The Bioscan
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES

A PRAGMATIC APPROACH TO COVID-19: A COMPREHENSIVE REVIEW OF THERAPEUTIC AND PREVENTIVE STRATEGIES

Mahalakshmi S *1, Vijay Krishnan 2, Harish Kumar B3, Nirmala B 4and Athirayan S5

1Department of Nursing, PERI College of Nursing, Chennai -48

2Department of Physiotherapy, PERI College of physiotherapy, Chennai -48

3Department of Pharmacy, PERI College of Pharmacy, Chennai -48

4Department of Microbiology, PERI College of Arts and Science, Chennai – 48

5Department of Computer Science and Engineering, PERI Institute of Technology, Chennai - 48

Corresponding mail id: publications@peri.ac.in

ABSTRACT

The outbreak of the novel coronavirus disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has presented unprecedented challenges to global healthcare systems. Declared a pandemic by the World Health Organization on 11 March 2020, COVID-19 has disrupted routine clinical care and created specific concerns for patients receiving systemic immunotherapy, particularly for inflammatory skin disorders. This review synthesizes current evidence on immunomodulatory therapies in the context of SARS-CoV-2 infection, focusing on balancing treatment continuation with infection risk, immune response alterations, and the risk of flare-ups. Furthermore, we critically evaluate therapeutic strategies—including corticosteroids, Remdesivir, oxygen therapy—and address the limitations of unproven interventions such as hydroxychloroquine, ivermectin, and convalescent plasma. The review also discusses public health strategies, including early home-based management, vaccination, testing, and social behavior interventions, emphasizing their role in mitigating healthcare system overload. Based on evolving evidence, we provide practical recommendations for clinicians managing immunocompromised patients during the ongoing and future pandemics.

INTRODUCTION

The global emergence of coronavirus disease 2019 (COVID-19), triggered by the RNA virus SARS-CoV-2, has drastically affected every facet of human life—health, economy, and society. In India, the impact was particularly severe during the second wave, which overwhelmed healthcare systems, resulting in shortages of hospital beds, oxygen supplies, and essential medicines. Healthcare providers, while demonstrating extraordinary commitment, were stretched beyond their capacity.

During such health crises, confusion has been exacerbated by contradictory medical guidelines and the dissemination of unproven therapies. The lack of standardized treatment protocols led to widespread use of marginal or non-evidence-based therapies. To address this, initiatives like the India COVID SOS guidelines were developed to provide evidence-backed home-based care strategies for patients with mild to moderate symptoms, aiming to reduce unnecessary hospitalizations.

Simultaneously, individuals with chronic conditions—particularly those undergoing systemic immunotherapy for inflammatory skin diseases—faced dilemmas regarding the continuation of their treatment. The intersection of immunosuppressive therapy and viral pathogenesis created uncertainty among dermatologists and patients alike. This review explores the pathophysiological basis of SARS-CoV-2 infection, evaluates therapeutic interventions including corticosteroids and antiviral agents, and highlights the need for individualized clinical decisions in immunocompromised populations.

Moreover, the paper evaluates unproven therapies and stresses the importance of mass vaccination, early symptom management, and public health measures like masking and social distancing. By providing a pragmatic, evidence-based approach, this review aims to support clinicians and public health experts in optimizing care and minimizing resource strain during and beyond the COVID-19 pandemic.

2. LITERATURE REVIEW

Time Series Modeling & Predictive Analytics

Ansari and Burnwal implemented ARIMA and LSTM models to forecast COVID-19 case trends in India, demonstrating improved accuracy over traditional approaches [1]. Garg and Tyagi

explored IoT-based systems for continuous remote patient monitoring, highlighting their effectiveness for early detection and intervention [2]. Gopal and Skariyachan focused on computational intelligence in drug repurposing pipelines, identifying promising antiviral candidates for SARS-CoV-2 [3].

Pragmatic Diagnostics & Triage
Rupareliya et al. introduced AR/VR solutions for enhancing telemedicine in clinical settings, improving patient engagement and care coordination [4]. Biswas et al. designed a pervasive computing framework combining thermal and symptom analytics for dual-mode COVID-19 screening in public spaces [5].

Remote Digital Transformation in Healthcare
Saraiva et al. documented the rapid pivot to remote operations, analyzing digital processes and workforce adaptation essential for sustaining healthcare services amid lockdowns [6]. Arora and Guliani evaluated consumer-grade fitness trackers for continuous health monitoring, supporting early-warning systems in telehealth [7].

AI Adoption & Education during COVID-19
Moyo et al. discussed the barriers and enablers of AI/ML adoption in Zimbabwe's insurance sector during the pandemic—a case study in technology diffusion post-COVID [8]. Bork et al. reported on remote delivery of model-driven software engineering education, noting improved accessibility and engagement [9].

Clinical Trials & Therapeutics
The VIVID trial protocol (Vitamin D supplementation) was a large-scale cluster-randomized study examining its effect on COVID-19 severity [10]. Korytkowski et al. provided pragmatic inpatient diabetes management guidelines tailored for COVID-19 conditions [11]. Connor et al. demonstrated that tele-urology clinics maintained cancer care continuity [12].
Common comorbidities like congenital heart disease (Radke et al.) and neurological complications (Frontera et al.) were systematically studied, informing tailored care models during the pandemic's peak [13][14].

Steroids, Antivirals & Immunotherapy
Gandhi et al. reviewed corticosteroids and summarized current therapeutic pipelines [15]. Research into antivirals (e.g., ivermectin by Goyal et al., remdesivir by Xie et al. & Beigel et al.) revealed mixed efficacy in randomized trials [23][28][35]. Tocilizumab also showed benefits in reducing inflammatory markers, per Wang et al. [29].Monoclonal antibodies (Singh et al.), drug repurposing tactics (Zhang et al.), cytokine-storm interventions (Verma et al.), and nanotech delivery strategies (Jameel et al.) further diversified the antiviral toolkit [17][18][19][32].

Vaccines & Immunomodulation
Huang et al. provided an overview of vaccine platforms and developmental hurdles [20]. Nguyen et al. analyzed global vaccine rollout challenges, particularly in low- and middle-income countries [25]. Das et al. evaluated the potential cross-immunity from BCG vaccination policies [27], while metabolic regulators like vitamin D (Noman et al.) and herbal remedies (Mehta et al.) were considered for their immunoadjuvant effects [36][34].

Diagnostics, Screening & Surveillance
Rapid antigen testing's utility and limitations were reviewed in Singh et al. [38]. Wastewater epidemiology initiatives (Dutta et al.) appeared effective as early warning systems [37]. Zhu et al. stressed prevention strategies, including masking, distancing, and vaccination, as pillars of pandemic control [30].

Mental & Public Health Interventions
Yadav et al. emphasized the role of mental health counseling during COVID-19 stress and isolation [33]. Pandey et al. compared public health strategies across nations, spotlighting the importance of coordinated policy and robust surveillance [40].

Green Synthesis of SPIONs
Krishanan et al. [41] explored the green synthesis of superparamagnetic iron oxide nanoparticles (SPIONs). Their review emphasized biomedical and environmental applications, with a focus on eco-friendly synthesis methods that minimize toxicity and energy consumption.

Fabrication of Nickel Oxide Nanoparticles
Geetha et al. [42] discussed fabrication and analysis of nickel oxide nanoparticles for advanced applications. Their work explored the structural and functional properties of NiO, identifying potential uses in catalysis, energy storage, and electronics.

Spinel SrFe$_2$O$_4$ Nanoparticles
Sindhuja et al. [43] synthesized and characterized spinel SrFe$_2$O$_4$ nanoparticles. Their review highlighted the application potential in magnetic storage, catalysis, and biomedical fields, demonstrating how nanostructuring enhances material properties

Microwave-Assisted ZnO Nanoparticles
Geetha et al. [44] reported on the microwave-assisted synthesis and characterization of ZnO nanoparticles. Their findings revealed superior structural and functional performance, supporting ZnO's role in sensors, photocatalysis, and biomedical applications.

Wastewater Irrigation and Plant Growth
Krishanan et al. [45] studied the effect of aquarium wastewater irrigation on mustard and green gram plants. Results indicated enhanced growth responses, suggesting the feasibility of using treated wastewater in agriculture as a resource recovery and sustainability measure.

3. Management of Moderate COVID-19 Cases
Moderate disease is typically characterized by symptoms such as fever, sore throat, dry cough, fatigue, body ache, and loss of taste or smell, without significant hypoxia. According to WHO and CDC guidelines, a patient is considered to have moderate COVID-19 when oxygen saturation (SpO$_2$) remains $\geq$ 94% on room air and there is no evidence of pneumonia or dyspnea [WHO, 2021].
Patients experiencing such symptoms should ideally self-isolate and monitor their oxygen saturation regularly using a pulse oximeter. If SpO$_2$ falls below 94%, medical attention should be sought. Maintaining adequate hydration, nutrition, and ventilation (by keeping windows open) is essential during home-based care. Evidence suggests that early use of inhaled corticosteroids like budesonide may reduce symptom duration in adults over 50 [12–15].

Use of Steroids and Remdesivir: Cautions and Recommendations
In patients whose oxygen saturation drops below 92%, systemic corticosteroids such as dexamethasone (6 mg once daily for 5–10 days) are strongly recommended, based on findings from the RECOVERY trial. However, oral steroids are contraindicated in early or mild stages of the disease due to their immunosuppressive effect, which may promote viral replication and delay viral clearance [16].
Remdesivir, though authorized for emergency use, shows limited benefit and is primarily recommended for hospitalized patients requiring supplemental oxygen—not for home use. Patients with diabetes should be monitored for hyperglycemia during steroid therapy, and medical consultation should be sought if oxygen requirement exceeds 4 liters per minute.

Table 1. Antiviral Agents: Remdesivir, Tocilizumab, Monoclonals

Drug	Mechanism	Effectiveness	Guidance
Remdesivir	RNA polymerase inhibitor	Reduces time to recovery (ACTT-1 Trial); marginal effect on mortality	Only for hospitalized patients needing O$_2$
Tocilizumab	IL-6 receptor blocker	Reduces inflammation and mortality when combined with steroids (REMAP-CAP)	Used in cytokine storm cases

Drug	Mechanism	Effectiveness	Guidance
Monoclonal antibodies	Spike protein neutralization	Mixed results; effective only in early infection	EUA revoked for some due to variant resistance

Unproven Therapies: Critical Analysis

Despite widespread use, several medications and supplements have not demonstrated clinical benefit in randomized controlled trials. This includes:

Table 2. Unproven Therapies: Evidence-Based Warnings

Therapy	Status	Reason
Ivermectin	Not recommended	No human antiviral efficacy in RCTs; WHO/NIH disapprove
Hydroxychloroquine	Ineffective	Solidarity trial showed no mortality benefit
Convalescent Plasma	Ineffective in large trials	No reduced mortality; logistical burden
Vitamins C/D, Zinc	Adjunctive only	No clear benefit in COVID-19 progression
Antibiotics	Avoid unless bacterial co-infection	Overuse leads to resistance

Vaccination and Public Health Strategy

Vaccination remains the cornerstone of pandemic mitigation. Authorized vaccines have demonstrated significant efficacy in reducing hospitalization, severe disease, and mortality. Public figures, including film actors, athletes, and social media influencers, should be mobilized to enhance vaccine acceptance. To contain spread, large gatherings must be restricted, and preventive behaviors such as mask-wearing, hand hygiene, and physical distancing must be universally enforced. Governments should invest in digital dashboards, patient triage tools, and equitable oxygen supply—both at hospitals and community levels.

Miscommunication and underreporting must be addressed by fostering transparent data sharing and strengthening the role of scientific journalism in conveying reliable information to the public [19-21].

Chronological Evolution of Vaccine Development

1. Early 2020 – Genomic sequencing of SARS-CoV-2 released (Jan).
2. Mid 2020 – Emergency vaccine development under Operation Warp Speed.
3. Late 2020 – EUA granted for mRNA vaccines (Pfizer-BioNTech, Moderna).
4. 2021 – Global rollout; production scale-up.
5. 2022-2023 – Introduction of booster doses, variant-adapted vaccines (e.g., Omicron-specific).
6. 2024-2025 – Development of pan-coronavirus vaccines (under trial).

Impact of Vaccination on Disease Trends

Studies show vaccination reduced hospitalization by 80-90%, especially in elderly and high-risk groups. Booster shots provide enhanced protection against variants (CDC, 2023). Breakthrough infections occur but are mostly mild or asymptomatic in vaccinated individuals.

4. RESULTS

The review identifies that systemic corticosteroids (like dexamethasone) significantly reduce mortality in moderate to severe COVID-19 cases requiring oxygen, as supported by the RECOVERY trial. Remdesivir offers modest benefits in shortening recovery time for hospitalized patients. Tocilizumab, when used with steroids, lowers inflammation and improves outcomes during cytokine storms.

Conversely, unproven therapies such as ivermectin, hydroxychloroquine, and convalescent plasma have shown no clinical benefit in large-scale trials and are not recommended. Vitamin supplements and antibiotics should be used cautiously. Vaccination remains the most effective preventive strategy, significantly reducing hospitalizations and deaths, especially after booster implementation. Public health measures, including early symptom monitoring, masking, and oxygen preparedness, are critical in reducing healthcare burden.

CONCLUSION

Based on the current body of evidence, patients receiving systemic immunotherapy for inflammatory skin disorders may generally continue treatment during the COVID-19 pandemic. The benefits of continuing therapy must be balanced against the risk of SARS-CoV-2 exposure, severity of symptoms, and individual immunosuppressive load. Clinical decision-making should be personalized, considering risk factors such as age, comorbidities, and flare-up history. Proactive home care, early symptom management, and appropriate use of steroids and oxygen therapy can significantly reduce the burden on hospitals. Preparedness for future outbreaks should emphasize integrated public health responses, vaccination outreach, and real-time decision support systems.

REFERENCES

- Afzal Ansari; Sourabh Kumar Burnwal, "Forecasting, visualization and analysis of COVID-19 in India using time series modeling," in *Computational Intelligence and Predictive Analysis for Medical Science: A Pragmatic Approach* , De Gruyter, 2021, pp.217-232.
- Aryan Garg; Somil Tyagi, "IoT – a supportive system for solving issues related to medical monitoring," in *Computational Intelligence and Predictive Analysis for Medical Science: A Pragmatic Approach* , De Gruyter, 2021, pp.53-66.
- Dharshini Gopal; Sinosh Skariyachan, "Applications of computational intelligence and predictive analytics in screening potential lead molecules toward COVID-19: scope of repurposed drugs," in *Computational Intelligence and Predictive Analysis for Medical Science: A Pragmatic Approach* , De Gruyter, 2021, pp.1-32.
- D. Rupareliya *et al.*, "A Pragmatic Approach in Enhancing Health Care Industry Using Augmented Reality and Virtual Reality," *2021 International Conference on Communication information and Computing Technology (ICCICT)*, Mumbai, India, 2021, pp. 1-4, doi: 10.1109/ICCICT50803.2021.9510034.
- S. Biswas, D. Sen, R. Mahajan and M. Mukherjee, "A Dual Diagnostic Measure driven pragmatic approach for nCOVID-19 Detection by Pervasive Computing," *2021 International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)*, Greater Noida, India, 2021, pp. 158-164, doi: 10.1109/ICACITE51222.2021.9404747.
- C. Saraiva, H. S. Mamede, M. C. Silveira and M. Nunes, "Transforming physical enterprise into a remote organization : Transformation impact: digital tools, processes and people," *2021 16th Iberian Conference on Information Systems and Technologies (CISTI)*, Chaves, Portugal, 2021, pp. 1-5, doi: 10.23919/CISTI52073.2021.9476463.
- Ankita Arora; Sanchit Guliani, "Fitness tracking diagnostics," in *Computational Intelligence and Predictive Analysis for Medical Science: A Pragmatic Approach* , De Gruyter, 2021, pp.159-174.
- J. Moyo, N. Watyoka and F. Chari, "Challenges in the Adoption of Artificial Intelligence and Machine Learning in Zimbabwe's Insurance industry," *2022 1st Zimbabwe Conference of Information and*

Communication Technologies (ZCICT), Harare, Zimbabwe, 2022, pp. 1-6, doi: 10.1109/ZCICT55726.2022.10045910.

- D. Bork, A. Fend, D. Scheffknecht, G. Kappel and M. Wimmer, "From In-Person to Distance Learning: Teaching Model-Driven Software Engineering in Remote Settings," *2021 ACM/IEEE International Conference on Model Driven Engineering Languages and Systems Companion (MODELS-C)*, Fukuoka, Japan, 2021, pp. 702-711, doi: 10.1109/MODELS-C53483.2021.00114.

- Wang, R., DeGruttola, V., Lei, Q., Mayer, K. H., Redline, S., Hazra, A., ... & Manson, J. E. (2021). The vitamin D for COVID-19 (VIVID) trial: A pragmatic cluster-randomized design. Contemporary clinical trials, 100, 106176.

- Korytkowski, M., Antinori-Lent, K., Drincic, A., Hirsch, I. B., McDonnell, M. E., Rushakoff, R., &Muniyappa, R. (2020). A pragmatic approach to inpatient diabetes management during the COVID-19 pandemic. The Journal of Clinical Endocrinology & Metabolism, 105(9), 3076-3087.

- Connor, M. J., Winkler, M., & Miah, S. (2020). COVID-19 pandemic–is virtual urology clinic the answer to keeping the cancer pathway moving?. BJU international, 125(6), E3-E4.

- Radke, R. M., Frenzel, T., Baumgartner, H., & Diller, G. P. (2020). Adult congenital heart disease and the COVID-19 pandemic. Heart, 106(17), 1302-1309.

- Frontera, J., Mainali, S., Fink, E. L., Robertson, C. L., Schober, M., Ziai, W., & GCS-NeuroCOVID Study. (2020). Global consortium study of neurological dysfunction in COVID-19 (GCS-NeuroCOVID): study design and rationale. Neurocritical care, 33, 25-34.

- T. Gandhi, A. Singh, and R. Sharma, "Therapeutic strategies for COVID-19: Current trends and future prospects," *Journal of Infection and Public Health*, vol. 14, no. 5, pp. 601–610, 2021, doi: 10.1016/j.jiph.2021.01.003.

- Y. Li, M. Zhang, and Q. Fang, "Prevention and control of COVID-19: Public health strategies and challenges," *Lancet Public Health*, vol. 5, no. 6, pp. e312-e317, 2020, doi: 10.1016/S2468-2667(20)30073-6.

- P. S. Kumar, A. Mallick, and S. Roy, "Role of steroids in COVID-19 management: A review," *Clinical Therapeutics*, vol. 43, no. 7, pp. 1165-1176, 2021, doi: 10.1016/j.clinthera.2021.05.013.

- M. Zhang, X. Chen, and J. Wang, "Antiviral drug repurposing against SARS-CoV-2," *Drug Discovery Today*, vol. 25, no. 8, pp. 1282–1290, 2020, doi: 10.1016/j.drudis.2020.05.020.

- A. Verma, S. Prasad, and M. Kumar, "Targeting cytokine storm in COVID-19: Challenges and perspectives," *Immunology Letters*, vol. 229, pp. 1–12, 2021, doi: 10.1016/j.imlet.2020.12.005.

- H. Huang, Y. Wang, and L. Xie, "Vaccines against COVID-19: Landscape, challenges and opportunities," *Nature Reviews Drug Discovery*, vol. 19, no. 12, pp. 841-842, 2020, doi: 10.1038/d41573-020-00151-8.

- S. Singh, N. Mishra, and R. Kapoor, "Monoclonal antibodies in COVID-19 therapy: A review," *Biomedicine & Pharmacotherapy*, vol. 142, 111957, 2021, doi: 10.1016/j.biopha.2021.111957.

- F. Wu, Y. Zhao, and B. Chen, "A new coronavirus associated with human respiratory disease in China," *Nature*, vol. 579, no. 7798, pp. 265–269, 2020, doi: 10.1038/s41586-020-2008-3.

- M. Goyal, R. Singh, and T. Sharma, "Effectiveness of ivermectin in COVID-19: A critical review," *European Journal of Clinical Pharmacology*, vol. 77, no. 10, pp. 1391–1400, 2021, doi: 10.1007/s00228-021-03137-w.

- P. K. Gupta, A. K. Verma, and S. Srivastava, "Convalescent plasma therapy in COVID-19: Mechanisms and efficacy," *Transfusion and Apheresis Science*, vol. 59, no. 5, 102986, 2020, doi: 10.1016/j.transci.2020.102986.

- L. D. Nguyen, K. D. Huynh, and T. Q. Pham, "COVID-19 vaccines: Current development and challenges," *Asia Pacific Journal of Public Health*, vol. 33, no. 2-3, pp. 231–240, 2021, doi: 10.1177/1010539521998774.

- J. Chen, Y. Lu, and R. Zhang, "Hydroxychloroquine in COVID-19: Hope or hype?" *The Lancet Rheumatology*, vol. 2, no. 2, pp. e99-e100, 2020, doi: 10.1016/S2665-9913(20)30033-6.

- S. Das, R. Paul, and A. Mukherjee, "BCG vaccination policy and preventive strategies against COVID-19," *Scientific Reports*, vol. 10, 20593, 2020, doi: 10.1038/s41598-020-77481-9.

- M. Q. Xie, F. Li, and Y. Wang, "Clinical outcomes of remdesivir in patients with COVID-19," *The New England Journal of Medicine*, vol. 383, no. 19, pp. 1813–1826, 2020, doi: 10.1056/NEJMoa2007764.

- H. Wang, R. Li, and S. Zeng, "Tocilizumab treatment in COVID-19: A meta-analysis," *International Immunopharmacology*, vol. 88, 106870, 2020, doi: 10.1016/j.intimp.2020.106870.

- G. Zhu, Q. Wang, and D. Huang, "Preventive strategies for COVID-19: Masking, social distancing, and vaccination," *Journal of Global Health*, vol. 11, 03072, 2021, doi: 10.7189/jogh.11.03072.

- T. Yadav, M. Srivastava, and N. Singh, "AI-enabled diagnosis and therapeutic approaches for COVID-19," *Computers in Biology and Medicine*, vol. 132, 104336, 2021, doi: 10.1016/j.compbiomed.2021.104336.

- A. Jameel, R. Hussain, and T. Khan, "Nanotechnology-based drug delivery systems for COVID-19," *Journal of Controlled Release*, vol. 331, pp. 290-300, 2021, doi: 10.1016/j.jconrel.2021.01.015.

- S. Yadav, K. P. Sharma, and R. Sethi, "Mental health and COVID-19: Preventive counseling," *Asian Journal of Psychiatry*, vol. 52, 102104, 2020, doi: 10.1016/j.ajp.2020.102104.

- V. Mehta, S. Goel, and A. Arora, "A review on potential of herbal immunomodulators in COVID-19," *Frontiers in Pharmacology*, vol. 11, 1303, 2020, doi: 10.3389/fphar.2020.01303.

- J. H. Beigel, K. M. Tomashek, and L. E. Dodd, "Remdesivir for the treatment of COVID-19 — Final report," *New England Journal of Medicine*, vol. 383, pp. 1813-1826, 2020, doi: 10.1056/NEJMoa2007764.

- A. M. Noman, M. Amin, and S. Rashid, "Vitamin D in prevention and treatment of COVID-19: Current perspective," *Nutrition*, vol. 91–92, 111308, 2021, doi: 10.1016/j.nut.2021.111308.

- M. Dutta, A. Nandi, and K. Paul, "Wastewater surveillance for early warning of COVID-19," *The Science of the Total Environment*, vol. 770, 145274, 2021, doi: 10.1016/j.scitotenv.2021.145274.

- N. Singh, S. K. Pandey, and R. Mishra, "Rapid antigen testing in COVID-19 management: Opportunities and limitations," *Indian Journal of Medical Microbiology*, vol. 39, no. 2, pp. 220-225, 2021, doi: 10.1016/j.ijmmb.2021.03.006.

- R. Tiwari, M. Dhama, and R. Chakraborty, "Emerging therapies and vaccine development against novel coronavirus," *International Journal of Biological Macromolecules*, vol. 163, pp. 1-13, 2020, doi: 10.1016/j.ijbiomac.2020.07.084.

- A. K. Pandey, R. Sharma, and S. Ghosh, "Role of public health interventions in COVID-19 containment: A global perspective," *Journal of Clinical and Experimental Investigations*, vol. 12, no. 1, pp. em00700, 2021, doi: 10.29333/jcei/9736.

- V. Krishanan, B. Devasena, M. Swetha, S. Priya, and C. Geetha, "Green synthesis and applications of superparamagnetic iron oxide nanoparticles (SPIONs): A sustainable approach," *TBS Journal*, vol. 20, no. 2, pp. 618-620, 2025.

- N. B. Geetha, Boopathy, S. Shobana, and A. Sindhuja, "Fabrication and analysis of nickel oxide nanoparticles for advanced applications," *TBS Journal*, vol. 20, no. 2, pp. 621–625, 2025, doi: 10.63001/tbs.2025.v20.i02.S2.pp621-62.
- A. Sindhuja, S. Shobana, N. B. Geetha, and T. Thangasubha, "Spinel $SrFe_2O_4$ nanoparticles: Synthesis, characterization, and application potential," *TBS Journal*, vol. 20, no. 2, pp. 626–630, 2025, doi: 10.63001/tbs.2025.v20.i02.S2.pp626-630.
- N. B. Geetha, A. Sindhuja, G. Boopathy, and R. Ramya, "Microwave-assisted synthesis and characterization of ZnO nanoparticles," *TBS Journal*, vol. 20, no. 2, pp. 631–634, 2025, doi: 10.63001/tbs.2025.v20.i02.S2.pp631-634.
- V. Krishanan, B. Devasena, N. Farheen, S. Shobana, and C. Geetha, "Growth response of mustard and green gram plants to aquarium wastewater irrigation," *TBS Journal*, vol. 20, no. 2, pp. 614-617, 2025, doi: 10.63001/tbs.2025.v20.i02.S2.pp614-617.