

Eating Attitudes Related to the Nutritional Status of University Girls in Peshawar Khyber Pakhtunkhwa, Pakistan

Ayesha Syed¹, Zia ud Din¹,
Falak Zeb¹, Fazia Ghaffar²,
Saleem Khan¹,
Mudassir Iqbal³ and
Bilal Ali Khan¹

Abstract

Eating attitudes toward food may have an effect on overall health and contribute to cultural differences in non-communicable diseases. A cross-sectional study was conducted on 250 University girls in Peshawar to investigate eating attitude in relation to nutritional status. Girls were assessed in personal regarding eating attitude, anthropometric, dietary and biochemical indices. Based on Eating Attitude Test (EAT-26) scales, girls with and without eating disorders (anorexic and non-anorexic groups) were identified. In SPSS, An independent t-test and chi-square test were used to evaluate association between anemia and risk factors. Point-biserial and Pearson product-moment correlation coefficient showed positive association of EAT-26 and body image score with Body Mass Index (BMI), Waist Circumference (WC), Waist to Hip Ratio (WHR), Total Body Fat (TBF) and Visceral Body Fat (VBF) while negative correlation with Hemoglobin (Hb) ($p < 0.01$). In the logistic regression analysis, two major dietary patterns, healthy (49%) and (51%) unhealthy were identified. Anorexic girls were 69 (27.6%) and non-anorexic 181 (72.4%). Means weight, BMI, WC, WHR, TBF and VBF of the non-anorexic group were significantly lower than those of anorexic groups ($p < 0.05$). Based on BMI and WC, more anorexic girls were found overweight and obese in comparison to the rest ($p < 0.05$). Risk factors associated with anemia included underweight, poor eating attitude, anxiety/depression and stress; supplements not using and unhealthy dietary pattern. The study concluded that University girls are at higher risk for getting eating disorders which may lead to both acute and chronic health problems.

Keywords: Eating attitudes; Visceral body fat; Eating disorders; Anemia

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Introduction

The measurement of eating attitude can be useful to recognize the relationship of people's with food and their related behavioral choices. It is evident that food related various behaviours may contribute to social and cultural changes in non-communicable diseases by affecting the overall health [1]. Different studies related to eating and nutrition have emphases on physiological and societal aspects, but it is thought to produce merely limited knowledge if disassociated from their relevant social background; that is a reason, a psychological, social and cultural approach is compulsory [2]. It is thus believed that people develop a relationship with food and the term "eating attitude" seems to better describe it [3-8].

Different people have different attitudes towards eating, like adolescent girls are mostly conscious about their body weight loss, body shape and dissatisfied from their body appearance. Mostly adolescence girls are practicing unhealthy dieting for losing weight to become thin and slim. Preventive measures are needed to reduce these nutrition oriented behaviors as they can cause psychosocial and medical risks. These risks are not occasionally connected with the increasing risk of medically established eating related with the increasing risk of lethal behavior such as smoking, consumption of alcohol and psychoactive substances, developmental depression and suicidal behavior. Disturbed eating behaviors are more prevalent in females. Mostly teenage girls are at high risk of these nutrition related attitude because they are more anxious about their diet,

- 1 Department of Human Nutrition, The University of Agriculture, Peshawar, Pakistan
- 2 College of Home Economics, University of Peshawar, Pakistan
- 3 Department of Agriculture Chemistry, The University of Agriculture, Peshawar, Pakistan

Corresponding author: Falak Zeb

✉ falak106@gmail.com

Department of Human Nutrition, The University of Agriculture, Peshawar, Pakistan.

Tel: +92 919216903

Fax: +92 91 9216520

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weight and body appearance. Serious disturbance in food related behavior is a major determinant of eating (to eat too little or too much) [9].

Unhealthy eating patterns lead to various health problems including bulimia and anorexia nervosa, and unspecified disturbed eating behaviors. Among eating disorders, bulimia and anorexia nervosa are more prevalent in the developed western countries. Our culture expect from all women in a mean of desirable body shape, which suggest a strong message of beauty. A young girl divides herself and her esteem which dependent on the echo she sees in the mirror or on the number of pounds she reads on the balance [10,11]. Individuals suffered from anorexia nervosa refuse to maintain elevated body weight (above or below the normal weight), they have extreme fear of gaining weight and express their own body size and appearance as there is substantial disturbance [12]. But who appear with bulimia nervosa having excessive food intake, with no sense of controlling over eating and then they use a compensatory behavior to prevent weight gain, such as starvation, excessive physical activity, induced vomiting, misuse of laxatives and diuretics [13].

In particular, the reasons for the progression of globalized eating disorders in University adolescent girls are they living away from home develop disturbed eating attitude, lifestyle changes and showing undesirable and abrupt modification in traditional diet and food practices [14-16]. It is evident from previous studies that among college students the consumption of fast food is increasing day by day [17-19]. These unhealthy food practices may be linked to various factors like away from home for long time, being with friends, study burden, limited availability of healthy foods and more choices of fast foods in the universities. These factors also influenced by mass media [20]. Therefore the current study was conducted to hypothesize that disturbed eating attitude may affect the nutritional and health status of the University girls.

Material and Methods

This cross-sectional study was carried out in two universities, i.e., University of Peshawar and The University of Agriculture, Peshawar. From each University, 125 female students (both boarder and non-boarder; undergraduates and graduates) were randomly selected. Selection criteria included university girls, who were apparently healthy and free from any chronic disease. All the subjects (n=250) were measured and interviewed in personal using standard procedures.

Anthropometric assessment

WHO anthropometric procedure was used to measure the height, weight, BMI and waist & hip circumferences of adolescent's girls. Beam scale was used to measure the individual's weight nearest to 0.01 Kg while height was measured by using height board nearest 0.01 cm. The waist circumference was measured through measuring tape by placing between iliac crest and lower rib margin around the abdomen midway. The readings were taken to the nearest 0.1 cm and the individuals were categorized as normal <80 cm, overweight 80-88 cm and obese >88 cm. The measuring tape was placed around the buttocks for measuring

hip circumference nearest to 0.1 cm. Body mass index was calculated from weight/height readings. Similarly, WHR was designed from the waist and hip readings and data was equated with international classifications to establish the subjects' nutritional status as Andriod shape (WHR >0.8) and Gynoid shape (WHR <0.8).

Haemoglobin, glucose and blood pressure determination

Haemoglobin concentration in the whole blood of girls was determined by transferring 2-3 drops of the sample to a disposable hemocue micro-cuvette using Hemocue Hb 301. Random blood glucose level of the study subjects were measured using blood glucometer. This was a simple and feasible way to determined blood glucose and Hb level by finger prick method. Before taking the reading, information about the last meal was obtained from the subject. Results were recorded in mg/dl. Using sphygmomanometer, blood pressure of the selected women was recorded with the subjects in a comfortable seated position and the right arm fully exposed and resting on a supportive surface. Two readings of both systolic and diastolic blood pressure were taken at least 5-10 mints apart and the mean of the two measurements was calculated and recorded. Blood pressure measurements were recorded on a form.

Eating attitude of the subjects

Eating attitude of the girls was evaluated using the Eating Attitude Test (EAT-26). EAT-26 test has three sub-scales, Dieting; showing the number of girls who were on diet, Bulimia; subjected to extreme intake of food having no sense of controlling eating and oral control; being characterized by having orally control on food. A questionnaire was developed to evaluate body image of the girls, so this questionnaire was used to determined either they are satisfied or dissatisfied from their body image because girls have more perception about their body appearance and want to be look slimmer and smart.

Dietary pattern assessment

Semi quantitative Food Frequency Questionnaire (FFQ) was used to get data on dietary intake and food frequency based on monthly data including more than 100 food items. Using data from FFQ, adolescent dietary pattern (healthy and unhealthy) were estimated. There was twenty seven food groups were listed in FFQ which is based on similar nutrients profile. Based on frequent consumption of all food groups two major dietary patterns were identified including healthy and unhealthy. Dietary patterns were labeled based on interpretability and characteristics of the items retained in each pattern.

Statistical analysis

All data was entered into SPSS (SPSS Inc. 2007). Different files for each dataset (anthropometry, dietary, nutritional and health status, eating attitude and body image) were generated to minimize data entry errors. For checking data errors and distribution descriptive statistics like mean, mode, median and frequency were used. Exploring the data by descriptive statistics helped to determine appropriate statistical techniques for data

analysis. Health, nutritional and dietary risk factors for anemia in girls was identified using logistic regression at 95% confidence intervals.

Results and Discussion

Results

Socio-demographic characteristics: Table 1 depicts the demographic and socioeconomic status of the girls. Mean \pm Standard Deviation (SD) for age (years), family members and family income (Rupees in thousands) per month of the girls were 22 ± 2.02 , 7.32 ± 3.75 and 66 ± 20 respectively. A total of 104 (42%) and 146 (58%) of girls were from UOA and UOP respectively. Similarly, 143 girls (57%) were boarder and 107 girls (43%) were non boarder. Out of the cohort, 60 (24%) girls were living in joint family system. Majority of the girls (n=220, 88%) were having their own residential accommodation, while only 30 (18%) of girls were in rented houses. The results explore that majority of the study girls were from established families, living in their own residential accommodation in nuclear family system.

Dietary pattern of the girls: Dietary patterns of the individuals refer to the varieties, proportions, quantities and frequency of

food groups or items, which they used in their routine life. The dietary pattern of the girls was determined using data collected through semi quantitative Food Frequency Questionnaire (FFQ). Using appropriate statistical test, two dietary pattern were determined; healthy, being characterized by nutrient rich food items and unhealthy, being characterized by energy rich food item. Food items being identified in the healthy and unhealthy dietary patterns of the girls. Overall, 49% of girls had healthy while 51% had unhealthy dietary pattern (Table 2).

Nutritional and health status of the subject: Nutritional status of the cohort was determined by assessing anthropometric and biochemical measurements. Based on BMI, 21%, 55%, 17.2% and 7% of the respondents were underweight, normal, overweight and obese respectively. Similarly, based on waist circumference, 60%, 21% and 19% of the respondents were normal, overweight and obese respectively; while 16% and 84% of the cohort had android (apple) and gynoid (pear) shape based on WHR. Results on blood Hb level showed that 40% and 60% of the cohort were anemic and non-anemic respectively. WC indicates overall central obesity; based on this measurement, 40% girls were having tendency towards central obesity. Results on WHR show that 16% girls were of android shape as they have more fats accumulated

Table 1: General socio-demographic characteristics of the cohort (n=250). *SD: Standard Deviation; AUP: Agriculture University Peshawar; UOP: University of Peshawar.

Characteristics		Mean \pm SD*/No. of girls (%)
Age (Mean)		22 \pm 2.02
Family members (mean)		7.32 \pm 3.75
Family Income in Thousand (Rs.)	-	66 \pm 20
University Status	AUP*	104 (42%)
	UOP*	146 (58%)
Current Residency Status, N (%)	Boarder	143 (57%)
	Non-Boarder	107 (43%)
Family type, N (%)	Joint	60 (24%)
	Nuclear	190 (76%)
Home ownership, N (%)	Own	220 (88%)
	Rented	30 (18%)

Table 2: Dietary patterns of the cohort.

Healthy Pattern	Unhealthy Pattern
Red/Orange/colored vegetables (carrots, tomato, bringal etc.)	Rice pulao, kitchri, biryani, plane rice
Green/dark green vegetables (spinach, salad, okra, peas etc.)	Wheat based Readymade (parata/fries/bread) & chips
White Meat (fish, mutton, poultry etc.)	Burger/high energy junk
All Other vegetables (except colored vegetables)	Cream
Egg (fried, boiled, omlate)	Ready to Use Biscuits/cake/rusk/snake items high energy
Fresh Milk	Cheese
Seasonal fruits (all available)	Sweet Dishes (Zarda +Custard+ Kheer)
Vegetable oil	plain rice
Red Meat (beef, minced meat)	Ice-cream/energy rich snakes
Commercially available cereal	Packed Juices
Salad	Butter
Fresh fruit juices	-
Yogurt and Buttermilk	-
Starchy vegetables	-
Rice with daal/yogurt	-
Legumes (cooked alone)	-
N=122 (49%)	N=128 (51%)

in their abdominal region and were centrally obese. Based on Hb, 40% girls were anemic indicating relatively high tendency in the girls towards anemia (Table 3). The sound clarification for our finding that individuals who were underweight having less disturbed eating attitude in comparison to over-weight and obese. Psychological basis are also the main factor for disturbed eating behavior even normal BMI individual can also adopt these disorders.

Correlation between eating attitude scores and nutritional status indices of girls: Table 4 illustrates results on correlation of EAT-26 and its sub-scale scores, body image scores with anthropometric and health parameters. The association of EAT-26 with BMI, WC, WHR, TFAT and VFAT was positively correlated while negatively correlated with Hb ($p < 0.01$). The relationship of dieting scale with BMI, WC, HC, WHR, TFAT and VFAT was strongly positive ($p < 0.001$) and mildly associated with DBP ($p < 0.05$). The correlation of bulimia with age and blood Hb was negative while positive with WHR. Trend of association of oral control with anthropometric measurements were different in comparison to EAT-26, dieting and bulimia scores; it was negatively associated with BMI, WC, WHR, TFAT, VFAT, Hb and RBG ($p < 0.05$). Similarly the relationship of body image scale (BIS) with BMI, WC, WHR, TFAT, VFAT, and SBP was positive ($p < 0.05$). More or less similar trends in findings were reported as in previous studies on eating attitude and body measurements.

Nutritional status and eating attitude scores by EAT groups: Table 5 shows findings of girls' nutritional and eating characteristics,

and body image by EAT groups. The mean values of weight (kg), height (cm), BMI, WC (cm), HC (cm) and WHR of anorexic group were 57.8 ± 9.0 , 159.0 ± 7.0 , 24.1 ± 9.1 , 82.1 ± 11 , 98.4 ± 9 and 0.7 ± 0.06 respectively while of non-anorexic were 52.7 ± 9.2 , 160 ± 7.7 , 22 ± 4.6 , 77 ± 10.5 , 97 ± 7.2 and 0.7 ± 0.07 respectively. Means weight, BMI, WC and WHR of the anorexic group were significantly lower than those of non-anorexic groups ($p < 0.05$). Means percent TBF and VBF of anorexic group were $33.5 \pm 7.1\%$ and $6.4 \pm 1.5\%$ while of non-anorexic group were $29.5 \pm 7\%$ and $5.3 \pm 1.6\%$ respectively; these values were significantly different among the groups ($p < 0.05$). Means Hb (mg/dl), RBG (mg/dl), SBP (mmHg) and DBP (mmHg) of anorexic group were 11.5 ± 1.2 , 99.5 ± 16.3 , 113 ± 13.4 and 71.9 ± 13.5 while for non-anorexic were 12 ± 1.1 , 109 ± 21 , 112 ± 12.2 and 71.4 ± 8.7 respectively; non-significant differences in these means were evident among groups ($p > 0.05$). As expected, mean scores of EAT 26, dieting scale, bulimia scale and oral control scale of anorexic group were significantly higher than those of non-anorexic group ($p < 0.05$). The mean value of BIS for anorexic group was 24.1 ± 8.7 while for non-anorexic group was 18.4 ± 8.1 ; this difference was significant ($p < 0.05$).

Discussion

Dietary pattern of the girls: There are long lasting impacts of unhealthy eating and sedentary physical activity on the physical health of adolescents [21]. Therefore the energy imbalance may occurred due to these unhealthy behaviors, alone or in combination [22,23] and the individual probably become

Table 3: Nutritional and health status of Cohort (n=250). *BMI: Body Mass Index; *WC: Waist Circumference; WHR: Waist to hip ratio; Hb: Hemoglobin.

Characteristics	N (%)
BMI*	
Underweight (18.5)	53 (21%)
Normal (18.5-24.99)	137 (55%)
Overweight (25-30)	43 (17.2%)
Obesity (>30)	17 (7%)
WC*	
Normal (<80 cm)	137 (60%)
Overweight (80-88 cm)	53 (21%)
Obese (>88 cm)	47 (19%)
WHR	
Andriod shape (WHR >0.8)	41 (16%)
Gynoid shape (WHR <0.8)	209 (84%)
Hb	
Anemic (<12 mg/dl)	99 (40%)
Normal (12-16 mg/dl)	151 (60%)

Table 4: Correlation of girls total EAT 26 score, eat 26 sub-scales and body image scores' with their anthropometric and health measurements. EAT-26: Eating Attitude Test 26; ** $p < 0.001$; * $p < 0.05$; HC: Hip Circumference; TFAT: Total Fat; VFAT: Visceral FAT, RBG: Random Blood Glucose; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure.

	Age	BMI	WC	HC	WHR	TFAT	VFAT	Hb	RBG	SBP	DBP
EAT-26	-0.075	0.255**	0.203**	0.04	0.196**	0.260**	0.277**	-0.204**	-0.109	0.0805	0.065
DIETNG	0.038	0.460**	0.389**	0.182**	0.357**	0.511**	0.537**	-0.087	0.042	0.09	0.127*
BULM	-0.173*	0.029	0.072	-0.056	0.127*	0.102	0.072	-0.192**	-0.101	0.099	0.054
ORAL	-0.133*	-0.209**	-0.196**	-0.085	-0.202**	-0.280**	-0.275**	-0.143*	-0.210**	-0.130*	-0.157*
BMAG	-0.003	0.323**	0.280**	0.092	0.270**	0.275**	0.291**	-0.064	0.096	0.124*	0.083

Table 5: Mean nutritional and eating characteristics and body image by EAT groups. BMI: Body Mass Index; NS: Nutritional Status; BIS: Body Image Status.

Characteristics	EAT groups, Mean \pm SD		p-value	
	Anorexic (n=69)	Non Anorexic (n=181)		
Anthropometric	Weight (Kg)	57.8 \pm 9.0	52.7 \pm 9.2	<0.001
	Height (cm)	159.0 \pm 7.0	160 \pm 7.7	NS
	BMI	24.1 \pm 9.1	22 \pm 4.6	<0.001
	WC	82.1 \pm 11	77 \pm 10.5	0.001
	HC	98.4 \pm 9	97 \pm 7.2	NS
	WHR	0.7 \pm 0.06	0.7 \pm 0.07	0.001
Body Composition	Total Fat (%)	33.5 \pm 7.1	29.5 \pm 7	<0.001
	Vis Fat (%)	6.4 \pm 1.5	5.3 \pm 1.6	<0.001
Health	Hb	11.5 \pm 1.2	12 \pm 1.1	NS
	RBG	99.5 \pm 16.3	109 \pm 21	NS
	SBP	113 \pm 13.4	112 \pm 12.2	NS
	DBP	71.9 \pm 13.5	71.4 \pm 8.7	NS
Eating Scale	EAT 26	30.3 \pm 11.8	12.9 \pm 4.2	<0.001
	Dieting scale	16.3 \pm 6.4	5.5 \pm 5.1	<0.001
	Bulimia scale	5.1 \pm 2.7	2.4 \pm 2.1	<0.001
	Oral control	8.9 \pm 4.3	5.4 \pm 4.0	<0.001
BIS	-	24.1 \pm 8.7	18.4 \pm 8.1	<0.001

overweight or underweight. Lower intake of nutrient dense food leads to various nutrient deficiencies [24]. In developed countries, obesity and overweight in adolescence are mostly related to high consumption of energy dense food and lower intake of nutrient dense food items with sedentary physical life according to National Health and Medical Research Council Australia [25]. The factors like, environmental, hormonal, social and lifestyle alteration having potential for changes in food choices are important in controlling over dietary preferences [26]. The increase in sleeping time during adolescence is also affecting the eating behaviors and routine intake of food [27]. Hormonal changes may be implicated in a preference for salty, sweet, or high fat foods [28,29]. The food preferences and choices can also be influenced by dietary preferences of family member and peers, television advertising and social marketing [30]. These modifications, attached with the ready availability of cheap food items and beverages, high in calories and low in nutrients [31] can lead to replacement of healthy food choices with fatty and sugary food choices. A study revealed that the mean daily intake of milk and milk products, pulses, green leafy vegetables and fruits were obviously inadequate and having low healthy food practices of rural adolescent girls in India [32]. The existing result of our study is similar with Kotecha et al. [21], who also reported that over half of the adolescent students consumed unhealthy foods including fast and junk food [33].

Nutritional and health status of the subjects: The current study findings suggest that poor dietary pattern may be linked with undernourishment and anemic status of the study girls. Girls have more desire to attain an ideal lean body shape in comparison to boys; this may lead to the development of eating disorders. Genetic and under nutrition are the reasonable factors for under-weight individuals. Pappas et al. [31] observed a high prevalence of under nutrition in Pakistani population in

young age group due to disturbed eating pattern [34]. There is a high prevalence of malnutrition with disturbed eating behaviors as reported previously in a study of eating disorder in medical students in Karachi [35]. Another study conducted in a public school in Delhi also revealed the prevalence of overweight and obesity amongst affluent girls as 31% and 7.5% respectively and linked with unhealthy dietary habits [36]. A similar study was conducted amongst adolescent girls of Chennai, India in 1998 that reported 9.6% of the girls were overweight and 6% were obese [37]. In the present study, 40% were anemic (Hb <12 mg/dl) which was higher than an estimate of 22% in an earlier study in urban [38], and 27% in peri-urban adolescent school girls [39], while somehow similar to 44% in adolescent female garment factory workers of India [40]. Relatively high prevalence of anemia may be due to lack of proper education on anemia and iron rich sources. The high prevalence of anemia and iron deficiency in our community can be related to a similar kind of diet consumed in these areas. Though both WC >80 cm and WHR >0.85 denote central obesity, the prevalence of obesity was 19% using the criterion WC >80 cm and 16% using WHR >0.85 amongst adolescent girls. WC is an indicator for the absolute adipose tissues while WHR indicates the relative retentions of central fatty mass [41]. This may categorize the prevalence of obesity by using two criteria i.e., central obesity by WC >80 cm or WHR >0.85. Ramachandran et al. [36] found the prevalence of obesity (as per International Obesity Task Force (IOTF) definition of obesity) to be 2.7% in Indian adolescent girls belonging to low, middle as well as high-income groups which is low as compared to that found in our study [42]. In current study, relatively higher prevalence of obesity may be due to the reason that half of the study subjects were boarder where access to entertainment activities involving physical exertion is limited.

Correlation between eating attitude scores and nutritional status indices of girls: Relationship of disordered eating attitudes

with body composition and anthropometric indices in physical education students was positive with weight, BMI, WHR, HC, and WC [43]. Liao et al. [23] reported positive relationship between BMI and EAT-26 score in male and female Chinese medical students [44]. Significant positive correlations were found between EAT-26 score and body weight, BMI and mid-upper arm, waist and HPs [45]. Altug et al. [4] found positive correlation between eating disorders and weight in Turkish female university students [46]. In a study, in adolescent females, EAT-26 score showed significant correlations with BMI, Waist Perimeter (WP) and Fat Mass (FM) [47]. There was significant positive correlation between EAT-26 and percentage body fat in a comparative study on eating attitude among college students [48]. Various studies suggest that in different cultural societies were positive correlation between body shape distortion score and EAT-26 scores [49].

Nutritional status and eating attitude scores by eat groups:

Wong et al. conducted a study and found that about 55% of the students had normal body size, while 45% of the students had abnormal body size based on BMI. The difference between boys and girls body sizes was highly significant ($p < 0.001$). More girls were significantly normal than boys ($p < 0.001$). Similarly, 43.9% students were satisfied with their current body size, while 43.3% students were not satisfied with their current body size respectively. Most (50.6%) of the girls were not satisfied, while

majority (48.4%) of the boys were satisfied with their current body size. They further reported that the mean EAT-26 score was 8.66 ± 7.36 for the students, while the disturbed eating behaviors rate of the students was 8.6%. Statistically a significant difference ($p < 0.05$) was found between the eating disorders of boys and girls. The eating disorder ratio of girls was higher than boys ($p < 0.05$) [50]. Memon et al. [26] also performed a cross-sectional study and found that majority of the students were at high risk of eating disorders, screened by EAT-26, while their nutritional status was normal according to their BMI ($18.5-25 \text{ kg/m}^2$) [35].

Conclusion

Mean anthropometric and health measurements of the subjects were in the normal recommended range except Hb, which was recorded below normal range. Anorexic were 69 (27.6%) while non-anorexic were 181 (72.4%). The prevalence of anemia in the study girls was 40%. The association of EAT-26 with BMI, WC, WHR, TFAT and VFAT was positively correlated while negatively correlated with Hb ($p < 0.01$). Eating disorders including, dieting, bulimia and oral control were among the potential risk factors for anemia.

Authors Disclosure

All authors have no conflict of interest regarding this paper.

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