A Population-Based Study of Acne and Body Mass Index in Adolescents

Moderate to severe acne has a prevalence of 10% to 20% in adolescent populations and is associated with psychosocial problems. There is a growing interest in possible links between diet, lifestyle, and acne. However, possible relationships remain controversial. On the other hand, the number of overweight children and adolescents is increasing. The aim of the present study was to demonstrate a possible relationship between body mass index (BMI) and acne in adolescents.

Methods. The study population consisted of adolescents aged 18 or 19 years in Oslo, Norway, who were not seeking health care. The survey was cross-sectional and questionnaire-based. Informed consent was obtained from all participants. The Regional Committee for Medical Research Ethics in Norway approved the study. Further information about the study, its population, and its variables are available in an open-access journal. A total of 4744 participants were invited and the participation rate was 80%.

Data were collected on acne from 3655 adolescents and on BMI from 3584 adolescents. The data regarding acne were collected through the following question: “In the last week, have you had pimples?” Response options included (1) No; (2) Yes, a little; (3) Yes, a lot; and (4) Yes, very much. Because the goal was to explore moderate and severe acne, responses 3 and 4 were considered positive for acne for the purpose of this study.

Body mass index was calculated as weight in kilograms divided by height in meters squared and was based on participants’ self-reported answer to the following question: “What was your weight and height when last measured?” A BMI of 25 or higher is considered overweight, and 30 or higher, obese in adolescent boys and girls aged 18 years or older. We pooled the overweight and obese categories because there were only 32 obese girls and 37 obese boys in our population. Body mass index was divided into 4 categories: lower than 18.50; 18.50 to 22.99; 23.00 to 24.99; and 25 or higher.

To calculate the adjusted odds ratios (ORs), the following variables were included in the model: mental distress; cigarette smoking; alcohol intake; ethnicity; family income; and dietary intake of soft drinks with sugar, raw vegetables, fatty fish, chocolate and/or sweets, and potato chips. The adjustment variables used were the same as previously described in the same population. SPSS software for Windows, version 16.0, was used for the statistical analyses (IBM), and ORs were calculated with 95% confidence intervals (CIs).

Results. The prevalence of overweight was 9.5% in girls and 15.4% in boys. The prevalence of acne was 13.1% in girls and 14.0% in boys. Among those who were overweight or obese (BMI ≥25), the prevalence of acne was 18.5% in girls and 13.6% in boys (Table 1).

In girls, there was an unadjusted OR of 2.1 (95% CI, 1.4-3.3) between acne and overweight, and an adjusted OR of 2.0 (95% CI 1.3-3.2). In boys, no significant associations were found between acne and BMI (Table 2).

By regression analysis, we found that in the sample of adolescent girls for whom we also had data on age at menarche (n = 1215), the odds ratio for having acne with a BMI of 25 or higher was 2.1 (95% CI, 1.3-3.4). Here, we controlled for age at the time of menarche in addition to the variables used previously in the adjusted analyses.

Comments. This study demonstrates that overweight and obesity are associated with acne in girls aged 18 and 19, but the same association was not observed in boys.

It has previously been shown that boys and girls (age 6-11 years) in Taiwan with lower BMI have a lower prevalence of acne. In adult women, however, no difference in BMI was found across acne severity. In British male soldiers older than 20 years, those with acne tended to be heavier. We are not aware of any other

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**Table 1. Reports of Moderate to Severe Acne Across 4 Categories of BMI for Adolescent Boys and Girls**

<table>
<thead>
<tr>
<th>Sex</th>
<th>BMI</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;18.50</td>
<td>18.50-22.99</td>
</tr>
<tr>
<td>Boys</td>
<td>10/56 (18)</td>
<td>155/946 (14.3)</td>
</tr>
<tr>
<td>Girls</td>
<td>28/217 (12.9)</td>
<td>151/1277 (11.8)</td>
</tr>
</tbody>
</table>

Abbreviation: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared).

**Table 2. Adjusted ORs (95% CIs) for Association Between Moderate to Severe Acne and BMI in Adolescent Boys and Girls**

<table>
<thead>
<tr>
<th>Sex</th>
<th>BMI</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;18.50</td>
<td>18.50-22.99</td>
</tr>
<tr>
<td>Boys</td>
<td>1.3 (0.6-2.7)</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>Girls</td>
<td>0.9 (0.5-1.5)</td>
<td>1 [Reference]</td>
</tr>
</tbody>
</table>

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); OR, odd ratio.

Adjusted for mental distress, ethnicity, family income, cigarette smoking, alcohol intake, and 5 different dietary factors (soft drinks with sugar, raw vegetables, fatty fish, chocolate and/or sweets, and potato chips). For additional information see Halvorsen et al (2009).
studies that have investigated the relationship between acne and BMI. Strengths of this study are the many participants and the high participation rate, and thus its representativness. An additional strength is the inclusion of relevant variables in the adjusted analyses, especially mental distress, which reflects symptoms of depression and anxiety, and dietary parameters. In addition; the results in both girls and boys were the same when overweight and obesity were defined as being above the 85th percentile.

Limitations of the study include the cross-sectional design, which makes interpretation of causality difficult, and the use of self-reported data on BMI and acne, which can allow for measurement errors. However, the acne question used has been previously validated, and the BMI prevalences were similar to findings among 18-year-old adolescents from the United Kingdom and the United States. Another limitation is that there were no data available on total caloric intake in this population. Finally, despite the ability to control for age at menstrual age, which is known to be related to hormonal status. In addition, despite the findings demonstrating a relationship between acne and overweight and obesity in girls aged 18 and 19 years, the study limitations do not allow the straightforward interpretation that obesity causes acne.

To our knowledge, this is the first population-based study of acne and BMI in adolescents. Given the importance of this common skin problem, along with the increasing prevalence of both overweight and obesity in children and adolescents, further exploration is warranted into the association between BMI and acne in this age group.

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**Author Contributions:** Drs Halvorsen, Bjertness, and Lien had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. **Study concept and design:** Halvorsen and Bjertness. **Acquisition of data:** Bjertness. **Analysis and interpretation of data:** Halvorsen, Vleugels, and Lien. **Drafting of the manuscript:** Halvorsen and Vleugels. **Critical revision of the manuscript for important intellectual content:** Vleugels, Bjertness, and Lien. **Statistical analysis:** Halvorsen. **Obtained funding:** Halvorsen and Bjertness. **Administrative, technical, and material support:** Halvorsen and Bjertness. **Study supervision:** Vleugels, Bjertness, and Lien.

**Financial Disclosure:** None reported.

**Funding/Support:** This study was supported in part by The University of Oslo and Norwegian Institute of Public Health, The Regional Center for Child and Adolescent Mental Health, Eastern and Southern Norway; The University of Oslo and Norwegian Institute of Public Health for Planning, Conducting and Funding of Youth 2004.

**Role of the Sponsors:** The sponsors had no role in the design and conduct of the study; in the collection, analysis, and interpretation of data; or in the preparation, review, or approval of the manuscript.

**Additional Contributions:** Florence Dalgard, MD, PhD, helped collect data and reviewed the article.