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"POST COVID SYNDROME - IMPLICATION OF INFLAMMATORY MARKERS"

Internal Medicine

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ABSTRACT

Background- Post Covid syndrome is an established clinical entity in view of SARS-COVID19 infection. Evidences show that it causes symptoms pertaining to multiple organ systems like fatigue, myalgia and various cardiopulmonary and neuropsychiatric manifestations. Its pathogenesis is multifactorial but exact mechanism is not established due to lack of research. **Objectives-** This study was carried out in order to find the association of inflammatory markers in blood with prolonged COVID symptoms in subjects of COVID-19. **Materials and Methods-** This analytical cross sectional study was conducted on cases of mild-moderate COVID-19. They were followed for prolonged symptoms. Clinical variables along with laboratory investigations were obtaioned and multivariate analyses were performed. **Result-** Most common symptom of PCS overall was fatigue. Inflammatory markers like CRP, NLR, Ferritin and D-dimer were raised proportionately higher among the patients with prolonged covid. Patients with deranged levels of inflammatory markers had 4-5 fold increased risk of PCS.

KEYWORDS

Post-COVID syndrome, Prolonged COVID, PCS, COVID-19

INTRODUCTION

COVID-19 is a deadly virus which has become a global disease burden and has become the focus of many researches as per the need of the time.Post-COVID syndrome was described for the first time in spring 2020 in the context of a survey of prolonged COVID-19 symptoms, run by the Patient-Led Research Collaborative, citizen's scientist group.[1] Soon after the first COVID-19 cases evolved, they observed that COVID-19 patients had symptoms persisting for several weeks after acute infection.[1]Long- Covid or Post-COVID syndrome is increasingly recognized as a new clinical entity in the context of SARS-CoV-2 infection. Symptoms persisting for more than three weeks after the diagnosis of COVID-19 fall into the category of post-COVID syndrome.

The most common post-COVID symptoms include fatigue, dyspnea, olfactory and gustatory dysfunction, chest pain, myalgia, and sleep and mental disorders.[1-4] Symptoms may last for several months and disrupt work activities. Evidences of long-COVID symptoms involving various organ systems are rapidly growing in literature. In recent months, our knowledge on post-COVID syndrome has expanded, mainly due to the recognition of new clinical manifestations, including rare neurological and thromboembolic complications, while the long-term consequences of the disease remain largely unknown. Its incidence ranges from 10% to 35%, however, rates as high as 85% have been reported among patients with a history of hospitalization.[5-7]

As of now, we have not known much about the pathogenesis of Prolonged COVID. Currently it is a Poorly known entity. The pathogenesis of post-COVID syndrome is multi-factorial and more than one mechanism may be implicated in several clinical manifestations. Underlying chronic, low grade inflammation has been theorized for its pathogenesis. Available data shows conflicting results regarding the implication of inflammatory markers in full clinical spectrum and its long-term outcome. Further research is also imperative to elucidate the pathogenesis of post-COVID syndrome.

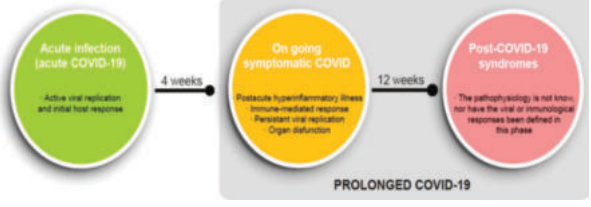


Figure 1 showing natural history of PCS

AIMS AND OBJECTIVES

- Our aim was to know whether subjects with PCS have higher blood levels of inflammatory markers, after mild to moderate COVID-19.

MATERIALS AND METHODS

- Study type- Analytical cross sectional study
- Total cases= 120
- Cases of mild- moderate COVID-19 were included
- Epidemiological data (age, sex, BMI, smoking, co-morbid status) and clinical variables of acute COVID along with blood levels of inflammatory markers were obtained.
- A patient infected with COVID-19 was classified as PCS (Prolonged Covid Syndrome) if signs and symptoms persisted beyond 12 weeks.
- Neutrophil count, NLR, CRP, D-dimer levels were assessed.
- Multivariate analyses were performed.

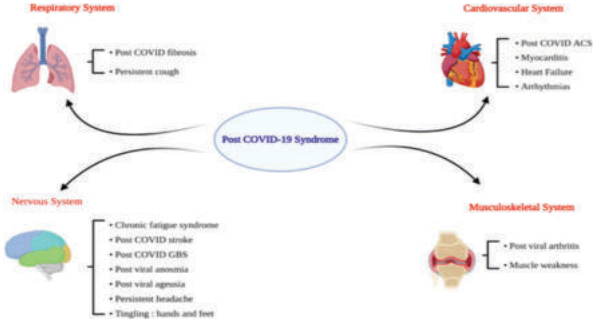
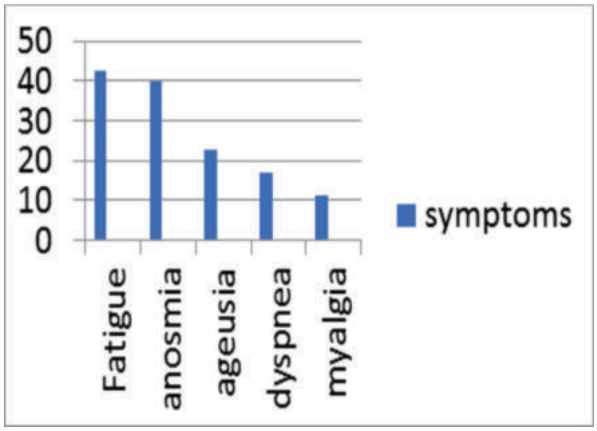


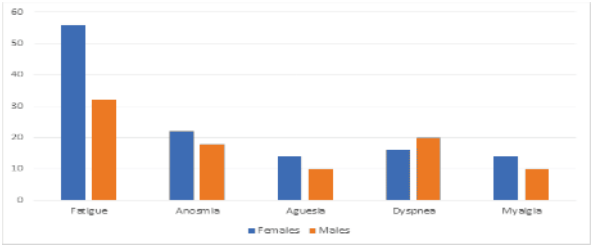
Figure 2 showing various presentation of PCS

OBSERVATIONS AND RESULTS

- Mean age= 45.7 years
- 60% males (n=72), 40% females (n=48)



Graph 1 showing prevalence of symptoms among patients of PCS



Graph 2 showing gender wise distribution of symptoms in patients of PCS

Table 1 showing correlation of CRP levels with PCS

	Patients with PCS (n=49)	Patients without PCS (n=71)
CRP levels high	40	24
CRP levels low-normal	09	47
P-Value	<0.00001	

Table 2 showing correlation of NLR levels with PCS

	Patients with PCS (n=49)	Patients without PCS (n=71)
NLR levels high	32	19
NLR levels low-normal	17	52
P-Value	<0.001	

Table 3 showing correlation of Ferritin levels with PCS

	Patients with PCS (n=49)	Patients without PCS (n=71)
Ferritin levels high	20	07
Ferritin levels low-normal	29	64
P-Value	<0.001	

Table 4 showing correlation of D-dimer levels with PCS

	Patients with PCS (n=49)	Patients without PCS (n=71)
D-dimer levels high	27	12
D-dimer levels low-normal	22	59
P-Value	<0.001	

DISCUSSION

- PCS affected 54.17% of women and 31.94% of men (p=0.015).
- Among the acute symptoms, women presented a higher frequency of fatigue (56.2% vs 31.9%) as compared to men.
- Most common symptom of PCS overall was fatigue (in 44% cases) while least common was reported to be myalgia (in 12% cases). The distribution of symptoms was similar for both sexes.
- Neutrophil count, NLR and CRP showed the best correlation with PCS.
- Inflammatory markers like CRP, NLR, Ferritin and D-dimer were raised proportionately higher among the patients with prolonged covid.
- Patients with deranged levels of inflammatory markers had 4-5 fold increased risk of PCS.
- Patients with raised CRP or NLR had a 10-17 fold increased risk of PCS.

CONCLUSION

- Post Covid syndrome i.e.Prolonged COVID is an important health issue which should not be ignored.
- It should always be taken into due consideration in patients of COVID even those with mild symptoms.
- It has major impact on quality of life.
- High risk individuals should be screened for early detection and prevention.

The evolving data indicate a multi-factorial pathogenesis, namely inflammation, nervous system dysfunction, endothelial damage, and thromboembolism as the main pathogenetic mechanisms. It is expected that as the long-term complications of COVID-19 unfold, more evidence will be available to guide therapeutic management. Further research is needed in order to elucidate the incidence, clinical spectrum, pathogenesis, and prognosis of this new clinical entity.

Limitations of the study

- Absence of sufficient evidence based data and researches on Post covid syndrome.
- Loss of long-term follow-up.

Conflict of interest – Nil

REFERENCES

1. Patient-Led Research Collaborative. Report: What Does COVID-19 Recovery Actually Look Like? An Analysis of the Prolonged COVID-19 Symptoms Survey by Patient-Led Research Team. Available online: https://patientresearchcovid19.com/research/ report-1/ (accessed on 7 May 2021).
2. Writing Committee for the COMEBAC Study Group; Morin, L.; Savale, L.; Pham, T.; Colle, R.; Figueiredo, S.; Harrois, A.; Gasnier, M.; Lecoq, A.L.; Meyrignac, O.; et al. Four-month clinical status of cohort of patients after hospitalization for COVID-19. JAMA 2021. [CrossRef]
3. Alpert, O.; Begun, L.; Garren, P.; Solhkhah, R. Cytokine storm induced new onset depression in patients with COVID-19. A new look into the association between depression and cytokines—Two case reports. Brain Behav. Immun. Health 2020, 9, 100173. [CrossRef] [PubMed]
4. Dicpinigaitis, P.V.; Canning, B.J. Is there (will there be) a post-COVID-19 chronic cough? Lung 2020, 198, 863–865. [CrossRef]
5. Covid-19-Long-Term-Health-Effects. Available online: https://www.gov.uk/government/publications/covid-19-long-termhealth-effects/covid-19-long-term-health-effects (accessed on 7 May 2021).
6. Carvalho-Schneider, C.; Laurent, E.; Lemaignen, A.; Lemaignen, A.; Beaufils, E.; Bourbao-Tournois, C.; Laribi, S.; Flament, T.; Ferreira-Maldent, N.; Bruyère, F.; et al. Follow-up of adults with noncritical COVID-19 two months after symptom onset. Clin. Microbiol. Infect. 2021, 27, 258–263. [CrossRef] [PubMed]
7. Becker, R.C. COVID-19 and its sequelae: A platform for optimal patient care, discovery and training. J. Thromb. Thrombolysis 2021, 1–8. [CrossRef]
8. World Health Organization. Coronavirus Disease (COVID-19) Situation Reports. Available online: https://www.who.int/ emergencies/situation-reports
9. Pavli, A.; Theodoridou, M.; Maltezou, H.C. Post-COVID syndrome: Incidence, clinical spectrum, and challenges for primary healthcare professionals. Arch. Med. Res. 2021. [CrossRef]
10. Havervall, S.; Rosell, A.; Phillipson, M.; Mangsbo, S.M.; Nilsson, P.; Hober, S.; Thelin, C. Symptoms and functional impairment assessed 8 months after mild COVID-19 among health care workers. JAMA 2021. [CrossRef]
11. Sun, B.; Tang, N.; Peluso, M.J.; Iyer, N.S.; Torres, L.; Donatelli, J.L.; Munter, S.E.; Nixon, C.C.; Rutishauser, R.L.; RodriguezBarraquer, I.; et al. Characterization and biomarker analyses ofpost-COVID-19 complications and neurological manifestations. Cells 2021, 10, 386. [CrossRef]
12. Tenforde, M.; Kim, S.; Lindsell, C.; Billig Rose, E.; Shapiro, N.I.; Files, D.C.; Gibbs, K.W.; Erickson, H.L.; Steingrub, J.S.; Smithline, H.A.; et al. Symptom duration and risk factors for delayed return to usual health among outpatients with COVID-19 in a multistate health care systems network-United States, March–June 2020. MMWR Morb. Mortal. Wkly. Rep. 2020, 69, 993–998. [CrossRef]
13. Nalbandian, A.; Sehgal, K.; Gupta, A.; Madhavan, M.V.; McGroder, C.; Stevens, J.S.; Cook, J.R.; Nordvig, A.S.; Shalev, D.; Sehrawat, T.; et al. Post-acute COVID syndrome. Nat. Med. 2021, 27, 601–615. [CrossRef] [PubMed]
14. Al-Jahdhami, I.; Al-Naamani, K.; Al-Mawali, A. The post-acute COVID-19 syndrome (long COVID). Oman Med. J. 2021, 36, e220. [CrossRef] [PubMed]
15. Scordo, K.A.; Richmond, M.M.; Munro, N. Post-COVID-19 syndrome: Theoretical basis, identification, and management. AACN Adv. Crit. Care 2021, e1–e8. [CrossRef]
16. Amenta, E.M.; Spallone, A.; Rodriguez-Barradas, M.C.; El Sahly, H.M.; Atmar, R.L.; Kulkarni, P.A. Post-acute COVID-19: An overview and approach to classification. Open Forum Infect. Dis. 2020. Available online: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7665635/ (accessed on 7 May 2021).
17. Fernandez-de-Las-Penas, C.; Palacios-Cena, D.; Gomez-Mayordomo, V.; Cuadrado, M.L.; Florencio, L.L. Defining post-COVID symptoms (post-acute COVID, long COVID, persistent post-COVID): An integrative classification. Int. J. Environ. Res. Public Health 2021, 18, 2621. [CrossRef] [PubMed]
18. Huang, C.; Huang, L.; Wang, Y.; Li, X.; Ren, L.; Gu, X.; Kang, L.; Guo, L.; Liu, M.; Zhou, X.; et al. 6-month consequences of COVID-19 in patients discharged from hospital: A cohort study. Lancet 2021, 397, 220–232. [CrossRef] Vaccines 2021, 9, 497 10 of 12
19. Simani, L.; Ramezani, M.; Darazam, I.A.; Sagharichi, M.; Aalipour, M.A.; Ghorbani, F.; Pakdaman, H. Prevalence and correlates of chronic fatigue syndrome and post-traumatic stress disorder after the outbreak of the COVID-19. J. Neurovirol. 2021, 27, 154–159. [CrossRef]
20. Moreno-Pérez, O.; Merino, E.; Leon-Ramirez, J.M.; Prunier, L.; Cavelier, G.; Thill, M.P.; Rodriguez, A.; Dequanter, D.; Lechien, J.R.; Le Bon, O.; et al. COVID19-ALC research Post-acute COVID-19 Syndrome. Incidence and risk factors: A Mediterranean cohort study. J. Infect. 2021, 82, 378–383. [CrossRef] [PubMed]
21. Garg, P.; Arora, U.; Kumar, A.; Wig, N. The "post-COVID" syndrome: How deep is the damage? J. Med. Virol. 2021, 93, 673–674. [CrossRef] [PubMed]
22. Willi, S.; Luthold, R.; Hunt, A.; Hanggi, N.V.; Sejdiu, D.; Scaff, C.; Bender, N.; Staub, K.; Schlagenhauf, P. COVID-19 sequelae in adults aged less than 50 years: A systemic review. Travel. Med. Infect. Dis. 2021, 40, 101995. [CrossRef] [PubMed]
23. Halpin, S.J.; McIvor, C.; Whyatt, E.G.; Adams, A.; Harvey, O.; McLean, L.; Walshaw, C.; Kemp, S.; Corrado, J.; Singh, R.; et al. Post-discharge symptoms and rehabilitation needs in survivors of COVID-19 infection: A cross-sectional evaluation. J. Med. Virol. 2021, 93, 1013–1022. [CrossRef] [PubMed]
24. Garrigues, E.; Janvier, P.; Kherabi, Y.; Le Bot, A.; Hamon, A.; Gouze, H.; Doucet, L.; Berkani, S.; Oliosi, E.; Mallart, E.; et al. Post-discharge persistent symptoms and health-related quality of life after hospitalization for COVID-19. J. Infect. 2020, 81, e4–e6. [CrossRef]
25. Davis, H.E.; Assaf, G.S.; McCorkell, L.; Wei, H.; Low, R.J.; Re'em, Y.; Redfield, S.; Austin, J.P.; Akrami, A. Characterizing Long COVID in an International Cohort: 7 Months of Symptoms and Their Impact. Available online: https://www.medrxiv.org/content/10.1101/2020.12.24.20248802v2 (accessed on 7 May 2021).