

Distribution of influenza viruses in Northern Greece during 1972–1983

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SUMMARY

Observations on the circulation of influenza viruses in Northern Greece during the winters of 1972/3 to 1982/3 are presented.

Influenza A viruses were detected every winter with the exception of those of 1973/4 and 1981/2, when neither type A nor type B was isolated. The strains of type A isolated during the study period were similar to those circulating world-wide over the same time scale.

Influenza B viruses were isolated only during the winters of 1972/3 and 1979/80; influenza A viruses were also circulating in the community at those times. The B strains detected were similar to those recorded world-wide during the period of study.

INTRODUCTION

Influenza as a human disease has been and continues to be of great importance. Since the first transmission of the disease to laboratory animals (Smith, Andrewes & Laidlaw, 1933) enormous progress has been made in the study of influenza viruses. Cultivation techniques in embryonated eggs (Burnet, 1940) and in tissue culture have been established. The haemagglutinating properties of the viruses have been recognized (Hirst, 1941) and haemadsorption techniques have been developed (Vogel & Shelokov, 1957). The antigenic, biological and biochemical properties of influenza viruses have been extensively studied and different types of vaccine have been tried in order to control the disease (Bashe *et al.* 1964; Andrews *et al.* 1966; Beare *et al.* 1968; Couch *et al.* 1974).

Unfortunately influenza viruses manage to penetrate the community's defence and individuals suffer several infections. In addition to its yearly appearance influenza occurred as a pandemic in 1890, 1918, 1933, 1957–8 and 1968–70, resulting in millions of excess deaths. For many years Greece has experienced influenza pandemics and yearly outbreaks but has taken no part in influenza surveillance programmes.

Accordingly in 1971 the newly developed virology unit of the University Microbiology Laboratory of the Medical School in Thessaloniki commenced studies to prospectively monitor the distribution of influenza viruses in Northern Greece. The programme included isolating and typing of the influenza viruses circulating in the community and serological studies by haemagglutination-inhibition (HI)

and complement fixation (CF). The World Health Organization became aware of the activities of this laboratory and in 1979 requested that the laboratory become a national influenza centre for Northern Greece. Another national influenza centre for Southern Greece was established at the Pasteur Institute in Athens in 1978 since influenza viruses can be introduced into Greece from neighbouring countries to the north or south.

This paper presents data of influenza viruses isolated from patients in Northern Greece beginning with the winter of 1972/3 and ending with the winter of 1982/3. It is the first documented report on influenza viruses circulating in Greece during this 11-year period.

MATERIALS AND METHODS

Nasopharyngeal and throat swabs were collected within 3 days of onset from patients with influenza-like illness. Swabs were inoculated aseptically into 10- to 12-day-old hens' eggs. Fowl and human group O RBC were used for HA and HI tests. The isolation and typing procedures used were those described by Grist, Ross & Bell (1974). Prototype virus strains and their homologous sera were kindly provided by the W.H.O. Collaborating Centre, Atlanta, Georgia, U.S.A., except for the year 1972/3, when these reagents were commercially obtained from the Italdiagnostic company. Representative isolates of all the strains obtained were sent to the W.H.O. World Influenza Centre in London for further typing and investigation.

RESULTS

Our results are summarized in Table 1. Most of the influenza viruses isolated were type A. The winters of 1972/3 and 1979/80 were the only ones during which influenza group B viruses were also isolated. In the winters of 1975/6, 1977/8 and 1978/9 only a single strain of influenza A predominated, whereas in the years 1979/80, 1980/1 and 1982/3 at least two strains were circulating concurrently in the community. Intermediate strains between two type A viruses were encountered by the W.H.O. London centre, especially in 1976/7. In 1979/80, when influenza B viruses predominated, some intermediate strains between two type B viruses were also encountered by the W.H.O. London centre (Table 1). Data of the clinical illness is also presented in Table 1. People of all ages were affected in general, except for the years 1977/8 and 1978/9 when only young people under 20 years old were affected. Despite the presence of influenza-like illness in the community in the winters of 1973/4 and 1981/2, influenza viruses were not isolated.

The strains of influenza viruses detected in Northern Greece were compared with those recorded world-wide during the same period (Table 2). The patterns were very similar.

DISCUSSION

Our studies on influenza viruses circulating in Northern Greece over an 11-year period showed that type A strains predominated in the area. However, this conclusion may be misleading since only egg-inoculation techniques were used, which favour the isolation of type A (Grist *et al.* 1974; Hsiung, 1982; Stuart-Harris

Table 1. *Influenza viruses isolated from winter 1972/1973 to winter 1982/1983 in Northern Greece and clinical data of influenza illness*

Influenza season	No. of patients examined	No. of isolations	Influenza serotype	Influenza illness
1972/3	31	10	9 A/England/42/72 (H3N2) 1* B virus	Mild to moderate upper respiratory syndromes: some pneumonia cases followed
1973/4	44	—	—	Mild upper respiratory syndromes
1974/5	29	7	6 A/Port Chalmers/1/73 (H3N2) and 1† A/Port Chalmers/1/73 (H3N2) and A/Scotland/840/74 (H3N2)	Moderate upper and lower respiratory syndromes
1975/6	15	4	A/England/864/74 (H3N2)	Mild upper respiratory syndromes
1976/7	35	15	† A/Victoria/3/75 (H3N2) and A/Victoria/112/76 (H3N2)	Mild upper respiratory syndromes
1977/8	19	5	A/USSR/90/77 (H1N1)	Moderate upper respiratory syndromes
1978/9	60	1	A/USSR/90/77 (H1N1)	Mild feverish syndromes
1979/80	85	12	1 A/Texas/1/77 (H3N2) 2 A/Bangkok/1/79 (H3N2) 1† A/Texas/1/77 (H3N2) and A/Bangkok/1/79 (H3N2) 2 B/Singapore/222/79 6† B/Singapore/222/79 and B/Hong Kong/8/73	Variable from mild to severe lower respiratory syndromes
1980/1	30	8	2 A/USSR/90/77 (H1N1) 4 A/Bangkok/1/79 (H3N2) 2† A/Texas/1/77 (H3N2) and A/Bangkok/1/79 (H3N2)	Moderate upper and lower respiratory syndromes
1981/2	17	—	—	Very mild feverish syndromes
1982/3	18	5	4 A/Philippines/2/82 (H3N2) 1 A/Hong Kong/1/82 (H3N2)	Mild upper respiratory syndromes

* Not further typed.

† Intermediate strains between the two viruses stated.

& Schild, 1976). Moreover, patients with type B infection usually have mild symptoms, making hospitalization or medical follow-up unnecessary.

From the clinical data of the cases virologically investigated it appeared that, in those years when a single virus strain was predominant (1975/6, 1977/8, 1978/9), the symptoms of the infection were more uniform and typical than in those years (1974/5, 1979/80, 1980/1) when several types were circulating. This was particularly evident in 1979/80, when at least five different strains of influenza type A and type B were isolated; during this time the clinical presentation varied markedly in respect of the severity of illness.

Table 2. Comparison of types of influenza viruses circulating in Northern Greece and world-wide from winter 1972/1973 to winter 1982/1983

Influenza season	Types isolated in N. Greece	Types isolated world-wide	
1972/3	A/England/42/72 (H3N2) B virus	A/Hong Kong/1/68 (H3N2) A/England/42/72 (H3N2) A/Hong Kong/5/72 (H3N2)	B/Hong Kong/1/72
1973/4	—	A/England/42/72 (H3N2) A/Port Chalmers/1/73 (H3N2)	B/Victoria/08926/70 B/Hong Kong/5/72
1974/5	A/Port Chalmers/1/73 (H3N2) A/Scotland/840/74 (H3N2)	A/England/42/72 (H3N2) A/Scotland/840/74 (H3N2) A/Port Chalmers/1/73 (H3N2)	B/Hong Kong/5/72 B/Victoria/08926/70
1975/6	A/England/864/75 (H3N2)	A/Port Chalmers/1/73 (H3N2) A/England/864/75 (H3N2) A/Scotland/840/74 (H3N2)	
1976/7	A/Victoria/3/75 (H3N2) A/Victoria/112/76 (H3N2)	A/Victoria/3/75 (H3N2) A/New Jersey/76 (swine H1N1) A/Victoria/112/76 (H3N2)	B/Hong Kong/5/72
1977/8	A/USSR/90/77 (H1N1)	A/Victoria/3/75 (H3N2) A/USSR/90/77 (H1N1) A/Texas/1/77 (H3N2)	
1978/9	A/USSR/90/77 (H1N1)	A/Victoria/3/75 (H3N2) A/Texas/1/77 (H3N2) A/USSR/90/77 (H1N1)	B/Hong Kong/5/72
1979/80	A/Texas/1/77 (H3N2) A/Bangkok/1/79 (H3N2) B/Singapore/222/79 B/Hong Kong/8/73	A/Texas/1/77 (H3N2) A/Bangkok/1/79 (H3N2) A/USSR/90/77 (H1N1)	B/Hanover/13/78 B/Singapore/222/79
1980/1	A/USSR/90/77 (H1N1) A/Bangkok/1/79 (H3N2) A/Texas/1/77 (H3N2)	A/USSR/90/77 (H1N1) A/Bangkok/1/79 (H3N2) A/Texas/1/77 (H3N2)	
1981/2	—	A/Texas/1/77 (H3N2) A/Bangkok/1/79 (H3N2) A/Brazil/11/78 (H1N1) A/England/333/80 (H3N2)	
1982/3	A/Philippines/2/82 (H3N2) A/Hong Kong/1/82 (H3N2)	A/Texas/1/77 (H3N2) A/England/333/80 (H3N2) A/Philippines/2/82 (H3N2) A/Bangkok/1/79 (H3N2) A/Belgium/2/82	B/Hong Kong/5/72 B/Singapore/222/79

From Kyriazopoulou-Dalaina & Papapanagiotou (1977), Kyriazopoulou-Dalaina & Symeonidis (1978), and W.H.O. Weekly Epidemiological Records (1972-83).

Deaths attributable to influenza have been officially recorded, since 1972, at an annual rate of 150-350, except for 1967 when no deaths were reported and for 1977 when only 10 deaths due to influenza were reported. Data of deaths for the years 1981, 1982 and 1983 have not yet been published (Office National de Statistique de Grèce, 1972-1980).

In the winter of 1979/80 two different strains of influenza A were isolated from members of the same family who became ill one after another. They were an A/Texas/1/77 (H3N2) strain recovered from a father and a A/Bangkok/1/79

(H3N2) strain recovered from his son who reported ill 3 days later than his father. The incident shows separate sources of infection in a year (1979/80) during which many different strains of influenza viruses were circulating concurrently in the community.

In the winter of 1974/5, of the 29 patients virologically examined, nine were children living together in a nursery school. Four strains of influenza viruses were recovered from them, three typed as A/Port Chalmers/1/73 (H3N2), while one has been characterized by the W.H.O. London centre as an intermediate strain between A/Port Chalmers/1/73 (H3N2) and A/Scotland/840/74 (H3N2). It seems that antigenic variation occurred as a consequence of virus passage from one patient to another in that closed community.

Although we failed to isolate any influenza viruses during 1973/4 and 1981/2, a mild influenza-like illness was reported in the community and serological investigations (CF seroconversions) suggested that influenza B was circulating in Northern Greece at those times.

In general, it appeared that the pattern of circulating influenza virus strains seen in Northern Greece was similar to that recorded world-wide (Table 2). There has been, however, a short time delay in the appearance of these characteristic strains in Northern Greece, probably due to differences in climate when compared with other north European countries. The influenza season in this part of the world starts usually in November and ends in April each year.

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