(REVIEW ARTICLE)

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Elevating GLP-1 receptor agonist adoption in India: A comprehensive review integrating the CLIBS framework and rogers' model of diffusion

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Abstract

India faces a pressing epidemic of diabetes and obesity, driven by changing lifestyles, suboptimal dietary habits, and a lack of widespread preventive measures. Although GLP-1 receptor agonists (GLP-1 RAs) hold significant promise for improving glycemic control and supporting weight loss, their adoption in India remains suboptimal. Key barriers include high treatment costs, insufficient insurance coverage, limited patient and provider awareness, and cultural stigma toward injectable therapies.

This review synthesizes existing challenges and proposes an integrated approach to enhancing GLP-1 RA adoption in India by combining the CLIBS model—Cost-effectiveness, Long-term data, Insurance, Long-term benefits, and social media impact—with Rogers' Diffusion of Innovations framework. Together, these models offer a structured, evidence-based roadmap for stakeholders, including policymakers, healthcare professionals, pharmaceutical companies, and patient advocacy groups, to overcome financial, social, and systemic barriers to GLP-1 RA use. By uniting economic strategies, robust data, insurance reforms, patient-centered education, and strategic social media engagement, this integrated approach can propel broader acceptance of GLP-1 RAs, mitigating India's growing burden of diabetes and obesity.

Keywords: GLP-1 Receptor Agonists; Diabetes; Obesity; CLIBS Model; Rogers' Diffusion; Cost-Effectiveness; Adoption Barriers

1. Introduction

India is witnessing an alarming rise in metabolic diseases, particularly diabetes and obesity. (Mohajan, D., & Mohajan, H. K. (2023).) According to the International Diabetes Federation (IDF), India ranks among the highest in diabetes prevalence worldwide, with the numbers expected to escalate if no comprehensive intervention is implemented (Pradeepa, R., & Mohan, V. (2021).). The confluence of urbanization, sedentary lifestyles, and high-calorie diets has accelerated this health crisis, affecting both urban and rural populations. (Casari, S., Di Paola, M., Banci, E., Diallo, S., Scarallo, L., Renzo, S., ... & Lionetti, P. (2022).)

Although therapeutic options are abundant, GLP-1 receptor agonists (GLP-1 RAs) stand out for their unique role in enhancing glycemic control and supporting weight management. They exert their action by simulating the endogenous hormone glucagon-like peptide-1, stimulating insulin secretion, reducing glucagon release, slowing gastric emptying, and promoting satiety.(Zheng, Z., Zong, Y., Ma, Y., Tian, Y., Pang, Y., Zhang, C., & Gao, J. (2024) .However, widespread adoption in India is limited by cost, inadequate insurance, awareness gaps, and social stigma around injectable therapies.

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This review offers a comprehensive analysis of these barriers and presents a dual-framework strategy to address them. First, we introduce the CLIBS model—focusing on Cost-effectiveness, Long-term data, Insurance, Long-term benefits, and the Social media impact. Secondly, we integrate Rogers' Diffusion of Innovations model to show how innovation adoption occurs across different segments of society (innovators, early adopters, early majority, late majority, and laggards). (Halton, C. (2023).) By aligning clinical, economic, and sociobehavioral insights, the proposed approach could significantly enhance GLP-1 RA uptake in India and other developing nations

2. The Indian Scenario: Rising Diabetes and Obesity

2.1. Epidemiological Trends

Genetic predisposition, coupled with environmental and lifestyle factors, places India at high risk for type 2 diabetes. (Shitomi-Jones, L. M., Akam, L., Hunter, D., Singh, P., & Mastana, S. (2023).) According to estimates, prevalence rates have surged across demographics, including rural areas. Abdominal obesity remains a critical predictor of insulin resistance and related metabolic disorders. (Gupta, R. D., Kothadia, R. J., & Parray, A. A. (2023).)

2.2. Lifestyle Influences

Urbanization has led to the rise of high-calorie convenience foods, reduced physical activity, and increased stress. (Vilar-Compte, M., Burrola-Méndez, S., Lozano-Marrufo, A., Ferré-Eguiluz, I., Flores, D., Gaitán-Rossi, P., ... & Pérez-Escamilla, R. (2021) . Cultural norms—such as feasting on high-glycemic foods during celebrations—further compound the problem. Unbalanced nutrition, inadequate sleep, and insufficient physical exercise amplify metabolic disruptions, including fat accumulation and glucose intolerance. (Clemente-Suárez, V. J., Beltrán-Velasco, A. I., Redondo-Flórez, L., Martín-Rodríguez, A., & Tornero-Aguilera, J. F. (2023).)

2.3. Public Health Burden

The growing prevalence of diabetes and obesity not only impacts the healthcare system financially but also reduces individuals' quality of life. Long-term complications such as cardiovascular disease, neuropathy, retinopathy, and nephropathy strain healthcare resources and underscore the urgent need for effective, sustainable interventions.(Sugandh, F. N. U., Chandio, M., Raveena, F. N. U., Kumar, L., Karishma, F. N. U., Khuwaja, S., ... & Kumar, S. (2023).)

3. GLP-1 Receptor Agonists: Mechanism and Clinical Promise

GLP-1 RAs offer multiple clinical advantages by:

- **Enhancing insulin secretion** in response to hyperglycemia.
- **Reducing glucagon release**, thus decreasing hepatic glucose production.
- **Delaying gastric emptying**, which increases satiety and aids in weight reduction.
- **Potential cardiovascular benefits**, with several studies indicating reductions in major adverse cardiovascular events. (Mariam, Z., & Niazi, S. K. (2024).)

This dual-action on glycemic control and weight makes GLP-1 RAs a compelling choice for India's substantial population with type 2 diabetes and coexisting obesity.

4. Barriers to GLP-1 RA Adoption in India

4.1. High Cost

GLP-1 RAs are priced significantly higher than generic oral anti-diabetic medications. This cost differential poses a major hurdle, especially in a market dominated by out-of-pocket health expenditures. (Arora, S., Grandhi, B., & Vakhariya, S. (2024))

4.2. Limited Insurance Coverage

Low health insurance penetration in India means many patients shoulder the expenses for advanced therapies themselves. Publicly funded insurance schemes often do not cover high-cost medications like GLP-1 RAs, and private insurers may impose tight restrictions.(Mohanty, S. K., Upadhyay, A. K., Maiti, S., Mishra, R. S., Kämpfen, F., Maurer, J., & O'Donnell, O. (2023).)

4.3. Awareness and Social Media Misconceptions

Clinicians and patients alike may be unaware of the full benefits of GLP-1 RAs. Meanwhile, social media can amplify negative anecdotes or misinformation about side effects, hindering adoption (Javaid, A., Baviriseaty, S., Javaid, R., Zirikly, A., Kukreja, H., Kim, C. H., ... & Marvel, F. A. (2024).

4.4. Cultural Barriers and Injectable Stigma

Many patients in India prefer oral medications or alternative treatments, associating injectable therapies with more severe disease (Murdan, S., Wei, L., van Riet-Nales, D. A., Gurmu, A. E., Usifoh, S. F., Tăerel, A. E., ... & Furnham, A. (2023)) Additionally, cost, convenience, and cultural preferences can further discourage the use of injectables.

4.5. Side Effects and Adherence

While gastrointestinal side effects (e.g., nausea, vomiting) are generally mild and transient, they can lead to early discontinuation if healthcare providers do not adequately educate and support patients.(Gorgojo-Martínez, J. J., Mezquita-Raya, P., Carretero-Gómez, J., Castro, A., Cebrián-Cuenca, A., de Torres-Sánchez, A., ... & Rubio-Herrera, M. Á. (2022)

5. The CLIBS Model: A Structured Solution Approach

To overcome these hurdles, we propose the **CLIBS** model:

- **Cost-effectiveness (C)**
- **Long-term data (L)**
- **Insurance (I)**
- **Long-term benefits (B)**
- **Social media impact (S)(Rajput, R., Sinha, B., Lodha, S., Deb, P., Das, S., Agarwal, S., ... & Thomas, N. (2022).)**

5.1. Cost-Effectiveness (C)

- **Pricing Strategies**: Pharmaceutical firms could implement tiered pricing or bulk discounts for emerging markets like India.(*Cardiovascular Diabetology v. 20 (1)* 21 (2021).)
- **Local Manufacturing**: Encouraging domestic production of GLP-1 RAs could lower costs and improve supply chain efficiency.
- **Government Subsidies**: Potential tax breaks or subsidies could reduce the financial burden, making these therapies more accessible.

5.2. Long-Term Data (L)

- **India-Specific Clinical Trials**: Generating robust local evidence of efficacy and safety reinforces the value proposition of GLP-1 RAs.(Drucker, D. J. (2024).)
- **Outcomes Registries**: National or regional registries to track real-world patient outcomes can further demonstrate long-term cost–benefit.
- **Physician Education**: Continuous medical education programs ensure healthcare providers stay updated on evolving guidelines and best practices.

5.3. Insurance (I)

- **Policy Advocacy**: Working with policymakers and insurance bodies to include GLP-1 RAs in basic healthcare coverage can massively expand access.
- **Customized Insurance Packages**: Designing diabetes-specific insurance plans that incorporate advanced therapies fosters affordability.
- **Public–Private Partnerships**: Collaborative programs between government schemes and private insurers can scale coverage faster.

5.4. Long-Term Benefits (B)

- **Holistic Value Proposition**: Emphasizing reductions in cardiovascular events, renal complications, and hospitalizations can justify the higher upfront cost.
- **Patient Education**: Transparent communication about the health improvements and potential reduction in morbidity helps patients and families see long-term value.
- **Lifestyle Integration**: Reinforcing diet, exercise, and behavioral therapies alongside GLP-1 RAs improves real-world outcomes and patient satisfaction.

5.5. Social Media Impact (S)

- **Accurate Information Campaigns**: Clinical societies and patient advocacy groups can spearhead social media initiatives to disseminate evidence-based knowledge.(Somani, S., Jain, S. S., Sarraju, A., Sandhu, A. T., Hernandez-Boussard, T., & Rodriguez, F. (2024).)
- **Influencer and Community Engagement**: Utilizing healthcare influencers and local community leaders to share positive experiences can counteract misinformation.
- **Peer Support Networks**: Online communities where patients can discuss their experiences and concerns encourage adherence and reduce stigma.

6. Integrating Rogers' Diffusion of Innovations Model

Everett Rogers' **Diffusion of Innovations** theory provides a useful lens to understand and accelerate the adoption of GLP-1 RAs 222. According to Rogers, the uptake of any innovation follows a bell-shaped curve, segmented into **innovators**, **early adopters**, **early majority**, **late majority**, and **laggards**. Adoption is influenced by five key attributes:

- **Relative Advantage**: The perceived benefit of the innovation compared to existing options. GLP-1 RAs offer a significant advantage by addressing both glycemic control and weight management.
- **Compatibility**: The innovation's alignment with users' lifestyles, beliefs, and needs. Integrating GLP-1 RAs with cultural dietary practices and focusing on minimizing disruption can improve compatibility.
- **Complexity**: The perceived difficulty in understanding and using the innovation. Clear instructions for injection, digital reminders, and healthcare support can mitigate complexities.
- **Trialability**: The ability to test the innovation on a limited basis. Short-term pilot programs, patient trial initiatives, and sample vouchers can reduce hesitancy.
- **Observability**: The visibility of tangible outcomes. Publicizing weight reduction and glycemic control success stories—especially via social media—can help prospective adopters see the potential benefits.

6.1. Tailoring Rogers' Model to the Indian Context

- **Innovators and Early Adopters**: These may include leading endocrinologists, specialized obesity clinics, and tertiary care hospitals that champion new therapies.
- **Early Majority**: Motivated by positive reports and peer recommendations, larger segments of clinicians and patients may adopt GLP-1 RAs as they become more affordable and well-known.
- **Late Majority and Laggards**: These groups may remain resistant due to higher cost-sensitivity, cultural barriers, and distrust of novel therapies. Targeted educational campaigns and robust insurance coverage can help shift these segments.

By integrating **Rogers' attributes** into the **CLIBS model**, stakeholders can more effectively address the psychological and behavioral components of adoption. For instance, demonstrating **long-term benefits** (B) and disseminating positive results via **social media** (S) bolster the **observability** of GLP-1 RAs, while policies that reduce **cost** (C) and enhance **insurance** (I) coverage address concerns over **relative advantage** and **complexity**.

7. Policy Implications and Future Directions

7.1. Multi-Stakeholder Engagement

Implementing the integrated CLIBS + Rogers' model requires concerted efforts from policymakers, pharmaceutical companies, healthcare providers, insurers, and patient advocacy groups. Legislative changes, pricing negotiations, and expanded public insurance schemes can dramatically lower barriers.

7.2. Education and Training

Healthcare Providers: Regular workshops, webinars, and guidelines updates can sharpen prescribing behaviors and help clinicians manage side effects effectively.

Patients and Caregivers: Accessible informational materials and community outreach programs are crucial for improving adherence and countering misconceptions.

7.3. Research Priorities

Longitudinal Studies: Extended follow-up data, particularly from Indian populations, can clarify the real-world effectiveness and cost–benefit of GLP-1 RAs.

Implementation Research: Evaluating the effectiveness of the CLIBS approach and Rogers' model in different geographic and socioeconomic contexts can guide scale-up efforts.

7.4. Digital Health Opportunities

The proliferation of telemedicine and health apps in India offers new avenues for patient education, adherence tracking, and peer support. Integrating these digital tools with GLP-1 RA prescriptions can enhance patient outcomes and accelerate diffusion.

8. Conclusion

GLP-1 receptor agonists represent a pivotal advancement for combating India's escalating diabetes and obesity crisis. However, financial constraints, limited insurance coverage, awareness gaps, and cultural stigmas have impeded their widespread acceptance.

By marrying the CLIBS model—focusing on Cost-effectiveness, Long-term data, Insurance, Long-term benefits, and social media impact—with Rogers' Diffusion of Innovations framework, stakeholders can tackle both systemic and behavioral barriers. This integrated strategy emphasizes practical solutions such as pricing reforms, robust clinical evidence, insurance inclusivity, and targeted communication to enhance the visibility and perceived value of GLP-1 RAs.

Through aligned action and cross-sector collaboration, India has the potential to substantially improve care for millions of individuals at risk for or living with diabetes and obesity. If effectively executed, these dual frameworks can shape a more equitable healthcare landscape, offering a model for other developing nations grappling with similar metabolic health crises.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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