

VESTIBULAR EVALUATION OF POST COVID-19 PATIENTS USING VIDEONYSTGAMOGRAPHY

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Introduction

The Coronavirus disease 2019 (COVID-19) caused by the Severe Acute Respiratory Syndrome coronavirus was considered a global pandemic and a major public health problem worldwide. While COVID-19 infection primarily affect the respiratory system, there is recent growing evidence of neurological involvement of COVID-19 involving both central and peripheral nervous systems with symptoms including dizziness, headaches, fatigue, and loss of consciousness. The physiology of human peripheral and central vestibular systems is complex and highly integrated. It maintains a person's balance through the simultaneous interaction of various subsystems. VNG is the most commonly practiced method of vestibular assessment due to the close physiological connections between the vestibular and the visual systems , it can record and measure nystagmus that enables simultaneous subjective observation of eye movements together with objective data collection and analysis.

Accordingly, this study was designed to assess the effect of COVID-19 infection on the vestibular system in a sample of COVID-19 patients complaining of dizziness that temporally related to the infection compared to a control group.

Aim of the Work

The aim of this study was to assess the long term effects of COVID-19 infection on vestibular system function in post COVID patients using VNG.

Subjects and Methods

The study included 60 subjects, divided into two groups each group included 30 subjects, Control group including 15males and 15 females, their age range from 18 to 63 years with mean age 41.67 ± 12.83 , study group including 13 male and 17 female with mean age 44.23 ± 14.26 with no history of previous vestibular disorder .VNG was done including: spontaneous nystagmus, gaze, static position tests, oculomotor function included smooth pursuit and saccade, Dix–Hallpike maneuver and finally bithermal caloric test. Were carried on ICS Chartr 200 VNG/ENG system (Otometrics, Denmark).

The latency, accuracy, and velocity of the saccade and smooth pursuit gain and phase shift of each frequency were recorded by the software by asking the patient to follow the moving target, Dix-Hallpike maneuver was done to exclude Benign Paroxysmal Positional Vertigo (BPPV), Nystagmus was recorded using VNG goggles with vision denied, and in bithermal caloric test Jongkees's formula was used to assess unilateral caloric weakness, and Directional preponderance was calculated also.

Results

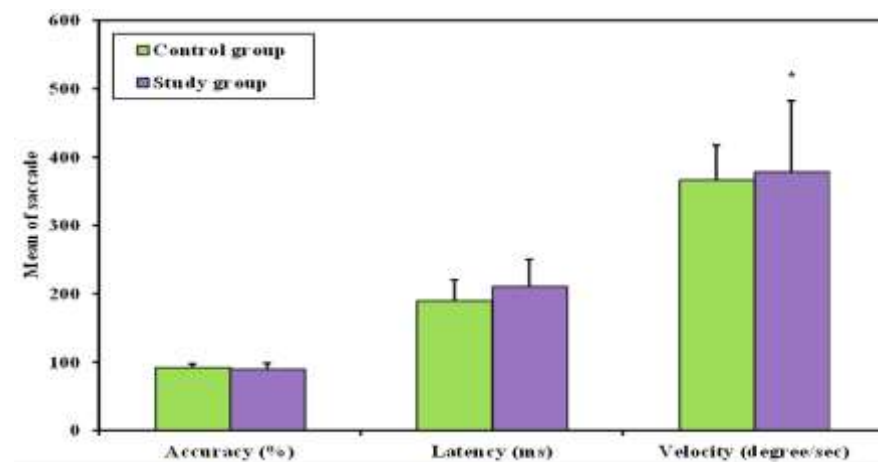
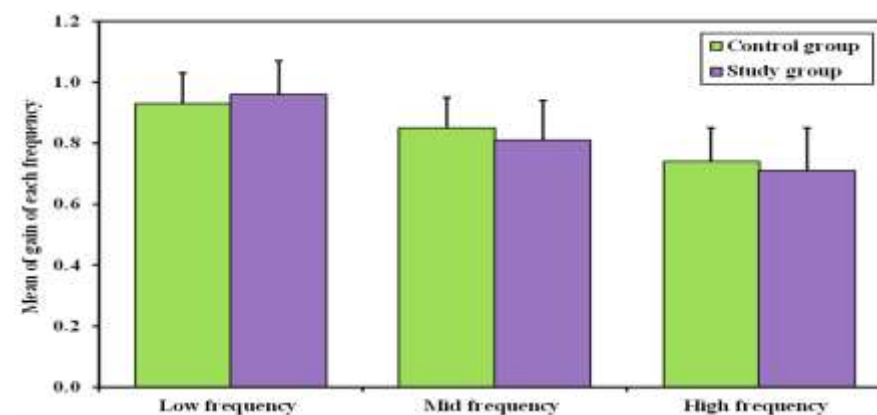


Figure 1: Comparison between the two studied groups according to saccade parameters



-Low frequency: Average of 0.2 & 0.3 HZ Gain

-Mid frequency: Average of 0.4 & 0.5 HZ Gain

- High frequency: Average of 0.6 & 0.7 HZ Gain

There were statistically significant results between the two groups according to phase shift in mid frequencies

Figure 2: Comparison between the two studied groups according to smooth pursuit gain of each frequency

Table: Comparison between the two studied groups according to bithermal caloric

Bithermal caloric	Control group (n = 30)	Study group (n = 30)	t	p
Total right				
Min. –Max.	20.0 – 64.0	16.0 – 66.0	0.495	0.622
Mean $\pm$ SD.	41.60 $\pm$ 14.37	39.80 $\pm$ 13.78		
Median (IQR)	36.50 (30.0 – 56.0)	38.50 (28.0 – 50.0)		
Total left				
Min. –Max.	20.0 – 64.0	23.0 – 67.0	0.019	0.985
Mean $\pm$ SD.	39.50 $\pm$ 14.41	39.43 $\pm$ 13.08		
Median (IQR)	36.0 (27.0 – 50.0)	36.0 (32.0 – 43.0)		
UW				
Min. –Max.	3.0 – 19.0	1.0 – 18.0	0.254	0.800
Mean $\pm$ SD.	8.87 $\pm$ 4.69	8.57 $\pm$ 4.45		
Median (IQR)	8.0 (5.0 – 12.0)	7.0 (6.0 – 12.0)		
DP				
Min. –Max.	1.0 – 19.0	2.0 – 16.0	0.898	0.373
Mean $\pm$ SD.	8.40 $\pm$ 4.73	7.40 $\pm$ 3.85		
Median (IQR)	8.0 (5.0 – 12.0)	7.0 (4.0 – 10.0)		

- UW: unilateral weakness

- DP: directional preponderance

Conclusion

According to the established results in this study :

- There was No statistically significant difference between both groups in spontaneous nystagmus, gaze stabilization or bithermal caloric tests.
- The significant increase in Saccade velocity and smooth pursuit phase shift (at mid frequencies) in the study group in comparison to the control group may denote the presence of a central lesion in the vestibuloocular pathway or it can also be due to fatigue, drowsiness, or medication which is reversible.
- BPPV was diagnosed in six patients by Dix-Hallpike maneuver and positional tests, that may be explained by prolonged bed rest or hypoxic theories.