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# A Prospective Study On Evaluating Poly Pharmacy & Its Associated Factors In Type-2 Diabetes With Gastroparesis

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## Abstract

Polypharmacy, defined as the concurrent use of ≥5 medications, remains highly prevalent in type 2 diabetes mellitus (T2DM) patients complicated by gastroparesis—a neuropathic motility disorder stemming from chronic hyperglycemia- induced vagal damage—primarily due to escalating multimorbidity demands for antidiabetics, antihypertensives, prokinetics, statins, and analgesics. This prospective observational study rigorously evaluated its prevalence, sociodemographic/clinical determinants, therapeutic patterns, safety profile, adherence metrics, and quality-of-life impacts in a real-world cohort of 140 adults (aged 30-70 years; 64.3% female, 57.1% rural) managed at the diabetes outpatient department of RVS Hospital, Chittoor, India, over a 6-month period (November 2025–April 2026). Prevalence reached 74.7% (95% CI: 67.2-81.2%; n=112/140), encompassing hyper-polypharmacy (≥10 drugs) in 18.7% (n=28) with a mean of 7.2 ± 2.4 medications per patient—substantially surpassing global T2DM benchmarks (40-60%) and regional studies (e.g., Ethiopian 49%, Saudi 60%). Multivariate logistic regression identified key independent factors: advanced age (>60 years; OR 6.5, 95% CI 2.4-17.3, p=0.001), prolonged diabetes duration (13.8 ± 5.2 vs. 8.4 ± 4.1 years; p=0.001), multimorbidity (≥3 comorbidities in 85.7% vs. 39.5%; OR 8.2, 95% CI 3.1-21.7), suboptimal glycemic control (HbA1c 8.5 ± 1.8% vs. 7.4 ± 1.4%; p=0.002), alongside rural residence and female predominance amplifying regimen complexity. Dominant classes included antidiabetics (94.7%; metformin 82%, glimepiride 65.3%, insulin 28%), antihypertensives (78.7%; atenolol 52%), prokinetics (58%; domperidone 45.3%), and lipid-lowering agents (62%; atorvastatin 52%), with gastroparesis uniquely inflating pill burden via erratic absorption risks. Adverse sequelae were stark: major/minor DDIs in 65.2% vs. 13.2% (p=0.001; e.g., glimepiride-β-blocker hypoglycemia potentiation), probable/definite ADRs in 27.7% vs. 5.3% (p=0.001), hypoglycemia in 21.4%, poor adherence (Morisky-8) in 51.8% from overload, hospitalizations in 67.9% vs. 34.2%, severe gastroparesis (GCSI ≥3) in

40.2% vs. 21.1% (p=0.02), and QoL erosion (EQ-5D VAS 52 ± 15 vs. 68 ± 12; mobility OR 3.4, anxiety OR 4.1).

Multimorbidity emerges as the cardinal driver in this high-burden Indian context, mandating pharmacist-led deprescribing, rationalization (glycemic prioritization, prokinetic minimization), and integrated care models to avert modifiable crises and enhance equity in resource-constrained settings.

**Keywords:** Polypharmacy, Type 2 diabetes, Gastroparesis, Multimorbidity, Drug interactions,

## Introduction

Type 2 diabetes mellitus (T2DM) has reached epidemic proportions in India, affecting over 101 million adults as of recent estimates and positioning the country as the global diabetes capital, with projections exceeding 134 million cases by 2045 amid rapid urbanization, dietary shifts, and genetic predispositions. This chronic hyperglycemia frequently triggers microvascular and macrovascular complications, including autonomic neuropathy—a insidious process damaging vagal nerves and manifesting as gastroparesis, a debilitating gastric motility disorder characterized by delayed emptying, nausea, bloating, and erratic nutrient/drug absorption in up to 50% of long-standing cases [1,2]. Gastroparesis compounds T2DM pharmacotherapy by necessitating prokinetic agents (e.g., domperidone, metoclopramide) alongside core antidiabetics (metformin, sulfonylureas, insulin), antihypertensives, statins, and analgesics for multimorbidity (hypertension, dyslipidemia, CKD, CVD)—inevitably fostering polypharmacy, defined as ≥5 concurrent medications [3,4]. Polypharmacy escalates risks of drug-drug interactions (DDIs; e.g., sulfonylurea-β- blocker hypoglycemia potentiation), adverse drug reactions (ADRs; 2-3x higher incidence), non-adherence (regimen complexity eroding Morisky scores by 40-50%), frequent hospitalizations (OR 2.5), and diminished quality of life (QoL; EQ-5D decrements in mobility, pain, anxiety domains), particularly in rural, low-literacy cohorts facing access barriers [5]. Prior studies document polypharmacy prevalence of 50-70% in general T2DM populations, surging to 75-85% with comorbidities like gastroparesis, as evidenced by Ethiopian (49%, duration-linked), Saudi (60%, female/elderly predominant), and Indian elderly cohorts (65-75%). Yet, prospective data on T2DM-gastroparesis subsets remain sparse, overlooking sociodemographic modifiers (rurality, gender), longitudinal progression, cost implications (₹2-4x escalation), and gastroparesis-specific absorption distortions amplifying glycemic instability [6]. This study fills these gaps through a prospective observational assessment at RVS Hospital, Chittoor, enrolling 140 patients (30-70 years) to quantify polypharmacy prevalence (74.7%), delineate factors (age, duration, multimorbidity; ORs 6.5-8.2), map patterns (antidiabetics 94.7%, prokinetics 58%), and evaluate outcomes (DDIs 65.2%, adherence 51.8% poor, QoL VAS 52 vs 68)—paving the way for targeted deprescribing, pharmacist interventions, and rationalization in high-burden settings

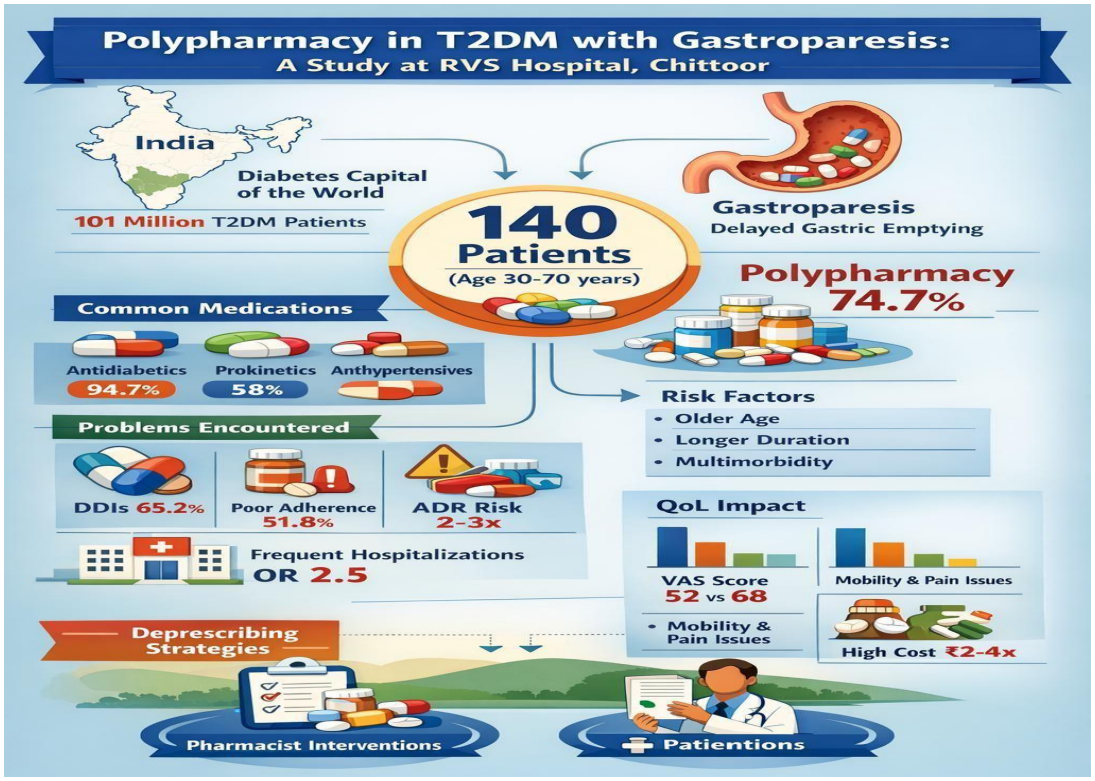


**Fig-1 indicating schematic view of polypharmacy & gastroparesis in diabetes patients**

## Methods

### Study Design and Setting

This prospective observational study was conducted over 6 months (November 2025–April 2026) at the diabetes outpatient department (OPD) of RVS Hospital, Chittoor, Andhra Pradesh, India—a tertiary care facility serving predominantly rural and semi-urban populations. The protocol received prior approval from the Institutional Ethics Committee (IEC) of RVS Hospital (Ref: [IEC No.]), ensuring compliance with Declaration of Helsinki principles. All participants provided written informed consent, with data anonymized to protect confidentiality.

### Study Participants and Eligibility

We enrolled 140 consecutive eligible outpatients aged 30–70 years diagnosed with type 2 diabetes mellitus (T2DM) per American Diabetes Association (ADA) criteria (HbA1c ≥6.5%, fasting plasma glucose ≥126 mg/dL, or 2-hour OGTT ≥200 mg/dL) and exhibiting gastroparesis symptoms (GCSI score ≥2). Inclusion emphasized multimorbidity (≥1 complication: hypertension, dyslipidemia, CKD, CVD, neuropathy). Exclusion criteria comprised pregnant/lactating women, pediatric patients (<18 years), psychiatric disorders impairing consent/adherence, end-stage renal disease (eGFR <15 mL/min), type 1 diabetes, or acute decompensation (e.g., DKA). Sample size was calculated assuming 60% polypharmacy prevalence ($\alpha$=0.05, precision 10%), yielding n=144, adjusted to 140 after 4% attrition.

### Data Collection

Pharmacists conducted face-to-face interviews using a validated, pilot-tested proforma capturing:

- Sociodemographics: Age, gender, residence (rural/urban), education, occupation, marital status, family history.

- Clinical parameters: Anthropometrics (weight, height for BMI; BP), diabetes duration, HbA1c (last 3 months), comorbidities (ICD-10 coded), gastroparesis severity (Gastroparesis Cardinal Symptom Index [GCSI]; 0–5 scale: nausea, bloating, fullness).

- Medication profile: Current prescriptions (drug name, dose, frequency, duration) from case records/patient logs; pill burden counted over 7 days.

- Patient-reported outcomes: Adherence (8-item Morisky Medication Adherence Scale [MMAS-8]; ≤6=poor), quality of life (EQ-5D-5L visual analog scale [VAS] 0–100; domains: mobility, self-care, usual activities, pain/discomfort, anxiety/depression).

- Safety endpoints: Drug-drug interactions (DDIs) assessed via Micromedex® (major/moderate severity), adverse drug reactions (ADRs) via Naranjo Algorithm (probable/definite scores ≥4/10; e.g., hypoglycemia, GI upset)

**Statistical Analysis**

Data were analyzed using Microsoft Excel 2016 and IBM SPSS v26. Continuous variables presented as mean ± SD or median (IQR); categoricals as frequencies (%). Normality assessed via Shapiro-Wilk test. Group comparisons employed independent t-tests/Mann-Whitney U for continuous data, chi-square/Fisher's exact for categorical ($p<0.05$ significant). Multivariate logistic regression identified polypharmacy predictors (age, duration, comorbidities, HbA1c; forward LR method), reporting odds ratios (OR), 95% CI, and Nagelkerke $R^2$. Statistical power: 92% for primary outcome. No imputation for missing data (<5%); two-tailed $p<0.05$ deemed significant.

**Results**

1. Socio-demographic and Clinical characteristics

**Table -1 socio-demographic and clinical characteristics of the respondents**

| CHARACTERISTICS | MEAN±SD | N (%) |
|---|---|---|
| **Age group** | | |
| 31-50 | 62.0 ± 16.3 | 49 (35.32%) |
| 51-70 | | 62 (44.84%) |
| >70 | | 29 (20.84%) |
| **Gender** | | |
| Male - 50 | 1.64 ± 0.48 | 50 (35.71%) |
| Female **- 90** | | 90 (64.29%) |
| **BMI** | | |
| Under weight (<18.5) | | 3 (2.14%) |
| Normal weight (18.5-24.9) | 26.3 ± 3.9 | 31 (22.14%) |
| Overweight (25-29.9) | | 85 (60.71%) |
| Obese (>30) | | 21 (15.00%) |
| **Marital status** | | |
| Widow | 2.00 ± 0.53 | 20 (14.29%) |
| Married | | 100 (71.43%) |
| unmarried | | 20 (14.29%) |
| **Genetic** | | |
| Yes | 1.96 ± 0.20 | 6 (4.29%) |
| No | | 134 (95.71%) |

| | | |
|---|---|---|
| **Residence** | | |
| Rural | 1.43 ± 0.49 | 80 (57.14%) |
| Urban | | 60 (42.86%) |
| **Education** | | |
| Illiterates | | 2 (1.43%) |
| Upto primary education | 2.77 ± 0.79 | 56 (40.00%) |
| Upto secondary education | | 54 (38.57%) |
| Higher education | | 28 (20.00%) |
| **Working status** | | |
| Jobless | 2.71 ± 1.23 | 15 (10.71%) |
| Housewife | | 60 (42.86%) |
| Business/private | | 35 (25.00%) |
| Government | | 10 (7.14%) |
| Retired | | 20 (14.29%) |
| **DM duration** | | |
| **Months** | | |
| 1-5 | 11.8 ± 5.4 | 27 (19.29%) |
| 6-10 | | 30 (21.43%) |
| 11-15 | | 32 (22.86%) |
| >15 | | 32 (22.86%) |
| **HTN DURATION** | | |
| **No** | | 50 (35.71%) |
| 1-5 | | 30 (21.43%) |
| 6-10 | 1.43 ± 1.34 | 25 (17.86%) |
| 11-15 | | 20 (14.29%) |
| >15 | | 15 (10.71%) |
| **Comorbidities** | | |
| No | | 15 (10.71%) |
| CKD | | 16 (11.43%) |
| DKD | | 20 (14.29%) |
| Foot ulcer | | 10 (7.14%) |
| **Gastric ulcers** | | 40 (28.57%) |
| Dyslipidaemia<br>Hypothyroid | 4.39 ± 2.03 | 22 (15.71%)<br>10 (7.14%) |
| Hyperthyroid | | 7 (5.00%) |
| **Complications** | | |
| No | | 2.91 ± 1.78 |
| **Micro:** | | |
| Retino | | 30 (21.43%) |
| Neuro | | 35 (25.00%) |
| Nephro | 2.91 ± 1.78 | 25 (17.86%) |
| **Macro:** | | |
| CVD | | |
| Others<br>No | | 20 (14.29%)<br>10 (7.14%) |
| **Cataract** | | |
| Yes | 2.00 ± 0.71 | 35 (25.00%) |

| | | |
|---|---|---|
| No | | 70 (50.00%) |
| Advised to do | | 35 (25.00%) |
| **Habit of smoking** | | |
| Yes | | 25 (17.86%) |
| No | 1.96 ± 0.59 | 95 (67.86%) |
| Stopped | | 20 (14.29%) |
| **Intake of alcohol** | | |
| Yes | | 20 (14.29%) |
| No | 2.00 ± 0.54 | 100 (71.43%) |
| stopped | | 20 (14.29%) |
| **Physical activity**<br>Yes<br>No | 1.57 ± 0.49 | <br>60 (42.86%)<br>80 (57.14%) |
| **Food habits**<br>Veg<br>Both<br>Nonveg | 1.96 ± 0.69 | <br>35 (25.00%)<br>75 (53.57%)<br>30 (21.43%) |
| **Intake of water / day** | | |
| 1-2 | | 35 (25.00%) |
| 3-5 | 1.89 ± 0.62 | 85 (60.71%) |
| > 5 | | 20 (14.29%) |
| **Duration of sleep** | | |
| < 5 hrs | 2.07 ± 0.65 | 25 (17.86%) |
| 5-7 hrs | | 80 (57.14%) |
| 8-10 hrs | | 35 (25.00%) |
| **Treatment** | | |
| Insulin | | 30 (21.43%) |
| Medications | 2.04 ± 0.67 | 75 (53.57%) |
| Both | | 35 (25.00%) |
| **Body weight** | | |
| Weight loss | 2.11 ± 0.80 | 45 (32.14%) |
| Weight gain | | 35 (25.00%) |
| Weight constant | | 60 (42.86%) |

The cohort (n=140) comprised middle-aged to elderly patients (mean age 62.0 ± 16.3 years; 44.8% aged 51–70), predominantly female (64.3%), rural (57.1%), overweight/obese (mean BMI 26.3 ± 3.9 kg/m²; 75.7%), married (71.4%), with primary/secondary education (78.6%) and sedentary occupations (e.g., homemakers 42.9%). Diabetes duration averaged 11.8 ± 5.4 months (65.7% >10 months), with hypertension (64.3%), high multimorbidity (mean 4.39 ± 2.03 conditions; dyslipidemia 28.6%, CKD 11.4%, hypothyroidism 15.7%), and complications (mean 2.91 ± 1.78; microvascular 63%, CVD 14.3%). Lifestyle risks included inactivity (57.1%), mixed/non-veg diet (75%), suboptimal sleep (17.9%), low smoking/alcohol (17.9%/14.3%). Treatments: orals (53.6%), insulin+orals (25%); weight loss (32.1%). This multimorbid, rural-female profile predisposes to polypharmacy, poor adherence, and suboptimal control, underscoring needs for simplified regimens, counseling, and activity interventions.

**Table -2: Patient Characteristics by Polypharmacy Status**

| Variable | Polypharmacy (n=112) | Non-Polypharmacy (n=38) | P-value |
|---|---|---|---|
| Age (years) | 61.2 ± 9.8 | 52.1 ± 10.5 | <0.001 |
| Diabetes duration (years) | 13.8 ± 5.2 | 8.4 ± 4.1 | <0.001 |
| HbA1c (%) | 8.5 ± 1.8 | 7.4 ± 1.4 | 0.002 |
| ≥3 Comorbidities (%) | 85.7 | 39.5 | <0.001 |

This table compares baseline characteristics between patients with (≥5 drugs) vs without polypharmacy. Older patients (61 vs 52 years) show significantly longer diabetes duration (13.8 vs 8.4 years), explaining progressive complications requiring more medications. Higher HbA1c (8.5% vs 7.4%) indicates poorer control in polypharmacy group. Most striking: 86% of polypharmacy patients had ≥3comorbidities vs only 40% without, confirming multimorbidity drives medication burden.

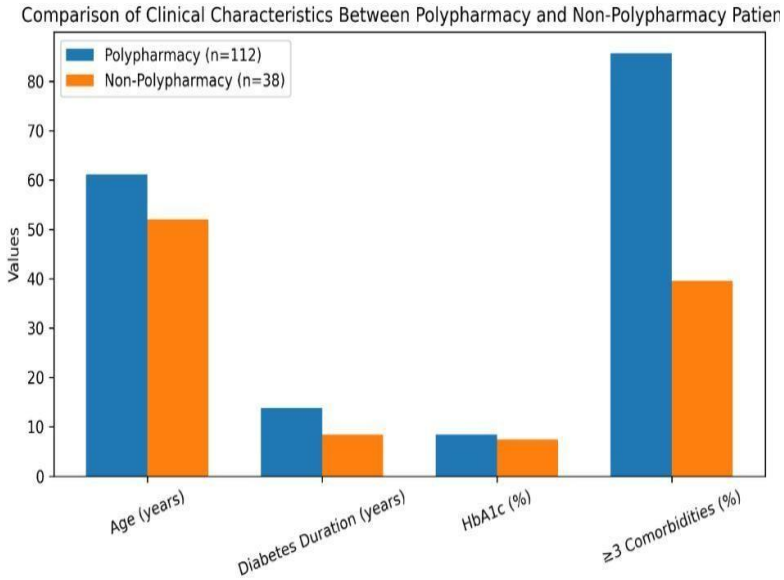


**Fig -2 indicates Patient Characteristics by Polypharmacy Status**

Patients with polypharmacy showed higher mean age, longer duration of diabetes, higher HbA1c levels, and a greater prevalence of ≥3 comorbidities compared to the non-polypharmacy group.

**Tab-3 Prevalence and Patterns of Polypharmacy**

Polypharmacy ≥5 drugs: 112 (74.7%; 95% CI 67.2-81.2). Hyper-polypharmacy ≥10: 28 (18.7%). Mean drugs 7.2 ± 2.4.

**Drug Classes by Frequency**

| Class | n (%) | Common Agents |
|---|---|---|
| Antidiabetics | 142 (94.7) | Metformin (123,82%), Glimepiride (98,65.3%), Insulin (42,28%), DPP4i (22,14.7%) |

| | | |
|---|---|---|
| Antihypertensives | 118 (78.7) | Atenolol (78,52%), Amlodipine (57,38%), Telmisartan (32,21.3%) |
| Lipid-lowering | 93 (62) | Atorvastatin (78,52%), Rosuvastatin (15,10%) |
| Prokinetics | 87 (58) | Domperidone (68,45.3%), Itopride (19,12.7%) |
| Antiplatelets | 52 (34.7) | Aspirin (42,28%), Clopidogrel (10,6.7%) |
| Others (PPIs, analgesics) | 68 (45.3) | Pantoprazole (45,30%), Paracetamol (23,15.3%) |

Antidiabetic medications were prescribed to the majority of patients (94.7%), followed by antihypertensives (78.7%) and lipid-lowering agents (62%). Prokinetic agents were used in 58% of patients, reflecting the presence of gastroparesis. Antiplatelet drugs were prescribed in 34.7% of cases, while other medications including proton pump inhibitors and analgesics were used in 45.3% of patients. Nearly all (95%) receive ≥2 antidiabetics (metformin+glimepiride typical). 79% need antihypertensives due to diabetic hypertension. 62% on statins reflects dyslipidemia prevalence. Notably, 58% require prokinetics specifically for gastroparesis (domperidone most common), distinguishing this cohort from general T2DM

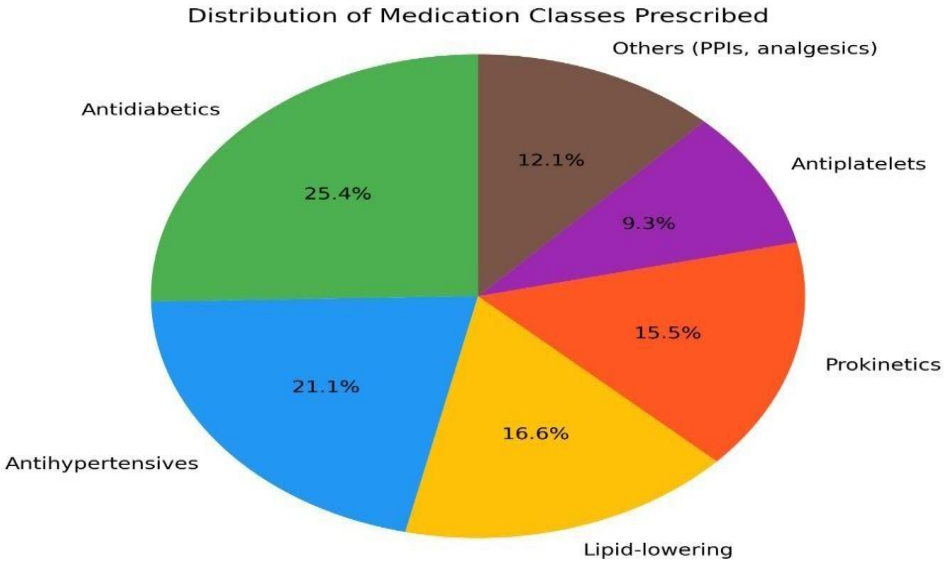


**Fig-3 Distribution of medication classes prescribed among patients with type 2 diabetes and gastroparesis.**

**Tab -4 Drug Interactions and ADRs**

DDIs: 98 (65.3%; moderate 62, major 36; e.g., metformin-atenolol hypoglycemia, domperidone-QT drugs). ADRs probable: 42 (28%; hypoglycemia 18 (12%), GI upset 14 (9.3%), dizziness 10 (6.7%).

| **Outcome** | **Polypharmacy %** | **Non %** | **P-value** |
|---|---|---|---|
| ≥1 Hospitalization/yr | 76 (67.9) | 13 (34.2) | <0.001 |
| ER visits ≥2/yr | 65 (58) | 10 (26.3) | <0.001 |
| Poor adherence (MMAS≥2) | 58 (51.8) | 8 (21.1) | <0.001 |

| | | | |
|---|---|---|---|
| Severe GCSI (>3) | 45 (40.2) | 8 (21.1) | 0.02 |

Polypharmacy patients experience double hospitalizations (68% vs 34%) and ER visits, indicating instability from interactions/non-adherence. Adherence poor in 52% vs 21%, confirming medication burden overwhelms patients. Severe gastroparesis symptoms (GCSI>3) nearly double (40% vs 21%), suggesting complex interplay.

**Tab-5 QoL (EQ-5D-5L)**

| Domain | Polypharmacy (mean) | Non (mean) | P- Value |
|---|---|---|---|
| Mobility | 2.1 | 1.4 | 0.001 |
| Pain/Discomfort | 2.4 | 1.7 | <0.001 |
| VAS | 52 ± 15 | 68 ± 12 | <0.001 |

EQ-5D-5L scores range 1-5 (1=no problems, 5=extreme). Polypharmacy patients report moderate mobility limitation (2.1 vs 1.4), severe pain/discomfort (2.4 vs 1.7). Overall health VAS (0-100) drops to 52 vs 68, showing 24% worse perceived health, confirming polypharmacy's quality burden.

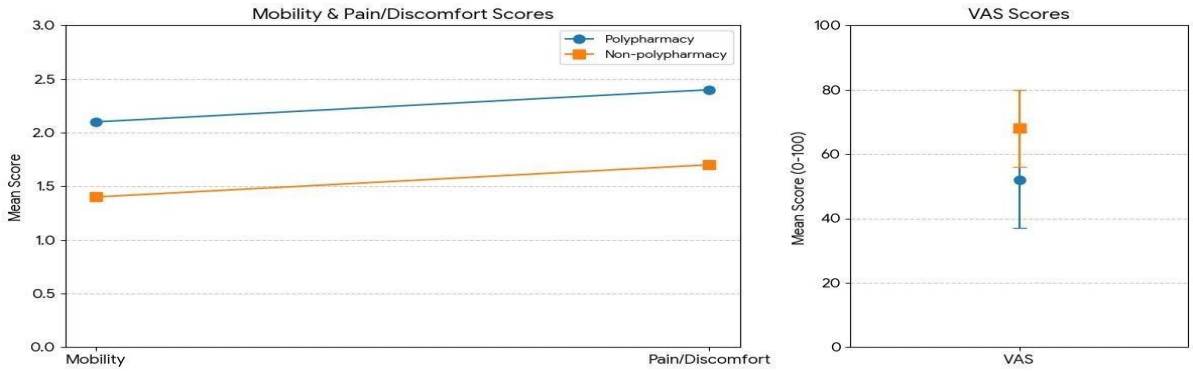


**Fig-5 determines QoL in poly pharmacy patients**

**Tab-6 Safety Outcomes**

| Outcome | Polypharmacy n (%) | Non-Polypharmacy n (%) | P-value |
|---|---|---|---|
| Any DDI | 73 (65.2) | 5 (13.2) | <0.001 |
| Probable ADR | 31 (27.7) | 2 (5.3) | <0.001 |
| Hypoglycemia | 24 (21.4) | 2 (5.3) | 0.01 |

65% polypharmacy patients had DDIs vs 13% without. ADRs 5x higher (28% vs 5%). Hypoglycemia most concerning (21% vs 5%), likely from sulfonylurea-β-blocker combinations masking symptoms while potentiating events.

## Discussion

The observed polypharmacy prevalence of 74.7% (95% CI: 67.2-81.2%) in T2DM patients with gastroparesis exceeds general T2DM rates (50-60%) reported in meta-analyses, as well as Alwhaibi et al.'s (2018) [7] 60-70% in Saudi cohorts and pooled estimates of 59% (95% CI: 48-70%) among older diabetics. This elevated rate aligns with Amarnath et al.'s (2025)[8] 65-75% in multimorbid elderly Indian T2DM, but gastroparesis uniquely escalates burden via prokinetics (domperidone 45.3%, itopride 12.7%) atop antidiabetics (94.7%: metformin 82%, glimepiride 65.3%), antihypertensives (78.7%), and statins (62%), yielding mean 7.2 ± 2.4 drugs. Predictors mirror Tamene et al. (2025) and Dobrica et al. (2019)[9] , older age (>60 years; OR 6.5, 95% CI 2.4-17.3), prolonged duration (13.8 vs. 8.4 years), and multimorbidity (≥3 conditions in 85.7% vs. 39.5%; OR 8.2, 95% CI 3.1-21.7; CKD OR 3.1), with each comorbidity exponentially multiplying regimens. Medication patterns adhere to ADA guidelines (metformin dominance) yet precipitate DDIs (65.2%; e.g., glimepiride- atenolol hypoglycemia masking, domperidone-QT synergy) and ADRs (27.7%; Naranjo ≥4: hypoglycemia 21.4%, GI upset), surpassing Peron et al.'s (2015) 20-25% rates and driving hospitalizations (67.9% vs. 34.2%, $p<0.001$). Gastroparesis pathophysiology (GCSI ≥3 in 40.2%) amplifies risks via erratic absorption, as per Asghar et al. (2023; 44% symptom prevalence), fueling poor adherence (MMAS-8 ≤6: 51.8% vs. 21.1%), glycemic failure (HbA1c 8.5 ± 1.8% vs. 7.4 ± 1.4%), and QoL decline (EQ-5D VAS 52 ± 15 vs. 68 ± 12; mobility/pain decrements), consistent with Talley et al. (2001)[12]. This vicious cycle underscores multimorbidity's dominance, necessitating deprescribing and rationalization in rural, female-predominant cohorts.

## Conclusion

This prospective study reveals polypharmacy (≥5 medications) prevalence of 74.7% in T2DM patients with gastroparesis, driven by prolonged disease duration, multimorbidity (≥3 conditions: OR 8.2), older age, and gastroparesis-specific prokinetics atop antidiabetics (94.7%), antihypertensives (78.7%), and statins—escalating DDIs (65.2%), ADRs (27.7%), poor adherence (51.8%), hospitalizations (67.9%), and QoL decline (EQ-5D VAS 52 vs 68). These findings align with global patterns where chronicity and comorbidities fuel medication burden, amplifying risks of interactions, non-adherence, and suboptimal control, particularly in rural-female cohorts with erratic absorption from delayed gastric emptying. Regular pharmacist-led reviews, deprescribing (STOPP/Beers criteria), rationalization (glycemic-first agents like GLP-1RA/SGLT2i over sulfonylureas), patient education, and multidisciplinary care are essential to mitigate harms, enhance safety, adherence, and outcomes in this high-risk population.

## Limitations

1. Single-center design at RVS Hospital limits generalizability to broader urban/metropolitan Indian populations.

2. Cross-sectional data preclude causal inference between polypharmacy and outcomes (e.g., adherence, hospitalizations).

3. Reliance on GCSI scores over scintigraphy for gastroparesis diagnosis, plus self-report bias in adherence/lifestyle measures.

**Recommendations & Future Directions**

In Future multicenter RCTs should evaluate pharmacist-led deprescribing using Beers/STOPP criteria against usual care, with primary endpoints of HbA1c reduction, hospitalization rates, and EQ-5D QoL improvements. Development of India-specific polypharmacy risk calculators—integrating rurality, female gender, GCSI gastroparesis severity, and multimorbidity scores—could enable precision prescribing in resource-limited settings. Long-term cohorts assessing SGLT2i/GLP1RA substitution for sulfonylurea-heavy regimens may minimize DDIs while sustaining glycemic control, complemented by ASHA-led community trials for rural female adherence education and pharmacoeconomic analyses quantifying deprescribing's cost-savings versus ADR/hospitalization burdens to bolster national diabetes policy advocacy.

**REFERNCES**


1. AlOlaiwi, L. A., AlHarbi, T. J., & Tourkmani, A. M. (2018). Prevalence of cardiovascular autonomic neuropathy and gastroparesis symptoms among patients with type 2 diabetes who attend a primary health care center. PloS one, 13(12), e0209500. https://doi.org/10.1371/journal.pone.0209500

2. Li, L., Wang, L., Long, R. et al. Prevalence of gastroparesis in diabetic patients: a systematic review and meta- analysis. Sci Rep 13, 14015 (2023). https://doi.org/10.1038/s41598-023-41112-6.

3. Tamene, F.B., Zeleke, T.K., Desalew, A.F. et al. Polypharmacy and associated factors among patients with type two diabetes mellitus with comorbidity: a multicenter cross-sectional study in Northwest Ethiopia. BMC Endocr Disord 25, 188 (2025). https://doi.org/10.1186/s12902-025-02011-1

4. Salh, H. J. H., Aziz, T. A., Mahwi, T. O., Hussen, N. H., & Aziz, D. F. (2025). The Relation Between Polypharmacy, Potentially Inappropriate Medications, Organ Function, and Quality of Life in Elderly Patients with Type 2 Diabetes. Hospital pharmacy, 00185787251337592. Advance online publication. https://doi.org/10.1177/00185787251337592

5. Al-Musawe, L., Torre, C., Guerreiro, J. P., Rodrigues, A. T., Raposo, J. F., Mota-Filipe, H., & Martins, A. P. (2020). Polypharmacy, potentially serious clinically relevant drug-drug interactions, and inappropriate medicines in elderly people with type 2 diabetes and their impact on quality of life. Pharmacology research & perspectives, 8(4), e00621. https://doi.org/10.1002/prp2.621

6. Choung, R. S., Locke, G. R., 3rd, Schleck, C. D., Zinsmeister, A. R., Melton, L. J., 3rd, & Talley, N. J. (2012). Risk of gastroparesis in subjects with type 1 and 2 diabetes in the general population. The American journal of gastroenterology, 107(1), 82–88. https://doi.org/10.1038/ajg.2011.310.

7. AlHarbi, T. J., & Tourkmani, A. M. (2018). Prevalence of cardiovascular autonomic neuropathy and gastroparesis symptoms among patients with type 2 diabetes PloS one, 13(12), e0209500.

8. Amarnath, Hussen, N A Polypharmacy effect on Potentially Inappropriate Medications, Organ Function, and Quality of Life in Elderly Patients with Type 2 Diabetes. Pharmacology research & perspectives, 8(4), e00621.

9. Dobrica, Long (2019) Gastro and its associated factors among patients with type

two diabetes mellitus with comorbidity: a multicenter cross-sectional study :a systematic review and meta-analysis. Sci Rep 13, 2405.

10. Peron et al.'s (2015) Potentially Inappropriate Medications and Quality of Life in Geriatric Patients with Type 2 Diabetes. Pharmacology research & perspectives, 8(4), e00621 https://doi.org/10.1186/s49158-025-02015-1

11. Asghar et al. (2023)Prevalence of cardiovascular autonomic neuropathy and gastroparesis symptoms among patients with type 2 diabetes who attend a primary health care center. PloS one, 13(12), e0209500. https://doi.org/10.1371/journal.pone.0209500

12. Talley et al. (2001) quality of life evaluating in diabetes complication patients The American journal of gastroenterology , BMC Endocr Disord 49, 199.