Prevalence of diabetes distress and its correlates among adults with type 2 diabetes mellitus in a primary health center of Bihar – A cross-sectional study

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ABSTRACT

Context: Diabetes is a chronic disease associated with many complications. Approximately 20% of people living with diabetes suffer from some form of depression. "Diabetes distress" (DD) is used to describe the significant negative psychological reactions related to emotional burdens and worries specific to an individual's experience to manage severe, complicated chronic disease such as diabetes. **Aim:** To determine the proportion having DD and to identify the sociodemographic and morbidity related factors associated with the presence of DD among adults with Type2DM who are being treated at PHC Naubatpur, Bihar. **Material and Methods:** This facility based cross-sectional analytical study was done over 3 months among 260 Type2DM patients attending PHC Naubatpur. Sociodemographic details and morbidity related details were collected followed by PAID questionnaire to assess DD. **Results:** Around 60% of the participants were of age ≤60 years. Majority (63.8%) of the participants were having diabetes from past 1-10years. One-fourth (24.6%) of them were having score of ≥40, therefore having DD. Alcohol consumption and presence of diabetes complications in the participants were found to be independent predictors of DD. **Conclusion:** This study showed a high (24.6%) prevalence of DD. It is essential to identify high-risk patients with different mental health needs. Healthcare providers should focus on reducing DD and devise ways to increase self-care practices and coping skills.

Keywords: Bihar, diabetes, diabetes complications, diabetes distress, PAID scale

Introduction

Diabetes ranks among the most widespread chronic ailments worldwide, impacting close to 400 million people. It is anticipated that the number of adults living with diabetes will rise to 113 million by 2030 and escalate further to 151 million by 2045.[1] India accounts for one in seven of all adults living with diabetes in the world. Diabetes in India has increased from 61.3 million in 2011 to 74.2 million in 2021. With such a high number of people living with diabetes in India, it is one of the countries with the highest burden of the disease. Living with diabetes is challenging, as it is associated with a lot of restrictions leading to people being emotionally distressed.[2] The guidance provided by either the educator or the physician might appear intricate for individuals without a medical background, potentially intensifying the emotional strain associated with the diagnosis and necessary

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lifestyle adjustments.[3] Additionally, it can result in unfavorable medical and psychological consequences, such as decreased physical activity, poorer dietary choices, reduced adherence to medication regimens, infrequent self-monitoring of blood glucose levels, increased levels of glycated hemoglobin (HbA1c), heightened incidence of severe hypoglycemia, and compromised quality of life. The culmination of these challenges and stressors may contribute to what is known as "diabetes burnout," potentially leading to disengagement from diabetes management.[4] Research revealed a significant correlation between diabetic distress (DD) and inadequate glycemic control, exerting a detrimental impact on treatment adherence, self-management practices, and engaging in risky behaviors.[5] It is also known that approximately 20% of people living with diabetes suffer from some form of depression. Although the actual cause of depression in diabetes is not understood yet, its chronic nature is thought to be one of the reasons.[6] Recent research has shown that depression in diabetes is a separate entity and should not be considered similar to other forms of depression. In modern contexts, "Diabetes Distress" is utilized to describe the significant negative psychological reactions linked to the emotional challenges and anxieties that are particular to an individual's struggle in managing a serious, complex, and demanding chronic illness like diabetes.[7]

The prevalence of severe DD varies between 10% and 30% among individuals with diabetes, contingent upon case diversity, and may exhibit disparities across different settings and countries.[3] Studies have shown that DD adversely affects their compliance with medical advice, treatment adherence, lifestyle modifications as well as their ability to follow self-care practices. This is, therefore, linked to poor diabetes control and a higher risk of developing complications.[8]

The recent American Diabetes Association guidelines issued in 2017 recommended that routine monitoring of diabetic people for DD should be carried out, particularly when treatment targets are not met and/or at the onset of diabetes complications. Individuals identified with DD should be provided with additional psychological counseling.[9] Limited number of studies from India have explored this distress among diabetic patients.[10] In a study conducted among diabetics from Delhi, Mumbai, Kanpur, Chennai, Hyderabad, Bangalore, and Kolkata, DD was shown to be more common than 50% of the time.[10] Sasi *et al.*[11] (2013) conducted a study among diabetics attending the clinic at a rural tertiary health care center in Andhra Pradesh and reported that 40% of the patients had moderate DD. In a research study led by Thour *et al.*[12] (2015) at the Endocrinology Clinic of a tertiary hospital in Chandigarh, it was discovered that among 73 diabetic individuals, the prevalence of depression was 41%. Severe depression was identified in 4% of the participants, moderate depression in 10%, and mild depression in 27%.

With this background, this study was aimed to assess the DD among individuals with diabetes managed in a primary care setting and this will further help in identifying the mental health care needs of these patients.

Materials and Method

Study setting

The research was conducted at the Primary Health Center (PHC) in Naubatpur, Bihar, which also serves as the Rural Health and Training Centre (RHTC) of AIIMS, Patna. This institute is of national significance under the Ministry of Health and Family Welfare, Government of India, and the study is carried out by the Department of Community and Family Medicine. The RHTC is located at around 15 km from AIIMS, Patna. It caters to a population of 50,000 individuals residing in rural areas of Patna district. The primary health care management of patients with type 2 diabetes mellites (DM) is provided at PHC, Naubatpur. Patients' contact information and clinical details are maintained in the chronic disease register maintained at the Non-communicable Disease (NCD) Clinic in the PHC. This RHTC works in coordination with the Bihar Health Department.

Study design and duration

This is a Facility based cross sectional study and was carried out for three months (September 2021 to November 2021).

Study participants

The participants in this study included all the type 2 DM who are registered in and receiving treatment from the NCD Clinic, PHC, Naubatpur, in the study duration. Patients not willing to participate and not giving consent were excluded from the study.

Sample size and sampling technique

The sample size calculated assuming the prevalence of DD among diabetes patients as 40%,[11] absolute precision of 6%, and 95% confidence interval (5% alpha error) using OpenEpi software was 257, which was rounded off to 260. The first case was chosen through convenience sampling, and subsequent participants were consecutively enrolled in the study until the desired sample size was attained.

Study tool

The study tool included a pre-tested, structured, standard questionnaire, which was divided into three sections. Section A contained socio-demographic details of the patients. Section B contained behavioral and morbidity related details of the DM patients. Section C comprised the Problem Areas In Diabetes (PAID) questionnaire, which was administered to assess for the presence of DD.[13] The PAID is a validated questionnaire that contains 20 items.[14] Each question in the PAID questionnaire is on 5-point Likert scale with a value from 0 to 4, with 0 representing "no problem" and 4 "a serious problem." Patients scoring 40 or higher were considered to have DD.

Study procedure

The study tool was administered via face-to-face interviews by the investigators and interns of the Department of Community and

Family Medicine. The interns were trained by the investigators regarding the administration of study tools, and a quality check was done by investigators every alternative day. The tool was administered in Hindi, the local language of the study site. The tool was translated as per World Health Organization (WHO) guidelines for language translation with forward and backward translation and tested for appropriateness with the help of a medico-social worker of the department and three subject experts. The study tool was developed in google forms for the correctness of the entry and was filled by the investigators and interns.

Statistical analysis

The collected data were entered into Microsoft Excel sheet and analyzed using IBM SPSSv22.0 software. Descriptive statistics was applied to describe the morbidity-related variables, such as duration of disease and treatment, complications of diabetes and other comorbidities. The behavioral and morbidity-related factors were analyzed using the Chi-square test of association, Student's *t*-test and analysis of variance (ANOVA) wherever necessary. A multivariable logistic regression analysis was performed to identify the factors associated with DD. All the variables whose *P* value is less than 0.2 in univariable analysis were included for building a logistic regression model. An adjusted odds ratio (AOR) with 95% CI was interpreted. Values of $P < 0.05$ were considered statistically significant (two-sided tests).

Ethical considerations

Ethical clearance was obtained from IEC, AIIMS Patna (Ref. No. AIIMS/Pat/IEC/2022/852), and the study was not funded by any organization. We adhered to the principles of ethics thereafter.

Results

Sociodemographic and behavioral characteristics

Of the 260 study participants, 50.8% (132) were female. The ages ranged from 27 to 90 years, with a mean (SD) age of 56.5 (11.53) years. Half, 129 (49.6%), of the participants were educated up to undergraduate level and the same proportion of participants were involved in unskilled jobs. One in every four

Table 1: Sociodemographic details of participants (*n*=260)

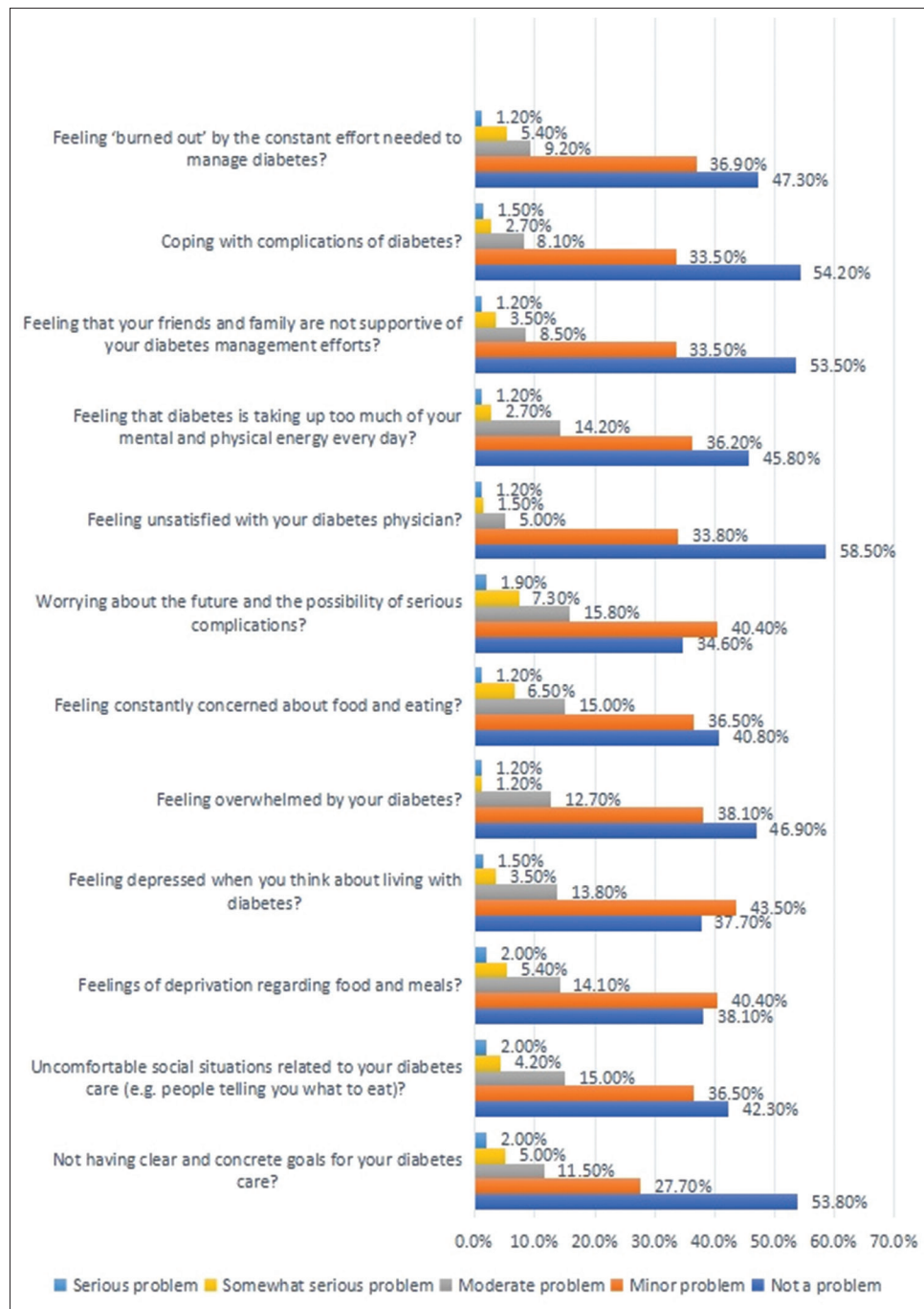| Variable	Category	Frequency (%)
Age	≤60 years	153 (58.8)
	>60 years	107 (41.2)
Gender	Male	128 (49.2)
	Female	132 (50.8)
Education	Illiterate	88 (33.8)
	Undergraduate	129 (49.6)
	Graduate and above	43 (16.5)
Occupation	Unemployed	35 (13.5)
	Unskilled	129 (49.6)
	Semiskilled & skilled	96 (36.9)
Tobacco consumption	Present	53 (20.4)
Alcohol consumption	Present	13 (5)

participant consumed tobacco. Alcohol consumption was seen in only 5% (13) of the participants [Table 1].

Morbidity related characteristics

Majority, 166 (63.8%), of the participants were having diabetes from past 1-10 years. Almost half, 143 (55%), of the study population adhered to their treatment for past 1-10 years. One in three participants consumed only one drug for diabetes. Most of the study population (89.2%) did not have any complications related to diabetes. Around 40% of participants were also suffering from hypertension. Only 6.2% of the participants had other co-morbidities, such as hypothyroidism and cardiovascular diseases. Almost, half (55%) of the study population were not having any recent fasting blood sugar (FBS) reports [Table 2].

Diabetes-related distress details

There were statistically significant differences in the mean (SD) DD scores when comparing the study population with diabetes complications to those without [34.7 (13.2) vs. 41 (11.1), $P < 0.05$] and when comparing those with controlled FBS levels to those with uncontrolled FBS levels [36.9 (13.8) vs. 37.8 (11.9), $P < 0.05$]. Although the DD score was higher in patients who consumed two or more drugs compared to their counterparts, it was not statistically significant [36.4 (12.7) vs 35 (10.7) and 34.6 (16.4), $P = 0.729$] [Table 2].

Prevalence of diabetes distress

Almost half, (53.8%), of the study participants said that it was not a problem not having clear and concrete goals for their diabetes care; 45% reported a minor problem when asked whether they were feeling discouraged with their diabetes treatment plan. A majority (43.5%) said that they felt minor problems when asked whether they felt depressed when they think about living with diabetes. Four out of 10 (40.4%) participants said that they felt a minor problem when asked if they worried about the future and the possibility of serious complications. The same proportion of participants (40.4%) reported not having a problem and minor problem when asked if they felt guilt or anxiety when they went off track with their diabetes management. The majority of the participants (58.5%) reported satisfaction with their diabetes physician; 54.2% felt that it was not a problem coping with complications of diabetes; 47.3% reported that it was not a problem when asked if they felt burnt out by the constant effort needed to manage diabetes. The participants' responses to the PAID scale are shown in Figure 1. Based on the responses received to the PAID scale, the prevalence of DD among them was reported to be 24.6% (95% CI: 19.77-30.2) [Figure 2].

Factors associated with diabetes distress

DD was present in half of the participants who consumed alcohol. Among those with DD, two third participants belonged to Below poverty line (BPL) families and same proportion had diabetes for a duration of one to ten years. There was noticed uncontrolled FBS in about 80% of participants present with DD. Using univariate analysis, the consumption of alcohol (unadjusted

Figure 1: Participants' response to a few questions on PAID scale (N = 260)
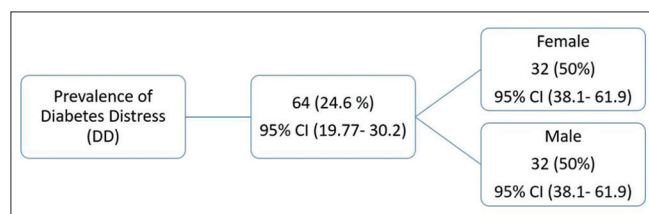

Figure 2: Prevalence of diabetes distress using PAID scale (N = 260)

odds ratio [OR]: 3.88; 95% CI: 1.25-12.03) and presence of diabetes complications were found to be significant predictors

of DD (unadjusted odds ratio [OR]: 2.59; 95% CI: 1.15–5.83). However, other variables, including age, presence of hypertension and other comorbidities, were also considered in multivariable logistic regression.

The consumption of alcohol by the participants (adjusted OR [AOR]: 3.616; 95% CI: 1.134-11.532) and presence of diabetes complications (adjusted OR [AOR]: 2.314; 95% CI: 1.099–5.360) were found to be independent predictors of DD [Table 3].

Table 2: Morbidity-related characteristics of the patients (*n*=260)				
Variable	Category	n (%)	DDS score [Mean (SD)]	*P*
Duration of the disease (years)	<1	84 (32.3)	36 (12.29)	0.775
	1−10	166 (63.8)	35.2 (11.35)	
	>10	10 (3.8)	34.1 (7.17)	
Duration of the treatment (years)	<1	110 (42.3)	34.8 (11.9)	0.626
	1−10	143 (55)	35.7 (11.1)	
	>10	7 (27)	39.3 (12.7)	
No. drugs being consumed	0	9 (3.5)	34.6 (16.4)	0.729
	1	175 (67.3)	35 (10.7)	
	≥2	76 (29.2)	36.4 (12.7)	
Diabetes complications	No	232 (89.2)	34.7 (13.2)	0.021*
	Yes	28 (10.8)	41 (11.1)	
Hypertension	Yes	103 (39.6)	35.3 (11.7)	0.878
	No	157 (60.4)	35.5 (11.4)	
Other comorbidities	Yes	16 (6.2)	40.6 (13.6)	0.132
	No	244 (93.8)	35.1 (11.3)	
FBS	Controlled	23 (8.8)	36.9 (13.8)	0.021*
	Uncontrolled	94 (36.2)	37.8 (11.9)	
	Not having reports	143 (55)	33.6 (10.6)	

*Statistically significant (*P*<0.05) for the mean (SD) DDS scores using the independent samples t-test for the presence of diabetes complications and using the one-way ANOVA test for the presence of recent FBS reports

Discussion

This study was a facility-based cross-sectional study of 260 adults with type 2 diabetes mellitus, attending the NCD clinic at PHC, Naubatpur, located at around 15 km from AIIMS, Patna. The prevalence of DD among them was found to be 24.6%. According to reports, DD was prevalent in other Asian nations with a rate between 19 and 23%.[9,15] Symon AK *et al.*[2] in south Kerela reported moderate to high-level DD to be only 13.2%. Compared to our study's findings, a study carried out in South Africa found that 44% of the participants experienced moderate to high levels of discomfort, as well as higher scores on the emotional load dimension and routine distress.[16] Two studies from Germany used the same PAID questionnaire as in our study to show that 8.9% and 10.7% of their sample were distressed.[1,17] In a hospital-based study in South India, the distress rate was very low (2.4%), and the majority of those with diabetic discomfort were found to have inadequate glycemic control.[18] As some of them employed the DDS-17 scale, it is possible that the difference between the prevalence of DD in this study and the DD proportions previously reported is due to the use of various assessment instruments.

Although around 60% of participants were of age ≤60 years, age and gender were not found to be associated with DD in our study. Younger age and female gender were significant factors in several studies.[4,16] According to our study, there was no gender difference with respect to DD. However, according to Sasi *et al.*,[11] the gender difference was apparent and significant with respect to the glycemic control, with poor glycemic control being observed more in females (54.3%) than in males (45.6%). The literature reveals conflicting findings regarding how gender affects glycemic management in type 2 diabetes. Past studies have shown that psychological discomfort among diabetic patients is significantly influenced by education and occupation.[19] However, in our study, we found that education and occupation had no significant influence on DD. In the past, it was assumed that patients with more education also knew more about diabetes. Smartphone use and the quick growth of social media, however, have made it simple for patients to learn about diabetes, drastically reducing the link between diabetes knowledge and education. Smoking was also associated with DM distress and depression in a study conducted in Saudi Arabia whereas in our study, we did not get any association between the two.[20] Alcohol consumption and the presence of complications of diabetes were found to be the significant independent predictors of DD in our study.

Conclusion

DD has not received much attention in India, and this facility-based research sheds light on the current situation in rural Bihar. It affects health outcomes, yet it is rarely considered when treating the patient. Healthcare professionals need to actively attend to patients' psychological needs and pay closer attention to patients' diabetes-related distress.

The small sample size of this study, which may have reduced its power, was one of its limitations. We did not investigate genetic vulnerability, despite the possibility that it contributes to DM discomfort and depression. Further investigation on the health- and treatment-related aspects of the burden of diabetes is required and the relationship between DD and depression in T2DM must be determined. We think a multicenter study, Diabetes Attitude, Desire and Needs (DAWN) initiatives, is needed to look into this issue nationally.[10,21]

The following are the suggested management techniques: Use the DDS-17 to screen for the four DD factors; provide assistance to them and include their family in the management plan to improve

Variables	Sub-variables	Diabetes distress, *n* (%)		Crude OR (95% CI)	AOR (95% CI)
		Absent	Present		
Age[$]	<60 years	112 (73.2)	41 (26.8)	1	1
	>60 years	84 (78.5)	23 (21.5)	1.337 (0.746-2.397)	1.294 (0.696-2.406)
Gender	Male	96 (75)	32 (25)	1.042 (0.592-1.832)	
	Female	100 (75.8)	32 (24.2)	1	
Alcohol consumption[$]	Yes	6 (46.2)	7 (53.8)	3.88 (1.25-12.03)*	3.616 (1.134-11.532)*
	No	190 (76.9)	57 (23.1)	1	1
Education	Illiterate	65 (73.9)	23 (26.1)	1.548 (0.627-3.820)	
	Undergraduate	96 (74.4)	33 (25.6)	1.504 (0.634-3.568)	
	Graduate and above	35 (81.4)	8 (18.6)	1	
Occupation	Unemployed	29 (82.9)	6 (17.1)	1.241 (0.2188-7.044)	
	Unskilled	94 (72.9)	35 (27.1)	2.234 (0.4759-10.488)	
	Semiskilled	61 (74.4)	21 (25.6)	2.066 (0.4268-9.998)	
	Skilled		2 (14.3)	1	
Color of ration card	Blue (APL)	53 (35.1)	19 (33.9)	0.950 (0.498-1.812)	
	Red (BPL)	98 (64.9)	37 (66.1)	1	
Tobacco consumption	Yes	41 (77.4)	12 (22.6)	1.146 (0.560-2.345	
	No	155 (74.9)	52 (25.1)	1	
Diabetes complications[$]	Yes	16 (57.1)	12 (42.9)	2.59 (1.15-5.83)*	2.314 (1.099-5.360)*
	No	180 (77.6)	52 (22.4)	1	1
Presence of Hypertension[$]	Yes	81 (78.6)	22 (21.4)	0.74 (0.41-1.34)	0.757 (0.400-1.434)
	No	115 (73.2)	42 (26.8)	1	1
Comorbidities[$]	Yes	9 (56.3)	7 (43.8)	2.55 (0.91-7.15)	2.197 (0.725-6.661)
	No	187 (76.6)	57 (23.4)	1	1
Duration of the disease	<1 year	64 (32.7)	20 (31.3)	0.923 (0.500-1.701)	
	1−10 years	124 (63.3)	42 (65.6)	1.250 (0.245-6.372)	
	>10 years	8 (4.1)	2 (3.1)	1	
Duration of the treatment	<1 year	87 (44.4)	23 (35.9)	2.837 (0.593-13.580)	
	1−10 years	105 (53.6)	38 (59.4)	2.072 (0.443-9.688)	
	10 years	4 (2.0)	3 (4.7)	1	
Number of drugs	0	7 (3.6)	2 (3.1)	0.800 (0.153-4.175)	
	1	133 (67.9)	42 (65.6)	0.884 (0.477-1.639	
	≥2	56 (28.6)	20 (31.3)	1	
Recent fasting blood sugar reports	Controlled	16 (20.3)	7 (18.4)	0.889 (0.331-2.385)	
	Uncontrolled	63 (79.7)	31 (81.6)	1	

OR, odds ratio; CI, confidence interval; AOR, adjusted OR. [$]Used for adjustment of the final model; Nagelkerke R^2=0.075 (7.5%). *$P<0.05$ indicates statistical significance

self-care routines and coping mechanisms; rule out additional sources of distress (if known from the past medical history); use the HbA1c to track the glycemic management (if needed as a baseline); screen them every 3 months with a HabA1c test.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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