SEROPREVALENCE AND ASSOCIATED RISK FACTORS OF MAEDI-VISNA IN AMEDGUYA SHEEP BREED MULTIPLICATION CENTER, AMHARA REGION, NORTHERN ETHIOPIA

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ABSTRACT

Maedi-visna (MV) is a chronic viral disease mostly infects adult sheep and is manifested by respiratory involvement. The present research was conducted to determine the seroprevalence and associated risk factors of MV in the Amedguya sheep breed multiplication center. Across sectional study was conducted from November 2017 to April 2018 to detect MV antibody. A total of 3292 serum sample was collected and total prevalence of 87.4% (n=2876/3292) was recorded. Of the sampled sheep 137 were males and 3155 were females and MV prevalence was 3.2% and 96.8% in males and females respectively. Across breed seropositivity for Menz, Awasi, Awasi cross Menz, and Dorper cross Menz were 34.6%, 50.9%, 12.1% and 2.5% respectively and found to be statically significant with \( \chi^2 = 67.783; P = 0.00 \). The seropositivity with respect to the age were 24.1%, 56.7 and 19.3% for young, adult and old age respectively which is statistically significant \( \chi^2 = 80.125; P = 0.00 \). This study also reflected that sero-positivity was higher in sheep with respiratory sign involvement than that of apparently healthy ones 61.9% and 38.1% respectively \( \chi^2 = 44.236; P = 0.00 \). Generally this study indicated that the high prevalence of MV was record in the center. Since the MV has no effective treatment or vaccine strict bio-security measures must be implemented with culling of all seropositive animals from the breeding line.

Key words: - Breed; Cull; Disease; Maedi-Visna; Menz; Seroprevalence; Sheep
1. INTRODUCTION

Small ruminants in Ethiopia are reared in different livestock production systems ranging from crop-livestock mixed systems in the highlands, to pastoral systems in the arid lowlands. Sheep and goats play a significant role in the nation’s economy. Meat and milk are major sources of protein, and hides, live animals, and carcasses account for a significant proportion of exports. The increased demand for sheep meat, cash income and food security has increased their importance in the country (Alemu and Merkel, 2008).

Respiratory diseases caused by concurrent infections have been identified as the leading health problem of small ruminants which accounts for up to 54% of the overall mortality of sheep in Ethiopian central highlands (Mukasa-Mugerwa et al., 2000). The cause of respiratory disease in the central highlands of Ethiopia has partly been identified involving multiple agents such as bacteria (Pasteurella, Mannheimia, Chlamydia, Mycoplasma species, etc), virus (PPR, Parainfulenza-3 virus, Maedi-visna, etc.) and lungworms (Dictyocaulus fillaria and Muelleris capillaries) (Garedew et al., 2010).

Maedi-Visna is caused by small ruminant lentiviruses (SRLV) within the genus lentivirus belonging to family Retroviridae (Narayan and Clements, 1989). Maedi-Visna is a chronic and progressive viral disease most commonly seen in adult sheep and the disease is characterized by progressive interstitial pneumonia or neurological manifestations (Lamontagne et al., 1983).

It is closely related to Caprine arthritis encephalitis virus (CAE) (Banks, et al., 1983). Maedi-Visna (MV) is an economically important viral disease of sheep that occasionally affects goats, due to mortality infected animals (Sakhaee, 2010; OIE, 2012). The most likely risk factors are ingestion of virus contaminated ovine colostrum and milk by goats and vice versa, as well as a close contact between the species in overstocked barns are the source of infection (Brodie, et al., 2000; Peterhans et al., 2004). The incubation period of this subclinical infection is usually more than two years and its clinical signs appear when the animal is 3 to 4 years old (OIE, 2006). Generally, both horizontal and vertical transmission has been proposed for MV virus (Black laws, et al., 2004). After entry of the virus into the body, the host is infected for lifelong (OIE, 2006).
MV is a composite name, originally Icelandic, used to describe two slowly progressive infectious diseases of sheep, which share a common viral etiology (Christodoulopoulos, 2006). There are two forms of the disease. Maedi is the respiratory form and Visna is the nervous form (Radostit, et al., 2006 and Akkan, et al., 2009).

The clinical signs of Maedi are observed more common than Visna. The clinical signs of Maedi are coughing, dyspnea, emaciation and mastitis. Abortions are also recorded but associated with severity of infection (Christodoulopoulos, 2006). Clinical signs of Visna are weakness in the hind legs, arthritis, weight loss, mastitis and progression to complete paralysis and sometimes CNS disorders are also observed. In both Maedi and Visna, the body temperature does not increase if there is not a secondary infection (Straub, 2004).

MV infection can be diagnosed by clinical findings and the confirmative diagnosis must be performed by laboratory methods such as postmortem examination, histopathological lesions, virus serology and isolation. Several methods are used for serological diagnosis of MV including; Agar Gel Immune Diffusion (AGID), enzyme linked immune sorbent assay (ELISA) and polymerase chain reaction (PCR) (Herrmann-Hoesing, et al., 2010 and Asadpour, 2014).

A Menz sheep genetic improvement project was initiated in 1967. The breeding strategy adopted was crossbreeding of the local Menz sheep with exotic wool sheep breeds. The breeding goal was to improve the mutton and wool production of Menz sheep. Coarse fleece produced from Menz sheep is widely used by Menz sheep producers to weave carpet and traditional blankets called Zitet and Banna. The project also planned to supply finer and longer wool fiber produced from crossbred sheep to the Debre-Birhan blanket Factory (Solomon Gizaw and Tesfaye Getachew, 2002).

Researches on MV infection of sheep in north central highlands Ethiopia showed that the disease had already emerged in the area and controlling further dissemination to other unaffected regions had been a national agenda (Ayelet et al., 2001; Tibbo et al., 2001; Tsegaw, 2004 and Woldemeskel et al., 2004).

The two multiplication ranches of Debra-Brhan and Amedguya have been closed from 2004 to 2007 due to an outbreak of MV. The catastrophe resulted in high mortality and disposal by
slaughtering of animals that tested positive for maedi-visna. However, the ranches managed to preserve the purebred Awassi flocks with great effort. Exotic diseases and biosecurity are other challenges associated with the importation of exotic germ plasm that should be considered (Solomon, et al., 2015)

MV is an emerging disease introduced to the country through the imported sheep breeds. Previous reports from the assessment of the disease in and around the stocking and rearing centers of North Shewa showed that the disease became one of the most important diseases of respiratory system of sheep in the central Ethiopia (Moges et al., 2002).

Although the emergency of the disease was obvious, there is lack of ample amount of researches which indicate the current status and associated risk factors of MV in the center. Therefore the objective of this study is to determine the seroprevalence and associated risks of the disease and to suggest further intervention.

2. LITERATURE REVIEW

2.1. History of the Virus

MVV was discovered in sheep by (Sigurdsson et al, 1957) in Iceland in the early 50’s, although the disease symptoms had been described prior to this discovery in South Africa, the USA and Iceland. The concept of « slow viruses » resulting from this discovery prompted the name of the lentivirus (lentus (lat.) =slow) genus of which MVV is a member. Two distinct pathological situations, corresponding to the main clinical manifestations of MVV infection, featured in those early descriptions. The first, called Maedi (« dyspnea » in Icelandic), is a progressive pneumonia and the second, called visna (« fading away – state of progressive apathy » in Icelandic), is a demyelinating leukoencephalomyelitis (Palsson, 1976). MVV can also infect other organs or tissues, particularly joints in which it causes arthritis and the mammary glands where it causes mastitis (Palsson, 1976 and Watt, et al., 1998).
In Iceland, MVV is likely to have appeared subsequent to the importation of asymptomatic but infected Karakul rams from Germany in 1933, which resulted in widespread dissemination of the infection to most flocks. Following its discovery in Iceland, MVV infections were detected in various countries, although with differing prevalences (Yilmaz, et al., 2002). Exceptions are Australia and New Zealand, where lent viral infections have been observed in goats but not in sheep (Greenwood, et al., 1995). In North America, the North American equivalent to MVV is called ovine progressive pneumonia virus (OPPV) (Cutlip, et al., 1977).

2.2. Etiology

Maedi-visna results from infection by the maedi-visna virus, a member of the genus Lentivirus in the family Retroviridae (subfamily Orthoretrovirinae). This virus becomes integrated into leukocyte DNA; infected animals become chronic carriers. Several genetically distinct isolates circulate in sheep. Phylogenetic analyses have demonstrated that maedi-visna virus is closely related to Caprine arthritis encephalitis virus (CAEV), a lentivirus found most often in goats. These two viruses share many features, and are often considered together as the small ruminant lentiviruses (SRLV) (Pisoni, et al., 2007).

2.3. Pathogenesis of the Virus

Maedi-visna is characterized by a long incubation period and, typically, symptoms take several months or even years to develop (Narayan and Cork., 1985). Infection persists for life and infected animals are a constant reservoir of infection which, consequently, permits the virus to persist in its host. In contrast to infections with HIV, SIV and FIV, immunosuppressant is not a feature of Maedi-visna (Clements and Zink 1996).

2.4. Associated Diseases and Symptoms

Visna – Maedi is a chronic viral disease prevalent in adult sheep. The disease is rarely found in certain species of goat. Maedi-Visna virus is also referred to as ovine progressive pneumonia (OPP). This disease corresponds to two clinical entities caused by the same Maedi is a form that results in a chronic progressive pneumonia. Visna refers to the neurological form of the disease and predominantly causes meningo encephalitis in adult sheep. This disease has inflicted many
economic losses worldwide due to its long incubation period and the high mortality rate of sheep and goats. MV virus can infect sheep of any age but clinical symptoms rarely occur in sheep less than two years old (Scott, 2012).

The onset of the diseases is gradual resulting in relentless loss of weight in addition to breathing problems. Cough, abortion, rapid breathing, depression, chronic mastitis and arthritis are also additional symptoms observed. These symptoms appear mostly in animals over the age of three and therefore might spread to other flocks before clinical diagnosis can be achieved. Animals showing the above symptoms might die within six months of infection. This causal lentivirus can be found in monocytes, lymphocytes and macrophages of infected sheep in the presence of humoral and cell mediated immune response and can also be detected by conducting several serological tests (Lamontagne, et al., 1983).

2.5. Diagnosis

The most convenient way to diagnose MV infection is to perform serology and the most widely used diagnostic test for detection antibodies is Enzyme linked Immune sorbent Assays (ELISAs) which recommended by (OIE, 2004). Because it is suitable for screening large numbers of samples and is more sensitive than agar gel immune diffusion test (AGID). Also it is reported that ELISA is generally more sensitive technique than PCR due to the low viral load in the postseroconversion phase of infection (De Andrés, et al., 2005). In recent years, as an alternative to serology, methods have been developed that allow the detection of the viral genome by PCR (Peterhans, et al., 2004). In addition, some infected animals may not be detected by PCR due to primer mis-pairing to target DNA sequences (Karanikolaou, et al., 2005).

2.6. Deferential Diagnosis

The differential diagnosis for Maedi includes pulmonary adenomatosis, parasitic lung infections, and caseous lymphadenitis with lung involvement. In cases with neurologic symptoms, scrapie, listeriosis, rabies, louping ill, parasitic central nervous system (CNS) infections and space-occupying lesions of the CNS should also be considered. Caprine arthritis and encephalitis can also resemble maedi-visna (Pisoniet al., 2007).
2.7. Mode of Transmission

Most animals become infected early in life, from drinking infected colostrum’s or milk. The virus can also be spread during close contact, probably by the respiratory route. Coinfection with pulmonary adenomatosis (Jaagsiekte) virus increases MVV titers in the respiratory tract, increasing contact transmission between sheep (Clements, and Zink, 1996).

Transmission has been reported from water contaminated with feces, but indirect spread is generally thought to be rare. Intrauterine spread is thought to be negligible or minor. MVV infects sheep or goats for life, but viral burdens vary between individual animals. Both asymptomatic and symptomatic animals can transmit this virus. Sheep can be a source of SRLV transmission to goats, and vice versa. There is little information on the route(s) of transmission between sheep and goats, but the ingestion of contaminated colostrum or milk, or close contact between the two species in crowded barns have been suggested. Under experimental conditions, lambs that have nursed from infected goats can become persistently infected with SRLV (Pisoni, et al., 2007).

2.7.1. Horizontal Transmission

Free virus or virus-infected cells are horizontally transmitted by inhalation of respiratory secretions (Zink and Johnson, 1994). Several studies support the hypothesis that, under certain circumstances, viral transmission between adult animals may play an important role in the spread of MVV. In addition, horizontal transmission is closely associated with close confinement in winter stabling, the duration of the presence of the virus in the flock and annual acquisition of replacements (Houwers, 1997).

2.7.2. Vertical Transmission

In an endemically infected flock, virus-infected cells and free virus are passed from ewes to their lambs via colostrum and milk (Concha-Bermejillo, 1997). The permeability of the gut of newborn lambs greatly favors vertical transmission. The duration of infection in the ewe and the extent of the contamination of the progeny appear to be correlated (Houwers, 1997). Naturally, lambing is a time of high lentivirus expression which facilitates the spread of infection. Since mastitis is frequent in affected animals, vertical transmission may be facilitated by the recruitment of mononuclear infected cells to the mammary glands (Zink and Johnson, 1994).
2.8. Control and Prevention

In most countries, both MVV and CAEV infections in sheep and goats are currently controlled by an array of complementary methods (Sihvonen, et al., 2000). Periodic serological tests using agar gel immune diffusion (AGID) or ELISA represent the standard method of detecting MVV-infected animals. For the eradication of infection in the flocks, two different strategies are adopted. Because, as described above, colostrum and milk are of prime importance in the infection of newborn lambs or kids, the lambs are removed from their infected mothers’ immediately after birth and are raised in separate flocks. Colostrum fed to these lambs is heat-treated (56°C for 60 min) and milk is pasteurized. Better still, the animals are fed colostrum and milk from certified MV-free ewes. As an alternative to separating newborn lambs from their mothers, sero-positive animals may be removed from the flock (Knowles, 2000).

Although these methods have met with some success in several countries, these control and eradication programs have a number of limitations, such as insufficient sensitivity and specificity of serological tests, relative importance of the other modes of transmission or resistance to culling seropositive animals particularly in flocks raised for commercial milk production (Peterhans, et al., 2004).

3. MATERIALS AND METHODS

3.1. Study Area Description

The study was conducted in Amed-Guyasemi intensive sheep breed multiplication center which is located in Mehal Media, Menz, Northern showa zones, of Amhara regional state, Ethiopia. Amedguyais located at 300km to the north east of Addis Ababa. The multiplication center has 880 hectares of pasture land which is 2900m above sea level and average temperature of 15°C creceing 800-1500mm of rainfall. The center distributes genetically improved rams of six months age for farmers of selected zones of the region such as Northern Showa and Southern-Wollo in line with the regional road map sheep breed improvement.
3.2. Study Animals

The study animals are sheep breed managed in semi-intensive management system, in the center 3975 sheep composed of different age, sex, and breed of local Menz pure Awasi breed imported from Israel and Dorper.

Table 1. Flock dynamics at Amedguya semi intensive sheep breed multiplication center

<table>
<thead>
<tr>
<th>s/n</th>
<th>Sheep breed</th>
<th>Flock size</th>
<th>Sex composition</th>
<th>Age composition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>1</td>
<td>Menz</td>
<td>1275</td>
<td>53</td>
<td>1222</td>
</tr>
<tr>
<td>2</td>
<td>Awasi</td>
<td>109</td>
<td>85</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Dorper</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Cross breed (F1)</td>
<td>2583</td>
<td>82</td>
<td>2501</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3975</td>
<td>165</td>
<td>3810</td>
</tr>
</tbody>
</table>

(Source: Amedguya breeding center report, 2017)

The sheep grazed on communal pasture land during day times and sheltered in groups at night. Concentrate feed was provided at the morning in common feed trafo. They get water from communal water sources located at different sites in the center. They were regularly de-wormed with albendazole and other related drugs and were vaccinated against anthrax, sheep pox, and pasteurellosis as per the manufacturer recommendation. They were also sprayed against ectoparasites.

3.3. Study Design

A cross-sectional study was conducted from November 2017 to April 2018 to detect MV antibody using i-ELISA at Amed – guya sheep breed multiplication center. The task was the regional government designed project to screen sheep above six month in the center for MV. Accordingly a total of 3292 serum samples were collected and submitted to National Animal Health Diagnostic and Investigation Center (NAHDIC) Sebeta, Ethiopia; and the test was conducted according to the standard protocol.

Following the clinical examination of individual animal, obtained clinical findings such as coughing, dyspnea and nasal discharge with their respective ages and breed was recorded.
Animals above six month age were categories to young (6month-12month), adult (12-24 month) and old (>24month).

Ten milliliter (10ml) of blood samples were taken from the jugular vein after disinfecting the site of vein puncture with savlon following proper restraining of sampling animal. Sterile vacationer tubes and needles were used for each animal. Serum samples were extracted from the blood samples by centrifuging at 3000 RPM for 15 minutes and then were transferred to crayon-vials and stored in a deep freezer (-20°C) in NAHDIC viral serology laboratory until analysis was conducted.

MVV indirect screening test kit (IDvet, 310, rue Louis Pasteur-Grabels-FRANCE) was used to analyze the samples. This indirect enzyme linked immune sorbent assay (I-ELISA) kit utilizes 96 micro-wells which are coated with inactivated MV antigen. All procedures and protocols of the company were strictly followed in the serum analyzing process. The results were read using (ELISA reader Gen5) at 450 nm wavelength and obtained observance values were calculated based on the protocol provided by company with the kit. Accordingly percent inhibition ratio under 50% was considered as negative, between 50% and 60% was considered as doubtful and above 60% was considered as positive.

3.4. Sample Size Determination and Sampling Method

All sheep above six month of age (n=3292) were sampled for the study purposively. Those animals with age blow six month were not sampled due to the presence of maternal antibody in their serum.

3.5. Data Management and Analysis

The data were entered in to Microsoft excel sheet and statistical analysis of the data was performed by using SPSS version 20 package program. The data were analyzed to compute frequency percentages. Chi-square was used to assess the effect of breed, sex, age and clinical sign involvement on the prevalence of MV antibodies. A p-value (p<0.05) was considered to be statistically significant.
4. RESULTS

A total 3292 sheep were examined for Maedi-Visna virus antibody using i-ELISA and overall 87.4% (n=2876/3292) were found to be seropositive (table 1). From the sampled sheep 95.8% and 4.2% were female and male respectively and within sex seropositivity were 96.8% and 3.2% for female and male respectively which were statistically significant. With the age group 24.1%, 56.7%, and 19.3% were seropositive for young, adult and old animals respectively which were statistically significant. Based on breed 34.6%, 50.9%, 12.1% and 2.5% were seropositive for Menz, Awasi cross Menz, Dorper cross Menz and pure Awasi respectively thus, prevalence differences among the breeds was with significant difference of ($\chi^2=67.783$, $p=0.00$). Out of total Seropositive animals for MV in sheep with clinical respiratory involvement were 61.9% while, 38.1% in apparently health. The present respiratory clinical syndromes statistically significant ($\chi^2=44.236$, $p=0.00$) with MV seropositivity hence, is could be one of the indication factor for MV diagnosis in further.

Table 2 Risk factors associated with seroprevalence of MV in sheep managed under Amedguya breed multiplication center

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Number of samples</th>
<th>Number of positives</th>
<th>% of positives</th>
<th>$\chi^2$ (chi-square)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>137</td>
<td>93</td>
<td>3.2</td>
<td>49.136</td>
<td>0.00</td>
</tr>
<tr>
<td>Female</td>
<td>3155</td>
<td>2783</td>
<td>96.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young (6-12 month)</td>
<td>878</td>
<td>692</td>
<td>24.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult (12-24 month)</td>
<td>1809</td>
<td>1630</td>
<td>56.7</td>
<td>80.125</td>
<td>0.00</td>
</tr>
<tr>
<td>Old (&gt;24 month)</td>
<td>605</td>
<td>554</td>
<td>19.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Breed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure Menz</td>
<td>1056</td>
<td>994</td>
<td>34.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awasi cross menz</td>
<td>1732</td>
<td>1464</td>
<td>50.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dorper cross menz</td>
<td>413</td>
<td>347</td>
<td>12.1</td>
<td>67.783</td>
<td>0.00</td>
</tr>
<tr>
<td>Pure Awasi</td>
<td>91</td>
<td>71</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Respiratory involvement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical sign involvement</td>
<td>2106</td>
<td>1779</td>
<td>61.9</td>
<td>44.236</td>
<td>0.00</td>
</tr>
<tr>
<td>No clinical sign involvement</td>
<td>1186</td>
<td>1097</td>
<td>38.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. DISCUSSION

Maedi-visna is a chronic progressive viral disease which is mostly seen in adult sheep and characterized by pneumonia and neurological manifestations (Narayan and Clements, 1989). Respiratory disease (pneumonia) has been a serious health problem of sheep which can result in considerable economic loss in many sheep farms and breeding centers in Ethiopia (Tibbo et al., 2001). The causative agent behind this case can be different strain of bacteria or virus like MV (Woldemeskel et al., 2002).

In the present study the overall prevalence is 87.4% (n=2876/3292) which is slightly higher than previous report of (70%) by (Woldemeskel et al., 2002) which was conducted in Amedguya sheep breeding and multiplication center and (74%) by (Seyum 2005). While the current prevalence strongly agrees with (88%) which was reported by the national survey in Debra-Brhan ranch (Getnet et al., 2010).

In this study, percentage of MV prevalence showed significant difference between male and female sheep with (p<0.005). The prevalence rate was 3.2% and 96.8% in males and females respectively which shows females as highly affected than males and agrees with previous study of (Getnet et al., 2010). While it disagrees with (Seyoum et al., 2005) reported the seropositivity higher in male animals than females. The reason of this difference can be because females stay longer in a breeding flock than males as replacement stock (Getenet et al., 2010). But further research should be conducted for confirmation.

In this study the study animals were clustered in to three clusters as young (6-month-12-month), adult (12-24 month) and old (>24month). In a study conducted by (Garedew et al., 2010) seropositivity is higher in adults (72.89%) than young sheep. However, Simard and Morley (1994), reported that the prevalence of the disease decrease in 9 years old animals. In the current study the prevalence rate of MV is 24.1%, 56.7% and 19.3% in young, adult and old age categories respectively. Accordingly, the highest prevalence is recorded in the adults 56.7%. The infection rate of the virus increase as the animal age increase (Brodie et al., 1998). The reason for this difference may be in proportional number of animals in each category. But further studies should be conducted for detailed justification.
The result from this finding indicates that there is significant difference in prevalence among sheep breeds. The highest seroprevalence \(50.9\%\) was recorded in Awasi cross Menz breed and disagrees with previous \(92\%\) recorded by (Woldemeskel et al., 2002) and followed by Menz \(34.6\%\) and pure Awasi \(2.5\%\). The study result also agree with the idea forwarded by Woldemeskel et al., (2002) which stated that, Menz breeds are more susceptible for MV. The current study agrees with, Awasi sheep do not develop the ovine lent virus associated disease even though they are susceptible to the infection (Perk 1995).

In this study clinical sign involvement has significant association with the serological test result. The study result indicated that \(61.9\%\) of samples with clinical respiratory sign involvement were found to be MV sero-positive for ELISA test and the remaining \(38.1\%\) were negative for the test and agrees with (Getenet et al., 2010). Clinical signs of Maedi occur more commonly than Visna (Christodouloupolous, 2006). (Legesse Garedew et al., 2010) reported the possibility of encountering characteristic maedi-visna pneumonic lesions without sero-positivity. This might be due to the fact that antibody against the maedi-visna virus accumulates over time and hence makes difficult to detect antibody at earlier stage of infection than at later stage of the disease (Radostits et al., 2000).

6. CONCLUSION AND RECOMMENDATIONS

The present research was conducted to determine the seroprevalence and associated risk factors of MV in the Amedguya sheep breed multiplication center. The result of the study indicated that there is high prevalence of MV in the multiplication center. A total of 3292 serum sample was collected and total prevalence of \(87.4\%\) (\(n=2876/3292\)) was recorded. Of the sampled sheep 137 were males and 3155 were females and MV prevalence was 3.2% and 96.8% in males and females respectively. Maedi-visna virus infection has neither appropriate treatment nor vaccine developed. And is also highly contagious, can transmit from one to the other in contact animals in the center and where rams distributed. Also it was recorded that sexes, age, breed of animals were putative risk factors for Maedi-visna virus circulation in the center. The source of the infection of MV to the breed multiplication center was imported exotic sheep breeds which were clearly
indicted through breed susceptibility difference further on studies should be conducted and until now there is no effective treatment or vaccine was developed for the disease MV at global and because of recurrent respiratory clinical involved case report and high seroprevalence for MV in the center the following points are recommended:

-All seropositive animals should be culled

-The stock should be replaced with sero negative animals verified by certified lab center.

-Lambs should be prevented from suckling colostrum of infected ewe

-National and regional agenda should be set while importing animals from abroad and improved ram dissemination should be set while importing for improving livestock productivity.

**Abbreviation**

**LIST OF ABBRIVATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AGID</td>
<td>Agar Gel Immune Diffusion</td>
</tr>
<tr>
<td>CAEV</td>
<td>Caprine Arthritis Encephalitis Virus</td>
</tr>
<tr>
<td>CNS</td>
<td>Central Nervous System</td>
</tr>
<tr>
<td>ELISA</td>
<td>Enzyme Linked Immune -Sorbent Assay</td>
</tr>
<tr>
<td>MVV</td>
<td>Maedi-Visna Virus</td>
</tr>
<tr>
<td>MV</td>
<td>Maedi-Visna</td>
</tr>
<tr>
<td>NAHDIC</td>
<td>National Animal Health Diagnostic and Investigation Center</td>
</tr>
<tr>
<td>OPP</td>
<td>Ovine progressive pneumonia</td>
</tr>
<tr>
<td>OIE</td>
<td>Organization of International Encephalitis</td>
</tr>
<tr>
<td>OPP</td>
<td>Ovine Progressive Pneumonia</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
</tr>
<tr>
<td>SRLV</td>
<td>Small Ruminant Lentivirus</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
</tbody>
</table>
Declaration

Ethics approval and consent to participate
No need of ethical clearance

Consent for publication
No need of permission

Availability of data material
The data and materials are available.

Competing interests
None of the authors of this paper have a financial or personal relationship with other people or organizations that could inappropriately influence or bias the content of this paper by any means.

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Author’s contribution
Beheru, Demeke, Fassil and Melesse contributed in epidemiological data gathering, sampling, laboratory tests, data acquisition, statistical analysis and drafting of the manuscript analysis of data and write up of the manuscript. In all the authors read and approved the final version of the manuscript.
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7. REFERENCES


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