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## Mathematical Models on Acute Lymphoblastic Leukemia (ALL)

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### Abstract

More than 12 million cases and more than 6.4 million deaths due to Acute Lymphoblastic Leukemia (ALL) disease were reported worldwide by the end of 2021. More than .50 million cases and more than .42 deaths have been reported in India. Physicians and Surgeons are working on a number of conceptual, theoretical or mathematical modelling techniques in the battle against Acute Lymphoblastic Leukemia (ALL) Protocol: This systematic review aims to provide a comprehensive review of published mathematical models on ALL in India and the concepts behind the development of mathematical models on ALL, including assumptions, modelling techniques, and data inputs. Initially, related keywords and their synonyms will be searched in the Global Literature on this disease database managed by World Health Organisation (WHO). The studies will be selected for their quality, transparency, and ethical aspects, using the Overview, Design concepts, Details (ODD) protocol and International Society for ALL.

**Keywords:** ALL, Mathematical Model, Transparency etc.

### Introduction-

The sudden outbreak of a new pathogen called the Acute Lymphoblastic Leukemia (ALL). This disease has threatened the world population within a short period of its occurrence. The ALL has been exhausting the health care resources not only in poor or developing countries but in developed countries as well. Moreover, factors such as mass migration of workers, unemployment, the education system, and management of critical non patients of The ALL have become a concern amidst this disease. Mathematical models are powerful tools in executing a better understanding of disease spread dynamics and transmission of the ALL. These mathematical models can help us to understand this type of Cancer the size and duration of the Cancer wave, and the extent of illness in co-morbid conditions in countries that are struggling with health .

A prerequisite for a model is that it should provide predictions corresponding to reality. During the past year and a half, several mathematical models have been published for the ALL in low-and-middle income countries (LMICs). Several types of media has published a few models for quantitative prediction of infusion. Other models were developed to predict the effect of nonpharmaceutical measures on dynamics the ALL. In India, a number of mathematical models on the ALL were proposed and published in peer-reviewed journals and as grey literature during this time interval. This systematic review aims to provide a comprehensive review of existing mathematical models on the ALL in India that are published from time to time.

The recognised studies from the systematic review would be helpful in finding this research gap. The scholar additionally helps to understand the concept behind the development of mathematical models on the ALL conducted in India in terms of their assumptions, modelling techniques, and data inputs. The review will also aim to identify, where feasible, the reliability of the various mathematical models in predicting the ALL in India.

## Models and Discussion-

These insights might help to develop a methodology and the potential use of these models in predicting pandemic outbreaks in a limited resourced setting for future fatal disease. A preliminary search on the database of systematic review, PROSPERO, MEDLINE, and Implementation reports was conducted, and no systematic reviews on the topic were identified of the ALL. Protocol Method and design The study design is a systematic review of mathematical models on the ALL in India. The method has been developed and reported in compliance with Preferred Reporting Items for Systematic Reviews and Meta-analysis Protocol (PRISMA-P) of the ALL disease. Please see Reporting guidelines for the completed checklist. The search for the ALL final review will be documented and reported as per PRISMA-S). To perform a comprehensive review of existing mathematical models on the ALL and to assess the reported number of cases of infections, the peak of infections, mortalities, and spread of the infection in India.) To identify the concept behind the development of the mathematical models on the ALL, for example, assumptions, modelling techniques and data inputs. If possible, to check the reliability of mathematical models (i.e., the closeness of the predictions with the actual data this Cancer type) in predicting the real fatal disease situation in a limited resource country. Research questions What are the concepts behind the development of the mathematical models on the ALL? What are the assumptions, modelling techniques, and data inputs and the qualities, transparency and ethical considerations of mathematical modelling on ALL in India?

A study will be selected if it presents a mathematical or statistical model of this type of Cancer and reports the following parameters - an incubation period, basic reproduction number . 1. Articles on mathematical modelling of the ALL in countries other than India. 2. Articles on non- ALL outcomes. 3. Articles where the abstract or full text is not available of ALL. 4. Articles not conducting and reporting mathematical models will be excluded of ALL 5. Articles will be excluded if they only present on evaluating intervention strategies without offering parameter estimates or trajectory projection of ALL 6. Reviews and non-original papers. Search strategy of the ALL The comprehensive search strategy has been developed in consultation with an information specialist 7. Global literature on the ALL disease) and will be supplemented by a manual search at Semantic Scholar for relevant English language articles published from time to time.

Additionally, cross-referencing of included studies focused on India from previously published systematic reviews on the topic, and forward and backward citations of included studies will be conducted to identify more studies the ALL. The global literature on the disease ALL. Search terms like “pneumonia” AND “model,” “modelling,” “modelling,” “dynamic,” “estimation,” “prediction,” OR “transmission” AND “India,” OR “Republic of India,” OR “India,” “Indian”. A study will be selected if it presents a mathematical or statistical model of the ALL and reports the following parameters of the, basic reproduction number (Ro) infectious period searched and onward citation searching will be conducted using confirmed cases, peak time, mortality due to infection, further consequences of disease, validation and performance of each model will be assessed.

## Conclusion-

This systematic review will be performed to identify, and critically review published mathematical models on the ALL in India. Understanding of the concept behind the development of ALL mathematical models in India in terms of their assumptions, modelling techniques and data inputs could help the policymaker, scientist and physicians to promote best practices in mathematical modelling. Extended data Figshare: Mathematical models on ALL in India:

Final Search strategy\_Mathematical models on Acute Lymphoblastic Leukemia (ALL) in India.docx. Reporting guidelines Figshare: PRISMA-P checklist for 'Mathematical models on ALL in India: Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

This systematic study will be performed to critically examine relevant literature of existing mathematical models of this type of Cancer in India. The findings will help to understand the concepts behind the development of mathematical models on ALL conducted in India in terms of their assumptions, modelling techniques, and data inputs.

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