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Association Between Sedentary Lifestyle, Television-Watching and Asthma

Nathan Bliss

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Abstract

Background: In developed countries sedentary lifestyle is becoming an ever worsening problem. This sedentary lifestyle includes TV watching and general lack of activity. Childhood obesity is on the rise and is reaching epidemic levels. Specifically concerning, is a possible link between TV watching as youth and subsequent asthma development. There are some theories about the mechanism of asthma development related to prolonged periods of youth TV watching. It is thought that TV viewing induces a depressed respiratory rate which, over time, can lead to permanent lung damage. This damage triggers development or worsening of asthma in later years.

Methods: Exhaustive search of available medical literature of MEDLINE-PubMed, CINAHL, and MEDLINE-Ovid was conducting using the keywords television, asthma, eczema, atopic disease, sedentary, lifestyle, and youth. Studies were evaluated for quality using GRADE criteria.

Results: There is an association between screen time, lifestyle and presence or development of asthma in children. There is evidence to show that it is not due solely to a lack of physical activity but could be directly associated with TV viewing at a young age.

Conclusion: Longer duration of television viewing is associated with a more sedentary lifestyle and a worsening and/or development of asthma and atopic disease. The studies relied on subjective data and more research should be conducted. However, clinicians should educate parents of young children about the possible harms of too much TV watching.

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Keywords
Television, asthma, eczema, atopic disease, sedentary, lifestyle, youth
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Association Between Sedentary Lifestyle, Television-Watching and Asthma

Nathan Bliss

A Clinical Graduate Project Submitted to the Faculty of the
School of Physician Assistant Studies
Pacific University
Hillsboro, OR
For the Masters of Science Degree, Aug 2018
Faculty Advisor: Dr. Pedemonte
Clinical Graduate Project Coordinator: Annjanette Sommers, PA-C, MS
Biography
Nathan Bliss is a native of Utah, where he majored in International Business at Utah Valley University. After completion of his undergraduate degree he managed a large dairy in Delta, Utah and subsequently moved to Germany to complete a cattle genetics internship with Alta Genetics. In 2013, he began his prerequisite coursework and research toward Physician Assistant school. While at UVU he became a senior research assistant, published in the Acoustical Society of America journal and presented his findings at an Acoustical Society of America professional conference in Providence, Rhode Island. His clinical experience includes working as an EMT on an ambulance and as a critical care technician in the Shock Trauma Intensive Care Unit in Murray, Utah.
Abstract

Background: In developed countries sedentary lifestyle is becoming an ever worsening problem. This sedentary lifestyle includes TV watching and general lack of activity. Childhood obesity is on the rise and is reaching epidemic levels. Specifically concerning, is a possible link between TV watching as youth and subsequent asthma development. There are some theories about the mechanism of asthma development related to prolonged periods of youth TV watching. It is thought that TV viewing induces a depressed respiratory rate which, over time, can lead to permanent lung damage. This damage triggers development or worsening of asthma in later years.

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Conclusion: Longer duration of television viewing is associated with a more sedentary lifestyle and a worsening and/or development of asthma and atopic disease. The studies relied on subjective data and more research should be conducted. However, clinicians should educate parents of young children about the possible harms of too much TV watching.

Keywords: Television, asthma, eczema, atopic disease, sedentary, lifestyle, youth
Acknowledgements

To Professor Sommers: Thank you for your desire, drive and contagious optimism in helping us students become EBM-able practitioners who can make informed and quality decisions, and in turn give informed and quality advice to our future patients. We appreciate you and your never-ending smile.

To my family: Thank you for standing by me through this ordeal that is PA school. You never stopped loving and supporting me even when I questioned my career decisions.
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Table 1: Quality assessment of reviewed articles
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List of Abbreviations
TV Television
CSS Cross-sectional Study
Association Between Sedentary Lifestyle, Television-Watching and Asthma

BACKGROUND

Asthma prevalence has increased over several decades, and is the leading chronic illness among children and adolescents in several nations.\(^1\),\(^2\) There are several risk factors associated with asthma in youth and adults. For example, allergic rhinitis, second hand smoke, viral respiratory illness as a child and sedentary lifestyle, including prolonged hours of television viewing are all associated with the development of asthma. Some of these factors are not modifiable, however, television viewing is. This review will consider the connection between television watching, sedentary lifestyle and presence or development of asthma.

METHODS

An exhaustive search of available medical literature was used from MEDLINE-PubMed, CINAHL, and MEDLINE-Ovid. Keywords included: Television, asthma, eczema, atopic disease, sedentary, lifestyle, and youth. The references of relevant articles were also search for eligible studies. Studies were required to include inactivity or TV watching in youth, and asthma. Articles were assessed for
quality using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE).\textsuperscript{6}

**RESULTS**

A total of 15 articles were reviewed for relevancy. Three applicable articles\textsuperscript{3-5} were found which addressed possible connections between the lifestyle of children and presence or development of asthma. No additional articles were found by searching the references of the included studies. See Table 1.

**Kim et al**

The findings in this study\textsuperscript{3} are based on the data obtained from the 2007 third Korea Youth Risk Behavior Web-Based Survey (KYRBWS-III), a cross-sectional survey of health-risk behaviors among a representative sample of Korean middle- and high-school students aged 13–18 years. This survey is conducted annually by the Korea Centers for Disease Control and Prevention. The 72 943 study subjects were selected using the complex sampling design of the survey. The subjects were sorted into groups of sedentary time including television watching, playing online games or surfing the internet according to their answers on an anonymous questionnaire which ranged from <1 hr/day, to >4 hrs/day. The association between asthma and physical
activity was assessed by conducting multiple logistic regression analyses of the data by using the statistical software SPSS 17.0 Complex Sample.³

**Strom and Silverberg**

In this study⁵, data were analyzed from 2 cross-sectional studies including 133 107 children age 6-17 years enrolled in the 2003-2004 and 2007-2008 National Survey of Children’s Health. Bivariate and multivariate survey logistic regression models were created to calculate the odds of atopic disease and atopic disease severity on vigorous physical activity, television or video game use, and sports participation.⁵ See Table 2.

“In pooled bivariate models, children with eczema (OR, 1.23; 95% CI, 1.03-1.48; P = .03), and ever history of asthma (OR, 1.32; 95% CI, 1.13-1.61; P = .0004), and current history of asthma (OR, 1.34; 95% CI, 1.12-1.61; P = .001) had higher odds of spending >5 hours per day watching television or playing video games. However, these associations did not remain significant in multivariate models.⁵”

**Sheriff et al**

The Avon Longitudinal Study of Parents and Children (ALSPAC) is a prospective study⁴ of 14 541 pregnancies with 13 988 live births
surviving to at least 1 year. Children taking part in the ALSPAC study with no wheeze up to the age of 3.5 years and follow-up data at 11.5 years of age took part in a prospective longitudinal cohort study. The main outcome measure was asthma, defined as doctor-diagnosed asthma by 7.5 years of age with symptoms and/or treatment in the previous 12 months at 11.5 years of age. Parents reported hours of TV viewing.4

In children with no symptoms of wheeze at 3.5 years of age and follow-up at 11.5 years of age, the prevalence of asthma was 6% (185/3065). Increased TV viewing at 3.5 years was associated with increased prevalence of asthma at 11.5 years of age. Children who watched television for 0.2 h/day were almost twice (adjusted OR 1.8 (95% CI, 1.2-2.6)) as likely to develop asthma by 11.5 years of age as those watching TV for 1–2 h/day.4 See Table 3.

**DISCUSSION**

Asthma is on the rise and childhood inactivity is becoming more prevalent. These studies demonstrate a link between asthma and the amount of TV watched by children. The Kim et al3 demonstrated an adjusted OR of .86 with <3 hrs sedentary time per day. But demonstrated no significant differences among all physical activities and asthma severity. This was supported with similar odds ratios in
the Strom and Silverberg\textsuperscript{5} which was an OR of 1.32. The strongest study, Sheriff et al\textsuperscript{4}, found an adjusted OR of 1.8.

The Sherriff et al study\textsuperscript{4} was conducted in England and was a large longitudinal birth cohort study. It utilized a prospective collection method to minimize the effects of memory bias since it relied on mothers reporting the amount of TV time for their children. However, The Sherriff et al study\textsuperscript{4} was non-gender-specific, was not modified by body mass and was not influenced by current sedentary behavior at age of asthma development.

The Strom et al and Silverberg study\textsuperscript{5} took a different perspective in their study. It was concluded in this study that children with a 1 year or more history of eczema and/or asthma had a higher rate of sedentary lifestyle. This lifestyle included TV watching and video game playing. These children had a greater prevalence of hay fever and a lower rate of sport participation. Symptoms of wheezing, rhino conjunctivitis, and eczema also were associated with increased odds of daily television viewing in adolescents.

The Kim et al\textsuperscript{3} study took the middle ground and found that there was some conflicting data between causative factors of asthma and asthma causing the factors. They found that there may be more association between parental beliefs and customs toward physical activity than there is between asthma and physical activity.
These controversial results could be attributed to differences in methodologies between the previous studies and to the inherent difficulty in ascertaining with cross-sectional data whether sedentary time increases asthma prevalence or whether patients with asthma avoid physical activity. Therefore, it is still controversial and further investigation is needed.\textsuperscript{3}

The last 2 studies\textsuperscript{4,5} are subject to possible errors due to memory, and socially biased answers on self-reporting questionnaires.

To mitigate the controversial nature of the results, future studies must isolate variables like parental beliefs, customs, memory dependence, and self-reporting questionnaires in a standardized way. Also, height and weight must be recorded and reported by third party to avoid socially-desirable behaviors affecting statistics.

**CONCLUSION**

Longer duration of television viewing is associated with a more sedentary lifestyle and a worsening and/or development of asthma and atopic disease. The studies relied on subjective data and more research should be conducted. However, clinicians should educate parents of young children about the possible harms of too much TV.
References


2. Braman SS. The global burden of asthma. Chest 2006;130:4S-12S


<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Downgrade Criteria</th>
<th>Upgrade Criteria</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Limitations</td>
<td>Indirectness</td>
<td>Inconsistency</td>
</tr>
<tr>
<td>Kim et al¹</td>
<td>CSS</td>
<td>Seriousᵃ</td>
<td>Not Serious</td>
<td>Not Serious</td>
</tr>
<tr>
<td>Strom et al³</td>
<td>CSS</td>
<td>Seriousᵃ</td>
<td>Not Serious</td>
<td>Not Serious</td>
</tr>
<tr>
<td>Sheriff et al²</td>
<td>Longitudinal cohort</td>
<td>Not serious</td>
<td>Not Serious</td>
<td>Not Serious</td>
</tr>
</tbody>
</table>

CSS: cross-sectional study
ᵃ Dependence upon survey data which carries a high risk of bias.
Table 2

Odds ratios and 95% confidence intervals (unadjusted and adjusted) for asthma at 11.5 years of age according to daily TV viewing at 3.5 years of age in children with no symptoms of wheeze up to 3.5 years.

<table>
<thead>
<tr>
<th>TV viewing at 3.5 years of age</th>
<th>Asthma at 11.5 years of age</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (185/3065)</td>
<td>Boys (88/1436)</td>
<td>Girls (97/1629)</td>
</tr>
<tr>
<td></td>
<td>n=3002</td>
<td>n=1401</td>
<td>n=1601</td>
</tr>
<tr>
<td>Not at all, % (n)</td>
<td>5.0 (4/80)</td>
<td>4.8 (2/42)</td>
<td>5.3 (2/38)</td>
</tr>
<tr>
<td>Crude OR (95% CI)</td>
<td>0.9 (0.3 to 2.5)</td>
<td>0.9 (0.2 to 3.7)</td>
<td>0.9 (0.2 to 4.0)</td>
</tr>
<tr>
<td>Restricted OR (95% CI)*</td>
<td>0.6 (0.1 to 2.3)</td>
<td>0.5 (0.07 to 3.8)</td>
<td>4.5</td>
</tr>
<tr>
<td>Adjusted OR (95% CI) BMI**</td>
<td>0.8 (0.2 to 2.6)</td>
<td>0.5 (0.1 to 3.8)</td>
<td>1.1 (0.3 to 4.9)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)***</td>
<td>0.5 (0.1 to 2.2)</td>
<td>0.5 (0.06 to 3.4)</td>
<td>0.6 (0.08 to 4.9)</td>
</tr>
<tr>
<td>&lt;1 h/day, % (n)</td>
<td>4.2 (36/850)</td>
<td>4.4 (16/364)</td>
<td>4.1 (20/486)</td>
</tr>
<tr>
<td>Crude OR (95% CI)</td>
<td>0.8 (0.5 to 1.1)</td>
<td>0.8 (0.4 to 1.4)</td>
<td>0.7 (0.4 to 1.2)</td>
</tr>
<tr>
<td>Restricted OR (95% CI)</td>
<td>0.7 (0.5 to 1.1)</td>
<td>0.7 (0.4 to 1.4)</td>
<td>0.7 (0.4 to 1.3)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI) BMI</td>
<td>0.7 (0.5 to 1.2)</td>
<td>0.7 (0.4 to 1.4)</td>
<td>0.8 (0.4 to 1.4)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>0.7 (0.44 to 1.1)</td>
<td>0.7 (0.4 to 1.4)</td>
<td>0.7 (0.3 to 1.3)</td>
</tr>
<tr>
<td>1-2 h/day, % (n)</td>
<td>5.6 (78/1394)</td>
<td>5.6 (37/666)</td>
<td>5.6 (41/728)</td>
</tr>
<tr>
<td>Reference category</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>&gt;2 h/day, % (n)</td>
<td>9.0 (61/678)</td>
<td>8.8 (29/329)</td>
<td>9.2 (32/349)</td>
</tr>
<tr>
<td>Crude OR (95% CI)</td>
<td>1.7 (1.2 to 2.4)</td>
<td>1.6 (1.0 to 2.7)</td>
<td>1.7 (1.1 to 2.7)</td>
</tr>
<tr>
<td>Restricted OR (95% CI)</td>
<td>1.8 (1.2 to 2.6)</td>
<td>1.6 (0.9 to 2.8)</td>
<td>2.0 (1.2 to 3.4)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI) BMI</td>
<td>1.8 (1.3 to 2.7)</td>
<td>1.8 (1.1 to 3.1)</td>
<td>1.9 (1.1 to 3.1)</td>
</tr>
<tr>
<td>Adjusted OR (95% CI)</td>
<td>1.8 (1.2 to 2.6)</td>
<td>1.7 (1.0 to 3.0)</td>
<td>1.9 (1.1 to 3.3)</td>
</tr>
<tr>
<td>p for linear trend</td>
<td>0.0003</td>
<td>0.02</td>
<td>0.005</td>
</tr>
</tbody>
</table>

*Univariable analysis restricted sample in multivariable (fully adjusted model) (n=2305).
**Adjusted for body mass index (quartiles) at 11.5 years only (n=2471).
***Adjusted for body mass index (quartiles) at 11.5 years, maternal asthma/allergies, maternal smoking during pregnancy and maternal housing inadequacy, financial difficulties, low educational attainment, psychopathology of mother and lack of social network practical support during pregnancy (n=2305).
**Table 3**

Percentage of children developing asthma by 11.5 years of age (who were asymptomatic at 3.5 years of age) with and without bronchial hyper-responsiveness (BHR) according to TV viewing

<table>
<thead>
<tr>
<th>TV viewing</th>
<th>No BHR</th>
<th>BHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>3.2 (1/31)</td>
<td>33.3 (2/6)</td>
</tr>
<tr>
<td>&lt;1 h/day</td>
<td>2.0 (8/410)</td>
<td>11.5 (6/52)</td>
</tr>
<tr>
<td>1-2 h/day</td>
<td>2.7 (18/656)</td>
<td>17/0 (16/94)</td>
</tr>
<tr>
<td>&gt;2 h/day</td>
<td>4.6 (14/304)</td>
<td>28.3 (13/46)</td>
</tr>
</tbody>
</table>

Odds ratios and 95% confidence intervals (unadjusted and adjusted) for asthma at 11.5 years of age according to daily TV viewing at 3.5 years of age in children with no symptoms of wheeze up to 3.5 years.