Knowledge and Behaviour of Vitamin A Consumption Associates to Night Blindness

Suparmi Suparmi (suparmi@unissula.ac.id)
Universitas Islam Sultan Agung

Harka Prasetya
Universitas Islam Sultan Agung

Atik Rahmawati
Universitas Islam Sultan Agung

Milliam Shinta Lailaulaan
Universitas Islam Sultan Agung

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Abstract

Background

Night blindness is the first sign of vitamin A deficiency, which can lead to blindness if left untreated. This study aimed to determine the relationship between college students' knowledge and consumption of vitamin A-rich foods and the appearance of night blindness symptoms.

Methods

This cross-sectional study involved 409 students in their sixth semester at Sultan Agung Islamic University. A questionnaire was used to collect data on the level of knowledge and behaviour of vitamin A consumption. Low Luminance Questionnaire (LLQ) collected data on night blindness complaints. To determine the effect of each independent variable on the dependent variable, bivariate and multivariable binary logistic regressions were conducted. The \( p \)-value threshold for statistical significance was set at 0.05.

Results

Bivariate analysis of the Chi-square test revealed that gender, study programme cluster, level of knowledge, and vitamin A consumption behaviour were significantly associated (\( p < 0.05 \)) with night blindness symptoms. The logistic regression analysis results revealed that learning and behaviour regarding vitamin A consumption were associated with night blindness (\( p < 0.05 \)). Vitamin A consumption is strongly associated with night blindness symptoms, with an odds ratio (OR) of 2.560 (95% confidence interval [CI]: 1.215–5.392), whereas vitamin A knowledge showed an OR of 2.239 (95% CI: 1.110–4.516).

Conclusion

The level of knowledge and behaviour regarding vitamin A consumption is related to night blindness in college students. This study advises students to maintain a healthy diet to prevent night blindness.

Background

Vitamin A is an essential nutrient that is crucial in maintaining eye health. Vitamin A's active all-trans retinol metabolite endures a cycle that generates rhodopsin for light perception in the eye.\(^1\) Rhodopsin is involved in the dark adaptation process, allowing humans to see in the faint light. People with night blindness can see well during the day due to their cone cells, but they have difficulty seeing at night due to the ineffectiveness of their rod cells. Vitamin A deficiency can result in night blindness, which makes it difficult to perform tasks in faint light or at night.\(^1,2\)

Night blindness is the first symptom of vitamin A deficiency, which can lead to blindness if left untreated.\(^3–5\) In developing countries, it is common to consume foods deficient in vitamin A.\(^6,7\) It affects the eating patterns of students with an active study schedule. The dining habits of college students often
result in overeating with high-calorie food selections. Changes in behaviour regarding consuming foods typically low in vitamins, such as vitamin A, affect the rise of ocular health disorders, particularly during the online learning period and the COVID-19 pandemic. The behaviour of consuming carotenoids, a source of vitamin A, is influenced by a person's level of education. There has never been researched on the relationship between college students' knowledge and behaviour regarding consuming vitamin A-containing foods and night blindness complaints.

Numerous individuals have colour vision deficiency (CVD). Research on Saudi Arabian medical students reveals that 87 per cent of students with CVD are unaware of their condition. As a result, these students may encounter many difficulties in their medical education, particularly when identifying colour slides and specimens and investigating specific physical signs. The serial monitoring of electroretinogram (ERG) testing for vitamin A deficiency (VAD) associated with night blindness is crucial for demonstrating functional recovery post-treatment. The research conducted in Nepal reveals that Nepalese women's vitamin A intake is near the recommended amount for pregnancy and is significantly reduced, but it does not eliminate sunrise.

This study aims to determine the relationship between the level of knowledge and behaviour regarding the consumption of vitamin A-rich foods and the occurrence of sunset symptoms in students. To prevent sunrise, it is anticipated that the results of this study will be one of the consideration materials used by the university administration in determining whether or not to educate academic citizens about vitamin A-rich foods and provide them with these foods.

**Methods**

**Study design**

This research is a analytical observational study with a cross-sectional design. The respondents in this study were 409 students in the 3rd year of Universitas Islam Sultan Agung.

**Data collection**

Data on the knowledge and behavioural consumption level of vitamin A was obtained using questionnaires tested for their reliability and validity. At the same time, complaints about symptoms of obscurity were obtainable using the Low Luminance Questionnaire. (LLQ). The questionnaires are compiled in a Google form and shared through a WhatsApp group of students.

A knowledge-level questionnaire on vitamin A consumption consists of 20 questions about vitamin A deficiency's sources, benefits and consequences. The answer is "right" and "wrong". The level of knowledge is categorised as low-sized if the number of correct answers is 0–13 and high if the answer is "Right" of 14–20 questions. Vitamin A consumption behaviour was asked through a questionnaire with
20 questions related to the type, frequency and habits of consuming foods that contain vitamin A. The answer is "Yes" and "No". Behaviour is categorised as bad if the number of replies is 0–13 and good if the answer is 14–20. The LLQ consists of 32 questions on complaints related to dusk, consisting of 6 sub-scales, namely extreme illumination (questions 1–8), mobility (Questions 9–14), generally dim lighting (Q 15–20), peripheral vision (Q 21–23), driving (Q 24–28), and emotional stress. (pertanyaan ke 29–32). The answer to LLQ is "Yes" and "No". Symptoms are categorised as low-sized if the answer is "Yes" 0–21 and high 22–32.

Data Analysis

Data were analysed using SPSS version 25.0 (IBM, United States). The chi-square test is used to analyse the relationship between knowledge and behaviour of vitamin A consumption with the appearance of symptoms of darkness. Multivariate analysis with logistical regression testing determines the most influential variables on the appearance of darkness symptoms.

Results

56% of respondents were enrolled in the Health Cluster Study Programme (Medicine, Dental Medicine, and Nursing). In contrast, 44% were enrolled in the Non-Health Cluster (Islamic Religious Education, Language and Communication Sciences, Economics, Electrical Engineering, and Industrial Engineering). The majority of respondents are male and 22–25 years old. 72.1% of respondents had a high level of vitamin A knowledge, 66.7% had healthy vitamin A consumption habits, and 69.4% had low levels of ignorance. (Tabel 1).
Table 1
Characteristics, Level of Knowledge, and Behaviour Regarding Vitamin A Consumption, as well as Symptoms of Night Blindness in Respondents

<table>
<thead>
<tr>
<th>Respondent Characteristic</th>
<th>n (%   )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Cluster of Study Programme</strong></td>
<td></td>
</tr>
<tr>
<td>• Medicine</td>
<td>229 (56,0)</td>
</tr>
<tr>
<td>• Non-Medicine</td>
<td>180 (44,0)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>• 18–21 years old</td>
<td>200 (48,8)</td>
</tr>
<tr>
<td>• 22–25 years old</td>
<td>209 (51,2)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>• Woman</td>
<td>193 (47,2)</td>
</tr>
<tr>
<td>• Man</td>
<td>216 (52,8)</td>
</tr>
<tr>
<td><strong>Knowledge Level of Vitamin A</strong></td>
<td></td>
</tr>
<tr>
<td>• Low-Middle</td>
<td>114 (27,9)</td>
</tr>
<tr>
<td>• High</td>
<td>295 (72,1)</td>
</tr>
<tr>
<td><strong>Vitamin A Consumption Behaviour</strong></td>
<td></td>
</tr>
<tr>
<td>• Low-Middle</td>
<td>136 (33,3)</td>
</tr>
<tr>
<td>• High</td>
<td>273 (66,7)</td>
</tr>
<tr>
<td><strong>Night Blindness Symptom</strong></td>
<td></td>
</tr>
<tr>
<td>• Low-Middle</td>
<td>341 (83,3)</td>
</tr>
<tr>
<td>• High</td>
<td>68 (16,6)</td>
</tr>
</tbody>
</table>

Table 2 displays the results of a bivariate analysis using a chi-square test at a significance level of $p = 0.01$, indicating that gender, prodi cluster, level of knowledge, and vitamin A consumption behaviour are significantly associated with sunset symptoms. Learning and behaviour regarding vitamin A consumption were associated with darkness symptoms, according to logistic regression analysis ($p < 0.05$). The likelihood ratio for vitamin A consumption was 2,560 (IK 95%: 1,215–5,392), while the likelihood ratio for knowledge about vitamin A was 2,239 (IK 95%: 1,110–4,516).
Table 2 presents a bivariate analysis of the relationship characteristics of respondents with Rabun Senja symptoms.

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>Night Blindness Symptom [n, (%)]</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low-Middle</td>
<td>High</td>
</tr>
<tr>
<td><strong>The Cluster of Study Programme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Medicine</td>
<td>209 (91,3)</td>
<td>20 (8,7)</td>
</tr>
<tr>
<td>• Non-Medicine</td>
<td>132 (73,3)</td>
<td>48 (26,7)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Woman</td>
<td>182 (94,3)</td>
<td>11 (5,7)</td>
</tr>
<tr>
<td>• Man</td>
<td>159 (73,6)</td>
<td>57 (26,4)</td>
</tr>
<tr>
<td><strong>Knowledge Level of Vitamin A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Low-Middle</td>
<td>102 (89,5)</td>
<td>12 (10,5)</td>
</tr>
<tr>
<td>• High</td>
<td>239 (81,0)</td>
<td>56 (19,0)</td>
</tr>
<tr>
<td><strong>Vitamin A Consumption Behaviour</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Low-Middle</td>
<td>126 (92,6)</td>
<td>10 (7,4)</td>
</tr>
<tr>
<td>• High</td>
<td>215 (78,8)</td>
<td>58 (21,2)</td>
</tr>
</tbody>
</table>

**Discussion**

This study had a significant association (p 0.05) between the level of knowledge and consumption of vitamin A and hallucinatory symptoms. In a previous study, Rachman et al. discovered that adolescents in Denpasar, Bali consumed more fruits and vegetables in proportion to their nutrition knowledge.\(^{17}\) People with a greater understanding of vitamin A are typically more aware of the significance of vitamin A's benefits for eye health.\(^{18}\)

This study's multivariate analysis revealed that the behaviour of respondents had a significant impact on the onset of negative symptoms. A person with healthy vitamin A-containing food consumption patterns has a positive effect because adequate nutrition can preserve eye health. Knowledge of proper vitamin A intake will generally result in improved consumption habits but may not necessarily result in a healthy diet. The symptoms are also obtained about the origin of the faculty, where signs of low sunset are more prevalent among health students because nutrition or related courses can enhance the knowledge and behaviour of health students. Consequently, excellent nutritional knowledge should be accompanied by a daily application.\(^{19}\)
There is a correlation between gender and high-rise symptoms, with more symptoms reported by male respondents. The findings are consistent with previous research indicating that men (65%) experience more nightmares than women (35%). Due to a mutation in the nyctalopia gene (NYX) on Xp11.4 and X chromosome-related deficiencies in men, the risk of blindness tends to be higher in men.\textsuperscript{20,21} There is a correlation between gender and high-rise symptoms, with more symptoms reported by male respondents. The findings are consistent with previous research indicating that men (65%) experience more nightmares than women (35%). Due to a mutation in the nyctalopia gene (NYX) on Xp11.4 and X chromosome-related deficiencies in men, the risk of blindness tends to be higher in men.\textsuperscript{5,20,22}

Using online questionnaires to capture data allows respondents to search for answers on the web and the internet, causing respondents to not answer the questionnaire according to their knowledge. Some queries that required respondents to recall the types of food consumed during the learning period at home also resulted in less specific responses to the questionnaire. In addition, the study did not explicitly examine the symptoms of darkness with the participants due to this. Further research is required to measure retinol or vitamin A levels in the blood serum and directly analyse respondents for wheezing. Sunset should be avoided for students so that when they graduate from university, they can perform well according to their respective competencies; for example, students from Prodi Health are not expected to misdiagnose the patient.

**Conclusion**

The level of knowledge and behaviour regarding vitamin A consumption is related to night blindness in college students. This study advises students to maintain a healthy diet to prevent night blindness.

**Declarations**

**Acknowledgement**

Thank you to the reviewer who reviewed this manuscript anonymously.

**Conflict of interest**

The authors declare no conflicts of interest.

**Funding disclosure**

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**Ethics approval**

All participants were informed of the purpose of the study, and their participation was voluntary. All respondents provided their informed consent digitally and signed online. The research was approved by
the Institutional Review Board (or Ethics Committee) of the Faculty of Medicine at Universitas Islam Sultan Agung (Document Number 260.VII/2022/Komisi Bioetik) and conducted in accordance with the Declaration of Helsinki.

Authors’ contributions

Conceptualization, S.S; methodology, S.S., H.P and A.R; software, S.S; validation, S.S; formal analysis, S.S; investigation, S.S and M.S.L.H; resources, S.S; data curation, S.S and M.S.L.H; writing—original draft preparation, S.S; writing—review and editing, S.S., H.P and A.R.; visualization, S.S.; supervision, S.S., H.P and A.R; Project administration, S.S; funding acquisition, S.S and H.P. All authors have read and agreed to the published version of the manuscript.

Availability of data and materials

Not applicable

References


