Association of lifestyle factors with menstrual problems and its treatment-seeking behavior among adolescent girls[☆]

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ABSTRACT

Background: Lifestyle factors such as obesity, exercise, smoking, alcohol drinking, physical activity, and stress are related to menstrual problems among adolescents. Therefore, this study examines the association of lifestyle factors with menstrual problems among adolescent girls. Furthermore, the study also seeks to examine treatment-seeking behaviour for menstrual problems among adolescent girls.

Methods: Secondary data analysis was performed on cross-sectional survey data obtained from the Understanding the Lives of Adolescents and Young Adults (UDAYA) project survey. The sample size for this study was 12,707 adolescents girls aged 10–19 years. There are two outcome variables, i.e., menstrual problem and its treatment-seeking behaviour. The study employed the heckprobit selection model, which is a two-equation model.

Results: About 11% of adolescent girls suffered from menstrual problems, and among them, nearly one-third of adolescent girls sought treatment. The study noticed that menstrual problems were higher among adolescents who had severe depressive symptoms [β : 0.53; CI: 0.36, 0.70], were using substance [β : 0.03; CI: -0.24, 0.29], and were not involved in physical activity [β : 0.06; CI: -0.03, 0.15]. Adolescent girls from the richest wealth quintile were less likely to report menstrual problems [β : -0.15; CI: -0.32, -0.04], however, were 0.45 times significantly more likely to seek treatment for menstrual problems [β : 0.45; CI: 0.12, 0.78] than poorest adolescent girls.

Conclusions: There is a need to focus on improving health education on puberty and menstruation that may further improve the treatment-seeking for menstrual problems among adolescent girls, specifically in rural areas.

1. Introduction

Disorders in menses or its irregularities are a significant problem among adolescent girls. More than 75% of them experience some problems associated with menstruation.¹ Changes in the normal menstrual patterns of adolescent girls may affect their physical and psychological well-being.² Moreover, such disturbances have been well documented to have an impact on the physical and social activities of adolescents.³ Simultaneously, it has been found that lifestyle factors

such as obesity, exercise, smoking, alcohol drinking, physical activity, and stress are related to menstrual problems.⁴ In this context, worldwide research indicates that the prevalence of mental and emotional disorders and behavior in adolescents, especially girls, has been increased significantly in recent years, which may be due to the high level of limitations arising from gender roles.⁵ Besides, it is found that during the pubertal years, there are increases in depressive symptoms and anxiety.⁶ Previous studies have also shown that the onset of depression events is observed during adolescence and is associated with menstrual disorders.⁷

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However, some cross-sectional and qualitative studies have found a reverse causal relationship between depressive symptoms and menstrual disorders among young women.⁸ Further, Earlier literature reported that smoking status and depressive symptoms are related to menstrual problems, and the impact of depressive symptoms on menstrual problems is more substantial in never smokers.⁹

Studies addressing the effect of smoking and alcohol consumption on female reproductive function provide conflicting results.¹⁰ Smoking-related behavior may disturb hormonal changes of the menstrual cycle.¹¹ Moreover, daily physical activity helps maintain ideal body weight, with a rise in insulin sensitivity, and helps in the regularization of the menstrual cycle and overall feeling of well-being.¹² The study also found that a low level of physical activity has the strongest association with irregular periods. Women who are both obese and sedentary have a higher prevalence of irregular periods than normal-weight women who exercise moderately.⁴ Further, body mass index (BMI) plays a vital role in maintaining menstrual cycle regularity. Studies have shown that obesity causes many menstrual problems such as anovulation, irregularity, and adverse pregnancy outcomes, with lasting effects for children.¹³

There is a growing body of literature suggesting that the changes in hormone levels associated with lifestyle factors result in various menstrual problems among young women.¹⁴ However, the examination of these factors with menstrual problems in adolescents in low-resource settings has received little attention. Furthermore, it has been noticed that previous studies of the relationship between lifestyle factors and menstrual problems among young and adult women involved age-related differences. On the other hand, with regard to treatment-seeking behavior, due to cultural norms, adolescent girls commonly hold negative attitudes and beliefs towards menstruation.¹⁵ This study involving adolescent girls aged 10–19 years aimed to examine the association of lifestyle factors such as depressive symptoms, physical activity, and substance use with menstrual problems in adolescence and explore the treatment-seeking behaviour for menstrual disorders in adolescents. The study hypothesised that adverse lifestyle factors are positively associated with menstrual disorders during adolescence. It also hypothesised that adolescents with higher socioeconomic status are more likely to seek treatment for menstrual disorders.

2. Methods

2.1. Data

Secondary data analysis was performed on cross-sectional survey data from Understanding the Lives of Adolescents and Young Adults (UDAYA) project survey. The survey was conducted in two Indian states Uttar Pradesh and Bihar, in 2015–2016 by the Population Council under the Ministry of Health and Family Welfare, Government of India. The UDAYA collected detailed information on family, media, community environment, assets acquired in adolescence, and quality of transitions to young adulthood indicators. The sample size for Uttar Pradesh and Bihar was 10,350 and 10,350 adolescents aged 10–19 years, respectively. The required sample for each sub-group of adolescents was determined at 920 younger boys, 2,350 older boys, 630 younger girls, 3,750 older girls, and 2,700 married girls. The UDAYA adopted a multi-stage systematic sampling design to provide the estimates for states as a whole as well as urban and rural areas of the states. The detailed information on the sampling procedure and survey design was published elsewhere.¹⁶ The effective sample size for this study was 12,707 adolescents girls aged 10–19 years.

2.2. Variable description

2.2.1. Outcome variable

There are two outcome variables, i.e., menstrual problem and its treatment-seeking behavior. The first variable was formed using the

question “Have you had menstrual problem in the last three months?” if the response was yes, then the second outcome variable was formed using the question “Did you seek treatment for this complaint?” Both the outcome variable was recoded in 0 “no” and 1 “yes.”

2.2.2. Explanatory variables

1. Depressive symptoms were assessed by asking nine questions from the respondents; the respondent was asked about the symptoms for the past two weeks only. The questions included a. had trouble falling asleep or sleeping too much, b. feeling tired or having little energy, c. poor appetite or eating too much, d. trouble concentrating on things, e. had little interest or pleasure in doing things f. feeling down, depressed or hopeless, g. feeling bad about yourself, h. been moving or speaking slowly, i. had thoughts that respondent would be better off dead. All the above questions were asked on a scale of four, i.e., 0 “not at all,” 1 “less than one week,” 2 “one week or more” and 3 “nearly every day.” The scale of 27 points was then generated using egen command in STATA 14. (Cronbach alpha: 0.86). The variable was then recoded into three categories, i.e., a. Mild (0–9), b. Moderate (10–14) and c. Severe (15–27). Mild includes minimal and mild, moderate include moderate only and severe include moderately severe and severe. The categories were redefined for analytical purposes.
2. Substance use was recoded as “no” and “yes,” i.e., respondents who either consume any type of substance, which include either tobacco or alcohol consumption or do not consume tobacco or alcohol.
3. Physical activity is categorized as “yes,” i.e., engage in any physical activities and “no,” which involve respondents who do not engage in any physical activities. Physical activities also include respondents who participated in any games or sports.
4. Body mass index (BMI) was calculated using BMI Z-scores. The WHO recommended cut-off points for overweight and obesity were BMI-for-age Z-score $>+1$ SD and $>+2$ SD. The variable was recoded as thin (<-2 SD), normal (≥ -2 SD and ≤ 1 SD) and overweight/obese ($>+1$ SD).
5. Age was categorized into early adolescents (10–14 years) and late adolescents (15–19 years).
6. Education was recoded as no education, 1–7, 8–9, and 10 and above years of education.
7. Working status was coded as no “not working” and yes “working.”
8. Media exposure was coded as no exposure, rare exposure, and frequent exposure.
9. The wealth index was recoded as poorest, poorer, middle, richer, and richest.
10. Caste was recoded as Scheduled Caste and Scheduled Tribe (SC/ST) and non-SC/ST. The SC and ST are among the most disadvantaged socio-economic groups in India. The OBC is the group of people who were identified as “educationally, economically and socially backward”. The OBC is considered low in the traditional caste hierarchy but somewhere above the boundary of the most disadvantaged groups. The “other” caste category is identified as having higher social status.¹⁷
11. Religion was recoded as Hindu and non-Hindu. The category of non-Hindu was recoded as so because the frequency of other religions was very low.
12. Residence was available in data as urban and rural.
13. Data was available for two states, i.e., Uttar Pradesh and Bihar. As the survey was conducted in these two states only.

2.2.3. Statistical analysis

Univariate and bivariate analysis was used to carve out the preliminary results. Chi-square test was conducted to find the significance level for the bivariate associations. Additionally, the study employed

heckprobit selection model, which is a two-equation model.¹⁸ First, there is a selection model (in this study, referring to “Have you had menstrual problem in the last three months? (Yes or no)”). Secondly, there is an outcome model with a binary outcome (in this study refers to “Did you seek treatment for this complaint? (Yes or no)”). The model provides a two-step analysis and deals with the zero-sample issue, based on which it can accommodate the heterogeneity (i.e., shared unobserved factors) between respondents and then address the endogeneity (between occurrence menstrual problem and opting for its treatment) among adolescents.

3. Results

Fig. 1 displays the prevalence of menstrual problems among adolescent girl and their treatment-seeking behavior. About 11% of adolescent girls suffered from menstrual problems, and among them, nearly one-third of adolescent girls sought treatment.

The socio-demographic profile of the study population is presented in Table 1. It was found that seven per cent and ten per cent of adolescent girls had moderate and moderately severe/severe depressive symptoms, respectively. Only two per cent of adolescent girls were using substance use, one-third of adolescent girls were physically active, and nine per cent of girls were thin. The majority of respondents belonged to the late adolescent group, 36% of girls had 10 & above years of education, and 18% of girls were working. About 53% of girls had frequent media exposure, and 16% of girls lived in urban areas.

Table 2 provides the prevalence of menstrual problems and their treatment-seeking behavior among adolescent girls by background characteristics. The menstrual problem was significantly higher among adolescent girls who had moderate depressive symptoms (15.6%) than those who had minimal/mild ones (11.1%). Though, it was least among those who had moderately severe/severe depressive symptoms. Moreover, adolescent girls who were using substance use (21.8%) and physically active (11.7%) reported more menstrual problems than their counterparts. Similarly, the menstrual problem was more prevalent among overweight/obese (16.1%). However, the result was not significant. As expected, the prevalence of menstrual problems was higher among late adolescents (11.5%); however, early adolescents sought more treatment than late adolescents (36.2%). Adolescent girls with 10 & above years of education reported more menstrual problems (11.8%) than adolescents with no education (11.3%). Moreover, the prevalence of menstrual problems was higher among adolescent girls who had rarely (11.5%) or frequently (11.3%) media exposure than those with no media exposure. Media exposure among adolescent girls had a positive association with treatment-seeking behavior. Poorer girls reported significantly more menstrual problems (12%); however, the richest girls sought more treatment (42.3%). Likewise, the prevalence of menstrual

Fig. 1. Prevalence of menstrual problem among adolescent girls and their treatment seeking behavior.

Table-1

Socio-demographic profile of adolescents girls aged 10–19 years.

Background variables	Sample	Percentage
Depressive symptoms		
Minimal/mild	10,483	82.5
Moderate	915	7.2
Moderately severe/severe	1,309	10.3
Substance use		
No	12,399	97.6
Yes	308	2.4
Physical activity		
Yes	4,242	33.4
No	8,465	66.6
BMI Status^a		
Thin	299	9.1
Normal	2,867	86.9
Overweight/obese	132	4.0
Age (in years)		
Early adolescents (10–14)	580	4.6
Late adolescents (15–19)	12,127	95.4
Education (in years)		
No education	1,650	13.0
1–7	2,783	21.9
8–9	3,754	29.5
10 and above	4,519	35.6
Working status		
No	10,427	82.1
Yes	2,280	17.9
Media exposure		
No exposure	2,331	18.3
Rarely	3,625	28.5
Frequently	6,751	53.1
Wealth index		
Poorest	1,672	13.2
Poorer	2,321	18.3
Middle	2,773	21.8
Richer	3,141	24.7
Richest	2,800	22.0
Caste		
SC/ST	3,252	25.6
Non-SC/ST	9,455	74.4
Religion		
Hindu	9,975	78.5
Non-Hindu	2,732	21.5
Residence		
Urban	2,055	16.2
Rural	10,652	83.8
State		
Uttar Pradesh	8,626	67.9
Bihar	4,081	32.1

^a Only selected adolescents who were eligible for BMI measurement; SC/ST: Scheduled Caste/Scheduled Tribe.

problems was significantly higher among SC/ST girls (11.8%) than non-SC/ST counterparts. Though, the results were opposite for their treatment-seeking. Rural girls (11.7%) reported significantly higher menstrual problems than urban ones. At the same time, urban girls (35.5%) sought more treatment than their rural counterparts.

Estimates from the heckprobit model for menstrual problems and its treatment-seeking behavior among adolescent girls are presented in Table 3. Menstrual problem was 0.35 and 0.53 times significantly more likely among adolescent girls who had moderate [β : 0.35; CI: 0.21, 0.48] or moderately severe/severe [β : 0.53; CI: 0.36, 0.70] depressive symptoms respectively than those had minimal/mild symptoms. Similarly, adolescent girls those were using substance [β : 0.03; CI: −0.24, 0.29] and were physically inactive [β : 0.06; CI: −0.03, 0.15] were 0.03 and 0.06 times more likely to report menstrual problem respectively compared to those who were not using substance use and physically active. Late adolescent girls were 0.27 times significantly more likely to report menstrual problems [β : 0.27; CI: 0.06, 0.48] compared to early ones. However, late-adolescent girls were 0.19 times less likely to seek treatment for the menstrual problem [β : −0.19; CI: −0.66, 0.27] than their counterparts. The probability of menstrual problems to occur in

Table 2

Bivariate analysis for menstrual problem and treatment seeking among adolescent girls (10–19 years).

Background variables	Menstrual Problem (N = 12,707)		Treatment seeking (1334)	
	Percentage	p < 0.05	Percentage	p < 0.05
Depressive symptoms		*		
Minimal/mild	11.1			
Moderate	15.6			
Moderately severe/severe	9.4			
Substance use		*		
No	16.8			
Yes	21.8			
Physical activity				
No	10.3			
Yes	11.7			
BMI Status^a				
Thin	9.3			
Normal	13.4			
Overweight/obese	16.1			
Age (in years)		*		
Early adolescents (10–14)	5.9		36.2	
Late adolescents (15–19)	11.5		33.6	
Education (in years)				
No education	11.3		34.4	
1–7	11.0		33.8	
8–9	10.7		36.5	
10 and above	11.8		31.2	
Working status				
No	11.4		34.1	
Yes	10.4		31.6	
Media exposure				*
No exposure	10.7		30.7	
Rarely	11.5		32.1	
Frequently	11.3		35.5	
Wealth index		*		*
Poorest	11.6		26.9	
Poorer	12.0		28.9	
Middle	11.3		34.6	
Richer	11.6		33.5	
Richest	9.9		42.3	
Caste		*		*
SC/ST	11.8		32.0	
Non-SC/ST	11.0		34.3	
Religion		*		*
Hindu	11.0		33.3	
Non-Hindu	11.9		35.0	
Residence		*		*
Urban	8.6		35.5	
Rural	11.7		33.4	
State		*		
Uttar Pradesh	11.5		33.5	
Bihar	10.6		34.0	

^a Only selected adolescents where eligible for BMI measurement; SC/ST: Scheduled Caste/Scheduled Tribe; *if p < 0.05.

adolescent girls from the richest wealth quintile was low in comparison to adolescent girls from the poorest wealth quintile [β : -0.15 ; CI: $-0.32, -0.04$]. Adolescent girls from the richest wealth quintile were 0.45 times significantly more likely to seek treatment for menstrual problems [β : 0.45; CI: 0.12, 0.78]. Adolescent girls who lived in rural areas were 0.19 times significantly more likely to report menstrual problems [β : 0.19; CI: 0.09, 0.28] than urban areas. Moreover, rural girls were 0.06 times less likely to seek treatment for the menstrual problem [β : -0.06 ; CI: $-0.27, 0.15$] compared to urban ones. However, the result was not significant.

4. Discussion

This article examined factors associated with menstrual problems among adolescent girls with an emphasis on lifestyle factors. Also, this study explored the treatment-seeking for menstrual problems among them. The study is important as previously available studies only

Table 3

Estimates from heck probit model for menstrual problems and its treatment seeking behavior among adolescent girls aged 10–19 years.

Background variables	Outcome equation (12,707)	Selection Equation (1334)
	Coef. (95% CI)	Coef. (95% CI)
Depressive symptoms		
Minimal/mild	Ref.	
Moderate	0.35*(0.21,0.48)	
Moderately severe/severe	0.53*(0.36,0.7)	
Substance use		
No	Ref.	
Yes	0.03(-0.24,0.29)	
Physical activity		
Yes	Ref.	
No	0.06(-0.03,0.15)	
Age (in years)		
Early adolescents (10–14)	Ref.	Ref.
Late adolescents (15–19)	0.27*(0.06,0.48)	$-0.19(-0.66,0.27)$
Education (in years)		
No education	Ref.	Ref.
1–7	0.02(-0.14,0.17)	$-0.07(-0.37,0.23)$
8–9	$-0.01(-0.15,0.13)$	0.01 ($-0.27,0.27$)
10 and above	0.06(-0.09,0.20)	$-0.20(-0.48,0.09)$
Working status		
No	Ref.	Ref.
Yes	$-0.09(-0.2,0.01)$	0.05(-0.17,0.27)
Media exposure		
No exposure	Ref.	Ref.
Rarely	0.03(-0.11,0.17)	$-0.03(-0.3,0.23)$
Frequently	0.10(-0.03,0.23)	$-0.04(-0.29,0.21)$
Wealth index		
Poorest	Ref.	Ref.
Poorer	$-0.01(-0.16,0.13)$	0.04(-0.24,0.33)
Middle	$-0.07(-0.22,0.09)$	0.19(-0.11,0.49)
Richer	$-0.07(-0.22,0.08)$	0.18(-0.11,0.48)
Richest	$-0.15*(-0.32,-0.04)$	0.45*(0.12,0.78)
Caste		
SC/ST	Ref.	Ref.
Non-SC/ST	$-0.03(-0.13,0.08)$	0.04(-0.17,0.25)
Religion		
Hindu	Ref.	Ref.
Non-Hindu	0.08(-0.03,0.2)	$-0.07(-0.3,0.15)$
Residence		
Urban	Ref.	Ref.
Rural	0.19*(0.09,0.28)	$-0.06(-0.27,0.15)$
State		
Uttar Pradesh	Ref.	Ref.
Bihar	$-0.06(-0.15,0.03)$	0.04(-0.13,0.21)
/athrho	$-0.80*(-1.34,-0.26)$	
rho	$-0.66*(-0.87,-0.26)$	
Wald chi2	16.14	
Censored observation	11,373	
Uncensored observation	1,334	
Total observation	12,707	

SC/ST: Scheduled Caste/Scheduled Tribe; *if p < 0.05; Ref: Reference; Coef. Coefficient; BMI status not controlled due to low sample size.

examined prevalence and factors associated with menstrual problems and menstrual hygiene among adolescent girls, thus, ignoring the treatment-seeking for those menstrual problems.¹⁹ The study reported that around 11% of the adolescent girls suffered from menstrual problems. Previously available literature in different Indian settings has found a higher prevalence of menstrual problems among adolescent girls.²⁰ Furthermore, results noted that only one-third (33.7%) of the adolescent girls, who had a menstrual problem, took treatment for their menstrual problems. Treatment seeking for menstrual problems among adolescent girls is not discussed much in the Indian scenario; however, a study in urban Puducherry noted that around one-third (36%) of the women seek treatment for their menstrual problems from a health facility.²¹

The results significantly noticed higher menstrual problems among adolescents who had severe depressive symptoms. Depression has been noticed as one of the important factors associated with menstrual problems.²² However, the relation between depression and the menstrual problem may be bi-directional as the menstrual problem may also prompt depression among adolescents.²³ Menstruating girls live in constant fear of menstruation signs (such as anxiety, depression, abdominal cramps, back pain, and tiredness) that may arise before a week from menstruation and may last after a week of menstruation.²⁴

The study further noticed that substance use among adolescent girls might also increase the risk of menstrual problems; however, the results were not significant. Previously available literature unanimously agreed with the association between substance use and menstrual problems among adolescent girls.¹ Substance use may promote depression among adolescents, which further may be linked to menstrual problems among them.⁹ Adolescents who do substance use consume nicotine during smoking, and nicotine may reduce the endometrial blood flow, which may further explain the association between smoking and menstrual problems.²⁵ Results also noted that adolescents who were not involved in any physical activities were more likely to report menstrual problems; however, results were not statistically significant in the heck probit model. Previously available literature from various settings also confirmed the positive association between physical inactivity and menstrual problems among adolescent girls.²⁶ Physical activity is believed to be associated with lower water retention and autonomic reactions in a girl's body that protect them from menstrual disorders; therefore, menstrual problems may be higher among those adolescents who are not involved in any physical activities.²⁷

The study highlighted that late adolescents were more likely to report menstrual problems than early adolescents. Previously available literature also highlighted that menstrual problems increases with an increase in the gynaecological age among adolescent girls.²⁸ Furthermore, treatment-seeking for menstrual problems was higher for early adolescents than late adolescents; however, results were not statistically significant. At the early ages of menstruation, adolescent girls tend to have poor knowledge about the menstrual cycle, and this could be attributed to their higher treatment seeking than late adolescents. Furthermore, as age increases, girls started seeking advice from their mothers and friends that may result in low treatment-seeking for menstrual problems among adolescent girls.²⁹ Chan et al. believe that adolescent girls start accepting the menstrual problems as their family do not support them and taught them to avoid visiting doctors for such problems.³⁰

Results also noticed that adolescent girls from the richest wealth quintile were less likely to have menstrual problems and more likely to seek treatment for menstrual problems. Previously available studies are in line with our above finding.³⁰ It is very much likely that an increase in wealth improves menstrual hygiene,³¹ which may further result in lowering the susceptibility to genital infections and therefore reducing menstrual problems. The study highlighted that menstrual problems were higher among rural girls; however, the treatment-seeking for menstrual problems was lower. Adolescent girls in rural areas have limited access to knowledge about menstrual hygiene, which may be attributed to their higher menstrual problems.³² Furthermore, girls in rural areas generally do not prefer to disclose their menstrual problems, which may be attributed to their lower treatment-seeking for menstrual problems. Also, limited health-care facilities in rural areas could hamper treatment-seeking among adolescent girls.

5. Strengths and limitations of the study

The data is cross-sectional in nature and therefore limits our understanding of possible causal inferences. Few study variables, such as substance use and physical activity, were self-reported and may not depict actual scenarios. Moreover, data is limited to only two states of India; therefore, study findings shall not be generalized to the country

population. More research would be needed that shall extend upon the findings of this study. Despite the above limitations, the study has some strengths too. The study findings are based on large sample size. This study also explores various factors associated with treatment-seeking for menstrual problems among adolescent girls.

6. Conclusion

The prevalence of menstrual problems among adolescent girls is a serious concern; furthermore, suboptimal treatment-seeking for menstrual problems is another issue. The study noticed that menstrual problems were higher among adolescents who had depressive symptoms, using the substance, and were not involved in physical activity. Furthermore, menstrual problems were higher among late adolescents, adolescents from poor households, and from rural households. Overall, the treatment-seeking for menstrual problems was dismal among adolescents, specifically among adolescents from poor households. Treatment seeking for menstrual problems among adolescent girls should be explored as very limited girls were seeking treatment for menstrual problems. There is a need to focus on improving health education on puberty and menstruation that may further improve the treatment-seeking for menstrual problems among adolescent girls, specifically in rural areas. Adolescent girls feel threaten and embarrassed about being asked about the menstruation²⁹; therefore, it is recommended to have a women-friendly health care system in place so that girls can seek treatment for their menstrual problems without any hesitation. Moreover, it is important to educate adolescent girls about various menstrual problems before they start menstruating so that they can enjoy a healthy menstrual life.

Author's contribution

Shekhar Chauhan: Writing-Original draft. **Pradeep Kumar:** Supervision, Conceptualization, Analysis, Methodology, Validation, Acquisition of data. **Ratna Patel:** Writing-review & editing, Validation. **Shobhit Srivastava:** Conceptualization, Methodology, Supervision, software, validation, Acquisition of data. **David Jean Simon:** Writing-review & editing. **Muhammad T:** Writing-Original draft, Writing-review & editing, Validation.

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Declaration of competing interest

The authors declare that they do not have conflict of interests.

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