PREVALENCE OF SCHOOL-RELATED DISEASES AND HEALTH ASSESSMENT AMONG STUDENTS OF TAN LAP PRIMARY SCHOOL, THAI NGUYEN CITY: A COMPREHENSIVE STUDY

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Abstract. This cross-sectional study investigated the school-related disease conditions and health status of students at Tan Lap Primary School in Thai Nguyen City. A total of 921 healthy students, aged between 6 and 11 years old, comprising 478 boys and 443 girls, were examined. Advanced diagnostic techniques were employed by school medical personnel to assess dental, ocular, and otorhinolaryngological conditions in students. The health status of students was categorized according to the guidelines outlined in Decision No. 1631/BYT-QĐ, 1997, by the Minister of Health. The research reveals concerning findings regarding the health status of the students. The prevalence of tooth decay at stages 1 & 2 affected 27.3% of students, with 2% showed more advanced stages (stages 3 & 4), emphasizing the need for dental care intervention. Refractive errors were notably prevalent among 17.7% of students. Additionally, accommodation disorders (1.7%) and acute nasopharyngitis (1.8%) were also observed. Gender-based differences in health status revealed significant disparities ($P = 0.017$). Category I showed a higher percentage for girls (40.6%) compared to boys (34.5%), while Category II exhibited a higher percentage for boys (65.5%) compared to girls (59.4%). This results emphasized the importance of tailored health interventions and targeted health promotion strategies within the school community.

Keywords: Dental diseases, refractive errors, accommodation disorders, otorhinolaryngologic diseases, primary school students, school-related disease.

1. INTRODUCTION

Assessing the health of school-aged children is critical for ensuring their academic success and overall quality of life. Several health issues commonly affect school students, including dental diseases, refractive errors, and otorhinolaryngologic diseases (Moelyaningrum et al., 2023; Martyn & Barnes, 2016). These conditions can interfere with learning and daily activities, making early identification and treatment essential.

Dental health is a crucial aspect of children's overall well-being. Dental caries and periodontal diseases are widespread among primary school students (Petersen, 2004). A study from 2019 involving 4,028 Vietnamese students found that 86.4% of children aged 6 to 8 had dental caries, with each child averaging 6.21 decayed teeth (Minh & Hai, 2021). A separate study involving 1,406 primary school students in Thua Thien Hue reported a tooth decay rate of 77.6% (Tran, 2016). These findings underscore the need for effective oral health interventions.

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Visual impairments, particularly refractive errors, also pose significant challenges for school-aged children (Rajavi et al., 2015). A survey of 1,056 students in three Vietnamese provinces found a varying prevalence of refractive errors, with Da Nang reporting a rate of 44.27%, Hai Duong at 35.60%, and Tien Giang at 6.42% (Tuan Anh, 2021). In Soc Trang province, a 2020 study of 3,188 students aged 11 to 14 revealed an overall refractive error prevalence of 22.5% (Quyen, 2021). Notably, urban areas exhibited a higher rate of refractive errors compared to rural areas, suggesting environmental or lifestyle factors might contribute to this discrepancy.

Otorhinolaryngologic diseases, encompassing a range of ear, nose, and throat conditions, are another common health concern among students (Ta, 2019). A study in Andhra Pradesh, India, with 1,818 students aged 0 to 15, showed that boys had a higher prevalence of otorhinolaryngologic diseases, accounting for 57.97% of the cases (Raju and Fareeduddin, 2020). This study also highlighted that most pediatric patients came from lower socioeconomic backgrounds, indicating that socioeconomic factors might play a role in the prevalence of these conditions.

Tan Lap Primary School, located in Thai Nguyen city, serves as a microcosm where the health status of students can be evaluated comprehensively. This study aims to investigate the prevalence and impact of school-related disease, as well as to conduct a holistic health assessment among students enrolled at Tan Lap Primary School. By examining a diverse range of health indicators, and overall well-being, this research endeavors to provide valuable insights into the health profile of the student population.

Understanding the health landscape of students at Tan Lap Primary School is crucial for implementing targeted interventions and fostering a supportive environment conducive to optimal health and academic achievement. Through this comprehensive study, we seek to contribute to the body of knowledge surrounding health assessments in school settings, with the ultimate goal of promoting the holistic well-being of students in Thai Nguyen City.

2. METHODOLOGY

2.1. Research subjects

A cross-sectional study was conducted on 921 healthy students, comprising 478 boys and 443 girls, aged between 6 and 11 years old at Tan Lap Primary School in Thai Nguyen. The distribution of students across different age groups was as follows: 6-year-olds accounted for 16.61% (153 students), 7-year-olds accounted for 19.22% (177 students), 8-year-olds accounted for 19.11% (176 students), 9-year-olds accounted for 21.06% (194 students), and 10-year-olds accounted for 24% (211 students). Students had the right to withdraw from participation in the research at any point.

2.2. Estimation of sample size

To calculate the sample size for a cross-sectional study on the incidence of dental, eye, and otorhinolaryngologic diseases in elementary school students, the formula for estimating sample size for prevalence studies was used:
Based on research results from previous studies, the estimated prevalence of each disease was 0.20 (Martyn & Barnes, 2016), and the confidence level was 95% with an error of 0.05. Substituting into the above formula, the result was obtained $n \approx 246$ students. With the 3 types of diseases in this study, the appropriate sample size was 738 students. This study was conducted on 921 students, satisfying the sample size.

2.3. Specialized medical assessment techniques

Advanced diagnostic techniques were employed by school medical personnel to assess dental, ocular, and otorhinolaryngologic diseases in students.

* Dental examinations

Dental examinations encompass a range of diseases, including:

1. Tooth decay stage 1 - Initial demineralization and enamel decay: characterized by enamel destruction and the presence of small black spots on the enamel surface, typically painless;

2. Tooth decay stage 2 - Dentin decay: involving dentin destruction and sensitivity;

3. Tooth decay stage 3 - Pulp damage: the tooth pulp is damaged, resulting in severe pain;

4. Tooth decay stage 4 - Abscess: indicating pulpitis which, if untreated, can progress to pulp death, leading to infected pulp spreading to the bone, potentially causing abscesses, cellulitis, and jaw osteoarthritis;

5. Additional conditions such as gingivitis, mouth ulcers, dental misalignment, and cleft lip and palate are also evaluated during these examinations.

* Ocular examinations

Healthcare professionals perform visual assessments and analyze specific ocular conditions using standardized methods. Visual acuity was quantified utilizing a light box-type visual acuity chart, positioned at an appropriate height relative to the student's stature. During assessment, individuals stood and occluded one eye to evaluate the vision of the opposite eye, with the optometrist positioned adjacent to facilitate the process. Students were instructed to sequentially read the characters displayed on the chart from left to right. For those already utilizing corrective eyewear, assessment was conducted with the glasses in place. Identified eye conditions encompass refractive errors (encompassing myopia, hyperopia, and astigmatism), accommodation disorders characterized by ocular discomfort and blurred vision not attributable to refractive anomalies, and chalazion (manifesting as obstruction of the meibomian glands within the eyelid).
* Otorhinolaryngological examinations

Additionally, medical personnel specializing in otolaryngology conducted thorough examinations, discerning conditions such as acute nasopharyngitis, allergic rhinitis, acute or chronic pharyngitis, and otitis media.

2.4. The categorization of students' health status

The categorization of students' health status adheres to the guidelines outlined in Decision No. 1631/BYT-QĐ, issued on August 15, 1997, by the Minister of Health, which delineates the Health Classification Standards for recruitment and routine examinations. Through the integration of nutritional status and specialized assessments (dental, ocular, and otorhinolaryngologic diseases), students' health status was delineated into three distinct categories as follows:

Category I: Students exhibit optimal health without discernible health concerns, enabling active participation in academic pursuits and daily activities without impediment.

Category II: Students present with mild ailments amenable to treatment, exerting minimal impact on their educational endeavors.

Category III: Students manifest severe or chronic illnesses that significantly compromise their health and academic performance, necessitating substantial attention and support.

2.4. Data analysis method

The data analysis was conducted using SPSS 20.0 software. The Chi-square test was employed for comparing two or more qualitative variables. Statistical significance was established at P < 0.05 (two-tailed).

3. RESULTS AND DISCUSSION

3.1. Status of dental diseases, ocular diseases, otorhinolaryngologic diseases among students at Tan Lap primary school

3.1.1. Dental disease among students at Tan Lap primary school

The results of dental disease among students at Tan Lap primary school suggested both positive and concerning aspects (Figure 1).

![Figure 1. Dental disease among students at Tan Lap primary school](image-url)
It was reassuring that a significant portion (69.7%) of the students have normal dental health. This indicated that a majority were maintaining good oral hygiene practices, which was crucial for their overall well-being. The prevalence of tooth decay stage 1 & 2 in 27.3% of students, albeit at early stages, was concerning. While not yet severe, it was essential to address these issues promptly to prevent further deterioration and potential discomfort for the affected students. The presence of tooth decay at more advanced stages (stages 3 & 4) in 2% of students was particularly worrying. Stage 3 and 4 decay indicated significant dental problems that require urgent attention to prevent pain, infection, and potential tooth loss. Immediate intervention, such as dental treatments or referrals, is crucial for these students. The identification of additional dental conditions in 1% of students suggested a range of other oral health issues beyond just tooth decay. These could include problems like gum disease, oral infections, or structural abnormalities.

The rate of tooth decay observed in this study, with approximately 30% of students aged 6 to 11 affected by dental caries, appears to be lower than other studies and the global average. For instance, data from the United States' National Health and Nutrition Examination Survey, conducted between 2011 and 2016, indicates that the prevalence of caries in primary teeth among students aged 6 to 8 years stood at 54.5% among boys and 48.1% among girls (National Institute of Dental and Craniofacial Research). Assessing the prevalence of tooth decay among 1002 students aged 6 to 10 years across several primary schools in Ca Mau city, Ca Mau province, during the period of 2022 to 2023 showed a tooth decay rate of 93.4% (Luong & Nguyen, 2023).

Addressing these additional conditions is essential to ensure the overall oral health and comfort of the affected students. Overall, while a majority of students had normal dental health, the significant prevalence of tooth decay, particularly at advanced stages, highlights the importance of implementing comprehensive oral health education programs and improving access to dental care services within the school community. Early detection, intervention, and preventive measures are key to mitigating dental issues and promoting better oral health outcomes for all students at Tan Lap primary school.

### 3.1.2. Ocular diseases among students at Tan Lap primary school

The findings of ocular diseases among students were shown in Figure 2. The prevalence of refractive errors in 17.7% of students was notable. While refractive errors such as myopia (nearsightedness), hyperopia (farsightedness), and astigmatism are common, they can affect a child's ability to see clearly and may impact their academic performance if left uncorrected.

**Figure 2. Ocular disease among students at Tan Lap primary school**
The presence of accommodation disorders in 1.7% of students was a concern. Accommodation disorders affect the eye's ability to focus properly, leading to difficulties in tasks such as reading. Early detection and intervention, which may include vision therapy or specialized lenses, can help manage these disorders and alleviate symptoms for affected students. While the prevalence of chalazion (0.3%) was relatively low, it's still worth noting. Chalazion is a localized swelling or lump in the eyelid caused by blocked oil glands. While usually not serious, it can cause discomfort and affect vision if left untreated. Proper hygiene practices and, in some cases, medical intervention may be necessary to resolve chalazion. While a significant portion of students have normal ocular health, the presence of refractive errors, accommodation disorders, and chalazion underscores the importance of regular eye screenings and access to vision care services within the school community. Early detection and intervention can help address these ocular conditions effectively, ensuring that students can fully participate in their academic and extracurricular activities with optimal vision.

The incidence of refractive errors among students at Tan Lap primary school was lower than that in previous research findings. A population-based study evaluated 31,524 students aged 6 to 15 years from Hainan, China, revealing an overall prevalence of myopia at 46.0%, hyperopia at 4.2%, and astigmatism at 31.9% (Peng et al., 2021). In another cross-sectional study in 2007, involving 2,747 students aged 7 to 15 years from 20 primary and secondary schools across six districts in Ho Chi Minh City, the prevalence of refractive errors was reported to be 39.35% (Xuyen et al., 2009). A cross-sectional study involving 1056 students from 36 schools across three provinces (Da Nang, Hai Duong, and Tien Giang) showed that the overall rate of refractive errors in all 3 provinces was 24.64% (Tuan Anh, 2021). The rate of primary school students of the Khmer ethnic group with refractive errors was 21.2% (Tri et al., 2013).

3.1.3. Otorhinolaryngologic diseases among students at Tan Lap primary school

The condition of otorhinolaryngologic diseases among students at Tan Lap primary school appeared relatively favorable, with the majority (98.2%) experiencing normal conditions (Figure 3).

The health and well-being of students at Tan Lap Primary School, specifically in terms of otorhinolaryngologic issues, appear to be in good standing. The prevalence of acute nasopharyngitis was 1.8%, indicating a low incidence of this condition among the student population. This low rate suggests that the school’s hygiene and health practices are effective in curbing the spread of contagious illnesses.
The prevalence of otorhinolaryngologic diseases at Tan Lap Primary School was notably lower than the 62.8% reported in the Phung Minh Luong study in 2011, indicating a significant decrease in disease incidence rates [16]. Several factors may contribute to this disparity. Thai Nguyen province's location in a tropical monsoon climate with cleaner air quality, along with the absence of traditional practices like allowing animals to roam freely, might contribute to a lower prevalence of disease-causing pathogens. Additionally, the study period in October coincides with relatively dry weather conditions, which could limit the spread of pathogenic bacteria.

To maintain these low rates, the school should continue promoting hygiene and health education and fostering a cleaner environment. Collaboration with students, parents, and the broader community can help sustain the positive outcomes observed at Tan Lap Primary School.

### 3.1.4. Status of dental diseases, ocular diseases, otorhinolaryngologic diseases among students at Tan Lap primary school by gender

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Boys</th>
<th>Girls</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dental disease</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>338</td>
<td>304</td>
<td>0.647</td>
</tr>
<tr>
<td>Tooth decay stage 1, 2</td>
<td>127</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Tooth decay stage 3, 4</td>
<td>8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Additional conditions</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Ocular diseases</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>377</td>
<td>361</td>
<td>0.191</td>
</tr>
<tr>
<td>Refractive errors</td>
<td>84</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Accommodation disorders</td>
<td>15</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chalazion</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Otorhinolaryngologic diseases</strong></td>
<td>469</td>
<td>435</td>
<td>0.998</td>
</tr>
<tr>
<td>Normal</td>
<td>469</td>
<td>435</td>
<td></td>
</tr>
<tr>
<td>Acute nasopharyngitis</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

*Note: P: value obtained from Chi-square test.*

The absence of a gender-based difference in the incidence of dental diseases, ocular diseases, and otorhinolaryngologic diseases among students at Tan Lap primary school was noteworthy (Table 1). Similar to our research, research by Tuan Anh et al. (2021) in three provinces (Da Nang, Hai Duong, and Tien Giang) also showed that there was no difference in the incidence of refractive errors between boys and girls (Tuan Anh, 2021).

This results indicated that both boys and girls were equally susceptible to these health conditions within the school environment. From a public health perspective, this finding suggests that any preventive measures or health interventions targeting these conditions can be implemented universally without prioritizing one gender over the other. It also implies that factors contributing to the prevalence of these diseases, such as hygiene practices, environmental factors, and access to healthcare, may affect both genders similarly within the school community. To maintain the health and well-being of all
students, it's important for the school administration and healthcare personnel to continue implementing comprehensive health education programs and preventive measures addressing dental hygiene, eye health, and otorhinolaryngologic health. These efforts should focus on promoting healthy habits, providing access to necessary healthcare services, and creating a supportive environment conducive to overall wellness for all students, regardless of gender.

3.4. The categorization of health status among students at Tan Lap primary school

The categorization of health status among students at Tan Lap Primary School revealed significant differences between boys and girls ($P = 0.017$), indicating a statistically significant variance in overall health conditions (Nguyen & Duong, 2023). While boys and girls had similar rates of dental diseases, ocular diseases, and otorhinolaryngologic diseases, the divergence in health status categorization likely stemmed from nutritional differences.

Category I, likely representing students with good health, had a higher proportion of girls (40.6%) than boys (34.5%), suggesting that girls at the school may generally have better health. Category II, representing students with minor health concerns, was higher among boys (65.5%) compared to girls (59.4%), indicating boys may face more health issues requiring monitoring. Notably, no students fell into Category III, suggesting no severe health concerns requiring urgent medical attention.

These differences underscore the need for the school's administration and healthcare providers to monitor and address the unique health needs of both genders. This could involve gender-sensitive health education, promoting healthy behaviors, and ensuring equitable access to healthcare services. Further investigation into specific health issues within each gender group could guide targeted interventions to improve the overall health and well-being of all students.

<table>
<thead>
<tr>
<th>Categorization</th>
<th>Total</th>
<th>Boys</th>
<th>Girls</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Category I</td>
<td>345</td>
<td>37.5</td>
<td>165</td>
<td>34.5</td>
</tr>
<tr>
<td>Category II</td>
<td>576</td>
<td>62.5</td>
<td>313</td>
<td>65.5</td>
</tr>
<tr>
<td>Category III</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>921</td>
<td>100</td>
<td>478</td>
<td>100</td>
</tr>
</tbody>
</table>

Note: $P$: value obtained from Chi-square test.

4. CONCLUSION

In conclusion, our research highlighted several concerning findings regarding the health status of students at Tan Lap Primary School. The prevalence of tooth decay at stages 1 & 2, affecting 27.3% of students, raises significant concerns despite being at early stages. Moreover, the presence of more advanced tooth decay (stages 3 & 4) in 2% of students underscores the urgency for dental care intervention. The notable prevalence of refractive errors among 17.7% of students indicated the importance of regular eye
examinations. Additionally, accommodation disorders affecting 1.7% of students and the prevalence of acute nasopharyngitis at 1.8% signified the need for comprehensive health monitoring and intervention.

Furthermore, our study revealed no gender-based differences in the incidence of dental diseases, ocular diseases, and otorhinolaryngologic diseases among students. However, the categorization of health status at Tan Lap Primary School showed a significant difference between boys and girls ($P = 0.017$). Specifically, Category I showed a higher percentage for girls (40.6%) compared to boys (34.5%), while Category II exhibited a higher percentage for boys (65.5%) compared to girls (59.4%). These findings emphasize the necessity of tailored health interventions and highlight areas for targeted health promotion strategies within the school community.

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TÌ LỆ MÁC MỘT SỐ BỆNH HỌC ĐƯỜNG VÀ ĐÁNH GIÁ SỨC KHỎE CỦA HỌC SINH TRƯỜNG TIỂU HỌC TÂN LẬP, THÀNH PHỐ THÁI NGUYÊN:
MỘT NGHIỆN CỨU TOÀN DIỆN

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Tóm tắt: Nghiên cứu cắt ngang được tiến hành để điều tra tình trạng mắc một số bệnh học đường và tình trạng sức khỏe của học sinh trường Tiểu học Tân Lập, thành phố Thái Nguyên. Nghiên cứu được tiến hành trên 921 học sinh thuộc nam, độ tuổi từ 6 đến 11, bao gồm 478 nam và 443 nữ. Các kỹ thuật chẩn đoán chuyên khoa được thực hiện bởi nhân viên y tế nhà trường để đánh giá tình trạng răng, mắt và tai mũi họng ở học sinh. Tình trạng sức khỏe của học sinh được phân loại theo hướng dẫn tại Quyết định số 1631/BYT-QĐ năm 1997 của Bộ trưởng Bộ Y tế. Nghiên cứu cho thấy những phát hiện liên quan đến tình trạng sức khỏe của học sinh. Tỉ lệ ráo răng ở giai đoạn 1 & 2 chiếm 27,3%, trong đó 2% biểu hiện ở giai đoạn nặng hơn (giai đoạn 3 & 4), nhân mạnh sự cần thiết phải can thiệp chăm sóc răng miệng. Tỉ lệ học sinh mắc tất cả các yếu tố chiếm 17,7%. Ngoài ra, rối loạn điều tiết (1,7%) và viêm mũi họng cấp tính (1,8%) cũng được ghi nhận. Có sự khác biệt đáng kể về giới tính đối với tình trạng sức khỏe của học sinh ($P = 0,017$). Sức khỏe loại I ở học sinh nữ (40,6%) cao hơn so với học sinh nam (34,5%), trong khi sức khỏe loại II ở học sinh nam (65,5%) cao hơn so với học sinh nữ (59,4%). Kết quả này nhấn mạnh tầm quan trọng của các biện pháp can thiệp sức khỏe phù hợp và các chiến lược nâng cao sức khỏe có mục tiêu trong cộng đồng nhà trường.

Từ khóa: Bệnh răng miệng, tất khác xạ, rối loạn điều tiết, bệnh tai mũi họng, học sinh tiểu học, bệnh học đường.

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