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Psittacosis in a highly endemic area in Italy

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SUMMARY

In one locality in Italy where the incidence of psittacosis has increased rapidly since 1980, a hospital-based study and a seroepidemiological survey were carried out in order to define the clinical and epidemiological features of psittacosis in that area.

Registers of the Virology Unit of the University of Ancona, Italy, were reviewed and all hospitalized patients with a serological diagnosis of psittacosis were identified. A total of 76 cases were found and studied. A presumptive bird source was identified in 80% of 62 patients, on whom a detailed investigation had been possible. Poultry represented the most frequent probable source of infection. Clinically, the predominant pattern of illness was a moderately severe lower respiratory tract infection, with chest X-rays showing pulmonary shadowings in 68 patients (89%).

In the seroepidemiological study, 51 out of 143 subjects were exposed to birds (35·7%), but only 7 out of 96 urban adult blood donors (7·3%) were positive for chlamydial antibodies using the microimmunofluorescence test.

INTRODUCTION

Chlamydia psittaci has re-emerged as an important pathogen and human-to-human transmission has been particularly evident in recent outbreaks (Anonymous, 1984; Isaacs, 1984; Schachter, 1986). A new strain of *C. psittaci* designated TWAR has been isolated from cases of acute respiratory infection (ARI) in which there is no evidence of avian transmission (Grayston *et al.* 1986). The TWAR strain has been shown on a serological basis to be also the cause of an epidemic of mild pneumonia with no evidence of avian transmission (Saikku *et al.* 1985). An additional outbreak of *C. psittaci* infection lacking the same evidence has been reported (Pether *et al.* 1984); moreover, in some national and local reports on psittacosis an avian source of infection has been found only in a small proportion of cases (Bruu *et al.* 1984; Nagington, 1984; Anonymous, 1986).

This paper presents the results of two studies on the clinical and epidemiological

features of psittacosis in an endemic area of Italy where the disease resembles an actual zoonosis (Maffei *et al.* 1984).

MATERIALS AND METHODS

Hospital-based study

The registers of the Virology Unit of the University of Ancona, Italy, were reviewed and all hospitalized patients with a serological diagnosis of psittacosis were identified (for the period October 1981 to February 1985). The study included the patients admitted to 12 hospitals.

At the time of their illness, sera of patients were tested by complement fixation (CF) test against *Coxiella burnetii*, *Mycoplasma pneumoniae*, influenza A and B viruses, adenoviruses (group antigen) and respiratory syncytial virus. From September 1983, sera were tested for antibody to *Legionella pneumophila* serogroup 1 by an indirect immunofluorescence test. Diagnosis of psittacosis was made by CF test using a commercially available chlamydia group antigen (Behring Institute).

A confirmed case of psittacosis was defined as one with a compatible illness plus a fourfold or greater rise in the CF titre, a presumptive case as a compatible illness and a single or constant titre of 128 or more, and a suspected case as a compatible illness and a single or constant titre of 32 or 64 in the absence of serological evidence of recent infection by the other pathogens tested.

Incidence rates of psittacosis have been calculated only for cases occurring in the population of the catchment area of 7 of the 12 hospitals (about 200000 people) in which serological screening was carried out on all their ARI patients.

Medical records of patients diagnosed as having had psittacosis were reviewed and clinical data were reported in a standard form.

Local Public Health Services were asked to obtain information about possible avian exposure of cases and to record on a standard questionnaire.

Seroepidemiological study

Sera from adult blood donors living in an urban setting and from adult volunteers with a known exposure to birds (mostly poultry animals and pigeons) and living in the study area were examined for chlamydia antibodies by both CF test (see above) and the microimmunofluorescence (MIF) test.

The latter test was performed using the elementary bodies of a *C. psittaci* strain of avian origin (Bio-Merieux).

Blood donor sera were kindly provided from two individual donor sessions by the blood bank of Ancona, Italy.

Subjects exposed to birds were recruited from the out-patients submitting their sera for non-infectious diseases to the laboratory services of three small rural hospitals of the study area.

RESULTS

Hospital-based study

Sera from 76 of the patients had one or more CF titres of $\geqslant 32$. Demographic characteristics of the patients are reported in Table 1. Based on the serological

Table 1. *Cases of psittacosis by age and sex in an Italian area (October 1981–February 1985)*

Age	Males	Females	Total (%)
<20	3	0	3 (3·9)
20–39	6	8	14 (18·4)
40–59	22	7	29 (38·2)
⩾60	15	15	30 (39·5)
Total	46	30	76 (100·0)

Table 2. *Major clinical and laboratory features of 76 cases of psittacosis, Italy, October 1981 to February 1985*

Finding	No. of patients	%
Headache	13	17·1
Cough	37	48·7
Chest pain	18	23·7
Physical signs of pulmonary involvement	64	84·2
Temperature >38·5 °C	36	47·4
Leucocyte count >10000/mm³	18	23·7
Erythrocyte sedimentation rate >60 mm/h	43	56·6
Serum glutamic oxaloacetic transaminase >60 I.U./l	4	5·3
Serum glutamic pyruvic transaminase >60 I.U./l	9	11·8

Table 3. *Radiographic features of 76 cases of psittacosis, Italy, October 1981 to February 1985*

Finding	No. of patients	%
Infiltrate present	68	89·5*
Involvement		
Unilateral	62	91·2†
One lobe	55	80·1†
Lower lobe(s)	46	67·6†
Patchy pattern	50	73·5†

* Percentage of all cases.
† Percentage of cases with positive X-ray finding.

evidence, 31 of them (40·8%) were confirmed cases, 27 (35·5%) presumptive and 18 (23·7%) suspected. In one presumptive case a titre of 512 for adenovirus was found, and in another presumptive case a fourfold decrease in titre for influenza A was observed. Of the series 60·5% were male and most cases were 41 years and more old.

Fifty-five cases occurred in the catchment area of the seven hospitals where the serological evaluation of patients admitted for ARI was systematically performed. In this area there was an increasing number of diagnosed cases over the 3 years fully covered by the study, with 26 having been admitted in 1984 (corresponding to 13 per 100000 population annual hospitalization rate). In the study period (41 months) the overall hospitalization rate was 27·5 per 100000 population. A clear seasonal distribution of cases was not observed. Frequency of signs and symptoms

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Table 4. *Histories of exposure to avian sources of infection in 62 cases of psittacosis, Italy, October 1981 to February 1985*

History	No. of patients	%
Poultry owner	9	14·5
Pigeon fancier	1	1·6
Pet bird owner	4	6·5
Owner of poultry, pigeons and pet birds	26	41·9
Occasional exposure	10	16·1
Negative	12	19·4

Table 5. *Chlamydial antibodies in urban blood donors and subjects exposed to birds, Italy*

Group	Number tested	Number with titres ≥16 (%)	
		CF*	MIF*
Urban blood donors	96	0	7 (7·3)
Subjects with bird exposure	143	1 (0·7)	51 (35·7)

* Antibody test by complement fixation (CF) and microimmunofluorescence (MIF).

is reported in Table 2. Temperature higher than 38·5 °C was recorded in 47% of cases and physical signs of pulmonary involvement were present in 84%. Half of the patients complained of cough, while systemic complaints such as malaise, chills, headache, myalgias and chest pain were rarely recorded. Laboratory data were generally unimpressive and only erythrocyte sedimentation rate was frequently raised (57%).

Pulmonary shadowings were seen on X-ray in 68 patients (89%) (Table 3). The changes were mostly unilateral with only one lobe affected. Lower lobes were most frequently involved and patchy shadows were commoner than the homogeneous ones.

The personnel of the local Public Health Services interviewed 62 out of 76 patients (81·6%); most of those not interviewed were patients living in the area of a non-collaborating Local Health Unit.

Forty patients (64·5%) had been exposed to birds on their own property (Table 4); most of them had been simultaneously exposed to poultry, pigeons and pet birds. Ten patients (16·1%) had been occasionally exposed to avian sources of infection; eight of them had had a contact with pet birds and/or poultry of friends, relatives or neighbours. One patient (a 3-year-old child) had gone into a pet bird shop and a railway man had had an occupational exposure since he had carried a case containing pigeons. Only two small clusters of cases were identified. Two cases occurred in the same family and the other two were co-owners of the same aviary.

Seroepidemiological study

The results of the seroepidemiological study are summarized in Table 5. Seven out of 96 urban blood donors (7·3%) and 51 out of 143 subjects exposed to birds

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(35·7%) were positive for chlamydia antibodies by the MIF test. Only one serum (from a poultry owner) was positive in the CF test (titre of 32).

DISCUSSION

The unusually high incidence of psittacosis and the high proportion of cases with a positive history of avian exposure are the most significant findings of the hospital-based study.

Psittacosis agents have been defined as 'unacceptable, but easily controllable, sources of human disease' (Schachter, Sugg & Sung, 1978). This is probably true in the United States, where pet birds seem to be the most important avian source of *C. psittaci* infection (Potter, Kaufmann & Plikaytis, 1983). In our study area, most cases were presumably due to small poultry farms, which in some rural towns are run by more than 50% of families. The risk associated with these farms is clearly demonstrated by the seroepidemiological study, in which poultry and/or pigeon owners were shown to have a 35·7% seropositivity rate for chlamydia antibodies compared with 7·3% in urban blood donors.

In the study area the poultry owners are often exposed also to pigeons in which a high rate of *C. psittaci* infection has been observed in Italy (Borroni, Gelosa & Scanziani, 1983) and in several other countries, such as Great Britain (Bevan & Bracewell, 1986; Bracewell & Bevan, 1986) and France (Milon *et al.* 1983). No microbiological data about the suspected avian sources of infection of our cases are available and therefore it is not possible to identify the species or group of birds which should be regarded as the major potential source.

The control of the spread of *C. psittaci* infection is very difficult in small poultry farms; here it is impossible to implement all the measures proposed for large poultry processing plants, such as the serological evaluation of birds to be introduced into the farm (Eugster, 1980). Moreover, chlamydiosis is a zoonosis which can have serious consequences in man but which may be less serious in economically important animals (Harris, 1983) and therefore a close liaison between the human public health services and the veterinary ones is often lacking.

Since 1980 all sera from patients with ARI submitted to the Virology Unit of the University of Ancona have been screened for chlamydia antibodies and the number of diagnosed cases of psittacosis rapidly increased in the subsequent years. Most clinicians and public health workers have become aware of the problem, which may partly explain the high proportion of cases with well-documented exposure to avian sources of infection (80%). The Public Health Laboratory Service Communicable Disease Surveillance Centre monitoring *C. psittaci* infections in England and Wales report a history of such exposure in about 20% of cases (Anonymous 1986) which may be due to the unreliability of the sources of epidemiological information. In Tayside, Scotland, a presumptive bird source was identified in 61% of 31 laboratory notified cases of psittacosis (period January 1980 to July 1984) when all patients were interviewed by a community medicine specialist or trainee (Hill, 1984).

Clinically, the prevailing pattern of illness was a moderately severe lower respiratory tract infection with X-rays showing unilobar patchy shadowings.

Physical signs of pulmonary involvement were present in most cases, while routine laboratory studies were of scant help in the differential diagnosis. These findings are in accordance with the clinical picture of psittacosis reported by others (Seibert, Jordan & Dingle, 1956; Schaffner *et al.* 1967) and confirms that psittacosis pneumonia cannot be recognized only on clinical features (Schaffner, 1979). Because of the non-specific clinical presentation, chlamydial aetiology must be considered in all patients affected by lower respiratory tract infection especially (but not only) when they have been exposed to an avian source of infection.

Based on our experience and according to the diagnostic criteria adopted by the USA Centers of Disease Control surveillance programme of psittacosis (Potter, Kaufmann & Plikaytis, 1983), a $\geqslant$32 CF titre for chlamydial antibodies can be considered suggestive of current or recent *C. psittaci* infection in a patient with a compatible illness because such titres are rarely found in healthy subjects. Our patients with a single or constant titre of 32 or 64 showed similar epidemiological and clinical features to the ones in whom a more unequivocal serological diagnosis had been made.

The results of the seroepidemiological study confirm that the MIF test is more sensitive than the CF test in measuring chlamydial antibodies (Schachter, 1985) and suggest that MIF test may be very useful in serosurveys on *C. psittaci* infection.

It has been predicted that in the year 2000 chlamydial infection will be amongst the major infective problems discussed in the medical literature (Evans, 1985) and perhaps by then the term 'chlamydia' will not be taken always to refer to *C. trachomatis*.

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