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Glycemic Control and Associated Factors Among Adult Type Two Diabetic Patients in Selected Hospitals, Addis Ababa, Ethiopia

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Abstract

BACKGROUND/AIMS: Diabetes mellitus (DM) is a chronic metabolic disease characterized by elevated blood glucose levels and affects 3.8 percent of the Ethiopian population, according to the American Diabetes Association's recommendations. To prevent long-term diabetes-related complications, people diagnosed with DM should always maintain their glycemic control (GC). This study will examine why adults with type 2 diabetes do not adequately manage their GC.

MATERIALS AND METHODS: Patients with type 2 DM were enrolled in the cross-sectional study. Using a finite population correction factor, the sample size was calculated. A structured questionnaire and a signed consent form were developed, and data generated via an exit interview were collected. Data were entered into the Statistical Package for the Social Sciences (SPSS) for analysis. Descriptive statistics and multivariable logistic regression analyses provided information on the examined constructs.

RESULTS: A total of 294 participants were enrolled in the study. The prevalence of GC issues was increasing in this population. Of these participants, 170 (65% of all participants) had metabolic dysregulation related to elevated blood glucose. Furthermore, the study demonstrated that participants' occupational status (e.g., being a housewife or self-employed), the level of family support, a family history of type 2 diabetes and/or other chronic diseases, and participants' use of blood pressure medication all predicted poor GC. The use of blood pressure medication was associated with a positive attitude toward seeking medical help. All predictors were statistically significant ($p<0.05$) and/or had 95% confidence intervals indicating statistical significance.

CONCLUSION: Because many patients have uncontrolled glucose levels, the overall management of these patients should be improved so that they can better manage their diabetes and hypertension. Hence, ongoing health education and counseling are recommended for diabetic patients to achieve and maintain optimal levels of blood glucose while preventing major complications related to their disease. In the professional realm, the findings of this study represent an important resource for healthcare administrators and leaders, aiding them in developing healthcare policies and making strategic decisions. Additionally, it makes a novel contribution to the growing body of literature in the field of healthcare.

Keywords: Diabetes mellitus (DM), glycemic control (GC), type 2 diabetes, hyperglycemia, Ethiopia

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INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia (elevated blood glucose) due to inadequate insulin secretion, impaired insulin action (insulin resistance), or both.[1] The disease causes serious short-term complications, such as ketoacidosis and hypoglycemia (low blood glucose), and ongoing damage to organs such as the eyes, kidneys, peripheral nerves (peripheral neuropathy), the heart, and blood vessels. DM is classified into three primary types: type 1 diabetes, type 2 diabetes, and gestational diabetes (GDM).[2,3] Type 1 diabetes is usually classified as an autoimmune disease, in which the destruction of pancreatic beta cells (which produce insulin) is permanent and the onset is usually during childhood or youth; by contrast, type 2 diabetes is usually characterized by insulin resistance and, later, by a decrease in the production of insulin.[2] GDM occurs during pregnancy and is caused by insulin-inhibiting hormones.[3,4] Diabetes is a public health emergency, is rapidly increasing in prevalence, and currently ranks among the four most common non-communicable diseases tracked by world health officials.[2,5] Globally, between 1980 and 2014, the number of people with diabetes increased from 108 million to 422 million, and the global prevalence of diabetes rose from 4.7% to 8.5% of the world's population over the same period.[5] Estimates indicate 642 million cases of diabetes worldwide by 2040.[6,7] In Africa, the average prevalence of diabetes is 0.3% and 7.0% for females and males, respectively, but only 3.8% overall for both sexes combined.[8,9] Glycemic control (GC) is important for preventing complications and reducing healthcare costs, because an hemoglobin A1c (HbA1c) level below 7% is associated with improved blood-glucose control and a reduced risk of long-term adverse complications of diabetes.[1] The study aimed-to clarify the factors affecting glycemic-control among type-2 DM patients in Addis Ababa so enhancing healthcare strategies and interventions in the area based on the conceptual framework presented on (Figure 1).

MATERIALS AND METHODS

Study Design and Setting

A research study will be conducted to investigate people diagnosed with type 2 DM and are receiving outpatient care at two hospitals in Addis Ababa, Ethiopia. More than one hundred twenty million (120,000,000) Ethiopians live in rural areas, while more than three million (3,000,000) live in and around the capital, Addis Ababa, which has a rapidly expanding healthcare system comprising numerous hospitals and clinics.[10] Between March 25 and April 30, 2025, a cross-sectional study of patients with type 2 DM in government hospitals was conducted.

Study Population and Sample Size

Patients aged 18 and older who were currently receiving treatment for diabetes and had at least three fasting blood glucose (FBG) measurements within the previous year were included in this study. Those who were critically impaired or mentally impaired were not included in the study. The sample size was determined using a finite population correction factor based on the historical 59.2% prevalence of poor control of blood glucose.[11] The sample size was then adjusted for an estimated nonresponse rate, yielding the final number of participants to be selected through random sampling techniques.[12]

Study Variables

The dependent variable is GC, while the independent variables include sociodemographic factors (i.e., age, sex, education, marital status, occupation, income); self-care practices (i.e., diet, exercise, smoking, alcohol consumption); clinical factors (i.e., medication adherence, social support, complications); and patient-provider interactions.[13-15]

Data Collection and Instrument Validation

Before collecting the data, all instruments were validated. To collect all data, the study used a combination of retrospective chart reviews and exit interviews; the latter employed standardized and validated questionnaires. Clinical information, such as FBG, blood pressure, body mass index (BMI), and comorbidities, was abstracted from patient records.

The interview-based instruments assessed medication adherence (Morisky scale), patient satisfaction with provider interactions, self-care practices, knowledge about self-care, and attitudes toward self-care. These instruments were adapted from other studies and validated for content by experts in endocrinology and public health. All instruments were translated into Amharic or Afaan Oromo as appropriate and back-translated for linguistic and conceptual accuracy.[16] All instruments were pretested on 5% of the study population at a local health facility to assess their clarity, participant understanding, and feasibility, and were modified based on the pretest results.[17,18]

Training and Data Quality Assurance

Data collectors received extensive training in health research, interview methods, medical record abstraction, use of Kobo Collect, and ethical practices. The data collectors received daily supervision and were on site to ensure that the data were collected completely, accurately, and reliably.

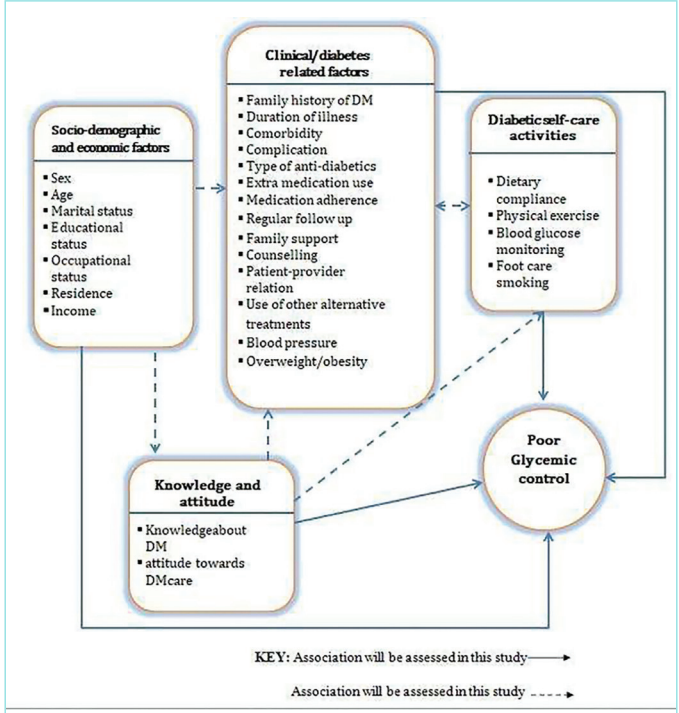

Figure 1. "Conceptual framework for factors associated with glycemic control among adult type 2 DM patients at government hospitals in Addis Ababa, Ethiopia, 2025."

DM: Diabetes mellitus.

Ethical Information

The study was approved by the Addis Ababa Public Health Research and Emergency Management Directorate (approval number: PG/REC/024/21, date: 30.11.2021). All eligible participants were informed about the objectives, procedures, risks, and benefits of the study. Written informed consent was obtained prior to participation. Participants were assured of confidentiality and their right to withdraw at any time without consequence.

Statistical Analysis

For statistical analysis, researchers entered data into Epi Info and SPSS software and analyzed the data using descriptive statistics to create a profile of participants' demographic characteristics. Variables identified in bivariate analysis as associated with poor glycosylated hemoglobin (HbA1c) were entered into multivariate logistic regression to identify independent predictors of poor GC. Odds ratios and 95% confidence intervals (CIs) were calculated, and p-values <0.05 were considered statistically significant.[17]

Operational Definitions

A patient is considered to have good glucose control when the average fasting blood sugar level, calculated as the mean of the fasting blood sugar measurements from the three most recent hospital visits, is less than 154 mg/dL.[19, 20] A patient has poor GC when the average FBG level is greater than or equal to 154 mg/dL.[20]

RESULTS

Socio-Demographic Characteristics

The study included 294 people with diabetes from Ethiopia; all completed the questionnaires, yielding a 100% response rate. The sample consisted of 129 males and 165 females, with an age range of 29-68 years. Approximately 75.2% of the participants were aged 40-60 years. Participants were more likely to be married (54.4%) than divorced (10%). Most (96.3%) participants had completed some formal schooling: primary school (30.3%), high school (33.3%), and university (32.7%). Moreover, 67.7% of participants indicated that they earned over 6000 ETB (Ethiopian Birr) per month (see Table 1).

Glycemic Control Status

As indicated in Table 2, the mean FBG level over the past 3 months was 161.29 mg/dL, and 65% of patients exhibited inadequate GC (Figure 2). Regarding clinical characteristics, 36% of respondents had at least one additional chronic condition besides diabetes; hypertension, kidney disease, and heart disease were the most common. A significant proportion of participants (43.9%) reported using alternative treatments for diabetes, and 92.3% reported using traditional medicine. Notably, more than 63% reported an unfavorable relationship with their healthcare provider, and 13% had missed at least one counseling session during their last three visits.

Clinical or Diabetes-Related Characteristics

E-glucose meters were used by 80.3% of respondents; 56.1% reported having a relative with diabetes, and 87.8% reported receiving family support for diabetes. The mean BMI was 27.62, and about 88.1% of participants were overweight. Additionally, 27.9% had high blood pressure, while 72.1% had normal blood pressure (see Table 2).

Attitude and Knowledge

Knowledge and attitudes regarding diabetes were measured using a 26-item questionnaire. Of the participants, 42.2% exhibited limited knowledge of diabetes management, and 36.1% had a negative attitude

Table 1. Socio-demographic and economic factors among type 2 DM adult outpatients at government hospitals, Addis Ababa, Ethiopia, 2025

Variable	Categories	Number (%)
Gender	Female	165 (56.1)
	Male	(43.9)
Age	<40	38 (12.9)
	40-60	221 (75.2)
	>60	35 (11.9)
Marital status	Single	77 (26.2)
	Married	157 (53.4)
	Divorced	31 (9.9)
	Widowed	29 (10.5)
Educational status	No formal education	11 (3.7)
	Primary education	89 (30.3)
	Secondary education	98 (33.3)
	Tertiary education	96 (32.7)
Occupation	Governmentemployee	70 (23.8)
	Non-government	72 (24.5)
	Self employed	95 (32.3)
	Housewife	36 (12.2)
	Retired	21 (7.1)
Family income	<6000 (ETB)	95 (32.3)
	≥6000 (ETB)	199 (67.7)

ETB: Ethiopian Birr, DM: Diabetes mellitus.

toward diabetes management. The relationship between one's level of knowledge and glycemic control was not statistically significant; however, patients' attitudes toward diabetes were significantly correlated with their blood sugar levels (Table 3).

Diabetic Self-Care Activities

Diabetic self-care activities were evaluated through eleven questions covering nutrition, physical activity, blood glucose monitoring, foot care, and tobacco use. Results indicated that 60.5% of participants demonstrated effective self-care behaviors. Medication adherence was assessed using the Morisky Medication Adherence scale, with 76.5% of participants showing strong adherence to their prescribed regimen.

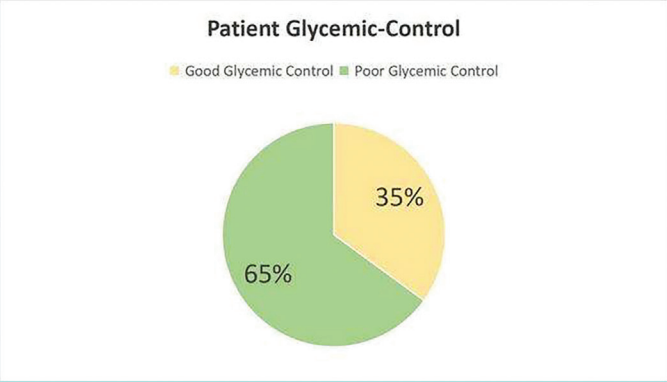

Figure 2. "Prevalence of poor glycemic control in type 2 DM patients at government Hospitals, Addis Ababa, Ethiopia, 2025."

DM: Diabetes mellitus.

Patient satisfaction with healthcare services was also measured, revealing that 63.9% of patients were not completely satisfied (Table 3).[16]

Factors Associated with Poor Glycemic Control

Bivariate regression analysis was used to ascertain the relationship between each independent variable and inadequate GC. Gender, marital status, patient occupation, family history of diabetes, family support, presence of other chronic diseases, utilization of alternative treatments, blood pressure, patient attitude, self-care, medication adherence, and patient satisfaction were significantly correlated with inadequate GC ($p<0.25$; 95% CI). The factors were incorporated into a multivariable analysis to identify independent predictors of inadequate GC (Table 4).

Factors linked to inadequate glycemic management, as identified by multivariable logistic regression analysis, included occupation (self-employed and homemaker), blood pressure, family history of diabetes, family support, presence of chronic illnesses, and a positive disposition.

In the multivariate analysis, self-employed individuals exhibited an 11.6-fold increased risk of poor GC compared to government employees, whereas housewives had a decreased likelihood of poor GC relative to government employees. Maintaining normal blood pressure decreased the likelihood of inadequate glycemic management by 92.3%. Individuals with a familial predisposition to diabetes were 75% less likely to have inadequate GC. Patients with a good attitude toward diabetes management were 95.1% less likely to have poor GC, whereas patients with other chronic health problems were 6.75 times more likely to have poor GC. Individuals with familial support were 94.9% less likely to experience poor GC than their peers (Table 4).

Table 2. Clinical or diabetes-related factors among type 2 DM adult outpatients at government hospitals, Addis Ababa, Ethiopia, 2025

Variables	Categories	Number (%)
Family history of DM	No	129 (43.9)
	Yes	165 (56.1)
Family support	No	36 (12.2)
	Yes	258 (87.8)
Counselling	No	39 (13.3)
	Yes	255 (86.7)
Use of other Alternative treatments	No	165 (56.1)
	Yes	129 (43.9)
Body mass index	Normal	11 (3.7)
	Overweight	259 (88.1)
	Obese	24 (8.2)
Blood pressure	Hypertensive	82 (27.9)
	Normal	212 (72.1)
Personal glucometer	No	58 (19.7)
	Yes	236 (80.3)
Chronic condition	No	188 (36)
	Yes	106 (64)

DM: Diabetes mellitus.

Table 3. Knowledge, attitude, and care activities among type 2 DM adult outpatients at government hospitals, Addis Ababa, Ethiopia, 2025

Variables	Categories	Number (%)
Knowledge of DM	Poor	127 (43.2)
	Good	167 (56.8)
Attitude towards DM care	Positive	106 (36.1)
	Negative	188 (63.9)
Self-care	Poor	122 (41.5)
	Good	172 (58.5)
Medication adherence	Poor adherence	59 (20.1)
	Moderate adherence	10 (3.4)
	High adherence	225 (76.5)
Satisfaction with service	No	188 (63.9)
	Yes	106 (36.1)

DM: Diabetes mellitus.

Table 4. Bivariate and multivariate regression analysis for potentially significant predictor variables among type 2 DM adult patients at government hospitals, Addis Ababa, Ethiopia, 2025

Variables	Category	Glycemic control		Crude OR	Adjusted OR	p-value
		Poor (n=191)	Good (n=103)			
Occupation	Govt employee	51 (26.7)	19 (18.4)	1	1	
	Non-govermental organization	44 (23)	28 (27.2)	0.585 (0.29-1.2)	0.876 (0.214, 3.594)	0.18
	Self employed	67 (35.1)	28 (27.2)	0.89 (0.45-1.77)	11.629 (2.51, 53.879)	0.002*
	Housewife	12 (6.3)	24 (23.3)	0.186 (0.078-0.45)	0.099 (0.015, 0.649)	0.016*
	Retired	17 (8.9)	4 (3.9)	1.58 (0.47-5.31)	4.598 (0.408, 51.857)	0.217
Gender	Female	165 (86.3)	97 (32.9)	1	1	
	Male	26 (13.6)	6 (5.8)	1.88 (1.15, 3.09)	0.192 (0.055, 0.672)	0.01*
Marital status	Single	65 (34)	12 (11.6)	1	1	
	Married	92 (6.2)	65 (63.1)	0.261 (0.13-0.52)	0.966 (0.176, 5.286)	0.968
	Divorced	16 (8.3)	15 (14.5)	0.21 (0.082-0.54	0.503 (0.088, 2.862)	0.438
	Widowed	18 (9.4)	11 (10.6)	0.28 (0.11-0.72)	0.015 (0.001, 0.180)	0.001*
Family support	No	29 (15.2)	7 (6.8)	1	1	
	Yes	162 (84.8)	96 (93.2)	0.41 (0.17-0.97)	0.05 (0.006, 0.404)	0.048*
Family history	No	95 (49.7)	34 (33)	1	1	
	Yes	96 (50.3)	69 (67)	0.5 (0.3, 0.82)	0.25 (0.085, 0.796)	0.019*
Other chronic case	No	114 (59.7)	74 (71.8)	1	1	
	Yes	77 (40.3)	29 (28.2)	1.72 (1.03, 2.89)	6.73 (1.98, 22.85)	0.002*
Use of alternative treatments	No	96 (50.3)	69 (67)	1	1	
	Yes	95 (49.7)	34 (33)	2.01 (1.22, 3.31)	5.64 (1.74, 18.23)	0.004*
Satisfaction		133 (69.6)	55 (53.4)	1	1	
		58 (30.4)	48 (46.6)	0.5 (0.305, 0.82)	4.19 (0.408, 43.104)	0.105
Adherence	Poor	58 (30.4)	11 (10.6)	1	1	
	Good	133 (69.6)	92 (89.3)	0.274 (0.137, 0.55)	0.3.323 (0.404, 27.32)	0.264*
Attitude	Negative	99 (51.8)	7 (6.8)	1	1	
	Positive	92 (48.2)	96 (93.2)	0.068 (0.03, 0.15)	0.05 (0.016, 0.152)	0.001*
Self-care	Poor	90 (47.1)	32 (31.1)	1	1	
	Good	101 (52.8)	71 (68.9)	1.79 (1.097, 2.9)	3.15 (0.899,11.05)	
BP	Hypertensive	76 (39.8)	6 (5.83)	1	1	
	Normal	115 (60.2)	97 (94.17)	0.09 (0.04, 0.22)	0.077 (0.081, 0.332)	0.001*

*Statistically significant at p-value <0.05, references category-first, OR: Odds ratio, DM: Diabetes mellitus, BP: Blood pressure.

DISCUSSION

This study investigated the prevalence of poor glycemic control (PGC) among adults with type 2 diabetes at two hospitals in Addis Ababa. Results show that the prevalence of PGC is very high among participants sampled, with 65% of them showing difficulty achieving good glycemic management, thus demonstrating the necessity of implementing targeted strategies to improve management of their diabetes. PGC can be attributed to clinical factors such as medication nonadherence, physical inactivity, and other factors that create favorable conditions for the development of PGC. The findings of this study are consistent with those of other studies conducted in countries with similar income levels, including Egypt, Tanzania, and parts of Ethiopia, indicating that people living with diabetes face similar challenges in achieving optimal GC.[21-24] However, the prevalence estimates of PGC differ slightly between studies at the Shanan Gibe Hospital (Southwestern Ethiopia) and at Tikur Anbesa Specialized Hospital (Addis Ababa), with Shanan Gibe reporting lower prevalence rates, and Tikur Anbesa reporting higher prevalence rates, than those found in the current study. One explanation for the disparities between these studies is Tikur Anbesa Hospital also receives referrals from patients seeking advanced diabetes care throughout the country.[24]

Additionally, the study reported a strong association between PGC and occupational group. Housewives are less likely to have PGC because their work schedules allow stability in daily routines, an increased ability to provide timely and appropriate nutrition through opportunities for food preparation, and greater family involvement in managing their diabetes. There is little evidence in the literature regarding the effect of daily routines on housewives in Ethiopia; however, related research indicates that routines contribute to consistent self-care behaviors, which in turn improve GC in the Ethiopian community.[25-27] Conversely, self-employed individuals, including street vendors, are at greater risk of being diagnosed with diabetes due to their more variable working hours, limited finances, stress, and injurious workload constraints, which ultimately hinder adherence to medical follow-up, dietary recommendations, and clinic attendance (Dessie Referral Hospital Study 2019). Many self-employed individuals are also likely to have lower literacy levels, which further explains these disparities and emphasizes the role that occupation and education play in managing diabetes. Additional evidence from Canada shows that workers with long working hours and high levels of occupational stress have a higher incidence of PGC.

This study also demonstrates a significant association between PGC and both family support and family history of diabetes. It has been determined that patients with PGC have neither family support nor a family member diagnosed with diabetes. Results from a study in Saudi Arabia concluded that the likelihood that an individual with a family history of diabetes (87%) will be diagnosed with PGC is much higher than that for those without a family history of diabetes (28%). Similarly, studies from Türkiye (71.2%) and Brazil (62.67%) show that patients with diabetes who have a family history of diabetes are less likely than those without a family history of diabetes to achieve optimal GC.[28] It is plausible that individuals with a prior diagnosis of type 2 diabetes would be more likely to have PGC because of genetic factors, which affect the severity and duration of diabetes. Additionally, a study conducted in Jazan City, Saudi Arabia, demonstrated that family support and close relationships with healthcare providers are associated with lower mean HbA1c.[29]

The presence of family support was also shown to increase the likelihood of successful diabetes management through referrals and general medical advice.

Study Limitations

Several limitations should be noted. Its cross-sectional design limits the ability to establish causality between the identified factors and PGC. Self-reported measures of self-care behaviors, attitudes, and other patient-reported variables may be subject to recall bias and social desirability bias. The study was conducted at only two hospitals in Addis Ababa, which may limit the generalizability of the findings to other regions, including rural populations. Selection bias may also have occurred because only patients attending follow-up visits were included. FBG, rather than HbA1c, was used to assess glycemic control; however, FBG may not fully reflect long-term glycemic status. Finally, although validated instruments were employed, residual measurement error cannot be completely excluded.

CONCLUSION

A recent study found that a significant proportion of people with type 2 DM do not achieve the recommended glucose levels. The study found that 65% of patients with diabetes treated at government hospitals had inadequate glycemic control. Critical factors associated with poor GC in the study population include occupation, family history of DM, familial support, comorbidities, alternative medication use, and patient attitudes toward diabetes care and management. It is recommended to focus on and intervene in the following areas: family support, early detection of comorbidities, medication adherence, and patient education regarding attitudes, to improve glycemic control.

MAIN POINTS

- High prevalence of poor glycemic control (PGC): Sixty-five percent of adult patients with type 2 diabetes exhibited inadequate glycemic control.
- Psychosocial and family factors matter: A positive attitude and strong family support significantly reduce the likelihood of poor glycemic outcomes.
- Occupation-specific risk patterns: Self-employed individuals have markedly higher odds of PGC, whereas housewives have lower odds compared with government employees.
- Comorbidities and alternative therapies increase risk: The presence of other chronic conditions and the use of alternative therapies are strong independent predictors of PGC.
- Clinical implication: Multifaceted interventions-addressing attitude, family support, and strict blood pressure control-are needed to improve glycemic outcomes.

ETHICS

Ethics Committee Approval: The study was approved by the Addis Ababa Public Health Research and Emergency Management Directorate (approval number: PG/REC/024/21, date: 30.11.2021).

Informed Consent: All eligible participants were informed about the objectives, procedures, risks, and benefits of the study. Written

informed consent was obtained prior to participation. Participants were assured of confidentiality and their right to withdraw at any time without consequence.

Footnotes

Authorship Contributions

Surgical and Medical Practices: A.G.F., İ.E., Concept: A.G.F., İ.E., Design: A.G.F., İ.E., Data Collection and/or Processing: A.G.F., İ.E., Analysis and/or Interpretation: A.G.F., İ.E., Literature Search: A.G.F., İ.E., Writing: A.G.F., İ.E.

DISCLOSURES

Conflict of Interest: İlker Etikan is a member of the Editorial Board of the Cyprus Journal of Medical Sciences. However, he was not involved in the editorial decision of the manuscript at any stage.

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