

The Effects of Earphone Usage on Ear Wax (Cerumen) Impaction

Kulaklık Kullanımı ve Kulaklık Tipinin Kulak Kiri Oluşumuna Etkisi

Osman H Çam ©

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ABSTRACT

Objective: To determine whether the use of earphones affects ear wax accumulation, to reveal whether it increases the need to consult a doctor, and to try to understand whether these issues vary according to earphone type.

Method: In this study, patients who applied to Ear Nose and Throat Clinic due to ear congestion between 2020 March and September and were found to have ear wax in the ear examination were included. Those who do not use headphones are classified as the control group, and those who use headphones are classified as the study group. The study group using earphones was evaluated within themselves in three categories according to the type of earphones they used, as those who used headsets, silicone inserts, or suspended inserts. The ear cleaning habits of the patients, the frequencies of ear cleaning, and visiting the physician due to ear congestion were noted.

Results: A total of 46 patients were included in the study. The control group consisted of 16, and the study group of 30 patients. The mean ages of the patients were 48.5 ± 18.01 for the control group and 40.87 ± 21.28 for the study group. The average frequencies of weekly ear care of the patients were 3.25 in the control, and 2.9 in the study group. ($P > 0.05$) The average time to consult a physician for ear cleaning was 62.63 months in the control group and 60.9 months in the study group. ($P > 0.05$)

Conclusion: The use of headphones does not affect the frequency of the patients' self weekly ear care or visiting a physician for ear cleaning. Similarly, no significant relationship was found between earphone types and frequency of self ear care and visiting a physician.

Keywords: cerumen, cerumen impaction, earphones

Öz

Amaç: Kulaklık kullanımının kulak kiri birikimine olan etkisinin olup olmadığını saptamak, doktora başvuru ihtiyacını artırıp artırmadığını ortaya koymak ve bu problemlerin kulaklık tipine göre değişip değişmediğini anlamaya çalışmak.

Yöntem: Bu çalışmaya 2020 Mart-Eylül döneminde Kulak Burun Boğaz Kliniği'ne kulak tıkanıklığı nedeni ile başvuran ve muayenelerinde kulak kiri saptanan hastalar dahil edilmiştir. Kulaklık kullanmayan kontrol grubu, kulaklık kullananlar ise çalışma grubu olarak sınıflanmıştır. Kulaklık kullanan çalışma grubu kendi içinde kullandıkları kulaklık tipine göre headset kullananlar, silikon uçlu insert kullananlar ve askıda duran insert kullananlar olarak üç kategoride değerlendirilmiştir. Hastaların kulak temizleme alışkanlıkları, kulak temizleme sıklıkları, kulak tıkanıklığı nedeni ile hekime başvuru sıklıkları not edilmiştir.

Bulgular: Çalışmaya toplam 46 hasta dahil edilmiştir. Kontrol grubu 16, çalışma grubu 30 kişiden oluşmaktaydı. Kontrol grubu için yaş ortalaması $48,5 \pm 18,01$, çalışma grubu için $40,87 \pm 21,28$ idi. Hastaların haftalık kulak bakımı sıklığı kontrol grubunda 3.25, çalışma grubunda 2.9 olarak saptanmıştır. ($p > 0.05$) Grupların kulak temizleme için hekime başvurma süreleri kontrol grubunda 62.63 ay, çalışma grubunda 60.9 aydır. ($p > 0.05$)

Sonuç: Kulaklık kullanımının hastaların kendi haftalık kulak bakımları sıklığında, kulak temizleme için hekime başvurma sıklıklarına etkisi yoktur. Benzer şekilde kulak tıkanma seviyeri ile kulaklık kullanımı arasında anlamlı ilişki bulunmamıştır.

Anahtar kelimeler: kulak kiri, kulak mumu, kulak tıkanıklığı, kulaklık

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Corresponding Author:

Osman H Çam

Baskent University,

School of Medicine,

Department of Otolaryngology

Head and Neck Surgery

✉ osman.cam@gmail.com

ORCID: 0000-0002-2785-4474



INTRODUCTION

Ear wax (cerumen) production is a physiological process in humans and mammals, which provides a natural barrier for the penetration of water and small insects. Cerumen also forms an acidic surface in order to prevent bacterial reproduction. The self-cleaning mechanism of the ear expels the ear wax.

However, in some people, this self-cleaning mechanism may be faulty and results in cerumen impaction. The distortion of the self-cleaning mechanism resulting in cerumen impaction is not well understood.

The structure of the external ear canals could induce cerumen impaction. For example, a narrow and deformed external ear canal could be a predisposing factor.(1,2) Dermatological conditions affecting the inner lining of the external ear canal and existence of numerous hair in the external ear canal may increase the susceptibility to cerumen impaction. Besides these intrinsic factors, extrinsic factors are blamed as using cotton buds, wearing earplugs, hearing aids, and earphones.(3–5)

This study aims to understand the effects of earphone usage and earphone types on ear wax impaction.

MATERIALS AND METHODS

The study was conducted in compliance with the declarations of Helsinki and supported by Baskent University Institutional Review Board. The study had a retrospective design. The charts of patients referred to Baskent University Istanbul Hospital between March-September 2020 with complaints of ear congestion have been included in the study. The patients with a previous history of ear surgeries, diagnosed with other than cerumen impaction, and patients with external ear canal

diseases have been excluded from the study. The patients were classified into two groups. The control group, who did not wear earphones, the study group, who regularly used earphones.

The type of earphone used, weekly earphone wearing hours, weekly frequencies of self ear care, and frequencies of consulting physicians for earwax removal have been noted. (Figure - 1) Also, the blockage levels of the right and left ears were noted and classified into four levels. Non-occluding cerumen (Obstruction level 1), partially occluding cerumen (Obstruction level 2), mostly occluding cerumen (Obstruction level 3), and totally occluding cerumen (Obstruction level 4). The groups were compared with independent t-test, ANOVA, and chi-square tests in SPSS 12.0 for Windows.



Figure - 1 Earphone types included in the study
A. Headset type B. Insert type with silicon tips
C. Insert type without silicon tips

RESULTS

A total of 46 patients were included in the study. The control group consisted of 16, and the study group (earphone group) of 30 patients. The mean ages for the control, and the earphone groups were 48.50 ± 18.01 , and 40.87 ± 21.28 years, respectively.

There was no statical difference in terms of weekly self ear care frequencies between the control and the earphone groups. ($P > 0,05$) (Table -1). Frequencies of self ear care were not affected by earphone usage.

Table -1 Weekly frequencies of self ear care within groups

	Group	N	Mean	Std. Dev.	Min.	Max.	*P
Weekly self ear care frequency	Control group	16	3.25	2.27	.00	7.00	,619
	Earphone group	30	2.90	2.25	.00	7.00	
	Total	46	3.02	2.24	.00	7.00	

Independent T-test results

Std Dev: standard deviation, Min: minimum, Max: maximum

Table – 2 Physician referral frequencies for ear wax removal withn groups

	Group	N	Mean	Std. Dev.	Min.	Max.	*P
Physiciain referral frequency (Months)	Control group	16	62.63	71.70	6.00	180.00	,939
	Earphone group	30	60.90	72.80	.00	240.00	
	Total	46	61.50	71.62	.00	240.00	

Independent T-test results

Std.Dev: standard deviation, Min:minimum, Max: maximum

Table – 3 Weekly earphone usage hours and obstruction levels for right ears

	Obstruction level	N	Mean	Std. Dev.	Min.	Max.	*P
Weekly earphone usage (Hours)	1	2	13.50	9.19	7.0	20.0	,946
	2	5	21.40	19.61	2.0	50.0	
	3	4	19.00	18.49	2.0	35.0	
	4	19	18.57	14.44	1.0	55.0	
	Total	30	18.76	14.96	1.0	55.0	

*One way ANOVA test

Std.Dev: standard deviation, Min:minimum, Max: maximum

Table – 4 Weekly earphone usage hours and obstruction levels for left ears

	Obstruction level	N	Mean	Std. Dev.	Min.	Max.	*P
Weekly earphone usage (Hours)	1	5	16.00	13.76	2.0	30.0	.555
	2	2	5.00	.00	5.0	5.0	
	3	7	20.71	13.92	1.0	35.0	
	4	16	20.50	16.50	2.0	55.0	
	Total	30	18.76	14.96	1.0	55.0	

*One way ANOVA test results

Std.Dev: standard deviation, Min:minimum, Max: maximum

Table – 5 Obstruction levels for both ears according to used earphone types

		Earphone Type								*p
		Insert earphone without silicone tip		Insert earphone with silicone tip		Headset		Total		
		N	%	N	%	N	%	N	%	
Right ear obstruction level	1	1	50,0%	0	0,0%	1	50,0%	2	100,0%	,265
	2	3	60,0%	2	40,0%	0	0,0%	5	100,0%	
	3	1	25,0%	1	25,0%	2	50,0%	4	100,0%	
	4	7	36,8%	10	52,6%	2	10,5%	19	100,0%	
Left ear obstruction level	1	0	0,0%	5	100,0%	0	0,0%	5	100,0%	,180
	2	1	50,0%	1	50,0%	0	0,0%	2	100,0%	
	3	3	42,9%	2	28,6%	2	28,6%	7	100,0%	
	4	8	50,0%	5	31,3%	3	18,8%	16	100,0%	

* Ki-square test results

There was no statistical difference in physician referral frequencies between the control, and the earphone groups. ($p>0,05$) (Table-2). Physician referral frequencies were not affected by earphone usage.

Weekly earphone usage hours according to the right ear blockage levels were 13.5 hours in level 1, 21.4 hours in level 2, 19.0 hours in level 3 and 18.57 hours in level 4 blockages, respectively. There was no statistically significant difference in terms of weekly earphone usage hours and obstruction levels of the right ears. ($P>0,05$) (Table -3)

Weekly earphone usage hours in terms of the left ear blockage levels were 16.0 hours in level 1, 5 hours in level 2, 20.7 hours in level 3 and , 20.5 hours in level 4 blockages, respectively. There was no statical statistically significant difference in terms of weekly earphone usage hours and obstruction levels of left ears. ($P>0,05$) (Table 4)

There was no statistically significant relationship between obstruction levels of right and left ears and earphone types ($P>0.05$). In other words, the right and left ear obstruction levels did not change according to the variations in earphone types.(Table - 5)

DISCUSSION

With the development of individual broad data bandwidth allocation, smartphones and tablets have become indispensable to our daily lives for reaching online sources and social media. With the production of wireless and long-lasting battery earphones, they have been used in increasing frequency. Besides entertainment, there is a growing trend worldwide to work from home, particularly in the current COVID-19 pandemic.(6,7)

The COVID-19 pandemic strike has popularized daily remote teleworking, remote teleclasses, and online telemeetings. Parallel to these working environments and social transformations, earphone usage has been recommended to maintain a comfortable and delighted workplace. (8)

The advantages of wearing earphones are to refrain from being easily distracted and to reduce outside noise. Nevertheless, the effect of earphone use on the ear canal and cerumen impaction is unknown. This study aimed to understand the effects of earphone usage on cerumen impaction. According to a prevailing assumption the likelihood of cerumen impaction correlates with earphone usage. Our results contradicted this assumption, and wearing earphones was not associated with cerumen impaction.

Limitations of the Study

The main limitation of the current study was our limited number of patients. Although, we have investigated the levels of ear canal obstructions; we have not studied the ear wax composition to find any difference in the compositions of the ear waxes of the groups. Also, ear wax viscosity may be another factor that we have not studied.

Another limitation of our study was the absence of data about the shape, and width of external ear canal, which could be another factor influencing the cerumen impaction. However, this kind of study had very complex design, needs numerous patient groups, and includes lots of data to be analyzed.

Strength of the Study

According to our knowledge, this is the first paper studying earphone usage and cerumen impaction. In 2015, Manchaiach et al.⁽⁹⁾ studied the relationship between use of hearing aid and cerumen impaction.

The impetus behind their study was that blockage of the external ear canal with a foreign body may end up with mechanic obstruction of the external ear canal and accumulation of earwax. Surprisingly they did not find any significance between hearing aid use and cerumen impaction. The clinical practice guidelines on earwax recommend regular ear canal checks every three to six months.(10) Regular checks for these patients become debatable with these conclusions. Nevertheless, still frequent, and regular control of the earmolds, earmold tubes, and earwax traps should be carried out since physiological processes produce

them continuously.

Earphone use is not the sole criterion to get suspected. Thus we also studied earphone types and how many hours of earphone use was practiced in a week. These factors may also influence the earwax impaction. Surprisingly we did not find any significant relationship between earphone types, duration of earphone usage, and earwax impaction.

We have classified and investigated ear canal obstruction levels in both ears that could be directly affected by earphone types, but similarly, we did not find any relation between earphone usage and cerumen impaction.

In conclusion, there is no relation between earphone usage and earwax impaction. Earphone types and duration of earphone use do not influence earwax impaction.

Ethics Committee Approval: The ethics committee approval of our project was given by Başkent University Clinical Research Ethics Committees on 27/10/2020 and the project number is KA20/389.

Conflict of Interest: None.

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REFERENCES

- Hauk L. Cerumen Impaction: An Updated Guideline from the AAO-HNSF. *Am Fam Physician*. 2017;96:263-264. (PMID: 28925660)
- Michaudet C, Malaty J. Cerumen Impaction: Diagnosis and Management. *Am Fam Physician*. 2018; 98:525-529. (PMID: 30277727)
- Stone CM. Preventing cerumen impaction in nursing facility residents. *J Gerontol Nurs*. 1999;25:43-45. (PMID:10578765) <https://doi.org/10.3928/0098-9134-19990501-14>
- Horton GA, Simpson MTW, Beyea MM, Beyea JA. Cerumen Management: An Updated Clinical Review and Evidence-Based Approach for Primary Care Physicians. *J Prim Care Community Health*. 2020; 11:1-5 (PMID: 31994443) <https://doi.org/10.1177/2150132720904181>
- McCarter DF, Courtney AU, Pollart SM. Cerumen impaction. *Am Fam Physician* 2007;75:1523-8. (PMID: 17555144)
- Sinclair RR, Allen T, Barber L, Bergman M, Britt T, Butler A, Ford M, Hammer L, Kath L, Probst T, Yuan Z. Occupational Health Science in the Time of COVID-19: Now more than Ever. *Occup Health Sci*. 2020 1:1-22. (PMID: 32838031) <https://doi.org/10.1007/s41542-020-00064-3>
- Watterson A. COVID-19 in the UK and Occupational Health and Safety: Predictable not Inevitable Failures by Government, and Trade Union and Nongovernmental Organization Responses. *New Solut*. 2020;30:86-94. (PMID: 32448036) <https://doi.org/10.1177/1048291120929763>
- Lopez-Leon S, Forero DA, Ruiz-Díaz P. Recommendations for working from home during the COVID-19 pandemic (and beyond). *Work*. 2020;66:371-375. (PMID: 32568161) <https://doi.org/10.35542/osf.io/ynxdcg>
- Manchaiah V, Arthur J, Williams H. Does Hearing Aid Use Increase the Likelihood of Cerumen Impaction? *J Audiol Otol*. 2015;19:168-71. (PMID: 26771016) <https://doi.org/10.7874/jao.2015.19.3.168>
- Schwartz SR, Magit AE, Rosenfeld RM, Ballachanda BB, Hackell JM, Krouse HJ, Lawlor CM, Lin K, Parham K, Stutz DR, Walsh S, Woodson EA, Yanagisawa K, Cunningham ER Jr. Clinical Practice Guideline (Update): Earwax (Cerumen Impaction). *Otolaryngol Head Neck Surg*. 2017;157:539. (PMID: 28045591) <https://doi.org/10.1177/0194599816671491>