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EVALUATION OF FIELD DIAGNOSTIC TESTS FOR THE DETECTION OF NEWCASTLE DISEASE VIRUS

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In developing countries like India, much importance is being given for the diagnosis, control and eradication of cattle and poultry diseases which affects the economy of the country to a very great extent. Products from poultry contribute substantially to the economy of the farmers and one of the economically important disease of poultry is the "NEWCASTLE DISEASE'. The diagnostic techniques have improved over the last few decades and the indentification of NDV in secretions or tissues relies on the isolation of the infectious agent and its characterization by several tests like Mean death time (Hanson Brandly, 1955), Intracerebral pathogenecity index and Intravenous pathogenecity index (Allan *et al.*, 1978) which are time consuming. Moreover the commonly used Haemag glutination (HA) Test and Haemagglutination inhibition (HI) test (Allan and Gough, 1974) require specific laboratory conditions and skilled personnel.

In countries where Newcastle disease is endemic, not every laboratory can afford to be equipped with costly sophisticated equipments. Therefore alternative methods which are rapid, reliable, economical and easy without depending on sophistication have to be developed. With this view a study was undertaken to evaluate the efficiency of various field diagnostic tests viz., Dot-Enzyme linked Immunosorbent assay (Dot-ELISA) , Latex agglutination test (LAT), Avidin Biotin-Dot ELISA (AB-Dot ELISA) and Immunoperoxidase test (IPT) with the standard OIE approved HA and HI tests for Newcastle Disease diagnosis.

Materials and Methods

Suspected tissue samples (brain, trachea, proventriculus, spleen, intestinal contents and ileocaecal tonsil) collected from field outbreaks were used in the tests. Healthy, uninfected/unvaccinated chicken tissue was kept as control.

Haemagglutination and Haemagglu tination inhibition test: This test was performed out on tissue suspensations as per the method prescribed by OIE. 1992.

Dot/Enzyme Linked Immunosorbent assay: Tissue suspensions were used in conducting the test. The test was carried out

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as per the method described earlier (Pappas *et al.*, 1983) with minor modificatons (modification was made with respect to the buffer used; in this case Tris Buffered saline, PH7.5 and the incubation time of (10-12 min at each step).

Latex agglutination test : This test was carried out as per the method of Bansal *etal.* (1988) with minor modifications (modification was made with respect of the type of globulin (chicken globulins for NDV), concentration of globulin (2mg/ml) used for coating, and the final suspension (0.6%) of coated beads).

Avidin-Biotin Dot Elisa Test : This test was performed by using the kit supplied by Dakkapotts (Denmark) and the test was carried out as per the method of Jayakumar *et al.* (In press)

Immunoperoxidase test : This test was carried out on impression smears from field outbreaks and was conducted as per the method of Jayakumar et al. (In press).

Results and discussion

Totally 258 samples from field outbreaks were utilized to compare the following tests namely HA and HI tests, Dot-ELISA, LAT, IPT and AB-Dot-ELISA.

It is seen from the results of the present study (Table) that 180 samples were found positive by HA and HI tests (69.76 percentage), 165 samples by LAT (63.95 percentage) , 175 samples by AB Dot ELISA (67.8 percentage) and 157 samples by IPT (60.85 percentage). The sensitivity and

Comparision of Dot-ELISA, AB-Dot ELISA, LAT and IPT with the standard HA and HI test for the detection of Newcastle Disease virus

S.No.	Tests	Total No. tested	Number +ve	Number -ve	Total % +ve	Sensitivity	Specificity	Students 't' value Stand. vs Field tests
1	HA & HI	258	180	78	69.76			
2.	Dot ELISA	258	171	87	66.30	98.28	92.86	0.8536^{NS}
3.	AB Dot ELISA	258	175	83	67.80	99.40	95.12	0.4800^{NS}
4.	LAT	258	165	93	63.85	97.63	87.64	1.52^{NS}
5.	IPT	258	157	101	60.85	95.12	84.78	2.13

NS - Non significant (P>0.05)* - Significant (P<0.05)

specificity of field tests viz., Dot-ELISA, LAT, AB Dot ELISA and IPT were found to be 98.28 percentage, 97.63 percentages, 99.4 percentage and 95.12 percentage and the specificity was found to be 92.86 percentage, 87.64 percentage, 95.12 percentage and 84.78 percentage respectively for Newcastle Disease virus, No significant difference was observed between Dot ELISA, LAT, AB Dot-ELISA and the standard HA and HI test, however significant differences were observed between IPT and HA and HI.

Based on the results, the present study revealed that the field diagnostic tests evaluated in this study were very specific and agreed well with standard OIE approved HA and HI tests. The tests viz., Dot ELISA, LAT AND AB Dot-ELISA are very rapid, simple and dose not require trained personnels. The colour developed in Dot-ELISA and AB Dot-ELISA (brown colour) does not fade, hence serves as permanent record which could be documented for future comparison. It is also clear from the study of the field diagnostic tests compared (Table), Avidin-biotin Dot EIISA is efficient, sensitive and specific. The use of Avidin as a bridge molecule between biotin moieties increased the sensitivity of the test (Hsu-ming *et al.*, 1981; Jayakumar *et al.*, in press). The IPT test does require only an ordinary microscope for reading the results. Dot-ELISA, AB Dot-ELISA and LAT might be useful in the diagnosis of Newcastle Disease Virus particularly when large number of samples have to be examined in the field. Eventhough AB Dot ELISA is found to be superior among the field tests compared it is slightly costlier than Dot-EliSA and Lat. Hence, under field conditions the economy of the test is a major criteria in addition to its superiority. It is concluded that the Dot-ELISA and LAT are suitable for use in field conditions without the need of sophisticated equipments and highly trained personnels.

Summary

Based on the study which compared the efficacy of various field diagnostic tests viz., Dot-ELISA, LAT, AB Dot-ELISA and IPT with the standard OIE approved HA and HI test for the diagnosis of Newcastle Disease virus it is concluded that the AB Dot-ELISA is superior. However, since AB Dot-ELISA is costlier, Dot-ELISA and LAT are more suitable for use in field conditions with almost comparable efficacy as that of Ab Dot-ELISA.

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