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Original Research Article

Assessment of Balance and Fatigue In COVID-19 Patients Admitted to a Tertiary Care Center: A Retrospective Analysis

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ABSTRACT

Background: COVID-19 predominantly affects the respiratory system; however, evidence indicates a multisystem disease, with some patients presenting with neuromuscular and psychological sequelae. Impaired balance, and fatigue are frequently found in the patients with respiratory illness and is associated with functional impairments in daily life.

Objectives: A Retrospective analysis of balance and fatigue in COVID-19 disease and identifying any influence of comorbidities on balance and fatigue with different disease severities will help us understand and widen the scope of physiotherapy interventions during COVID-19 and Post-COVID-19 rehabilitation

Procedure: The Medical and Physiotherapy records of 67 patients, in the age group of 18 – 75 years, admitted in a Tertiary care hospital with COVID-19 were considered from the period of September 2020 to March 2021. Data consisting of sex, severity of COVID-19, Oxygen status, comorbidities, SLS time for Static balance, FRT distance for dynamic balance and NRS score for fatigue, were considered for analysis while those on HFNC or Ventilator, unconscious patients or with altered sensorium, or musculoskeletal and neurological conditions were excluded.

Results: FRT distance, SLS time and NRS scores were significantly reduced in those who were on oxygen supplementation as compared to those not on oxygen supplementation.

There was a moderate negative correlation between age and FRT, SLS values of those who were on oxygen supplementation but not in those without oxygen supplementation. There was no significant difference in FRT, SLS & NRS values with or without comorbidities.

Conclusion: Balance performances were significantly reduced and fatigue significantly increased in COVID-19 patients who were on supplemental oxygen. Age is also an important factor influencing balance in them. Comorbidities did not have any effect on balance and fatigue in different disease severities. Assessment of static balance, dynamic balance and fatigue should be considered as an important part of Physiotherapy routine assessments in patients with COVID-19.

KEY WORDS: Static balance, Dynamic balance, Fatigue.

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INTRODUCTION

Coronavirus Disease 2019 (COVID-19) has spread worldwide and has emerged causing a global pandemic since several waves have hit us in the past couple of years and the impact it has created on the long term health hazards post infection. The highly infectious and pathogenic novel coronavirus (COV) leads to severe acute respiratory syndrome (SARS-CoV-2) [1]. COVID-19 predominantly

affects the respiratory system; however, evidence indicates a multisystem disease, with some patients presenting with neuromuscular and psychological sequelae [2].

Genomic studies show that the SARS-CoV-2 virus has similar homological sequences with two of its beta-coronavirus predecessors, the SARS-CoV associated with Severe Acute Respiratory Syndrome (SARS-CoV-2) and the virus associated with Middle Eastern Respiratory Syndrome (MERS), it is helpful to review the neurological symptoms of these two earlier diseases as the plausible link between COVID-19 and neurological symptoms [3].The continuously evolving mutations of this virus makes it necessary to study it retrospectively in order to understand the impacts it may have on human health and quality of life.

The 3-stage classification system, helps to know that COVID-19 illness exhibits 3 stages of increasing severity, stage I (Early infection), Stage II (IIa without hypoxia and IIb with hypoxia) which involves Pulmonary Phase and Stage III is Hyperinflammatory Phase [4]. The influence of comorbidities in the manifestation and outcome of disease is very well known. The disease is found to be severe in those with multiple comorbidities and may also be fatal in immunocompromised [5].

The goals of oxygen supplementation in COVID-19 are, to treat and correct hypoxemia and prevent tissue hypoxia, thereby avoiding end-organ hypoxic tissue damage to vital body organs. There is clinical utility of oxygen in the management and treatment of hypoxemia in COVID-19 patients. Various antivirals, steroids, immunomodulators have used along with oxygen therapy as the mainstay of treatment [5]. Physical therapy for COVID-19 patients is recommended in all stages of the disease. The three major components of the medical system for COVID-19 are, prevention, treatment, and rehabilitation, all of which are equally important. Physical therapy rehabilitation will directly affect the physical function of patients. Physical therapy intervention during ICU stay helps in earlier transfer of patients to the general wards. Physical Therapy for COVID-19 Patients in Stable Period during Isolation and Post recovery enable patients to reduce impairments, restore their functions & enable early return to the society [6].

Physical therapy interventions include, positioning to improve ventilation, different types of breathing exercises and airway clearance, early mobilization, maintaining as well as improving physical strength and endurance, Aerobic exercise testing using appropriate tests eg. 6 Minute Walk Test, aerobic training, Resistance training, ADL training and relaxation. Interventions are tailormade according to the patient's presentation, the stage of the disease and ability of the patients [7].

It remains unclear whether the impairment of multiple system functions is reversible or if the long-term existence of the virus can cause physical dysfunction in these patients. After COVID-19 disease, many patients experience a variety of problems with normal functioning and thus will require rehabilitation services to overcome these problems for a long term [8].

Impaired balance; and fatigue are frequently found in the patients with respiratory illness and is associated with functional impairments in daily life [9]. Since COVID-19 presents with severe respiratory system disorder causing hypoxia and Neurological disorders, assessment of balance may be considered as an important aspect, since balance disorders may cause multiple impairments (e.g., falls) leading to secondary complications. Balance is considered a complex motor skill derived from the interaction of multiple sensorimotor processes. Balance is an individual's ability to maintain the line of gravity within their Base of support. Static Balance is the ability to maintain postural stability and orientation with center of mass over the base of support and body at rest. Dynamic balance is the ability to maintain postural stability and orientation with centre of mass over the base of support while the body parts are in motion [10].

The Single leg Stance (SLS) Test is used to assess static balance. It is a practical task which can help in assessing balance required for daily activities [11]. It assesses the ability to stand unassisted on one leg. The person stands on one leg unassisted with hands on hips and

eyes open and the time is calculated in seconds from the time one foot is flexed off the floor to the time when it touches the ground. The procedure is repeated three times and average was taken [12]. They have a range of validity of 0.657–0.998 [12] and reliability of 0.84–0.97 [12].

Functional Reach Test (FRT) (Test-retest reliability r = 0.89. Inter-rater agreement on reach measurement = 0.98) is clinically feasible measure for dynamic balance assessment. It assesses the patient's stability by measuring the maximum an individual can reach forward while standing in fixed position. It is measured in centimeters. According to Duncan, et all 1990, the functional reach score equals the difference (in inches or centimeters) between the 'end' and the 'start' hand positions. The patient was instructed to stand next to, but not touching, a wall and position the arm that is closer to the wall at 90 degrees of shoulder flexion with a closed fist The location of the 3rd metacarpal is recorded. The patient is instructed to reach as far as possible forward without taking a step. Scores are determined by assessing the difference between the start and end position is the reach distance, measured in centimeters. Three trials are done and the best of three is noted [13]. Criteria to stop the test: The patient's feet lifted up from the floor or they fall forward.

Balance assessments are a valuable clinical tool for monitoring neurological and musculoskeletal status as well as for managing fall risk. Balance function can be predominantly assessed using performance or activity-based measurements [13].

Fatigue is a term used to describe an overall feeling of tiredness, lack of energy, lack of motivation. It is different from feeling drowsy or sleepy. Fatigue is a common symptom of many medical conditions that range in severity from mild to serious. It is also a natural result of some lifestyle choices, such as lack of exercise or poor diet. Because the symptom of fatigue is often vague, clinical evaluation requires the consideration of various physical and psychological precipitating factors.

The Numerical Rating Scale (NRS) for fatigue is a patient-administered, single-item, 11-point horizontal scale anchored at 0 and 10, with 0 representing 'no fatigue' and 10 representing 'as bad as you can imagine'. It is very feasible and easy to administer during routine Physiotherapy assessments. It gives us a patient's perspective in understanding Fatigue experienced due to COVID-19.

Since COVID-19 affects multiple systems including respiratory and neuromuscular systems, assessment of static and dynamic balance by using simple and feasible bedside clinical assessment tools will be worthwhile in COVID-19 in-patients referred for Physiotherapy mobilization to rule out balance impairments in tertiary care hospitals. Fatigue which is commonly seen in COVID-19 patients due to physical and psychological factors, may influence the patient's exercise performance. Hence rating patient's overall perception of fatigue is valuable in COVID-19 patients [14].

A 63 year old male with COVID-19 admitted to a tertiary care center, presented with dizziness, imbalance and fatigue during his routine Physiotherapy care. We continued with his regular COVID-19 and post COVID-19 care for the next few months (from November 2020 to March 2021), consisting of pulmonary physiotherapy and balance training tailored to his individual needs. It was found that balance impairment was completely reversed with Physiotherapy interventions. We have published a case report of the same [10]. This prompted us to do a further detailed retrospective analysis of records of balance and fatigue in all the data available till march 2021.

Need of the study: Impaired balance and fatigue are frequently found in the patients with respiratory illness and are associated with functional impairments in daily life, causing secondary complications (e.g. falls, Musculoskeletal injuries) affecting their quality of life.

A Retrospective analysis of balance and fatigue in different stages of COVID-19 disease with different disease severities will help us understand and widen the scope of physiotherapy interventions during COVID-19 and Post-COVID-19 rehabilitation. It may throw light

upon the various manifestations of this constantly evolving disease, enabling us to contribute newer strategies in its management. An understanding of influence of comorbidities in different stages of the disease in balance performance and fatigue may aid us in perceiving its role in deciding the Physical therapy management and outcomes in COVID-19.

Aim: To analyse static balance, dynamic balance and fatigue in patients with various disease severities of COVID-19 admitted to a tertiary care centre.

Objectives: 1. To analyse performance of static balance assessed by SLS test, dynamic balance assessed by FRT and fatigue by NRS in patients with various stages of disease severities of COVID-19, admitted in a tertiary care centre. 2. To identify any effect of comorbidities on balance and fatigue in them.

Study Procedure: The Medical and Physiotherapy records of patients admitted in a Tertiary care hospital with COVID-19 were considered from the period of September 2020 to March 2021. A record of a total of 67 patients in the age group of 18 – 75 years(as per the data availability) were identified.

Data consisting of age, sex, severity of COVID-19, Oxygen status (with and without oxygen supplementation), comorbidities, FRT for dynamic balance, SLS test for static balance and NRS values for fatigue were considered for analysis. Data of those with oxygen supplementation in the form of nasal prongs, oxygen mask, Non Re-breathing Mask were included in the analysis. The oxygen saturation of all patients were 90% and above (with or without oxygen supplementation), as only those were fit for mobilization and could perform balance tests. Those who were on HFNC (High Flow Nasal Canula), on Ventilator, unconscious patients or with altered sensorium, musculoskeletal, neurological conditions (eg Stroke), Acute infective polyneuropathies, were not included in the study.

The data was put in Microsoft Excel 365 and descriptive statistics was used for the categorical data. The continuous data was first tested for normality using the Shapiro-Wilk test. Based on the normality of the data, parametric and non-parametric tests were used as applicable. A two tailed p-value <0.05 considered as statistically significant.

Descriptive statistics:

Table 1: Showing the descriptive statistics.

Total no of Patients	67
Total no of Patients in stage I	6
Total no of Patients in Stage II a	41
Total no of Patients in II b	19
Total no of Patients in stage III	1
Total no of Patient without supplemental Oxygen	47
Total no of Patients with supplemental oxygen	20
Total no of Patients without any Comorbidities	24
Total no of Patients with Comorbidities	43

Data was analyzed from the records of a total of 67 patients from September 2020 to March 2021. There were 57 males and 10 females in the age group ranging from 20 to 74 years. There were 6 patients in Stage I, 41 patients in Stage II a , 19 patients in Stage II b and only 1 patient in Stage III. 47 patients were without supplemental oxygen and 20 were on oxygen supplement. Various Comorbidities like Diabetes myelitis, Hypertension, Cardiac conditions, Pulmonary condition, Chronic kidney diseases were seen in 43 patients, while 23 patients did not have any comorbidities.

RESULTS

The data was found to be not normally distributed according to Shapiro-Wilk test hence, appropriate nonparametric tests were used for further analysis.

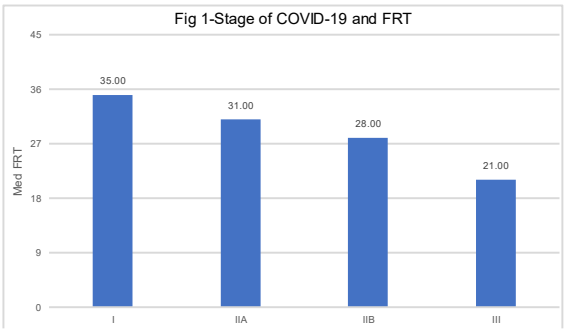

Fig. 1: Stage of COVID-19 and FRT.

There was a decreasing trend of FRT distance as the stage of COVID-19 progresses (Fig 1).

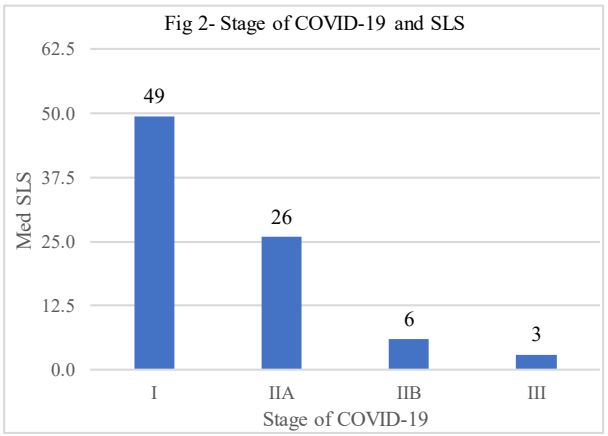

Fig. 2: Stage of COVID-19 and SLS.

Similarly a decreasing trend of SLS time was found as the stage of COVID-19 progresses. (Fig 2)

NRS score with the progression of the severity of COVID-19 is depicted in Fig 3.

Table 2: Intergroup analysis of balance and fatigue across different stages of Covid-19.

	Stages of COVID												P -value	
	I				II A				IIB					
	Mean	Median	CI		Mean	Median	CI		Mean	Median	CI			
			LL	UL			LL	UL			LL	UL		
FRT	35.08	35	28.02	42.14	29.46	31	27.14	31.78	27.76	28	24.08	31.44	0.111	NS
SLS	79.53	49.46	-17.72	176.78	34.39	25.95	23.03	45.75	27.37	6	11.73	43.02	0.091	NS
NRS	2	2.5	0.24	3.75	2.31	2	1.69	2.93	1.63	2	0.96	2.29	0.695	NS

*Independent sample Kruskal Wallis test used

There was no statistically significant difference in FRT, SLS and NRS values across the different disease severity of COVID-19. (Table 2) Since there was data of only one patient was available in stage III, it could not be considered for analysis.

Table 3: Intergroup analysis of balance and fatigue in patients with and without requirement of oxygen supplementation.

	On supplemental oxygen				Not on supplemental oxygen				P-value	
	Mean	Median	CI		Mean	Median	CI			
			LOWER LIMIT	UPPER LIMIT			LOWER LIMIT	UPPER LIMIT		
FRT	26.07	26.25	23.3	28.84	30.75	32	28.47	33.03	0.011	Sig
SLS	13.69	5	5.25	22.13	45.45	35.78	31.27	59.64	0	Sig
NRS	2.6	2	2.02	3.17	1.8	2	1.28	2.42	0.04	Sig

*Independent sample Mann Whitney U Test used

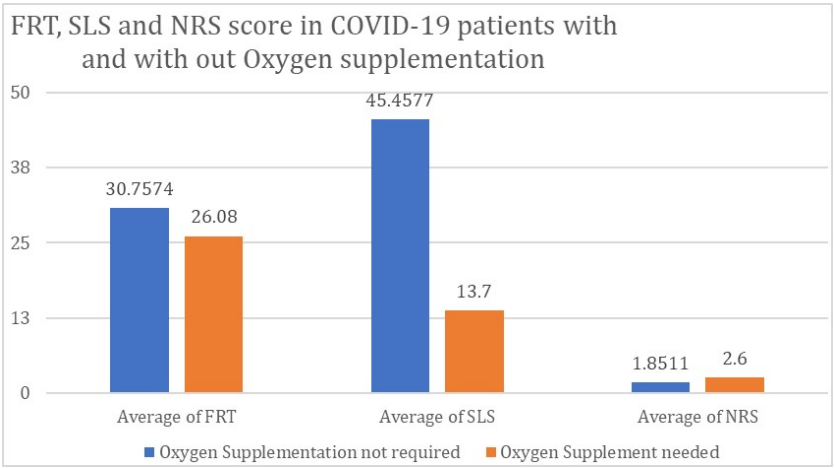

Fig.3: FRT, SLS, and NRS score in COVID-19 patients with and without oxygen supplementation.

Significant difference in FRT, SLS and NRS values between patients without supplemental oxygen and with oxygen supplementation were observed. Lower scores of FRT distance, SLS time and higher NRS scores were observed in patients with supplemental oxygen as compared to patients without supplemental oxygen.

Table 4: Correlation between Age and Outcome measures in patients with and without supplemental oxygen.

	Correlation of Age in patients with supplemental oxygen			Correlation of Age in patients without supplemental oxygen		
	R- Value	P - Value	Sig 2 tailed	R – value	P - Value	Sig 2 tailed
FRT	-0.609	0.004	Sig	-0.173	0.246	NS
SLS	-0.506	0.023	Sig	-0.164	0.271	NS
NRS	0.311	0.182	NS	0.151	0.311	NS

* Spearman's correlation was used

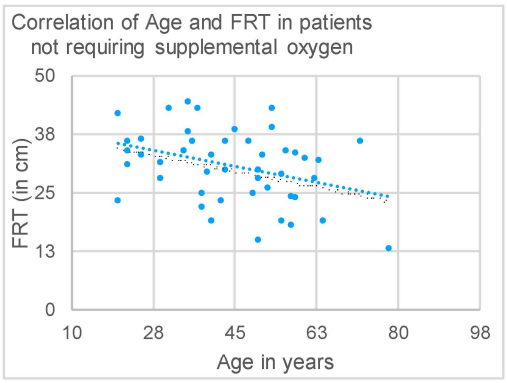

Fig.4: Correlation of age and FRT in patients not requiring supplemental oxygen.

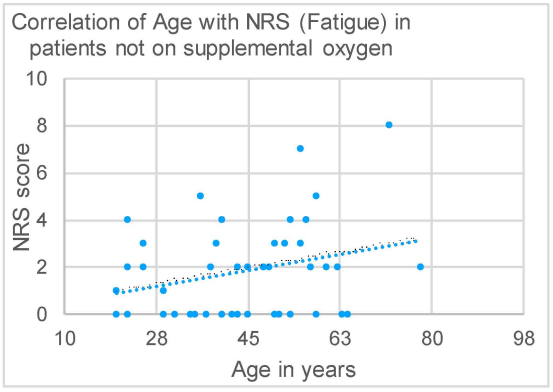

Fig.5: Correlation of age and FRT (cm) in patients on oxygen.

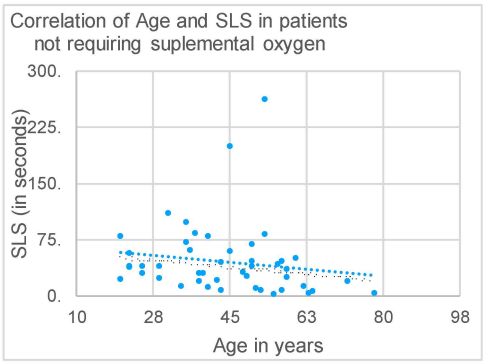

Fig.6: Correlation of age and SLS in patients not requiring supplemental oxygen.

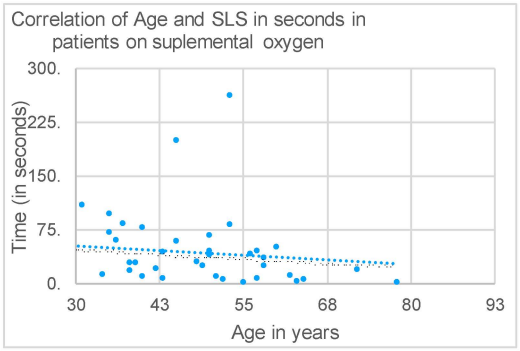

Fig.7: Correlation of age and SLS in patients on supplemental oxygen.

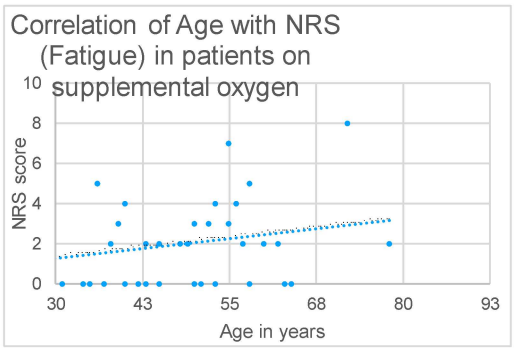

Fig.8: Correlation of age and NRS (Fatigue) in patients on supplemental oxygen.

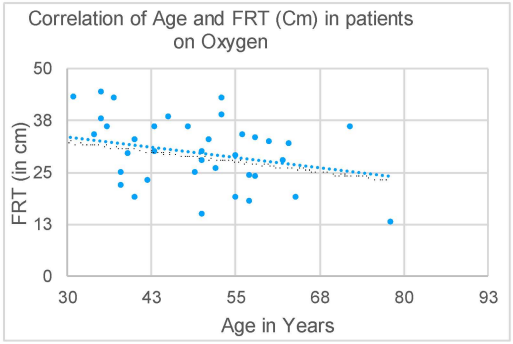

Fig. 9: Correlation of age and FRT in patients on supplemental oxygen.

A significant moderate negative correlation using Spearman's Rank correlation was found between Age and FRT distance (r = - 0.609, p = 0.004) and between Age and SLS time (r = -0.506, p = <0.01) in patients requiring supplemental oxygen. No correlation was found between Age and NRS scores in patients with oxygen supplementation (r=0.311, p = 0.183). Thus, we can infer from table 4 that in patients who were on oxygen supplementation, as the age increased there was a decrease in FRT distance and SLS time. No such correlation between age and 3 parameters was observed in patients not requiring supplemental oxygen viz: FRT (r = -0.173, p = 0.246), SLS (r =-0.164, p = 0.271) and NRS (r = 0.151, p =0.311)

Table 5: Intergroup analysis of balance and fatigue with and without comorbidities.

	Without comorbidities				With comorbidities				P-Value	
	Mean	Median	CI		Mean	Median	CI			
			Lower limit	Upper limit			Lower limit	Upper limit		
FRT	29.89	28.75	26.42	33.35	29.06	30	26.84	31.28	0.804	NS
SLS	35	27.48	22.29	47.71	36.51	23.47	20.99	52.03	0.556	NS
NRS	2.37	2	1.34	3.4	1.9	2	1.5	2.3	0.772	NS

*Independent sample Mann Whitney U Test used

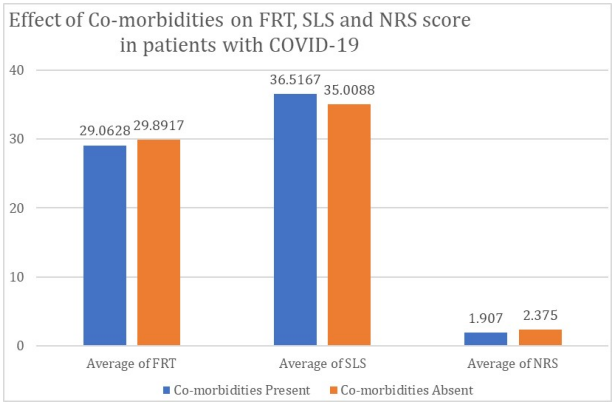

Fig. 10: Effect of co-morbidities on FRT, SLS and NRS score in patients with COVID-19.

No significant difference was observed in FRT, SLS and NRS values in patient with and without comorbidities inferring that, comorbidities did not have an effect on FRT, SLS and NRS values in COVID-19 patients.

DISCUSSION

FRT and SLS values showed a decreasing trend with advancing stage of the disease fig 1 & 2. However, no significant difference was noted in any of three parameters viz: FRT, SLS and NRS between the disease stages I, IIa, IIb & III. This could be attributed to an uneven number of samples in each stage of COVID-19, Stage I had only six patients, stage II A 41, stage IIB 19 and stage III had only one patient. An equal distribution of the samples across the stages would have probably yielded a different result, but this being a retrospective analysis the data was analysed as it was available. Therefore, we did further analysis by classifying the data into 2 groups namely patients with supplemental oxygen and without supplemental oxygen. Among the total of 67 patients, 20 were on oxygen supplementation and 47 were without oxygen supplementation. Intergroup analysis for FRT, SLS & NRS was done using independent sample Mann Whitney U test which showed statistically significant difference in between the 2 groups, as seen in Table-3. The FRT & SLS values of those who were on supplemental oxygen were significantly lesser than those who were without supplemental oxygen. Thus, we can say that the dynamic balance, (functional reach distance) of those who were on supplemental oxygen was less than that of those who were not on supplemental oxygen. Similarly, Static balance (Single leg stance time), was less in patients who were on supplemental oxygen as compared to those who were not on supplemental oxygen. Similar findings were seen with NRS which is an indicator of Fatigue. The NRS values of those requiring oxygen supplementation were more than those who did not require oxygen supplementation, indicating greater fatigue levels in subjects requiring oxygen. FRT SLS and NRS are simple, easy to administer outcome measures routinely done in neurophysiotherapy evaluations. However, it was observed that the performance of these balance tests like FRT, SLS and the subjective feeling of overall Fatigue in the past 24 hours, were poorer in COVID-19 patients who were on oxygen. Hence, this can be attributed to the assumption that those who required oxygen supplementation suffered from a severe form of COVID-19 disease compared to those who did not require oxygen.

According to previous literature the COVID-19 virus gains access via Angiotensin-converting enzyme -2 (ACE-2). The presence of ACE-2 receptors in the tissues of the nervous system is hypothesised to be the reason that the virus leads to neurological manifestations. ACE2 receptors are present in the glial cells, neurons, and skeletal muscle. The virus from the general circulation can also pass into the cerebral circulation [15].

The presence of inflammatory markers such

as C-reactive protein and leukocytes confirm the presence of cytokine storm. Cytokine storm is markedly elevated levels of proinflammatory cytokines, lymphopenia, an increased number of neutrophils. Cytokine storm is associated with enhanced vascular hyperpermeability, coagulopathies, and multisystem dysfunction [16]. IL-6 is a key element of the cytokine storm. It is known that the release of IL-6 causes vascular leakage and activation of complement and coagulation cascades. In addition, higher levels of D-dimer are present, which is a marker of a hypercoagulable state and endogenous fibrinolysis. Cytokine storm is also responsible for causing arthralgia. General muscle pain or myalgia, muscle soreness and fatigue are common symptoms in COVID-19. There is an alteration in muscular protein homeostasis. This alteration may occur quickly and be secondary to an accelerated muscle protein breakdown and a suppression of muscle protein synthesis [17].

The hyperinflammation status can trigger a reduction in muscular mitochondrial content and a decrease in phosphorylation enzyme activity may have negative consequences on functional neuromuscular capacity. These neuromusculoskeletal changes can be attributed to fatigue and decreased performance on static and dynamic balance scales.

According to the study done in COPD patients, those who were on oxygen supplement showed balance impairments. It might be that the oxygen users were more sedentary, leading to greater impairments in balance. The previous report of an association between oxygen use and low physical activity supports this contention. Other possible explanations for the relationship between balance impairments and oxygen use include decreased motor coordination from cerebral hypoxemia, and the potential physical hazard from ambulatory oxygen equipment [18].

Dizziness caused due to COVID-19 because of Vestibular apparatus or its higher connections can also lead to affection of balance, apart from the above reasons. However, there was no data available in the form of any dizziness assessments in our records to actually comment on this.

A study about Myalgic Encephalomyelitis/ Chronic Fatigue Syndrome, suggests insights pertaining to the lymphatic system and the nasal cerebrospinal fluid outflow pathway in patients with chronic fatigue syndrome, idiopathic intracranial hypertension in COVID-19. Fatigue syndrome may result from damage to olfactory sensory neurons, causing reduced outflow of cerebrospinal fluid through the cribriform plate, and further leading to congestion of the lymphatic system with subsequent toxic build-up within the central nervous system [19]. This study indicates one of the probable causes of increased Fatigue seen in our study with the advancement of disease severity. Although there was a significant difference in NRS scores of patients with and without oxygen supplementation, the mean values of NRS scores were in the mild category. This could be because of the already decreased activity levels in our patients due to the in-patient stay. However, considering Fatigue assessments in the out patient's department during post COVID-19 follow-ups may throw better insight in its analysis and management.

Many studies have shown Neuropsychiatric illnesses like Anxiety, Depression, insomnia etc prevalent in COVID-19 in-patients. (20) Presence of these, may also contribute towards impairment of Balance and Fatigue. Considering all the above factors in future studies will be beneficial in planning effective treatment strategies for COVID-19 and post COVID-19 rehabilitation.

Table 4 shows analysis of correlation between FRT, SLS and Age, in patients with and without oxygen supplementation. There was a significant moderate negative correlation between FRT and age, SLS and age in patients with oxygen supplementation. Hence, we can infer that as the age increases, the FRT & SLS values go on decreasing in those who were on supplemental oxygen. Thus, we can say that age is an important factor influencing static and dynamic balance for those who require oxygen supplementation in COVID-19 or in whom the disease is more severe.

There was no significant correlation between FRT & SLS with age in those who did not

require oxygen supplementation. We can deduce that, in those who do not require oxygen, or in whom the disease is milder this relationship does not hold true.

Another interesting finding in our study is that, NRS did not show any correlation with age irrespective of oxygen requirement. Thus, we can infer that Fatigue did not have any relationship with Age in patients with COVID-19.

Evidence has shown that individuals with pre-existing comorbidities are at greater risk for severity of COVID-19. Multiple comorbidities are associated with the severity of COVID-19 disease progression. (5) In the data that we collected, we found a wide range of comorbidities including DM, HT, IHD, Pulmonary complications, Obesity, RA, Malaria, Renal disorders and Marfan's disease (Some of them were with multiple comorbidities too). Among the sample of 67, 43 patients had comorbidities and 24 were with no comorbidities. Hence, we grouped our data into binomial categories viz. those with and without comorbidities. We did an intergroup analysis of FRT, SLS & NRS between those with and without comorbidities by using independent sample Mann Whitney U test, as shown in table 5. There was no statistically different difference in all the 3 outcome measures between the 2 groups. This indicates that presence or absence of comorbidities did not affect the Static balance, Dynamic balance and Fatigue in patients with COVID-19. This gives us a probable perspective that disorder of Balance and fatigue could be due to the effect of COVID-19 disease process itself. Yet, these findings require rigorous prospective research in order to derive definite conclusions since solely this study may not be able to defend the above possibilities. Nevertheless, the assessment of static and dynamic balance during the in-patient course of the disease may help Physiotherapists plan early intervention strategies to manage balance impairments and alleviate the disease related complications and the risk of falls, especially in the elderly, since falls may have detrimental effects on their activities of daily living and quality of life.

CONCLUSION

From this retrospective analysis of balance and fatigue in COVID-19 patients admitted to a tertiary care centre, we can conclude that the FRT distance, SLS time and NRS scores were significantly reduced in those who were on oxygen supplementation as compared to those not on oxygen supplementation, indicating a decrease in balance performance with increase in disease severity. There was a moderate negative correlation between age and balance indicating that as the age advances there is a decrease in FRT & SLS values of those who were on oxygen supplementation. There was no correlation between age and fatigue in COVID-19 in patients with or without oxygen therapy. Thus, age is an important factor in balance performance but not for fatigue as the disease becomes severe. Since there was no significant difference in FRT, SLS & NRS values in COVID-19 in-patients with or without comorbidities, we can deduce that balance performances were not affected by comorbidities. Thus, we can also imply that assessment of static and dynamic balance and fatigue should be considered as an important part of Physiotherapy routine assessments in patients with COVID-19. This is important for planning early, preventive, effective & holistic Physiotherapy intervention strategies in COVID-19 and post COVID-19 management.

ABBREVIATIONS

SLS time – Single Leg Stance time,
FRT distance - Forward Reach Test distance,
NRS score – Numerical Rating Scale score
HFNC – High Flow Nasal Canula.

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Author's contribution

Lakshmiprabha Deviprasad: The author has made substantial contributions in conception and design of the study acquisition of data, or analysis and interpretation of data. She has been involved in drafting the manuscript or revising it critically for important intellectual content; and has also given final approval of the version to be published.

Bhagyashree Hajare: The author has made substantial contributions in conception and design of the study acquisition of data, or analysis and interpretation of data. She has been involved in drafting the manuscript or revising it critically for important intellectual content

Krishna Sukhadev Rathod: The author has made substantial contributions in conception and design of the study acquisition of data, or analysis and interpretation of data. He has been involved in drafting the manuscript or revising it critically for important intellectual content

Ankita Bhanushali: The Author has done acquisition of data for the study

Ashwini Munde: The Author has done acquisition of data for the study.

Shreya Chury: The author has been involved in drafting the manuscript or revising it critically for important intellectual content.

Rutu Parikh: The Author has done acquisition of data for the study.

Saraswati Iyer- the author has made contribution in conceptualizing and designing the study and has been involved in important intellectual content.

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