

# ASSESSMENT OF RECURRING PREVALENCE AND NEW CASES OF INFECTIONS IN DIABETIC PATIENTS RECEIVING INSULIN THERAPY COMPARED TO THOSE ON ORAL HYPOGLYCEMIC AGENTS

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**Resume.** Diabetes mellitus refers to a collection of metabolic conditions marked by high blood sugar, resulting from problems in the body's glucose regulation system, which is controlled by the hormones insulin and glucagon.

**Keywords:** sodium-glucose linked Transporter 2, Sodium Hydrogen exchanger pump, glucagon-like peptide 1, dipeptidyl peptidase 4.

**Relevance.** Management of diabetes mellitus generally relies on two pharmacological strategies: insulin administration and oral antidiabetic medications. Insulin, produced by pancreatic beta cells, lowers blood glucose by enhancing uptake into muscle and fat tissue while reducing hepatic glucose output. It is secreted in two main patterns—basal release at a steady low level and post-meal surges known as bolus insulin. Available insulin preparations are categorized as short-, intermediate-, or long-acting. Insulin therapy is indispensable for type 1 diabetes and for advanced type 2 diabetes when oral agents fail. Oral drugs include sulfonylureas, which trigger insulin secretion; metformin, which improves sensitivity; thiazolidinediones, which act through PPAR pathways;  $\alpha$ -glucosidase inhibitors, which slow carbohydrate absorption; DPP-4 inhibitors, which prolong incretin activity; and SGLT2 inhibitors, which promote urinary glucose loss.

Individuals with diabetes are

highly susceptible to infections because persistent hyperglycemia weakens immune defenses. Respiratory illnesses such as pneumonia, tuberculosis, influenza, and COVID-19 occur more frequently and with greater severity. Urinary tract infections are common, as glucose-laden urine supports bacterial growth, leading to cystitis, pyelonephritis, or sepsis. Skin and soft tissue infections—including cellulitis, abscesses, and necrotizing fasciitis—affect nearly one-third of patients.

With diabetes prevalence rising in Sri Lanka, this study examines infection patterns in patients treated with insulin compared to those on oral agents, aiming to inform preventive measures and improve clinical outcomes.

**Aim:** to investigate the recurring occurrence and new cases of respiratory, urinary, and skin infections among individuals with diabetes, comparing those managed exclusively with oral antidiabetic agents to those receiving insulin therapy

**Objectives:**

1. To determine the recurring prevalence and incidence of respiratory, urinary, and skin infections among diabetic patients treated with oral hypoglycemic agents.

2. To assess the periodic prevalence and incidence of respiratory, urinary, and skin infections in diabetic patients receiving insulin therapy.

3. To compare infection rates between insulin therapy and oral hypoglycemic treatment in diabetes management.

4. To evaluate the effectiveness of each drug modality in reducing respiratory, urinary, and skin infections among diabetic patients.

**Materials and methods.** The research will be undertaken at the medical clinics of Vavuniya. Ethical clearance will be obtained from the Faculty of Medicine, University of Peradeniya, along with formal approval from the respective consultants.

The study population will consist of individuals aged 30–70 years diagnosed with type 1 or type 2 diabetes who have been receiving either insulin therapy or oral hypoglycemic agents for a minimum of one year. Exclusion criteria include patients with gestational diabetes, rare forms of the disease, pregnant or lactating women, those with immunocompromised states (e.g., HIV/AIDS, malignancy, organ transplantation), individuals on long-term immunosuppressive or antibiotic therapy, and those with poor adherence to prescribed medication. Sample size determination was based on Enderlein's formula for comparing two population proportions, using

$p=0.5$ ,  $z=1.96$ , and  $d=0.1$ . This yielded 193 participants per group, and with an additional 10% to account for non-respondents, the final sample size will be 428.

Independent variables include treatment modality, age, occupation, ethnicity, marital status, and education, while dependent variables encompass respiratory, urinary, and skin infections, lifestyle factors, comorbidities, and sex. Data will be gathered through a structured, interviewer-administered questionnaire, pre-tested for validity, and subsequently digitized using Google Forms. Entries will be transferred into Excel for verification and statistical analysis. Results will be summarized through descriptive measures and inferential tests, with findings displayed in tables and charts to highlight differences in infection prevalence between treatment groups.

**Results and their discussion.** A total of 415 diabetic patients were included in the study, comprising 3 individuals with type 1 diabetes and 412 with type 2 diabetes. The sample consisted of 132 men (31.8%) and 283 women (68.2%). Among men, 54.5% were managed with oral hypoglycemic drugs (OHD) and 45.5% with insulin, while among women, 51.5% used OHD and 48.5% insulin. Overall, 218 participants (52.5%) had been on OHD and 197 (47.5%) on insulin for at least one year.

The highest proportion of combined OHD and insulin use was observed in the 60–70 age group (57.1%). The average duration of diabetes was longer in insulin users ( $14.9 \pm 9.4$  years)

compared with OHD users ( $11.2 \pm 7.8$  years). Lifestyle factors showed that most patients were non-smokers (93.7%) and non-alcohol consumers (89.6%), with similar trends across both treatment groups. Hospitalization due to hyperglycemia was relatively uncommon, reported by 18.2% of insulin users and 14.7% of OHD users. Fatigue was the most frequently reported hyperglycemic symptom (68.5% insulin, 47.2% OHD), followed by hunger. Hypertension ( $\approx 68\%$ ) and dyslipidemia ( $\approx 58\%$ ) were the most common comorbidities. Peripheral neuropathy was the leading complication (61.9% insulin, 50.9% OHD), followed by retinopathy (51.3% insulin, 39.9% OHD).

Infection prevalence during the previous year revealed respiratory tract infections (RTI) as the most frequent (53.3%), followed by skin and soft tissue infections (SSTI, 26.7%) and urinary tract infections (UTI, 24.6%). Among OHD users, 24.3% experienced UTI compared with 24.9% of insulin users; RTI was reported by 54.6% of OHD users and 51.8% of insulin users.

Statistical testing showed no significant relationship between treatment type and UTI ( $p = 0.895$ ), RTI ( $p = 0.567$ ), or SSTI. RTI recurred most often, with 27.6% reporting two episodes and 24.0% three or more, but recurrence rates did not differ significantly between groups.

**Tbl. 1.** Prevalence of each type of infection among the study population

Type of infection	N (%)
Urinary tract infections	
Present	102 (24.6)
Not present	313 (75.4)
Respiratory tract infections	
Present	221 (53.3)
Not present	194 (46.7)
Skin and soft tissue infections	
Present	111 (26.7)
Not present	304 (73.3)
N (%)	415 (100.0)

### Conclusions:

1. Distribution in Skin and soft tissue infections were slightly more common among insulin users (31.0%) compared to OHD users (22.9%).

2. A minority of insulin users (11.2%) reported local injection site symptoms such as lumps, redness, or swelling, but the majority (88.8%) did

not experience such issues.

3. RTI showed the highest recurrence, with 27.6% experiencing two episodes and 24.0% experiencing three or more within one year. Recurrence rates for UTI, RTI, and SSTI did not differ significantly between OHD and insulin groups.

### Literature

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## ОЦЕНИТЬ ЧАСТОТУ И НОВЫЕ СЛУЧАИ ИНФЕКЦИЙ МОЧЕВЫВОДЯЩИХ ПУТЕЙ, ДЫХАТЕЛЬНЫХ ПУТЕЙ И КОЖИ У ПАЦИЕНТОВ С ДИАБЕТОМ, ПОЛУЧАЮЩИХ ИНСУЛИНОТЕРАПИЮ, ПО СРАВНЕНИЮ С ПАЦИЕНТАМИ, ПРИНИМАЮЩИМИ ПЕРОРАЛЬНЫЕ ГИПОГЛИКЕМИЧЕСКИЕ ПРЕПАРАТЫ

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**Резюме.** Сахарный диабет относится к совокупности метаболических состояний, характеризующихся повышенным уровнем сахара в крови, возникающим из-за проблем в системе регуляции глюкозы в организме, которая контролируется гормонами инсулином и глюкагоном.

**Ключевые слова:** натрий-глюкозный транспортер 2, натрий-водородный обменный насос, глюкагоноподобный пептид 1, дипептидилпептидаза 4