

THE SITUATION OF FOOT AND MOUTH DISEASE VIRUS TYPES AND SUBTYPES IN IRAN IN 1980-1983

M.R. Firouzi Bandpay, M. Amighi, M. Lombard, R. Piroird and M. Salehizadeh

SUMMARY

During the period of 1980 to 1982 only 01, the enzootic type of FMDV, was frequently isolated from the FMD suspected samples collected in different provinces of the country and dispatched to the Razi Institute. In the first half of 1983 FMDV type A was isolated from a sample received from a cattle farm in south western part of the country (FARS) and a few days later the Asia 1 type was also isolated and identified in the western part (LORESTAN), which was the first reappearance of this type since 1973. In the serological survey of the different strains of FMDV isolated in Iran, it was determined that the 0 type isolated in 1982 was to some extent different from the O Tabriz 1977. No difference was observed between Asia 1 types isolated in 1973 and 1983. There was a great difference between type A 1983 and A22, the enzootic type of Iran.

The O strains of some countries in the Middle and Near East were stable in their serological properties.

INTRODUCTION AND HISTORY

A brief historical background of FMDV types isolations and identifications at the Razi Institute are as follows:

The O type was isolated in 1955 and the A type in 1960: The SAT 1 type was appeared in 1962 and the latest case in 1964 (1). In 1964 the A22 subtype of FMDV was isolated in Iran and since 1964 the A22 and 01 subtypes were frequently isolated and identified in different regions of the country. Since 1973 the A22 type has been isolated at intervals and the severity of Foot and Mouth Disease caused by this type decreased annually, e.g. from 21 March 1973 to 21 March 1974, 38 samples were identified as type A whereas, since 21 March 1974 only 17 cases of this type were identified from a total number of about 2107 samples received at the FMD laboratory. It is worth mentioning that, there was not a single case of type A in 1976, 1980, 1981 and 1982.

The presence of Asia 1 type had not been reported until late in 1957 and subsequently in 1964. These outbreak did not widely spread and were successfully contained in a very short period of time. In 1973 the Asia 1 type again entered Iran from the Eastern border of the country, this time causing heavy losses. This outbreak was also controled in a period of less than four months by mass vaccination as well as the re-enforcement of animal health measures (2).

The latest outbreak due to this type occurred in 1983.

MATERIALS AND METHODS

Antigens:

For typing, antigens were prepared from the FMD suspected samples received at the Razi Institute.

For subtyping, antigens, were produced in monolayer cultures as previously described (3) and by Frenkel method.

The strains of FMD used in the survey were as follows:

1980: O Sanabel Arabia, O Kafr Egypt, O Azerbaidjan and O Khorassan Iran.

1981: O Israel and O Diarb Egypt.

1982: O Tafresh Iran.

1983: Asia 1 and A Iran.

Antisera:

Hyperimmune guinea pig antisera were prepared according to the method described before (4,5).

Complement Fixation Test:

For isolation and identification of FMDV types from the suspected samples of the infected animals, received during the period of 21 March 1980 to 21 March 1984, the Complement Fixation Test according to Kolmer's method was employed (6).

For determination of serological differences among the different types of FMD virus isolated during the recent and previous years in Iran as well as those, which were isolated in the various countries of the Middle and Near East, the Complement Fixation Test according to the original and modified method of Osler (50% haemolysis) was performed (7,8).

In this survey only the 'r1' values were calculated from:

Activity of serum against heterologous strain.

$$r1 = \frac{\text{Activity of serum against heterologous strain.}}{\text{Activity of serum against homologous strain.}}$$

RESULTS AND DISCUSSION

The results of typing and subtyping are demonstrated in the various tables.

Table 1- Isolation and identification of FMDV from samples received from 21 March 1980 to 21 March 1984.

Year	1980 - 1981			1981 - 1982			1982 - 1983			1983 - 1984				
	Type	Total	O	Neg.	Total	O	Neg.	Total	O	Neg.	Asial	A	Neg.	
Meath														
March-April	6	1	5	18	7	11	32	5	27	28	18	-	-	10
April-May	7	3	4	31	7	24	44	20	24	66	18	-	-	48
May-June	13	3	10	27	9	18	68	24	44	39	13	1	1	24
June-July	13	3	10	23	4	19	28	3	25	18	3	3	-	12
July-Aug.	21	6	15	28	-	28	19	7	12	84	11	23	-	50
Aug.Sept.	8	-	8	6	-	6	25	11	14	46	13	13	-	20
Sept.-Oct.	37	10	27	2	-	2	15	4	11	56	11	14	-	31
Oct.-Nev.	3	-	3	10	6	4	11	2	9	61	12	17	-	32
Nov.-Dec.	6	1	5	14	2	12	14	1	13	82	19	14	-	49
Dec.-Jan.	7	1	6	11	1	10	21	8	13	45	8	7	2	28
Jan.-Feb.	9	-	9	34	12	22	32	23	9	54	3	13	-	38
Feb.-March	43	9	34	41	5	36	36	15	21	71	10	12	-	49
TOTAL	173	37	136	245	53	192	345	123	222	650	139	117	3	391

Table 2- Epizootiology of FMD during the period of 21 March 1980 to 21 March 1984

Type	Total		Asial		Neg.	%		%	
Year	O	+	A	+		O	Asial	A	Neg.
		+		+		+	+	+	+
1980 - 1981	173	37	-	-	136	21.38	0	0	78.61
1981 - 1982	245	53	-	-	192	21.36	0	0	78.36
1982 - 1983	345	123	-	-	222	35.65	0	0	64.34
1983 - 1984	650	139	117	3	391	21.38	18	0.46	60.16
TOTAL	1413	352	117	3	941	24.91	8.28	0.21	66.6

Table 3 – Isolation and identification of FMDV types from different provinces of Iran from 21 March 1980 to 21 March 1984

Province	Total	O +	Asia1 +	A +	Neg.
1 – Central	464	107	29	-	328
2 – Fars	145	28	12	1	104
3 – Gorgan	130	52	6	-	72
4 – Khorassan	119	32	4	-	83
5 – Western Azerbaidjan	75	19	16	2?	38
6 – Mazandaran	72	25	5	-	42
7 – Isfahan	59	13	-	-	46
8 – Semnan	51	9	3	-	39
9 – Lorestan	38	3	9	-	26
10 – Guilan	38	9	9	-	20
11 – Ilam	37	9	3	-	25
12 – Khusestan	35	10	-	-	25
13 – Eastern Azerbaidjan	28	6	4	-	18
14 – Zanjan	27	8	7	-	12
15 – Kerman	25	7	-	-	18
16 – Bakhtaran	21	2	5	-	14
17 – Hamadan	19	6	-	-	13
18 – Sistan and Bluchestan	10	2	-	-	8
19 – Kordestan	7	-	5	-	2
20 – Yazd	7	4	-	-	3
21 – Chahar Mahal Bakhtiari	3	1	-	-	2
22 – Booshehr	3	-	-	-	3
TOTAL	1413	325	117	3	941

Table 4 – 'r1' values calculated from mean serum titres of 3 or more tests

Virus Sera	Asia1 1973	Asia1 1983	A22	A 1983
Asia1 1973	1	0.71	-	-
A22	-	-	1	0.2

Table 5- 'r1' Values calculated from mean serum titres of 3 or more tests

Virus		1980				1981		1982
		0	0	0	0	0	0	0
		Sanabel Arabia	Kafr Egypt	Azerbaidjan Iran	Khorossan Iran	Israël	Diarb Egypt	Tafresh Iran
Sera								
01Lausanne	1965	0.33	0.27	0.58	0.38	0.40	0.25	0.52
01 BFS	1967	0.43	0.40	0.53	0.33	0.37	0.61	0.50
01 Manisa	1969	1	0.90	0.87	0.65	0.65	1	0.85
0 Sharquia	1972	1	0.88	0.93	0.70	0.66	0.85	0.74
0 Mashoury	1968	NT	0.62	0.60	0.57	0.43	0.89	0.70
0 Tabriz	1977	NT	NT	0.65	0.70	NT	NT	0.56
0 Israël	1981	0.40	0.37	NT	NT	1	0.45	NT

As the tables concerning the isolation and identification of types (1, 2, 3) indicate 01 the enzootic type of Iran has been isolated and identified in all provinces of the country, e. g., 352 (24. 91%) samples were identified as type 0 from the total number of 1413 samples tested during the mentioned period.

Table 1 and 3 show that, 3 years after the disappearance of type A, the first case was isolated from a sample collected in Frars in June 1983 and subsequently 2 suspected cases in January 1984 from western Azerbaidjan.

It is also demonstrated in the various charts that, Asia 1 type has been isolated and identified in a sample received from Lorestan in June 1983, which was the first case reported since 1973, and subsequently it was frequently isolated and identified in other provinces of the country.

The results of r1 Values demonstrated in the Tables 4 and 5 indicate that:

- 1 - The Asia 1 types isolated in 1973 and 1983 are closely related ($r_1 = 0.71$).
- 2 - The A type 1983 is widely different from A22 ($r_1 = 0.2$).
- 3 - Eastern strains are different from European strains $0.3 < r_1 < 0.5$, and thus very homogenous.
- 4 - Eastern strains remain relatively near to Turkish vaccine strains (O Manisa) and Egyptian strains (O Sharquia) as the ratio is between 0.66 and 1.
- 5 - Iranian strains (O Tafresh) seems to be to some extent different from the O Tabriz.

FMDV type A appeared in 1983 with a wide antigenic variations, did not extend to other regions due to the regular application of trivalent vaccine (A22, 01, Asia1) on susceptible animals. Although A22 viruses show wide differences in their antigenic properties, are mostly related to each other from the epidemiological point of view (9).

The Asia 1 type 1983, which was closely related to that of 1973, was mostly isolated in calves and non vaccinated animals. Most of the industrial cattle farms resisted this type, due to the regular vaccination, (vaccination) carried out during the past 10 years.

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