

SUPPLEMENTARY MATERIAL

Remission or not remission, that's the question. Shedding light on remission and the impact of objective and subjective measures reflecting disease activity in rheumatoid arthritis

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Supplementary Table 1: Association between variables and remission among rheumatoid arthritis patients during 2019 using multivariable logistic regression.

	DAS28(4) Remission	DAS28(3) Remission	CDAI Remission	SDAI Remission	4vRemission (Normal)	4vRemission (>20 PGA)	3vRemission (Without PGA)	2vRemission (Subjective)	2vRemission (Objective)
Age (years)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.1)	1.0 (1.0, 1.0)
Female	0.9 (0.4, 1.9)	0.8 (0.4, 1.5)	1.0 (0.5, 2.0)	1.2 (0.6, 2.4)	1.1 (0.5, 2.6)	0.7 (0.3, 1.5)	0.8 (0.4, 1.4)	1.4 (0.5, 3.2)	0.9 (0.5, 1.9)
BMI (kg/m ²)	1.0 (0.9, 1.0)	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)	0.9 (0.9, 1.0)	1.0 (0.9, 1.0)	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)
Education (years)	1.0 (0.9, 1.1)	1.1 (1.0, 1.1)	0.9 (0.8, 1.0)	1.0 (0.9, 1.1)	1.0 (0.9, 1.2)	1.0 (0.9, 1.1)	1.0 (1.0, 1.1)	1.0 (0.9, 1.1)	1.1 (1.0, 1.2)
Smoker	0.8 (0.3, 1.9)	1.1 (0.4, 2.7)	0.7 (0.3, 1.8)	1.0 (0.4, 2.4)	1.0 (0.3, 3.2)	0.4 (0.1, 1.2)	0.6 (0.3, 1.3)	1.5 (0.4, 5.2)	0.9 (0.4, 2.0)
Disease Duration (years)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (0. 1.0, 1.1)	1.0 (1.0, 1.1)	1.0 (1.0, 1.1)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.1)	1.0 (1.0, 1.1)
aCCP Positive	2.5 (0.9, 7.2)	2.8 (1.0, 7.4) *	2.2 (0.8, 6.1)	2.0 (0.8, 5.4)	1.7 (0.5, 5.7)	3.5 (1.2, 10.8)	2.2 (0.9, 5.2)	1.2 (0.3, 4.1)	2.0 (0.7, 5.4)
RF Positive	0.7 (0.3, 2.1)	0.6 (0.2, 1.6)	0.7 (0.3, 1.7)	0.8 (0.3, 2.0)	0.5 (0.2, 1.5)	0.7 (0.3, 1.8)	0.6 (0.3, 1.5)	0.6 (0.2, 2.0)	1.0 (0.4, 2.5)
ESR (mm/h)	1.0 (0.9, 1.0) *	1.0 (0.9, 1.0) *	1.0 (0.9, 1.0)	0.9 (0.9, 1.0) **	1.0 (0.9, 1.0)	1.0 (0.9, 1.0)	1.0 (0.9, 1.0) **	1.0 (0.9, 1.0)	0.9 (0.9, 1.0) ***
Pain (VAS, 0–100 mm)	1.0 (1.0, 1.0) **	1.0 (1.0, 1.0)	0.9 (0.9, 1.0) ***	0.9 (0.9, 1.0) ***	0.9 (0.9, 0.9) ***	0.9 (0.9, 1.0) ***	1.0 (1.0, 1.0)	0.9 (0.9, 0.9) ***	1.0 (1.0, 1.0)
M-HAQ (0–3)	1.0 (0.3, 3.2)	0.5 (0.2, 1.5)	0.7 (0.2, 3.1)	1.0 (0.3, 4.1)	0.3 (0.0, 2.3)	0.5 (0.1, 2.4)	1.1 (0.4, 2.9)	0.2 (0.0, 1.7)	1.2 (0.4, 3.3)
Fatigue (VAS, 0–100 mm)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0) ***	1.0 (1.0, 1.0) **	1.0 (1.0, 1.0) *	1.0 (1.0, 1.0) **	1.0 (1.0, 1.0)	1.0 (1.0, 1.0) **	1.0 (1.0, 1.0)
Morning stiffness (h)	0.7 (0.5, 1.0)	0.9 (0.7, 1.2)	0.5 (0.3, 0.9) *	0.5 (0.3, 0.9) *	0.9 (0.5, 1.6)	0.6 (0.3, 1.0) *	0.8 (0.6, 1.0)	1.1 (0.6, 2.1)	0.9 (0.6, 1.1)
IGA (VAS, 0–100 mm)	0.9 (0.8, 0.9) ***	0.9 (0.9, 0.9) ***	NA	NA	0.9 (0.8, 1.0) *	0.9 (0.8, 0.9) ***	0.9 (0.9, 0.9) ***	1.0 (0.9, 1.0)	0.9 (0.9, 1.0) ***
PGA (VAS, 0–100 mm)	NA	1.0 (1.0, 1.0)	NA	NA	NA	NA	1.0 (1.0, 1.0)	NA	1.0 (1.0, 1.0)
TJC28 (0–28)	NA	NA	NA	NA	NA	NA	NA	NA	0.8 (0.8, 1.0) **
SJC28 (0–28)	NA	NA	NA	NA	NA	NA	NA	0.8 (0.4, 1.6)	NA
CRP (mg/L)	NA	NA	1.0 (0.9, 1.0)	NA	NA	NA	NA	0.9 (0.8, 1.0)	NA
Nagelkerke R Square	0.6	0.5	0.6	0.6	0.7	0.7	0.4	0.7	0.4

Abbreviations: BMI = Body Mass Index, aCCP = Anti-cyclic citrullinated peptide, RF = Rheumatoid Factor, ESR = Erythrocyte Sedimentation Rate, CRP = C-Reactive Protein, TJC28 = Tender 28-Joint Count, SJC28 = Swollen 28-Joint Count, IGA = Investigators Global Assessment, VAS = Visual Analog Scale (Measured 0–100), DAS28 = Disease Activity Score, PGA = Patient Global Assessment, MHAQ = Modified Health Assessment Questionnaire. DAS28 = Disease Activity Score, CDAI = Clinical Disease Activity Index, SDAI = Simple Disease Activity Index, NA = Not Available. *Note:* All data are collected from an ordinary outpatient clinic in southern Norway. All values represent the Exp(B) (Odds Ratio) for remission with its confidence interval of 95% in parentheses. Variables constructing the given remission-assessing methods are omitted. 4vRemission is achieved when ≤10 CRP, ≤1 TJC28, ≤1 SJC28, and ≤10 PGA. 3vRemission is achieved when ≤10 CRP, ≤1 TJC28, and ≤1 SJC28. 2vRemission (Objective) is achieved when ≤10 CRP and ≤1 SJC28. 2vRemission (Subjective) is achieved when ≤10 PGA and ≤1 TJC28. **Categorical Variables:** Sex (Female, Male), Smoking Status (Smokers, Non-Smokers), aCCP Evaluation (Positive, Negative), RF Evaluation (Positive, Negative). **Significance:** All values marked bold have significant p-value with *** <0.001, ** <0.01, and * <0.05.

Supplementary table 2: Multivariant (enter) association between PGA and the patient's variables in rheumatoid arthritis patients using linear regression reported in different disease activity subgroups (2019)

	3-variable Remission <i>N</i> = 327 (65%)			<i>DAS28(4) m-hDa</i> <i>N</i> = 105 (21%)			<i>CDAI m-hDa</i> <i>N</i> = 99 (20%)			<i>SDAI m-hDa</i> <i>N</i> = 92 (18%)		
	β	B (95% CI)	P	β	B (95% CI)	P	β	B (95% CI)	P	β	B (95% CI)	P
Demographics												
Age (years)												
Female												
BMI (kg/m ²)												
Education (years)												
Smoker												
Disease Duration (years)												
Biomarkers												
aCCP Positive												
RF Positive												
Disease Activity Variables												
ESR (mm/h)				0.2	0.2 (0, 0.4)	*				0.2	0.2 (0, 0.4)	*
CRP (mg/L)				-0.2	-0.2 (-0.4, 0)	*						
TJC28 (0–28)												
SJC28 (0–28)												
IGA (VAS, 0–100 mm)												
Patient-Reported Outcome Measures												
Pain (VAS, 0–100 mm)	0.7	0.7 (0.5, 0.8)	***	0.7	0.7 (0.5, 0.9)	***	0.7	0.7 (0.5, 0.8)	***	0.7	0.7 (0.5, 0.8)	***
MHAQ (0–3)	0.1	6.9 (0.5, 13.3)	*									
Fatigue (VAS, 0–100 mm)	0.2	0.2 (0.1, 0.3)	***	0.2	0.1 (0, 0.3)	*	0.2	0.1 (0, 0.3)	*	0.2	0.1 (0, 0.3)	*
Morning stiffness (h)												
Adjusted R Square	0.8			0.8			0.8			0.8		

Abbreviations: **3v-Remission** = 3-variable remission (≤ 1 SJC28, ≤ 1 TJC28, ≤ 10 CRP), **CDAI** = Clinical Disease Activity Index, **SDAI** = Simple Disease Activity Index, **m-hDa** = moderate-high Disease Activity, β = Standardized Coefficient Beta, **B** = Unstandardized Coefficient B, **BMI** = Body Mass Index, **aCCP** = Anti-cyclic citrullinated peptide, **RF** = Rheumatoid Factor, **ESR** = Erythrocyte Sedimentation Rate, **CRP** = C-Reactive Protein, **TJC28** = Tender 28-Joint Count, **SJC28** = Swollen 28-Joint Count, **IGA** = Investigators Global Assessment, **VAS** = Visual Analog Scale (Measured 0–100), **PGA** = Patient Global Assessment, **MHAQ** = Modified Health Assessment Questionnaire. *Note:* All data are collected from an ordinary outpatient clinic in southern Norway in 2019 using a complete dataset (N=502). **Significance:** All values marked bold have significant p-value with *** <0.001, ** <0.01, and * <0.05.

Supplementary Table 3: Comparison between excluded and included rheumatoid arthritis patients recruited for the period 2015 and 2019

	2015			2016			2017			2018			2019		
	Excluded (n = 454)	Included (n = 613)	P	Excluded (n = 354)	Included (n = 554)	P	Excluded (n = 389)	Included (n = 555)	P	Excluded (n = 335)	Included (n = 409)	P	Excluded (n = 369)	Included (n = 502)	P
Demographic															
Age (years)	63 (15) [0%]	63 (13) [0.0%]	0.75 6	65 (14) [0%]	61 (14) [0%]	<0.01	64 (14) [0%]	62.0 (13) [0.0%]	0.023	64 (15) [0%]	61 (14) [0%]	0.01	64 (14) [0%]	62 (14) [0%]	0.05 3
Female	330 (73%) [0%]	410 (67%) [0%]	0.042	260 (73%) [0%]	377 (68%) [0%]	0.083	284 (71%) [0%]	362 (65%) [0%]	0.046	233 (70%) [0%]	334 (68%) [0%]	0.673	245 (66%) [0%]	335 (68%) [0%]	0.917
BMI (kg/m ²)	25 (4.2) [6.8%]	27 (4.7) [2.0%]	<0.01	26 (5.1) [8.8%]	26 (4.4) [0.9%]	0.830	26 (5.4) [7.3%]	26.2 (4.4) [2.0%]	0.715	26 (5.4) [7.5%]	26 (4.4) [1.6%]	0.947	26 (5.2) [6.5%]	26 (4.5) [1.8%]	0.867
Education (y)	12 (3.7) [5.3%]	12 (3.4) [0.5%]	0.526	11 (3.7) [7.6%]	12 (3.6) [0.4%]	0.036	12 (3.8) [6%]	12 (3.6) [1.6%]	0.220	12 (3.8) [6.9%]	12 (3.5) [1.4%]	0.184	12 (3.8) [6.2%]	12 (3.5) [1.6%]	0.179
Current Smokers	82 (19%) [3.5%]	118 (19%) [0.5%]	0.800	65 (20%) [5.9%]	101 (18%) [0.2%]	0.643	52 (14%) [5%]	90 (16%) [1.3%]	0.268	51 (16%) [6.3%]	82 (17%) [1%]	0.805	63 (18%) [4.6%]	78 (16%) [1.0%]	0.395
Disease Duration (y)	13 (11) [0%]	12 (10) [0%]	0.1	13 (11) [0%]	12 (9.9) [0%]	0.065	13 (11) [0%]	12 (10) [0%]	0.160	12 (11) [0%]	11 (11) [0%]	0.490	13 (11) [0%]	11 (11) [0%]	0.005
Biomarkers															
aCCP	297 (70%) [6.2%]	421 (72%) [4.9%]	0.388	222 (69%) [8.8%]	393 (75%) [4.9%]	0.065	263 (72%) [8%]	380 (72%) [5%]	0.940	211 (68%) [7.5%]	356 (76%) [4.9%]	0.013	245 (70%) [5.4%]	357 (74%) [3.4%]	0.309
RF Positive	285 (66%) [4.8%]	409 (69%) [3.4%]	0.292	217 (66%) [7.6%]	374 (70%) [4.0%]	0.226	237 (65%) [8.5%]	370 (70%) [4.1%]	0.163	209 (67%) [7.5%]	311 (68%) [6.7%]	0.154	227 (66%) [6.2%]	318 (67%) [5.6%]	0.657
Disease Activity Variables															
ESR (mm/h)	15 (13) [67%]	18 (15) [8.8%]	0.045	18 (19) [57%]	15 (14) [9.2%]	0.014	15 (16) [58%]	14 (13) [15%]	0.197	20 (20) [68%]	14 (15) [18%]	0.01	19 (21) [68%]	13 (12) [21%]	<0.01
CRP (mg/L)	6.3 (11) [67%]	6.5 (11) [0%]	0.857	11 (22) [55%]	5.9 (11) [0%]	<0.01	8.7 (17) [51%]	6.2 (14) [0%]	0.051	9.4 (17) [57%]	6 (10) [0%]	0.04	8.5 (18) [58%]	5.8 (10) [0%]	0.017
TJC28 (0–28)	1.5 (3.1) [38%]	1.4 (2.9) [0%]	0.447	1.8 (3.4) [40%]	1.4 (2.9) [0%]	0.072	2.3 (4.0) [40%]	1.2 (2.6) [0%]	<0.01	1.8 (3.5) [30%]	1.3 (2.9) [0%]	0.658	1.8 (3.6) [31%]	1.4 (2.8) [0%]	0.045
SJC28 (0–28)	1.0 (2.0) [38%]	0.9 (1.8) [0%]	0.242	1.2 (2.5) [40%]	1.0 (2.3) [0%]	0.163	1.5 (3.0) [40%]	0.9 (2.3) [0%]	0.003	1.1 (2.3) [30%]	0.9 (2.1) [0%]	0.212	0.9 (2.1) [31%]	0.7 (1.9) [0%]	0.131
IGA (0–100)	9.4 (11) [37%]	10 (12) [0%]	0.381	9.6 (12) [44%]	10.1 (13) [0%]	0.625	12 (15) [45%]	9.2 (13) [0%]	0.040	9.8 (12) [41%]	11 (14) [0%]	0.448	8.0 (11) [36%]	7.8 (12) [0%]	0.908
Composite Disease Activity Scores															
DAS28(3) score	2.4 (0.8) [85%]	2.3 (0.9) [0%]	0.595	2.7 (1.1) [75%]	2.3 (0.9) [0%]	<0.01	2.9 (1.2) [75%]	2.2 (0.9) [0%]	<0.01	2.6 (1.0) [73%]	2.3 (0.9) [0%]	0.01	2.5 (1.1) [77%]	2.2 (0.9) [0%]	0.005
DAS28(4) score	2.5 (1.0) [94%]	2.5 (1.0) [0%]	0.963	2.9 (1.3) [94%]	2.4 (1.0) [0%]	0.065	2.6 (1.1) [93%]	2.4 (1.0) [0%]	0.280	2.8 (1.1) [91%]	2.4 (1.1) [0%]	0.060	2.7 (1.1) [94%]	2.4 (1.1) [0%]	0.078
CDAI	7.0 (6.4) [62%]	6.6 (6.5) [0%]	0.476	5.3 (5.2) [80%]	6.5 (6.9) [0%]	0.156	6.9 (7.3) [74%]	6.1 (6.9) [0%]	0.271	6.9 (7.2) [70%]	6.5 (6.7) [0%]	0.52	6.5 (6.7) [66%]	6.1 (6.6) [0%]	0.764
SDAI	NA	7.2 (6.8) [0%]	NA	NA	7.1 (7.3) [0%]	NA	NA	6.7 (7.5) [0%]	NA	NA	7.2 (7.0) [0%]	NA	NA	6.7 (7.0) [0%]	NA
Patient-Reported Outcome Measures															
PGA (0–100)	36 (26) [20%]	33 (26) [0%]	0.110	34 (28) [42%]	32 (25) [0%]	0.274	33 (26) [34.2%]	30 (24) [0%]	0.148	36 (27) [36%]	32 (26) [0%]	0.099	34 (26) [34%]	33 (26) [0%]	0.587
Pain (0–100)	36 (26) [22%]	33 (26) [7.2%]	0.084	36 (27) [42%]	32 (25) [7.4%]	0.032	33 (27) [37%]	32 (25) [6.8%]	0.491	39 (27) [39%]	33 (26) [8.6%]	0.01	34 (27) [36%]	33 (26) [9.4%]	0.403
MHAQ (0–3)	0.5 (0.5) [21%]	0.5 (0.5) [3.6%]	0.364	0.6 (0.6) [40%]	0.4 (0.5) [3.4%]	0.001	0.4 (0.5) [34%]	0.4 (0.5) [6.5%]	0.792	0.5 (0.5) [37%]	0.4 (0.5) [8.4%]	0.132	0.5 (0.5) [34%]	0.4 (0.5) [7.6%]	0.038
Fatigue (0–100)	40 (30) [22%]	37 (30) [4.7%]	0.143	40 (31) [42%]	36 (30) [4.2%]	0.167	40 (33) [36%]	39 (29) [6.7%]	0.387	41 (32) [38%]	38 (31) [8.2%]	0.253	40 (31) [36%]	38 (30) [9.2%]	0.265
Morning Stiffness	0.9 (1.2) [22%]	1.0 (1.3) [9.0%]	0.575	1.0 (1.4) [41%]	0.9 (1.3) [7.8%]	0.191	0.9 (1.4) [36%]	0.8 (1.1) [6.7%]	0.179	1.0 (1.2) [39%]	0.9 (1.2) [9%]	0.250	0.8 (1.2) [20%]	0.9 (1.3) [9.0%]	0.773
Treatment															
b/tsDMARDs	155 (34%) [0%]	255 (42%) [0%]	0.013	116 (33%) [0%]	247 (45%) [0%]	<0.01	139 (35%) [0%]	216 (39%) [0%]	0.208	106 (32%) [0%]	199 (41%) [0%]	0.009	154 (42%) [0%]	206 (41%) [0%]	0.836
TNFi	93 (21%) [0%]	155 (25%) [0%]	0.066	62 (18%) [0%]	153 (28%) [0%]	<0.01	83 (21%) [0%]	129 (23%) [0%]	0.382	55 (16%) [0%]	102 (21%) [0%]	0.114	86 (23%) [0%]	102 (20%) [0%]	0.290
Mono b/tsDMARDs	45 (9.9%) [0%]	40 (6.5%) [0%]	0.043	27 (7.6%) [0%]	51 (9.2%) [0%]	0.408	40 (10%) [0%]	52 (9.4%) [0%]	0.726	26 (7.8%) [0%]	61 (12%) [0%]	0.031	47 (13%) [0%]	65 (13%) [0%]	0.927
Mono TNFi	26 (5.7%) [0%]	19 (3.1%) [0%]	0.035	8 (2.3%) [0%]	30 (5.4%) [0%]	0.021	26 (6.5%) [0%]	26 (4.7%) [0%]	0.215	10 (3.0%) [0%]	31 (6.3%) [0%]	0.030	22 (6.0%) [0%]	28 (5.6%) [0%]	0.801
csDMARDs	258 (57%) [0%]	405 (66%) [0%]	0.002	192 (54%) [0%]	362 (65%) [0%]	0.001	223 (56%) [0%]	366 (66%) [0%]	0.002	198 (59%) [0%]	325 (66%) [0%]	0.034	208 (56%) [0%]	325 (65%) [0%]	0.012
Methotrexate	213 (47%) [0%]	346 (56%) [0%]	0.002	154 (44%) [0%]	302 (55%) [0%]	0.001	181 (46%) [0%]	315 (57%) [0%]	0.001	160 (48%) [0%]	275 (56%) [0%]	0.018	177 (48%) [0%]	286 (57%) [0%]	0.008
Prednisone	228 (50%) [0%]	311 (51%) [0%]	0.868	197 (56%) [0%]	265 (48%) [0%]	0.022	204 (51%) [0%]	266 (48%) [0%]	0.311	175 (52%) [0%]	226 (46%) [0%]	0.084	174 (47%) [0%]	227 (45%) [0%]	0.571
No Treatment	56 (12%) [0%]	53 (8.6%) [0%]	0.049	46 (13%) [0%]	44 (7.9%) [0%]	0.013	55 (14%) [0%]	42 (7.6%) [0%]	0.002	40 (12%) [0%]	31 (6.3%) [0%]	0.005	38 (10%) [0%]	31 (6.2%) [0%]	0.026

Note: All data are collected from an ordinary outpatient clinic in southern Norway. Categorical variables are presented as numbers and percentages (%) and continuous variables as mean with standard deviation (SD). Missing data are presented as mean in percentage [%]. χ^2 test for categorical variables and one-way ANOVA for continuous variables was used to assess the differences between included and excluded datasets for each consecutive year. **Abbreviations:** BMI = Body Mass Index, aCCP = Anti-cyclic citrullinated peptide, RF = Rheumatoid Factor, ESR = Erythrocyte Sedimentation Rate, CRP = C-Reactive Protein, TJC28 = Tender 28-Joint Count, SJC28 = Swollen 28-Joint Count, IGA = Investigators Global Assessment, VAS = Visual Analog Scale (Measured 0–100), DAS28 = Disease Activity Score with CRP, CDAI = Clinical Disease Activity Index, SDAI = Simple Disease Activity Index, PGA = Patient Global Assessment, MHAQ = Modified Health Assessment Questionnaire, b/tsDMARDs = biological and target synthetic Disease-Modifying Antirheumatic Drugs, TNF = Tumour necrosis factor, csDMARDs = conventional synthetic Disease-Modifying Antirheumatic Drugs, No Treatment = Implies patient is not receiving either b/tsDMARDs, csDMARDs or Prednisolone.