

Exploring the Impact of Anosmia on Daily Living: An Examination of Residents in Benghazi, Libya

Balgeis Ali Elfallah¹

¹ Faculty of Medicine, University of Benghazi, Benghazi, Libya

Correspondence: Faculty of Medicine, University of Benghazi. Benghazi, Libya. E-mail: balgeis.elfallah@gmail.com

Received: April 5, 2024 Accepted: April 26, 2024 Online Published: April 30, 2024

doi:10.5539/gjhs.v16n5p42

URL: <https://doi.org/10.5539/gjhs.v16n5p42>

Abstract

The main objective of this study was to investigate how patients with anosmia cope with their daily lives in the second-largest city in Libya, Benghazi. Three dimensions are used to examine: (1) quality of life (QOL); (2) personal safety; and (3) social life. The data of the 34 patients was collected by distributing a questionnaire in two medical centres in Benghazi, Libya. After conducting the One-Sample Wilcoxon Signed Rank test and the Kruskal-Wallis test, the results demonstrate that the anosmia has no statistically significant effect on the QOL or personal safety. The results of social life, on the other hand, found that anosmia has no serious negative impact on patients' social lives. Furthermore, the results reveal that there are no statistically significant differences in questionnaire replies between patients with different ages, durations of anosmia, and genders, except that it found a statistically significant difference between patients with different anosmia durations and the QOL.

Keywords: Anosmia, quality of life, personal safety, social life

1. Introduction

The absence of the sense of smell known medically as anosmia greatly affects a person's quality of life and daily activities (Hummel., 2017). Anosmia can be due to many causes, like infections, head injuries, sinonasal diseases and neurological issues (Pellegrino., 2020). Though often overshadowed by deficiencies like vision or hearing loss, anosmia brings about distinct hurdles that go beyond just perception to impact lifestyle choices, safety measures, eating habits and social engagements (Croy, Nordin, & Hummel, 2014). Recent studies on the impacts of anosmia have highlighted its effects on individuals' well-being and societal involvement (Bochicchio et al., 2023; Joshi & Hummel, 2024; Nagi, Singh & Mahajan, 2024). However, most research originates from contexts with a focus on understanding anosmia in places like Benghazi, Libya from a medical standpoint not its effect on lifestyle. This gap in knowledge leaves much to learn about how individuals cope with the loss of smell, in this region characterized by diversity and unique socio-political dynamics alongside healthcare obstacles.

In this setting delving into how anosmia affects the people of Benghazi presents a chance to understand how losing the sense of smell influences aspects of daily life such, as the quality of life (QOL), safety measures, and social connections. Studies focusing on these experiences amongst patients with anosmia living in Benghazi are limited despite their influence on lifestyle. Therefore, this study aims to bridge that gap by exploring the multidimensional effects of olfaction impairment affecting people living in Benghazi, exposing their lived realities, hardships and adaptation mechanisms. This paper deals with a localised examination of how it influences lifestyle, safety rules, and social interactions in a Libyan city named Benghazi. Consequently, this survey seeks to expose the unique challenges people living with a lack of a sense of smell go through and also what they do to change their lifestyles. Therefore, the main questions of the research are:

- 1) How is QOL affected for patients with anosmia?
- 2) How is personal safety affected for patients with anosmia?
- 3) How is social life affected for patients with anosmia?

2. Material and Methodology

In collecting the data, this research relied on a questionnaire prepared for this purpose. The questionnaire consists of two sections. The first section relates to the participant's data, such as gender, age, extent of loss of sense of

smell, and whether the participant suffers from any diseases. The second section consists of the three axes of the research; these axes are as follows:

- First axis: items that are related to QOL (seven questions).
- Second axis: items that are related to personal safety (seven questions).
- Third axis: items that are related to social life (seven questions).

Thus, the total number of questions in the axes is 21. The researcher used the 5-Likert scale, where the number 1 is given for the answer: strongly disagree, and the number 5 is given for the answer: strongly agree. The questionnaire was distributed at (1) the Speciality Surgical Center, which is a government teaching centre for Urology and ENT in Benghazi; and (2) the Al-Rowad Specialized Center, which is a private centre in Benghazi for ENT and speech therapy, over the period from November 2023 to March 2024. The approval for distributing the questionnaire has been obtained from both centres. The researcher emphasised the necessity of responding to the questionnaire from only patients who lost their sense of smell and did not regain it.

The researcher collected 34 valid questionnaires, which were analysed by employing the following: (1) Cronbach's alpha test to examine the internal consistency of the items; (2) the Kolmogorov-Smirnov test to investigate the normality of the distribution of the replies; (3) the descriptive statistics by calculating the mean, standard deviation, and median; (4) the One-Sample Wilcoxon Signed Rank test, to explore whether the median of the answers regarding the items above is significant from the testing median, which is 3; (5) the Kruskal-Wallis test to investigate whether there are significant differences in the respondents with different gender, age, and smell loss period. It is worth mentioning that One-Sample Wilcoxon Signed Rank and Kruskal-Wallis tests compare the median, not the mean, where the median is more appropriate for non-normally distributed data. Also, 0.05 is the significant level for all the above tests.

3. Results

3.1 Results of Respondents' Characteristics

The results in Table 1 below present the characteristics of the 34 patients who responded to the questionnaire. With 22 (65%) patients out of 34, the results indicate that the majority of the patients are female. In terms of age, most of the patients are between 41 and 60 years old, with 16 (47%) patients, followed by the age range of 20 to 40 years old, with 13 (38%) patients. In terms of the duration of anosmia, half of the patients (17) stated that they had lost their sense of smell for more than a year and 9 patients in less than a month, while the other was between 1 month and 12 months. Only 9 (26%) out of 34 patients stated that they have received medical or psychological support, while the others reported that they have not. Finally, 19 (56%) patients reported that they were infected with COVID-19, while 9 patients reported that they were suffering from allergic rhinitis, and the other 9 reported that they were suffering from chronic sinusitis. Besides, only one patient had a head trauma, and 4 had other medical issues, while the other six patients stated that they had no medical history.

Table 1. Respondents' Characteristics

Respondents Characteristics	No.	(%)
Gender:		
Male	12	35%
Female	22	65%
Age:		
Under 20	2	6%
20-40	13	38%
41-60	16	47%
61-80	2	6%
Over 80	1	3%
Duration of Anosmia:		
Less than 1 month	9	26%
1-3 months	3	9%

3-6 months	2	6%
6-12 months	3	9%
More than 12 months	17	50%
Received any medical or psychological support:		
Yes	9	26%
No	25	74%
Past Medical History:		
Allergic Rhinitis	9	26%
Chronic Sinusitis	9	26%
Head Trauma	1	3%
Covid-19	19	56%
Others	4	12%
No Medical History	6	18%

3.2 Results of Cronbach's alpha and Kolmogorov-Smirnova test

The Cronbach's alpha test was performed twice. Firstly, it was conducted separately on the answers to the three factors that this study analyses. These factors are the QOL, personal safety, and social life; each item has seven questions. Then Cronbach's alpha test was re-conducted for the answers to all 21 questionnaires. Table 2 below shows the results of Cronbach's alpha as well as Kolmogorov-Smirnova test, respectively. In terms of the items, Cronbach's alpha is between 0.670 and 0.752. According to Taber (2018), if the alpha value is between 0.67 and 0.87, it is considered reasonable. However, when taking into account the alpha value for the questionnaire as a whole, the value reaches 0.827, and this is considered fairly high, according to Taber (2018). Furthermore, it is evident from the results of Kolmogorov-Smirnova that all p-values are less than 0.05, and hence, the responses are not normally distributed. Therefore, this research employs the nonparametric tests.

Table 2. Results for Reliability and Normality of the Answers

Items	Cronbach's Alpha		Kolmogorov-Smirnov ^a		
	No. Items	Value	Statistic	df	Sig.
Items related to QOL.	7	0.670	0.132	34	0.020*
Items related to personal safety.	7	0.711	0.170	34	0.014*
Items related to social life.	7	0.752	0.169	34	0.015*
Overall	21	0.827			

*Significant at a 0.05 level.

3.3 Results of QOL Investigation

The main objective of this section is to examine how QOL is affected by patients with anosmia. The investigation results of the QOL after conducting the One-Sample Wilcoxon Signed Rank test are presented in Table 3 below. For the total QOL items, with a median equal to 3.214, the p-value equals 0.160, which is greater than 0.05, thus, the results indicate that the median of the answers does not differ significantly from the testing median of 3. Thus, the anosmia does not affect the QOL of the patients. In terms of the items in QOL, which represent the QOL interactions, it is noted that all p-values are statistically significant, except items two and three. Although the research has not clarified the relationship between the loss of the sense of smell and taste, many studies have shown that there is a strong connection between them (Borsetto, Hopkins & Philips, 2020; Javed et al., 2022). In this research, the participants significantly lost some of their weight, although there was no change in their appetite after losing their sense of smell.

Table 3. Results of QOL Investigation

Items related to QOL	Mean	Std.	Median	Significant
<i>Total</i>	3.176	0.739	3.214	0.160
1 My current quality of life is not good enough.	3.67	1.384	4.00	0.010*
2 To what extent is the magnitude of your joy from eating and drinking following your loss of smell?	3.21	1.516	4.00	0.449
3 How often do you feel unsatisfied or irritated because you cannot smell?	2.85	1.460	3.00	0.418
4 How has losing your sense of smell affected how you go through everyday activities like preparing meals and tidying up a house?	2.55	1.325	3.00	0.044*
5 I am not sure that I can manage my daily activities well with my smell loss.	3.42	1.091	3.00	0.031*
6 Since I lost my smell, it seems that I have lost some weight.	4.30	1.045	5.00	0.000*
7 My appetite has changed since I lost my sense of smell.	2.09	1.378	1.00	0.001*

Test value = 3, *Significant at a 0.05 level.

3.4 Results of Personal Safety Investigation

The main objective of this section is to examine how personal safety is affected by patients with anosmia. Table 4 below displays the findings of the One-Sample Wilcoxon Signed Rank test about the personal safety investigation. For the total personal safety items, the results show that there is no significant difference between the testing median of 3 and the median of the replies (3), with a p-value of 0.372, which is greater than 0.05. Therefore, patients' safety is unaffected by the anosmia. Except for items 6 and 7, all items related to personal safety are statistically significant. It comes to the forefront that patients do not rely often on other sensory cues due to their anosmia. Also, participants were not exposed to any risks resulting from anosmia, nor did they take any precautions in this regard. Thus, they are not concerned about their safety. However, according to the questionnaire responses, out of 34 patients, only 3 reported that they were exposed to food burning when cooking without being aware of it due to the loss of their sense of smell. Another patient mentioned that his pants were exposed to a minor fire due to cigarette smoke without being aware of it as well. Finally, patients stated that they did not attend any courses for risk management regarding anosmia.

Table 4. Results of Personal Safety Investigation

Items related to Personal Safety.	Mean	Std.	Median	Significant
<i>Total</i>	3.097	0.511	3.00	0.372
1 How often do you rely on what you see or other senses to detect things such as gas leaks or rotten foodstuffs which might be dangerous?	2.30	1.425	2.00	0.003*
2 Have any dangerous accidents occurred because of smell loss?	1.76	1.062	1.00	0.000*
3 There is no additional safety procedures were taken for me to reduce the risk of losing my sense of smell.	4.30	1.075	5.00	0.000*
4 Are you apprehensive about personal safety and security considering your inability to perceive smells?	2.39	1.248	2.00	0.006*
5 There are no specific guidelines or training on managing the safety aspects related to the lack of olfaction.	4.73	0.452	5.00	0.000*
6 I avoid any situation that could be dangerous to me because of my loss of smell.	3.18	0.528	3.00	0.132
7 My loss of smell has interfered with detecting the presence of any dangerous odour, for instance, smoke and gas leaks among others.	3.15	0.712	3.00	0.225

Test value = 3, *Significant at a 0.05 level.

3.5 Results of Social Life Investigation

The main objective of this section is to examine how social life is affected by patients with anosmia. After employing the One-Sample Wilcoxon Signed Rank test, the social effect findings are shown in Table 5 below. For the total social life items, the findings demonstrate that, with a p-value of 0.000, there is a statistically significant difference between the testing median of 3 and the reply median of 1.920. Consequently, anosmic patients significantly do not agree that the loss of smell influences their social lives. Furthermore, every item on social life has a statistically significant value. Where patients do not feel embarrassed when eating in public places, however, there is also no clear support from family and friends regarding their diagnosis. The results also found that there is no change in their relationship or social life because of smell loss, and they are not anxious about attending any social event.

Table 5. Results of Social Life Investigation

Items related to Social Life.	Mean	Std.	Median	Significant
<i>Total</i>	<i>2.121</i>	<i>0.672</i>	<i>1.920</i>	<i>0.000*</i>
1 I can't stand eating food in public places due to a lack of smell.	1.58	0.902	1.00	0.000*
2 There is no encouragement from friends and relatives when it comes to dealing with my lost sense of smell.	3.91	1.308	5.00	0.001*
3 When someone else eats, talks about or enjoys a good aroma I am left alone.	2.45	1.543	2.00	0.022*
4 I feel anxious about how the smell loss I suffer interferes with communicating with others	1.88	1.269	1.00	0.000*
5 It makes me tense going for social activities that involve food because of smell loss.	1.64	1.025	1.00	0.000*
6 Other people did not fully understand or know what anosmia was all about and how it affected me.	2.09	1.208	2.00	0.000*
7 Have you noticed any changes in your social life or relationships since the sense of smell has been lost?	1.42	0.936	1.00	0.000*

Test value = 3, *Significant at a 0.05 level.

3.6 Results of the Differences in the Replying

Finally, as mentioned earlier, the Kruskal-Wallis test is used to examine whether there are statistically significant differences among the respondents to the questionnaire for different ages, anosmia periods, and genders. With p-values bigger than 0.05, the results in Table 6 below asserted that there are no significant differences in the responses for the QOL, personal safety, and social life questions between different ages and genders. However, there are statistically significant differences in the replies between different anosmia durations regarding the QOL (p-value = 0.031), while in personal safety as well as in social life, the differences are not statistically significant.

Table 6. Results of the Differences in the Replies

	Total Number <i>n (%)</i>	QOL (p-value)	Personal Safety (p-value)	Social life (p-value)
Age				
Less than 20 years	2 (6%)			
Between 20 and 40	13 (38%)			
Between 41 and 60	16 (47%)	0.270	0.568	0.728
Between 61 and 80	2 (6%)			
More than 80	1 (3%)			

Anosmia Duration				
Less than 1 month	9 (26%)			
Between 1 and 3 months	3 (9%)			
Between 3 and 6 months	2 (6%)	0.031*	0.655	0.191
Between 6 and 12 months	3 (9%)			
More than 12 months	17 (50%)			
Gender				
Male	12 (35%)			
Female	22 (65%)	0.444	0.557	0.118

*Significant at a 0.05 level.

4. Discussion

This study aimed to investigate how daily life is affected for patients with anosmia. The examination of this study is conducted by testing (1) the QOL; (2) personal safety; and (3) social life. The data on the 34 patients was collected through a questionnaire. 22 of the patients are female, and most of the patients are between 41 and 60 years old. Moreover, the majority of patients lost their smell for more than a year. After analyzing the data, the results indicate that there is no statistically significant impact of anosmia on the QOL or personal safety. The results of social life, on the other hand, found that smell loss significantly does not affect negatively their social life. Also, the results indicated that there are no statistically significant differences in questionnaire replies between patients with different ages, durations of anosmia, and genders, except that there is a significant difference only between patients with different anosmia durations and the QOL.

The results of this research are interesting since they differ from the majority of other previous studies. For instance, in terms of QOL, Miwa et al. (2001) found that patients with a perceived resolution of olfactory compromise have a higher QOL than those with continuing olfactory impairment. Similarly, Brämerson, Merkonidis et al. (2015), Winter et al. (2023), and Gary et al. (2023) asserted that anosmia negatively affects the QOL of patients. These results are supported by other studies (Elkhohi, Abdelwahab, & Abdelhafeez, 2021; Bakhsh et al., 2023; Mattos et al., 2023). Also, 40%–76% of patients experienced depressive episodes following olfactory impairment (Elkhohi et al., 2021). Joshi and Hummel (2024) found a significant relationship between smell sensitivity and well-being. Furthermore, taste, smell, and nutrition are closely related to one another. Consequently, deficiencies in these senses have a major impact on the effectiveness of nutrition (Alkanat & Arslan, 2024). The results of this research are in line with the results of Stevenson et al. (2020) concerning patients' appetites not changing due to their smell loss. Also, the results of Ball et al. (2021) and Tan et al. (2022) are consistent with the results of this study regarding the clear lack of medical support for anosmic patients, which constitutes an incentive for research into this topic.

Although anosmia affects patients' ability to recognize odours that indicate danger, such as a gas leak or fire (Elkhohi et al., 2021; Bakhsh et al., 2023), the results of this study did not find any effect of the anosmia on the personal safety of patients. While other studies confirmed the existence of a strong relationship between old age and death due to the loss of smell (Pinto, 2014; Liu, 2019; Van Regemorter et al., 2020). Regarding this point, the reason might be that the majority of the participants in this research were between 20 and 60 years old, whereas only 3 participants were older than 60. This, in turn, did not show a relationship between old age and loss of sense of smell. Lee et al. (2024) found that around 60% of the participants in their study worked to reduce the risks related to olfactory dysfunction, such as installing gas detectors and relying on the assistance of others with their sense of smell. However, this study found that the majority did not employ any precautions or safety actions in this regard. Anosmic patients reported that they have been exposed to serious accidents such as fire, gas leakage, and poisoning (Santos et al., 2004; Pence et al., 2014). This was also confirmed in this study, where one of the participants mentioned that he had a slight fire in his pants due to smoke residue, and he did not notice it. Another patient reported that the food was burned in the kitchen, and he did not notice it until after the neighbours alerted him.

When Lee et al. (2024) asked in their study whether patients with smell loss were concerned about safety, 371 patients (85.9%) said they were, 31 (7.2%) said they weren't, and 30 (6.9%) patients said they had not given it any attention. The researcher believes that the result of this research regarding the lack of a relationship between

anosmia and personal safety is most likely because, fortunately, the 34 members of the sample were not exposed to serious danger due to loss of smell, except 2 of them. Hence, they are unable to fully define this topic. Furthermore, participants might face some fear of eating because of their inability to distinguish between edible food and spoiled food or food with an unpleasant smell. This was confirmed in this research when one of the patients stated that if he had any doubts about the validity of the food, he would ask his relatives or neighbours to check its smell and validity. The differences between the results of this study and other studies regarding the effect of anosmia on QOL and personal security might be because the social conditions or risks are different between countries, which is called a cultural consideration.

The results of this research concerning anosmia do not negatively affect the social lives of the patients, which is also considered a paradox of interest. Since many previous studies found that anosmia interfered with the social lives of patients. For example, people with congenital anosmia reported far greater rates of sadness and increased social insecurity as compared to controls (Croy et al. 2012). The negative impact of anosmia on a social life may be due to a lack of understanding by society and the people surrounding the patient about the presence of their suffering (zou et al., 2016). It is also confirmed in this research that there is no clear support from friends and family in this regard. Also, some participants in this research stated that they feel some frustration due to their inability to distinguish body odours that may be bad. Therefore, they started bathing more than usual and using more perfume and deodorant.

This research found a statistically significant difference in the responses to the questionnaire regarding the QOL between patients with different periods of smell loss. The reason is mostly because 50% of the study's sample lost their sense of smell for a period exceeding a year, while 26% lost it in a period less than a month. Therefore, it is expected that patients who have lost their sense of smell for more than a year have relatively adapted to their new life, unlike patients who lost their sense of smell in less than a month, as they are at the beginning of their suffering regarding the QOL compared to the other group.

5. Conclusion

Although the study found that anosmia neither positively nor negatively affects the overall QOL or personal safety of patients with anosmia (p -value = 0.160, p -value = 0.372, respectively), the research also revealed that it does not significantly appear to hurt their social life as well (median = 1.920, p -value = 0.00). This means that, according to the analysis, anosmia does not damage the social life of such people. In comparison with what would be expected if there were no effects from losing one's sense of smell, and hence, patients who lose their sense of smell do not report having substantially lower social functioning than anticipated. However, other influences on individuals' social abilities need to be considered too, in light of these findings about people suffering from smelllessness. It is worth mentioning that smell is much more than recognizing odours; it is intricately associated with our social experiences and encounters. Whether through mom's cooking, which brings families together, or subtle scents that remind us of good times with friends, olfaction plays a fundamental role in our social lives. Therefore, feeling connected and having a support network around us is crucial for one's mental and emotional well-being. Even though social interaction itself may not be directly affected by a loss of the sense of smell in this paper, it remains important also to critically look at why quality and personal safety have not been significantly affected. At the end of this research, anosmia should not only be considered a patient-specific organic disease but other factors, such as social factors and personal safety, must also be considered. Otherwise, the patient may suffer from loneliness and isolation. Thus, healthcare authorities should help patients find services to manage their psychosocial burden and prepare them for the possibility that symptoms could last for years. Unfortunately, this does not seem to exist in Libya at this time.

Financial Support and sponsorship

Nil.

Informed Consent

Obtained.

Provenance and Peer Review

Not commissioned; externally double-blind peer-reviewed.

Data Availability Statement

The data that support the findings of this study are available on request.

Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

References

- Alkanat, H. Ö., & Arslan, S. (2024). Long-term smell loss experiences after COVID-19: A qualitative study. *Health Expectations*, 27(2). <https://doi.org/10.1111/hex.14018>
- Bakhsh, E., Shaban, M., Alzoum, M. A., AlNassir, A. M., Bin Hamad, A. A., Alqahtani, M. S., ... & Alamri, N. F. (2023). Neurological consequences of pulmonary emboli in COVID-19 patients: a study of incidence and outcomes in the Kingdom of Saudi Arabia. *Brain Sciences*, 13(2), 343. <https://doi.org/10.3390/brainsci13020343>
- Ball, S., Boak, D., Dixon, J., Carrie, S., & Philpott, C. M. (2021). Barriers to effective health care for patients who have smell or taste disorders. *Clinical Otolaryngology*, 46(6), 1213-1222. <https://doi.org/10.1111/coa.13818>
- Bohicchio, V., Mezzalana, S., Maldonato, N. M., Cantone, E., & Scandurra, C. (2023). Olfactory-related quality of life impacts psychological distress in people with COVID-19: The affective implications of olfactory dysfunctions. *Journal of Affective Disorders*, 323, 741-747. <https://doi.org/10.1016/j.jad.2022.12.049>
- Borsetto, D., Hopkins, C., Philips, V., Obholzer, R., Tirelli, G., Polesel, J., & Boscolo-Rizzo, P. (2020). Self-reported alteration of sense of smell or taste in patients with COVID-19: a systematic review and meta-analysis on 3563 patients. *Rhinology*, 58(5), 430-436. <https://doi.org/10.4193/rhin20.185>
- Brämerson, A., Nordin, S., & Bende, M. (2007). Clinical experience with patients with olfactory complaints, and their quality of life. *Acta Oto-Laryngologica*, 127(2), 167-174. <https://doi.org/10.1080/00016480600801357>
- Croy, I., Negoias, S., Novakova, L., Landis, B. N., & Hummel, T. (2012). Learning about the functions of the olfactory system from people without a sense of smell. *PLoS One*, 7(3), 1-7. <https://doi.org/10.1371/journal.pone.0033365>
- Croy, I., Nordin, S., & Hummel, T. (2014). Olfactory disorders and quality of life-an updated review. *Chemical senses*, 39(3), 185-194. <https://doi.org/10.1093/chemse/bjt072>
- Elkholi, S. M. A., Abdelwahab, M. K., & Abdelhafeez, M. (2021). Impact of the smell loss on the quality of life and adopted coping strategies in COVID-19 patients. *European Archives of Oto-Rhino-Laryngology*, 278, 3307-3314. <https://doi.org/10.1007/s00405-020-06575-7>
- Gary, J. B., Gallagher, L., Joseph, P. V., Reed, D., Gudis, D. A., & Overvest, J. B. (2023). Qualitative olfactory dysfunction and COVID-19: an evidence-based review with recommendations for the clinician. *American Journal of Rhinology & Allergy*, 37(1), 95-101. <https://doi.org/10.1177/19458924221120117>
- Hummel, T., Whitcroft, K. L., Andrews, P., Altundag, A., Cinghi, C., Costanzo, R. M., ... & Haehne, A. (2017). Position paper on olfactory dysfunction. *Rhinology*, 54, 1-30. <https://doi.org/10.4193/Rhino16.248>
- Javed, N., Ijaz, Z., Khair, A. H., Dar, A. A., Lopez, E. D., Abbas, R., & Sheikh, A. B. (2022). COVID-19 Loss of Taste and Smell: Potential Psychological Repercussions. *Pan African Medical Journal*, 43(1). <https://doi.org/10.11604/pamj.2022.43.38.31329>
- Joshi, A., & Hummel, T. (2024). The association between well-being and olfactory sensitivity. *Journal of Sensory Studies*, 39(2). <https://doi.org/10.1111/joss.12905>
- Lee, L., Luke, L., Boak, D., & Philpott, C. (2024). Impact of olfactory disorders on personal safety and well-being: a cross-sectional observational study. *European Archives of Oto-Rhino-Laryngology*, 1-9. <https://doi.org/10.1007/s00405-024-08529-9>
- Liu, B., Luo, Z., Pinto, J. M., Shiroma, E. J., Tranah, G. J., Wirdefeldt, K., ... & Chen, H. (2019). Relationship between poor olfaction and mortality among community-dwelling older adults: a cohort study. *Annals of internal medicine*, 21;170(10), 673-81. <https://doi.org/10.7326/M18-0775>
- Mattos, J. L., Hasan, S., Schlosser, R. J., Payne, S. C., & Soler, Z. M. (2023). The association of gustatory dysfunction, olfactory dysfunction, and cognition in older adults. *International forum of allergy & rhinology*, 13(9), 1577-1583. <https://doi.org/10.1002/alr.23126>
- Merkonidis, C., Grosse, F., Ninh, T., Hummel, C., Haehner, A., & Hummel, T. (2015). Characteristics of Chemosensory Disorders-Results from a Survey. *European Archives of Oto-Rhino-Laryngology*, 272, 1403-1416. <https://doi.org/10.1007/s00405-014-3210-4>

- Miwa, T., Furukawa, M., Tsukatani, T., Costanzo, R. M., DiNardo, L. J., & Reiter, E. R. (2001). Impact of olfactory impairment on quality of life and disability. *Archives of Otolaryngology-Head & Neck Surgery*, 127(5), 497-503. <https://doi.org/10.1001/archotol.127.5.497>
- Nagi, R. S., Singh, S. P., & Mahajan, P. (2024). The Lingering Effects of COVID-19: The Psychological State and Quality of Life of Patients with Persistent Loss of Smell and Taste. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 76(1),1373-1374. <https://doi.org/10.1007/s12070-023-04260-9>
- Pellegrino, R., Cooper, K. W., Di Pizio, A., Joseph, P. V., Bhutani, S., & Parma, V. (2020). Coronaviruses and the chemical senses: past, present, and future. *Chemical senses*, 45(6), 415-422. <https://doi.org/10.1093/chemse/bjaa031Actions>
- Pence, T. S., Reiter, E. R., DiNardo, L. J., & Costanzo, R. M. (2014). Risk factors for hazardous events in olfactory-impaired patients. *JAMA Otolaryngol Head Neck Surgery*, 140(10), 951-955. <https://doi:10.1001/jamaoto.2014.1675>
- Pinto, J. M., Wroblewski, K. E., Kern, D. W., Schumm, L. P., & McClintock, M. K. (2014). Olfactory dysfunction predicts 5-year mortality in older adults. *PLoS One*, 9(10). <https://doi.org/10.1371/journal.pone.0107541>
- Santos, D. V., Reiter, E. R., DiNardo, L. J., & Costanzo, R. M. (2004). Hazardous events associated with impaired olfactory function. *Archives of Otolaryngology-Head Neck Surgery*, 130(3), 317-319. <https://doi.org/10.1001/archotol.130.3.317>
- Stevenson, R. J., Mahmut, M. K., Horstmann, A., & Hummel, T. (2020). The aetiology of olfactory dysfunction and its relationship to diet quality. *Brain sciences*, 10(11), 769. <https://doi.org/10.3390/brainsci10110769>
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in science education*, 48, 1273-1296. <https://doi.org/10.1007/s11165-016-9602-2>
- Tan, B. K. J., Han, R., Zhao, J. J., Tan, N. K. W., Quah, E. S. H., & Tan, C. J. W. (2022). Prognosis and persistence of smell and taste dysfunction in patients with COVID-19: Meta-analysis with parametric cure modelling of recovery curves. *BMJ*, 378. <https://doi.org/10.1136/bmj-2021-069503>
- Van Regemorter, V., Hummel, T., Rosenzweig, F., Mouraux, A., Rombaux, P., & Huart, C. (2020). Mechanisms linking olfactory impairment and risk of mortality. *Frontiers in Neuroscience*, 14. <https://doi.org/10.3389/fnins.2020.00140>
- Winter, A. L., Henecke, S., Lundström, J. N., & Thunell, E. (2023). Impairment of quality of life due to COVID-19-induced long-term olfactory dysfunction. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1165911>
- Zou, L. Q., Yang, Z. Y., Wang, Y., Lui, S. S., Chen, A. T., Cheung, E. F., & Chan, R. C. (2016). What does the nose know? Olfactory function predicts social network size in human. *Scientific Reports*, 6(1). <https://doi.org/10.1038/srep25026>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).