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Polypharmacy Among NCD Patients in Rural Tamil Nadu: A Comprehensive Review

Priyadharshini Dharmalingam[1]
[1] *Assistant Professor, Govt medical college, Tiruvallur.*

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Corresponding Author:
Priyadharshini Dharmalingam

Abstract:

Non-communicable diseases (NCDs) account for nearly two-thirds of mortality in India and are increasingly prevalent in rural populations. The coexistence of multiple chronic conditions has led to a rise in polypharmacy, commonly defined as the use of five or more medications. Polypharmacy is associated with adverse drug reactions, drug interactions, poor adherence, and increased healthcare costs. Evidence from Indian studies suggests that the prevalence of polypharmacy ranges from 13% in rural populations to nearly 49% among elderly individuals. Rural Tamil Nadu, with its high NCD burden and evolving healthcare infrastructure, represents a critical setting for understanding this issue. This review synthesizes evidence from approximately 20 studies to explore the epidemiology, determinants, consequences, and management of polypharmacy in rural NCD patients.

Keywords: Polypharmacy, NCD, Rural

1. Introduction

India is undergoing an epidemiological transition characterized by a rapid increase in NCDs such as diabetes, hypertension, and cardiovascular diseases. These conditions account for approximately 63% of total deaths in the country [3]. Tamil Nadu, despite its relatively advanced healthcare system, has a high burden of NCDs even in rural areas. Population-based studies have shown that diabetes prevalence in rural Tamil Nadu is approximately 20–22%, while hypertension affects around 15–16% of adults [4]. These chronic conditions often coexist, leading to multimorbidity and the need for multiple medications. Consequently, polypharmacy has become a common phenomenon in clinical practice.

Studies across India consistently report a high prevalence of polypharmacy, especially among elderly individuals and those with chronic diseases [1,2,5]. This highlights the importance of evaluating its impact in rural settings.

Definition and Concept of Polypharmacy

Polypharmacy is generally defined as the concurrent use of five or more medications. However, some studies define it as four or more drugs in community settings [5]. Hyperpolypharmacy refers to the use of ten or more medications.A systematic review of 27 studies in India reported a pooled prevalence of polypharmacy of 49% and hyperpolypharmacy of 31% among older adults [1]. Another study reported that the average number of drugs per elderly patient was 7.4, indicating a substantial medication burden [6-8]. Polypharmacy may be appropriate when clinically justified, but inappropriate polypharmacy—characterized by unnecessary or harmful medications—poses significant risks.

Burden of NCDs and Multimorbidity

The increasing prevalence of NCDs in rural Tamil Nadu is a major driver of polypharmacy. Lifestyle factors such as physical inactivity, poor diet, and tobacco use contribute significantly to this burden [4,9].

Multimorbidity is highly prevalent among elderly individuals, with studies showing that more than 80% of elderly patients have two or more chronic conditions [6]. This necessitates multiple drug therapies, increasing the likelihood of polypharmacy. A large multicentric study in rural India reported that polypharmacy prevalence increases significantly with age and number of comorbidities [5]. Similarly, urban Indian studies have shown that comorbidities and hospitalization are strong predictors of polypharmacy [2].

Prevalence of Polypharmacy

Polypharmacy prevalence varies widely depending on population and setting. A multicentric rural Indian study across 515 villages reported a prevalence of 13% using a ≥4 drug definition [5]. In contrast, studies among elderly populations report much higher rates. A cross-sectional study in South India reported that 81.3% of hospitalized elderly patients experienced major polypharmacy (≥5 drugs) [7]. Another study across six Indian cities found that 33.7% of older adults were exposed to polypharmacy [2]. Systematic reviews indicate that nearly half of elderly Indians are affected by polypharmacy, with significant regional variations [1,10,11]. South India has also been reported to have higher rates of hyperpolypharmacy compared to other regions [1].

Determinants of Polypharmacy

Polypharmacy is influenced by multiple factors. Multimorbidity remains the most important determinant, as patients with multiple chronic conditions require combination therapy [2,5]. Age is another critical factor, with prevalence increasing significantly among individuals above 60 years.Healthcare system factors also contribute to polypharmacy. Fragmented care, multiple healthcare providers, and lack of electronic medical records lead to duplication of prescriptions. A study highlighted that transitions of care and recent hospitalizations are significantly associated with polypharmacy [2].

Patient-related factors such as self-medication, low health literacy, and use of traditional medicines further increase medication burden. Self-medication is reported in nearly 20% of older adults in India, contributing to inappropriate drug use [2]. Socioeconomic factors also play a role, with higher income and better access to healthcare associated with increased medication use [5].

Consequences of Polypharmacy

Polypharmacy is associated with several adverse outcomes. One of the most significant is the increased risk of adverse drug reactions (ADRs). The risk of drug interactions increases exponentially with the number of medications.

A recent Indian study reported significant drug-drug interactions among elderly patients with polypharmacy, highlighting the clinical risks involved [8]. Another study reported that polypharmacy is associated with drug-related problems, including ADRs and therapeutic duplication [9].

Polypharmacy also contributes to poor medication adherence. Studies have shown that complex drug regimens lead to confusion and non-compliance, particularly among elderly patients [2]. Economic burden is another important consequence. Multiple medications increase out-of-pocket expenditure, which is a significant concern in rural populations.[12-14]

Polypharmacy and Medication Adherence

Medication adherence is a major challenge in NCD management. Polypharmacy increases pill burden and regimen complexity, leading to poor adherence.

Studies in India have consistently shown that adherence decreases as the number of medications increases [2]. Patients often forget doses, discontinue medications, or take incorrect dosages.

Poor adherence leads to inadequate disease control, resulting in further addition of medications and worsening polypharmacy. This creates a vicious cycle that negatively impacts patient outcomes.[15]

2. Challenges in Rural Tamil Nadu

Rural Tamil Nadu faces several unique challenges in managing polypharmacy. Limited health literacy among patients leads to poor understanding of medication regimens. Many patients are unable to differentiate between drugs or understand their purpose.

Healthcare system challenges include inadequate follow-up, lack of medication review, and limited availability of trained healthcare professionals. Although government schemes provide free medications, they may inadvertently increase polypharmacy if not monitored properly.[6]

The concurrent use of traditional medicines is another concern, as it increases the risk of drug interactions. Studies have shown that a significant proportion of patients use alternative therapies alongside allopathic medications [2].

Strategies to Address Polypharmacy

Addressing polypharmacy requires a comprehensive approach. Regular medication review and deprescribing are essential to identify and discontinue unnecessary medications. Adherence to standard treatment guidelines can reduce inappropriate prescribing. The use of fixed-dose combinations can help reduce pill burden and improve compliance. Patient education is critical in improving medication adherence. Counseling regarding drug use, side effects, and importance of adherence can empower patients. The role of pharmacists is increasingly recognized in medication management. Pharmacist-led interventions have been shown to reduce polypharmacy and improve outcomes. Integration of electronic health records can improve coordination of care and prevent duplication of prescriptions.[17,18]

Table 1: Prevalence of Polypharmacy in Indian Studies

Study	Setting	Population	Definition	Prevalence
Bhagavathula et al [1]	Systematic review (27 studies)	Elderly	≥5 drugs	49%
Das et al [2]	Urban India	Older adults	≥5 drugs	33.7%
Multicentric rural study [5]	515 villages	General population	≥4 drugs	13%
Gulam et al [7]	Rural hospital	Elderly	≥5 drugs	81.3%
Indian elderly study [6]	Community	Elderly	≥5 drugs	~25%
Recent Indian study [8]	Hospital	Elderly	≥5 drugs	High prevalence

3. Conclusion

Polypharmacy is a significant and growing concern among NCD patients in rural Tamil Nadu. Evidence from multiple Indian studies indicates that nearly half of elderly individuals are affected, with even higher prevalence in hospital settings. Multimorbidity, aging, and healthcare system factors are the primary drivers. Polypharmacy is associated with adverse outcomes including drug interactions, poor adherence, and increased healthcare costs. Addressing this issue requires a multidisciplinary approach involving rational prescribing, patient education, and healthcare system strengthening. Future research should focus on community-based data and interventions tailored to rural populations.

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