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ORIGINAL RESEARCH

Caesarean section in women with axial spondyloarthritis and psoriatic arthritis: a population-based study

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ABSTRACT

Background There is sparse documentation on pregnancy outcomes in women with axial spondyloarthritis (axSpA) and psoriatic arthritis (PsA). Data on disease activity are often lacking, preventing the direct investigation of the effect of inflammation on pregnancy outcomes. A caesarean section (CS) implies a higher risk for complications than vaginal delivery. It delays mobilisation after birth necessary to counteract inflammatory pain and stiffness.

Objective To explore a possible association of inflammatory active disease and CS rates in women with axSpA and PsA.

Methods Data from the Medical Birth Registry of Norway (MBRN) were linked with data from RevNatus, a Norwegian nationwide observational register recruiting women with inflammatory rheumatic diseases. Singleton births in women with axSpA (n=312) and PsA (n=121) included in RevNatus 2010–2019 were cases. Singleton births, excluding mothers with rheumatic inflammatory diseases, registered in MBRN during the same period time (n=575 798) served as population controls.

Results CS occurred more frequently in both axSpA (22.4%) and PsA (30.6%) groups compared with population controls (15.6%), with even higher frequencies in inflammatory active axSpA (23.7%) and PsA (33.3%) groups. Compared with population controls, women with axSpA had higher risk for elective CS (risk difference 4.4%, 95% CI 1.5% to 8.2%) but not emergency CS. Women with PsA had higher risk for emergency CS (risk difference 10.6%, 95% CI 4.4% to 18.7%) but not elective CS.

Conclusion Women with axSpA had higher risk for elective and women with PsA for emergency CS. Active disease amplified this risk.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ There appears to be an increased risk for caesarean section in women with axial spondyloarthritis (axSpA) and psoriatic arthritis (PsA) compared with the general population.

⇒ Limited data on disease activity during pregnancy warrant further research.

WHAT THIS STUDY ADDS

⇒ Information on the risk for elective and emergency caesarean section in active axSpA and active PsA compared with population controls.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Findings of active disease as a risk for caesarean section may contribute to enhanced pregestational counselling and disease control and tighter monitoring during pregnancy.

INTRODUCTION

The rate of caesarean section (CS) is increasing worldwide. A recent trend analysis concluded with a worldwide rate of 21.1%, covering 94.5% of all births.[1] Norway has had a relatively stable low CS rate compared with other high-income countries, around 16% during 2005–2016.[2]

Axial spondyloarthritis (axSpA) and psoriatic arthritis (PsA) are rheumatic inflammatory diseases classified as spondyloarthropaties.[3] This group of disorders is characterised by axial and or peripheral arthritis, enthesitis, dactylitis and potential extra-articular manifestations such as uveitis, skin rash and inflammatory bowel disease. Both axSpA and PsA typically have their onset during childbearing years. Recent studies from European countries report CS to be more frequent in women with inflammatory joint diseases in general,[4 5] and more specifically in axSpA[6–9] and PsA,[8 10–12] compared with the general population. In women with spondyloarthropaties, early mobilisation after birth is important to counteract inflammatory pain and stiffness. Often, there is a prompt need to introduce or restart immunosuppressive disease modifying medication. In cases with infection after CS, this may be delayed by several weeks.

CS implies higher risks for maternal complications compared with vaginal delivery and should only be performed when medically

indicated.[1] The reasons for considering CS may be complex, including the presence of underlying maternal risk factors for pregnancy complications, earlier obstetric history, psychosocial factors and obstetric practice.[2]

To our knowledge, only one previous European study reported data on associations between disease activity in spondyloarthropaties during pregnancy and CS rates.[7] The main objective of this study was to explore a possible association of inflammatory active disease and the occurrence of elective and emergency CS in women with axSpA and PsA.

PATIENTS AND METHODS

Study population

In this population-based cohort, we linked data from the Medical Birth Registry of Norway (MBRN) with data from RevNatus. MBRN is a mandatory national health registry. It includes information about maternal health before and during pregnancy as well as maternal and neonatal complications during pregnancy and birth. Since December 1998,[13] maternal inflammatory rheumatic diseases have been coded according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). It takes approximately 2 years before registered data are available for research purposes.

RevNatus is a Norwegian nationwide medical quality register designed for prospective follow-up of women with inflammatory rheumatic diseases from the time of planning a pregnancy until 1-year post partum. The register provides data on demographic variables, disease activity, medication, laboratory status, pregnancy outcome, self-reported health status and lactation. Data are recorded preconception, in every trimester of the pregnancy and 6 weeks, 6 and 12 months after delivery. The register is operated by The Norwegian National Advisory Unit on Pregnancy and Rheumatic Diseases (NKSR). All patients above 16 years of age with a rheumatic diagnosis planning pregnancy are eligible for inclusion in RevNatus. They are included and followed at their local rheumatology department.

In the present study, 576 231 singleton births recorded in MBRN 2010–2019 were eligible for inclusion.

Variables

Maternal variables such as age, parity, smoking, body mass index (BMI), diabetes, assisted reproductive technology (ART), previous CS and mode of delivery in the current pregnancy were derived from MBRN. Educational status, disease-specific information including disease activity and medication as well as health-related quality of life (HRQoL) variables for the patient groups were retrieved from RevNatus.

Assessment of disease activity

In axSpA, disease activity was assessed using the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI). The BASDAI is calculated from six patient-reported items: fatigue, back pain, peripheral joint pain and swelling, localised tenderness, duration and severity of morning stiffness. Items are scored by a numerical response scale (0–10) to give a final score between 0 and 10 (highest disease activity). A cut-off of 4 is commonly used to define active disease.[14] We defined inactive axSpA as BASDAI <4 and active axSpA as BASDAI ≥4.

In PsA, disease activity was assessed using Disease Activity Score 28 with CRP (DAS28-CRP-3). This is a composite score consisting of the number of tender and swollen joints among 28 joints and CRP.[15] The European alliance of associations for rheumatology (EULAR) has defined four disease categories in the DAS28-CRP-3 score ranging from 0 to 10: remission (DAS28<2.6), low disease activity (DAS 28≥2.6 but ≤3.2), moderate disease activity (DAS 28 >3.2 but ≤5.1) and high disease activity (DAS28 >5.1).[16] CRP is measured by the local method of choice. CRP values <5 mg/L are considered within reference area. We defined inactive PsA as DAS28-CRP-3 <2.6 and active PsA as DAS28-CRP-3 ≥2.6.

Health-related quality of life

RAND-36[17] is a composite measure of different aspects of HRQoL. RAND-12[18] uses a subset of 12 items from RAND-36. Both questionnaires cover eight domains, scored 0–100, a higher score indicating a better HRQoL. A change in score of ≥5 to <10 is perceived as a marginal change or difference and ≥10 a clear change or difference. In this study, we looked at five of eight domains: bodily pain, physical function, general health, mental health and vitality. RAND-36 was registered until 2016 and RAND-12 from 2017 in RevNatus, and the scorings of the above domains in either questionnaire were used.

Statistical analyses

Group comparisons were performed using independent samples t-test for continuous variables and the Pearson χ^2 test, the Fisher's exact test test or the unconditional z-pooled test[19] for dichotomous variables. We calculated 95% CIs for risk differences using Newcombes method.[20] Two-sided p<0.05 were considered to represent statistical significance, and 95% CIs are reported where relevant. The statistical analyses were performed using IBM SPSS Statistics for Windows, V.28.0.1, STATA MP V.17 and https://www4.stat.ncsu.edu/~boos/exact/

RESULTS

Patient recruitment

Singleton births among women diagnosed with either axSpA or PsA formed the patient groups. There were 319 singleton births among women with axSpA and 126 singleton births among women with PsA registered in RevNatus during 2010–2019. Seven and five of these births were not possible to link to MBRN, probably due to erroneous birthdate registered in RevNatus, leaving 312 births in the axSpA group and 121 births in the PsA group for the present study.

Table 1 Characteristics of population controls and patient groups, reported as n (%) unless specified as mean (SD)

Characteristic	Population controls	axSpA	P value*	PsA	P value*
Singleton births 2010–2019	575 798	312		121	
Maternal age (years), mean (SD)	30.6 (5.1)	31.7 (4.3)	<0.001	32.0 (4.7)	0.003
<35	460 720 (80.0)	242 (77.6)	0.31	87 (71.9)	0.034
≥35	115 077 (20.0)	70 (22.4)		34 (28.1)	
Missing	0	0		0	
Parity					
No children	244 354 (42.4)	141 (45.2)	0.35	48 (39.7)	0.60
≥1 child	331 444 (57.6)	171 (54.8)		73 (60.3)	
Missing	0	0		0	
Smoking in pregnancy	34 237 (6.7)	19 (6.3)	0.87	9 (8.0)	0.74
Missing	67 663	12		8	
BMI first trimester, mean (SD)	24.4 (4.8)	25.1 (5.0)	0.020	26.9 (5.6)	<0.001
≥25.0	138 056 (34.5)	89 (40.3)	0.09	49 (58.3)	<0.001
≥30.0	49 167 (12.3)	33 (14.9)	0.28	25 (29.8)	<0.001
Missing	176 090	91		37	
Previous CS	55 992 (9.7)	32 (10.3)	0.83	15 (12.4)	0.40
Missing	0	0		0	
Diabetes†	25 924 (4.5)	17 (5.4)	0.50	8 (6.6)	0.37
Missing	0	0		0	
ART‡	20 121 (3.5)	15 (4.8)	0.27	18 (14.9)	<0.001
Missing	0	0		0	

*P value for patient group compared with population controls.
†Pregestational or gestational.
‡Assisted reproductive technology.
ART, assisted reproductive technology; axSpA, axial spondyloarthritis; BMI, body mass index; CS, caesarean section; PsA, psoriatic arthritis.

The reference group constituted 575 798 singleton births from the general population. Births in women diagnosed with inflammatory rheumatic diseases coded according to ICD-10 were excluded from the reference group (see online supplemental table 1).

Characteristics of population controls and patient groups are shown in table 1. Women with PsA were older and more often overweight (BMI ≥25) and/or obese (BMI ≥30) compared with axSpA women and controls. ART was reported in 18/121 (14.9%) of the PsA pregnancies, compared with 20 121/575 798 (3.5%) of the population controls. Other factors known to influence the risk for CS did not differ significantly between patient groups and population controls.

Disease-related characteristics of the two patient groups are shown in table 2. The majority fulfilled either the assessment of spondyloarthritis international society (ASAS) classification criteria or the classification criteria for psoriatic arthritis (CASPAR).[3]

The patient groups were divided into inactive or active disease in the third trimester, as defined by BASDAI[14] for axSpA and DAS-28-CRP[16] for PsA. Information on disease activity in the 3rd trimester was missing in 67/312 (21.5%) axSpA-pregnancies and in 30/121 (24.8%) PsA-pregnancies. In axSpA, 131/245 (53.5 %) had inactive and 114/245 (46.5%) had active disease whereas in PsA 64/91 (70.3%) had inactive and 27/91 (29.7%) had active disease. Educational level was low among women with active PsA. Women with active disease had a shorter mean disease duration than women with inactive disease. In the active axSpA group, a smaller proportion of women used TNFi any time during pregnancy compared with women with inactive SpA, although not statistically significant. Concerning HRQoL assessment, the mean scores on mental health were high while the mean scores on vitality were particularly low for both patient groups irrespective of disease activity. The scores for the 5 selected domains in the axSpA group and for 3 of the 5 selected domains in the PsA group were more than 10 points higher in inactive compared with active disease, indicating a clinically relevant difference favouring inactive disease.

The frequencies of CS are shown in table 3. CS occurred more frequently in both axSpA (70/312, 22.4%) and PsA (37/121, 30.6%) groups compared with population controls (89840/575763, 15.6%). CS frequencies were higher in active axSpA (27/114, 23.7%) and active PsA (9/27, 33.3%) groups. The risk difference was 6.8% in

Table 2 Clinical characteristics of axSpA and PsA, and grouped according to disease activity in the third trimester, reported as n (%) unless specified as mean (SD)

Characteristic	SpA (total)	Inactive axSpA* BASDAI <4	Active axSpA* BASDAI ≥4	diff† (p value‡)	PsA (total)	Inactive PsA* DAS28 <2.6	Active PsA* DAS28 ≥2.6	diff† (p value‡)
Singleton births 2010–2019	312	131	114		121	64	27	
Educational level								
Low (<14 years)	100 (33.2)	35 (27.6)	36 (32.7)	5.1 (0.47)	50 (42.0)	22 (34.9)	19 (73.1)	38.2 (0.002)
High (≥14 years)	201 (66.8)	92 (72.4)	74 (67.3)		69 (58.0)	41 (65.1)	7 (26.9)	
Missing	11	4	4		2	1	1	
Disease criteria fulfilled‡	272 (94.4)	114 (3.4)	105 (99.1)	5.7 (0.03§)	105 (94.6)	57 (95.0)	23 (100)	5.0 (0.32§)
Missing	24	9	8		10	4	4	
Disease duration mean (SD)	5.2 (4.3)	5.8 (4.3)	4.3 (3.9)	1.5 (0.01)	6.6 (5.3)	6.9 (5.7)	5.2 (3.5)	1.7 (0.18)
Missing	58	19	21		22			
Prednisolon*	11 (3.9)	4 (3.3)	4 (3.7)	0.4 (0.87§)	9 (8.8)	6 (10.0)	3 (11.5)	1.5 (0.87§)
Missing	29	9	5		19	4	1	
Sulfasalazine*	15 (5.3)	4 (3.3)	9 (8.3)	5.0 (0.12§)	7 (6.9)	5 (8.3)	2 (7.7)	0.6 (1.0§)
Missing	29	9	5		19	4	1	
TNFi*	12 (4.3)	10 (8.3)	1 (0.9)	7.4 (0.01§)	3 (2.9)	2 (3.3)	none	3.3 (0.42§)
Missing	30	10	5		19	4	1	
TNFi pregnancy	63 (26.0)	34 (33.0)	22 (22.9)	10.1 (0.15)	27 (26.2)	15 (26.8)	6 (25.0)	1.8 (1.0)
Missing	70	28	18		19	8	3	
Bodily pain* mean (SD)	47.4 (27.5)	63.5 (23.5)	27.8 (16.9)	28.9 (<0.001)	58.0 (27.2)	62.1 (26.0)	46.8 (27.2)	15.3 (0.017)
Missing	64	10	7		32	5	2	
Physical function* mean (SD)	52.6 (28.4)	67.0 (22.9)	35.2 (24.8)	32.4 (<0.001)	62.5 (26.9)	69.0 (25.8)	45.7 (21.7)	23.3 (<0.001)
Missing	61	10	4		31	4	2	
General health* mean (SD)	51.1 (24.2)	62.5	37.4	26.0 (<0.001)	54.5 (18.6)	58.3	45.3	13.0 (0.004)
Missing	62	10	4		31	4	2	
Mental health* mean (SD)	75.1 (14.7)	81.0 (11.9)	68.0 (14.8)	11.2 (0.007)	77.1 (15.3)	78.4 (13.8)	73.0 (17.9)	5.4 (0.14)
Missing	63	11	5		33	6	2	
Vitality* mean (SD)	32.1 (21.3)	40.2 (21.7)	22.5 (16.2)	20.4 (0.005)	39.2 (22.1)	41.7 (23.0)	33.4 (17.9)	8.3 (0.11)
Missing	62	10	5		33	5	2	

*In third trimester.
†Diff = differences in proportions for dichotomous and mean difference for continuous variables.
‡P value for active compared to inactive disease.
§The unconditional z-pooled test.
axSpA, axial spondyloarthritis; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; DAS-28, Disease Activity Score 28; PsA, psoriatic arthritis.

Table 3 Caesarean section in population controls and patient groups expressed as proportions and risk differences

	Total	Caesarean section	%	Risk difference % (95% CI)	P value*
Population controls	575 763	89 840	15.6		
axSpA, total	312	70	22.4	6.8 (2.6 to 11.8)	**0.001**
Active axSpA†	114	27	23.7	8.1 (1.2 to 16.7)	**0.024**
Inactive axSpA†	131	24	18.3	2.7 (–3.0 to 10.2)	0.46
PsA, total	121	37	30.6	15.0 (7.5 to 23.7)	**<0.001**
Active PsA†	27	9	33.3	17.7 (3.0 to 36.6)	**0.028‡**
Inactive PsA†	64	20	31.3	15.7 (5.6 to 27.8)	**0.001**

p-values in bold are statistically significant values
*P value for patient group compared with population controls.
†In third trimester.
‡Fisher's exact test.
axSpA, axial spondyloarthritis; PsA, psoriatic arthritis.

the axSpA group and 15.0% in the PsA group. In the axSpA group, the risk difference was highest in women with active disease (8.1%), whereas women with inactive disease (2.7%) did not show a statistically significant risk difference compared with population controls. In the PsA group, the risk differences were similar for active (17.7%) and inactive (15.7%) disease.

Table 4 shows that elective CS occurred most frequently in the active axSpA group (15/114, 13.2%), with a risk difference of 7.6% compared with population controls. The risk for elective CS was not increased in inactive axSpA compared with population controls. Elective CS occurred more frequently in the PsA group (12/121, 9.9%) than among population controls (32114/575763, 5.6%) although not statistically significant. Emergency CS occurred most frequently in the active PsA group (7/27, 25.9%), with a risk difference of 15.9% compared with population controls. In the axSpA group, emergency CS rates (39/312, 12.5%) were comparable with population controls (57 691/575 763, 10.0%).

Among women with CS, obesity (BMI ≥30) was most prevalent in PsA women (13/37, 54.2%) with a risk difference of 35.9% (95% CI 16.9% to 53.9%) compared with population controls. ART had been performed in 7/37

Table 4 Elective and emergency caesarean section in population controls and patient groups expressed as proportions and risk differences

	Total	Elective CS	%	Risk difference (95% CI)	P value*
Population controls	575 763	32 114	5.6		
axSpA, total	312	31	9.4	4.4 (1.5 to 8.2)	**0.001**
Active axSpA†	114	15	13.2	7.6 (2.6 to 15.0)	**<0.001**
Inactive axSpA†	131	11	8.4	2.8 (–0.8 to 8.8)	0.22
PsA, total	121	12	9.9	4.3 (0.2 to 11.0)	0.060
Active PsA†	27	2	7.4	1.8 (–3.5 to 17.8)	0.66‡
Inactive PsA†	64	7	10.9	5.4 (–0.2 to 15.3)	0.091‡
	Total	**Emergency CS**	**%**	**Risk difference (95% CI)**	**P value***
Population controls	575 763	57 691	10.0		
axSpA, total	312	39	12.5	2.5 (–0.7 to 6.6)	0.17
Active axSpA†	114	12	10.5	0.5 (–3.9 to 7.5)	0.98
Inactive axSpA†	131	13	9.9	0.1 (–4.1 to 6.2)	1.0
PsA, total	121	25	20.7	10.6 (4.4 to 18.7)	**<0.001**
Active PsA†	27	7	25.9	15.9 (3.2 to 34.7)	**0.015‡**
Inactive PsA†	64	13	20.3	10.3 (2.3 to 21.7)	**0.011**

p-values in bold are statistically significant values
*P value for patient group compared with population controls.
†In third trimester.
‡Fisher's exact test.
axSpA, axial spondyloarthritis; CS, caesarean section; PsA, psoriatic arthritis.

(18.9%) of PsA women, with a risk difference of 13.7% (95% CI 4.2% to 28.9%). Previous CS was most prevalent in axSpA women (28/70, 40%), with a nonsignificant risk difference of 7.9% (95% CI −2.7% to 19.6%). Other risk factors did not occur significantly more often in the patient groups compared with population controls (see online supplemental table 2).

Concerning HRQoL among women with CS, the domain mental health had high mean scores in both patient groups irrespective of CS, indicating a perception of good mental health. In contrast, vitality had particularly low mean scores regardless of diagnosis and delivery mode. There was a marginal difference (>5 ≤10) in the domains bodily pain, physical function and general health in axSpA and in the domains bodily pain, physical function and vitality in PsA, favouring the groups without CS (see online supplemental table 2).

DISCUSSION

We found increased risk of CS in axSpA and PsA women compared with population controls, and this is in accordance with earlier studies.[6 8 10–12] We also found associations between disease activity and elective and emergency CS, and these are novel findings. Most women in the two patient cohorts had inactive disease or low to moderate disease activity in the third trimester, in line with recent studies describing disease activity in axSpA and PsA during pregnancy.[7 21–24]

In axSpA women, we found increased risk for elective, but not emergency CS. This is in line with two previous studies.[8 9] A third study found increased risk for both elective and emergency CS.[6] In this study, pre-eclampsia was more common in axSpA women with emergency CS (24% vs 8%), which may explain the increased risk for emergency CS.[6] Among women with emergency CS in our cohort, pre-eclampsia occured more frequently in the axSpA group than among population controls (15.4% vs 8.8%, data not shown). In the inactive axSpA group the prevalence of pre-eclampsia was similar (7.7% vs 8.8%), whereas it was substantially higher in the active axSpA group (25.0% vs 8.8%), supporting an influence of inflammatory active disease. Only one previous study[7] had access to data on disease activity during pregnancy in axSpA. This study found no association with active disease. Disease activity was assessed using the Ankylosing Spondylitis Disease Activity Score (ASDAS) with C-reactive protein (CRP), and active disease was defined as ASDAS CRP >2.1 (high disease activity).[14] Differences in assessments and definitions of active disease may partly explain the diverging findings.

Our findings indicate that active disease may be an important risk factor for elective CS in axSpA women. We did not find any other measured risk factors to be significantly more common compared with population controls. There were no differences in the use of medication in women with inactive and active axSpA, except a lower percentage of TNFi-use during pregnancy in women with active compared with inactive axSpA. A less aggressive treatment in these women may have led to a less optimally controlled disease. Fear of harming the fetus may be one reason to withstand from treatment during pregnancy. In the first 5–6 years of the study period, the recommendations on TNFi -use in pregnancy were stricter due to little documentation, contributing to less aggressive treatment. A womans perception of poor physical function and general health as well as high levels of bodily pain and fatigue in the third trimester may contribute to a shared decision for elective CS. A high proportion of previous CS in parous women with axSpA may also play a role.

In PsA women, we found an increased risk for emergency CS, with active disease amplifying the risk. Elective CS occurred more frequently in women with PsA than in controls, although not statistically significant. Our findings are in line with three previous studies.[10–12] One study reported a higher frequency of elective, but not emergency CS.[8] None of these studies had available data on disease activity.

Our findings indicate that active disease may be an important risk factor for emergency CS in PsA. In addition, maternal age >35 years and obesity that are general risk factors for emergency CS were more prevalent in PsA women compared with population controls. This is in accordance with earlier studies.[10–12] ART was also more common in PsA women and may together with the above factors and other possible unmeasured factors explain the increased risk.

There were no differences in the medication use in women with active and inactive PsA. The use of prednisolone and traditional disease-modifying antirheumatic drugs was low, while TNFi-use was similar across groups. As for axSpA women a fear of harming the fetus and earlier recommendations may be a reason for withstanding from treatment. Low HRLQoL may influence on the decision to perform elective or emergency CS.

One strength of the study was the linkage of RevNatus and MBRN, ensuring a population-based study. Registration of all births in MBRN gives valid information on main outcomes and pregestational risk factors in a nationwide unselected cohort, thereby diminishing selection bias. Information on disease activity and other disease-related variables during pregnancy for the patient groups from RevNatus was a major strength, giving insight to causal relationships of observed differences in population controls and disease groups.

A limitation of the study was the lack of disease activity measures validated for pregnancy in women with axSpA and PsA. BASDAI scores may be influenced by symptoms related to pregnancy and not active disease, like fatigue and back pain, potentially overestimating disease activity in pregnant women with axSPA. The ASDAS with CRP is a more objective disease activity assessment, though not validated for pregnancy. Until 2015 BASDAI was the only assessment of axSpA in RevNatus, the reason for using this instrument in the present study. Both BASDAI[21] and

ASDAS-CRP[7] have been used in previous studies assessing disease activity in pregnant women with axSpA. The disease activity may have been underestimated in PsA using DAS28-CRP, as the disease can affect distal interphalangeal joints and ankles[3] that are not among the 28 counted joints. The DAS28-CRP was originally validated for use in rheumatoid arthritis (RA).[15] It is considered the best disease activity assessment in pregnant women with RA, avoiding ESR that physiologically increases during gestation as well as patient global potentially influenced by pregnancy related symptoms.[25] The DAS28-CRP-3 was validated and commonly used in assessing peripheral PsA[26 27] until 2010, and previous studies have used the DAS28-CRP-3 assessing disease activity in pregnant women with PsA.[22 24] The disease activity index for PsA (DAPSA)[28] was introduced in 2010 and is calculated from a 66-joint count for swelling and a 68-joint count for tenderness, patient global assessment, patient pain assessment and CRP level. It has become the preferred disease activity assessment in PsA but is not validated for pregnancy. DAPSA was not introduced as a variable in RevNatus until 2016/2017 and could not be used.

Another limitation is that women with quiescent disease may not be included in RevNatus, skewing the patient population towards those with more severe disease. However, in Norway, most pregnant women with inflammatory rheumatic diseases are followed in the public specialist healthcare system and enrolled in RevNatus. We, therefore, believe the register to be representative of the population at large. A third limitation is missing information on BMI and HRQoL variables, demanding caution when interpreting the results. We did not have information on induction of labour, and this may be a residual confounder. A further limitation is the possibility of other unmeasured confounding factors.

The findings of this study may help in counselling women with spondyloarthropaties planning pregnancy. We believe they are relevant in countries with similar treatment during pregnancy and comparable obstetrical practice. Achieving inactive disease requires pregestational planning, optimalisation of medication and monitoring. We have identified risk factors that need to be addressed before pregnancy, and especially in PsA maternal age and weight demands attention. Perception of bodily pain and physical function should be discussed alongside with advice on possible lifestyle changes.

CONCLUSION

Active disease in the third trimester increased the risk for elective and emergency CS in prospectively followed women with axSpA and PsA. This finding supports the recommendations of counselling and careful planning before conception and systematic monitoring during pregnancy, targeting inactive disease.

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