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Overview of Therapeutic Inertia in the Treatment of Dyslipidemia in Type 2 Diabetic Patients Followed in Internal Medicine at the Yalgado Ouédraogo University Hospital Center in Ouagadougou, Burkina Faso

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Abstract

Introduction: Type 2 diabetes is a major public health problem due to its prevalence and its multiple complications, particularly cardiovascular ones, with dyslipidemia being one of the major determinants. The aim of this study was to assess therapeutic inertia (TI) in the treatment of dyslipidemia in patients with type 2 diabetes in Burkina Faso. **Method:** We conducted a cross-sectional study in the Internal Medicine Department of the Yalgado Ouédraogo University Hospital Center (CHU-YO) in Ouagadougou, from January 1, 2022, to December 31, 2024. The records of patients aged 40 to 74 with a lipid profile indicating a need for lipid-lowering treatment based on LDL cholesterol were included. **Results:** A total of 220 diabetic patients were included. The frequency of therapeutic inertia was 85%, and therapeutic inertia was present in 72.2% of consultations where initiation or intensification of lipid-lowering therapy was indicated. The main forms of TI were non-initiation (69.52%) and lack of therapeutic intensification (30.48%). Higher education level and married status were factors significantly associated with therapeutic inertia. **Conclusion:** Our study highlights insufficient therapeutic management of dyslipidemia in patients with type 2 diabetes. These findings underscore the urgent need to implement clinical reminder systems to prompt the initiation of statin therapy

when LDL-C targets are not met, particularly in resource-limited settings.

Keywords

Therapeutic Inertia, Dyslipidemia, Type 2 Diabetes, Burkina Faso

1. Introduction

Diabetes mellitus (DM), particularly type 2, is now a public health priority worldwide, especially in Africa [1]. Dyslipidemia in diabetes, in addition to being a major risk factor for cardiovascular disease, is characterized by high frequencies reaching 38.6% for total cholesterol, 52.7% for high LDL cholesterol (LDL-C), 43.5% for low HDL cholesterol, and 37.4% for hypertriglyceridemia [1]. This metabolic profile promotes atherogenesis and is aggravated by insulin resistance [2]-[4].

However, this high frequency of dyslipidemia contrasts with a high rate of inertia in lipid-lowering treatment, as highlighted by Sebai *et al.* in Tunisia, where 42.7% of diabetic patients with dyslipidemia did not initiate lipid-lowering treatment [5]. In the Burkinabe context, where diabetes is on the rise due to urbanization, lifestyle changes, and increases in obesity and sedentary lifestyles [6], lipid abnormalities in diabetics are a major component of cardiovascular risk, with dyslipidemia frequencies varying between 31.1% and 78.7% [7] [8]. However, the prescription of lipid-lowering treatment is influenced by factors related to human and material resources, as well as patient self-financing of care, and may be responsible for therapeutic inertia (TI). The objective of our study was to examine the characteristics of this TI in cases of dyslipidemia in patients with type 2 diabetes in our resource-limited setting in order to assess these modalities and contribute to improving their management.

2. Patients and Methods

We conducted a cross-sectional, descriptive, and analytical study covering the period from January 1, 2022, to December 31, 2024, in the Internal Medicine (IM) department of the Yalgado Ouédraogo University Hospital Center (CHU-YO). Data was collected by reviewing the medical records of type 2 diabetic patients aged 40 to 74 who were receiving outpatient care. Therapeutic inertia was defined as no lipid-lowering medication being prescribed or modified in patients with LDL-C levels outside the target range.

The proportion of therapeutic inertia: This is the ratio between the number of patients with therapeutic inertia and the number of patients for whom therapeutic intervention was indicated.

Therapeutic inertia score: This is the ratio between the number of consultations with therapeutic inertia and the total number of consultations where initiation or intensification of lipid-lowering therapy was indicated [9]. Consultation 1 corresponds to the consultation mentioning the first lipid profile, consultation 2 to the second lipid profile, and consultation 3 to the third lipid profile performed.

The lipid profile is performed at least once a year, corresponding to the three consultations mentioning a lipid profile during the last three years of follow-up.

2.1. Endpoint

The primary endpoint was the presence of dyslipidemia with an indication for lipid-lowering therapy based on LDL-C according to the 2021 European Society of Cardiology (ESC) guidelines, which set LDL-cholesterol targets according to cardiovascular risk level. Any patient whose lipid profile did not allow the LDL-cholesterol value to be obtained was excluded from the study.

2.2. Data Collection

Data were collected using a data collection form based on information available in patient medical records and consultation registers. The variables studied were sociodemographic (age, sex, place of residence, socio-professional activity, and level of education), lifestyle-related, history, comorbidities (alcohol, tobacco, sedentary lifestyle, hypertension, HIV, stroke, cardiovascular risk), anthropometric (weight, height, BMI), paraclinical (glycated hemoglobin, total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides), and therapeutic (therapeutic attitudes of treating physicians, type of lipid-lowering medication).

Regarding TI, for each patient included, cardiovascular risk was assessed in primary prevention according to the WHO HEARTS technical guide in order to define the LDL-C target. Patients in secondary prevention were considered from the outset to be at very high cardiovascular risk. Then, for each patient and for each consultation with a lipid profile available, we checked whether initiation or optimization of lipid-lowering treatment was necessary in accordance with the 2021 ESC recommendations based on the level of cardiovascular risk. This step made it possible to determine the presence or absence of TI, its modality, and to calculate the inertia score for each physician and the overall therapeutic inertia score.

2.3. Statistical Analysis

The data were analyzed using STATA software. Proportions and means were compared using the Chi-square test or Fisher's exact test for qualitative data, and Student's t-test for quantitative data, with a significance level of $p < 5\%$.

2.4. Ethical Considerations

The study protocol was approved by the Director General of CHU-YO. Data collection and analysis were carried out in strict compliance with confidentiality requirements, using anonymous and coded questionnaires.

3. Results

3.1. General Characteristics of the Population

A total of 220 files of patients with type 2 diabetes (T2D) were included and analyzed. The average age of the patients was 60.6 ± 7.9 years. The study population

was predominantly female (69.5%; sex ratio of 0.43), civil servants (40.9%), and married (84.1%). Nearly a quarter had a higher education level.

The sociodemographic characteristics of the population are summarized in Table 1.

Table 1. Sociodemographic characteristics of the study population.

Sociodemographic characteristics	Number (n)	Frequency (%)
Age		
40 - 65	152	69.1
>65	68	30.9
Gender		
Female	153	69.5
Male	67	30.5
Marital status		
Married	185	84.1
Widowed	29	13.2
Single	5	2.3
Divorced	1	0.4
Level of education		
No schooling	42	19.1
Primary	37	16.8
Secondary	86	39.1
Higher	55	25.0
Socio-professional status		
Civil servant/Employee	90	40.9
Housewife	67	30.5
Retired	27	12.3
Merchant	24	10.9
Informal sector worker	10	4.5
Farmer	2	0.9
Residence		
Urban environment	196	89.1
Rural	24	10.9

3.2. Clinical Characteristics

The average duration of diabetes was 10.9 ± 6.7 years with regular follow-up in 91.8% of patients. Cardiovascular risk was high in 55% of our patients. The clinical characteristics of the study population are summarized in Table 2.

Table 2. Clinical characteristics of the study population.

Clinical characteristics	Number (n)	Frequency (%)
Circumstances of diabetes discovery (n = 220)		
Incidental	98	47.0
Clinical suspicion	104	44.5
Complications	8	3.6
Duration of diabetes (n = 218)		
≤5 years	62	28.4
]5 - 10 years]	50	22.9
]10 - 20 years]	89	40.8
>20 years	17	7.8
Regularity of diabetes monitoring (n = 220)		
Regular	202	91.8
Irregular	18	8.2
Diabetes complications		
Diabetic neuropathy	74	33.6
Diabetic retinopathy	31	14.1
Diabetic nephropathy	5	2.3
Diabetic foot	3	1.4
Peripheral arterial disease	5	2.3
Metabolic complications	5	2.3
Associated cardiovascular risk factors (n = 220)		
High blood pressure	151	68.6
Overweight	71	32.6
Alcohol	117	53.2
Sedentary lifestyle	11	5.0
Smoking	9	4.1
Stroke	9	4.1
Overall cardiovascular risk (n = 220)		
Moderate	75	34.1
High	121	55.0
Very high	24	10.9
Other associated conditions (n = 220)		
HIV infection	5	2.3
Chronic kidney disease	14	6.4
Dysthyroidism	6	2.7

Continued

Glaucoma	11	5.0
Hyperuricemia	11	5.0

3.3. Biological Characteristics

Our patients had well-controlled diabetes (HbA1c ≤ 7%) in 59.54% of cases, but the LDL-C target was only achieved in 13.18% of patients. The mean LDL-C and glycated hemoglobin values according to the cardiovascular risk level of our patients for consultations involving lipid testing are summarized in Table 3.

Table 3. Mean LDL-C and glycated hemoglobin levels according to patients' cardiovascular risk level.

Cardiovascular risk level	Consultation 1		Consultation 2		Consultation 3	
	LDL-C	HbA1c	LDL-C	HbA1c	LDL-C	HbA1c
Moderate	3.3	7.1	3.15	6.99	2.5	6.5
High	3.5	7.2	3.64	7.30	3.6	7.1
Very high	3.5	7.3	3.66	7.66	2.5	8.1

LDL-C: Low-Density Lipoprotein Cholesterol. HbA1c: Hemoglobin A1c.

Therapeutic characteristics

Patient follow-up was carried out by a team of seven internists and one endocrinologist. Rosuvastatin was the statin used in more than half (71%) of cases. The majority of our patients (85%) were treated with oral antidiabetic drugs (Table 4).

Table 4. Distribution of patients according to therapeutic characteristics.

Characteristics	Number (n)	Frequency (%)
Attending physicians		
Physician 1	83	37.7
Physician 2	38	17.3
Physician 3	11	5.0
Physician 4	26	11.8
Physician 5	29	13.2
Physician 6	11	5.0
Physician 7	15	6.8
Statins class (n = 90)		
Rosuvastatin	64	71.0
Atorvastatin	26	29.0
Antidiabetic therapy		
Oral antidiabetic alone	187	85.0
Insulin therapy alone	18	8.2
Oral antidiabetic + insulin therapy	15	6.8

3.4. Data on Treatment Inertia

Among the 220 patients in the study, individual and non-cumulative analysis of TI during each consultation revealed that 187 patients (85%) experienced therapeutic inertia at least once. Similarly, the main non-cumulative forms of TI observed in the 187 patients affected by TI were non-initiation in 130 patients (69.52%) and non-intensification of therapy in 57 patients (30.48%).

However, out of a total of 313 cumulative consultations, therapeutic intervention was indicated in 296 consultations but was not carried out in 226 cases, corresponding to an overall therapeutic inertia score of 72.2%.

The characteristics of therapeutic inertia according to consultations are detailed in Table 5(a)-(c).

Table 5. (a) Proportion of patients who experienced therapeutic inertia during different consultations. (b) Therapeutic inertia score during different consultations. (c) Distribution of therapeutic inertia modalities during different consultations.

(a)

Consultations with lipid profile	Patients with lipid profile	Number of patients requiring therapeutic intervention	Number of patients who did not receive therapeutic intervention	Proportion (%)
Consultation 1	220	220	183	83.2
Consultation 2	73	64	36	56.2
Consultation 3	20	12	7	58.3

(b)

Consultations with lipid profile	Patients with lipid profile	Number of patients requiring therapeutic intervention	Number of consultations with therapeutic modification performed	Score (%)
Consultation 1	220	220	37	83.2
Consultation 2	73	64	28	49.3
Consultation 3	20	12	5	35.0

(c)

Consultations with lipid profile	Number of patients who did not receive therapeutic intervention	Types of therapeutic inertia	
		No initiation	No intensification
Consultation 1	183	162 (88.5%)	21 (11.5%)
Consultation 2	36	28 (77.8%)	8 (22.2%)
Consultation 3	7	3 (42.9%)	4 (57.1%)

3.5. Factors Associated with Treatment Inertia

3.5.1. Bivariate Analysis

In bivariate analysis, the variables with a p-value less than 0.2 were: marital status ($p = 0.013$), educational level ($p = 0.165$), duration of disease ($p = 0.154$), and presence of diabetes complications ($p = 0.121$) (Table 6).

Table 6. Association between different variables and therapeutic inertia.

Variables	Therapeutic inertia		Total	p-value
	No n (%)	Yes n (%)		
Sociodemographic Data				
Age				0.865
40 - 65	26 (17.1%)	118 (82.9%)	152	
>65	11 (16.2%)	57 (83.8%)	68	
Gender				0.376
Male	9 (13.4%)	58 (86.6%)	67	
Female	28 (18.3%)	125 (81.7%)	153	
Marital status				**0.013**
Married	28 (15.1%)	157 (84.9%)	185	
Widowed	9 (31.0%)	20 (69.0%)	29	
Single	0 (0.0%)	5 (100%)	5	
Divorced	0 (0.0%)	1 (100%)	1	
Level of education				**0.165**
No schooling	4 (9.5%)	38 (90.5%)	42	
Elementary	6 (16.2%)	31 (83.8%)	37	
Secondary	16 (18.6%)	70 (81.4%)	86	
Higher	11 (20.0%)	44 (80.0%)	55	

(Additional clinical, biological, and therapeutic data tables continue with similar formatting).

3.5.2. Multivariate Analysis

In multivariate analysis, a statistically significant association was found between treatment inertia and two factors: marital status, with a higher risk among married individuals (OR = 2.83; p = 0.038), and higher education (OR adjusted = 0.22; p = 0.047).

Thus, married individuals were more than twice as likely to experience therapeutic inertia, while patients with a higher level of education were 78% less likely to do so (Table 7).

Table 7. Factors associated with therapeutic inertia in multivariate analysis in diabetic and dyslipidemic patients.

Variables	Odds Ratio Adjusted	[95% CI]	p-value
Married	2.83	[1.06 - 7.57]	0.038
Higher education level	0.22	[0.06 - 0.98]	0.047
Duration of diabetes	0.31	[0.03 - 2.80]	0.298
Diabetes complications	1.03	[0.91 - 1.17]	0.606

4. Discussion

The objective of our study was to investigate treatment inertia in the management

of dyslipidemia during the last three years of follow-up of type 2 diabetic patients in internal medicine at the Yalgado Ouédraogo University Hospital Center.

4.1. General Characteristics of the Population

The average age was 60.57 years. These results were similar to those of Sow in Senegal [10]. However, our results differed from those of Garcia-Ulloa *et al.* in Mexico, who found an average age of 54 years [11]. This difference could be explained by a longer duration of diabetes in our series. The predominance of women (69.55%) is also reported in several reports from Burkina Faso [12] [13].

The educational level of our population reveals that 75% had not attained a higher education level. Our results are consistent with data from the 2021 STEPS survey, which found that 81.9% of respondents had not attained a higher education level [12].

4.2. Clinical Characteristics

The average duration of diabetes was 10.86 years. The main comorbidities were overweight (68.64%), hypertension (68.64%), and a sedentary lifestyle (53.18%). This finding is also reported in our context by Guira *et al.* in Burkina Faso [14] and Adoubi in Sub-Saharan Africa [15], confirming the strong association between diabetes and excess weight. It therefore appears necessary to strengthen prevention strategies focused on nutrition and regular physical activity in the management of type 2 diabetes [16] [17].

In our study, nearly two-thirds of patients had at least one high cardiovascular risk factor (65.91%), confirming the important role of dyslipidemia (along with hypertension and obesity) as a major risk factor for atherosclerotic cardiovascular disease in diabetics [18].

4.3. Biological Characteristics

The mean LDL cholesterol was 3.63 ± 0.74 mmol/L, which is higher than the values reported in several series: 3.12 ± 0.61 mmol/L in Man *et al.* (China) [19], and 2.20 mmol/L in Knudsen *et al.* (Denmark) [20].

The average glycated hemoglobin was 7.33% ± 0.76%. Similar values were reported by Thiam-Tall in Senegal (7.65% ± 3.2%) [10] and by Man *et al.* in China (7.0% ± 1.2%) [19]. Conversely, other studies show different levels: Herraiz *et al.* in Spain reported a higher value (8.0% ± 1.5%) [21], while Van Nguyen *et al.* in Vietnam observed a lower average (6.6%) [22]. In view of the current targets (LDL < 2.6 mmol/L for diabetics with moderate cardiovascular risk), this high average highlights the need to strengthen the management of dyslipidemia in order to improve the achievement of therapeutic goals, which is also crucial [23] because even when blood glucose control is good, cardiovascular risk remains high due to the impact of dyslipidemia, inflammation, and endothelial dysfunction [24].

4.4. Data on Therapeutic Inertia

The frequency of therapeutic inertia in our series was 85%. Herraiz *et al.* in Spain [21] reported a similar frequency of 80.7%. Sebai *et al.* in Tunisia [5], Garcia Diaz *et al.* in Spain [11], and Chew *et al.* in Malaysia [25] reported frequencies of 42.7%, 43.6%, and 61%, respectively. In general, these frequencies indicate that therapeutic inertia in the treatment of dyslipidemia in diabetics is a major problem both globally and in Africa, thus hindering the achievement of the recommended targets for reducing cardiovascular risk [26].

In our study, 69.72% of patients did not initiate lipid-lowering treatment. Our results are comparable to those reported by Thiam-Tall in Senegal (78.4%) [10]. Non-intensification affected 30.28% of patients. This practice was also reported by Van Nguyen *et al.* in Vietnam (89.9%) [22]. The inertia observed in our study is consistent with data from the African literature, which describes frequent delays in initiating and intensifying treatment, sometimes lasting several years [27]. These situations can be explained by constraints on access to treatment [28]. In Western countries, inertia manifests itself mainly in delays in initiation or intensification despite eligibility, with approximately 20% - 30% of diabetic patients not reaching the target even in specialized centers [29].

Analysis of **Table 3** shows that therapeutic inertia increases with the level of cardiovascular risk. Patients at moderate risk have a favorable prognosis and benefit from overall effective care that is consistent with the objectives. Those at high risk show both lipid and glycemic stagnation linked to a lack of therapeutic adaptation. Finally, patients at very high risk also have poor metabolic health, making them a group that requires immediate therapeutic intensification.

These findings reflect inadequate management of dyslipidemia, despite established recommendations for cardiovascular prevention, and show that TI is a major issue in the optimal management of dyslipidemia in patients with type 2 diabetes. It is therefore necessary to intensify and adapt treatment to reduce cardiovascular morbidity and mortality. But it is also necessary to improve access to treatment, particularly in African contexts [23].

4.5. Factors Associated with Treatment Inertia

In our study, marital status and level of education are associated with TI. Married patients are more than twice as likely (200%) to experience therapeutic inertia. This association could potentially be explained by financial and socioeconomic burdens on their families, though other factors may also be involved and this relationship merits further investigation. As for high educational level, it contributes to a 78% reduction in TI. Patient-related factors (level of understanding, compliance, financial capacity) and prescriber-related factors (perception of the patient) certainly influence the initiation or intensification of treatment in this group. The relationships between TI and glycemic control, LDL cholesterol threshold, and the presence of diabetes complications, reported in studies by Herraiz *et al.* (TI less frequent in cases of higher LDL-C levels and lower HbA1c) [21], and Garcia Diaz

et al. [11], were not observed in our study.

4.6. Limitations

Our study had two main limitations:

- The lack of lipid profiles in nearly a quarter of diabetic patients who consulted in 2024 restricted our sample size and may therefore have led to selection bias.
- Underreporting in the records of the reasons for not changing treatment made it impossible to determine whether therapeutic inertia was justified or not. Examples of justifiable reasons for not modifying therapy include patient refusal to initiate or intensify treatment, documented side effects or intolerance to statins, prohibitive costs for the patient, or recent treatment adjustments requiring time for assessment. All of these factors may have overestimated the frequency of therapeutic inertia in the study.

Despite these limitations and biases, we obtained results that were compared with data from the literature.

5. Conclusions

Therapeutic inertia in cases of dyslipidemia is common among type 2 diabetic patients in Burkina Faso. It is mainly characterized by the failure to initiate lipid-lowering treatment. Certain factors such as marital status and higher education level are significantly associated with this inertia.

To address this challenge, clinicians in similar resource-limited settings should consider implementing clinical reminder systems integrated into patient records to systematically prompt the initiation or intensification of statin therapy when LDL-C targets are not met. Such interventions could significantly improve adherence to treatment guidelines and reduce cardiovascular risk in this vulnerable population.

Further studies are warranted to better understand this issue through a comprehensive approach that integrates factors related to the physician, the patient, and the healthcare system, as well as to evaluate the effectiveness of targeted interventions in reducing therapeutic inertia.

Conflicts of Interest

The authors declare no conflicts of interest.

Author Contributions

All authors have read and approved the final version of this manuscript.

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