, cigars, cigarettes, pipe tobacco, toothpaste, ointments, shaving cream, physician visits, immunizations, and medicines and drugs, including oral contraceptives.

We conducted a physical examination of each case and control person and recorded our observations of the skin, hair, genitalia, thyroid, and liver.

After completing the initial investigation at Fort Allen, we learned that gynecomastia might be present in several Haitians at Krome. We examined 512 of 534 male Haitians at Krome, or 96 percent, and all 10 non-Haitian aliens for gynecomastia; interviewed all the men with the disorder; and conducted a case-control study. The cases were 50 male Haitians who developed gynecomastia after entry. The 50 controls were randomly selected from INS entrant rosters. Two case-control pairs were excluded because of our inability to interview one or both of the pair, leaving 48 matched cases and controls. We used methods similar to those used at Fort Allen, except that controls were not matched by housing area, since all Haitians lived in one building.

We rescreened the entrants 3 months later at Krome and 5 months later at Fort Allen. At Krome, we examined 518 of 534 Haitian men (97 percent) and all 10 non-Haitian aliens for gynecomastia. At Fort Allen, we examined 508 of 574 male Haitians (89 percent). Since height and weight measurements of the Haitians at Fort Allen and Krome were not taken, we tried to locate other detained Haitians who had had these measurements taken. At the Federal Correctional Institution in Raybrook, N.Y., we found and measured 30 Haitians 18–50 years of age, who were the only detained Haitians

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Table 1. Prevalence of gynecomastia at Fort Allen, December 1981–January 1982

Group	Number screened	Gynecomastia		Relative risk ¹
		Number	Percent	
Employees	186	6	3	1.0 (referrant)
Haitian entrants . .	540	77	14	3.0 (range, 1.4–6.4)

¹ Risk adjusted for age; 95 percent confidence limits.

Table 2. Characteristics of entrants with gynecomastia, December 1981–May 1982

Characteristic	Fort Allen	Krome
First screening:		
Number examined	540	522
Number of cases	77	53
Prevalence rate (percent)	14	10
Second screening:		
Number examined	508	528
Number of cases	41	46
New cases	21	18
Prevalence rate (percent)	8	9
Total cases	98	71
Mean age (years)	24.8 ± 5.8	28.1 ± 7.9
Size, either breast, ≥15 mm in diameter (percent)	42	62
Bilateral enlargement (percent)	63	55
Symptomatic (percent)	68	79
Breast tenderness (percent)	84	74
Breast discharge (percent)	36	30
Time between arrival in the United States and onset of gynecomastia (days)	104 ± 51	96 ± 43

Table 3. Status of gynecomastia in rescreened Haitian entrants

Case status	Fort Allen ²		Krome ²	
	Number	Percent	Number	Percent
Cases rescreened	66	86	49	92
Improved	52	79	35	71
Unchanged	8	12	4	8
Worse	6	9	10	20

¹ Men rescreened at Fort Allen in May 1982 and at Krome in March 1982.

² 11 men at Fort Allen and 4 men at Krome were unavailable for administrative reasons.

who had had the measurements taken less than 2 months after arrival.

The following laboratory studies were coordinated by Dr. Eric Sampson, Clinical Chemistry Division, Center for Environmental Health, CDC.

1. Serum samples from 55 study participants at Fort Allen and 50 at Krome via antecubital venipuncture were analyzed for prolactin, luteinizing hormone, testosterone, estradiol, blood urea nitrogen, creatinine, serum glutamic-oxalacetic transaminase, serum glutamic-pyruvic transaminase, bilirubin, creatinine phosphokinase, lactate dehydrogenase, uric acid, phosphorus, calcium, and albumin. Serum samples from participants at Krome were also analyzed for free testosterone, free estradiol, and sex hormone binding globulin (10–12).

2. Milk and eggs from both Fort Allen and Krome and ground beef and goat meat from Fort Allen were analyzed for the presence of diethylstilbestrol.

3. Chicken, chicken skins, beef, and water from Krome were analyzed for the presence of estrogen (13).

4. Krome water samples were tested for steroids (14–16), metal ions (17), and 113 organic toxic chemicals—priority pollutants of the Environmental Protection Agency (EPA) (18).

5. Urine specimens from Krome were analyzed for cocaine, methaqualone, ethchlorvynol, glutethimide, meprobamate, propoxyphene, phencyclidine, tetrahydrocannabinol, barbiturates, phenothiazines, benzodiazepines, opium alkaloids, synthetic narcotics, tricyclic antidepressants, amphetamines, and antihistamines.

6. Tissue specimens from two Haitian patients who had had surgery for gynecomastia prior to our investigation were examined.

We determined the chi square value for each variable, used a logistic regression model, and found no appreciable differences in results between these methods. We used the Student's *t* test if serum results were normally distributed and Wilcoxon signed-rank test if the results were not normally distributed. For all other analyses, we computed the chi square value if the variable was dichotomous and used the Student's *t* test if the variable was continuous.

Results

Fort Allen. Of the 540 male Haitians 18–50 years old who had been examined in December 1981, 77 of them, or 14 percent, had gynecomastia (table 1). Of these 77 men, 16 had noted the problem before arriving at Fort Allen (11 while in Haiti, 5 in Miami). Of 186 non-

Haitian, male employees of the center examined, 6 had gynecomastia (3 percent), and, of these, 2 knew they had breast enlargement before the facility opened; the other 4 were asymptomatic. Compared with male employees of the center, male Haitian entrants had a relative risk, adjusted for age, of gynecomastia of 3.0, with 95 percent confidence limits (range, 1.4–6.4). The difference in prevalence between Haitians and employees was statistically significant.

In a second screening, on May 11, 1982, there were 41 cases of gynecomastia among 508 Haitian males, 18–50 years of age, some of whom had been present in December and some of whom had arrived since then (table 2). Of the 41 cases, 21 were newly detected; therefore, a total of 98 cases of gynecomastia was found during the two screenings. Most of these men had bilateral enlargement, were symptomatic (breast tenderness or breast discharge), and had gynecomastia less than 3+ in size. The breast discharge was a watery, colostrum-like fluid; no milky secretions were noted. In the cases first noted at Fort Allen, symptoms had begun to appear about 3 months after arrival of the men in the United States. The percentage of Haitian entrants with gynecomastia was similar in each arrival cohort. At Krome, each boatload or group of boatloads—there were dozens—was considered to be a cohort. At Fort Allen, a cohort was one of several groups transferred there together.

Of the 77 Haitian males with gynecomastia detected in early December, 66 were reexamined in May (the remaining 11 were unavailable for administrative reasons); 46 patients no longer had evidence of gynecomastia, and 6 had decreased breast size (table 3). Therefore, of the originally detected cases, 52 of 66 of them (79 percent) achieved either total or partial remission. Persons with total or partial remission had arrived in the United States, on the average, 21.6 days before those with new cases and those with continuing increased breast size ($P < .005$). The extent or severity of gynecomastia did not correlate with arrival date.

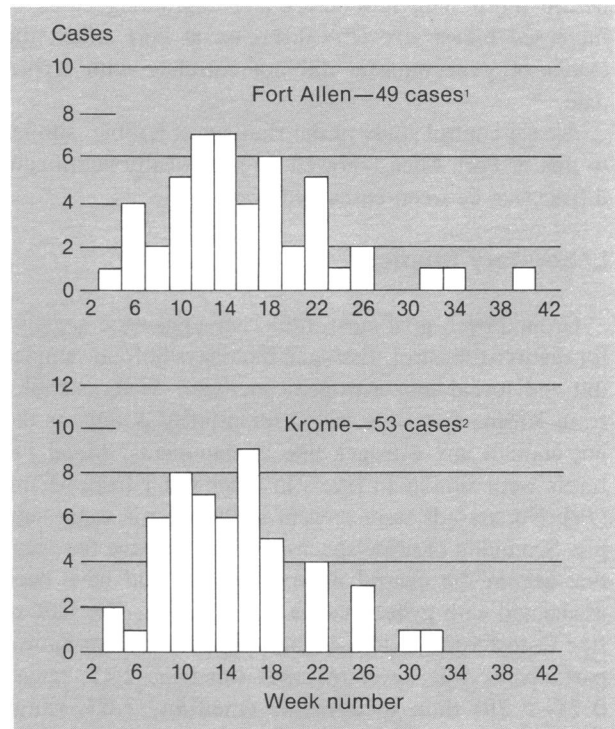
The case-control study showed no statistically significant differences between Haitians with cases of the disorder and Haitian controls.

Krome. Of the 512 Haitian and 10 non-Haitian male entrants 18–50 years old who were examined in January 1982, 53, or 10.0 percent, had gynecomastia (table 2). Of these 53, one was a non-Haitian and two were Haitians who reported having had the disorder before leaving Haiti.

On March 22, 1982, a second screening of 528 male entrants, 18–50 years old, revealed 46 who had gynecomastia (table 2). Of these 46 cases, 18 were newly detected; therefore, a total of 71 cases of gynecomastia were found during the two examinations. As at Fort

The patients came from a country where undernutrition is widespread, and they experienced an abrupt change to a high caloric diet rich in fat and protein—meat was served up to three times daily.

Time between arrival of Haitian entrants in the United States and onset of gynecomastia for symptomatic cases, May 1981–May 1982



¹Of 67 symptomatic cases (68 percent of 98), 18 had begun before arrival at Fort Allen.
²Of 56 symptomatic cases (79 percent of 71), 3 had begun before arrival at Krome.
 NOTE: Data do not include cases of gynecomastia existing at time of arrival at facility.

Allen, most of those affected had bilateral enlargement, were symptomatic, did not have a milky breast discharge, and had symptom onset about 3 months after arrival in the United States (see chart). As at Fort Allen, the percentage of Haitian entrants with gynecomastia was similar in each arrival cohort. More cases were 3+ or greater in size at Krome than at Fort Allen.

Of the 53 patients with gynecomastia detected in January, 49 were reexamined in March, the others being unavailable; 21 patients, or 43 percent, had no evidence of gynecomastia, and 14 patients, or 29 percent, had a decrease in breast size (table 3). Therefore, 35 of the patients reexamined, or 71 percent, had either total or partial remission. Men with total or partial remission had

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arrived in the United States, on the average, 36.7 days before those with new cases and continuing cases of increased breast size ($P < .001$). As at Fort Allen, the extent of gynecomastia did not correlate with arrival date.

A case-control study of the Haitians at Krome, similar to that at Fort Allen, showed no statistically significant differences between cases and controls.

Laboratory Studies

Ground beef, goat meat, milk, and eggs were negative for diethylstilbestrol. Estrogen bioassays of food samples did not reveal any estrogenic activity. Water samples from Krome that were tested for priority pollutants did not contain any estrogen-like contaminants. Metal ion levels were similar to levels in other water from Miami (19). No steroids were present in the Krome water supply. Screening of urine specimens from Krome for drugs that act on the central nervous system and have been associated with gynecomastia was negative. The ratio of free testosterone to free estradiol in serum from Krome participants was lower in cases (median, 2.17; range, 0.78–5.29) than in controls (median, 2.63; range 1.05–5.48), $P = .051$. All other serum samples showed no significant differences between cases and controls. Breast tissue specimens showed dilation of ducts with hyperplasia of ductule epithelium, focal papillary projection, edema of the periductule connective tissues, and the absence of lobular structures, all findings consistent with the diagnosis of gynecomastia.

Discussion

Our analysis shows that an outbreak of gynecomastia occurred at Fort Allen and Krome, that this outbreak was confined to entrants, predominantly Haitian, and that the development and resolution of the disorder were clearly related to the date of arrival in the United States. Case patients had lower free testosterone to free estradiol ratios than controls, but there were no appreciable differences in other serum hormone determinations.

Our results do not suggest that drug or estrogen contamination of the food, water, or other environmental samples via a continuous or intermittent source is a likely cause of this outbreak for the following reasons. First, the case-control study did not implicate the food, water, or any drugs or procedures as risk factors. Second, urine samples tested for drugs that might induce gynecomastia were negative. Third, neither the food nor the water contained estrogen or estrogen-like substances. Fourth, most cases detected at the first examination had gone into partial or total remission even while new cases were developing, and the men with newly detected cases arrived in the United States significantly later than those with the originally detected cases. Finally, although all Haitians were first detained at Krome, some stayed there less than 2 weeks, and many were not in the same facility at the same time.

A major problem in case ascertainment is distinguishing true gynecomastia from palpable adipose or subcutaneous tissue (20). Among the entrants, clinical obesity was not observed. Breast tissue from two Haitians who had had surgery prior to our investigation showed changes consistent with gynecomastia, and about 70 percent of the cases were symptomatic. By strictly defining our cases as having a palpable, firm, discoid, discrete, subareolar breast mass, we were able to evaluate accurately the population at risk.

Neither the incidence nor the prevalence of gynecomastia in Haiti or the United States is known. Our results show a prevalence rate of 3.2 cases of gynecomastia per 100 male employees at Fort Allen. Previously reported prevalence rates in the United States have ranged from a low of 7 cases per 100,000 (21) to a high of 36 cases per 100 in male military personnel (22). These discrepancies in rates exist because of different methodologies, case definitions, and study populations. Although one study reported microscopic evidence of gynecomastia in 40 percent of an autopsy series (23), those findings do not reflect the prevalence of clinically apparent gynecomastia and are subject to selection bias. The background rate of gynecomastia at Fort Allen was used for the comparative purposes of this study, but larger and more broadly based population screening would be necessary to define more precisely the prevalence of the disorder in the general population.

In 1947, several studies (5–7) described a syndrome of gynecomastia following severe starvation among American soldiers who had been incarcerated in Japanese prisoner-of-war camps. Diets had been inadequate, and many soldiers were malnourished. Since they developed gynecomastia after being placed on adequate diets, the syndrome became known as refeeding gynecomastia.

Although our case-control studies did not show any significant differences in dietary history, in view of the

difficulty of obtaining reliable dietary information in general, we believe that refeeding could explain the large number of cases of gynecomastia in different facilities in the absence of other physical or historical findings. Many similarities exist between the earlier descriptions of refeeding and our findings (5-7). First, our cases were mostly symptomatic, with breast tenderness the most common complaint; second, a number of cases had a serous discharge; third, the patients became symptomatic approximately 3 months after changes in their diet; finally, the patients came from a country where undernutrition is widespread (24), and they experienced an abrupt change to a high caloric diet rich in fats and protein—meat was served up to three times daily.

Haiti is the poorest nation in the Western Hemisphere, with a 1980 per capita income of \$260 (25,26). It ranks 104th in the world in per capita consumption of food, with a daily per capita caloric intake that is 90 percent of minimum requirements (26). Haiti's food staples include corn, millet, manioc, rice, bananas, and fruits; the Haitian diet is deficient in meat, fish, eggs, and poultry. In addition to the nutritional problems faced in Haiti, the boats used to sail to the United States often were not stocked with food. Although the Haitians at Fort Allen and Krome did not have their height and weight measured on arrival, Haitians detained at the Raybrook facility showed an average weight gain of 15 percent in 9½ months.

Although the endocrinology of gynecomastia is not fully understood, an alteration in the plasma ratio of androgens to estrogens has been associated with gynecomastia of varying etiologies, including refeeding. Following protein deprivation, an abrupt dietary correction may result in stimulation of pituitary gonadotropins, leading to a transient decrease in the testosterone to estradiol ratio (8). In our study, this ratio was significantly lower in cases than in controls. The temporal relationships of that release and measurable plasma levels of the relevant hormones and the clinical sequelae have yet to be fully documented.

To our knowledge, refeeding gynecomastia has not been reported in other entrant or refugee populations, probably because the phenomenon either was not noted or did not occur. The transient nature of refeeding gynecomastia and differences in diet, location, population, and medical care might explain this discrepancy.

Although refeeding could explain this outbreak, there are other possibilities. The Haitian entrants were treated for scabies with a product containing 1 percent lindane, and their clothing and bedding were sprayed with phenothrin. Lindane is stored in fat cells, is slowly released (27), and has been shown to have an extremely weak estrogenic effect (28) and to act synergistically with malnourishment (29). However, the more common side

effects of lindane were not seen in the Haitians, and no previous study has shown a relationship between lindane and gynecomastia. It is also possible that gynecomastia was somehow induced by the spray containing phenothrin alone or acting synergistically with lindane or malnutrition. However, all the Haitians, with and without gynecomastia, were exposed to these substances. There was not evidence of an association between gynecomastia and any other procedures, immunizations, or medications given on arrival.

In summary, the pattern of development and resolution of breast enlargement among detained Haitian entrants in 1981 and 1982, in view of probable prior nutritional deficiency, suggests that refeeding may be the cause of this outbreak of gynecomastia. Health care workers and immigration personnel should be aware that a marked change in type and quantity of food among undernourished entrants or refugees might induce gynecomastia.

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The Dentist's Role in Cessation of Cigarette Smoking

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Synopsis

Dentists in general practice were surveyed by mail questionnaire to determine the actions they were taking to promote cigarette smoking cessation among their patients. Findings are based on replies from 376 of the 466 dentists in western New York State to whom the questionnaire was sent in 1981.

The responses indicate that less than 18 percent of western New York State dentists smoke. The proportion is continuing its gradual decline, and dentists lead the general population in smoking abstention. Sixty-two percent of the dentists in the survey do not permit smoking in their waiting rooms, and 84 percent advise patients not to smoke. There is clear evidence of a relationship between the dentists' own smoking habits and their inclination to promote smoking cessation among patients. As fewer dentists smoke, more will be inclined to foster nonsmoking.

Dentists can use a variety of smoking cessation techniques. To carry out a minimal program of antismoking measures, dentists in general practice can serve as non-smoking role models for their patients, provide information about the health hazards of smoking, give advice, refer patients to cessation programs, recommend cessation measures, and monitor patients' efforts to quit smoking. While smoking cessation measures taken by dentists are not likely to convert more than 1 or 2 percent of patients who smoke per year, in time the dentists' efforts to promote smoking cessation can have an appreciable impact.

THIS PAPER PRESENTS SOME FINDINGS about antismoking actions carried out by dentists in general practice in western New York State. Like other health professions, dentistry has taken a stand against cigarette smoking (1).

Several authors have sought to define a particular role for dentistry in efforts to change the smoking habits of 53 million adult Americans (2). Most of what has been written, however, has taken the form of declarations,