Prioritizing Post-COVID-19 Syndrome Follow-Up Care: A Hybrid Multi-Criterion Decision-Making Approach

Objective:

The COVID-19 pandemic has led to significant health challenges, especially the emergence of post-COVID-19 syndrome, which continues to affect individuals even after recovery. This study proposes a hybrid approach to prioritize follow-up care for individuals suffering from post-COVID-19 symptoms in India, focusing on preventing complications in vulnerable groups such as those with diabetes, heart disease, asthma, and other comorbidities.

Methodology:

The research employs a Grey-TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) model integrated with Grey's Theory to address uncertainty in post-COVID-19 symptoms and their varying impacts on different patient groups. The study involved the following steps:

1. Data Collection:
    - An online questionnaire was distributed to 208 respondents across Tamil Nadu, India. These respondents were categorized into groups based on their health conditions, such as diabetes, cardiac issues, asthma, and other complications.
    - Demographic data was collected, including information on age, employment, place of residence (rural, semi-urban, urban), and prior knowledge of epidemic infections and preventive measures.
2. Criteria Weighting and Rating:
    - The preventive measures suggested by an expert committee of physicians were evaluated. These measures were designed to mitigate post-COVID-19 symptoms and were rated based on their importance in managing different health conditions.
    - Linguistic variables were used to assign weights to each criterion, reflecting the relative importance of the preventive measures for each patient category (diabetic, cardiac, asthma, etc.).
3. Grey-TOPSIS Model:
    - The Grey-TOPSIS model was applied to the data, which involved normalizing the decision matrix and calculating the weighted normalized matrix for each criterion.
    - The method then calculated the positive ideal solution and negative ideal solution for each alternative, resulting in a preference order for the preventive measures.

Findings:

The results of the Grey-TOPSIS analysis revealed a clear ranking of the health conditions most in need of preventive follow-up care:

- Cardiac patients (A2) were identified as the highest priority group, followed by diabetic patients (A1), asthma patients (A3), and finally, individuals with other complications (A4).
- The preference ranking was: A2 > A1 > A3 > A4, indicating that individuals with cardiac issues require more stringent follow-up care to prevent long-term complications from COVID-19.

This suggests that cardiac patients are at higher risk for severe post-COVID effects and should be prioritized for more comprehensive care. While diabetic and asthma patients are also vulnerable, their care requirements were ranked slightly lower compared to those with cardiac issues.

Conclusion:

This study highlights the importance of prioritizing healthcare measures for post-COVID-19 patients based on their underlying health conditions. The findings underscore the need for targeted preventive measures, particularly for individuals with cardiac conditions, to mitigate the long-term effects of COVID-19.

The Grey-TOPSIS model provides a structured, data-driven approach to decision-making in public health, allowing for more effective prioritization of care resources. The results can guide policymakers, healthcare providers, and decision-makers in designing tailored healthcare strategies for different population groups during and after the COVID-19 pandemic.

By implementing these prioritized measures, India can better manage the long-term health impacts of COVID-19, ensure sustainable public health outcomes, and reduce the strain on the healthcare system. This study is an essential contribution to the ongoing effort to safeguard public health and ensure effective responses during post-pandemic recovery.

Keywords:

Post-COVID-19 Syndrome, Grey-TOPSIS, Multi-Criterion Decision-Making, Diabetic, Cardiac, Asthma, Preventive Measures, Healthcare Prioritization, India, Public Health Strategy

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Figure 2. Control flow diagram of Proposed Grey-TOPSIS Method