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ORIGINAL ARTICLE

The association between cotton bud usage and ear infections among student

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ABSTRACT

This study aimed to determine the relationship between the use of cotton buds and ear complaints in Prima Indonesia University Faculty of Medicine students' classes in 2021. The method used was analytic observational with a cross-sectional design. Data from this research analysis were obtained from questionnaires filled out by 70 students, consisting of 35 users and 35 non-users of cotton buds. Data analysis was performed using the chi-square test. The results showed a significant association between the use of cotton buds and complaints of itchy ears (p = 0.000, OR = 28.632) and ear pain (p = 0.000, OR = 2.458), but no significant association was found with hearing loss, bleeding, or ear infections. We conclude that the use of cotton buds may increase the risk of itchy and painful ear complaints.

Keywords: gadget, headache, migraine, tension-type, student

Introduction

Cotton buds are often used to clean the ears. In a study, 92.8 percent of people in Nigeria used cotton buds for this purpose.[1] A study in Semarang also found that cotton buds were the most common ear-cleaning tool, with 85.1 percent of people using them. Other tools used include washcloths, wet wipes, pin heads, and hair pins.[2] A study found a strong link between the habit of cleaning ears using cotton buds and the occurrence of various ear complaints, especially otitis externa (outer ear infection). The most common complaint experienced by the study participants was itchy ears, followed by ear pain, fullness, and decreased hearing.[3]

Cotton buds are commonly used by adults and children to remove cerumen and relieve itching in the ears. They believed that cotton buds are a safe method for cleaning the ears and nose. Many people choose cotton buds because they are easy to use, affordable, and readily available.[4] However, cleaning ears with cotton buds is not beneficial to ear health. This habit can push the wax deeper, clog the ear canal, and allow bacteria to enter. This has the potential to damage sensitive tissue in the ear owing to trapped dirt, which in turn can reduce the working capacity of the hearing organ.[5]

Cotton buds have the potential to cause inflammation of the inner ear canal, making hearing loss more likely. Repeated trauma makes it easier for the ear to receive stimuli, triggering the release of inflammatory mediators that cause an inflammatory reaction.[6,7] Edema is a sign of inflammation. Edema in the ear canal causes complaints, such as a sense of closure, which leads to impaired sound conduction.[8] Since cotton buds

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have the potential to cause additional complaints, researchers are interested in examining the relationship and characteristics of the use of cotton buds to the incidence of ear complaints, as well as knowing the proportion of the incidence of ear complaints.

Method

This study used analytical observational research with a cross-sectional design that aimed to examine the relationship between the use of cotton buds and the incidence of ear complaints. The research location was at the Faculty of Medicine, Prima Indonesia University, with the research time taking place from April 1 to June 30, 2024. The study population included students from the Faculty of Medicine in 2021, with a sample of 70 students divided into two groups: 35 cotton bud users and 35 non-users. Purposive sampling was used, which was selected based on inclusion criteria such as willingness to be a sample, filling out a questionnaire, and a history of using cotton buds. Data were collected through a questionnaire containing questions about ear complaints, which were then analyzed using the chi-square statistical test with the help of the SPSS version 27 software.

Data analysis consisted of univariate and bivariate analyses. Univariate analysis was used to describe the characteristics of the research subjects, while bivariate analysis was used to examine the relationship between the independent variable (use of cotton buds) and dependent variable (ear complaints). The results of this study are presented in the form of frequency distribution tables and percentages.

Results

This study involved 70 university students to observe their habit of wearing ears using cotton buds. The participants were divided into two groups: a group that frequently used cotton buds (35 people) and a group that did not (35 people). In terms of age, the majority of the participants in both groups were in the 20-22 age range. However, there was a slight difference in the age distribution. In the cotton-bud user group, the highest percentage was at age 21 (45.7%), followed by age 20 (40%). In the non-user group, age 20 years was the most dominant (54.3%). In terms of sex, both groups showed a fairly balanced proportion of males and females. However, there were slightly more male students (54.3%) who did not use cotton buds than the user group. The results also showed a difference related to the experience of middle ear inflammation. Only one person (2.9%) from the cotton-bud user group had experienced middle ear inflammation, while no similar cases were found in the non-user group. The majority of students in both groups, both those who used cotton buds and those who did not, admitted to never having cleaned their ears at a healthcare facility in the last six months. This figure reached 91.4% of all participants.

Table 1. Characteristics of subjects (n=70)

Characteristics	Cotton bud usage	
	Yes	No
Gender		
Female	16 (22.9)	19 (27.1)
Male	19 (27.1)	16 (22.9)
Age (years)		
20	14 (40.0)	19 (54.3)
21	16 (45.7)	12 (34.3)
22	5 (14.3)	4 (11.4)
Diagnosed with middle ear inflammation		
Yes	1 (2.9)	0 (0)
No	34 (97.1)	35 (100)
Ear cleaning in health facility <6 months		
Yes	3 (8.6)	3 (8.6)
No	32 (91.4)	32 (91.4)

Based on Table 2, ear pain is one of the most prominent complaints. The incidence of ear pain among cotton-bud users was notably high (31.4 %). Conversely, there were no reports of ear pain in the group that did not use cotton buds. The results of the analysis revealed a highly significant association between the habit of using cotton buds and occurrence of ear pain among students. The p-value obtained was 0.000, which was

far below the conventional significance level of 0.05. This indicates that the observed relationship was unlikely to have occurred by chance. In other words, we can be highly confident that the association between cotton bud use and ear pain is not coincidental but rather reflects a true causal relationship. The calculated odds ratio (OR) was 2.458, indicating that students who frequently used cotton buds were 2.458 times more likely to experience ear pain than those who did not. The 95% confidence interval, ranging from 1.806 to 3.346, further supported this finding. This interval suggests that we can be reasonably certain that the true risk associated with cotton bud use lies within this range.

In addition to pain, ear itching was more frequently experienced by cotton-bud users. A significant 97.1% of cotton bud users reported ear itching compared to a much lower percentage (54.3 %) in the non-user group. This study demonstrated a strong correlation between the habit of cleaning the ears with cotton buds and the occurrence of ear itching among students. The p value in this study was extremely low (0.000). This indicates that the observed results were unlikely to be due to chance. Thus, we are confident that there is a direct relationship between cotton bud use and ear itching. Another important statistic is the odds ratio (OR). The OR indicates how much more likely someone is to experience ear itching if they use cotton buds than if they do not. In the present study, the odds ratio (OR) was 28.632. This means that students who frequently used cotton buds were 28 times more likely to develop ear itching than those who never used them.

Table 2. Incidence of ear complaints and cotton bud usage

Ear complaint	Cotton bud usage		p	OR
	Yes	No		
Ear pain				
Yes	11 (31.4)	0 (0)	0.000	2.458 (1.806 - 3.346)
No	24 (68.6)	35 (100)		
Itchy ear				
Yes	34 (97.1)	19 (54.3)	0.000	28.632 (3.517 - 233.071)
No	1 (2.9)	16 (45.7)		
Hearing impairment				
Yes	6 (17.1)	4 (11.4)	0.495	1.603 (0.410 - 6.264)
No	29 (82.9)	31 (88.6)		
Ear hemorrhage				
Yes	7 (20)	3 (8.6)	0.172	2.667 (0.629 - 11.306)
No	28 (80)	32 (91.4)		
Ear infection				
Yes	7 (20)	5 (14.3)	0.526	1.500 (0.426 - 5.277)
No	28 (80)	30 (85.7)		

Cotton bud use has also been linked to hearing impairment. The study revealed that 17.1% of cotton-bud users experienced hearing difficulties, while the corresponding figure for non-users was 11.4%. The obtained p-value of 0.495 is substantially larger than the conventional significance level of 0.05. This indicates that if there was no association between cotton bud use and hearing impairment (null hypothesis), we would expect to observe results as extreme or more extreme than those obtained in this study, approximately 49.5% of the time. An odds ratio (OR) of 1.603 suggests that students using cotton buds have a 1.603 times higher risk of hearing impairment. The extremely wide 95% confidence interval (0.410–6.264) includes one, implying that the true risk could be lower, equal to, or even substantially higher than this estimate. Given the wide confidence interval and non-significant p-value, the results are inconclusive and do not provide sufficient evidence to establish a causal link between cotton bud use and hearing impairment in this student population.

The risk of ear bleeding was also elevated among cotton-bud users. Twenty percent of cotton bud users reported experiencing ear bleeding compared to only 8.6% in the non-user group. Statistical analysis revealed no significant association between the habit of cotton bud use and the onset of hearing problems. Although there was a slight indication of a potentially increased risk among cotton bud users (as evidenced by an odds ratio marginally greater than 1), this finding was inconsistent and inconclusive owing to a wide

confidence interval. The p-value obtained was well above the conventional significance threshold of 0.05, further reinforcing the conclusion that there was no statistically significant relationship between the two variables. This suggests that the observed association is likely due to chance rather than a causal effect of cotton-bud use.

Likewise, ear infections were more prevalent among cotton bud users. The incidence of ear infections among cotton bud users was 20%, whereas that among non-users was only 14.3%. Statistical analysis revealed no significant association between the habit of using cotton buds and the incidence of ear infections among the student subjects of this study. The obtained p-value of 0.526 is substantially greater than the commonly accepted significance level of 0.05. This suggests that the observed relationship is likely due to chance, rather than a causal connection between the two variables. Additionally, the calculated odds ratio (OR) was 1.500, indicating that students who frequently used cotton buds had a 1.5 times higher risk of experiencing ear infections than those who did not. However, the 95% confidence interval for this OR was very wide, ranging from 0.426 to 5.277. The fact that this interval includes 1 suggests that there was no statistically significant difference between the two groups. In other words, although there is a trend towards increased risk, these results are insufficient to conclude a clear causal relationship.

Discussion

Cotton buds ear complaints

Research findings indicate that ear itching is the most common complaint among university students, which aligns with the existing theories regarding the pathogenesis of pruritus (itching) in the ear. The prevalence of ear itching, reported by 75.70% of respondents, can be attributed to various factors, such as allergies, mild infections, or irritation, often triggered by disruptions in the sebum balance of the ear canal. The theoretical framework proposed by Memar et al.[9] posits that ear itching is modulated by a diverse array of neural receptors, including H1, H4, and IL-31R, which can be activated by histamine or other irritants. Excessive use of cotton swabs can disrupt the natural sebum balance and induce irritation, corroborating the findings of this study that ear itching is the most prevalent complaint. This is consistent with study in which respondents who used cotton swabs for ear cleaning reported the highest incidence of ear itching at 45.28%.[3]

Furthermore, the finding that 15.70% of students experienced ear pain supports the theory underlying the causes of otalgia (ear pain). Otalgia can originate from the ear itself (primary otalgia) or from other areas of the ear (secondary otalgia). Ear pain associated with cotton swab use aligns with theories suggesting that improper cleaning techniques can cause irritation or trauma to the ear canal.[10] Although less prevalent than ear itching, this theoretical framework supports the significance of addressing ear pain and promoting safe cleaning practices. Complaints of ear pain indicate a more severe inflammatory stage characterized by increased pain and itching. This is marked by edema resulting from the enlargement of the external acoustic meatus lumen and thickening of the irritated skin epithelial debris, leading to increased secretion production.[3] Larasati et al. reported ear pain in 20% of 225 respondents, suggesting that this condition can be influenced by several factors including the frequency and quantity of cotton swab use.[11]

Hearing impairment, reported by 14.30% of the respondents, is also consistent with theories regarding the causes of hearing loss, such as cerumen impaction. Cerumen impaction caused by the accumulation of earwax due to cotton swab use can lead to a sensation of fullness in the ear and hearing difficulties.[12] These findings support the theory that improper cotton swab use can contribute to hearing impairment and underscores the importance of early intervention. A study by Martini et al.[13] involving schoolchildren reported that the majority (88%) did not experience hearing impairment due to cotton swab use. However, the study emphasized that parents should clean their children's ears cautiously and regularly monitor their hearing health.

The finding that 14.30% of the students reported ear bleeding aligns with the theory that bleeding can result from trauma caused by inserting cotton swabs too deep or from physical injury.[14] Although cases of bleeding are rare, this theory highlights the importance of cautious cotton swab use to prevent serious injuries. Finally, the ear infections experienced by 17.10% of students are consistent with theories suggesting that ear infections can be caused by bacteria or viruses introduced through the use of non-sterile cotton swabs.[15] Ear infections can be exacerbated by cotton swab use, which disrupts the natural defenses of the ear, emphasizing the need for education on proper cleaning techniques. A study found no significant correlation between cotton swab use and ear discharge but found a significant association when cotton swabs were used more than four times a day.[16]

Cotton bud usage and ear complaints

The study demonstrated a significant association between cotton bud use and ear pain. All participants reporting ear pain were cotton bud users (n=11, 100%). A p-value of 0.000 and an odds ratio (OR) of 2.458 (95% CI: 1.806-3.346) indicated a highly significant relationship. This aligns with the existing literature suggesting that cotton bud use can cause ear canal trauma, leading to pain from irritation or infection. Dewi et al.[17] and Bukit et al.[8] support these findings, emphasizing that cotton buds can damage ear tissue, induce inflammation, and cause pain. Similarly, cotton bud users exhibited a significantly higher risk of experiencing itchy ears (OR 28.632, p-value 0.000). This supports the theory that cotton bud use can trigger inflammation and allergic reactions in the ear canal, causing itching. Previous studies have shown that cotton bud-induced trauma or irritation can activate inflammatory mediators, exacerbating itching.

While cotton bud users had an OR of 1.603 for hearing impairment, the p-value of 0.495 indicated this relationship was not statistically significant. This suggests insufficient evidence to conclude that cotton bud use significantly increases the risk of hearing impairment. This may be due to other unidentified factors influencing hearing loss. Similarly, the p-value for ear bleeding was 0.172 with an OR of 2.667, indicating no statistically significant association. Although the OR suggests a potential increased risk, the p-value exceeds 0.05. Other research has shown that cotton bud use can cause ear canal trauma but not always lead to bleeding.

These findings underscore a significant association between cotton bud use and ear pain and itching, corroborating previous studies. However, no significant link was found between cotton bud use and hearing impairment or ear bleeding, suggesting a need for further research to identify other contributing factors. This study emphasizes the importance of educating individuals about the safe use of cotton buds and providing healthier alternatives for ear cleaning to prevent various ear health issues.

Conclusion

Demographic analysis revealed that the most frequent age among respondents using cotton buds was 21 years with a significant majority being female. The study demonstrated a highly significant association between cotton bud use and itchy ears, reported by a vast majority of respondents. Furthermore, the statistically significant p value of 0.000 for ear pain underscores the strong correlation between cotton bud usage and this symptom. Therefore, it is imperative to provide education on safe cotton bud use and appropriate ear hygiene practices to mitigate the risk of ear-related health problems. Future investigations should explore other factors that might influence hearing impairment and ear bleeding.

References

1. Aldawsari SA, Aldawsari AA, Aljthalin AA, AlDossari FM, Alhammad MA, Shatri MS Al, et al. Knowledge, Attitudes and Practices of Self-Ear Cleaning Among Medical Students, Majmaah University, Saudi Arabia. Int J Med Res Prof. 2018;4(4):155–61.
2. Najwati H, Saraswati LD, Muyassaroh. Gambaran pengetahuan orang tua dan perilaku membersihkan liang telinga anak dengan kejadian impaksi serumen pada anak sekolah dasar di wilayah pesisir (studi kasus pada anak kelas 1 di lima sekolah dasar, wilayah kerja Puskesmas Bandarharjo. J Kesehat Masy. 2017;5(4):359–67.
3. Kristianti A, Pratiwi ST, Safira N, Nazarudin N. Hubungan pembersihan telinga menggunakan cotton buds dengan kejadian keluhan telinga. Med Kartika J Kedokt dan Kesehat [Internet]. 2023 Jun 30;6(2):134–42. Available from: http://medikakartika.unjani.ac.id/medikakartika/index.php/mk/article/view/736
4. Gabriel OT, Mohammed UA, Paul EA. Knowledge, Attitude and Awareness of Hazards Associated with Use of Cotton Bud in a Nigerian Community. Int J Otolaryngol Head & Neck Surg. 2015;4(3):248–53.
5. Khan NB, Thaver S, Govender SM. Self-ear cleaning practices and the associated risk of ear injuries and ear-related symptoms in a group of university students. J Public Health Africa. 2017 Dec 31;8(2).
6. Nagala S, Singh P, Tostevin P. Extent of cotton-bud use in ears. Br J Gen Pract. 2011 Nov;61(592):662–3.
7. Frye MD, Ryan AF, Kurabi A. Inflammation associated with noise-induced hearing loss. J Acoust Soc Am. 2019 Nov 1;146(5):4020–32.
8. Bukit AOB, Qamariah N, Muthmainah N, Rofi'i A, Kaidah S. Hubungan frekuensi dan jumlah penggunaan cotton bud pada toilet telinga terhadap keluhan telinga berdenging berdasarkan nilai. Homeostasis [Internet]. 2023 Aug 26;6(2):277. Available from: https://ppjp.ulm.ac.id/journals/index.php/hms/article/view/9974
9. Memar O, Caughlin B, Djalilian HR. Symptoms, Solutions for Ear Itch. Hear J. 2019 May;72(5):44,46,47.
10. Earwood JS, Rogers TS, Rathjen NA. Ear Pain: Diagnosing Common and Uncommon Causes. Am Fam Physician. 2018 Jan 1;97(1):20–7.
11. Larasati A, Qamariahi N, Rahmiati R, Syamsuddin A, Hayatie L. Hubungan frekuensi dan jumlah penggunaan cotton bud untuk toilet telinga terhadap derajat keluhan nyeri. Homeostasis [Internet]. 2023 May 23;6(1):135. Available from:

https://ppjp.ulm.ac.id/journals/index.php/hms/article/view/8799
12. Mohi D, Sri Julyani, Pratama AA, Arifuddin ATS, Surdam Z. Hubungan antara Penggunaan Cotton Bud dengan Serumen Obturans pada Mahasiswa Fakultas Kedokteran Universitas Muslim Indonesia Angkatan 2020. Fakumi Med J J Mhs Kedokt. 2023 Feb 1;3(1):28–35.
13. Martini E, Sumardiyono. Deteksi Dini dan Habilitasi Gangguan Dengar Pada Bayi dan Anak. Medica Hosp J Clin Med. 2017 May 17;4(2).
14. Nareswari AA, Sangging PRA, Himayani R. Literature Review: Classification and Management of Auricular Trauma. Med Prof J Lampung. 2023 Jun 1;13(4.1 SE-):150–5.
15. Nabila A, Zahra TF, Sangging PRA, Himayani R. Perubahan kebiasaan hidup dalam rangka pencegahan penyakit otitis eksterna. J Kesehat dan Agromedicine. 2023;10(1).
16. Rudiansyah SDA, Qamariah N, Muthmainah N, Rofi'i A, Kaidah S. Hubungan antara frekuensi dan jumlah penggunaan cotton bud untuk toilet telinga terhadap keluhan telinga berair. Homeostasis. 2023;6(3).
17. Dewi NP, Vani AT, Triansyah I, Abdullah D, Hansah RB. Edukasi Dampak Penggunaan Cotton Buds untuk Membersihkan Telinga pada Siswa SMP YARI School Padang. J Abdimas ADPI Sains dan Teknol. 2022 Jun 30;3(2):36–9.