Review of: "Clinical and Subclinical Bovine Mastitis: Staphylococcus aureus Isolation and Identification from Dairy Farms Located in and Around Hawassa Town, Southern Ethiopia"

Mahmoud M.A. Moustafa[1]

1 Benha University

Review of the manuscript: TPCGTV

Clinical and Subclinical Bovine Mastitis: Staphylococcus aureus Isolation and Identification from Dairy Farms Located in and Around Hawassa Town, Southern Ethiopia

ABSTRACT

This abstract provides a summary of a cross-sectional study conducted to isolate and identify Staphylococcus aureus from bovine mastitis milk in dairy farms in and around Hawassa town, Ethiopia. Additionally, the study aimed to determine the risk factors associated with the occurrence of mastitis. While the abstract presents important findings and contributions to the field, there are several scientific criticisms that can be made.

Firstly, the abstract lacks details on the study methodology. It only briefly mentions that a cross-sectional study was conducted, but it does not elaborate on the sampling technique used, sample size calculation, or the specific methods employed for the isolation and identification of Staphylococcus aureus from the milk samples. Without this information, it becomes difficult to assess the robustness and reliability of the study findings.

Additionally, the abstract provides limited information on the characteristics of the study population. Although it states that 250 lactating cows were examined for clinical and subclinical mastitis from randomly selected dairy farms, it fails to mention any details regarding the breed, age distribution, parity, or management practices of the cows. Such information is essential for understanding the generalizability and interpretation of the results.

Moreover, while the abstract states that clinical signs and the California Mastitis Test (CMT) were used to identify clinical and subclinical mastitis, it does not describe the criteria used for diagnosing mastitis based on these methods. Therefore, it remains unclear how confident one can be in the accuracy of the mastitis diagnoses made in this study.

Additionally, the abstract lacks information on the statistical analysis performed to determine the risk factors associated with mastitis occurrence. It only mentions that logistic regression analysis was conducted, but no details are provided on the variables included in the analysis, the modeling approach used, or the criteria for determining statistical significance.

Without these details, it is challenging to assess the strength and validity of the reported associations.

Finally, the abstract concludes that the recovery of Staphylococcus aureus in nearly half of the mastitis milk samples indicates the possible presence of other pathogens. While this interpretation is plausible, it lacks evidence or further discussion on the potential presence of other pathogens commonly causing mastitis. This assertion would benefit from more detailed analysis and supporting evidence.

INTRODUCTION

The introduction provides background information on the prevalence and economic impact of mastitis in dairy cattle in Ethiopia. While it covers relevant topics, there are several scientific criticisms that can be made.

Firstly, the introduction lacks proper citation of the information presented. Many statements are made without providing specific references or sources to support the claims. This makes it difficult for readers to verify the accuracy and reliability of the information presented. Additionally, the use of outdated references (e.g., references from 2000, 2007) suggests that more recent literature may not have been adequately reviewed.

Furthermore, the introduction lacks a clear research question or objective. Although it is stated that the study aimed to isolate and identify Staphylococcus aureus from bovine mastitis milk and estimate the prevalence of the pathogen, it does not clearly state the purpose or rationale for conducting the study. A well-defined research question or objective would help to guide the study design and data collection process.

The introduction also lacks a concise and logical flow of information. It jumps between different topics and concepts without proper transition or organization. For example, it begins with discussing the livestock resources in Ethiopia, then moves on to the low per capita consumption of milk, before discussing the damage and economic impact of mastitis. This disjointed presentation makes it difficult for readers to follow the logical progression of the information.

Additionally, there are instances where the information provided is too general or lacks specificity. For example, it mentions that mastitis is known for its damage to udder tissue in numerous species, but it does not provide specific details about the extent of the damage or the specific consequences for dairy cattle. Specific and quantitative information would help to strengthen the arguments made in the introduction.

Moreover, the introduction lacks a critical evaluation of the existing literature. While it briefly mentions that previous studies have been conducted on the isolation and identification of Staphylococcus aureus from bovine mastitis milk in Ethiopia, it does not discuss the limitations or gaps in these studies. Providing a critical evaluation of the existing literature would help to highlight the need for the current study and justify its significance.

MATERIALS AND METHODS

STUDY AREA

The description of the study area in this section provides some relevant details but lacks certain scientific elements that could strengthen its quality.

Firstly, while the study provides information on the population size and geographic location of Hawassa, it does not discuss the rationale for selecting this specific study area. Justifying the choice of the study area is important to establish its representativeness and relevance to the research question. Details on factors such as the prevalence of mastitis in the area or the presence of specific risk factors would support the decision to conduct the study in Hawassa.

Furthermore, the description of the study area lacks important information on the dairy industry and management practices in Hawassa. Understanding the local farming systems, breed types, milking practices, and other relevant factors would provide context and help interpret the findings. Additionally, information on the management practices related to hygiene, housing, and milking routines would be valuable to assess the potential risk factors associated with mastitis in the area.

The climate description included in the study area lacks some key details. While it provides the average annual rainfall, temperature, and relative humidity, it does not provide information on seasonal variations, microclimatic differences within the area, or specific weather patterns that may influence the prevalence or transmission of mastitis. These details are crucial for understanding the environmental conditions that could impact mastitis occurrence in the study area.

The section also mentions the total livestock population of the Sidama region, including the number of cattle, goats, sheep, and poultry. However, it does not provide information on the proportion or distribution of dairy cattle within this population. Given that the study focuses on mastitis in dairy cattle, including statistics on the number and distribution of dairy cattle in the study area would help assess the representativeness of the study sample.

This study lacks a control group. Without a control group, it is difficult to determine if the prevalence of Staphylococcus aureus in the lactating cows is higher or lower than expected. This limits the ability to make meaningful conclusions about the risk factors for clinical and subclinical mastitis.

Additionally, the study methodology does not mention how the lactating cows were randomly selected from the dairy farms. The lack of a clear random sampling method raises concerns about the representativeness of the study sample and the potential for selection bias.

Furthermore, the study relies on self-reported information from farm owners regarding potential risk factors such as husbandry systems and farm hygiene. This introduces the potential for recall bias and may not accurately reflect the true risk factors for mastitis.

The use of the California Mastitis Test (CMT) for diagnosing subclinical mastitis is also questionable. While the CMT is a widely used tool, it is subjective and has limitations in accurately assessing the presence and severity of infection. This could result in the misclassification of cows with subclinical mastitis, leading to biased results.

There are also potential limitations in the isolation and identification of Staphylococcus aureus. The study states that colonies were identified based on morphological characteristics, hemolytic pattern, and Gram staining reaction. However, these methods alone may not be sufficient for the definitive identification of Staphylococcus aureus, as there are other

bacteria with similar characteristics. The use of biochemical tests such as the catalase, coagulase, mannitol salt agar, and purple agar base tests is mentioned, but the specific details and validation of these tests are unclear.

Overall, while this study provides some insights into the prevalence and risk factors for Staphylococcus aureus in lactating cows with mastitis, there are several methodological limitations that should be addressed to strengthen the validity and reliability of the findings.

One potential criticism of the isolation and identification methods used in this study is the lack of validation for the biochemical tests used for identifying Staphylococcus aureus. While the study mentions the use of the catalase, coagulase, mannitol salt agar, and purple agar base tests, no information is provided on the sensitivity, specificity, or accuracy of these tests for identifying S. aureus. This raises concerns about the reliability and validity of the identification of S. aureus in the study.

Additionally, the study does not mention the use of any confirmatory tests, such as molecular methods or PCR, to confirm the identification of S. aureus. This is important, as identification based solely on morphological characteristics, hemolytic patterns, and Gram staining can be subjective and may not always accurately identify S. aureus.

This study lacks information on the experience and training of the individuals performing the isolation and identification procedures. It is important to have skilled laboratory personnel who are experienced in performing these procedures and interpreting the results accurately. Without this information, it is difficult to assess the reliability and validity of the isolation and identification process.

Furthermore, the study does not mention any quality control measures taken during the isolation and identification process. This includes measures such as using positive and negative controls, following standardized protocols, and ensuring the sterility of the culture media and equipment. Without proper quality control measures, there is a risk of contamination and inaccurate results.

Overall, the lack of validation for the biochemical tests, the absence of confirmatory tests, insufficient information on the expertise of the laboratory personnel, and the absence of quality control measures raise concerns about the accuracy and reliability of the isolation and identification process used in this study.

RESULTS

The study only examined a total of 250 lactating cows, which may not be sufficient to accurately estimate the prevalence of mastitis in the broader population of lactating cows. Additionally, the study does not provide information on how the cows were selected for inclusion, which raises concerns about potential selection biases that could impact the generalizability of the findings.

The study uses the California Mastitis Test (CMT) as a diagnostic tool for subclinical mastitis, but the CMT does not provide a definitive diagnosis and is merely an indicator of potential infection. The reliance on CMT results alone may lead to an overestimation of the true prevalence of mastitis, as there is a possibility of false positives. Further diagnostic tests, such as bacterial culture, could help validate the CMT results and provide a more accurate assessment of mastitis

prevalence.

The analysis of risk factors for mastitis also presents some limitations. The logistic regression analyses conducted in the study provide odds ratios, but these do not necessarily imply causation. The study does not provide evidence of a temporal relationship, making it difficult to establish a cause-effect relationship between the risk factors and mastitis. Additionally, some of the odds ratios have wide confidence intervals, suggesting a lack of precision in the estimates.

Furthermore, the study does not consider the potential interaction effects between the risk factors. It is possible that the relationship between certain risk factors and mastitis might be modified by the presence of other factors. By not accounting for these potential interactions, the study may fail to capture the full complexity of the relationships between risk factors and mastitis.

Finally, the study only focuses on S. aureus as the causative bacterial agent of mastitis, neglecting other potential pathogens. Different pathogens can cause mastitis, and their prevalence and resistance patterns can vary. Limiting the analysis to S. aureus may not provide a comprehensive understanding of the microbial landscape associated with mastitis, limiting the generalizability of the findings to other regions or farms.

In conclusion, while the study provides valuable insights into the prevalence of mastitis and its associated risk factors, it is important to consider the limitations in sample size, diagnostic methods, analysis techniques, and the narrow focus on a specific bacterial agent. Further research with larger and more representative samples, expanded diagnostic approaches, and comprehensive analysis techniques would strengthen the scientific validity and generalizability of the findings.

DISCUSSION

The prevalence rates provided in the discussion are based on unspecified sample sizes, which makes it difficult to assess the representativeness of the study population. Additionally, information regarding how the samples were selected and whether they were randomly sampled or not is not provided. The absence of this information raises concerns about the potential for selection bias in the study.

The study only mentions "microbiological findings" without specifying the exact techniques or tests used to identify the causative agents. Different diagnostic methods can yield different results, so the omission of this information makes it challenging to compare the findings with other studies or evaluate the reliability of the results.

Furthermore, the discussion does not explore potential confounding factors that may influence the prevalence of mastitis. While differences in breeds, farm management practices, and environmental conditions are mentioned as possible explanations for variability in mastitis prevalence, these factors are not thoroughly examined or controlled for in the study. The lack of consideration for these confounding variables limits the interpretation of the results and the generalizability of the findings.

Additionally, the discussion lacks a critical analysis of the limitations of the study. It does not address potential sources of bias, such as self-reporting bias or measurement error in the detection of mastitis cases. Moreover, the potential impact of

unmeasured factors, such as the use of antibiotics or the presence of other diseases, on the prevalence of mastitis is not discussed.

Lastly, the study's recommendations for regular screening and treatment of subclinical mastitis and raising awareness of S. aureus as a public health concern are stated without sufficient evidence or rationale. The discussion does not provide a clear link between the study's findings and the suggested recommendations, making it difficult to understand the implications and feasibility of implementing these recommendations in practice.