

The Prevalence of Depression among Adult Asthmatic Patients in Jizan Region, Saudi Arabia

Mohamed Ahmed Sumaily*¹, Salwa Tayel², Elsiddig Mohamed Noureldin³

¹Department of Public Health Jizan – MOH, ²Department of Family and Community Medicine KSU, ³National Center for Vector – Borne Diseases Jizan – MOH, Saudi Arabia

*Corresponding author: Mohamed Ahmed Sumaily, Mobile: +966558812067, E-mail: mohamedsumaily@gmail.com

ABSTRACT

Background: Depression is an important issue in asthma. Uncover depression in asthmatic patients has important implications for identifying patients and suitable treatment of these patients this will improve quality of life, decrease medication intake and decrease hospitalization.

Objective: The aim of this study was to determine the prevalence of depression among adult asthmatic patients in Jizan region, Saudi Arabia.

Patients and methods: Cross-sectional study that was conducted in Jizan region at the chest diseases hospital. 270 (18-90 yrs.) asthmatic patients were recruited. The questionnaire including socio-demographic data, clinical risk factors of asthma, assessment of asthma by using asthma control test (ACT) and assessment of depression by using Patient Health Questionnaire-9 (PHQ-9).

Results: Out of 270 adult asthmatic patients, 255 responded (94.4%). The mean age of patients was 41.03 ± 15.893 years. The prevalence of depression among adult asthmatic patients was 32.9%. By multivariate analysis the lower education level [elementary school or below (Odds ratio 3.219 (95% CI; 1.443-7.177))] and longer asthma duration (22 years and above) Odds ratio 2.065 (95% CI; 1.089-3.916) were independently associated with the development of depression in adult patients with asthma.

Conclusion: The study showed that there was a high prevalence of depression among adult asthmatic patients in Jizan region, Saudi Arabia. The higher prevalence of depression was associated with lower education level, longer asthma duration, poor control of asthma and among married subjects. Screening for depression in adult asthmatic patients should be emphasized in primary health care centers, chest clinics and in hospitals. Adult asthmatic patients should be motivated to comply with asthma treatment.

Keywords: Depression, Asthma, Saudi Arabia.

INTRODUCTION

Asthma is one of the noncommunicable diseases. It is influencing 235 million individuals around the world and caused 383 000 deaths in 2015 according to the latest WHO estimates⁽¹⁾. In Saudi Arabia, asthma is the main causes of hospitalization⁽²⁾. In 2013 a national household survey found that asthma prevalence in Saudi adults was 4.05 % out of 525,794 Saudis aged 15 years or older (from a total of 12,000 households survey and 10,735 participants)⁽³⁾.

Depression is a common mental disease in the world that causes low mood, loss of interest, feelings down, trouble of sleep, disturbed appetite, feeling tired, and bad concentration⁽⁴⁾. The burden of depression is rising globally. It is the major reason of disability globally. Women are affected more than men by depression. Depression can cause suicide at worst status about 800 000 people die every year due to suicide. Although there is a treatment for depression, fewer than half of affected patients in the world (in different countries, fewer than 10%) get treatment. Some barriers to health care encompass inadequate mental health resource, poor of health care staff, insufficient assessment and social stigma related to mental illness. In countries of different income level, depressed people are not correctly diagnosed and treated⁽⁵⁾.

In Saudi Arabia, a study conducted at King Abdul Aziz Medical City-National Guard, in the biggest three primary health care centers in Riyadh, the prevalence of depression was found high 49.9% from ages 18 to 65 years⁽⁶⁾. The multiple underlying risk factors for depression such as chronic diseases, low income, job loss, female sex, divorced or widowed, single, younger age and lack of self-esteem⁽⁷⁾. Some of the consequences of depression destroys the quality of life, makes relationships difficult and affects the ability to work and risk of suicide⁽⁸⁾. Psychiatric diseases are a neglected part in the care of physical disorder and management, especially asthma where patients possibly get scared and worried during the acute attack at the time they sense that they might suffocate⁽⁹⁾.

In 2015 a study by **Ciprandi et al.**⁽¹⁰⁾ showed that the prevalence of depression was 11% in 263 patients with asthma. The study demonstrated that depression is common and relevant comorbidities in asthmatic patients. A study in 2017 at three cities of Saudi Arabia (Riyadh, Jeddah, and Alkhobar) showed that the prevalence of depression with asthma patients was 20 % (30 cases among 150 patients), including 50 asthmatic patients from every city⁽¹¹⁾. The depression is an important issue in asthma and some of the consequences of the depression in asthmatic patients are associated with decrease in asthma-specific quality of life and greater medication intake and more hospitalization⁽¹²⁾.



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To the best of our knowledge, a few studies in Saudi Arabia and no previous study in Jizan region has been conducted to determine the prevalence of depression among adult asthmatic patients and related factors in health facilities.

The present study aimed to investigate the prevalence of depression among adult asthmatic patients and related factors in Jizan region, Saudi Arabia.

PATIENTS AND METHODS

The study was conducted in Jizan region at the Chest Diseases Hospital at the outpatient clinic.

Inclusion Criteria: All Saudi patients aged 18 years or older who was registered at the chest diseases hospital and diagnosed as asthmatic patients.

Exclusion Criteria: Patients aged less than 18 years and the admitted patients in the hospital. Patients who received psychiatric treatment elsewhere and are on treatment at time of the study.

Data collection was conducted in outpatient's clinic for the asthmatic patients who had appointments and patients were selected randomly from medical records then medical staff notified patient about the questionnaire and after agreement we interviewed them.

Variables: Depression and factors, which may affect depression including socio-demographic factors, clinical risk factors of asthma and asthma control status.

Sample size: For calculation of the sample size for this study the following formula was used ⁽¹³⁾:

$$n = \frac{Z^2 P(1 - P)}{d^2}$$

Where (n) is the sample size, (z) is the statistic corresponding to the level of confidence, (p) is expected prevalence (that can be obtained from previous studies), (d) is the precision.

Given: d= 0.05, Z= 1.96 for 95% confidence level, p=0.20 based on ⁽¹¹⁾.

Then $n = (1.96)^2 (0.20) (0.80) / (0.05)^2 = 245$.

This sample size (245) increase to 270 to compensate for expected non-response rate of 10%.

Ethical permission:

A written permission was obtained from the chest diseases hospital in Jizan region. A written Arabic informed consent was obtained from every patient. This study was approved on 19 December 2017 (IRB number E-17-2773) by the institutional review boards of King Saud University College of Medicine.

Assessment of Asthma Control Test:

The Asthma Control Test (ACT) is standardized, valid and reliable to assess the level of asthma control with good internal reliability with a Cronbach's α of 0.85. It had a sensitivity of 71% and specificity of 71% ⁽¹⁴⁾. ACT Contains 5 items during the past 4 weeks about: the effect of asthma on duties, shortness of breath, the effect of symptoms on awakening from **Table (1):** The baseline characteristic.

sleep, need for nebulizer medication and evaluation of asthma control. Each item includes 5 response options, responses for every one of the 5 items are a score ranging from 5 (poor control of asthma) to 25 (complete control of asthma). A cutoff score of 19 or less recognizes patients with uncontrolled asthma. While a cut-point score of 20 or more has been defined as controlled asthma ⁽¹⁵⁾. The Arabic version of Asthma Control Test was used in the present study ⁽¹⁶⁾.

Assessment of depression:

Depression was assessed using the Patient Health Questionnaire-9 (PHQ-9) and it is standardized valid and reliable measure of depression with excellent internal reliability with a Cronbach's α of 0.89. It had high sensitivity of 88% and specificity of 88% compared to other questionnaires. The PHQ-9 is a nine-item and assesses each of the nine criteria on a scale from 0 (not at all) to 3 (nearly every day). The PHQ-9 score range from 0 to 27 and score of 10 or greater is considered depression, where a score less than 10 is considered no depression. The questionnaire included nine questions over the last two weeks how often have you been bothered by this problem: little interest in doing things, hopeless, troubling in asleep, feeling tired, poor appetite, feeling bad about self, trouble concentration, trouble in moving and thoughts about hurting self in some way ⁽¹⁷⁾. The Arabic version of "Patient Health Questionnaire 9" to assess depression was used in the present study ⁽¹⁸⁾.

The study period: This study was conducted between October 2017 and April 2018.

Statistical analysis

All statistical analyses were performed using SPSS 21.0 software (SPSS Inc., Chicago, IL, USA). Values were means \pm standard deviation (SD), frequencies and percentage (%). The independent T-test was used to compare between numerical variables associated with depression. The Chisquare test was used to compare between categorical variables associated with depression. Multivariate analysis was used to calculate the odds ratio for factors predicting depression among asthmatic patients. The confidence interval was set at 95% and a P value equal or less than 0.05 was considered statistically significant.

RESULT

Patient Characteristics:

Mean age of patients was 41.03 ± 15.893 with range of 18-90 years, 54.5% were males. The baseline characteristics are summarized in table (1). 42% of patients were elementary school or below and 67.1% were not working. Almost 72.5% were married. Moreover, almost 63.9% were rural residence. About 45.1% had asthma less than 10 years and above 78.8% without hypertension also about 87.5% without diabetes.

Demographic characteristic	Values * (N= 255)
Age in years -Mean ± SD -Range in years	41.03 ± 15.893 18-90
Gender -Male -Female	139(54.5%) 45.5%))116
Education -Elementary school or below -Intermediate or secondary school -College or above-	107(42%) 83(32.5%) 25.5%))65
Occupation -Working -Not working	84(32.9%) 171(67.1%)
Marital status -Single -Married	70 (27.5%) 185(72.5%)
Residence -Rural -Urban	163(63.9%) 92(36.1%)
Asthma duration -Less than 10 years -From 11 to 21 years -From 22 and above	115(45.1 %) 56(22%) 84(32.9%)
Hypertension -Yes -No	54(21.2%) 201(78.8%)
Diabetes -Yes -No	32(12.5%) 223(87.5%)

*Values are mean ± standard deviation, numbers, frequencies and percentages (%).

Asthma control test (ACT) among the asthmatic patients:

Table (2) showed the result of assessment of asthma using Asthma control test (ACT). We found that 70.2% have uncontrolled asthma. Whereas 29.8% have controlled asthma. Also, the mean asthma control test (ACT) score was 13.68 ± 6.150.

Table (2): Asthma control test (ACT) among asthmatic patients.

Asthma control test	Values * (N= 255)
1-In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home? All of the time Most of the time Some of the time A little of the time None of the time	 28 (11%) 54(21.2%) 64(25.1%) 55(21,6%) 54(21.2%)
2-During the past 4 weeks, how often have you had shortness of breath? More than Once a day Once a day 3 to 6 times a week Once or twice a week Not at all	 54(21.1%) 41(16.1%) 36(14.1%) 86(33.7%) 38(14.9%)
3-During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning? 4 or more nights a week 2 to 3 nights a week Once a week Once or twice Not at all	 40(15.7%) 68(26.7%) 33(12.9%) 72(28.2%) 42(16.5%)
4- During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)? 3 or more times per day 1 or 2 times per day from 2 or 3 times per week Once a week or less Not at all	 57(22.4 %) 52(20.4%) 46(18%) 56(22%) 44(17.3)
5- How would you rate your asthma control during the past 4 weeks? Not Controlled at All Poorly Controlled Somewhat Controlled Well Controlled Completely Controlled	 57(22.4%) 52(20.4%) 46(18%) 56(22%) 44(17.3%)
Classification of asthma ** -Uncontrolled ≤ 19 Controlled ≥ 20 -	 179(70.2%) 76(29.8%)
***ACT score -Mean \pm SD	 13.68 \pm 6.150

*Values are frequencies and percentages (%).

*** Asthma control status was evaluated by the asthma control test (ACT) score (uncontrolled, ACT ≤ 19 ; controlled, ACT ≥ 20),

***ACT = asthma control test.

Depression assessed using the Patient Health Questionnaire-9 (PHQ-9) among adult asthmatic patients:

Table (3) showed assessment of depression using PHQ-9 among adult asthmatic patients. We found one third (32.9%) having depression ≥ 10 among adult asthmatic patients. while tow third 67.1% non-depressed ≤ 9 .

Table (3): Depression assessed using the Patient Health Questionnaire-9 (PHQ-9) among adult asthmatic patients.

Depression	Values * (N= 255)
Over the last 2 weeks, how often have you been bothered by any of the following problems?	
0-Little interest or pleasure in doing things.	
Not at all	72(28.2%)
Several days	132(51.8%)
More than half the days	24(9.4%)
Nearly every day	27(10.6%)
b – Feeling down, depressed, or hopeless.	
Not at all	79(31%)
Several days	124(48.6 %)
More than half the days	33(12.9%)
Nearly every day	19(7.5%)
c- Trouble falling or staying asleep, or sleeping too much.	
Not at all	40(15.7%)
Several days	127(49.8%)
More than half the days	45(17.6%)
Nearly every day	43(16.9%)
d- Feeling tired or having little energy.	
Not at all	57(22.4%)
Several days	116(45.5%)
More than half the days	37(14.5%)
Nearly every day	45(17.6%)
e- Poor appetite or overeating.	
Not at all	75(29.4%)
Several days	117(45.9%)
More than half the days	30(11.8%)
Nearly every day	33(12.9%)
f- Feeling bad about yourself — or that you are a failure or have let yourself or your family down.	
Not at all	130(51%)
Several days	97(38%)
More than half the days	15(5.9%)
Nearly every day	13(5.1%)
g- Trouble concentrating on things, such as reading the newspaper or watching television	
Not at all	109(42.7%)
Several days	111(43.5%)
More than half the days	20(7.8%)
Nearly every day	15(5.9%)
h- Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.	
Not at all	114(44.7%)
Several days	100(39.2%)
More than half the days	24(9.4%)
Nearly every day	17(6.7%)
0- Thoughts that you would be better off dead or of hurting yourself in some way.	
Not at all	185(72.5%)
Several days	62(24.3%)
More than half the days	5(2%)
Nearly every day	3(1.2%)
Classification of depression **	
-Depression ≥ 10	84 (32.9%)
-No depression ≤ 9	171(67.1%)

**Depression was determined by a PHQ-9 score, the score ≥ 10 is considered depression, while a score ≤ 9 is considered no depression, * Values are expressed as frequencies and percentages (%). PHQ-9, patient health questionnaire-9.

The prevalence and comparison between depressed and non-depressed patients with asthma

Using PHQ-9 classification for depression, the prevalence of depression was 32.9. Table (4) showed education was 51.4% of elementary school or below, which was associated with depressed ($p < 0.001$), while 36.8% of married patients had depression ($p=0.035$). 28.7% of patients who had asthma less than 10 years were depressed ($p < 0.001$). The mean ACT score was lower in depressed patients (12.32 ± 5.230 , $p= 0.013$).

Table (4): Comparison between depressed and non-depressed patients with asthma.

Parameters	All patients		
	Depressed (n=84) ≥ 10	Non-depressed (n=171) ≤ 9	P value
Age in years -Mean ± SD	43.23 ± 17.241	39.95 ± 15.123	0.122
Gender -Male -Female	44 (31.7%) 40 (34.5%)	95 (68.3%) 76 (65.5%)	0.632
Education -Elementary school or below (%) -Intermediate or secondary school (%) -College or above (%)	55 (51.4%) 17 (20.5%) 12 (18.5%)	52 (48.6%) 66 (79.5%) 53 (81.5%)	0.001>
Occupation -Working (%) -Not working (%)	26 (31%) 58 (33.9%)	58 (69%) 113 (66.1%)	0.636
Marital status -Single (%) -Married (%)	16 (22.9%) 68 (36.8%)	54 (77.1%) 117 (63.2%)	0.035
Residence -Rural (%) -Urban (%)	54 (33.1%) 30 (32.6%)	109 (66.9%) 62 (67.4%)	0.932
Asthma duration -Less than 10 years (%) -From 11 to 21 years (%) -From 22 years and above (%)	33 (28.7%) 10 (17.9%) 41 (48.8%)	82 (71.3%) 46 (82.1%) 43 (51.2%)	0.001>
Hypertension -Yes (%) -No (%)	22 (40.7%) 62 (30.8%)	32 (59.3%) 139 (69.2%)	0.170
Diabetes -Yes (%) -No (%)	13 (40.6%) 71 (31.8%)	19 (59.4%) 152 (68.2%)	0.323
ACT score -Mean ± SD	12.32 ± 5.230	14.35 ± 6.465	0.013

Depression was determined by a PHQ-9 score ≥ 10, Values are expressed as Means ± SD, frequencies and percentage (%). ACT, asthma control test; PHQ-9, patient health questionnaire-9.

Association between depression and asthma outcomes:

All patients were classified into uncontrolled asthma or controlled asthma groups based on ACT score, which were summarized in Table (5). Depression was significantly more prevalent in the uncontrolled group than in the controlled group (39.1% versus = 10.333, $p < 0.001$) 2 18.4%, chi-squared χ .

Table (5): Association between depression and asthma outcomes according to asthma control status.

Variable	Depression (n= 84)	Non depression (n=171)	P value
Uncontrolled (n=179)	70 (39.1%)	109 (60.9%)	0.001
Controlled (n=76)	14 (18.4%)	62 (81.6%)	

Asthma control status was evaluated by the asthma control test (ACT) score (uncontrolled, ACT ≤19; controlled, ACT ≥20), values were frequencies and percentages (%).

Multivariate analysis predictors of depression among asthmatic patients:

The multivariate logistic analysis was used to identify a predictor of increased risk for clinical depression. The results revealed that lower education level (elementary school or below, Odds ratio 3.219, (95% CI; 1.443-7.177, p=0.004) and longer asthma duration (22 years and above, Odds ratio 2.065 (95% CI: 1.089-3.916, p= 0.026) were independently associated with the development of depression in adult patients with asthma (Table 6).

Table (6): Predictive factors of depression in patients with asthma.

Variable	Odds ratio (95% CI)	P value
Education *		
-Elementary school or below	3.219 (1.443-7.177)	0.004 0.785
-Intermediate or secondary school	0.887 (0.376-2.096)	
Marital status**	0.943 (0.453-1.963)	0.876
Asthma duration**		
-From 11 to 21 years	0.679 (0.295-1.563)	0.363 0.026
-From 22 years and above	2.065 (1.089-3.916)	
ACT score	0.964 (0.917-1.013)	0.149

CI, confidence interval; ACT, asthma control test.

* The reference of education variable was college or above.

**The reference of the marital variable was single.

***The reference of asthma duration variable was less than 10 years.

DISCUSSION

Many studies found an association between asthma and depression where depression has a great burden on asthmatic patients. It leads to decrease in the quality of life and increase medication intake and more hospitalization⁽¹⁰⁾. A few studies in Saudi Arabia and no previous study in Jizan region has been conducted to determine the prevalence of depression among adult asthmatic patients and related factors in health facilities.

We conducted this study by using the PHQ-9 questionnaire and confirmed a high prevalence (32.9%) of depression among adult asthmatic patients. The current study is consistent with the study of **Choi et al.**⁽¹⁹⁾ in Korea that used similar questionnaire (PHQ-9) to assess the depression. They found that the prevalence of depression was 16.8 % in patients with asthma, which is lower than this study. This lower prevalence reported in Korea may be due to their sample that included patients with better control asthma (high mean asthma control test score (ACT) was 19.9 ± 3.6 in Korea study

compared to patients in present study $13.68\% \pm 6.150$). A study in 2017 was conducted at three cities from Saudi Arabia (Riyadh, Jeddah, and Alkhobar) the prevalence of depression among adult asthmatic patients was 20% (30 cases /150 patients), which is lower than this study⁽¹¹⁾. This reported a lower rate of depression may be because they used smaller sample size (150 adult asthmatic patients) and included younger age group 34 year versus 41 year in the present study. Also, they used hospital anxiety and depression scale (HADS) to assess depression, which is different from the measure of depression in current study PHQ-9.

Another study in 2012 conducted in Egypt found the prevalence of depression in patients with asthma was 13.3 % which is lower than this study⁽²⁰⁾. This lower rate may be due to that the sample size was 98 asthmatic patients, which is smaller than current study and they recruited patients from Outpatient Chest Clinic at Al-Zahraa University Hospital, which is different from this study that conducted in the hospital specialized for chest diseases. Also, they used the Beck Depression Inventory (BDI) to assess depression, which is different from the measure of depression in current study PHQ-9. A study by **Tafti et al.**⁽²¹⁾ showed that the prevalence of depression was 65.4%, which is higher than this study. This higher rate may be because they used a different measure of depression which is 28-item general health questionnaire (GHQ-28), which has lower sensitivity and specificity (83 %, 78% respectively) compare to 88 %, 88% respectively for PHQ-9 which was used in the current study. A study by **Misra et al.**⁽²²⁾ found that the prevalence of depression in patients with asthma was 65% which is higher than this study. This higher rate may be due to that they used a sample size of 100 asthmatic patients, which is smaller than current study and they recruited patients from the department of pulmonary medicine at tertiary care hospital that may receive severe cases of asthma. Also, they used the Beck Depression Inventory (BDI) to assess depression which is different from the measure of depression in current study PHQ-9.

A study in 2003 was conducted in Australia showed that the prevalence of depression was 22.1% that is lower than this study⁽²³⁾. This lower prevalence reported in Australia may be because they used the PRIME-MD instrument to assess depression, which is different from the measure of depression in the current study PHQ-9. In 2015 a study by **Ciprandi et al.**⁽¹⁰⁾, in Italy showed that the prevalence of depression was 11% that is lower than this study. This lower prevalence reported in Italy may be due to that their sample included patients with better control asthma (high mean asthma control test score(ACT) 20 ± 4.4 in Italy compared to patients in present study $13.68\% \pm 6.150$). Also, they used hospital anxiety and depression scale

(HADS) to assess depression which is different from the measure of depression in current study PHQ-9.

A study (2010) in Brazil found that the prevalence of depression in patients with asthma was 53%, which is higher than this study⁽²⁴⁾. This higher rate may be due to that the sample size was 78 asthmatic patients, which is smaller than current study and they recruited patients from Asthma Outpatient Clinic of at tertiary care hospital that may receive severe asthma cases. Also, they used hospital anxiety and depression scale (HADS) to assess depression, which is different from the measure of depression in current study PHQ-9.

A study in Mexico (2006) found that the prevalence of depression among asthmatic patients was 8%, which is lower than this study⁽²⁵⁾. This reported rate may be because they used a smaller sample size of 60 asthmatic patients and included younger age group (34 year versus 41 year in the present study). Also, they used hospital anxiety and depression scale (HADS) to assess depression, which is different from the measure of depression in the current study PHQ-9.

The present study in the univariate and multivariate analyses showed a significant association between lower education level and depression in adult asthmatic patients. The lower the education level the higher the rate of depression. A similar association is found in the study of **Choi et al.**⁽²⁶⁾ in Korea and the study by **Tafti et al.**⁽²¹⁾ in Iran.

In the current study, the univariate analysis showed that age was not significantly associated with depression. Similar result is found in the study by **Ciprandi et al.**⁽¹⁰⁾ in Italy and a study in Turkey⁽²⁷⁾. However, another study **de Miguel Díez**⁽²⁸⁾ in Spain found older age was associated with depression among adult asthmatic patients.

The present study, in the univariate analysis, showed that married subjects had a higher prevalence of depression than single. Similar result is found in a study in Turkey⁽²⁹⁾. However, in multivariate, there was no significant association.

In current study, univariate analysis showed the significant association between poor asthma control and high prevalence of depression, which is also reported in the study of **Ciprandi et al.**⁽¹⁰⁾ in Italy and the study of **Choi et al.**⁽¹⁹⁾ in Korea. However, in multivariate analysis there was no significant association.

In the present study, both univariate and multivariate showed that the longer asthma duration was associated with higher prevalence of depression. Similar result is found by **Al-Habboo et al.**⁽⁹⁾.

There are some limitations to the present study; first, limitation it was not a community-based study, it was carried out in one chest hospital in Jizan region. This may explain the high prevalence of depression in this study. However, this hospital serves most asthmatic patients in Jizan region. Second, the depression was evaluated by a questionnaire and not by a clinician,

although PHQ-9 questionnaire is a good depression screening method.

CONCLUSION

The study showed that there was a high prevalence of depression among adult asthmatic patients in Jizan region, Saudi Arabia. The higher prevalence of depression was associated with lower education level, longer asthma duration, poor control of asthma and among married subjects.

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Conflict of interest: Nil.

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