

A Systematic Review of the Importance of Chemoprophylaxis and Immunoprophylaxis in Subclinical Case of Leprosy that can Reduce the Incidence and the Transmission of Leprosy

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Abstract: Leprosy is a condition that is believed to be caused by Mycobacterium leprae abbreviated as m-leprae. There is no medication known to treat leprosy. However, leprosy progression and transmission can be done by the use of chemoprophylaxis and immunoprophylaxis. The study is a systematic review of available literature on diseases and the preventive measures employed to prevent leprosy. The study question was developed based on prevention, intervention, comparison, outcome, and the study design incorporated in the study. The survey conducted through searches in different medical and nursing databases to get materials relevant to the study. Pubmed, Cinahl, among other databases, were screened to provide documents addressed to the PICOS question. Over three hundred articles were found in the screened databases, but only four were considered for this study. Inclusion and exclusion were based on keywords of the reviews that were found online. Chemoprophylaxis and immunoprophylaxis are essential in preventing the development and progression of leprosy. Chemoprophylaxis and immunoprophylaxis act as immunization agents to people who contact infected people regularly.

Keywords: immunoprophylaxis, chemoprophylaxis, leprosy, and transmission of leprosy

I. INTRODUCTION

Leprosy is a condition that is believed to be caused by Mycobacterium leprae abbreviated as *m-leprae*. The disease is transmitted through droplets as untreated patients contain bacillary load that is in high concentrations, and they contact with susceptible individuals. The high risk of transmission is owed to the contacts; in such cases sick individuals are at risk to their surroundings, and they are in the potential of getting leprosy [1]. In the recent past, there has been medical development to reduce the rate of transmission. The development of multidrug therapy has reduced transmission of leprosy in the world by 10 percent of reported and recognizable cases [2]. However, despite the availability and accessibility of multidrug therapy, there have been reported cases in the past ten years. This means that there is still a gap in developing the rightful process of preventing the transmission of leprosy [3]. Chemoprophylaxis is the process of administering drugs to an individual's situation or condition to prevent an infection into an individual or prevent a disease into an individual [4]. The drugs can also be administered to avoid further development of infection to an already active condition in an individual. Preventing leprosy has been termed as impossible, and there is no medication available that can prevent *m-leprae* virus that causes leprosy [5]. However, chemoprophylaxis has been found to prevent the progression of leprosy in contacts to those who have acquired *m-leprae* organisms. Immunoprophylaxis is the prevention of a disease

condition by producing an active or passive immunity that is injected into the people who are at high risk of getting infected by the disease condition [6]. In this case, immunoprophylaxis includes designing immunity that will prevent people surrounded by leprosy patients to get infected via contacts [7]. A combination of immunoprophylaxis and chemoprophylaxis can be a resourceful way of preventing the progression of leprosy from affecting more people.

II. BACKGROUND OF THE STUDY

A. Evidence-based research question

For the subclinical case of leprosy (P), what is the importance of chemoprophylaxis and immunoprophylaxis (I) in comparison with subclinical cases of leprosy which do not use chemoprophylaxis and immunoprophylaxis (C) in reducing leprosy (O) by controlling transmission of leprosy (S)?

In this perspective, the study will explore the main changes acknowledged and recorded to populations which there is a group of leprosy patients to understand the importance of the chemoprophylaxis and immunoprophylaxis in reducing and preventing further transmission of leprosy to those who do not have the disease condition. The main objective of the study is to investigate the importance of the two preventive measures and their effectiveness in preventing leprosy to those who are not yet infected; nonetheless, they are closer to the patients having the condition [8].

B. Background

According to World Health Organization, more than one hundred and fifty people in the world have leprosy majority coming from Africa and Asia continents. In United States, over one hundred people are diagnosed with leprosy every year [9]. However, it has been noted that leprosy is not so contagious. One can get infected when he or she gains nose and mouth droplets contact from a person who is already infected with the untreated disease. World Health Organization has also revealed that children are more likely to be affected than adults [10].

Leprosy condition primarily affects the skin and the brain nerves; a condition that leads to the paralyzation of an individual in case it attacks the spinal cord nerves. Sometimes the disease may attack the eyes and the thin linen in the nose [11]. The condition and the symptoms appear to an individual after 3 to 5 years after the person came into contact with a person who was infected with leprosy [12]. The time between when the person contacted the bacteria and when symptoms start showing is known as the incubation period [13]. The long incubation period has made it difficult for doctors and practitioners to detect and understand where the bacteria infected a person; hence, it needs to provide a preventive mechanism to those people who are at high risk of getting infected [14].

C. Literature Search and Strategy

This study has searched for several medical and nursing databases to get the necessary materials. These databases provided materials discussing the importance of chemoprophylaxis and immunoprophylaxis. Pubmed and Cinahl were the primary databases considered for this study. Pubmed and Cinahl provide information and articles about health issues and medication of different conditions and diseases in the United States, and the databases also include information about the National Health Institute of the United States. Online Journals for issues in Nursing and American Journals of Nursing were other databases that were researched to find materials for this study.

All these studies provided reliable and informative materials for use in this study. The contents were filtered from the last two decades to get the most accurate and updated information.

The keywords that were established in researching the databases included leprosy, symptoms of leprosy, prevention of leprosy, the prevalence of leprosy, importance of preventive measures of leprosy, importance of chemoprophylaxis and immunoprophylaxis, subclinical cases of leprosy, leprosy incubation period, treatment of leprosy, methods of reducing transmission of leprosy, diagnosis of leprosy and methods of controlling leprosy.

D. Inclusions and exclusions

The databases stated above in the study were screened systematically using the keywords stated above. In the databases over three hundred articles about individual studies were found, each contained detailed information on the keywords used for the search. However, materials that were found online were filtered according to the elements that provided answers to the PICOS question. The inclusion and exclusion criteria were based on keywords of the articles that were found in the databases. The materials that were excluded in this study had keywords like leprosy in children, treating leprosy, ways of avoiding leprosy, curing leprosy, the population affected by leprosy, and understanding leprosy. Though these articles and studies had relevant information about leprosy, their content did not try and help solving the PICOS question of the survey.

After excluding the studies with keywords that did not address the PICOS question of the survey, four articles were selected for systematic analysis for this study. The chosen studies had the following keywords: mycobacteria, antibiotics, preventing leprosy transmission, leprosy vaccine and chemoprophylaxis and immunoprophylaxis.

III. RESULTS

The first study considered for this study was conducted by Malcolm and Marivic entitled Combination Chemoprophylaxis and Immunoprophylaxis in Reducing the Incidence of Leprosy in 2016. The study aimed at investigating the effectiveness of chemoprophylaxis and immunoprophylaxis in preventing transmission and progression of leprosy [15]. The study was developed on understanding the available methods for treating disease and their effectiveness in the past to construct effective mechanisms of preventing leprosy conditions.

The study found out that various chemoprophylaxis methods are effective in treating people who are at high risk of getting infected with leprosy. Yet, they did not exhibit and sigh or any symptoms of leprosy [16]. In Indonesia, where the study was conducted, it was found that RIF treatment was useful to the community while those that did not take the drug had distinct effects from the condition in the same community [17]. The study recorded that RIF medication was up to 57 percent preventive of the leprosy condition in the households where there was regular contact with people infected with leprosy [18]. Dapsone prophylaxis programs that were initiated to the people living with the affected population were found to be effective in preventing further transmission of the Leprosy condition.

The combination of chemoprophylaxis and immunoprophylaxis was found to be an active method of controlling and preventing the transmission of leprosy among subclinical patients [19]. The study noted that the combined strategy involved the administering of BCG vaccine and RIF medication to prevent the transmission of leprosy as the most effective strategy in countering a weakening mycobacteria [20].

The second study considered for this study was conducted by Dos Santos et al. in 2018 [21]. The study was entitled *chemoprophylaxis of leprosy with rifampicin in contacts of multibacillary patients: study protocol for a randomized controlled trial*. The study was conducted to determine the effectiveness of chemoprophylaxis in preventing people from getting infected with leprosy in an environment where the majority of people have the disease [22]. The study took a design if administering rifampicin dosage to non-affected people in a situation where they made regular contact with leprosy infected patients who were under care. The study aimed to investigate whether the single-dose rifampicin in disease contacting patients had an effect of preventing one not to be affected with the condition before the patients' vaccination with BCG [23]. However, the study was limited to trial and registration. It was based on the Brazilian registry of clinical trials and thus biased on cases of other environments around the world [24].

The study found out that a combination of chemoprophylaxis and immunoprophylaxis was effective in preventing transmission and infection of people from *m.leprae* bacteria in a subclinical setting by reducing the number of new cases of people affected by leprosy [25]. The authors attribute the effectiveness of the combined preventive measure as the primary importance in preventing the transmission of leprosy in a subclinical setting [26]. A combination of chemoprophylaxis and immunoprophylaxis expands the

knowledge of immunization of leprosy. That is important in preventing transmission of the disease condition to the uninfected [27].

The third study systematically reviewed in this study was conducted by Bakker et al. in 2005 [28]. The study was entitled *Prevention of leprosy using rifampicin as chemoprophylaxis*. The study aimed at investigating whether rifampicin can be used as chemoprophylaxis in preventing leprosy [29]. The study was conducted in Indonesia Island, and the participants screened to make sure none had leprosy before the study period. In the three years that the population was under investigation, they were tested every year to monitor their condition. Chemoprophylaxis dosage was administered to everyone who made regular contact with people who had leprosy. Rifampicin was used as chemoprophylaxis to prevent leprosy conditions from transmitting to people who were not initially infected with the disease. Yet, they had daily and close contact with people with leprosy [30]. The study used a 3,950 study population, and after three years, their condition had not changed despite their regular contact with the people infected with leprosy [31]. The authors noted that the rifampicin reduced development of disease to the people who were affected, as well as preventing its progression to those who were not affected and had regular contact with the infected [32].

Table 1. Evidence Matrix of the sources

Citation	Database	Setting and Population	Type of Study	Evidence Level	Evidence Strength
Dos Santos et al, 2018	Pubmed.gov	Clinical trial	Cross-sectional	strong	strong
Bakker et al in 2005	US national Institute of health	3965 (Sample size)	Quantitative	standard	Standard
Malcolm and Marivic, 2016	US national Institute of health	Analysis of Chemoprophylaxis and immunoprophylaxis doses	Cross-sectional	Satisfactory	Strong
Palit and Kar, 2020	Pubmed.gov	Analysis of Chemoprophylaxis doses	Semi-structured	Standard	standard

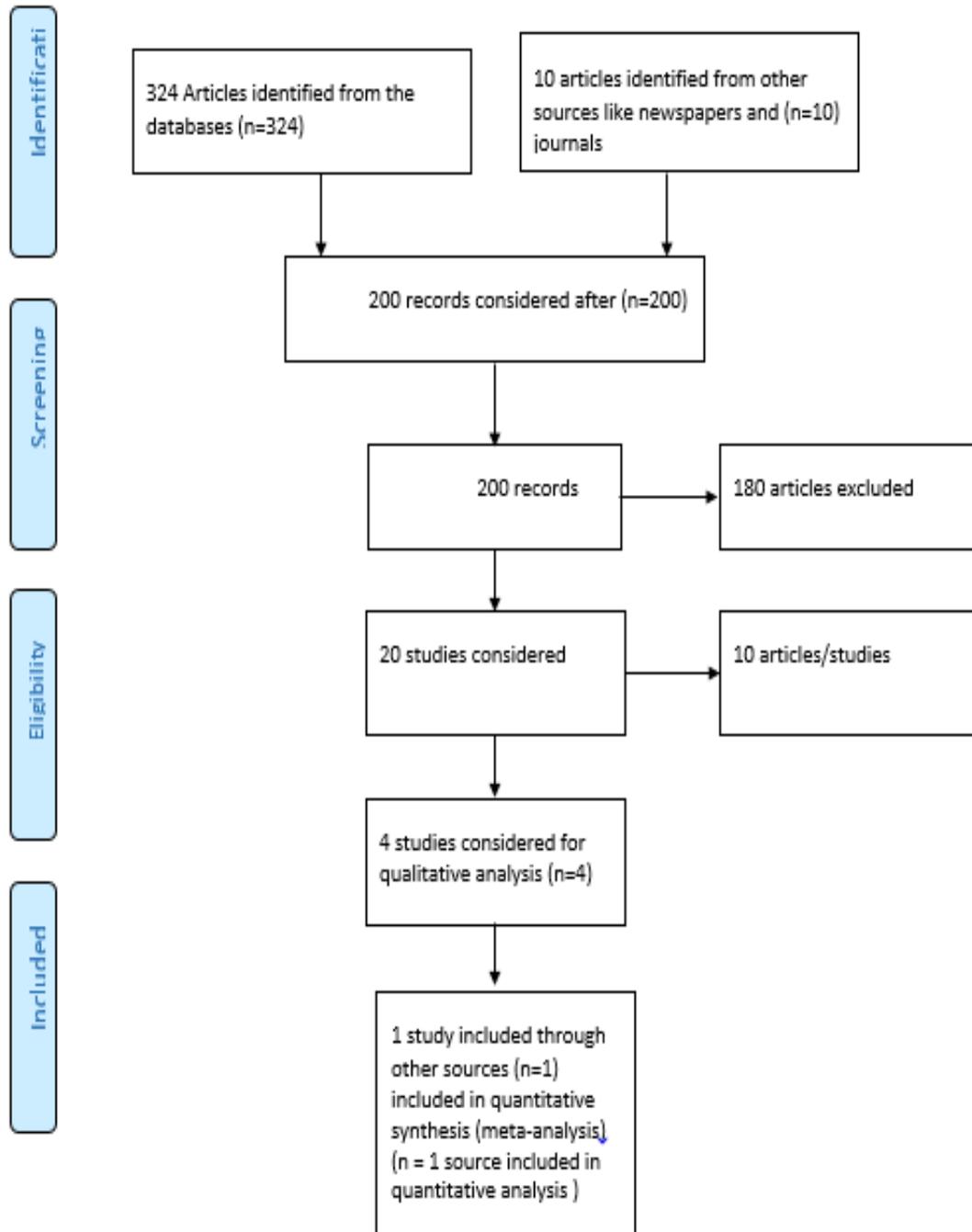


Fig. 1 Flow chart of finding references according to PRISMA GUIDANCE

IV. CONCLUSION

Chemoprophylaxis and immunoprophylaxis have great importance in controlling the infection of leprosy. The two methods not only prevent the development of disease among the patients but also they can prevent the progression of the mycobacteria to non-infected persons. The two are very useful in acting as the immunization factor to prevent individuals from getting infected with leprosy. Chemoprophylaxis and immunoprophylaxis are essential to people who are living in unsafe environments where they regularly contact with people who have the disease.

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