1. Introduction

China first announced the etiology of pneumonia on December 31, 2019. The initial cause was detected in Wuhan, Hubei Province, China. Epidemiological investigations traced these pneumonia cases to the Huanan Seafood Wholesale Market. By inoculating respiratory samples into human respiratory epithelial cells, scientists isolated a new respiratory virus. Genomic examination uncovered that this infection was connected with SARS-CoV, provoking its task as Extraordinary Strongly Respiratory Condition Covid 2 (SARS-CoV-2), routinely known as Coronavirus. The swift worldwide propagation of Covid-19 and the consequent loss of thousands of lives prompted On March 11, 2020, the World Health Organization (WHO) will declare a pandemic.. From that point forward, the pandemic has claimed a critical cost around the world, causing extensive loss of life, economic downturns, and increased poverty (1).

The spread of the Coronavirus infection has additionally impacted Indonesia. The Indonesian government formally declared the main instance of Coronavirus on Walk 2, 2020. Daily data from the government, sourced from the Covid-19 Handling and National Economic Recovery Committee, indicates that as of December 31, 2020, the overall number of affirmed Covid-19 cases in Indonesia come to 743,198. Out of this total, 611,097 individuals have recovered, while 22,138 individuals have succumbed to the virus. Covid-19 spreads rapidly from one individual to another (2).

Furthermore, the spread of Covid-19 in West Sumatra Province, especially in the city of Padang, continues to increase. From July to August 2021, there were recorded 1,113 positive cases. In September to October 2021, the number of positive cases in Padang City increased to 647 cases, and in the following two months, it increased again to 1,760 cases. TA similar upward trajectory in coronavirus infections was observed across various municipalities within the region. By late summer 2021, the cumulative tally of confirmed COVID-19 patients in the province had surpassed 3,502.

A deep understanding of its spreading patterns is necessary. This understanding is crucial for taking the right steps in controlling the virus transmission. Numerical approaches can provide profound insights into analyzing and modeling the dynamics of pandemic spread and allow for assisting in the efficient allocation of healthcare resources, including hospital beds, medical equipment, and required medical personnel. An epidemiological model can be created mathematically to represent a disease.

One of the many modeling techniques available to researchers is the SIR (Susceptible-Infectious-Recovered) model, which McKendrick and Kermack first proposed in 1927. This particular model has become a foundational tool in epidemiological studies. The SIR model tracks an individual's journey through three stages of disease progression: susceptibility, infection, and recovery. This approach forms the basis for many mathematical models used to analyze disease spread, particularly in epidemiology (3). SIR modeling is built on a framework that tracks an individual's journey through three stages of disease progression: susceptibility, infection, and recovered. This approach forms the basis for many mathematical models used to analyze disease spread, particularly in epidemiology. These models have proven especially valuable in understanding the initial phases of pandemics, often yielding insightful results. (4).

The model provides better Understanding the behavior of infectious diseases and aids in efforts to control their spread. Research shows that when disease transmission rates are high, the disease can spread widely in the population. However, by providing massively effective treatment to infected individuals, the updated model shows a drastic reduction in the time it takes to eradicate the disease. This modified model can be used to study and describe disease epidemics and endemics (5). In the case of discrete models, this research provides a solution for a new a distinct epidemic system that demonstrates behavior comparable to the continuous model. This research also successfully analyzed susceptible, infected, and recovered individuals, which has biological relevance (6).

This model has been utilized in research pointed toward deciding The essential multiplication number is urgent for specialists while simply deciding or approaches to resolve issues brought about by the Coronavirus infection. Model testing using data from the Batanghari Health Center UPTD obtained stable conditions for up to 100 months with a MAPE of 2.8%.

The SIR model demonstrate is frequently combined with a few numerical strategies to unravel the conventional differential condition framework fundamental the SIR show. In 2019, research was led utilizing two techniques, to be specific, the differential change strategy (DTM) and the Laplace-Adomian disintegration technique (LADM). In this review, the Differential Change Strategy (DTM) and the Laplace Adomian Deterioration Technique (LADM) were utilized to settle a nonlinear epidemiological model of PC infections. To illustrate the effectiveness and precision of these approaches, residual errors from multiple iterations were showcased for LADM, DTM, and the Homotopy Analysis Transform Method (HATM). The results highlighted the superior performance of LADM compared to the other methods (7).

A comparative study was conducted in 2021 between the fourth-order Runge-Kutta and the Euler (8). In light of this examination, it was found that the arrangements delivered by the two techniques are something similar,

however Euler succeeds as far as speed contrasted with Runge-Kutta Order 4. As a result, this discussion focuses on demonstrating the spread of Covid-19 instances in Padang City using the SIR demonstration with Runge-Kutta.