

Self-ear cleaning practice and the associated ear-related symptoms and injuries among medical students

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ABSTRACT

Objectives: The study sought to ascertain the prevalence; various methods used for self-ear cleaning practice and identify injuries during self-ear cleaning malpractice among medical students. **Methods:** A descriptive cross-sectional study with an online validated questionnaire conducted electronically from January to October 2022 among first, second, third, fourth and fifth-year medical students at Qassim University, including males and females in Qassim Region, Saudi Arabia. The study sample consisted of 386 participants: Males (n=202; 52.3%) and females (n=184; 47.7%). The distribution on the level of education was 1st year (n=85; 22%), 2nd year (n=67; 17.4%), 3rd year (n=81; 21%), 4th year (n=66; 17.1%) and 5th year (n=87; 22.5%). **Results:** The prevalence of self-ear cleaning practices among medical students is 83.2%, males (78%) and females (89%). The association between self-ear cleaning and experiencing ear or damage to the eardrum had no significant finding (χ^2 (1) = 0.017, p = 0.895). The students in the study acknowledge that they experienced different forms of ear symptoms. In terms of ear symptoms, itching was the most common (32.9%), followed by earache (27.2%) and a feeling of fullness (26.2%). The least frequent symptoms were vertigo (7%) and ear discharge (7.5%). Overall, there were significant differences between the methods used to clean the ears especially ear buds (93%) were the most common method. **Conclusion:** Our study demonstrates that, despite senior medical students' knowledge of medicine, self-ear cleaning still exists. This brings to a close the widespread lack of knowledge regarding how the ear naturally cleans itself. Therefore, the study advises highlighting the requirement for a medical education program on the issues with public health brought on by self-ear cleaning.

Keywords: Self-ear cleaning, Ear symptoms, Wax removal, Hygiene, Cotton buds.

1. INTRODUCTION

Cerumen is one of the primary barriers to infection in the ear canal (Johnson et al., 2013). The skin of the cartilaginous part of the external ear canal contains sebaceous glands and specialized ceruminous apocrine glands; their secretions mixed with desquamated epithelial cells produce cerumen (Ansari et al., 2021; Michaudet and Malaty, 2018). Cerumen has important functions; besides allowing desquamation, it facilitates cleaning and lubrication of the canal, entraps dirt and contains immune globulins, lysosomes, lipids, glycoproteins and trace elements that play a significant role in maintaining the local host defense mechanism in the ear (Guest et al., 2004; Khan et al., 2017). In addition, the highly acidic pH (approximately 4 to 5) of cerumen is harmful to organisms and helps reduce the risk of infection in the auditory canal (Khan et al., 2017). Normally, the canal has self-protecting and self-cleansing mechanisms assisted by jaw movement. The cerumen coat works its way to the lateral part of the canal and sloughs externally (Johnson et al., 2013).

Inserting things into the ear canal is a part of self-ear cleaning. Many people, including both adults and children, have adopted it as a habit, performed by them or with parental assistance. Few studies have reported a very high prevalence of self-ear cleaning up to 93% and 98% (Khan et al., 2017; Olaosun, 2014) respectively. In a study in coastal Karnataka, all 500 participants were reported to perform self-ear cleaning at home (Dosemane et al., 2015). The high prevalence is attributed to consciousness toward hygiene and prevention of earwax formation in the ear as demonstrated by 90% of the participants in a study in the Tundun-Wada community and National Ear Care Center in Nigeria that exhibited similar results. Fifty percent of the participants preferred self-ear cleaning because of itchiness and about one-third of the participants formed a habit of practicing this over several years (Afolabi et al., 2009; Olajide et al., 2015).

The anatomy of the ear canal varies among individuals and may cause wax accumulation. Self-ear cleaning is not only unnecessary but may also disturb normal physiology and lead to various pathologies (Johnson et al., 2013). Ear injuries caused by cotton buds and other materials are common in ENT clinics (Hobson and Lavy, 2005; Nussinovitch et al., 2004). Many patients report to their otorhinolaryngologists and family doctors with an otological complaint and urge to scratch their external ear canal with different objects available, such as match sticks, broomsticks, biro pen covers, feathers and even fingers (Adegbiyi et al., 2018; Oladeji et al., 2015).

An unprofessional practice of cleaning the ear canal increases the risk of ear-related symptoms and injuries. A study demonstrated that using cotton buds was associated with wax impaction in school children (Ulaganathan and Shalini, 2015). A similar association with neurodermatitis, otitis externa, contact dermatitis and tympanic membrane perforation was also reported (Ahmed et al., 2014).

The attitude, awareness and knowledge of the public regarding health hazards and complications of self-ear cleaning are very poor, as there is a common belief that it is beneficial (Afolabi et al., 2009). Many studies have reported poor knowledge regarding self-ear cleaning worldwide (Alateeq et al., 2018; Ghauth et al., 2018; Lukolo et al., 2021; Olajide et al., 2019; Tobih et al., 2021). A study conducted in the Makkah region on a young population demonstrated that 80% of participants had poor knowledge and 60% of them would not consult a doctor if they experienced hearing difficulties (Haji et al., 2021).

The results of another study conducted in Kuala Lumpur showed that self-ear cleaning became a regular activity, similar to bathing or brushing teeth. Seventy-four percent of the participants believed it helped remove wax from the ear and 16% used the cotton buds to scratch the ear canal when itchy (Lee et al., 2005). Another study conducted on ENT clinic patients at King Abdulaziz University Hospital showed that nearly half of the 378 patients were unaware whether complications from cotton buds could occur (Alrajhi et al., 2019).

Not only the public but also health workers and medical students show a concerning trend in this aspect, as indicated by multiple studies (Aldawsari et al., 2018; Alshehri et al., 2020; Koirala et al., 2020). A study was conducted at Al-Imam Mohammad Ibn Saud Islamic University, Saudi Arabia, by Turki Mahfoz, (2021) the results of which showed that 85% of medical students had good knowledge of ear-self-cleaning mechanisms, especially senior students. Moreover, 93% of medical students agreed that cleaning one's ears at home could cause ear injuries, although it did not affect their practice of self-ear cleaning, as 64% out of 708 students commonly cleaned their ears with cotton buds.

Globally, the morbidity and mortality associated with ear diseases and injuries remain important, but public health problems are ignored. The need for medical education programs in this subject is mandatory for all societies, including health workers and practitioners (Alrajhi et al., 2019; Khan et al., 2017; Mahfoz, 2021).

Our research sought to establish the prevalence of and various methods used for self-ear cleaning practice among medical students and identify injuries during self-ear cleaning malpractice.

2. MATERIAL AND METHODS

Study Design and Setting

A descriptive cross-sectional study was conducted among first, second, third, fourth and fifth-year medical students of Qassim University, including males and females in Qassim Region, Saudi Arabia with duration of 10 months from the 1st of January 2022 to the 1st of October 2022.

Study participants

Our target population comprised 718 male and female medical students of Qassim University. The study sample consisted of 386 participants with a 95% confidence interval and a precision of $\pm 5\%$, according to the formula below: $= (z^2 \times p \times q) / d^2$

Where:

n: Calculated sample size

z: The z-value for the selected level of confidence= is 1.96.

p: 50%, for maximum sample size calculation

q: $(1 - p) = 50\%$.

d: The margin of error = 0.05.

Data collection

An anonymous English-language validated questionnaire was distributed online using Google Forms as a tool. The questionnaire consisted of three sections and 23 questions, including open-ended, closed-ended and multiple-choice response questions. Section "A" included demographic data "age, gender and year of the study", Section "B" enquired about the ear cleaning practice and Section "C" enquired about ear-related symptoms and injuries. The questionnaire was adapted from (Khan et al., 2017) and some modifications were made, including other questions based on a review of the recent literature (Amutta et al., 2013; Olaosun, 2014). To ensure the reliability and validity of the questionnaire, a pilot study was conducted with 10 audiology students to improve its face/content validity and then distributed to all medical students of Qassim University. Samples were collected from March to April 2022 to complete the sampling.

Ethical considerations

Ethical approval was obtained from the Ethics Committee of Qassim University and written informed consent was obtained from each participant before the start of the study. Each medical student participated voluntarily and there was no cause for any participant to experience stress, discomfort, worry or loss of self-esteem, nor was it intended to invade their privacy.

Statistical method

Data manipulation was performed using the Tidy verse (Wickham et al., 2019) packages in R. The ggstatsplot (Indrajeet, 2021) package in R was used to plot the graphs. Statistical data in the graphs represent descriptive statistics, Pearson correlation values, p-value, means, confidence intervals and Bayesian estimation values. A 95% confidence interval was used as the baseline to interpret the multivariate analysis results.

3. RESULTS

Descriptive summative

Age, sex and academic year were socio-demographic variables in the study. Overall, the sample size for the study was 386 medical students including men (n=202; 52.3%) and women (n=184; 47.7%). The distribution based on the level of education was 1st year (n=85; 22%), 2nd year (n=67; 17.4%), 3rd year (n=81; 21%), 4th year (n=66; 17.1%) and 5th year (n=87; 22.5%). Cleaning of the ear was the main dependent variable categorized as self-ear cleaning, yes and no (n=321; 83.2%, n=65; 16.8%, respectively). The mean age was 22.01 years with a standard deviation of 1.644. The categorized coded ages were: 18–20 years (n=81; 21%), 21–23 years (n=239; 61.9%), 24–26 years (n=64; 16.6%) and over 27 years (n=2; 0.5%). Table 1 show that a significant association was observed only regarding the year of the study.

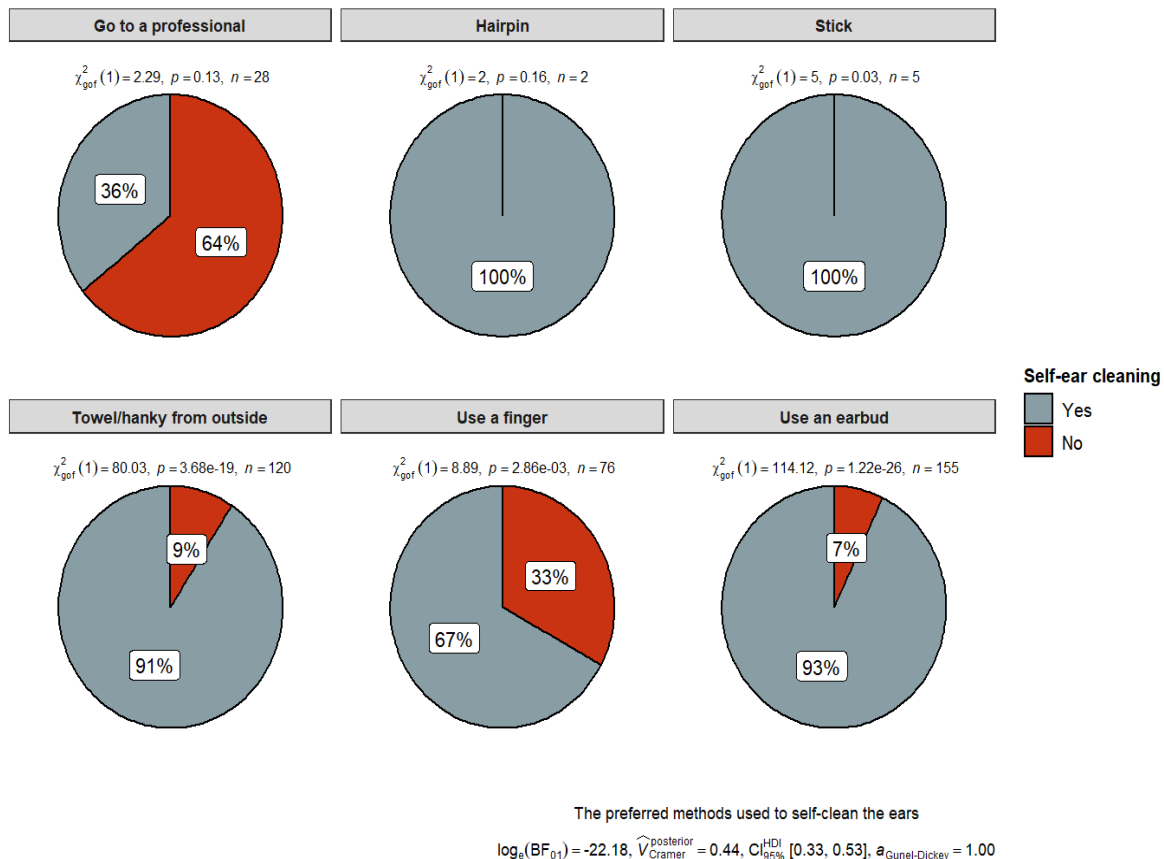
Table 1 Summary of cross-tabulation characteristics on the importance of cleaning ears

Variable	Characteristic	Beneficial	Harmful	Non-beneficial	Not sure	Total	χ^2	p-value
Age group	18–20 years	36 (9.3%)	11 (2.8%)	11 (2.8%)	23 (6%)	81 (21%)	9.347 (df=9)	0.406
	21–23years	116 (30.1%)	49 (12.7%)	26 (6.7%)	48 (12.4%)	239 (61.9%)		
	24–26 years	25 (6.5%)	12 (3.1%)	12 (3.1%)	15 (3.9%)	64 (16.6%)		
	Over 27 years	2 (0.5%)	0 (0%)	0 (0%)	0 (0%)	2 (0.5%)		
Gender	Female	83 (21.5%)	32 (8.3%)	19 (4.9%)	50 (13%)	184 (47.7%)	5.755 (df=3)	0.124
	Male	96 (24.9%)	40 (10.4%)	30 (7.8%)	36 (9.3%)	202 (52.3%)		
Year of Study	1st year	39 (10.1%)	10 (2.6%)	8 (2.1%)	28 (7.3%)	85 (22%)	29.78 (df=12)	0.003
	2nd year	36 (9.3%)	10 (2.6%)	7 (1.8%)	14 (3.6%)	67 (17.4%)		
	3rd year	48 (12.4%)	9 (2.3%)	11 (2.8%)	13 (3.4%)	81 (21%)		
	4th year	24 (6.2%)	21 (5.4%)	7 (1.8%)	14 (3.6%)	66 (17.1%)		
	5th year	32 (8.3%)	22 (5.7%)	16 (4.1%)	17 (4.4%)	87 (22.5%)		

Multivariate analysis

To identify the different methods for ear cleaning employed by medical students of Qassim University, overall, there were significant differences between the methods used to clean the ears (Figure 1). The effect size was greater than 0.25 (Cramer's $V = 0.43$), which meant most responses were significant. However, the findings regarding the methods used to clean the ear such as using a hairpin or visiting a professional were not substantial. Notably, most students acknowledged using ear buds (93%), fingers (67%) and a towel or handkerchief (91%) to clean outside the ears. Although the findings were not significant, it is noteworthy that most students (64%) acknowledged that they did not seek professional ENT services.

Fig.1 How do you clean your ears/ remove wax?

 $\chi^2_{\text{Pearson}}(5) = 75.97, p = 5.84\text{e-}15, \hat{V}_{\text{Cramer}} = 0.43, \text{CI}_{95\%} [0.33, 1.00], n_{\text{obs}} = 386$

Figure 1 How do you clean your ears/remove wax?

The students identified the parts of the ears that they self-cleaned (Figure 2). A towel or handkerchief and fingers were significantly (both $p < 0.001$) used to clean outside the ear canal (both 57%), although 36% each, would use a towel and fingers to clean both inside and outside the ear. Notably, ear buds were significantly ($p < 0.001$) used to clean both inside and outside the ears (68%). The findings regarding the use of hairpins and sticks were not significant. Most students significantly sought ($p = 0.01$) professional services.

The use of olive oil drops for self-ear cleaning had a significantly stronger effect size (Cramer's $V = 0.22$) than that of docusate sodium drops (Cramer's $V = 0.16$) (Table 2). Docusate sodium drops (7%) were significantly more popular than olive oil drops (4%) for cleaning both inside and outside the ear. However, olive oil drops (24%) were significantly more popular than docusate sodium drops (22%) for cleaning inside the ear. Similarly, olive oil drops (6%) were used considerably more than docusate sodium drops (5%) for cleaning outside the ear.

Fig.2 Which parts of the ear do you clean?

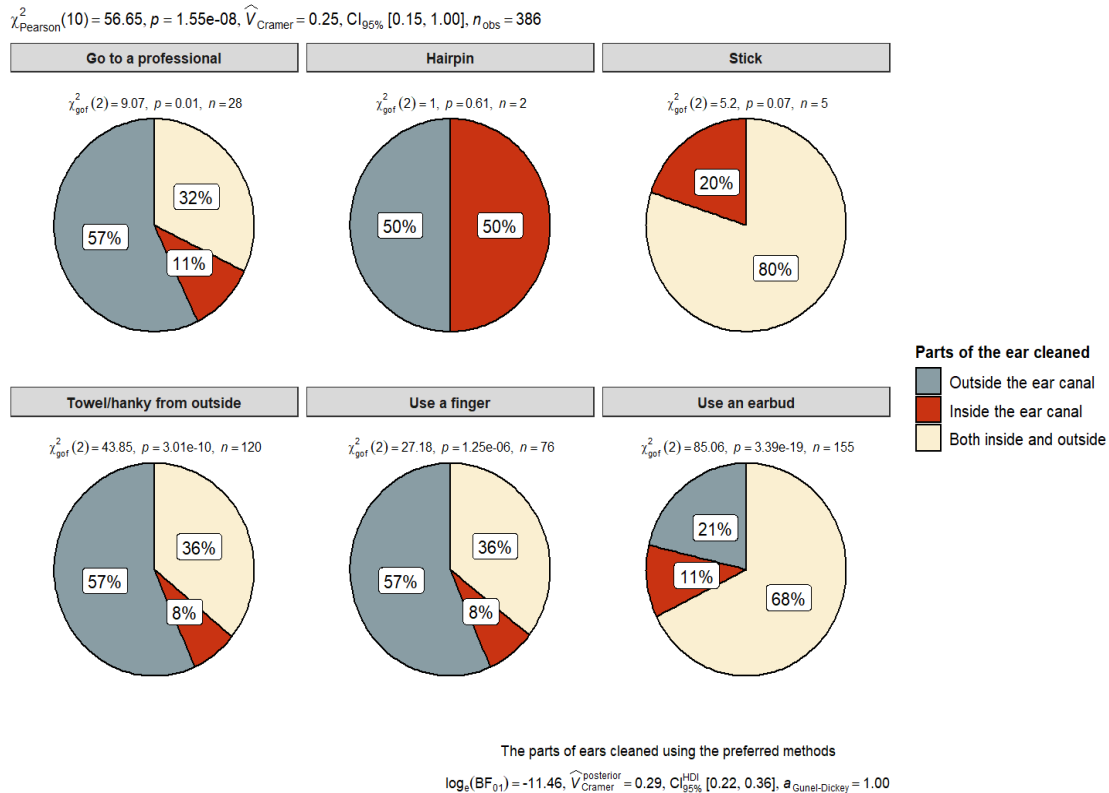


Figure 2 Which parts of the ear do you clean?

Table 2 The use of olive oil and docusate sodium drops for self-ear cleaning

	Variable	Both inside & outside	Inside the ear canal	Outside the ear canal
Use of olive oil drops	Chi-square statistics	$\chi^2_{\text{gof}}(1)=161.04, P < 0.001, n=188$	$\chi^2_{\text{gof}}(1)=9.76, p=0.0018, n=37$	$\chi^2_{\text{gof}}(1)=123.48, P < 0.001, n=161$
	Yes	4%	24%	6%
	No	96%	76%	94%
$\chi^2_{\text{pearson}}(2) = 21.01, p = 0.00003, \hat{V}_{\text{Cramer}} = 0.22, \text{CI}_{95\%} [0.12, 1.00], n_{\text{obs}} = 386$				
Use of Docusate sodium drops	Chi-square statistics	$\chi^2_{\text{gof}}(1)=136.17, P < 0.001, n=188$	$\chi^2_{\text{gof}}(1)=11.92, P=0.0006, n=37$	$\chi^2_{\text{gof}}(1)=130.59, P < 0.001, n=161$
	Yes	7%	22%	5%
	No	93%	78%	95%
$\chi^2_{\text{pearson}}(2) = 11.69, p = 0.0029, \hat{V}_{\text{Cramer}} = 0.16, \text{CI}_{95\%} [0.03, 1.00], n_{\text{obs}} = 386$				

There were no significant differences between the sources of advice in using olive oil drops to self-clean the ear (Figure 3). The use of olive oil drops for self-ear cleaning had a very weak effect size (Cramer's $V = 0.00$). However, there were significant differences in the sources of information. Social influence including friends (8%) and family members (7%) was the primary source of information. Internet was another significant source of information (6%), followed by ENT specialists (4%). Notably, general practitioners (GP) did not advocate the use of olive oil drops.

Fig.3 Where did you find out about the use of olive oil drops?

$\chi^2_{\text{Pearson}}(4) = 1.83, p = 0.77, \hat{V}_{\text{Cramer}} = 0.00, \text{CI}_{95\%} [0.00, 1.00], n_{\text{obs}} = 386$

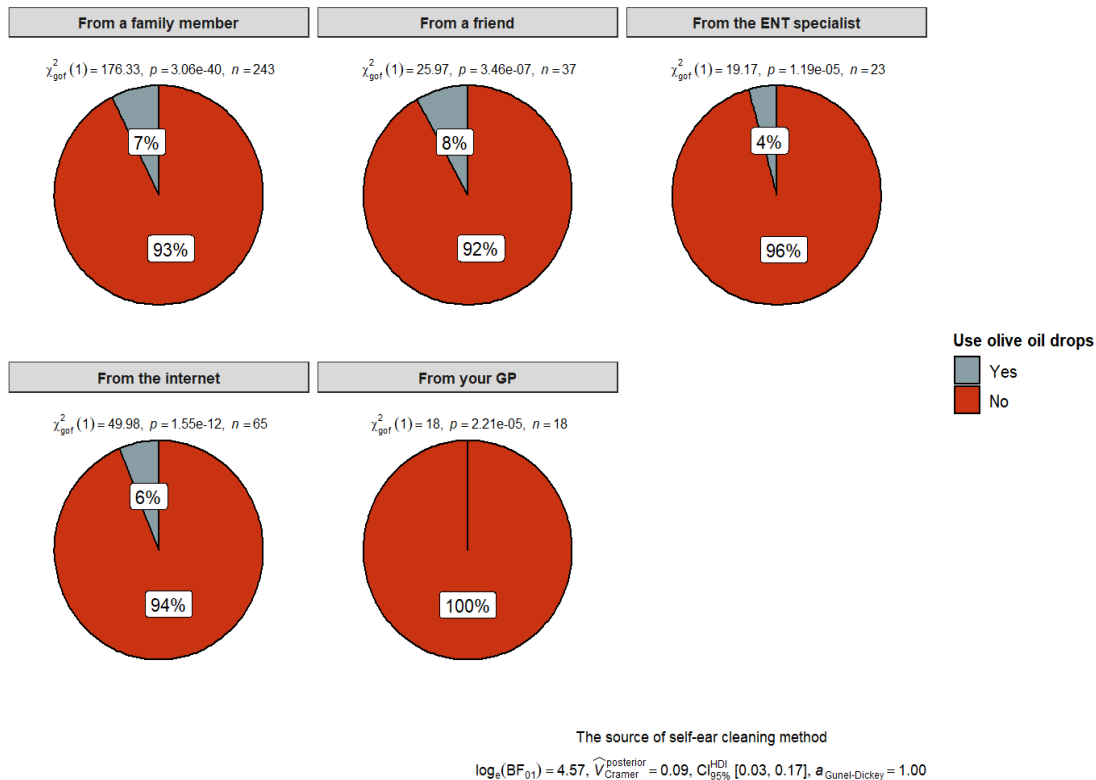


Figure 3 Where did you find out about the use of olive oil drops?

Docusate sodium drops were significant among the primary sources of information about its use (Figure 4). Similarly, significant results were observed for the individual sources of information regarding the use of docusate sodium drops. Information from ENT specialists had the highest score (26%), followed by that from the GP (11%) and Internet (9%). Social influence (family members (6%) and friends (5%)) was a minor source. The use of olive oil drops for self-ear cleaning had a strong effect size (Cramer's $V = 0.15$).

To estimates the prevalence of self-ear-cleaning practices among medical students at Qassim University. Overall, 321 (83.2%) medical students acknowledged that they self-cleaned their ears, while 65 (16.8 %) did not. The prevalence of self-ear cleaning was 83.2% in both men (78%) and women (89%) (Table 3).

Table 3 Prevalence of self-ear cleaning

Variable	Self-ear cleaning	No self-ear cleaning	Chi-square statistic (within differences)
Males	78%	22%	$\chi^2_{\text{gof}}(1)=109.59, p < 0.001, n=184$
Females	89%	11%	$\chi^2_{\text{gof}}(1)=64.34, p < 0.001, n=202$

To identify ear-related symptoms and injuries associated with self-ear cleaning practices among medical students at Qassim University. The association between self-ear cleaning and ear or ear drum damage was not a significant finding ($\chi^2(1) = 0.017, p = 0.895$) (Table 4).

Fig.4 Where did you find out about the use of Docusate sodium drops?

$\chi^2_{\text{Pearson}}(4) = 12.90, p = 0.01, \hat{V}_{\text{Cramer}} = 0.15, \text{CI}_{95\%} [0.00, 1.00], n_{\text{obs}} = 386$

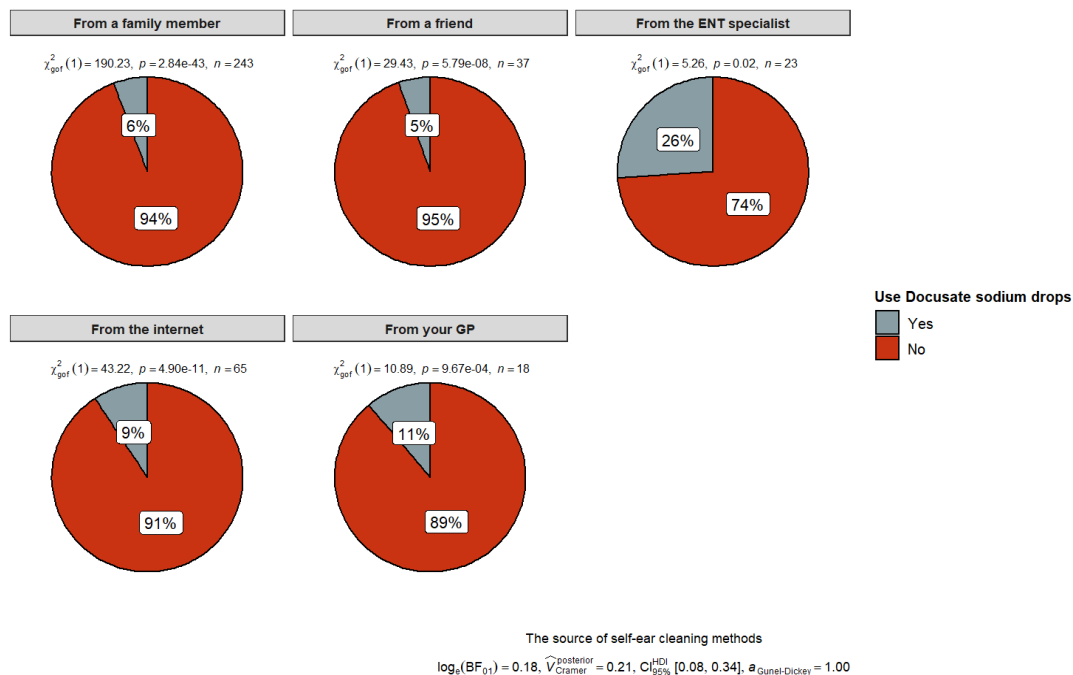


Figure 4 Where did you find out about the use of Docusate sodium drops?

Table 4 Association between self-ear cleaning and ear damage

		Experience ear damage	
		No	Yes
Self-ear cleaning	No	59 (15.3%)	6 (1.6%)
	yes	293 (75.9%)	28 (7.3%)

The students in this study acknowledged that they experienced different forms of ear symptoms (Figure 5). The most prevalent ear symptom was ear itchiness (32.9%), followed by earache (27.2%) and feeling of ear fullness (26.2%). Vertigo was the least prevalent 7%), followed by ear discharge 7.5%).

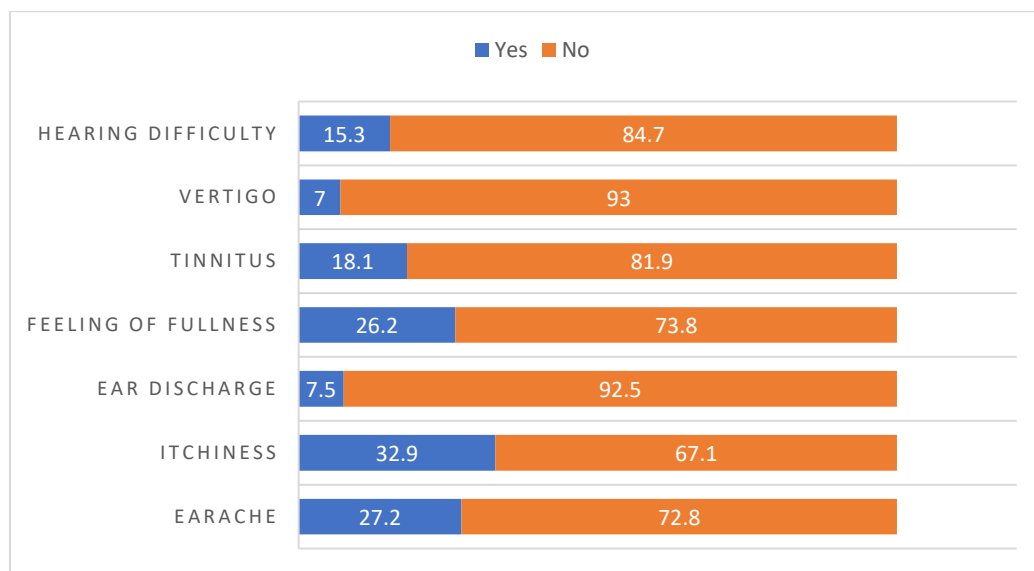


Figure 5 Ear-related symptoms experienced by the medical students in the study

There was no significant association between age and symptoms. A significant association was only found between tinnitus and gender ($\chi^2 (1) = 5.21; p = 0.022$). More women reported tinnitus ($n=42$; 10.9%) than men ($n=28$; 7.3%). There was a significant association between hearing difficulty and year of study: $\chi^2 (4) = 11.66; p = 0.020$. Hearing difficulties were experienced by the students from the 4th year ($n=16$; 4.1%), 1st year ($n=15$; 3.9%), both 2nd year and 5th year ($n=12$; 3.1%) and lastly 3rd year ($n=4$; 1%). To understand the perceptions of medical students at Qassim University regarding self-ear cleaning practices

Association between ear symptoms and use of cotton buds

The association between ear symptoms and cotton buds was investigated using cross-tabulation. Ear itchiness was significantly associated ($\chi^2 (1) = 7.111, p = 0.008$), whereas other symptoms were not. Ear itchiness was the most prevalent symptom that made most students use cotton buds ($n=82$; 21.2%), followed by earache ($n=65$; 16.8%) and then a feeling of fullness ($n=58$; 15%). Ear discharge recorded the least use of cotton buds to wipe the discharge from the ear ($n=13$; 3.4%). Discharge is mainly associated with bacterial infections.

Table 5 Association between ear symptoms and use of cotton buds

Symptoms	Use cotton buds	Do not use cotton buds	Total	χ^2	p-value	Significant
Earache	65 (16.8%)	40 (10.4%)	105 (27.2%)	2.84	0.092	Non-significant
Itchiness	82 (21.2%)	45 (11.7%)	127 (32.9%)	7.11	0.008	Significant
Ear discharge	13 (3.4%)	16 (4.1%)	29 (7.5%)	1.29	0.256	Non-significant
Feeling of fullness	58 (15%)	43 (11.1%)	101 (26.2%)	0.35	0.556	Non-significant
Tinnitus	44 (11.4%)	26 (6.7%)	70 (18.1%)	2.18	0.140	Non-significant
Vertigo	19 (4.9%)	8 (2.1%)	27 (7%)	2.80	0.094	Non-significant

Use of cotton buds among siblings and parents

The use of cotton buds was significant among siblings but non-significant among parents (Table 6). Notably, self-ear cleaning is popular among both siblings and parents.

Table 6 Use of cotton buds among siblings and parents

Self-ear cleaning			Chi-square statistic	Decision
Siblings self-cleaning their ears			$\chi^2 (1) = 35.81, p < 0.001$	Significant
No	34 (8.8%)	31 (8%)		
yes	57(14.8%)	264 (68.4%)		
Siblings use cotton buds for self-cleaning their ears			$\chi^2 (1) = 4.41, p = 0.036$	Significant
No	31 (8%)	34 (8.8%)		
Yes	109(28.2%)	212 (54.9%)		
Parents self-cleaning their ears			$\chi^2 (1) = 7.798, p = 0.005$	Significant
No	22 (5.7%)	43 (11.1%)		
Yes	59 (15.3%)	262 (67.9%)		
Parents use cotton buds for self-cleaning their ears			$\chi^2 (1) = 0.789, p = 0.374$	Non-significant
No	22 (5.7%)	43 (11.1%)		
Yes	91 (23.6%)	230 (59.6%)		

Period of self-ear cleaning

Overall, the most prevalent time when most students would clean their ears was not specific (37.6%), followed by the morning after a bath (35%); the least prevalent time was at night (1.3%). This finding was significant, $\chi^2 (4) = 23.31, p < 0.001$ (Table 7).

Table 7 Time of self-cleaning the ears

Self-ear cleaning	Any time of the day	At night	Morning after bath	No specific time	When relaxing
No	2 (0.5%)	2 (0.5%)	10 (2.6%)	49 (12.7%)	2 (0.5%)
Yes	29 (7.5%)	5 (1.3%)	135 (35%)	145 (37.6%)	7 (1.8%)

The number of years for self-cleaning the ears for most students was 1–5 years, followed by 6–10 years, as indicated by the significant association with self-ear cleaning, $\chi^2 (5) = 57.47$, $p < 0.001$ (Table 8).

Table 8 Years of self-cleaning ears

Self-ear cleaning	< 1 year	> 21 years	1-5 years	11-15 years	16-21 years	6-10 years
No	24 (6.2%)	8 (2.1%)	15 (3.9%)	3 (0.8%)	4 (1.0%)	11 (2.8%)
Yes	21 (5.4%)	19 (4.9%)	99 (25.6%)	66 (17.1%)	33 (8.5%)	83 (21.5%)

Association between ear damage and self-ear cleaning

The students were also asked about their overall perception regarding whether self-cleaning damaged their ears. These findings were not significant, $\chi^2 (1) = 0.407$, $p = 0.524$ (Table 9).

Table 9 Association between ear damage and self-ear cleaning

	Ear damage		
		No	Yes
Self-ear cleaning	No	7 (1.8%)	58 (15%)
	Yes	44 (11.4%)	277 (71.8%)

Association between gender and self-ear cleaning

The categorization of the student's data based on gender did not reveal any significant results for either gender: Females, $\chi^2 (1) = 0.259$, $p = 0.611$ and males, $\chi^2 (1) = 0.195$, $p = 0.659$ (Table 10).

Table 10 Association between gender and self-ear cleaning

	Self-cleaning damages the ears		
		No	Yes
Self-ear cleaning (females)	No	2 (1.1%)	19 (10.3%)
	yes	22 (12%)	141 (76.6%)
Self-ear cleaning (males)	No	5 (2.5%)	39 (19.3%)
	yes	22 (10.9%)	136 (67.3%)

Association between education and self-ear cleaning

There were no significant associations based on knowledge regarding ear damage due to self-cleaning and education level: First year, $\chi^2 (1) = 0.863$, $p = 0.353$; the second year, $\chi^2 (1) = 0.059$, $p = 0.809$; the third year, $\chi^2 (1) = 0.017$, $p = 0.895$; fourth year, $\chi^2 (1) = 1.456$, $p = 0.227$ and the fifth year, $\chi^2 (1) = 0.683$, $p = 0.408$ (Table 11).

Table 11 Association between education and self-ear cleaning

	Self-cleaning damages the ears	
	No	Yes
1 st year	2 (2.4%)	6 (7.1%)
	10 (11.8%)	67 (78.8%)
2 nd year	2 (3%)	9 (13.4%)
	12 (17.9%)	44 (67.5%)

3 rd year	1 (1.2%)	8 (9.9%)
	7 (9.7%)	65 (80.2%)
4 th year	0 (0%)	14 (21.2%)
	5 (7.6%)	47 (71.2%)
5 th year	2 (2.3%)	21 (24.1%)
	10 (11.5%)	54 (62.1%)

4. DISCUSSION

This study determined the prevalence and various methods used for self-ear cleaning practices among medical students and identified injuries during self-ear cleaning malpractice at Qassim University. The prevalence of self-ear cleaning reported was 83.2% which is lower compared to 93% and 98% report in previous studies (Khan et al., 2017; Olaosun, 2014). The current study reported the prevalence of self-ear cleaning in males (78%) and females (89%). The prevalence in females was slightly closer to the 93% reported by Khan et al., (2017) and almost similar to that reported by Dosemane et al., (2015).

The self-ear cleaning practice is an alarm among most medical students at Qassim University, who significantly associate it with itchiness. These findings are similar to those previously reported by Afolabi et al., (2009) and Olajide et al., (2015) in Nigeria. The current study found a significant correlation between the use of ear buds and itchiness. Notably, cotton buds could not be associated with an earache, ear discharge, feeling of fullness, tinnitus and vertigo, all of which do not warrant the use of cotton buds, but the uptake of medications to relieve the specific symptoms. There were no observable differences between self-ear cleaning and ear damage and 75.9% of the students were self-cleaning their ears because they had not experienced ear damage. However, 7.3% of the students confirmed they had experienced ear damage, yet they have continued self-cleaning their ears. This fact was further supported by 71.8% of the students acknowledging that although self-ear cleaning damages ears they are continuing with the practice. Similarly, data segregated by sex showed no significant differences. The significant differences in the use of cotton buds during self-ear cleaning showed that most students had acquired the habit from their siblings and parents. This concerning trend indicates a poor knowledge of ear hygiene. These results support those from previous studies (Afolabi et al., 2009; Alateeq et al., 2018; Ghauth et al., 2018; Lukolo et al., 2021; Olajide et al., 2019; Tobih et al., 2021) and the current study is in agreement with a study conducted in the Makkah region (Haji et al., 2021) in Saudi Arabia. The current study is rich in its findings owing to its investigation of the habit of self-ear cleaning among the youth (medical students) of both sexes. Gender issues in Saudi Arabia are very sensitive to strong cultural factors. Thus, the study was considered to address a gap that might have been ignored in Middle Eastern countries.

There were no significant associations based on knowledge regarding ear damage due to self-cleaning and the education level indicating that despite medical students' knowledge of the dangers of self-ear cleaning, the practice was still rampant. This finding is similar to those reported earlier Aldawsari et al., (2018), Alshehri et al., (2020) and Koirala et al., (2020) regarding self-ear cleaning practices among healthcare workers and medical students. Although this finding was not significant, the current study found that senior students (n=75; 19.4%) topped the list in the practice of self-ear cleaning. These results are comparable to those reported by Mahfoz, (2021) among medical students in Saudi Arabia. First-year and third-year students were at the top regarding practicing self-ear cleaning. This could be because they might not have been exposed to medical topics related to the harmful effects of self-ear cleaning in their course work.

Olive oil and docusate sodium drops were used for the self-ear cleaning process. Olive oil drops were primarily used because of the social influence of friends and family members. The same was evidenced by the siblings and parents regarding the use of cotton buds. Cultural and social ties in the Kingdom of Saudi Arabia are powerful and their influence on many aspects of a Saudi's life can go unnoticed. Thus, although medical students may know that the practice of self-ear cleaning is harmful, they may ultimately replicate what their peers are doing unconditionally. Notably, the information on using docusate sodium drops was mainly derived from prescriptions from ENT specialists and GP. Thus, social influence also plays a role in using docusate sodium drops, although the information on its use is less likely to be sourced from peers than from ENT specialists and GP.

The students used different materials to clean their ears. The use of ear buds, fingers and a towel or hand kerchief was widespread among the students for cleaning outside the ears. However, 64% acknowledged not seeking professional ENT services. These findings were similar to those reported by Haji et al., (2021) who noted that 60% of participants did not consult a doctor. Although not significant, some medical students continued using hairpins and sticks to clean their ears. Similarly, students were reported to significantly clean their ears using ear buds, fingers and towels, although some registered students sought professional services.

5. CONCLUSION

In conclusion, this study found that self-ear cleaning remains common among university medical students in Saudi Arabia. The prevalence of self-ear cleaning practices among medical students in Saudi Arabia is 83.2%. Social influence has a significant role in the use of olive oil drops, docusate sodium drops and cotton buds. This study reported that despite medical knowledge among senior medical students, the practice of self-ear cleaning continues. Thus, the study concludes with a rampant poor understanding of the natural process that the ear self-cleans. Therefore, the study recommends emphasizing the need for a medical education program on the public health problems associated with self-ear cleaning.

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Authors' contributions

Principal investigator: Waleed Abdulaziz Alhazmi: From the inception of the research proposal through its conclusion, organized and supervised the whole project and participated in all aspects of the study. Co-authors: Ahmed M Alshammari: Involved in every stage of the study, from proposal preparation to the end. Abdulraheem S Almutairi: Responsible for proposal writing and data gathering and participated in the majority of research phases, from proposal writing through conclusion. Moath K Alshweash: Responsible for the final introduction and data gathering and participated in the majority of the study phases from proposal preparation to conclusion. Saif M Alshammari: Responsible for questionnaire design, data collecting and analysis and data gathering and participated in the majority of research phases, from proposal writing through conclusion writing. Haneer M Alrashidi: Responsible for discussion and conclusion writing and participated largely during the research phases, from proposal writing through conclusion writing. Abdulmonem A Alsalmi: Helped with the development of the questionnaire, the gathering and analysis of data and many other aspects of the study process from proposal writing to report writing. Ali F Almetrafe: Primary responsibility for the research's discussion and conclusion and participated in its development through its many stages. Nasser A Aljazwa: Primary responsibility for the research's discussion and conclusion and participated in its development through its many stages.

Further information

All authors have confirmed that they have no current or historical financial relationships with any organizations that would have an interest in the submitted work and that they have no other affiliations or activities that might be construed to have influenced the work.

Ethical approval

The study was approved by the Medical Ethics Committee of Qassim Regional Research Ethics Committee with registration No. 21-16-08

Informed consent

Written informed consent was obtained from all individual participants included in the study.

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Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

REFERENCES AND NOTES

1. Adegbiyi WA, Olajide TG, Nwawolo CC. Patterns of self-ear cleaning among otorhinolaryngology patients in developing country. *Asian J Sci Technol* 2018; 9(4):1-5.
2. Afolabi O, Kodiya A, Ahmad B, Bakari A. Attitude of self-ear cleaning in black africans any benefit? *East Afr J Public Health* 2009; 6(1):43-6. doi: 10.4314/eajph.v6i1.45743
3. Ahmed S, Zaheer SAI, Shabbir SMA, Rao S, Islam T, Ahmed B. Association of dermatological conditions of external ear with the use of cotton buds. *J Enam Med Colle* 2014; 4(3):174-176.
4. Alateeq OM, Alwassel AI, Almuahini MS, Alruzayhi MK. Knowledge, attitude and practice of ear care in Saudi community. *J Middle East North Afr Sci* 2018; 4(2):42-44.
5. Aldawsari SA, Aldawsari AA, Aljthalin AA, Al Dossari FM, Alhammad MA, Al-Shatri MS, Aljthalin RA, Aljthalin RA, Alsaadoon SA, Alotaibi SH. Knowledge, attitudes and practices of self-ear cleaning among medical students, Majmaah University, Saudi Arabia. *Int J Med Res Prof* 2018; 4(4):155-161.
6. Alrajhi MS, Alim BM, Aldokhayel SD, Zeitouni LM, Al-Tawil LK, Alzahrani FA. Knowledge, attitudes and practices pertaining to cotton-bud usages and the complications related to their misuse among outpatients in an ear, nose and throat clinic. *J Nat Sci Med* 2019; 2(4):220.
7. Alshehri A, Asiri KA, Saeed M, Alahmari D, Alwabel H, Alahmari YD, Mahmood SE. Knowledge, attitudes and practices of self-ear cleaning among medical and non-medical students at King Khalid University, Abha, Saudi Arabia. *Int J Med Dev Ctries* 2020; 4(6):960-967.
8. Amutta SB, Yunusa MA, Iseh KR, Obembe A, Egili E, Aliyu D, Abdullahi M. Socio-demographic characteristics and prevalence of self-ear cleaning in Sokoto metropolis. *Int J Otolaryngol Head Neck Surg* 2013; 2:276-279.
9. Ansari A, Tariq MA, Sadiq NM. Histology, Ear. In *Stat Pearls* (Internet) 2021. <https://www.ncbi.nlm.nih.gov/books/NBK545170/>
10. Dosemane D, Ganapathi K, Kanthila J. Knowledge, attitude and practice of ear care in coastal Karnataka. *J Clin Diagn Res* 2015; 9(12):MC01.
11. Ghauth SB, Raman R, Wee CA. Use of cotton bud in Malaysia. *Clin Case Stud Rep* 2018. doi: 10.15761/CCSR.1000110
12. Guest J, Greener M, Robinson A, Smith A. Impacted cerumen: Composition, production, epidemiology and management. *QJM* 2004; 97(8):477-488.
13. Haji A, Alharbi B, Alhazmi K, Alharthi B, Kabli A, Siddiqui MI. The knowledge, attitudes and practices of self-ear cleaning in makkah region, cross-sectional study: Self-ear cleaning. *Saudi Med Horizons J* 2021; 1(1):26-33.
14. Hobson JC, Lavy JA. Use and abuse of cotton buds. *J R Soc Med* 2005; 98(8):360-361.
15. Indrajeet P. Visualizations with statistical details: The 'ggstatsplot' approach. *J Open Source Softw* 2021; 6(61):3167. doi: 10.21105/joss.03167
16. Johnson JT, Rosen CA, Bailey B. Baileys head and neck surgery. *Otolaryngol* 2013; 35(10):1681.
17. 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 Afr* 2017; 8(2).
18. Koirala B, Manandhar S, Shah RK. Knowledge, attitude and practice of ear care among pre-clinical medical students at Birat medical college teaching hospital. *Birat J Health Sci* 2020; 5(3):1236-1240.
19. Lee L, Govindaraju R, Hon S. Cotton bud and ear cleaning-A loose tip cotton bud? *Med J Malays* 2005; 60(1):85.
20. Lukolo LN, Kimera LC, Pilbee G. Self-ear cleaning practices and the associated risks: A systematic review. *Glob J Health Sci* 2021; 13(5):1-44.
21. Mahfoz TMB. Cerumen knowledge and ear cleaning practices among medical students in Saudi Arabia: An observational study. *Majmaah J Health Sci* 2021; 9(1):80-94.
22. Michaudet C, Malaty J. Cerumen impaction: Diagnosis and management. *Am Fam Physician* 2018; 98(8):525-529.
23. Nussinovitch M, Rimon A, Volovitz B, Raveh E, Prais D, Amir J. Cotton-tip applicators as a leading cause of otitis externa. *Int J Pediatric Otorhinolaryngol* 2004; 68(4):433-435.
24. Oladeji S, Babatunde O, Babatunde L, Sogebi O. Knowledge of cerumen and effect of ear self-cleaning among health workers in a tertiary hospital. *J West Afr Coll Surg* 2015; 5(2):117.
25. Olajide TG, Olajuyin OA, Eletta AP, Agboola SM, Busari AO, Adebara I. Self-Ear Cleaning: Prevalence and profile among school children in Ekiti, Nigeria. *J Biosci Med* 2019; 1-8.
26. Olajide TG, Usman AM, Eletta AP. Knowledge, attitude and awareness of hazards associated with use of cotton bud in a Nigerian community. *Int J Otolaryngol Head Neck Surg* 2015; 4:248-253.
27. Olaosun AO. Self-ear-cleaning among educated young adults in Nigeria. *J Fam Med Prim Care* 2014; 3(1):17.
28. Tobih JE, Esan TO, Esan DT, Ojumu IJ. Self-ear cleaning practices and hazards among undergraduates of a private university in Nigeria. *Acta Sci Med Sci* 2021; 5(12):151-157.
29. Ulaganathan M, Shalini R. A descriptive study of prevalence of impacted wax and its predisposing factors in school children. *Int J Healthc Biomed Res* 2015; 4(01):136-143.

30. Wickham H, Averick M, Bryan J, Chang W, Agostino ML, François R, Golemund G, Hayes A, Henry L, Hester J, Kuhn M, Pedersen TL, Miller E, Milton BS, Müller K, Ooms J, Robinson D, Paige SD, Spinu V, Takahashi K, Vaughan D, Wilke C, Woo K, Yutani H. Welcome to the tidy verse. J Open Source Softw 2019; 4(43):1686. doi: 10.21105/joss.01686