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## Variability of factors associated with grip strength in hand osteoarthritis according to sex: results from the DIGICOD cohort

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1     **Variability of factors associated with grip strength in hand osteoarthritis according to**  
2                                   **sex: results from the DIGICOD cohort**

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28    **Keywords:** hand osteoarthritis, grip strength, pain, comorbidities.

30 Decreased grip strength (GS) is a marker of comorbidities and of mortality over 60 years-old  
31 [1–3]. As it is simple and easily reproducible, GS can be used in outpatient follow-up [4].  
32 However, hand osteoarthritis (HOA), which can modulate GS and which is associated with  
33 comorbidities [5], is never considered [6]. The aims of this study were to describe GS in HOA  
34 and to determine whether decreased GS is associated with comorbidities in this population.

35 DIGICOD is a single-center prospective hospital cohort, which has included 426 patients over  
36 35 years of age with symptomatic HOA [7]. Analysis involved the baseline data. GS was the  
37 higher score of 3 repeated measures using a Jamar dynamometer.

38 Baseline grip strength of the dominant hand was compared between men and women (Student's  
39 T test) and was described by age (by 10-year age groups using Kruskal-Wallis test). 394 patients  
40 were analyzed, including 329 women (mean  $\pm$  SD of the dominant hand's grip strength of  
41  $21.6\pm 6.9$ kg) and 65 men ( $34.9\pm 9.8$ kg) with a mean age of  $66.9\pm 7.3$  years (**Table 1**). GS  
42 decreased with age ( $p<0.001$ ) and was lower in women ( $p<0.0001$ ).

43 Then, factors associated with decreased GS (general characteristics, including cumulative  
44 comorbidities and markers of pain et radiographic severity of HOA, namely the AUSCAN pain  
45 score and total KL score) were investigated using univariate and then multivariate linear  
46 regression analysis (adjustement on age, BMI and variables with  $p \leq 0.2$  in univariate analysis)  
47 and stratified by sex. Results were presented by beta coefficients and their 95% confidence  
48 intervals. In women, decreased GS was not associated with comorbidities but with pain and  
49 radiographic severity (i.e., Kellgren-Lawrence sum score) ( $p<0.05$ ). In men, decreased GS was  
50 associated with the presence of 3 comorbidities or more ( $-8.5 [-15.5 ; -1.43]$  kg *versus* a single  
51 comorbidity being OA), independently of radiographic severity (**Figure 2**). The study of each  
52 comorbidity separately did not show any association with GS.

53 We performed, for the first time in HOA, a stratified analysis of GS by sex because of an  
54 interaction between GS and sex. In women, decreased GS was associated with pain and  
55 radiographic severity. Therefore, hand pain and joint destruction due to HOA could interfere  
56 with GS interpretation and its association with comorbidities. In men, decreased GS was  
57 associated with the accumulation of comorbidities with a dose effect, independently of HOA  
58 symptoms and radiographic severity. This difference could be explained by a lesser pain score  
59 at baseline compared with women, whereas the number of comorbidities and radiographic  
60 severity was similar. A lack of power in men due to small sample size could also explain that  
61 no association was found.

62 In this cohort of symptomatic HOA, decreased GS reflects the radiographic severity of HOA in  
63 women but is not associated with comorbidities. The independent association between  
64 decreased GS and comorbidities remains only in men. Presence of symptomatic HOA should  
65 be considered for future studies investigating the relationship between GS and morbidity,  
66 especially in women.

67

68 **Ethical committee:** This study was approved by the French Ethical Committee (Comité de  
69 Protection des Personnes), reference: PARIS ILE DE FRANCE IV.

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**Table 1: Initial characteristics of the population by sex**

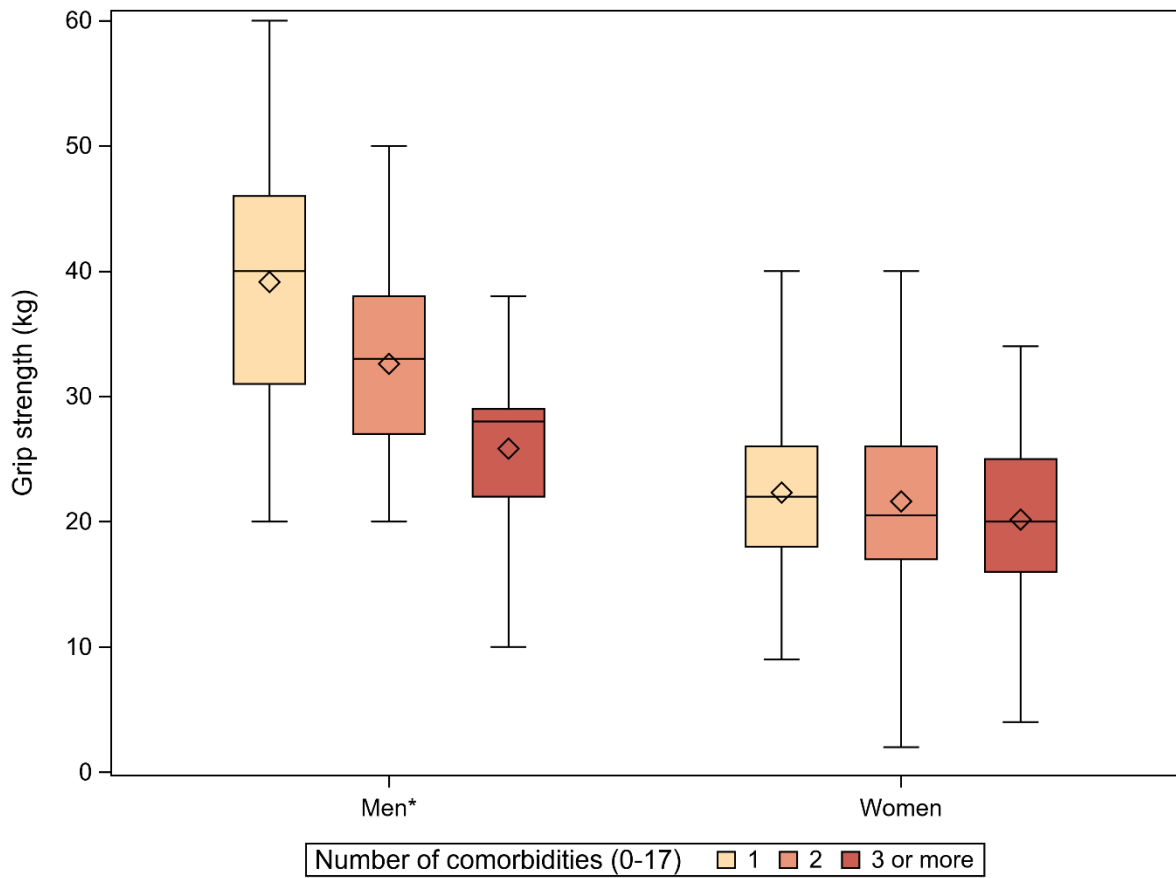
	Women (n = 329)		Men (n = 65)		P-value
	n*		n*		
<b>Age at baseline (years), m ± sd</b>	329	66.9 ± 7.1	65	66.9 ± 8.4	NS**
<b>Body Mass Index (kg/m<sup>2</sup>), m ± sd</b>	324	24.9 ± 4.4	64	26.7 ± 3.8	0.0019
<b>Socioprofessional category</b>	322		65		<.0001
1- Farmers, craftsmen, tradesmen and workers		16 (5.0)		9 (13.8)	
2 - Intermediate occupations and employees		147 (45.7)		13 (20.0)	
3 - Intellectual occupations		159 (49.4)		43 (66.2)	
<b>Current tobacco consumption</b>	325	25 (7.7)	64	2 (3.1)	NS
<b>Current alcohol consumption</b>	325	248 (76.3)	64	54 (84.4)	NS
<b>Physical Activity Index (EPIC score)</b>	314		60		
Inactive		55 (17.5)		10 (16.7)	NS
Moderately inactive		125 (39.8)		24 (40.0)	NS
Moderately active		68 (21.7)		15 (25.0)	NS
Active		66 (21.0)		11 (18.3)	NS
<b>CRP</b>	267		54		
< 5 mg/L		239 (89.5)		47 (87.0)	NS
≥ 5 mg/L		28 (10.5)		7 (13.0)	NS
<b>TSH (mU/L), m ± sd</b>	301	1.5 ± 0.8	63	1.6 ± 0.7	NS
<b>Albuminemia (g/L), m ± sd</b>	270	43.7 ± 3.1	55	45.0 ± 2.6	0.0052
<b>Creatininemia (µmol/L), m ± sd</b>	323	75.3 ± 9.9	63	93.6 ± 19.1	<.0001
<b>Vitamin D level (ng/mL), m ± sd</b>	309	34.0 ± 17.3	64	29.5 ± 13.8	0.0258
<b>COMORBIDITIES</b>					
<b>Functional Comorbidity Index (0-18)</b>	294		55		NS
1		122 (41.5)		26 (47.3)	
2		105 (35.7)		19 (34.5)	
≥ 3		67 (22.8)		10 (18.2)	
Mean ± sd		1.9 ± 1.0		1.7 ± 0.8	
<b>Modified Functional Comorbidity Index (0-17)</b>	299		56		NS
1		134 (44.8)		30 (53.6)	
2		110 (36.8)		20 (35.7)	
≥ 3		55 (18.4)		6 (10.7)	
Mean ± sd		1.8 ± 0.9		1.6 ± 0.7	
<b>PAIN INTENSITY</b>					
<b>AUSCAN Pain subscore (0-100), median [IQR]</b>	310	21.2 [9.2 ; 42.8]	57	16.4 [4.5 ; 28.6]	0.0228
<b>RADIOGRAPHIC SEVERITY</b>					
<b>Total Kellgren-Lawrence sum score (0-128), median [IQR]</b>	314	47.5 [33.0 ; 60.0]	64	49.0 [37.0 ; 62.5]	NS
<b>Total Kellgren-Lawrence sum score at the dominant hand (0-64), median [IQR]</b>	322	24.0 [16.0 ; 30.0]	65	24.0 [19.0 ; 31.0]	NS

84 Data are n (%), mean ± sd or median [IQR 25% to 75%].

85 \*n: number of available data

86 \*\* NS: Not significant

87 **Figure 2: Boxplot representing GS of the dominant hand according to sex and number of**  
88 **comorbidities**



89 \*p < 0.05 using linear regression models

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