

Unexpected impact of COVID-19 lockdown on spinal mobility and health perception in spondyloarthritis

Physical therapy (PT) forms the cornerstone of non-pharmacological treatment in axial spondyloarthritis (SpA).¹ The effect of temporary cessation of PT on SpA outcomes is unknown. Therefore, we evaluated the impact of a lockdown during the COVID-19 pandemic on physical activity patterns, spinal mobility and health perception in SpA.

Patients of the BeGIANT cohort, a Belgian multicentre prospective observational registry of newly diagnosed patients with SpA, completed an online questionnaire during the first lockdown in Belgium (March/April 2020), followed by a standardised clinical examination immediately thereafter. The online questionnaire (online supplemental file 1), developed jointly with patient advocacy groups, assessed changes in PT, exercise and sport regimens. We also probed the impact of a lockdown on health perception, including completion of the 36-Item Short Form Survey (SF-36) Questionnaire, Bath Ankylosing Spondylitis Disease Activity Index and Bath Ankylosing Spondylitis Functional Index. Patients from this lockdown cohort were clinically assessed by measuring Bath Ankylosing Spondylitis Metrology Index (BASMI) and chest expansion immediately after the lockdown (May 2020). Data were compared with the last available measurements as part of the standardised follow-up.

The online questionnaire was completed by 185 patients during the third week of the lockdown, of whom 65 patients (35 men, (mean±SD) age 40.8±11.6 years, symptom duration of 10.5±8.0 years) visited our outpatient clinic immediately post-lockdown. All 65 patients had stable disease and therapy prior to the lockdown. Among 33 (51%) patients following PT, 30 discontinued due to inaccessibility as a consequence of the lockdown.

Overall, no significant differences in spinal mobility measures were observed before and after lockdown. However, chest expansion was markedly lower immediately after the lockdown (before:

5.9±0.33 cm; after: 4.3±0.26 cm, $p\leq 0.0001$, figure 1A), and not limited to patients who temporarily ceased PT (online supplemental table 1). Intriguingly, chest expansion was significantly related ($p=0.270$, $p=0.037$) to 'the role of limitations due to emotional problems' subscale of the SF-36. All BASMI outcomes stayed stable over time whereas chest expansion in the lockdown cohort normalised to pre-lockdown values on the next regular clinical visit after the lockdown (pre: 5.9±0.33 cm; post: 6.1±0.34 cm, $p=1.0$). To determine the clinical relevance of our findings, we used long-term follow-up data from 202 other BeGIANT patients (online supplemental table 2), during a similar time frame before the COVID-19 pandemic. As shown in figure 1B, chest expansion remains remarkably stable over time, underscoring the unusual nature of the observed reduction in chest expansion coinciding with a COVID-19 lockdown. As for the patient's general health perception during the lockdown, one-third reported this to be worse, while two-thirds reported no difference. Importantly, none of the patients displayed COVID-19 suggestive symptoms nor a positive test result during the evaluated period. Because all clinical assessments from the lockdown onwards were performed in patients wearing a mask, changes in chest expansion were not influenced by wearing a mask.

While it was anticipated that temporary cessation of PT due to the lockdown would strongly impact the overall mobility of patients with SpA, this could not be demonstrated in our study. Likely explanations include a relatively short interruption of PT and the finding that most patients remained equally active by performing exercises and/or sports at home. A striking observation was the reduced chest expansion, independently from prior PT, normalising again after the lockdown. Although this observation was significantly associated with emotional distress, the study design did not enable to demonstrate a causal relationship. However, it is documented that emotional/psychological stress can influence the pulmonary function or evoke difficulties with breathing.²⁻⁴ Psychological distress during the COVID-19 pandemic was recently demonstrated in patients with rheumatic disease, yet the impact on mobility remains unclear.^{5,6} Thus, chest expansion might be vulnerable

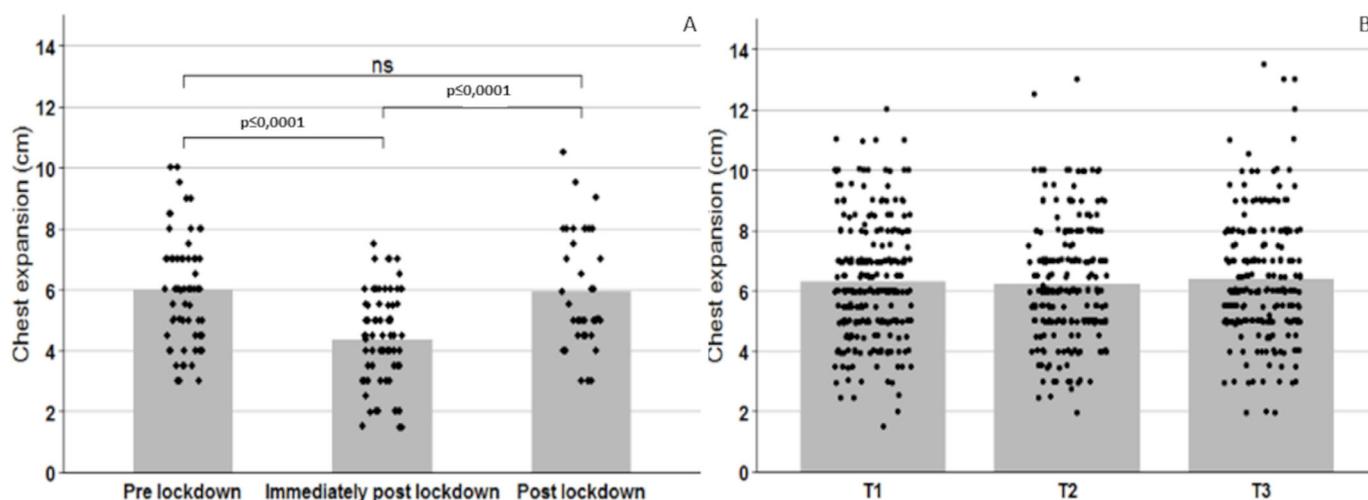


Figure 1 (A) Chest expansion in 65 patients with SpA was measured pre-lockdown (left panel), immediately after lockdown (middle panel) and 6 months after the pre-lockdown measurement (right panel). Significance ($\alpha=0.05$) was determined using an ANOVA test for repeated measures. The grey boxes represent the mean, $***=p\leq 0.0001$. (B) Standardised prospective follow-up of chest expansion in a nationwide cohort of patients with SpA (BeGIANT) over a period of 2 years, under stable established pharmacological therapy ($n=202$). Significance ($\alpha=0.05$) was determined using an ANOVA test for repeated measures. Chest expansion at follow-up at month 12 (T1) at month 18 (T2) and at month 24 (T3). The grey boxes represent the mean. ANOVA, analysis of variance; ns, not significant; SpA, spondyloarthritis.

to emotional distress and should be interpreted with caution under such conditions.

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Supplemental material

Table 1: Clinical examination pre and post lockdown in relation to physical therapy

	group 1: physiotherapy before and stop during lockdown (n=30)						
	pre lockdown		post lockdown		difference		p
	mean	SD	mean	SD	mean	SD	
BASMI							
Tragus-to-wall (cm)	11,2 ± 1,29		11,2 ± 0,84		0,0 ± 1,46		0,919
Modified Shöber (cm)	14,2 ± 0,87		14,5 ± 1,02		0,4 ± 0,98		0,035
Cervical rotation left (°)	80,0 ± 8,75		80,1 ± 12,65		0,1 ± 12,57		0,956
Cervical rotation right (°)	79,5 ± 10,50		79,7 ± 13,56		0,2 ± 14,00		0,94
Lumbar flexion left (cm)	18,0 ± 4,08		17,8 ± 4,24		-0,1 ± 3,25		0,811
Lumbar flexion right (cm)	17,8 ± 3,71		17,8 ± 4,14		0,0 ± 3,21		0,952
Intermalleolar distance (cm)	116,8 ± 16,82		112,2 ± 15,76		-4,6 ± 12,00		0,058
Chest expansion (cm)	6,4 ± 1,73		4,6 ± 1,38		-1,8 ± 1,95		≤0,0001
	group 2: no physiotherapy before lockdown (n=32)						
	pre lockdown		post lockdown		difference		p
	mean	SD	mean	SD	mean	SD	
BASMI							
Tragus-to-wall (cm)	11,2 ± 1,08		11,8 ± 1,23		0,7 ± 1,17		0,004
Modified Shöber (cm)	13,8 ± 1,05		14,2 ± 1,09		0,3 ± 1,01		0,061
Cervical rotation left (°)	78,6 ± 12,12		78,3 ± 13,02		-0,3 ± 10,77		0,895
Cervical rotation right (°)	78,4 ± 12,74		74,5 ± 19,61		-3,9 ± 21,28		0,315
Lumbar flexion left (cm)	17,7 ± 5,28		17,8 ± 5,79		0,1 ± 2,54		0,89
Lumbar flexion right (cm)	18,5 ± 4,49		20,3 ± 18,09		1,9 ± 16,74		0,533
Intermalleolar distance (cm)	114,0 ± 14,83		105,6 ± 31,16		-8,4 ± 28,55		0,12
Chest expansion (cm)	5,6 ± 1,82		4,2 ± 1,69		-1,4 ± 1,64		≤0,0001

BASMI and Chest Expansion values before and immediately after lockdown. The group was split based whether or not they had physical therapy before the lockdown. Paired T-tests were used for comparison and with Bonferroni correction the level of significance was $\alpha=0.006$.

In group 2, the Tragus-to Wall measurement displayed a small yet significant difference pre and post lockdown but for the overall analysis, we focused on the combined significant findings in both group 1 and 2.

Table 2: Patient demographics in the lockdown SpA cohort and the BeGiant control group

	BeGiant cohort (n=202)	Lockdown SpA cohort (n=65)	p
Age, years, mean \pm SD	39,8 \pm 11,42	39,7 \pm 11,78	0,958
Gender (M/F)	106/96	37/28	
Body weight, kg, mean \pm SD	75,1 \pm 14,62	73,0 \pm 13,26	0,317
Body height, cm, mean \pm SD	173,0 \pm 9,15	174,6 \pm 8,88	0,256
BMI, kg/m ² , mean \pm SD	25,1 \pm 4,41	23,8 \pm 3,46	0,044
Disease duration, years, mean \pm SD	6,2 \pm 5,26	6,1 \pm 6,13	0,865
Symptom duration, years, mean \pm SD	9,5 \pm 8,24	10,7 \pm 9,39	0,31
CRP, mg/L, , mean \pm SD	3,4 \pm 3,96	3,1 \pm 3,72	0,712
ESR, mm/h, , mean \pm SD	8,6 \pm 8,06	8,5 \pm 7,03	0,982
Tender/swollen joint count (%)	18,9 / 4,5	19,6 / 1,50	
Current NSAID use index (%)	22,3 \pm 36,4	36,7 \pm 47,08	
Current DMARD's use (%)	15,3	6,1	
Current biologicals use (%)	34,7	40	
BASMI total	2,1 \pm 0,88	1,9 \pm 0,85	0,063
BASDAI total	3,3 \pm 2,25	3,1 \pm 1,95	0,543
BASFI total	2,1 \pm 2,00	1,9 \pm 1,83	0,41
ASDAS total	1,9 \pm 0,92	2,0 \pm 0,73	0,832

N=number of patients, SD= standard deviation, M= male, F= Female, BMI= body mass index, CRP= C-reactive protein, ESR= erythrocyte sedimentation rate

The online questionnaire : INFLUENCE OF COVID-19 LOCKDOWN ON PHYSICAL CONDITION.**1. Questions regarding physical therapy and exercise therapy**

Before lockdown I received physical therapy yes / no

I received therapy regularly / irregularly, based on existing complaints

Treatment frequency

- 1x/month
- 2x/month
- 1x/week
- 2x/week
- 3x/week
- 5x/week

Which type of therapy did you receive ?
(multiple answers possible)

- massage therapy
- electrotherapy
- mobilization/ manipulation
- exercise therapy
- other :

Before lockdown I exercised at home yes / no

I exercised regularly / irregularly

Frequency of exercises

- 1x/month
- 2x/month
- 1x/week
- 2x/week
- 3x/week
- 5x/week

I used an exercise program

- composed by myself
- composed by my physical therapist
- from an online platform

During lockdown

- I still visit my physical therapist
- I can't visit my physical therapist anymore
- I receive digital guidance from my PT
- not applicable

Since/...../.....

During lockdown

- I exercise at home by myself, like before
- I now exercise at home by myself
- I don't exercise

During lockdown, I use an exercise program

- composed by myself
- composed by my physical therapist
- from an online platform

2. Questions regarding sports activities

Before lockdown I performed sports activities yes / no

I performed my sports
(multiple answers possible)

- alone
- with friends
- in a sportsclub
- with a patient group

Which sport(s) did you practice ?

.....
.....
.....

Minutes per practice
Times/month

.....
.....

During lockdown

- I can still practice my sport
- I can't practice my sport anymore, but I
perform a different sports activity
- I don't practice sports (anymore)
- I started practicing sports

During lockdown, I now

- walk
- run
- bike
- other:

Minutes per practice
Times/month

.....
.....

I use an activity monitor or a pedometer yes / no

Are you willing to share the data from your activity monitor or pedometer ? yes / no

3. Work related questions

Before lockdown I performed a paid job yes / no

My job consisted

- mainly out of manual labor (> 60%)
- mainly out of mental work (>60%)
- a combination of manual and mental work

I worked

- full-time
- part-time because of my rheumatic disease
- part-time because of other health condition
- part-time because of other reasons

My job situation was

- officer
- worker
- clerk
- self employed

- independent professionals
- other:

During lockdown

- I can keep working as usual
- I can work from home now
- I can't work anymore
- not applicable

Now that I working at home

- I stand more than usual
- I sit more than usual
- I move around more than usual

Working at home

- I can do this as ergonomical as at the office
(e.g. office chair and desk)
- I can do this less ergonomical than at the
office (e.g. kitchen chair and table)

4. Questions regarding medication use

During the lockdown, I changed my medication use

- yes, because of the COVID-19 pandemic
- yes, but not linked to the COVID-19
pandemic
- not applicable

During lockdown my use of NSAID's was

- unchanged
- increased
- diminished
- stopped
- not applicable

The NSAID's I take are

- aceclofenac
- celecoxib
- diclofenac
- etoricoxib
- ibuprofen
- indomethacine
- meloxicam
- nabumeton
- naproxen
- piroxicam
- proglumethacine
- tenoxicam
- other:

NSAID dosis

- <1day/week
- 1-3days/week
- 3-5days/week
- >5days/week
- daily

Average daily dosis mg
Start date/...../.....
Stop date/...../.....
During the lockdown my use of analgetics was	<input type="checkbox"/> unchanged <input type="checkbox"/> increased <input type="checkbox"/> diminished <input type="checkbox"/> stopped <input type="checkbox"/> not applicable
The analgetics I take are	<input type="checkbox"/> paracetamol <input type="checkbox"/> tramadol <input type="checkbox"/> other:
analgetics dosis	<input type="checkbox"/> <1day/week <input type="checkbox"/> 1-3days/week <input type="checkbox"/> 3-5days/week <input type="checkbox"/> >5days/week <input type="checkbox"/> daily
Average daily dosis mg
Start date/...../.....
Stop date/...../.....
During the lockdown my use of corticoids was	<input type="checkbox"/> unchanged <input type="checkbox"/> increased <input type="checkbox"/> diminished <input type="checkbox"/> stopped <input type="checkbox"/> not applicable
The glucocorticoids I take are	<input type="checkbox"/> methylprednisolone <input type="checkbox"/> prednisolone <input type="checkbox"/> other:
The glucocorticoids dosis	<input type="checkbox"/> <1day/week <input type="checkbox"/> 1-3days/week <input type="checkbox"/> 3-5days/week <input type="checkbox"/> >5days/week <input type="checkbox"/> daily
Average daily dosis mg
Start date/...../.....
Stop date/...../.....
During lockdown my use of DMARD's was	<input type="checkbox"/> unchanged <input type="checkbox"/> increased <input type="checkbox"/> diminished <input type="checkbox"/> stopped <input type="checkbox"/> not applicable

- The DMARD's I take are
- leflunomide
 - methotrexate
 - sulfasalazine
 - other:
- DMARD's dosis
- <1day/week
 - 1-3days/week
 - 3-5days/week
 - >5days/week
 - daily
- daily or weekly dosis
- mg/day or mg/week
- During the lockdown my use of biologicals was
- unchanged
 - increased
 - diminished
 - stopped
 - not applicable
- The biologicals I take are
- adalimumab
 - certolizumab-pegol
 - etanercept
 - golimumab
 - infliximab
 - secukinumab
 - other:

5. Questions regarding your health perception

How would you describe your current general health compared to before lockdown ?

- much better now
- a little better now
- about the same
- a little worse now
- much worse now

How would you describe your current morning stiffness compared to before lockdown ?

- much better now
- a little better now
- about the same
- a little worse now
- much worse now

How would you describe your current joint stiffness and stiffness in the back now compared to before lockdown ?

- much better now
- a little better now
- about the same
- a little worse now
- much worse now

How would you describe the hand-floor distance when you bend over with straight legs ?

- much better now
- a little better now
- about the same
- a little worse now
- much worse now

How would you describe your current muscle strength compared to before lockdown ?

- much better now
- a little better now
- about the same
- a little worse now
- much worse now

How would you describe your current general physical fitness compared to before lockdown ?

- much better now
- a little better now
- about the same
- a little worse now
- much worse now

6. Questions regarding perceiving covid-19 symptoms

Do you suspect you had COVID-19 infection symptoms during lockdown ? yes / no

Which symptoms did you experience ?

- fever
- shortness of breath
- dry cough
- pain in chest area
- muscle pain
- other:

Are you willing to visit the hospital after the lockdown for a short visit to evaluate the mobility of your joints and spine ? yes / no