



Research Article

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Poultry immunity against Ranikhet Disease Virus (RDV)- A case study of an indigenous poultry medication in village production systems of Maharashtra, India

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ABSTRACT

Poultry production is important for availability of low cost bioavailable protein and a means for diversified economic activity in rural society. These village production units have to depend on animal husbandry department for protection against disease outbreak more specifically Ranikhet disease virus (RDV). The present mode of vaccination program could not able to control RDV for larger geographical areas effectively. Different measures need to be identified to complement veterinary institutional effort for welfare of birds as well as public health. In this context, it is paramount that the knowledge of indigenous system needs to be recognized for sustaining quality veterinary services. The research study had identified an experimental broiler unit affected with RDV and tested the efficacy of an indigenous herbal medication (AHP/RDV/YR/T5) under village production system. The level of antibody titre against RDV was measured by Haemagglutination Inhibition (HI) test and it was found that adult stage test group of broiler birds had significant humoral response than control group. The clinical protection of experimental broiler birds from RDV through local knowledge system was confirmed therapeutically. These low cost medications need to be strengthened through demonstrations at different locale for poultry owners so as to adopt and benefit. This approach illustrates an alternative means for reducing input cost and minimizing higher technical application at rural units in protecting welfare of birds.

Keywords: poultry, immunity, ranikhet disease virus, indigenous, health

INTRODUCTION

In most developing countries, domestic poultry production helps farming community in generating source of income and acts as an integral part of their social system [1]. Recent decade it had emerged as an industrial activity since the market avenues for such produce are readily available at the door step of farmers such as contract broiler farming [2]. Further, backyard poultry rearing is being practiced as livelihood activity for women [3,4]. In countries like India such small units and domestic rearing are catered by services of state animal husbandry department. There were many evidences that these units of poultry rearing occupation face huge challenges in terms of outbreak of diseases[5]. Ranikhet Disease Virus (RDV) is one of the most important ailments affecting poultry sector and identified as public health threat [6, 7]. The virus is endemic to most parts of the world and pose considerable challenge in spite of large scale vaccination activities [8,9].

Animal husbandry departments serve these poultry units through veterinary institutions like Veterinary polyclinics, dispensaries and health camps. However, poultry owners find it difficult to carry few affected birds to veterinary institutions for diagnosis and therapeutic support. The factors like vaccine failure in many countries will remain a challenge due antigenic diversity of avian paramyxovirus [10]. However, conventional vaccine strategy needs to be sustained and will be paramount for public health, food safety [6]. The technological gap needs to be fulfilled by adopting different measures to protect welfare of birds [11]. The ban on antimicrobials had enthused in identifying alternative poultry feed additives of plant origin [12,13]. It is essential to identify novel means for sustaining poultry health and to complement such interventions locally.

The research study aims to unearth the importance of indigenous knowledge system for poultry health. In affected birds, studies had illustrated decrease in humoral antibodies and shedding of virulent RDV [10]. Henceforth there is a need to identify such medications which can enhance humoral antibodies against RDV. Rural society had better understanding and knowledge of plants used for such treatment [14]. It was also illustrated that not all medicinal herbs can enhance protection against RDV. The experiment had shared a scientific evidence of a locally available herbal medication (AHP/RDV/YR/T5) in significantly enhancing humoral response of broiler birds. These technologies are sustained by indigenous knowledge holders in different regions globally. It is appropriate to invest and support farmers to make use of these technologies so as to enhance the source of income by minimizing health risks [15].

EXPERIMENTAL SECTION

A broiler farm in the village of Yerangaon, Taluk Hingna from Nagpur district of Maharashtra was identified for testing of an indigenous poultry medication (AHP//RDV/YR/T5). The experimentation was conducted during summer by allocating separate shed for 120 birds. The partition of the shed was undertaken to keep control and test groups comprising of 60 birds each. The test medication was administered from 2nd week onwards at the rate of 4 gram per day for 50 birds. The control group of birds were maintained on standard diet during entire period of study.

Blood sample collection

Six birds in each of the pen were randomly selected and blood samples were collected on 2nd, 3rd and 5th week old broiler birds. A total of 12 blood samples were collected during 2nd week and these samples formed the baseline value. Subsequently, in 3rd, 5th week of study 24 blood samples were collected to test the efficacy of the medication.

Immunomodulatory profile

The serum samples were estimated for Haemagglutination Inhibition (HI) test to understand immunomodulatory property of test medication by standard protocol [16]. In order to quantify the immune response of birds against RDV it is essential to identify the required Haemagglutinating (HA) units.

Statistical analysis

The observed data on antibody response for RDV were analysed by *t* test.

RESULTS AND DISCUSSION

The HI titre values were estimated against Ranikhet disease virus in all groups at the end of 2nd week, 3rd week and 5th week of age. The values were expressed at $\text{Log}_2 10$ as represented in Table 1. The mean and standard deviation (SD) of these immunomodulatory responses were calculated and analysed. The calculated *t* value for 3rd, 5th week age of experimental birds was 21.43 and 2.87 respectively. The table value of $t_{0.05}$ at 10 degree of freedom (n) was 2.22. The result indicated that *t* values were found to be significant at 5 percent level during 3rd and 5th week age of experimental birds.

During 2nd week age of experimental birds, the mean HI titres value was not found significant between control and treatment groups. However, these birds had shown significant difference in HI titre value than control group during 3rd and 5th week of age. The mean titre value for test birds was found to be 5.00 Mean \pm 1.41 SD which was significantly higher than control group of birds (4.83 Mean \pm 1.33 SD) during 3rd week of age. Similarly, the test group of experimental birds had significantly higher HI titre value of 5.17 Mean \pm 0.75 SD than control group that had only 3.67 Mean \pm 1.03 SD during 5th week of age. The Table 1 clearly reflected that the level of antibody titre in control experimental birds started declining since 2nd week of age. This conclusively proved that the indigenous poultry medication AHP//RDV/YR/T5 had enabled adequate protection to test birds against respiratory distress due to Ranikhet disease virus. It was also noticed that the medication had demonstrated development of immunity within optimal duration among experimental birds.

Table 1. HI titre values at the end of 2nd week, 3rd week and 5th week (expressed at Log₂10)

SN	Age of sampled broiler birds					
	2 nd week ^{NS}		3 rd Week*		5 th Week*	
	Control	Test	Control	Test	Control	Test
1	7	5	6	5	3	5
2	5	5	6	6	3	4
3	4	5	6	4	3	5
4	5	3	4	5	3	6
5	6	8	4	7	5	6
6	5	3	3	3	5	5
Mean	5.33	4.83	4.83	5.00	3.67	5.17
SD	1.03	1.83	1.33	1.41	1.03	0.75

NS- Non significant *Significant at 5 per cent level SD- Standard deviation

CONCLUSION

RDV continues to cause severe mortality among birds in spite of vaccination program since 1950s. The failure of vaccination strategies to stop spread of disease had led to studies to understand immune response of birds through different control measures [17]. This indigenous medication that had enhanced the immunity during adult stage of broiler birds needs to be promoted on large scale. It was shared that for smallholder poultry production system, such medication needs to be validated through applied research [18]. Globally serological evidence of RDV affecting backyard poultry systems were also confirmed [19]. The experimental research conducted at farmer's field had confirmed that herbal medication had protected birds from field strain of RDV. These medications can be demonstrated for welfare of backyard poultry system. Enhanced immunity and disease free condition is important for profitable rearing of broiler birds [20]. Hence, it is imperative to nurture these sustainable practices by sharing the local knowledge with poultry owners more particularly women who rely on backyard poultry farming. Efforts need to be made to synergize this wisdom with veterinary institutions so as to diffuse among poultry owners.

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