Knowledge and Practice of Eating Disorders among a Group of Adolescent Dental Patients

Hicks TM* / Lee JY** / Nguyen T*** / La Via M**** / Roberts MW*****

***Objectives**: The objectives are to ascertain how much is known about the eating disorders of bulimia and anorexia nervosa in a group of female adolescents, to determine if they had practiced behaviors consistent with these eating disorders, and to determine if there was a disconnect with actual and perceived healthy weight status. **Study Design**: 126 research subjects completed a survey instrument. Embedded in the eighteen question survey were the five "SCOFF" questions, to determine if an eating disorder may exist. The BMI percentile was obtained for all participants. **Results**: 18.3% of the research sample may have an eating disorder as predicted by the SCOFF questions. Of those with a suspected eating disorder, only 38% could correctly identify the best description of bulimia nervosa and 50% for anorexia nervosa. The BMI percentiles were higher in the group suspected of having an eating disorder. **Conclusions**: Young adolescent females are at risk for eating disorders. Educational interventions should be directed at this young age group. If the at-risk individuals knew more about the consequences of these disorders, they may be less likely to practice the behaviors.*

***Keywords**: bulimia, anorexia, eating disorders, body mass index, adolescent*

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INTRODUCTION

Eating disorders can have devastating health consequences. It has been estimated that about 8% of women suffer from either anorexia nervosa or bulimia nervosa.[1,2] When these numbers are extrapolated to the general population, 24 million people in the US, and 70 million worldwide, deal with the symptoms of these disorders.[3] While some men are at risk, these eating disorders are overwhelmingly more prevalent in females with less than 10% of all cases of anorexia nervosa and bulimia nervosa attributed to males.[4,5] Long term studies have shown an increase in the incidence of eating disorders since the 1950s and these disorders are now the third most common chronic illness among adolescents.[6,7]

Depending on the eating disorder, numerous health problems including heart failure, diabetes and loss of menses in females, as well as low self-esteem possibly leading to suicide have all been described.[8,9,10] The mortality rate of females aged 15-24 with anorexia nervosa has been estimated to be 0.56 percent, 12 times higher than the annual death rate for this age group in the general population.[11] It has also been found that twenty percent of those suffering from anorexia will prematurely die from complications linked to the disorder.[3] Anorexia can also lead to oral changes associated with starvation and nutritional deficiencies.[12] Roberts[13] found gingival and plaque indexes to be increased in a case study of 47 patients. He reported that depression and distorted self-perception associated with anorexia nervosa may explain the lack of good oral hygiene. Patients with bulimia often have more severe oral complications. Their diet commonly contains a high level of sugar and carbohydrates, and chronic vomiting can expose the teeth to an acidic environment leading to enamel erosion patterns (perimolysis). Enlarged salivary glands are also a common finding among bulimic patients. This is often associated with xerostomia, which can contribute to an increase in dental caries.[14]

Despite the oral implications of these disorders, it has been shown that dentists are often not well informed about eating disorders and the oral cues that accompany them. In a study of 576 dentists and dental hygienists, Debate[15] found that more dental hygienists than dentists could identify oral manifestations of eating disorders. She also found that only 16% of dentists surveyed had a high knowledge of oral cues associated with eating disorders.

Hoek and van Hoeken[3] found the prevalence rate for anorexia is highest among females age 15-19, while those with the highest risk for bulimia are females age 20-24. The average age of onset of anorexia is 17 years of age.[16] Others have found that the age of onset is even younger, with the average age being as low as 14 years of age, and several cases beginning as young as 10 years of age. Young individuals, especially those in the high school age group, are specifically at risk for developing eating disorders due to personal, family, and peer pressures.[17]

* Travis M. Hicks, DDS, MS, Private practice
** Jessica Y. Lee, DDS, MPH, PhD, Professor, Department of Pediatric Dentistry, University of North Carolina School of Dentistry.
*** Tung Nguyen, DMD, MS,Clinical Assistant Professor, Department of Orthodontics, University of North Carolina School of Dentistry.
**** Maria La Via, MD, Associate Professor and Medical Director for Eating Disorders, Department of Psychiatry, University of North Carolina School of Medicine.
***** Michael W. Roberts, DDS, MScD, Henson Distinguished Professor and Associate Chair, Department of Pediatric Dentistry, University of North Carolina School of Dentistry.

Send all correspondence to: Michael W. Roberts, Department of Pediatric Dentistry, University of North Carolina School of Dentistry, 228 Brauer Hall, CB# 7450, Chapel Hill, NC 27599-7450

Phone: (919)966-2739

Email: mike_roberts@dentistry.unc.edu

While many people suffer from various eating disorders, they often go undiagnosed and untreated. Striegel-Moore[18] found that 10% of individuals with an eating disorder receive treatment for it. Due to oral implications of the disorders, such as perimolysis and caries, dentists and dental hygienists are often the first health providers to have the opportunity to identify a pattern associated with an eating disorder.[13]

Campbell and Roland[19] have shown that family and peers are usually the first to recognize a medical concern in loved ones, and are the ones who most commonly refer them for medical evaluation. Several studies have assessed lay people's understanding of eating disorders, but most addressed individuals in their twenties and older.[20] Few studies have looked at adolescents' knowledge of eating disorders and none have looked at children younger than high school age.[21] Because eating disorders are being seen increasingly in younger children, it is important that we determine the level of understanding of these disorders in this age group.

While eating disorders among women have been studied in great detail, less is known about young girls and their knowledge and practices of eating disorders. To better understand this younger age group of females, this study surveyed a cohort of female adolescent patients between the ages of 12-17 years with the specific aims to:

1) determine how much they know about the eating disorders of bulimia and anorexia nervosa;

2) determine if they have practiced behavior consistent with bulimia and/or anorexia nervosa;

3) and compare the individual participant's personal body image to the participant's Body Mass Index (BMI) percentile to determine if there is a disconnect with actual and perceived healthy weight status.

MATERIALS AND METHOD

This cross sectional study utilized a self completed survey instrument to assess knowledge and practice behavior consistent with anorexia nervosa or bulimia nervosa in an adolescent female population. Through a power analysis, it was determined that this study would be adequately powered with 125 participants completing the survey. A sample of 126 female study participants was recruited. The study was limited to females because the overwhelming majority of cases with these disorders are found in females. Inclusion criteria consisted of any female orthodontic patient in either the pediatric or orthodontic graduate clinics at the University of North Carolina at Chapel Hill (UNC) that could speak and read English and were between the ages of 12-17 years of age. Those that were excluded were males, patients that did not fall in this age range, were not a patient in these clinics, or did not speak or read English. Weight, height, and BMI percentile were obtained for all participants. The study was approved by the University of North Carolina IRB (#10-0853) .

Patients that fit the inclusion criteria and their parent/guardian were approached during a regularly scheduled orthodontic appointment at the UNC School of Dentistry and asked if they would participate in the research study. Both the parent and the clinic patient were given a fact sheet describing the study and were allowed to ask research personnel questions.

The survey instrument consisted of 18 questions including ones that addressed knowledge and behaviors associated with eating disorders. The five questions that comprise the "SCOFF (Sick, Control, One stone (stone=14 pounds), Fat, Food) Questionnaire" were embedded into our survey instrument. Figure 1. The SCOFF questionnaire was designed to "…raise suspicion that an eating disorder might exist before rigorous clinical assessment".[22] The questionnaire is intended to be a "simple memorable screening instrument…for non specialists". It has been validated in a group of British females aged 18-50 and it was concluded that "the SCOFF questionnaire detected all cases of anorexia and bulimia nervosa" in the study's sample population. The questionnaire designers stated that it was an "…efficient screening tool for eating disorders."[23] The US equivalent of the SCOFF questionnaire has been developed and validated in written and verbal form.[24,25,26] It indicates that an eating disorder of some kind may exist if a patient responds "Yes" to two or more of the five questions.

In addition to the SCOFF questions, our survey instrument included items to determine how much the subject knew about the eating disorders anorexia nervosa and bulimia nervosa. The study participant was asked to correctly identify the best description of both disorders from provided multiple choices. The questionnaire was pilot tested on a similar population prior to study initiation. It took approximately 5-10 minutes to complete the questionnaire.

If both the subject and parent/guardian agreed to participate, the questionnaire was distributed to the adolescent subjects who met the inclusion criteria. In an effort to obtain truthful responses, the questionnaire was completed by the subject in private. No personal identifiers were collected and the subjects were assured that they would not be linked to any of their answers. Once the survey was completed, the subject's height and weight were recorded.

Statistical Analysis

The data analysis was aimed at determining what percentage of adolescent females in the sample may be practicing behavior consistent with

Table 1. Responses to "SCOFF "questions imbedded in the survey

"SCOFF" QUESTIONS	Yes	No
Do you believe that you are fat when others say you are thin?	23.4%	76.6%
Do you worry that you have lost control over how much you eat?	23.2%	76.8%
Do you make yourself vomit because you feel uncomfortably full?	0.8%	99.2%
Would you say that food dominates your life?	6.4%	93.6%
Have you recently lost more than 15 pounds in a three-month period?	11.1%	88.9%

Two or more "Yes" responses indicate that an eating disorder of some kind may exist.
18.25% had two or more "Yes" responses.

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1. Do you know what bulimia nervosa is?
2. Do you know what anorexia is?
3. **Do you believe that you are fat when others say you are thin?**
4. **Do you worry you have lost control over how much you eat?**
5. Have you ever thought that you were overweight or needed to lose weight?
6. Have you ever thought that you were too thin and needed to gain weight?
7. Are you happy with your weight and how you look?
8. **Do you make yourself vomit because you feel uncomfortably full?**
9. Has anyone, especially a family member, friend or a teacher/ coach ever said that you were overweight?
10. **Would you that food dominates your life?**
11. Please check the one item which you believe best describes bulimia nervosa:
    a. Eating large amounts of food and then throwing up to prevent gaining weight.
    b. A nervous condition that causes you to only eat at meal time and avoid snacking.
    c. Refusing to eat in an attempt to lose or not gain weight because the person feels that they are fat.
    d. A nervous condition that cause you to be hungry and want to be eating all the time.
12. Please check the one item which you believe best describes anorexia nervosa:
    a. Eating large quantities of food and then throwing up to prevent gaining weight.
    b. A nervous condition that causes you to only eat at meal time and avoid snacking.
    c. Refusing to eat in an attempt to lose or not gain weight because the person feels that they are fat.
    d. A nervous condition that causes you to be hungry and want to be eating all the time.
13. Have you tried to lose weight with any of the following activities in the last year? (Check all that apply)
    a. Dieting by trying to reduce the amount of sugary or fatty foods I eat.
    b. Eat what I want but then go throw it up.
    c. Refusing to eat anything but salads and not too much of that either.
    d. A lot of exercising, such as running, biking, swimming, etc.
    e. Take laxative or pills to make me lose weight.
14. Have you ever discussed a desire to gain or lose weight with one of your parents?
15. Have you ever discussed a desire to gain or lose weight with one of your friends?
16. Have you ever discussed a desire to gain or lose weight with another adult, like a school nurse, school counselor or a doctor?
17. **Have you recently lost more than 15 pounds in a three-month period?**
18. Have you recently gained more than 15 pounds in a three-month period?

Figure 1. Questions included in the study questionnaire (SCOFF questions bolded)

Table 2. Bivariate relationships for behaviors and suspected eating disorder

Variable	Suspected Eating Disorder		P-value*
	Yes	No	
Behaviors Measures			
Discussed desire to gain/lose weight with parents			
Yes	77.2%	30.1%	P<0.05
No	22.7%	69.9%	
Discussed desire to gain/lose weight with friends			
Yes	82.6%	32%	P<0.05
No	17.4%	68%	
Discussed desire to gain/lose weight with another adult			
Yes	34.8%	4.9%	P<0.05
No	65.2%	95.2%	
Knows the best definition for bulimia nervosa			
Yes	38.1%	68.7%	P<0.05
No	61.9%	31.3%	
Knows the best definition for anorexia nervosa			
Yes	50%	76.3%	P<0.05
No	50%	23.7%	

*Chi-Square Test

eating disorders. Two sided 95% confidence intervals were used to capture this parameter. Each participant's BMI percentile was calculated to determine if they were at a healthy weight.

The major explanatory variable was whether the subject practices a behavior consistent with an eating disorder. This was measured by the subject's response of "Yes" or "No" to five questions from the previously validated SCOFF Questionnaire. The minor variable was the subject's ability to correctly identify the definition of anorexia nervosa and bulimia nervosa. Other questions were included to help illuminate the individual participant's self body image.

RESULTS

One hundred and twenty six adolescent females with a mean age of 13.9 years completed the questionnaire. It was found that 18.25% of the participants answered "Yes" to two or more of the specific SCOFF questions, indicating an eating disorder may exist. Table 1. No difference in age was found between the group that answered "Yes" to two or more of the SCOFF questions and the group that did not. Using a 95% confidence interval, it is believed that the true population of subjects with a possible eating disorder is between 12-25%.

The non-SCOFF questions in the questionnaire that elicited the most "Yes" responses were those that asked the subject whether they thought they were fat when others did not think they were, and if they had lost control over how much they ate. More than 20% of the sample responded "Yes" to these questions. The most common "No" response was to the question regarding vomiting habits, with less than 1% reporting that they practiced this habit.

The age/gender adjusted BMI percentiles for both those with and without a possible eating disorder as identified by this survey are seen in Figure 2. BMI percentiles were higher in the group

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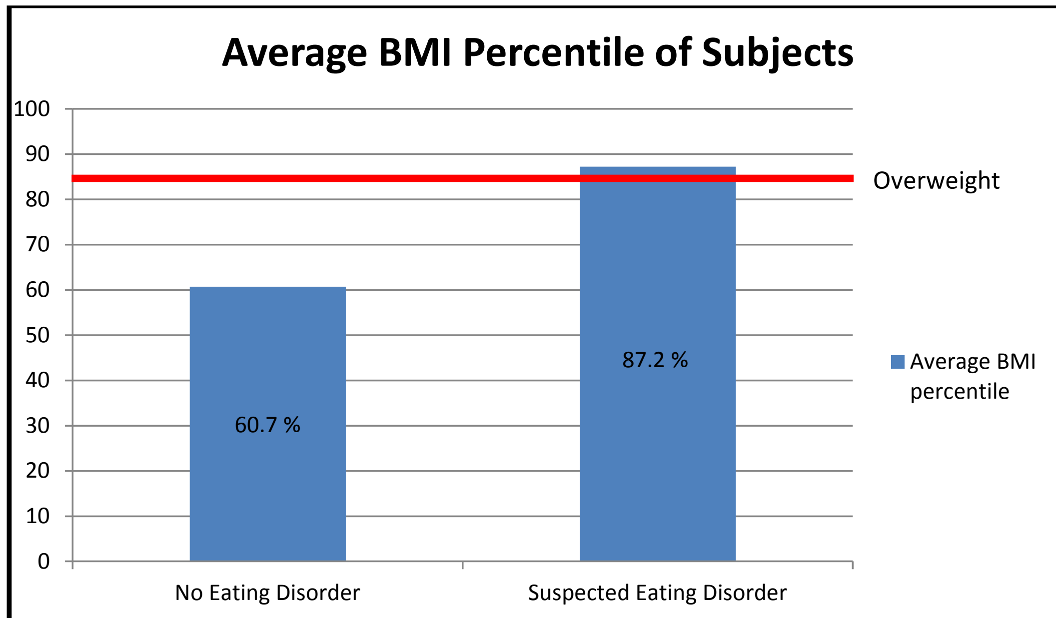

Figure 2. The average Body Mass Index (BMI) percentile of the cohort, separated by the suspicion of an eating disorder.

suspected of having an eating disorder. Based on a standardized scale for adolescent females where a BMI percentile of 85% to 95% is considered overweight, the average for the suspected eating disorder group was 87.2%. This is compared to an average BMI percentile of 60.7% for the non-suspected eating disorder group, which is in the healthy weight range.

The subject's ability to identify correctly the definition for anorexia nervosa and bulimia nervosa is displayed in Figure 3. Overall, 63% correctly identified the definition of anorexia nervosa and 72% chose the correct definition of bulimia nervosa.

When statistically analyzed, it became apparent that a difference existed between those subjects suspected of an eating disorder and those who were not. Only 38.1% of those suspected of having an eating disorder could correctly identify the definition of bulimia nervosa and 50% for anorexia nervosa. This is compared to 68.7% and 76.3% respectively for those without a suspected eating disorder. Those with a suspected eating disorder were also much more likely to have discussed their desire to gain/lose weight with someone, especially with parents and peers. All of these differences were statistically significant ($p< 0.05$). Table 2.

DISCUSSION

With over 18% of the study population answering "Yes" to two or more of the SCOFF questions, it suggests a large number of the subjects may have an eating disorder. Even with the 12.5% false positive previously reported[22], this is an alarmingly high percentage. This is a younger group than has been previously examined using the SCOFF survey instrument and may suggest younger females are more at risk for eating disorders than was once believed. More and earlier education may need to be directed at younger female adolescents to help them understand and appreciate the serious health risks associated with these disorders.

When looking at responses to individual SCOFF questions, it was found that a high percentage felt that they were fat and that they had lost control over how much they ate. A low percentage reported vomiting after eating and feeling full. This suggests that the subjects in our study were more at risk for anorexia than bulimia and supports the findings of Hock and van Hoeken[3] and may be a factor of the age of the population sampled. It makes sense even to adolescents that if you do not eat, you will lose weight. It takes more cognitive reasoning, usually obtained with maturity, to understand that if you eat, then vomit, you will lose or not gain weight.

The group suspected of having an eating disorder had a higher BMI percentile on average than the remaining sample population. The suspected group's mean BMI percentile was 87.2% which is more than 85% which is considered to be overweight. This sample group was cognizant of their appearance and, in a majority of the cases, accurately recognized when they were overweight. They were also usually motivated to address the issue. With proper education, children of this age can be taught appropriate ways to achieve and maintain a healthy weight.

The suspected eating disorder subjects were also more likely to discuss the desire to lose weight with others, including parents, friends and other adults. While many adults with these disorders keep them private, this study suggests that adolescents suspected of eating disorders do reach out to those close to them. Family and friends should be sensitive to a young person seeking help regarding weight issues.

Overall a majority of the subjects were aware of eating disorders and could correctly identify the definition of the disorder. However, subjects suspected of an eating disorder could not correctly identify as often the definitions of anorexia and bulimia nervosa. The subjects identified as possibly having an eating disorder were the ones who knew the least about the disorders.

CONCLUSIONS

Young adolescent females are often at risk for eating disorders. More education directed at this young age group is needed. If the at-risk individuals knew more about the disorders and the consequences that accompany them, they may be less likely to practice the behaviors. Because peers can be instrumental in the referral process for counseling if needed, it is important that adolescents and young adults appreciate and be able to recognize the symptoms of eating disorders.

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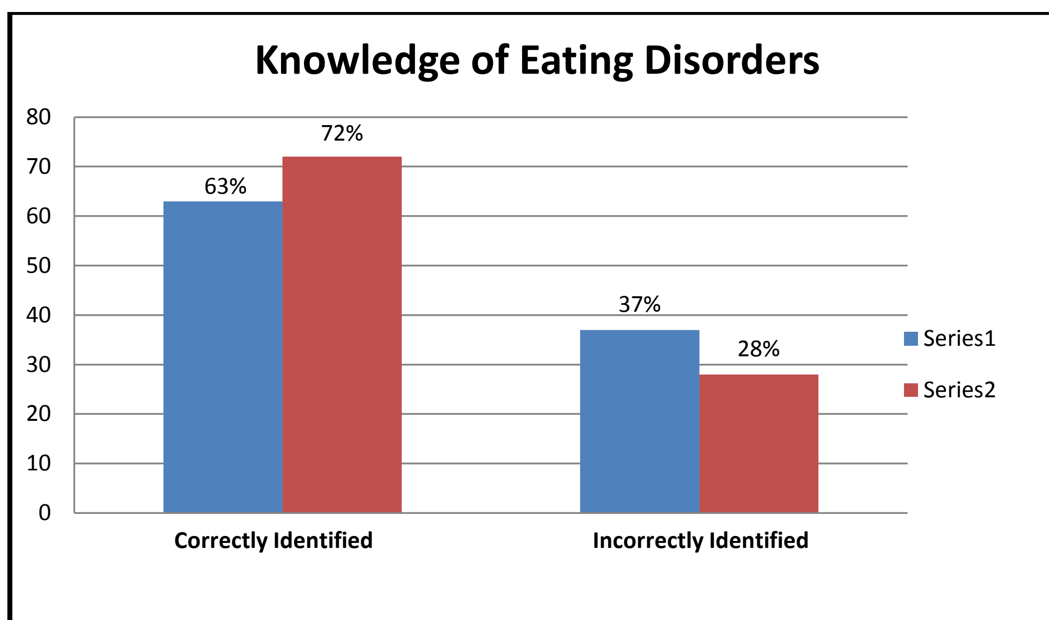

Figure 3. Knowledge of eating disorders

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