THE KORO "EPIDEMIC" IN SINGAPORE

By Koro Study Team*

Koro, a disease characterised by the sudden delusion of penis retracting, accompanied by intense panic, was a well-known entity and has been previously reported in Singapore (Gwee, 1963). Its occurence was sporadic, and mostly in association with sexual activity. It was known to the Chinese as Shook yang and it had been pointed out that this had been recorded as an entity in one of the oldest medical literature in Chinese medicine (Gwee, 1968). In Singapore, it is seen to affect Chinese more than others, and it has been suggested that the entity arose first of all from the association of fatal illnesses with penile retraction, a phenomenon not uncommonly seen at death, and then from the cultural belief of the importance of the genitalia in relation to life, the systematisation was made that the penile retraction in fact was the cause and not the effect of death (Gwee, 1963). The result is then a delusion of penile retraction followed by a fear of imminent death resulting in acute anxiety amounting to panic, and remedial measures adopted sometimes resulted in trauma to the genitalia. Other views of the entity ranged from sexual neurosis to depersonalisation syndrome (Manson-Bahr, 1960; Yap, 1965).

On 29th October, 1967, Koro first gained attention by a newspaper report wherein it was stated that some people, as a result of eating the flesh of pigs inoculated with anti-swine-fever vaccine, developed Koro, and had to be treated by doctors or other home remedies. The report was elaborated within a few days with further embellishments alleging that a pig after inoculation had died with penile retraction. Rumour was rife that the flesh of pigs inoculated with vaccine was unwholesome, and when consumed would cause Koro, which could be a killing disease. The pork sales began to go down, and further reports in the news carried increasing incidence of cases treated by doctors and Chinese physicians, and also accounts were published of at least one doctor and several Chinese physicians regarding the disease, chiefly emphasising that it should be treated quickly, and effectively with injections, acupuncture and other measures. The Ministry of Primary Production alarmed by the acute drop in pig consumption issued a statement that both swine fever and the anti-fever vaccine were harmless to man. This instead of achieving the desired effect of checking the rumour, seemed to give substance to the fears. On 31.10.67, cases of Koro were seen at the Emergency Unit of the Singapore General Hospital, and within the next few days, the cases reporting mounted until 3.11.67 when 97 male cases were seen in one day. At the same time, a small number was seen at Thomson Road General Hospital from 29.10.67, and also rising with the same trend to reach the peak of 11 male cases on 2.11.67 (Fig. 1). Considering that this has been an entity seen normally at the rate of about one case every two or three months, the incidence was therefore very much increased, and the

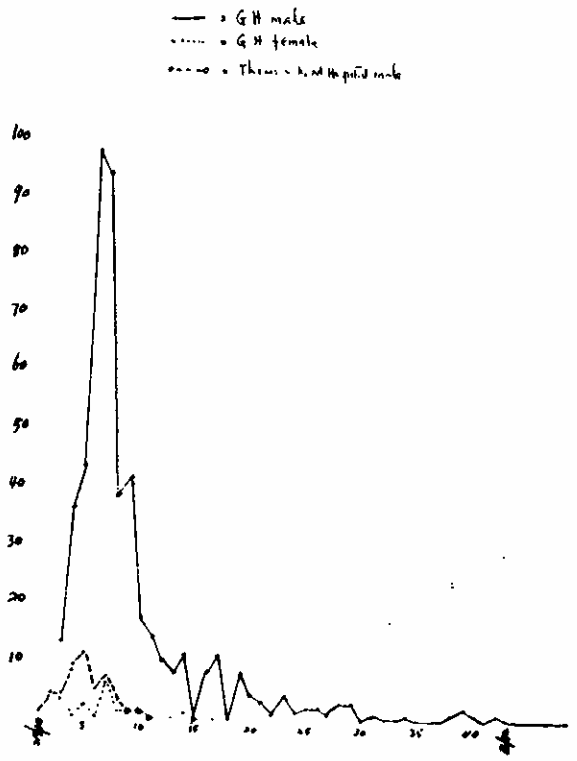

Fig. 1. Graph showing daily cases at the General Hospital and Thomson Road Hospital.

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rapidity of "spread", the large number of cases, and the concentration of cases all pointed to the existence of an "epidemic" in the real sense. At the same time, female cases, which had been reported in the past (Manson-Bahr) but were in fact very rarely seen, also appeared, but in much smaller number, and hence not really suitable for the analysis of trends and traits.

A public announcement was made by an expert medical panel of the Singapore Medical Association on 4.11.67, and was followed by another one by the Ministry of Health 2 days later. Both were given great prominence by local newspapers, and the latter was also on television which had a considerable following in Singapore. Both announcements stressed the harmlessness to human beings of pork from pigs with swine fever or inoculated with vaccine, and stated clearly that Koro was a result of fear, and not a physical disease with fatalities, and prominence was made that no case so far came to any harm other than what resulted from the remedial measures applied. Following the announcements, there was an immediate decline in the incidence, and on 5.11.67, the reported cases at the Singapore General Hospital were reduced to 38 male cases—less than half of the incidence the day before. On 7.11.68, the day following the second announcement, the reported cases were only 17 male cases and within a month Koro was not reported any more (Fig. 1).

It was decided to take this opportunity to study these cases with the following objects in view:—

1. To determine the nature of Koro as a disease entity Open mind with regard to aetiology was kept so that the study team might not be mind-blinded to possible causes like infection or poisoning.
2. To study the symptomatology of present Koro cases especially with regard to its similarity or otherwise with the previously described syndrome.
3. To determine the environmental factors such as education, news media, and areas of residence, that may have effects contributory to Koro incidence.
4. To verify or disprove the previously stated hypothesis that Koro is a cultural disease.

A team was formed of interested workers drawn from Medical Unit III, Singapore General Hospital, Woodbridge Hospital for mental diseases, and the Department of Social Medicine and Public Health, University of Singapore. All the cases recorded at the Emergency Unit of the Singapore General Hospital and Thomson Road General Hospital were listed, and an appeal was sent out to all registered doctors in Singapore to supply information of all cases of Koro seen and treated during that period. A standard form of enquiry was drawn up, and cases were interviewed in batches at two centres by the members of the team at Medical Unit III and MacPherson Road Outpatient Clinic (Appendix II).

The work was begun on 1st April, 1968, and completed on 27th July, 1968. The late start was partly to avoid a new scare which might precipitate a fresh epidemic, and also because of the time needed to organise the team. The results are now reported.

THE STUDY

As soon as it was apparent that the disease was occurring in epidemic proportions, a team was formed under the auspices of Medical Unit III, and a request letter was sent out to all doctors in Singapore, Government emergency units and outpatient departments for information regarding details of cases seen so that follow-up study could be made (Appendix I). All available information regarding the current case incidence was collected for reference. Very soon it was apparent that the masses of information were mostly lacking in detail, and did not yield much value apart from indicating the extent of public interest and alarm. The return from general practice was disappointingly small and of the few cases returned, a number did not have sufficient information such as date and addresses, and also a good proportion did not want to be followed up. Hence the principal source material had to be from the Emergency Unit and outpatient departments, and in this aspect the Emergency Unit of Outram Road General Hospital accounted for practically 80% of the total.

It was hoped originally that by case tracing, one could get to the first case so as to study his background, and also to investigate the mode of spread. However without the active co-operation of the majority of the general practitioners, this was not feasible.

The cases were called up by letter and given appointment at one of two appointed centres (Appendix III) so as to be most convenient to them from the point of transportation. The notice was in English and Chinese being the

two written languages that will be understood by almost everyone locally. If any case did not respond, a second call was made by post. A small number of letters was returned either with the remark of no such address or no such person indicating probably a desire of secrecy. Yet another small batch consisted in written replies to say that they were either too busy, or well or unwilling or that they had since regarded themselves as non-koro cases, and hence refused to come up. Originally, it was planned to do house visits on those who failed to respond to the second call and were not in one of the two above categories, but a trial run by a member of the study group met with so little co-operation that it was thought a waste of time to persist. Hence the study was confined ultimately to cases that respond to calls by letter only.

In all, 469 cases were recorded (this was a smaller figure than reported previously by one of us—Ngui (1969), the reason being that the latter was based on total number of cases recorded each day as shown by the incidence graph, but as some cases got more than one attack, there would be some reduplication) of these, 454 were males (94.7%) and 15 were females (5.3%).

The number responding to the calls was 235 (52%) as follows:—

Centre I (General Hospital, Medical Unit III)
Male=135
Female=4

Centre II (MacPherson Road Outpatient Clinic)
Male = 92
Female=4

Total Male reporting=227 (96.6%)
Total Female reporting= 8 (3.4%)

Hence about half of the cases turned up for further study, and the sex ratio was maintained about the same.

When a case turned up in answer to the circular letter, he was interviewed at one of the two centres by a member of the study team, and questioned along a pre-agreed line decided before the study began at a team meeting. A physical examination was made, and some explanation of the condition was made to the case principally regarding the normal anatomy, and the harmlessness of the complaint.

When it became apparent that no further call was being answered, the study was concluded and the materials assembled for analysis.

From the returns, it was possible to obtain a number of interesting information such as case distribution, case concentration, sex bias and age and racial breakdown. It can be seen that 97% were males and 95% were Chinese males (Table I) and that Malays and Indians together constituted only 2.2% of the total. Considering that the population in Singapore have the racial structure of Chinese : Malay : Indian = 7.6 : 1.5 : 0.9, this distribution proved conclusively that in spite of the fact that the disease has a Malay name, it is essentially a Chinese disease and would seem to support the suggestion that the original pathogenetic concept was of Chinese origin (Gwee, 1967).

TABLE I

ETHNIC AND SEX DISTRIBUTION

	Male	Female
Chinese	444 (95%)	15 (3.2%)
Malay	4 (0.9%)	0
Indian	6 (1.3%)	0
Others	0	0
TOTAL	454	15

TABLE II

AGE DISTRIBUTION (ALL CASES)

	Male	Female
0— 5 yrs.	6	0
6—10 yrs.	14	1
11—15 yrs.	70	5 (33.5%)
16—20 yrs.	138 (30.5%)	3 (20.0%)
21—25 yrs.	70	2 (13.4%)
26—30 yrs.	56 (29.0%)	2
31—35 yrs.	48	1
36—40 yrs.	22	0
41—45 yrs.	10	0
45→	11	1
Unknown	3	0
TOTAL	454	15

Youngest — 7/12
Oldest — 70
Time interval 31.10.67 - 6.12.67

From the age distribution (Table II) it could be seen that the majority of the cases was between 11-30 for both males and females, the peak in the male was between 16-20 years of age, whereas in the female it was between 11-15 years. These findings emphasized that the disease was commonest in young adults, and the earlier peak in female was likely to be due to the early puberty of the female sex. The most interesting feature was the fact that there were 6 cases below the age of 6, and in fact one seven months old only. All these young children were literally "shanghaied" into the ranks of Koro patients by anxious parents who were only too ready to diagnose Koro. This would seem to support the previous hypothesis that indoctrination had a great deal to do with the occurrence of the disease (Gwee, 1963).

TABLE III

NUMBERS AND INCIDENCE BY POSTAL AREA

Area	Number	Estimated Area Population	Incidence Per 10,000
1	34	118,000	3.3
2	18	84,000	2.1
3	101	200,000	5.1
4	7	35,000	2.0
5	6	40,000	1.5
6	9	22,000	4.1
7	42	125,000	3.4
8	41	117,000	3.5
9	21	54,000	3.9
10	13	59,000	2.2
11	9	46,000	2.0
12	31	99,000	3.1
13	29	51,000	5.7
14	66	206,000	3.2
15	8	102,000	0.8
16	3	39,000	0.8
17	1	27,000	0.4
18	1	10,000	1.0
19	13	157,000	0.8
20	0	28,000	0
21	4	36,000	1.1
22	3	27,000	1.1
23	10	36,000	2.8
24	1	19,000	0.5
25	2	17,000	1.2
26	1	23,000	0.4
27	0	41,000	0
28	3	33,000	1

Unknown 5 cases (Nos. 162, 223, 342, 360, 280)

The breakdown of case concentration for postal areas (Table III) showed that area 3 and area 13 had the highest incidences, and the next included areas 1, 7, and 8. The lowest were areas 20 and 27. As the population figures of postal areas were not available, the calculation was based on the estimate supplied by the Postmaster General which was derived from previous census figures and information based on housing development. Examining the map of Singapore (Fig. 2) there was no national or artificial barrier of note between postal areas, and it would be difficult to explain why case incidence rate should be different between contiguous areas (Fig. 2). However, different dialectic groups in Singapore Chinese tended to live apart giving rise to street names like Hokkien Street and Arab Street it seemed likely that there could be a dialect group bias which could include factors such as types of education, length of migration from China, contact with western medical belief, and cultural appraisal of sexual activities. It would be beyond the scope of the study team to delve into such a complex problem, which would involve a great deal of expertise, time and manpower to conduct surveys, and hence no attempt was made to explain the distribution phenomenon other than to note its presence.

It may be too readily assumed that a culture-linked illness would be allied to superstitious belief which education would dispel. However, education in most instances engenders its own cliché and bias, and in effect substitutes a more refined form of superstition for another such as the substitution of a pseudo-scientific rationalisation for the supernatural when attempting to account for natural phenomena. Koro, being an entity pertaining to tradition and cultural belief, must require a certain educational attainment on the part of the sufferer. Hence it is to be expected that the rate amongst educated persons would be higher than the corresponding one amongst the uneducated. The results showed (Table IV) that of the 236 cases answering to calls for interview, only 12 were uneducated (5%) whereas 3 had education beyond the secondary level (1%). The proportion of people having attained the level of education higher than secondary would be about ½% only (10,000) and uneducated ones would be 30%+. Chinese educated were 135 (57%) whereas English educated were 84 (35%). The ratio of Chinese educated to English educated in the population would be about 2:1 for the population showing that the media of instruc-

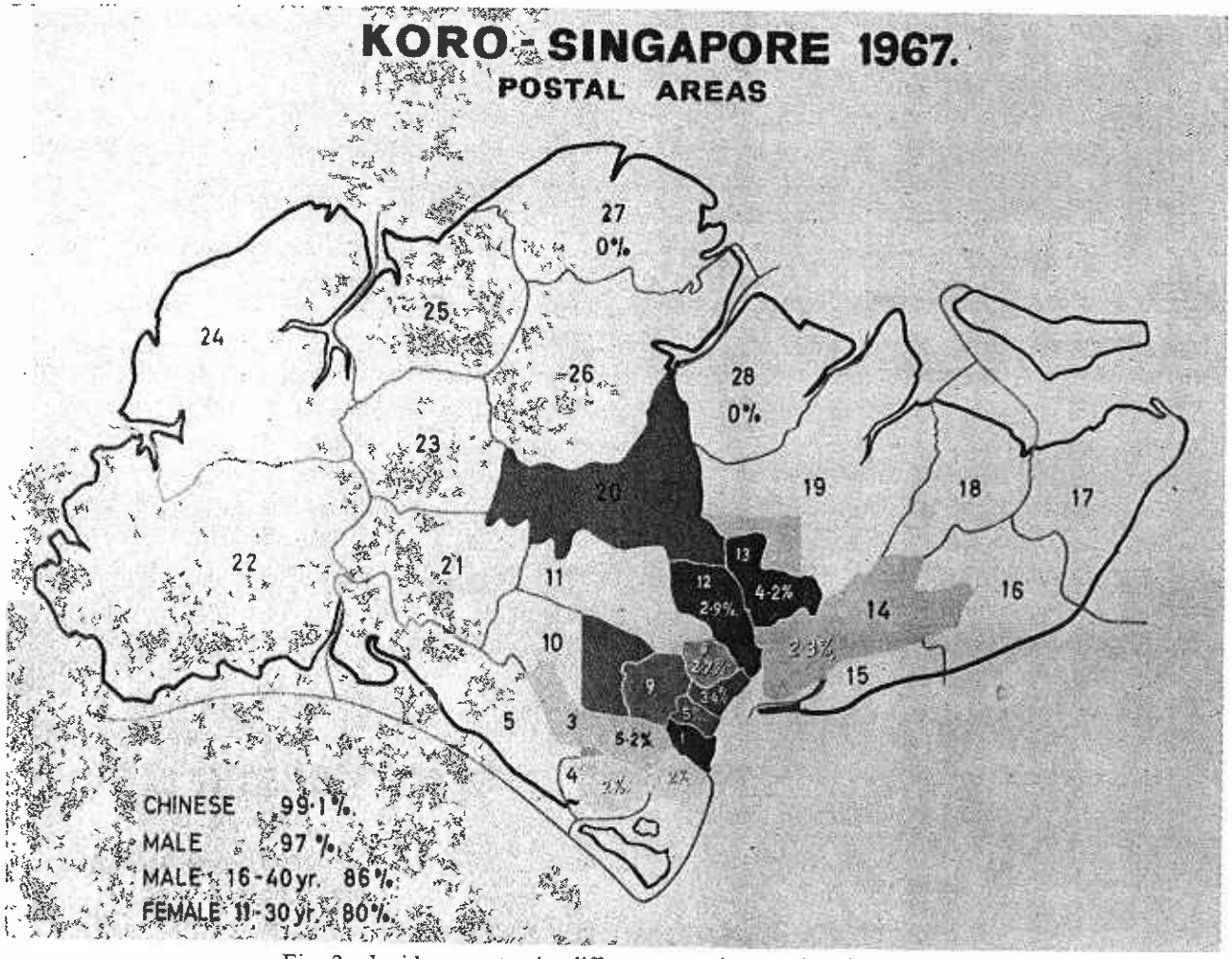

Fig. 2. Incidence rates in different postal areas in Singapore.

TABLE IV

EDUCATION OF CASES ATTENDING INTERVIEW

Education Level	Males		Females	
	General Hospital	Mac-Pherson Road O.P.D.	General Hospital	Mac-Pherson Road O.P.D.
Chinese Primary	48	39	0	1
Chinese Secondary	32	14	0	1
English Primary	22	15	2	—
English Secondary	23	22	0	—
Higher Education	3	0	0	—
Uneducated	7	2	1	2
Others	0	2	0	—
TOTAL	135	94*	3**	4

* Some cases were educated in both.
** One refused interview.

tion per se did not appear to affect the incidence of Koro amongst the Chinese cases. Secondary students were 92 (39%) compared to primary of 127 (60%) and since the primary population far exceeded the secondary one (>4:1 for all ages), this would show that a person with secondary or higher education was in fact far more prone to Koro than one with a primary education or no education. This difference is not due to age bias, for education is not compulsory in Singapore, and a good percentage of adults would be uneducated or educated up to primary level only.

It is necessary however to take note of the 6 cases below the age of 5 who could not possibly be receptive to complex cultural ideas to an effective degree. The study showed in fact that in all these cases, the diagnosis was made by the anxious elder relatives—parents etc. Hence they were more victims of the projected fears of other people than true Koro cases.

Studying the mode of onset and the progress of the "epidemic", it can be seen that the rise to peak incidence is very rapid resembling the spread of a highly infectious disease with a

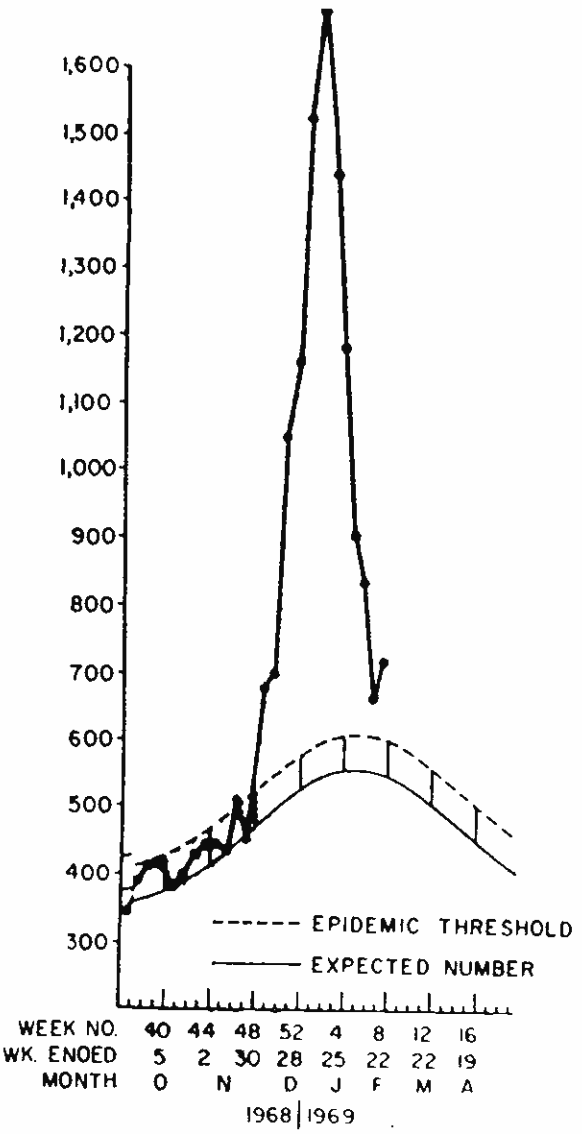

Fig. 3. Curve of Influenza Epidemic in U.S.A. Adapted from N.C.D.C.

very short incubation period. It is known that the spread of an infectious disease under epidemic conditions can be expressed mathematically with the cases multiplying at a geometrical progression (Fig. 3). Superficially, the behaviour of the Koro epidemic under discussion resembled the typical behaviour of epidemics. (Figs. 4 and 5) but the abrupt and precipitous rise and fall would mean such a high infectivity and short incubation as to be unlikely that it is due to transmission of infectious particles from man to man. Rather, it is suggestive strongly of the spread of rumour being also in a geometrical progression but far more catching and quicker to take effect.

In other words, this can be regarded as what is popularly called by lay people—epidemic hysteria. However, hysteria is a specific psychoneurosis with some typical patterns (Babinski, 1918), and the lack of motivation, the non-homogenous nature of the affected population, the presence of intense panic rather than the characteristic indifferent tranquillity, and the overwhelming male bias would argue against a label of hysteria in the true sense of the word.

SYMPTOMATOLOGY

It has been pointed out that a good account of Koro syndrome has been given in Chinese medicine (Gwee, 1968). Briefly it may be stated that the syndrome has three cardinal manifestations in firstly, a delusion of penile retraction and impending death; secondly, a panic syndrome with fear, feeling of collapse, palpitations, sweating, nausea, breathlessness, visual blurring and bodily spasm, pain or paraesthesis, and finally complications arising as a result of remedial measures. Obviously, the damages resulting from remedies are expressions of the degree of desperation of the panic, and the panic in turn is dependent on the strength of the delusion.

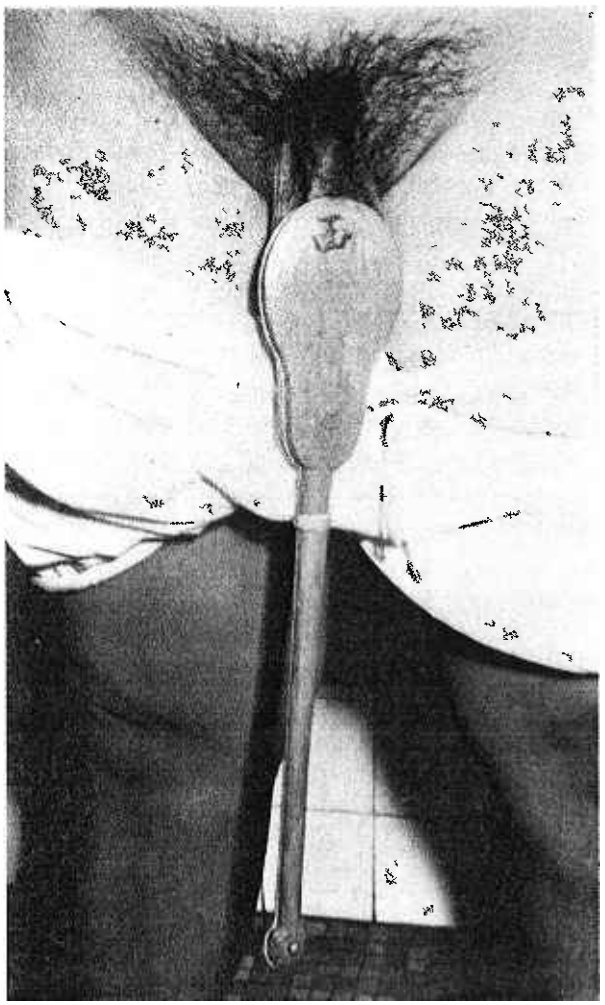

Fig. 4. A Koro Patient.

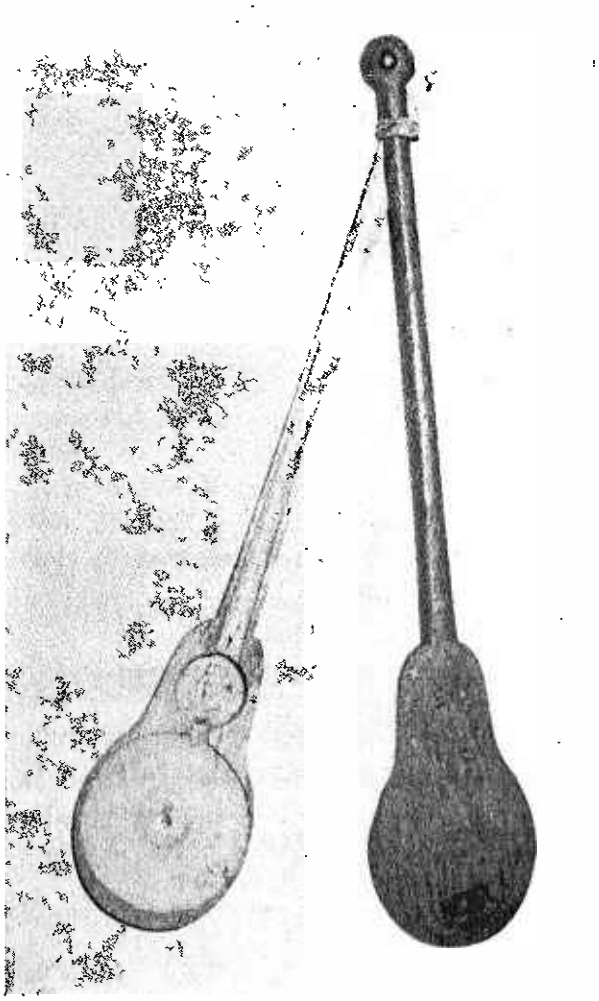

Fig. 5. A Restraint used by Koro Patient—Close-up View.

In the present epidemic, there has been hardly any injury to speak of although superficially the manifestation has been the same (Figs. 4 and 5). The predominant manifestations have been fear (90.5%), delusion of genital shrinkage (74.5%), delusion of penile retraction (60.9%), and palpitations (41.4%), and the principal remedial measures have been manual restraint (72%) and some placebo and reassurance (74.5%). Clearly, compared to what was known previously, the degree of desperation has been less, which seems to support the suggestion that Koro is on the decline as would be expected of a culture-linked reactive neurosis (Gwee, 1967).

Only 41 cases had further attacks (17%) which were easily controlled, and in 17 cases (7%), there was a feeling that sexual power was affected. This again serves to show that the belief is no longer so fixated in the Chinese population of Singapore. No significant relationship with sexual experience has been found, and without exception, every case has some idea of Koro either hearing about it previously or told about it at the "epidemic" before he was affected. This would seem another point for its being an indoctrination culture-bound syndrome.

Previously, it was suggested that Koro was a panic state arising out of a delusory belief based on cultural indoctrination (Gwee, 1963). The indoctrination provided the belief that it was possible to get a shrinkage of the genitals with fatal results, and given the right stimulus, in this particular instance the eating of pork from inoculated pigs, the belief culminated in a panic syndrome. The present epidemic therefore would seem to substantiate this postulate. The ease in which the epidemic was suppressed with publicised authoritative pronouncements and the effectiveness of cure in individual cases would also suggest that what is at work here is not infection but a mental state caused by rumours.

The present epidemic shows also how easily public fears can be caused by injudicious propaganda and statements, and how easily too they can be assuaged. The newspapers, television and radio would seem to be powerful tools in such circumstances. It also seems apparent that the best way to deal with a rumour-initiated condition is prompt and effective counter propaganda which can take effect practically instantaneously.

In conclusion, Koro has been suggested to be a panic syndrome linked with cultural indoctrination (Gwee, 1963). The "epidemic" in Singapore in 1967 when studied yields features which would seem to support this view.

ACKNOWLEDGEMENT

The Koro study team wishes to acknowledge the assistance and co-operation of the hospital units, outpatient services and general practitioners who supplied information of the cases seen and in particular to the Emergency Unit of the Singapore General Hospital where the bulk of the cases was seen. Gratitude is also expressed for the Hospital Records section for helping to prepare the punch-cards and the Postmaster General for the estimate of population in postal areas.

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APPENDIX I

Dear Doctor,

This is an appeal for your co-operation through the kind permission of the Singapore Medical Council.

Medical Unit III is studying the present outbreak of Koro as an academic problem. It is possible that you would have treated some cases in the recent outbreak, and would therefore be in a position to assist us. If you are able to supply any of the information appended below, please let us have your information by post or phone, and also please indicate if you would permit a member of our unit visiting your patients or seeing your records.

Name Age Sex Race *Address* and *Date seen* and any other information you feel would be of value to us. If you do not have all the information listed above, please let us have what is available. The information underlined would seem to us the minimum required to enable further investigation to be made.

Thank you.

Signed

.....

(Dr. A.L. Gwee)
General Hospital
7214 ext. 488

APPENDIX II

KORO

No. *Name:*
Date of onset including time:

Age:
1. 0 - 5
2. 6 - 10
3. 11 - 15
4. 16 - 20
5. 21 - 40
6. 41 - 50
7. 51 - 60
8. 61 →

Sex:
9. Male
10. Female

Race:
11. Malay
12. Indian
13. Others
14. Chinese (Southern)
15. Chinese (Northern)

Marital Status:
16. Married
17. Single

Address:

Symptomalogy:—

Mental:
18. Fear
19. Collapse
20. Fainting or loss of consciousness

Genital:
21. Genital pain
22. Shrinkage
23. Retraction
24. Parasthesia

Physical:
25. Bodily Pain
26. Bodily and or limb spasm
27. Visual blurring
28. Vomiting or nausea
29. Palpitation
30. Breathlessness

Treatment received and effect:
31. Injection
32. Medicine
33. Topical application
34. Psychotherapy

Emergency measures adopted by patient or well-wishers.

Personal concept of the nature of the illness.

Aetiology:
35. Eating of Pork
36. Exposure
37. Sexual activity
38. Trauma—local
39. Direct knowledge of Koro cases due to pork
40. Indirect

41. Direct knowledge of other Koro cases previously
42. Indirect

Sex:

43. Extra-marital sex
44. Marital sex
45. Nil
46. Any previous attack

Others:

Racial:

Birth Data:

47. Local born
48. Born in China
49. Born elsewhere
50. Father local born
51. Father born elsewhere
52. Mother local born
53. Mother born elsewhere

Education:

54. Chinese education up to Primary
55. Up to Secondary
56. Higher education
57. English education up to Primary
58. Up to Secondary
59. Higher education
60. Other streams up to Primary
61. Up to Secondary
62. Higher education
63. Uneducated
64. Reads newspapers daily
65. Reads newspapers occasionally
66. T.V. daily
67. T.V. occasionally
68. Radio daily
69. Radio occasionally

Type of Paper read:

Straits Times, Malay Mail, Eastern Sun, Sin Chew, Nanyang, others.

I.Q. (70 Normal, 71 Subnormal)

When beginning to eat Pork again?

Status after attack:

72. No further attack
73. 1 further attack
74. More than 1 further attack
75. Affects sexual power
76. Does not have effect
77. Affects general well being
78. No effect

Do you believe in the entity of Koro now?

Points:

1. All items to be filled.
2. From 18-38, query preceded by a general question: "Do you have any symptoms etc.?" These leading questions to be asked as and when necessary.
3. Put ? when the information is doubtful.

Physical Examination:

1. Obesity 2. Genitalia 3. Others

APPENDIX III

Dear Sir/Madam,

In connection with the recent Koro illness, you are requested to call at the MacPherson Road Estate Outpatient Dispensary or Medical Unit III, Bowyer Block, General Hospital on.....between.....a.m./p.m. to..... a.m./p.m. to see the doctor on duty.

Your co-operation will be much appreciated.

.....

Dr. Gwee Ah Leng
Senior Physician
General Hospital
Singapore, 3

Site of MacPherson Road Estate Outpatient Dispensary at MacPherson South Housing Estate (Block 65).