**Determining the Prevalence of Brucellosis among Patients Attending Kendu Adventist Hospital.**

**BY**

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A research proposal submitted in partial fulfillment of the requirement of the award of Diploma in Public Health

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# **Declaration**

I, Boaz Owuor Oduol, I do admit that this is my original work and has never been presented for an award of a degree/diploma in any other University/ college to the best of my knowledge.

Signature………………………………………………………………………………………..

Date…………………………………………………………………………………………….

# **Recommendation**

This project has been submitted for examination with my approval as the student’s supervisor.

Name of Supervisor…………………………………………………………

Signature………………………………………………………………………

Date……………………………………………………………………………

# **Dedication**

I dedicate this work to my Sister for supporting my education as well as my parents for the moral support in my early life.

# **Acknowledgement**

Thanks to the Almighty God for a clean bill of Health and allowing me extend my sincere gratitude to all the lecturers of The Africa Institute for Project Management studies Department of Public Health Sciences especially my supervisor Mr. Fredrick Ratemo for his endless support and guidance I would also like to appreciate my fellow class members, parents, brothers and sisters, friends, Fmsa community and my colleagues at work.

# **List of Abbreviations**

|  |  |
| --- | --- |
| IgA | Immunoglobulin A |
| IgG | Immunoglobulin G |
| IgM | Immunoglobulin M |
| Lab | Laboratory |
| M/F | Male/ Female |
| P/A | Present/Absent |
| PIN | Patient Identification Number |
| AIPMS | The Africa Institute for Project Management studies |

**Table of contents**

**[Declaration](#_Toc498244643)** [2](#_Toc498244643)

[**Recommendation** 3](#_Toc498244644)

[**Dedication** 4](#_Toc498244645)

[**Acknowledgement** 5](#_Toc498244646)

**List of abbreviation** …………………………………………………………………………7

[**Abstract** 8](#_Toc498244648)

[**1.0 Chapter One** 10](#_Toc498244649)

[**1.1** **Introduction** 10](#_Toc498244650)

[**1.2** **Statement of the Problem** 10](#_Toc498244651)

1.3 Justification…………………………………………………………………………11

[**1.4 General Objective of theStudy………………………………………………………**11](#_Toc498244653)

[**1.4.1 Specific objectives of the Study………………………………………………….11**](#_Toc498244654)

[**1.5 Hypothesis** 12](#_Toc498244655)

[**1.6 Research Questions** 12](#_Toc498244656)

[**2.0 Chapter Two** 13](#_Toc498244657)

[**2.1 Introduction** 13](#_Toc498244658)

[**2.2. Epidemiology** 14](#_Toc498244659)

[**2.3 Pathogenesis** 14](#_Toc498244660)

[**2.4 Symptoms** 15](#_Toc498244661)

[**2.5 Risk Factors / Predisposing factors** 16](#_Toc498244662)

[**2.6 Prevention** 16](#_Toc498244663)

[**2.7 Laboratory Diagnosis** 16](#_Toc498244664)

[**3.0 Chapter Three** 17](#_Toc498244666)

[**3.1 Materials/Reagents and Apparatus** 17](#_Toc498244667)

[**3.2 Sampling Technique** 17](#_Toc498244668)

[**3.3 Target Population and Sample Size** 17](#_Toc498244669)

[**3.4 Study Variables** 18](#_Toc498244670)

[**3.5 Laboratory Methods** 18](#_Toc498244671)

[**3.6 Data Analysis and Presentation** 19](#_Toc498244672)

[**4.0 Work Plan** 19](#_Toc498244673)

[**5.0 Budget** 21](#_Toc498244674)

[**6.0 References** 21](#_Toc498244675)

# **Abstract**

Brucellae are small Gram negative non-capsulated coccobacilli. They have no characteristic bipolar staining. However, they stain unevenly, obligate parasites of animals and humans and are characteristically located intracellular. Brucellosis is zootomic. Infection by these bacteria is caused by the following main species

* *Brucellae melitensis* mainly infects goats and sheep. It is the most virulent species
* *Brucellae abortus* typically infects cattle
* *Brucellae suis* typically infects pigs
* *Brucellae canis* infects dogs

Brucellae are aerobic with *B. abortus* thriving in carbon dioxide enriched atmosphere. They grow over a temperature range of 20–40 ºC with optimum of 37 ºC. Brucellae species are difficult to isolate particularly *B.abortus*. Tryptone soya diphasic medium is recommended for the isolation of Brucella species. Blood culture systems are also suitable and some provide rapid isolation. Brucellae produce a variety of colonial forms ranging from smooth, mucoid and rough colonies which are colorless or grey white. Lead acetate test strip in the neck of the tube containing glucose tryptone agar is useful intesting hydrogen sulphide production. *B.melitensis* is hydrogen sulphide negative.

Most strains of the other species are hydrogen sulphide positive. Cultures are kept for 4 weeks with subculturing every few days. Colonies on solid agar usually appear 2–3 days after incubation.

Immunoglobulin M (IgM) antibody levels rise during the first week of acute illness, peak at 3 months, and may persist during chronic disease. Even with appropriate antibiotic therapy, high IgM levels may persist for up to 2 years in a small percentage of patients. IgG antibody levels rise about 3 weeks after onset of acute disease, peak at 6–8 weeks, and remain high during chronic disease. IgA levels parallel the IgG levels. The usual serologic tests may fail to detect infection with *B canis.*

Brucellosis may be diagnosed using the following tests

**. Agglutination test—** It is performed with standardized heat-killed, phenolized, smooth *Brucella* antigens. IgG agglutinin titers above 1:80 indicate active infection. Individuals injected with cholera vaccine may develop agglutination titers to brucellae.

**. Blocking antibodies—**These are IgA antibodies that interfere with agglutination by IgG and IgM and cause a serologic test result to be negative in low serum dilutions (prozone), although positive in higher dilutions. These antibodies appear during the subacute stage of infection, tend to persist

for many years independently of activity of infection, and are detected by the Coombs antiglobulin method.

**. ELISA assays—**IgG, IgA, and IgM antibodies may be detected using enzyme-linked immunosorbent assay (ELISA), which use cytoplasmic proteins as antigens. These assays tend to

be more sensitive and specific than the agglutination test especially in the setting of chronic disease

**Treatment**

Brucellae may be susceptible to tetracyclines, rifampin, trimethoprim

sulfamethoxazole,aminoglycosides, and somequinolones. Symptomatic relief may occur within a few daysafter treatment with these drugs. However, because of theirintracellular location, the organisms are not readily eradicatedcompletely from the host. For best results, treatmentmust be prolonged. Combined treatment with a tetracycline such as doxycycline and either streptomycin for 2–3 weeks or

rifampin for 6 weeks is recommended.

**1.0 Chapter One**

## Introduction

Brucellosis is a common disease among pastoralists and nomadic herdsmen in developing countries, who are continually exposed to potentially infected animals (Abdirahman, 2014). Brucellosis is considered one of the most common global zoonoses (McDermott , cited in Ducrotoy et. al, 2014; Mai, Irons, Kabir, & Thompson, 2012). According to the Kenya National Bureau of Statistics (2012) there were 78 cases of brucellosis by county reported as outpatient morbidity in patients below 5 years of age in 2012. According to World Health Organization, every year 500,000 people were infected (WHO, cited in Wu et al., 2013).Brucellosis is reportable in most countries but surveillance system are weak (Kaneene, 2013). It is rare in most industrialized countries and more common in developing ones. Most human brucellosis cases, however, have been linked to *B. melitensis* (Anka et al., 2013)

## Statement of the Problem

Brucellosis is often associated with contact with infected animals or animal products. The infection is usually chronic and is characterized by undulating fever accompanied by symptoms that are nonspecific and highly variable. It is for this reason that the study aims at identifying patients infected by *Brucella* in good time and probably develop an intervention to reduce the number of people infected by the bacteria.

## Justification

The increase in supply of meat and milk in South Sudan have predisposed the population to infections including brucellosis associated with these animal products. Brucellosis is transmitted from animals to humans by ingestion of raw milk, milk products, raw liver, and close contact with animals through breeding, birth, slaughtering and contaminated dust (Cooper, in Wanjohi et al., 2012) This is because these animal products are not properly scrutinized before they are released to the public for consumption. The common infection caused by consumption of these products is Brucellosis. Its symptoms are nonspecific and highly variable. This results in patients undergoing repeated treatment if not properly diagnosed, which is costly for the afflicted person. This project aims to bring to the professionals.

## 1.4 General Objective of the Study

To find out the prevalence of Brucellosis among patients attending Kendu Adventist Hospital

### *1.4.1 Specific objectives of the Study*

* To determine the prevalence of *Brucellae melitensis* strain among patients.
* To determine the most common age group affected by brucellosis
* To determine the gender most affected by brucellosis

## 

## 1.5 Hypothesis

* Brucellosis patients are regular consumers of milk and meat.
* *B. melitensis* and *B. abortus* are the main species affecting humans.
* Brucellosis is more prevalent among the male population.

## 1.6 Research Questions

* 1. What is the most prevalent species in Kendu Adventist Hospital?
  2. Are consumption of infected meat and milk leading risk factors of brucellosis in Kenya?
  3. How can brucellosis be treated and prevented?
  4. Is it true that brucellosis is more prevalent in a particular gender? If yes, then why?

# **2.0 Chapter Two**

## 2.1 Introduction

*Brucella* species are obligate intracellular pathogens which are found in animals. The bacteria cause brucellosis in humans which is characterized by undulating fever. The infection is primarily caused by contact with infected animals or animal products, especially unpasteurized milk and other milk products. Cheese made from unpasteurized goats’ milk is a common vehicle. After the initial infection, a chronic stage may develop characterized by weakness, aches and pains, low-grade fever, nervousness, and other nonspecific manifestations compatible with psychoneurotic symptoms. *Brucellae* cannot be isolated from the patient at this stage, but the agglutinin titer may be high. The diagnosis of “chronic brucellosis” is difficult to establish with certainty unless local lesions are present.

The organisms progress from the portal of entry via lymphatic channels and regional lymph nodes to the thoracic duct and the bloodstream. They are then distributed to the parenchymatous organs. The lymphatic tissue, liver, spleen, bone marrow and other parts of reticuloendothelial system may have abscess that develop from granulomatous nodules. The brucellae are particularly intracellular in such lesions. After invasion by the bacteria, the body responds by producing IgM antibodies. IgM antibody levels rise during the first week of acute illness, peak at 3 months, and may persist during chronic disease. Even with appropriate antibiotic therapy, high IgM levels may persist for up to 2 years in a small percentage of patients. IgG antibody levels rise about 3 weeks after onset of acute disease, peak at 6–8 weeks, and remain high during chronic disease. IgA levels parallel the IgG levels.

## 2.2. Epidemiology

Annually, there are more than 500,000 new brucellosis cases worldwide every year (WHO, cited in Wu et al.,2013). Ahmed et al. (2010) conducted a study in Libya and found *Brucella* seroprevalence in humans and found seropositivity of 40% with 43% positive for IgM. Studies in Kenya have reported a prevalence range of between 5% - 45% in livestock as well as over 20% in humans in selected regions (Ogola et al.,2014).

Brucellosis is endemic in parts of the worldwhere brucellosis in animals has not yet been eradicated.It is endemic in the developing areas of the Mediterranean Region, Middle East, western Asiaand parts of Africa and Latin America.

## 2.3 Pathogenesis

There are various species of *Brucellae* that infect animals and humans. Although each species of *Brucella* has a preferred host, all can infect a wide variety of animals as well as humans.

The common routes of infection in humans are:

1. Intestinal tract, that is ingestion of infected animal products
2. Mucous membranes through droplets in the air
3. Skin through contact with infected tissues of animals.

The *Brucellae* that infect humans have specific differences in pathogenicity. *B abortus* usually causes mild disease without suppurative complications. Noncaseating granulomas of the reticuloendothelial system may occur. *B canis* also causes mild disease. *B suis* infection tends to be chronic with suppurative lesions; caseating granulomas may be present. *B melitensis* infection is more acute and severe.

The incubation period of brucellosis ranges from 1–4 weeks. The onset is insidious with malaise, fever, weakness, aches and sweat. The fever usually rises in the afternoon; it falls during the night and is accompanied by drenching sweat. There may be gastrointestinal and nervous symptoms. Lymph nodes enlarge and the spleen becomes palpable. Involvement of the liver can result in hepatitis which in turn may be accompanied by jaundice. Deep pain and disturbances of motion particularly in vertebral bodies, suggest osteomyelitis. These symptoms of generalized *Brucella* infection generally subside in weeks or months, although localized lesions and symptoms may continue.

## 2.4Symptoms

Generally these results in the following:

* + Rising and falling fever(undulating fever)
  + Enlarged lymph nodes, liver and spleen
  + Aches and pains
  + Muscular stiffness
  + Malaise
  + Sweating
  + Body weakness
  + General body weakness

Osteomyelitis, meningitis, or cholecystitis may also occur. This may lead to some histological reactions such as proliferation of mononuclear cells, exudation of fibrin, coagulation necrosis and fibrosis. Chronic stage that develops is characterized by weakness, aches and pains, low-grade fever, nervousness, and other nonspecific manifestations compatible with psychoneurotic symptoms.

## 2.5Risk Factors / Predisposing factors

Various risk and predisposing factors have been associated with brucellosis and include the following:

* + - Consumption of infected meat
    - Consumption of unpasteurized milk
    - Handling infected animals
    - Consumption of raw animal blood

## 

## 2.6 Prevention

To prevent the disease, the following techniques are used:

* Regular treatment and vaccination of animals
* Pasteurization of milk before consumption
* Proper inspection of meat before consumption

## 2.7 Laboratory Diagnosis

## 2.7.1 Buffered antigen agglutination

This was the screening test used to diagnose brucellosis among patients who visited the hospital with symptoms suggesting brucella infection. The patients'Sera were mixed with antigens of *B. abortus* and *B. melitensis* separately on a slide and shaken on a rocker for proper mixing. Agglutination was then observed on the slide with the different antigens of brucella. Formation of agglutinins with the antigens indicated brucellosis infection.

# 

# **3.0 Chapter Three**

## 3.1 Materials/Reagents and Apparatus

The materials, reagents and apparatus to be used in this project will include the following:

* Cotton swabs
* Syringe and needle
* Blood sample; venous blood
* *Brucella* antigens; *melitensis* and *abortus*
* Rocker
* Centrifuge
* Reaction plate

## 3.2 Sampling Technique

Patient samples being screened for *Brucellosis* from both outpatient and inpatient departments and will be purposively selected.

## 3.3 Target Population and Sample Size

The study will test 150 samples suspected Brucellosis patients who are attending Kendu Adventist Hospital.

## 3.4 Study Variables

The study variables considered in this study include, gender, age, test results and the *Brucella* species.

## 3.5 Laboratory Methods

It is with much delight that I take this opportunity to welcome all the patients to Kendu Adventist Hospital. On behalf of Kendu Adventist Hospital, and on my own behalf, I would like to congratulate everyone who is here today to help us in achieving this milestone in eradicating Brucellosis in Kendu Adventist Hospital and briefly am going to explain the procedure we are expected to undergo and also all the materials which we are going to use like, swabs, syringe and needle including vacutainer. Before removal of the blood sample,we are going to Tie a toniquete at the upper arm of the left hand and locate a vein at the cubital region before decontamination with the alcohol swab and make a puncture into the vein and withdraw blood using the needle and syringe. Progressively we will untie the toniquete and apply a dry cotton wool into the punctured site. Then Transfer the blood into a red topped vacutainer and let it clot. Consequently, centrifuge the clotted blood at 1000rpm for 3 min to obtain serum and pipette 40microlitres twice of the serum into 2 different wells in a reaction plate. Add one drop each of the *B*.*melitensis* and *B. abortus* into the different wells respectively, rock the plate for one minute on a rocker and observe for agglutination in the wells. Finally, we will record the results.

**Note:** If agglutination occurs within the wells, then the patient is brucellosis positive. In case of weak agglutination, then the blood sample can be cultured for proper isolation of the bacteria.

## 3.6 Data Analysis and Presentation

Simple statistical tools and methods will be used to analyze, summarize and represent the data. Data will be presented as frequency tables, pie, line or bar charts. The data will be analyzed using Microsoft Excel.

# **4.0 Work Plan**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TIME  ACTIVITY | 2018  NOVEMBER | 2018  DECEMBER | 2019  JAN | 2017  FEB |
| PROPOSAL WRITE UP |  |  |  |  |
| PROPOSAL SUBMISION AND DEFENCE |  |  |  |  |
| DATA COLLECTION, PROJECT WRITE UP AND DATA ANALYSIS |  |  |  |  |
| PROJECT SUBMISSION |  |  |  |  |

# **5.0 Budget**

|  |  |  |
| --- | --- | --- |
| **No** | **Activity/ Item** | **Allocation** |
| **1** | Transport | 10000 |
| **2** | Credit for reaching clients | 5000 |
| **3** | Brucella antibodies | 8000 |
| **4** | Food & miscellaneous | 10000 |
|  | **Grand Total** | **Ksh 33,000** |

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