Research Article
Volume 12:5, 2021

Journal of Veterinary Science and Technology

ISSN: 2157-7579 Open Access

Infectious Bursal Disease in Unvaccinated Chickens Reveals Higher Sero-Prevalence and Presence of Associated Risk Factors in Jimma Town, Southwestern, Ethiopia

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Abstract

A cross sectional study was conducted in apparently healthy unvaccinated backyard and small scale chicken from November 2019 to May 2020 at Jimma town, Ethiopia to estimate sero-prevalence of Infectious Bursal Disease (IBD) and its risk factors. Infectious bursal disease is highly contagious disease challenging the poultry industry world-wide. It is among the obstacle in the chicken production in Ethiopia. A total of 384 chickens were selected from purposively selected 100 poultry farms to estimate the sero-prevalence of IBD and to identify its risk factors. Data analysis was performed using stata software. Out of 384 serum samples tested, 206 were positive for indirect ELISA and overall prevalence of the disease was found to be 53.6% and flock-level prevalence with at least one seropositive chicken in the flock. The result of logistic regression analysis showed that age and isolation practice were significant risk factors for occurrence of IBD. Results of questionnaire survey revealed that majority of the respondents lack sufficient knowledge about IBD. Prevalence of IBD has statistically significant difference among owner age, educational level and experiences of rearing chicken. Hence, proper vaccination program and awareness creation of farmers on benefits of practicing isolating sick chickens should be implemented.

Keywords

Backyard chickens • Infectious bursal disease • Risk factors • Sero-prevalence

Abbreviations

BCSA: Central Statistical Agency; ELISA: Enzyme-linked Immunosorbent Assay; IBD: Infectious Bursal Disease; IBDV: Infectious Bursal Disease Virus; NAHDIC: National Animal Health Diagnostic and Investigation Center; OD: Optical Density

Introduction

CLivestock are important for human health and wellbeing. They are essential source of protein and nutritious human diet through milk, eggs, and meat. Both poultry meat and eggs enrich and contribute to a well-secured diet of young children in the sub Saharan Africa who are exposed so severe malnutrition [1]. Ethiopia has the highest number of livestock population in Africa; the poultry population being 56,866,719 of which 95.86%, 1.35% and 2.79% are indigenous, hybrid and exotic breeds, respectively [2]. The indigenous poultry production contributes about 98.5% and 99.2% of the national egg and poultry meat production, respectively.

Ethiopian poultry production has a long traditional practice which is mainly used as an immediate cash income for the rural communities although careless production system is practiced [3]. The sector is growing more quickly than any of the other major agricultural sectors. This sector will be expected to satisfy the future demands for protein in the country. In spite of the existing large population of chicken and potential future expansion of the poultry industry, the production system has been adversely affected by a variety of constraints such as management problem, predators and poultry diseases. Among these, diseases are the major factors that hinder poultry development [4].

Infectious Bursal Disease (IBD) has been considered as one of the major poultry inflicting heavy losses in Ethiopia [5]. It is an important immunosuppressive virus of young susceptible chickens and may exacerbate previous infections with other infectious agents, and may reduce the capacity of the chickens to respond to vaccination, as the virus damages the humoral and cellular immune responses of chickens [6,7].

Sero-positivity of IBD was reported by Mariam and Abebe with about 98.9% prevalence using Agar Gel Immuno deffusion test in Amhara region (Andasa farm) [8]. Other published reports like the Hailu et al. and Zeleke et al. also documented incidence rate of 38.4% and 17%, respectively [3,9]. Many other sero-prevalences of IBD in chickens were studied in different part of Ethiopia. Among these, the highest prevalence of 89.78% in Waliso, 73.5% in Gonder, 38.39% in Bahirdar, and 38.3% in Sebeta district were documented [9-12].

The reports from some parts of Ethiopia indicate prevalence of infectious bursal disease is increasing [9,12-14]. However, it is difficult to note the general prevalence in the whole country due to lack of uniform studies in different part of the country. The limited studies (surveys) so far conducted on IBD are not sufficient to show the exact national picture and significance except highlighting the existence of the disease in very limited areas of the country. There is limited information on prevalence and associated risk factors of IBD in the country including in Jimma town. Knowledge on infectious bursal disease is necessary for successful prevention-control program. Hence, the aim of the study was to gather information on status of IBD in unvaccinated chickens in the area. The objective of this study was to determine the sero-prevalence of IBD and its potential risk factors in Jimma

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Received: April 07, 2021; **Accepted:** April 21, 2021; **Published:** April 28, 2021

town and to evaluate the chicken's management practices of the community and its association with IBD prevalence in Jimma town of Oromia regional state, southwestern Ethiopia.

Materials and Methods

Description of the study area

The study was carried out in selected Jimma town, Oromia regional state, southwestern Ethiopia from November 2019 to June 2020. The town is located in the Jimma zone of Oromia Region, at a distance of 355 Km, Southwest of Addis Ababa, the capital city of Ethiopia, between 7˚40"-7.66˚41"N latitude and 36˚50"-36.83˚55"E longitudes and has an altitude of 1704 meters above sea level. Humid tropical climate is the main feature of the study area that varies from 1200-2000 mm per annum. The mean annual minimum and maximum temperature ranges from 6˚C and 31˚C, respectively with an overall average temperature of approximately 18.5˚C. The area has mixed crop-livestock agricultural production system. Despite the area is well known for its coffee production, still livestock production plays major role in the agricultural activities.

Based on the 2007 census conducted by CSA, this zone has a total population of 120,960 of whom 60,824 men and 6,136 women. With an area of 50.52 meter square kilometers, Jimma has population density of 2,394.30 and all are urban inhabitants. A total of 32,191 households were counted in this Zone which results in average of 3.76 persons to a household.

Jima zone is bordered on the south by southern nation's nationalities and peoples region, the northwest by Illubabor, on the north by East Wollega, on the northeast by west Shoa; part boundary with east Shoa is defined by Gibe River. Jimma town is bordered by four districts; namely in south by Seqa Cheqorsa district, in North by Manna district, in East by Qarsa district and in west by Dedo district (JTOUAD). The zone has one of the largest livestock populations in Ethiopia. With its livestock population estimated at: 2,212,962 heads of cattle, 866,561 heads of sheep, 457,311 heads of goats, 96,782 heads of horses, 17,644 heads of mules, 77,767 heads of donkeys, 1,951,129 heads of poultry and 546,722 Bee colony [2].

Target population

The target study population includes unvaccinated apparently healthy both local and cross breed chickens. In the selected sites, those are kept under backyard and small scale (semi intensive) production system.

Study design

A study was conducted using cross-sectional design from November 2019 to June 2020. The aim of the study was to assess the sero-prevalence of IBD and determine the associated risk factors related to age, sex, breed, farming system and effect of different management system on occurrence of IBD in the study area with supported semi-structured questioner of open ended and closed intended for farm owners/households.

Sampling method and sample size determination

Lists of poultry farms and number of backyard chickens were collected from Jimma town office of urban agriculture development and Jimma town administration livestock and fishery resource department. Based on the information obtained; unvaccinated chickens were considered in both the farming systems and breed. Accordingly; from seventeen Kebeles in Jimma town, six representative Kebeles (Ginjo Guduru, Hirmata Mantina, Ifa Bula, Bosa Kito, Bosa Addis and Mandara Qoci) were selected purposively. From each kebeles, households were selected purposively based on their willingness to participate in the study. Chickens were selected by clustered sampling method randomly in each household as number of animals sampled were proportion to flock size.

For this study sample size was determined based on the formula given by Thrusfield for estimation of IBD prevalence [15]. Because of the prevalence of IBD in the study area in backyard and small scale farming system has not been reported in both local and cross breeds, the expected prevalence was assumed to be 50%. The desired absolute precision and confidence interval were considered to be 5% and 95%, respectively.

$n=z2 \times pexp(1-pexp)/d2$

n=sample size

z=confidence statistic

pexp=expected prevalence

d=desired absolute precision

Accordingly, $n=(1.96)2 \times 0.5(1-0.5)/(0.05)2=384$

Therefore, by using this 50% expected prevalence, at a confidence level of 95% and required absolute precision of 5%, a total of 384 samples were examined.

The selection of household and samples was proportionally allocated between selected kebeles of study area. The average flock size in the study animals were range from 9-15 in backyard production system were local breeds and cross breeds were included in the study animals. About 10-15 household per kebeles and 3-5 chickens per households were selected randomly for sampling.

The sample size for the questionnaire was 100 for households and owners of the flocks. Interviewees' sample size was calculated using the formula of Arsham that uses for survey studies [16].

$N=0.25/(SE)2$

Where: N=sample size

SE=Standard error of the proportion

Assuming the standard error of 5% at a precision level of 5%, and the confidence interval of 95%, 100 HHs were selected for interview.

Blood sample collection

Blood samples were collected from 384 study animals in the study area during the study period. National Animal Health Diagnostic and Investigation Center (NAHDIC) was the place where the laboratory works were carried out. The blood samples were collected from the brachial (wings) vein of apparently healthy chickens aseptically. About 1-1.5 ml of whole blood was collected using 3 ml labeled sterile disposable syringe with 3 gauges and 21 needle sizes. The blood was allowed to clot for 24 hours at room temperature and then, the syringe was placed horizontally at 45° to allow sera separation. The separated serum was transferred into each labeled sterile Cryovial tubes and then kept cool for transportation to NAHDIC, Sebeta. Then each serum sample was subjected to the laboratory test to detect antibodies against the IBD virus.

Questionnaire survey

After verbal agreement was obtained from the respondents, objectives of the survey were explained to them before starting the interview. About 100 non-vaccinated chicken owner respondents were interviewed using local languages (Afaan Oromo and Amharic). Information related to the chickens attributes like breed, sex, age, farming system and history of vaccination were collected. Besides, information on farm owners such as: sex, owner age, educational level and experience in rearing chickens and on farm information such as disinfection mechanism, frequency of house cleaning, disposal of dead chickens, isolation practice, source of water, awareness on availability of vaccine, recent introduction of new chickens and other risk factors including awareness of the poultry disease as well as IBD were collected using a questioner format prepared for this purpose.

Indirect ELISA test

All serum samples were tested by indirect ELISA at NAHDIC according

to the manufacturer's manual procedures. Serum sample was tested for IBDV specific antibodies using a commercial IBDV-ELISA kit. Sera and antigen coated IBD-ELISA kits were taken from refrigerator and left at room temperature for half an hour before starting the test. Briefly, serum was pre-diluted to 1:500 in dilution buffer. Five microliter (5 µl) of each test serum was added to clean 96 well glass plate followed by the addition of 245 µl diluent solution to prepare 250 µl diluted sample. 100 µl of undiluted negative control and positive control were dispensed in to duplicate test kit (antigen coated IBD ELISA kit). Next 10 µl of the diluted sample from 250 µl diluent and test serum, 90 µl of diluent was taken and dispensed on antigen coated IBD ELISA kit to prepare final 100 µl diluted sample. After incubation for 30 min under room temperature, the mixture was washed by 350 µl distilled water 5 times. After washing 100 µl of conjugate was dispensed to all well which binds to any attached chicken antibody in the wells and well plates were incubated for 15 minutes and unbound conjugate were washed by distilled water 5 times. Lastly, 100 µl of substrate was dispensed to all well for subsequent development of color and well plates were incubated for 15 minutes and the reaction was then being stopped using stop solution. Any observed color by the naked eye was considered to be a positive reaction. The color reactions were quantified by measuring the optical density of each well at 650 nm using ELISA reader.

ELISA test validation and Interpretation

After reading the ELISA results, the test validity was checked for each plate based on two criteria set by the kit manufacturer; the mean Optical Density (OD) of the positive controls and normal controls on each plate. The test is considered valid of when the mean OD405 of the positive control value range between 0.250 and 0.900 and when the mean OD405 of the normal (negative) control serum is less than 0.250. The sample to positive (SP) ratio of the serum was determined as:

The Positive control to Negative control sample to positive ratio was calculated by the following formula directed by the manufacturer:

Sample to positive=(Sample absorbance–Average normal control)/ Corrected positive control absorbance

Therefore, SP value ≤ less or equal to 0.299 is Negative while SP value greater than 0.299 is taken as positive.

Linear equation (LOG_{10} TITER=(1.172*LOG_{10} SP)+3.614) generated by the kit manufacturer was used to calculate the antibody titters of test samples. It was also used to determine the association between LOG_{10} SP of a single serum dilution and the LOG_{10} of observed antibody titters. Hence, geometric mean titter calculation was done as LOG_{10} titter=(1.172*LOG_{10} SP)+3.614. Therefore, titter=10log_{10} titer or (AntiLOG_{10}).

Data management and analysis

All the data obtained from the field was recorded in the record sheet format and later entered into a computer and managed using Microsoft Excel work sheet. Descriptive statistics was utilized to summarize the data after edited, coded and data was analyzed using Stata software (Stata IC 13). All 384 blood samples were tested for IBD antibody using the indirect ELISA test. The apparent prevalence was calculated dividing the number of positive samples by total number of examined samples multiplied by hundred. Logistic regression was conducted to examine the association between the outcome variable and the different explanatory variables (age, sex, breed, farming system and management systems). Odds ratio was used to estimate the strength of associations among the dependent and the independent variables. In all the analyses, 95% confidence interval and p-value of less than 0.05 is set for significance of statistical associations between the dependent and independent variables.

Results

Overall sero-prevalence of infectious bursal disease

In the present study, a total of 384 chickens' sera were collected from unvaccinated local and crossbreed against infectious bursal disease and tested by indirect ELISA. The result showed that the overall apparent prevalence of infectious bursal disease with 53.6% (206/384) (95% CI 48.6-58.6) IBD in the study areas. Out of 100 flocks included in the study 73% (95% CI: 63.57-80.73) were seropositive with at least one seropositive chicken in the flock (Table 1).

Risk factors analysis

Chicken level related risk factors: The study revealed higher prevalence in chicken of younger age group with 58.9% (CI 55.0-67.6) as compared to chicken of adult (>15 weeks) with 41.1% (CI; 28.84-49.73) with statistically significant (x^2=13.641; p<0.05). In present study, high sero-prevalence of IBD was recorded in females than male chickens with 63.1% (95% CI; 46.5-77.1) and 41.1% (95% CI; 41.9-54.4), respectively. There was statistically significant differences of IBD sero-positivity between sexes (x^2=8.11 P<0.05). The prevalence of IBD in the local and cross breed was about 55.43% (95% CI; 36.4-73) in local and 50% (95% CI; 41.4-58.6) in cross breed. However, the difference was not statistically significant (p>0.05) (Table 2).

Management level related factors: The flock level univariable logistic regression analysis revealed that disposal of dead chickens, frequency of cleaning, isolation of sick chickens and source of water were found to be strongly associated with flock seropositivity to IBD infection (P<0.05). There was no significant difference of IBD sero-positivity according to production system (P>0.05). However relatively higher proportion of seropositivity was observed in small scale (57%) when compared backyard production system (52.6%) (Table 3).

Risk factors	Category	No examined	No positive	Prevalence (%)	95% CI
Kebele	Ginjo Guduru	49	35	71.4	36.6-91.5
	Hirmata Mantina	42	30	71.4	35.8-91.8
	Ifa Bula	70	50	71.4	38.2-91.0
	Bosa Kito	58	14	24.1	14.8-36.7
	Bosa Addis	82	23	28	9.0-60.6
	Mandara Qoci	83	54	65.1	32.5-87.8
Age	<15weeks	226	139	58.9	55.0-67.6
	>15weeks	158	67	41.1	33.0-52.6
Sex	Female	141	89	63.1	46.5-77.1
	Male	243	117	48.1	41.9-54.4
Breed	Local	258	143	55.43	36.4-73.0
	Cross	126	63	50	41.4-58.6
Production system	Small scale	93	53	57	39.7-72.8
	Backyard	291	153	52.6	46.8-58.3
Total		384	206	53.6	48.6-58.6

CI-Confidence Interval

Table 1. The overall sero-prevalence of IBD Jimma town.

Risk factors		No examined	No positive	Prevalence (%)	95% CI	OR	X^2	P-value
Age	<15weeks	226	139	58.9	55.0-67.6	2.17	13.64	<0.01
	>15weeks	158	67	41.1	33.0-52.6			
Sex	Female	141	89	63.1	46.5-77.1	1.8	8.11	<0.01
	Male	243	117	48.1	41.9-54.4			
Breed	Local Breed	258	143	55.43	36.4-73.0	1.2	1	0.317
	Cross breed	126	63	50	41.4-58.6			
Total		384	206	53.6	48.6-58.6			

CI- Confidence Interval, OR- Odds Ratio, X^2-Chi square

Table 2. Effect of chicken related factors on the prevalence of IBD.

Factors	Category	No tested	Prevalence (%)	95% CI	OR	P-value
Production system	Small scale	93	57	39.7-72.8	1.2	0.457
	Backyard	291	52.6	46.8-58.3	1	
Production system	Thrown	259	61	54.9-66.7	2.5	<0.01
	Buried	125	38.4	30.3-47.1	1	
Disposal of dead chickens	Irregular	170	67	66.4-75.6	1	
		119	45	36.7-54.3	0.3	<0.01
	One week interval	63	23.8	15.0-35.6	0.7	0.305
	Two month interval	59	37	56.0-50	0.8	0.832
Disinfection	Yes	137	41.6	33.7-49.9	0.5	<0.01
	No	247	60.3	54.1-66.1	1	
Isolation practice	Not-practiced	274	64.6	58.6-72.5	5	<0.01
	Practiced	110	28.6	13.0-35.3	1	
Source of water	Pond water	176	65.9	58.6-72.5	1	
	River	71	49.3	38.0-60.7	0.3	<0.01
	Tap water	137	40.1	32.3-48.5	0.7	0.22

CI: Confidence Interval; OR: Odds Ratio

Table 3. The effect management on the prevalence of IBD at individual chicken.

Questionnaires result

Among the interviewed 100 respondents, 83.2% were backyard where as 80% are small scale responded that there was high chicken mortality in their flocks. Most of the respondents (77.9%) didn't have the knowledge about the availability of vaccine for infectious bursal disease and they did not use it at all for their flock for any disease. Respondents were interviewed to describe the type of medication they use to their chickens when sick. Accordingly, (25.3%) use traditional remedy, (11.1%) modern and (63.1%) do nothing.

In the study area, about 48% interviewed poultry owners were at youth age (15-30) and has neither formal education nor train to rear chickens. The result also showed that 52% are illiterate groups, 52% are females and 60% of respondents have experience of keeping chicken less than three years. The present study also show that the sero-prevalence was higher (89.5%) in younger age (15-30) chicken attendant and lower (46.2%) in middle age (30-45). Higher prevalence (78.8%) of the disease was recorded in illiterate group than persons in elementary groups (44.4%) rearing chickens. Experience of keeping chickens was assessed during the present study. Accordingly, the higher prevalence (88.2%) was recorded in people having experience of less than three years. Experiences of rearing chickens have inverse relationships with sero-prevalence of IBD as prevalence decreases with increasing experiences of owners.

In the present study, higher prevalence of the disease is recorded in owners throw their dead chickens on the field (95%) than who bury their dead chicken (40%). Cleaning of chicken house irregularly indicated higher prevalence (93.5%) of IBD than those who clean chicken house everyday (40.9%). Disinfection practices, Isolation practices, and source of water were also assessed for the occurrence of the IBD. Accordingly, lower prevalence (29.4%) was recorded in flocks practicing disinfection strategy in their flock than who didn't (95.4%). At the same time, lower prevalence (48.7%) of IBD was also observed in flocks practicing isolation sick chickens from healthy one than owners did not isolate (93.3%) and higher prevalence was registered in flocks that used pond water than who use tap water (47.8%). The effect of difference in managements like disposal of dead chickens, frequency of house cleaning, disinfection, isolation practice has statistical difference on IBD sero-prevalence ($p<0.05$).

Discussion

The present study revealed that of the 384 chicken sera samples tested, 53.6% (206/384) samples were positive for IBD antibody. The result of the present finding (53.6%) was in agreement with various serological studies conducted by researchers in different parts of the country like Lemma et al., from Jijiga and Harar districts which reported a prevalence of 51.7% and Natnael in North Western Ethiopia (51.56%) [17,18]. Likewise, the sero-prevalence obtained in the current study was comparable to the reported prevalence of 54.8% in Tanzania by Swai et al., 50% in village chickens in Sahel zone of Nigeria and Ndanyi et al., in Kenya (49.3%) by using AGID as diagnostic tool [19,20].

The sero-prevalence of the present study is higher than what was reported by Asamenew et al. (2016) in Sebeta Hawas (38.3%) using indirect ELISA, Mushi et al., in Botswana (30%), and Reta in East Shoa Zone, Ethiopia (39.2%) using Agar gel immuno-diffusion test and lower prevalence rates were also reported in Bangladesh (10.2%) by Chakma [12,21-23]. On the other hand, the overall sero-prevalence of IBD in the present study was slight higher than the result reported by Sinidu et al., in northern Ethiopia (45.05%) [11].

On the contrary, in Ethiopian farm higher sero-prevalence was reported by Hailu et al., in three districts of west and south west Shoa (76.64%), Kassa and Molla in north Gonder (73.5%) using indirect ELISA and Agar gel immu-

no-diffusion test, Shiferaw et al., 90.3% in Mekele, Tesfaheywet and Getnet in Deber-zeit (82.5%), Woldemariam and Wossene 100% in Debre Zeit and Zeleke et al., 93.3% in Debre Zeit [3,9,10,14,24,25]. Overall, the discrepancies between the findings of the present and the previous studies could be attributed to the difference in the test employed; serological survey results can vary depending on sensitivity and specificity of the diagnostic tool applied and ELISA test is known to be highly sensitive than that of AGID [26]. From all reports the lowest and highest prevalence was reported in Bangladesh and Ethiopia which they reported 10.2% and 100%, respectively.

The occurrence of IBD in age wise was assessed during study period. Accordingly, higher prevalence was recorded (58.9%) in chickens between young age group which is supportive to the study finding of researchers [9,11]. However, this finding is in contrary to that reported by Tesfaheywet and Getnet which report age have no significant influence on occurrence the IBD disease [24].

In this study higher prevalence was recorded in female chicken (63.1%) than male (48.1%). The odds of IBD infection in female was about 1.8 times higher than that of male and the infection was statistically significantly with $P<0.05$. This finding wad in agreement with report of Shiferaw et al., Sinidu with statistically significant report ($P<0.05$) in Bahirdar [11,14]. On the other hand the current finding disagree with the report of Asamenew et al., and Natnael which they report the sex have no effect on the occurrence of the infectious bursal disease in chickens [12,18]. The result of present finding might be due to physiological and immunological difference between the two sexes. Moreover, the reproductive demands on the females may increase the risk of infection as compared to males.

The present study also revealed sero-prevalence of IBD in different breeds. The result shows that the disease is lower in cross breed (50%) and higher in local breed (55.43%) of chickens. However; there was no significant difference between breed ($p>0.05$). This might be due to the reason that chicken are allowed to scavenge in similar environment. The finding was in agreement with the study scholars like Natnael in north western Ethiopia, Mazengia et al., in Bahir Dar and Farta and Zeryehun and Fekadu in Central Oromia [18,27,28].

The present study showed that lower prevalence (52%) was reported in small-scale production system and higher prevalence (57%) was recorded; even though the difference is not statistically significant $P>0.05$. This might be due to close similarity of the two production systems in management system. The present finding disagrees with finding of Natnael which report the farming system has significant effect on the prevalence of IBD [18].

The present finding implies that the disease is widely spread over the study area and attributed to unfortunate poultry production system such as lack of vaccination practice, poor sanitation condition, frequent contact with wild birds, and flourishing commercial poultry farms in the area. The presence of IBD antibody in these chickens might be as a result of survival from natural infection. With maternal antibody and vaccination ruled out, the antibody detected in the chickens would have been caused by a field virus, since the chickens were on free range. This implies that the field virus is capable of inducing a higher antibody titer level.

Among the interviewed 100 respondents; 83.2% backyard and 80% small scale responded that there was high chicken mortality in their flocks. Most of the respondents (76%) didn't have the information to the presence of vaccine for IBD and they did not use it at all for their flock. This finding agrees with the report of Natnael [18]. Majority of the respondents (88.3%) in Jimma town responded that they know the poultry disease but they are not aware of the IBD. 80% of the respondents were cleaning their chickens' house irregularly. This results disagree with survey undertaken by Gezali in district of Jimma Zone who reported (76.6%) in Northern Ethiopia who reported (74.2%) of the households cleaned their chickens house once a day [28].

Owner age, sex, educational level and experience of keeping chicken on prevalence of the disease were assessed during the study period. Accordingly, prevalence of IBD has statistically significant difference among Owner age, educational level and experiences of rearing chicken ($P<0.05$). Experience of farm owner has importance in chicken health management and easy of understanding problems occurring in the flocks of chicken. In this study the level of IBD infection is decreasing with increasing experiences of owners. This implies that owner might be able for early identification of the problems, take measures for its control and provide good management to prevent the disease as become more experienced. 95% prevalence of IBD recorded in those flocks throw dead chickens on the field and 40% in flocks where owners dispose dead chickens and waste products by burning or buried it. This can associated with virus have ability to stay for long period of time in environment, frequent movement of chicken and constant contact with infected environments. A significantly higher prevalence ($P<0.05$) of IBDV was occur in non-isolated infected chickens 93.4% than isolated chicken 48.7% in this study. This confirms the fact that, limited knowledge of farmers about the way of transmission. Higher prevalence of 95% of IBD occurred in flocks that don't use disinfectant than those using disinfectant 29.4% in chicken house.

Conclusion

Ethical clearance was received from the Jimma University College of Agriculture and Veterinary Medicine for the animal parts. The ethical clearance was received from the university as the study was part of an MSc student thesis research work. In addition, oral consent was obtained from poultry owners and interviewees. They were requested to the questionnaire after expressing that their participation is fully voluntary and they may choose not to answer any question and may stop the discussion at any time. They were also told that refusing to participate will not affect their family in any way and emphasized that their responses will be kept confidential.

Limitation

This study may not represent the general prevalence of chickens as it targets only the unvaccinated ones. To study the general sero-prevalence of the disease, chickens should have been included from all strata.

Consent for Publication

Not applicable.

Availability of Data and Material

The datasets used during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding

Not applicable (waived).

Author's Contributions

YT has designed the proposal, collect the data, process the laboratory works and collect the questionnaire survey. YD guided him as he was his academic advisor and mainly contributed to the proposal development. GG has refined, analyzed, organized and edited the manuscript. SA has helped in laboratory work. All the authors are accountable for the accuracy and integrity of the content and all the authors read and approved the manuscript.

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How to cite this article: Tilahun, Yoseph, Yoseph Deneke, Gebrerufael Girmay and Shubisa Abera. "Infectious Bursal Disease in Unvaccinated Chickens Reveals Higher Sero-Prevalence and Presence of Associated Risk Factors in Jimma Town, Southwestern, Ethiopia." *J Vet Sci Techno*12 (2021): 98.