Does mild COVID-19 impact work ability?

A COVID 19 leve tem impacto na capacidade para o trabalho?

¿Puede la covid–19 leve afectar la capacidad laboral?

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ABSTRACT | This cross-sectional study compared work ability between individuals affected and not affected by mild COVID-19. The participants underwent serological testing for SARS-CoV-2 and answered the Work Ability Index (WAI) questionnaire. The seropositive group had a lower final WAI score compared to the seronegative group (40 [36–44] *vs* 43 [38–45]; p=0.008). The presence of three or more current injuries/diseases (PR=3.23; 95%CI:1.59-6.54; p<0.0001) and female sex (PR=3.28; 95%CI:1.27–8.46; p=0.014) were determining factors for lower work ability in the seropositive group. Work ability was poorer in individuals who had mild COVID-19, although the disease was not a determining factor for this decrease.

Keywords | COVID-19; Work Ability; Occupational Health.

RESUMO | Este estudo transversal comparou a capacidade para o trabalho entre indivíduos acometidos e não acometidos pela covid-19 leve. Os participantes realizaram exame sorológico para SARS-CoV-2 e responderam ao questionário Índice de Capacidade para o Trabalho. O grupo soropositivo apresentou menor escore final do ICT em comparação com o grupo soronegativo (40 [36-44] *vs* 43 [38-45]; p=0,008). A presença de 3 ou mais lesões/doenças atuais (RP=3,23; IC 95%:1,59-6,54; p<0,0001) e o sexo feminino (RP=3,28; IC 95%:1,27-8,46; p=0,014) foram

fatores determinantes para menor capacidade laboral no grupo soropositivo. Concluiu-se que, apesar dos indivíduos que tiveram covid-19 leve apresentarem menor capacidade para o trabalho, a doença não foi fator determinante para esse desfecho.

Descritores | Covid-19; Capacidade de Trabalho; Saúde do Trabalhador.

RESUMEN | Este estudio transversal realizó una comparación de la capacidad laboral entre individuos afectados por la covid-19 leve y individuos no afectados por esta afección. Los participantes se sometieron a un examen serológico para el SARS-CoV-2 y respondieron al cuestionario del Índice de Capacidad de Trabajo. El grupo seropositivo tuvo una puntuación ICT final más baja en comparación con el grupo seronegativo (40 [36-44] *vs.* 43 [38-45]; p=0,008). La presencia de 3 o más lesiones/enfermedades actuales (RP=3,23; IC 95%: 1,59-6,54; p<0,0001) y el sexo femenino (RP=3,28; IC 95%: 1,27-8,46; p=0,014) fueron los factores determinantes para una menor capacidad laboral en el grupo seropositivo. Se concluyó que, aunque las personas con la covid-19 leve tenían una menor capacidad laboral, la enfermedad no fue un factor determinante para este resultado.

Palabras clave | Covid-19; Capacidad de Trabajo; Salud Ocupacional.

INTRODUCTION

The disease caused by the SARS-CoV-2 virus (COVID-19) is no longer a global public health emergency, but it remains a challenge that needs long-term management in the health field[1]. In the workplace, feelings of fear, guilt, and frustration that shook workers and employment relationships at the beginning of the pandemic have also changed according to the control of the disease[2,3]. Today, employees who get infected remain away from work only in the initial phase of infection, to avoid contagion to other employees. However, some individuals affected by COVID-19, even if mild, may have prolonged signs and symptoms, which can negatively influence their functional and work activities[4-7].

Health and work have a direct relationship, so that work activities conducted under improper environmental, organizational, and physiological conditions can generate health problems and reduced productivity[8]. Health is a dynamic condition and changes over time, so each person experiences health/disease states in a unique way, according to their life circumstances and individual capabilities[9].

Little evidence associates post-COVID-19 health with work ability[10]. However, SARS-CoV-2 still infects the population, although with lower morbidity and mortality[1]. Considering that health is a dynamic process capable of affecting work ability and that even mild COVID-19 can cause prolonged signs and symptoms in some individuals[4-7], further investigation is necessary to clarify the post-COVID-19 relationship and work ability. This study aimed to compare the work ability of individuals affected and not affected by mild COVID-19, besides investigating which factors influence the work ability of people previously affected by the disease.

METHODOLOGY

This is a cross-sectional descriptive exploratory study, conducted as part of the study "Estado funcional e sequelas na vida diária de indivíduos acometidos pela covid-19" in Manaus, Amazonas - FunctionCov.

All people who went to the testing center at the *Escola de Enfermagem de Manaus da Universidade Federal do Amazonas* (EEM-UFAM), between October and December 2021 were invited to undergo serological test for SARS-CoV-2. The testing took place as a participation in the partner research project "Epidemiologia de SARS-CoV-2 no Amazonas – DetectCov," which aimed to report the prevalence of SARS-CoV-2 infection and its risk factors in a cohort in the state of Amazonas[11]. The sample was divided into two groups based on the serological test: SARS-CoV-2 seronegative, with negative anti-SARS-CoV-2 IgG; and mild seropositive SARS-CoV-2, with positive anti-SARS-CoV-2 IgG and a history of mild symptoms related to COVID-19. All participants were properly informed of the study's aims and signed an informed consent form.

The inclusion criteria for the research were as follows: being a participant in the cohort of the partner study "DetectCov" and having been tested for COVID-19 at EEM-UFAM, without presenting current symptoms that suggest the acute disease; be over 18 years; reside in Manaus; have paid work; have completed primary education; and sign the Work Ability Index (WAI). The exclusion criteria were: withdrawing from participating in the study at any time; not being able to answer the WAI questionnaire.

The participants previously answered (in the partner research project) an epidemiological questionnaire with personal information and history of symptoms and/or hospitalizations related to COVID-19. Then, they were subjected to an evaluation of their work ability, and those who tested positive for SARS-CoV-2 and agreed to participate in the research reported a history compatible with mild COVID-19 (clinical aspects that do not require oxygen therapy and/or hospitalization)[1].

The WAI questionnaire was used to evaluate work ability, which can express how well the worker can perform their activities regarding the demands imposed on their health status and their physical and mental capabilities[12,13]. The Brazilian version of the WAI has satisfactory measurement properties, which are suitable for individual and population evaluations[14,15], and it was applied as an interview in this study. The WAI score ranges from 7 (worst index) to 49 points (best index), creating the final classification: poor (7 to 27), moderate (28 to 36), good (37 to 43) or excellent (44 to 49). Due to the small number of individuals in the "poor" and "moderate" categories, this study assembled these classifications.

The primary outcome of the research was work ability. The sociodemographic variables used were gender, age group in years, schooling in years of study, marital status, and family income in minimum wages. As for health variables, the serological result for SARS-CoV-2 and the report of current injuries/diseases were used to determine other health conditions that could be related to work ability.

Statistical analysis was performed using SPSS 24 software for Windows. Data distribution was verified by the Shapiro-Wilk test and was described as mean and standard deviation or median and interquartile range (25%–75%), if they showed normal or non-normal distribution, respectively. Frequencies were also used. Comparisons were made using the Chi-squared test (categorical variables) and the Mann-Whitney test (continuous variables). Poisson regression with robust variance was performed to identify variables that influenced work ability. For this, the result of the final score of the dependent variable WAI was transformed into a dichotomous variable (great WAI ≥37 points and poor WAI ≤36 points). A multivariate model was created, which provides the prevalence ratio (PR) of the variables accompanied by a 95% confidence interval (95% CI). The forward stepwise method was used as input of variables, so the final regression model reached statistical significance (5%) and promoted a better fit of the model.
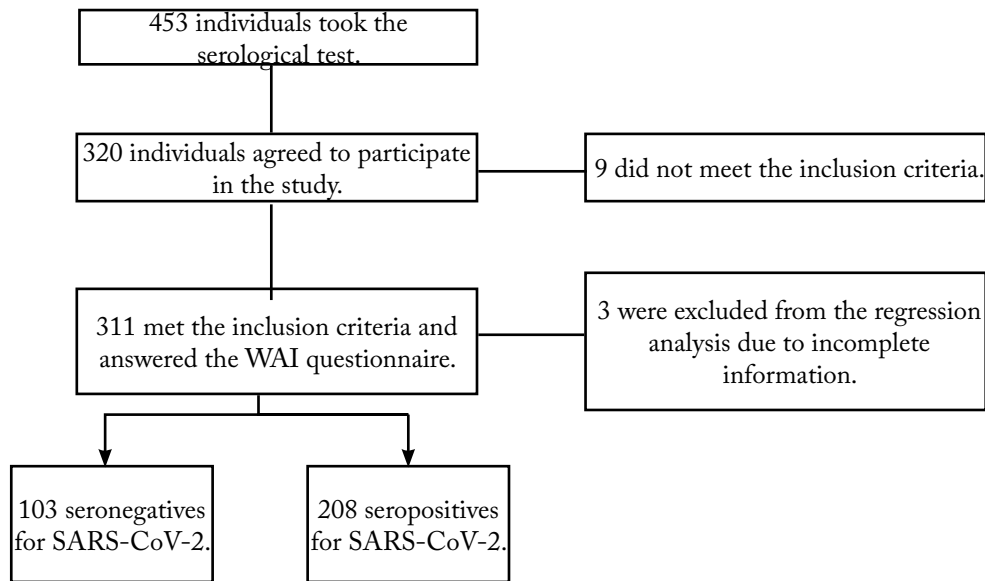
FINDINGS

Figure 1. Sample flowchart

Overall, 453 people were invited to participate in this research, 311 of whom were included and answered the WAI questionnaire. Figure 1 details the flowchart of the study sample.

Overall, 13 questionnaires were filled out incompletely by the evaluators, resulting in loss of information on the variables: sex and age, (n=13; 4.2%); marital status (n=14; 4.6%); education (n=16; 5.2%) and family income (n= 22; 7.1%).

Table 1 shows the characteristics of the participants, according to the serological result for SARS-CoV-2, Overall, the groups presented similar characteristics. However, ability to work was worse in the seropositive group, having a slightly poorer final score (40 [36-44] *vs.* 43 [38-45]; p=0.008) and a higher proportion of individuals in the poor/moderate work ability when compared to the seronegative group (23.6% *vs.* 16.5; p=0.015).

Table 1. Specimen characteristics according to SARS-CoV-2 serology result

Characteristic	SARS-CoV-2.Seronegative	SARS-CoV-2 Seropositive	Total	p
Sex				0.941
Male (N/%)	33 / 36.3	76 / 36.7	109 / 36.6	
Female (N/%)	58 / 63.7	131 / 63.3	189 / 63.4	
Age (N/%)				0.625
18-39 (years)	39 / 42.9	101 / 48.8	140 / 47.0	
40-59 (years)	45 / 49.5	93 / 44.9	138 / 46.3	
60 or + (years)	7 / 7.7	13 / 6.3	20 / 6.7	
Mean (SD) (years)	43 (12.4)	42 (12.7)		
Marital status				0.694
With partner (N/%)	42 / 46.2	90 / 43.7	132 / 44.4	
Without partner (N/%)	49 / 53.8	116 / 56.3	165 / 55.6	
Education (years of study)				0.481
Up to 12 years (N/%)	7 / 7.7	21 / 10.3	28 / 9.5	
13 or + years (N/%)	84 / 92.3	183 / 89.7	267 / 90.5	
Family income (minimum wage)				0.373
Up to 3 (N/%)	23 / 26.1	63 / 31.3	86 / 29.8	
4 or +(N/%)	65 / 73.9	138 / 68.7	203 / 70.2	
Current injuries and diseases				0.211
None (N/%)	21 / 20.4	29 / 13.9	50 / 16.1	
1-2 (N/%)	38 / 36.9	95 / 45.7	133 / 42.8	
3 or + (N/%)	44 / 42.7	84 / 40.4	128 / 41.2	
WAI (final score)				**0.008**
Median [25%-75%]	43 [38-45]	40 [36-44]		
WAI Classification				**0.015**
Poor/Moderate (N/%)	17 / 16.5	49 / 23.6	66 / 21.2	
Good (N/%)	44 / 42.7	107 / 51.4	151 / 48.6	
Excellent (N/%)	42 / 40.8	52 / 25	94 / 30.2	

SD: standard deviation; WAI: Work Ability Index.

Comparisons carried out using the Mann-Whitney test or Chi-squared test.

Table 2 describes the characteristics of the participants according to great or low WAI. There is a higher prevalence of females in the group with low work ability (p=0.006). Individuals in the group with low WAI reported three or more current lesions/diseases (p<0,001). The other characteristics were similar between the groups.

Table 2. Characteristics of the sample according to the Work Ability Index

Characteristic	Excellent WAI	Poor WAI	Total	p
Sex				**0.006**
Male (N/%)	95 / 40.6	14 / 21.9	109 / 36.6	
Female (N/%)	139 / 59.4	50 / 78.1	189 / 63.4	
Age (N/%)				0.462
18-39 (years)	114 / 48.7	26 / 40.6	140 / 47	
40-59 (years)	104 / 44.4	34 / 53.1	138 / 46.3	
60 or + (years)	16 / 6.8	4 / 6.3	20 / 6.7	
Mean (SD) (years)	42.3 (12.6)	42.4 (12.5)		
BMI (kg/m²)				0.879
Mean (SD)	25 (3.8)	25.4 (5.1)		
Marital status				0.488
With partner (N/%)	106 / 45.5	26 / 40.6	132 / 4.4	
Without partner (N/%)	127 / 54.5	38 / 59.4	165 / 55.6	
Education (years of study)				0.621
Up to 12 years (N/%)	21 / 9.1	7 / 11.1	28 / 9.5	
13 or + years (N/%)	211 / 90.9	56 / 88.9	267 / 90.5	
Family income (minimum wage)				0.816
Up to 3 (N/%)	68 / 30.1	18 / 28.6	86 / 29.8	
4 or + (N/%)	158 / 69.9	45 / 71.4	203 / 70.2	

(continues)

Table 2. Continuation

Characteristic	Excellent WAI	Poor WAI	Total	p
Current injuries and diseases				
None (N/%)	50 / 20.4	0 / 0.0	50 / 16.1	
1-2 (N/%)	118 / 48.2	15 / 22.7	133 / 42.8	**0.000**
3 or + (N/%)	77 / 31.4	51 / 77.3	128 / 41.2	
Serology for SARS-CoV-2				
Seronegative (N/%)	86 / 35.1	17 / 25.8	103 / 33.1	0.152
Seropositive (N/%)	159 / 64.9	49 / 74.2	208 / 66.9	

SD: standard deviation; BMI: Body Mass Index; WAI: Work Ability Index.

Comparisons carried out using the Mann-Whitney test or Chi-squared test.

Poisson regression was used to investigate factors associated with poor WAI in the SARS-CoV-2 seropositive group. Due to the lack of information on sex and age, 13 participants were excluded from the regression analysis, totaling 298 individuals in this analysis. The presence of three or more current lesions/diseases (PR=3.23; p<0.0001) and being female (PR=3.28; p=0.014) were the variables that have been shown to determine a less work ability for the seropositive group (Table 3). The history of COVID-19 was not a determining factor for the decrease in work ability, but it contributed to the strengthening of the model.

Table 3. Factors associated with low work ability in participants seropositive for SARS-CoV-2 (Poisson regression)

Variables	RP	95% CI	p
Current injuries and diseases			
≥3 injuries or diseases	3.23	(1.599-6.543)	**0.000**
≥3 injuries or diseases	1		
Sex			
Female	3.28	(1.273-8.467)	**0.014**
Male	1		
Serology for SARS-CoV-2			
Seropositive	1,868.	(0.901-3.876)	0.093
Seronegative	1		

PR: prevalence ratio. CI: confidence interval.

DISCUSSION

This research investigated the work ability of individuals affected and not affected by mild COVID-19. The results suggest the group of individuals affected by the disease has worse work ability compared to the group that has never had the disease.

The prevalence of poor WAI in the seropositive group was 23.6% in this study, which was higher than in the SARS-CoV-2 seronegative group. Also, such prevalence was higher than in groups from other studies, such as those conducted with nursing professionals from the primary health care network (17.9%)[16] and industrial workers (18%)[17], all without history of contact with the virus. Nevertheless, other studies conducted with individuals without COVID-19 history who worked in a public emergency hospital[18] and health professionals who worked specifically in a COVID-19 care hospital[19] demonstrated a higher prevalence of poor work ability (40.8% and 44.2%, respectively) compared to this study. Thus, we perceive contradictory results regarding work ability, reinforcing the multifactorial character of this outcome.

Although this study indicated that individuals with a history of mild COVID-19 had poorer work ability, the disease was not determinant for this outcome after adjusting for sex and number of diseases. Thus, it is not possible to affirm that, in isolation, the disease has negatively influenced work ability.

The relationship between current diseases and the decrease in work ability in this study differs from studies such as the one conducted with nurses[16] and with industrial workers[17], which found no association between these factors. On the other hand, it aligns with a study conducted in the Amazon, with nursers[18], which found a relationship between three or more diseases and decreased work ability. Note that the lack of information on whether lesions/diseases are preexisting or acquired after COVID-19 does not enable us to identify whether they are possible sequelae of the disease.

Seropositive women for SARS-CoV-2 were 3.23 times more likely to have a poor work ability compared to men in this study. This result converges with other studies that also identified a higher proportion of women with poor work ability and that suggest household chores, lower

wages and poorer working conditions compared to men as possible factors for this difference[16,19,20].

This study has limitations. First, the sample consisted of individuals from different classes of workers, who had different work demands and could make the group heterogeneous. Convenience sampling yielded uneven number of participants in each group, although this does not necessarily bias the interpretation of the results, since both groups have a considerable sample size. Moreover, this study used a single instrument, which is subjective and self-reported, to assess work ability, but WAI still has satisfactory measurement properties. Finally, as this is a cross-sectional study, no information was collected prior to COVID-19 on work ability and injuries/diseases that the participant already had. Even so, the findings can guide the approach to the health of people who had mild COVID-19 and will return to their work activities.

CONCLUSION

Individuals with a history of mild COVID-19 had lower work ability than those who had never had the disease. Even so, COVID-19 was not a determining factor for poor work ability. The presence of three or more concomitant injuries/diseases and female sex influenced the poorer work ability in individuals previously affected by mild COVID-19. Future studies with individuals who had moderate/severe COVID-19 are needed to expand knowledge about the influence of the disease on work ability according to the severity of the pathology and, thus, contribute to the early health monitoring of workers who have limitations, when necessary.

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