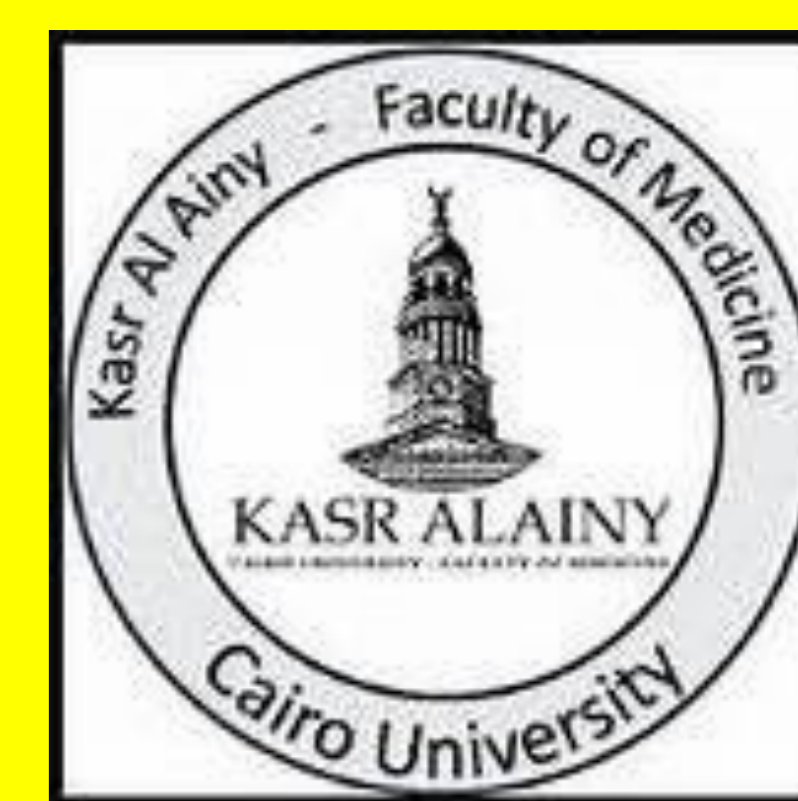


# Audiological Profile of Recovered SARS-COV-2 Patients

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## 1. Introduction

- Coronaviruses are large enveloped RNA viruses that cause mild respiratory diseases in animals and humans.
- In December 2019, several pneumonia cases with an unidentified etiology were reported in Wuhan, China.
- A novel coronavirus was identified on 6 January 2020 as the cause of these cases and named Coronavirus Disease 2019 [COVID-19].
- On 30 January 2020, WHO declared the novel coronavirus as an outbreak.
- Several studies reported auditory symptoms and affection of hearing assessment tests as PTA and OAEs.

### Aim:

- To assess hearing in recovered SARS-COV-2 patients using PTA, TEOAEs and ETF. Also, to correlate between the complaint of the patient, the disease severity and hearing affection.

## 2. Methods

- A case control study, each of cases and controls group comprised 58 subjects age and sex matched with age ranged between 18 to 50 years.
- All subjects were submitted to the following:
  - Full history taking.
  - Otologic examination, including otoscopy and tuning fork tests.
  - Basic audiological evaluation including:
    - Extended PTA
    - TEOAEs
    - Immittancemetry and ETF test.

Table : Affection of PTA and TEOAEs in right and left ears.

		NO.	%
Right PTA	Normal	37	63.80%
	Affected	21	36.20%
Left PTA	Normal	35	60.30%
	Affected	23	39.70%
Right TEOAEs	Normal	22	37.90%
	Affected	36	62.10%
Left TEOAEs	Normal	18	31.00%
	Affected	40	69.00%

## 3. Results & Discussion

- PTA showed a statistical significant difference between cases and controls in right ear thresholds at 250 Hz, 500 Hz, 4 KHZ, and 8 KHZ and in left ear thresholds at 250 Hz, 4 KHZ, 8 KHZ and 12.5 KHZ.
- Also, a statistical significant difference was found between cases and controls regarding TEOAEs overall reproducibility and amplitude (SNR).
- There is a relation between patient's complaint of hearing loss and PTA affection and between patient's complaint of tinnitus and OAE affection.
- Furthermore, there is a relation between patient's complaint of fullness and ETF affection.
- Correlation between PTA thresholds affection and COVID 19 disease severity showed a statistical significant difference in both ears.
- The high frequency hearing loss noticed in the current study and other studies could be attributed to the vascular theory (Ischemia, endothelial dysfunction and micro thrombosis) which affects more the basal part of cochlea (Saniasiaya, 2021). Other theories as brainstem damage, oxidative stress and cytokine storm could explain hearing loss present at any frequency range (Jafari et al., 2021).
- Moreover, middle ear affection resulted in the study could be explained by the spreading of the infection from the nasopharynx which may lead to effusion of the middle ear or potential changes in the middle ear (Fidan, 2020) and (Saniasiaya, 2021).

Table: Correlation between PTA threshold affection and COVID-19 severity

		Disease severity (Covid-19)						P value
		Mild		Moderate		Severe		
		Count	%	Count	%	Count	%	
Right PTA	Affected	6	20.0%	10	45.5%	5	83.3%	0.006
	Normal	24	80.0%	12	54.5%	1	16.7%	
Left PTA	Affected	7	23.3%	10	45.5%	6	100.0%	0.001
	Normal	23	76.7%	12	54.5%	0	0.0%	

## 4. Conclusions

- COVID-19 has unfavorable effect on hearing either in patients with audiological symptoms or not.
- COVID-19 affects hearing threshold at different frequencies.
- COVID-19 affects TEOAEs in patients even with normal PTA.
- There is a relation between patient's complaint of hearing loss and PTA affection and between complaint of tinnitus and TEOAEs affection
- PTA is sensitive in detection of hearing loss while TEOAEs is sensitive in detection of tinnitus in COVID-19 patients.
- There is a relation between patient's complaint of fullness and ETF affection.
- Severity of COVID-19 correlate with the severity of affection of PTA threshold and OAEs.
- Severity of COVID-19 correlate with patient's complaint of hearing loss and fullness.

## References

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