Hip Disability - A Cross Sectional Study of Prevalence and Characteristics

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Abstract

Hip disability, including pain, stiffness and weakness, can substantially influence people's daily life. To promote and maintain health, physical activity of a certain degree is needed. The purpose of the present study was to estimate the prevalence of hip disability in 18-84 year-olds and to characterise them by sex, age, body mass index (BMI), and physical activity.

A postal survey questionnaire was sent to a sample of 11900 subjects in a Swedish county and it was answered by 6475 (response rate 55%). Main outcome measure was hip disability. Both unadjusted and adjusted regression analysis were used to analyse the relationship between age, BMI and hip disability separately for men and women.

Hip disabilities were reported by 29.9%, more often by women and elderly. Also people <50 years reported hip disability (19.8%). People with hip disability had higher BMI (mean (standard deviation) 27.3 (5.1) and for those without 25.9 (4.7), p<0.001) and were less physically active (p<0.001). The association between hip disability and female sex (odds ratio=1.39), became even stronger when adjusting for age and BMI (odds ratio=2.64).

Hip disability is common in the general population. People with hip disability have higher BMI and lower physical activity which can threaten their health. For people with hip disability effective strategies to promote physical activity, despite pain, for preventing serious health consequences must be developed.

Keywords: Hip disability; Osteoarthritis hip; Prevalence; Exercise

Introduction

In the World Health Organization's (WHO) International Classification of Functioning, Disability and Health, known as ICF, disability is the negative aspect opposed to functioning [1]. Disability is consisting of changes in a person's body functions or structures (impairments), activity limitations and/or participation restrictions. Pain, stiffness and weakness are all categories in the domain body functions and common features of hip disability and hip osteoarthritis (OA) [2]. Pain and stiffness, according to ICF sensation of tightness or stiffness of muscles [1], can only be assessed subjectively whereas weakness can be assessed both subjectively and objectively. ICF classifies health and health-related domains in contrast to the International Classification of Diseases, Tenth Revision (ICD-10) that classifies health conditions (diseases, disorders, injuries, etc).

Hip disability can substantially have impact on both activities and health in general [3]. To promote and maintain health, physical activity for a minimum of 30 minutes, five days/week (moderate intensity), or vigorous intensity aerobic activity for a minimum of 20 minutes, three days/week (or a combination) is recommended [4]. But a large proportion of the adult population is physically inactive so effective strategies to promote physical activity must be developed [5]. On individual basis, physical activity on prescription (PaP®) can increase physical activity [6].

BMI based on self-reported height and weight is often biased, due to exaggerated (height) and under-estimated (weight), in varied degrees for both men and women being examined [7]. The differences between self-reported and measured length and weight have been found to be small in a Swedish population though, where length was over-reported by less than 0.5 cm, and weight was under-reported by 1.6-1.8 kg [8].

Hip disability can be caused by many diseases, disorders, injuries, etc, but in adults OA of the hip is the most common cause of hip disability. Hip OA can be classified with a combination of radiographic and clinical criteria or with clinical criteria only [9]. The prevalence of hip OA can range between 0.9% to 27%, mean 8.0%, heterogeneity due to differences in populations, age and gender distribution, type of radiographs, and diagnostic procedures [10]. Clinically diagnosed hip OA always implies hip disability. Pain, stiffness, and decreased hip muscle strength have been found to be significant explanatory factors for self-reported physical disability in persons with hip OA [11].

The objective of this study was to estimate the prevalence of self-reported hip disability in a sample of 18-84 year-olds from the general population and to characterise this population both totally and separately for men and women, according to age and BMI both in adjusted and unadjusted analyses and by physical activity.

Methods

A cross-sectional survey was performed in a population sample of 11900 men and women aged 18-84 years during March-May 2008, covering 16 municipalities in a county in central,

western Sweden with 211 003 inhabitants, using a postal survey questionnaire with three reminders. The sampling was random after stratification for gender, age group, and municipality. The questionnaire covered health, lifestyle factors, living conditions, service in the home municipality and hip disability. A total of 6475/11900 subjects answered the questionnaire with the overall response rate of 55%.

Focus in this study was the question 'Have you during the last six months experienced any problems from one or both of your hips?' [12], answered by 6344/11900 (53%), followed by "If yes, how would you like to describe your hip problems?" with the alternatives pain, stiffness, weakness and other problems. The overall response rate was 53%, lower among younger subjects than older (18-34 years 43%, 35-64 years 52-66%, 65-84 years 61-72%), lower among men compared to women (men 51%, women 64%). There were also differences in education levels (compulsory school 54%, grammar school 57%, university 58%), country of birth (Sweden 59%, Nordic countries 57%, other 42%). Among the responders there were partial missing data on the question regarding self-reported hip disability. Responders had on average a higher physical activity level (PAC), and spent more time per week on moderate physical activity.

BMI was calculated from self-reported weight divided by height squared (kg/m2) categorized according to the World Health Organization guidelines; underweight (BMI <18.5 kg/m2), normal weight (BMI between 18.5 and 24.9 kg/m2), overweight (BMI between 25 and 29.9 kg/m2), and obese (BMI equal to or over 30 kg/m2) [13].

Physical activity in leisure time, during last 12 months, was estimated on the four-category scale International Physical Activity Questionnaire (IPAQ) [14]. (A) indicated low physical activity (walking, bicycling, or other activities <2 hours a week), (B) moderate physical activity (walking, bicycling, or other activities >2 hours a week, mostly without perspiring), (C) moderate regular physical activity (physical activity regularly >30 minutes, 1-2 times a week changing clothes for running, tennis, bicycling, exercising at a gym, or other physical activity that makes one perspire or increases the pulse rate), and (D) regular physical activity or training (exercising or competing at least three times a week, >30 minutes at a time in team sports, jogging, bicycling, aerobics, swimming, or other comparative physical activities, ≥3 times a week).

The question 'How much time do you spend during an ordinary week on moderate activity that makes you warm (walking, gardening, heavy household, bicycling, swimming)? It can vary during the year, but try to make some kind of generalization' was asked with the alternatives; 'at least 5 hours per week', 'more than 3 hours but less than 5 hours per week', 'between 1 and 3 hours per week', and 'less than 1 hour per week'.

Data analysis

For population characteristics (age, BMI) means and standard deviations (sd) or frequencies (categorical variables) were used. Differences between people with and without hip disability were tested with Mann-Whitney's U-test and Fisher's exact test. Differences in the prevalence of hip disability between age categories were tested with Chi-square test and difference in BMI between age categories using a one-way ANOVA, separately for men and women.

To describe the unadjusted relationship between the prevalence of self-reported hip disability and age and BMI, and the unadjusted relationship between BMI and age, we used a running line smoother [15]. The running line smoother calculated the prevalence of hip disability at each value of age/BMI based on data in a small interval around that value. The results are smooth curves describing how the prevalence varies over age and BMI respectively. To further investigate if differences in prevalence between men and women could be explained by age and BMI, we used logistic regression with sex as analysis variable and adjusted for age and BMI. Non-linear dependencies were investigated using fractional polynomials [15], which is a model for non-linear relationships, flexible enough to capture trends in data, but not too flexible which may lead to over fitting. We also investigated if there were any two-way interactions. Model fit was tested with the Hosmer-Lemeshow test, and coefficient standard errors estimated with the bootstrap method [15]. Based on the regression model we simulated hip disability status based on the predicted probability for hip disability for each subject. By repeating this procedure 1000 times and then using the running line smoother, we were able to construct curves describing the adjusted relationship between hip disability and age and between hip disability and BMI, corresponding to the unadjusted curves [16].

To investigate the possible effect of bias in self-reported BMI we used the algorithm suggested by Nyholm et. al [7]. P-values in table 1 were adjusted using the Bonferroni-Holm method [17]. The analyses were performed with Stata/MP version 13 (Stata Corp LP, College Station, Texas, USA), significance level 0.05 and all two-tailed tests.

Ethical approval

According to the Swedish law of medical research ethics, population studies with de-identified personal data do not require ethics approval. The respondent has given consent when returning the questionnaire.

Results

Among the 6344 who (mean age 53 years (sd 18.4)), 1897 (29.9%) answered that they have had 'hip disability in one or both hips during the last 6 months', more often women and older people (table 1, figure 1).

The prevalence of self-reported hip disability increased up until 70 years of age, both for men and women. After age 70 the prevalence for men levelled out and decreased, but for women it continued to increase with an even steeper slope (figure 1, table 2). People younger than 50 years also reported hip disability (19.8%). Previously Sundén Lundius et. al [12] have reported the prevalence of self-reported hip disability among people aged 38-84. Subjects in that age interval in our study showed a prevalence

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Table 1: Characteristics for Men and Women Separately, for the Whole Sample, and Comparisons between People with and Without Hip Disability.

	Men n=2841 (44.9%)			Women n=3503 (55.1%)			Total n=6344		
	Self-reported hip disability			Self-reported hip disability			Self-reported hip disability		
	Yes n=748 26.3%	No n=2093 73.3%	p-value[1]	Yes n=1149 32.8%	No n=2354 67.2%	p-value[1]	Yes n=1897 29.9%	No n=4447 70.1%	p-value[1]
Age, mean (sd)	61 (14.8)	52 (18.4)		56 (17.0)	48 (18.3)		58 (16.4)	50 (18.4)	
BMI, mean (sd)	27.7 (4.5)	26.6 (4.5)	<0.001[2]	27.0 (5.5)	25.3 (4.7)	<0.001[2]	27.3 (5.1)	25.9 (4.7)	<0.001[2]
underweight [%]	0.5	0.7		0.9	2.4		0.7	1.6	
normal weight [%]	25.0	37.2		38.9	52.2		33.5	45.1	
overweight [%]	51.8	46.0		37.8	31.1		43.3	38.2	
obese [%]	22.7	16.2		22.4	14.3		22.5	15.2	
Pain	58.7	0	<0.001[3]	71.3	0	<0.001[3]	66.3	0	<0.001[3]
Stiffness	39.5	12.1	<0.001[3]	55.7	18.1	<0.001[3]	48.9	15.4	<0.001[3]
Weakness	54.4	14.5	<0.001[3]	54.7	22.4	<0.001[3]	54.6	18.9	<0.001[3]
Phys activity level [%]			p=0.001[2]			p<0.001[2]			p<0.001[2]
Low	24.5	18.0		21.4	14.3		22.6	16.1	
Moderate	42.4	39.4		45.2	40.9		44.7	40.2	
Moderate regular	18.3	24.5		20.7	26.1		19.8	25.3	
Regular exercise and training	14.8	18.2		12.8	18.7		13.5	18.4	
Moderate phys activity hrs/week [%]			p=0.100[2]			p<0.001[2]			p<0.001[2]
<1 h	15.3	10.5		13.3	7.9		14.1	9.1	
1-3 h	24.8	28.0		28.6	28.6		27.3	28.3	
3-5 h	24.8	25.4		29.9	32.8		27.9	29.2	
≥5 h	35.1	36.3		22.8	30.7		30.9	33.4	

Notes. [1]All p-values are adjusted for mass significance according to the Holm-Bonferroni. [2]Mann-Whitney's U-test. [3]Fisher's exact test. Sd= standard deviation .
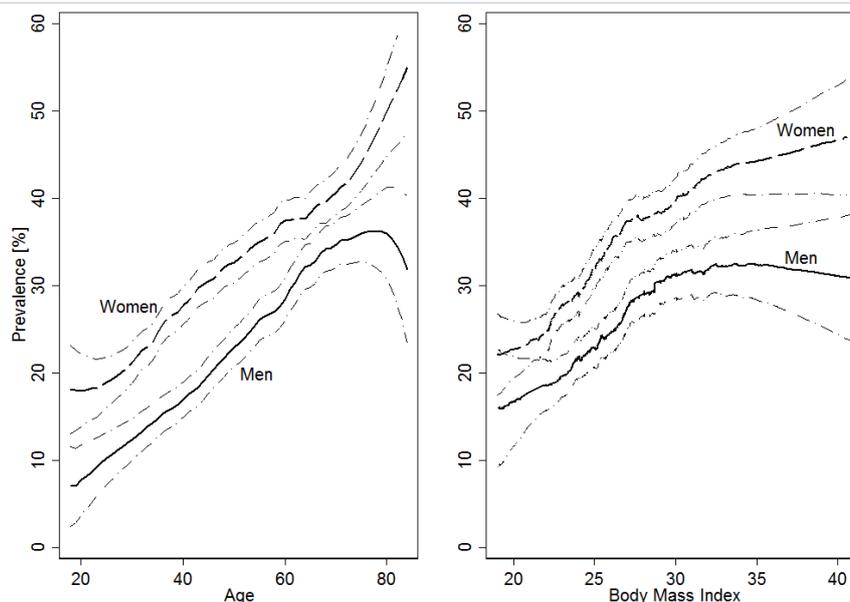

Figure 1: Observed prevalence of hip disability (unadjusted, created with a running line smoother) with 95% confidence bounds (dash-dotted lines) over age and BMI for men (solid lines) and women (dashed lines) separately.

Table 2: The Prevalence of Hip Disability, Presented as Numbers and Percentages, in Different Age Groups for Men and Women Separately, for the Whole Sample, and Comparisons with in Groups.

	Men			Women			Total		
	[n]	[%]	p-value[1]	[n]	[%]	p-value[1]	[n]	[%]	p-value[1]
Age groups			<0.001[2]			<0.001[2]			<0.001[2]
18-34	51/519	9.8		156/817	19.1		207/1336	15.5	
35-49	95/516	18.4		210/718	29.3		305/1234	24.7	
50-64	203/722	28.1		322/870	37.0		525/1592	33.0	
65-79	353/929	38.0		369/930	39.7		722/1859	38.8	
80-84	46/155	29.7		92/168	54.8		138/323	42.7	
Total	748/2841	26.3		1149/3503	32.8		1897/6344	29.9	

Notes. [1]All p-values are adjusted according to the Holm-Bonferroni method to avoid spurious hypothesis rejection due to mass significance. [2]Chi-square test.

of (1 649/4 798) 34%. Among those with self-reported hip disability 66.3% reported hip pain, 44.6% reported stiffness, 9.2% reported weakness (figure 2) and 7.8% reported other problems.

When applying the suggested correction algorithm to our material [7], using age as correction factor, the corrected BMI was on average 0.8 kg/m^2 higher than the self-reported. These were small differences and the effect of the correction on our regression analyses was negligible. Since the actual changes in BMI were small, we have chosen to use the self-reported BMI in our analysis.

There were differences in BMI between age categories (18-34 yrs 25.3 (sd 5.6), 35-49 yrs 26.3 (sd 4.7), 50-64 yrs 26.8 (sd 4.3), 65-79 yrs 26.7 (sd 4.7), 80-84 yrs 25.8 (sd 5.3), (One-Way ANOVA, p < 0.001). There were also differences between men and women in the relation between BMI and age, where men had higher BMI than women up to 75 years of age (figure 3). The prevalence of self-reported hip disability increased with BMI, with higher prevalence for women (figure 1). For men the prevalence increased with BMI only up to BMI 32.

In the adjusted analysis (figure 4), the non-linear association (seen in figure 1) remained only between BMI and self-reported hip disability, but was almost linear corresponding to an odds ratio approximately 1.03.

There were no significant interactions between explanatory variables, except between sex and age. The odds ratio for age was almost identical for men (OR=1.02, 95% CI [1.018, 1.026], p<0.001) and women (OR=1.03, 95% CI [1.026, 1.038], p<0.001). In the regression analysis with sex as the only explanatory variable, women had higher odds for hip disability (odds ratio (OR) =1.39, 95% confidence interval (CI) [1.24, 1.56], p<0.001) than men. When adjusting for age and BMI the association became stronger (OR=2.64, 95% CI [1.20, 5.78], p=0.016).

People with hip disability were less physically active (both men and women), compared to people without hip disability (table 1).

Discussion

Hip disability is common in the general population aged 18-84 (29.9%). People with hip disability were older, more often women, had higher BMI, and were less physically active. The
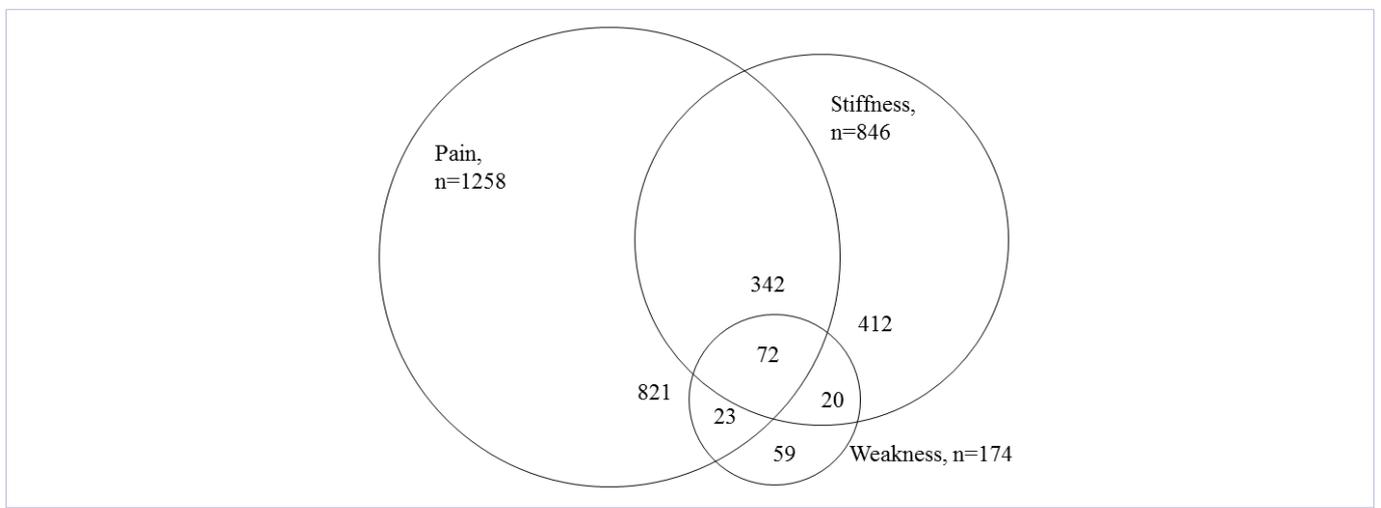

Figure 2: Number of subjects with pain, weakness and stiffness among those with self-reported hip disability.
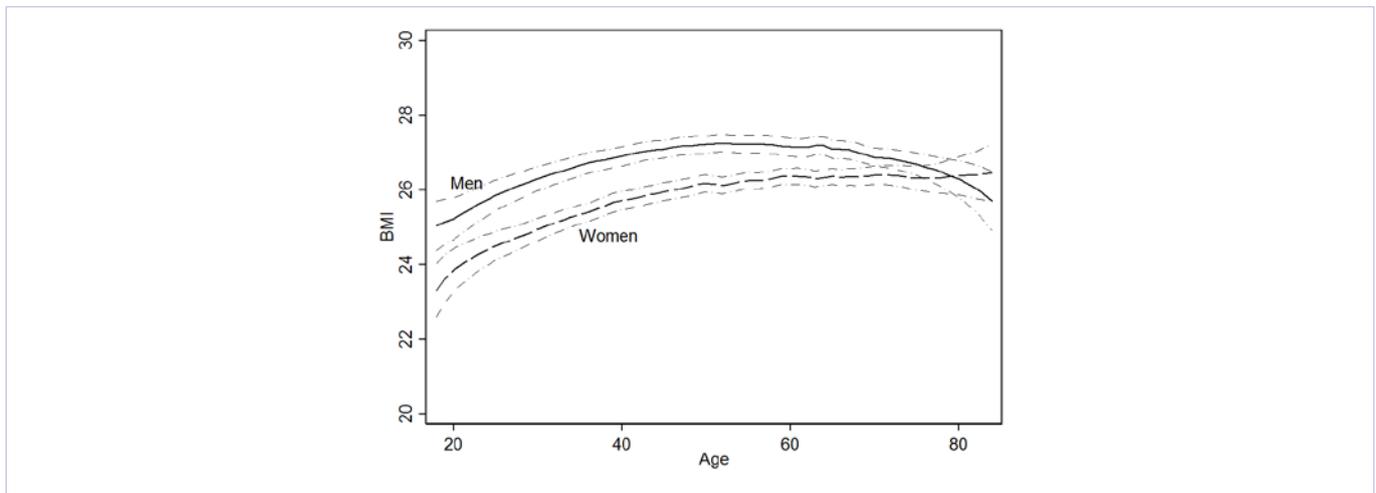
Figure 3: Observed unadjusted mean BMI over age (created with a running line smoother) with 95% confidence bounds (dash-dotted lines), for men (solid line) and women (dashed line).
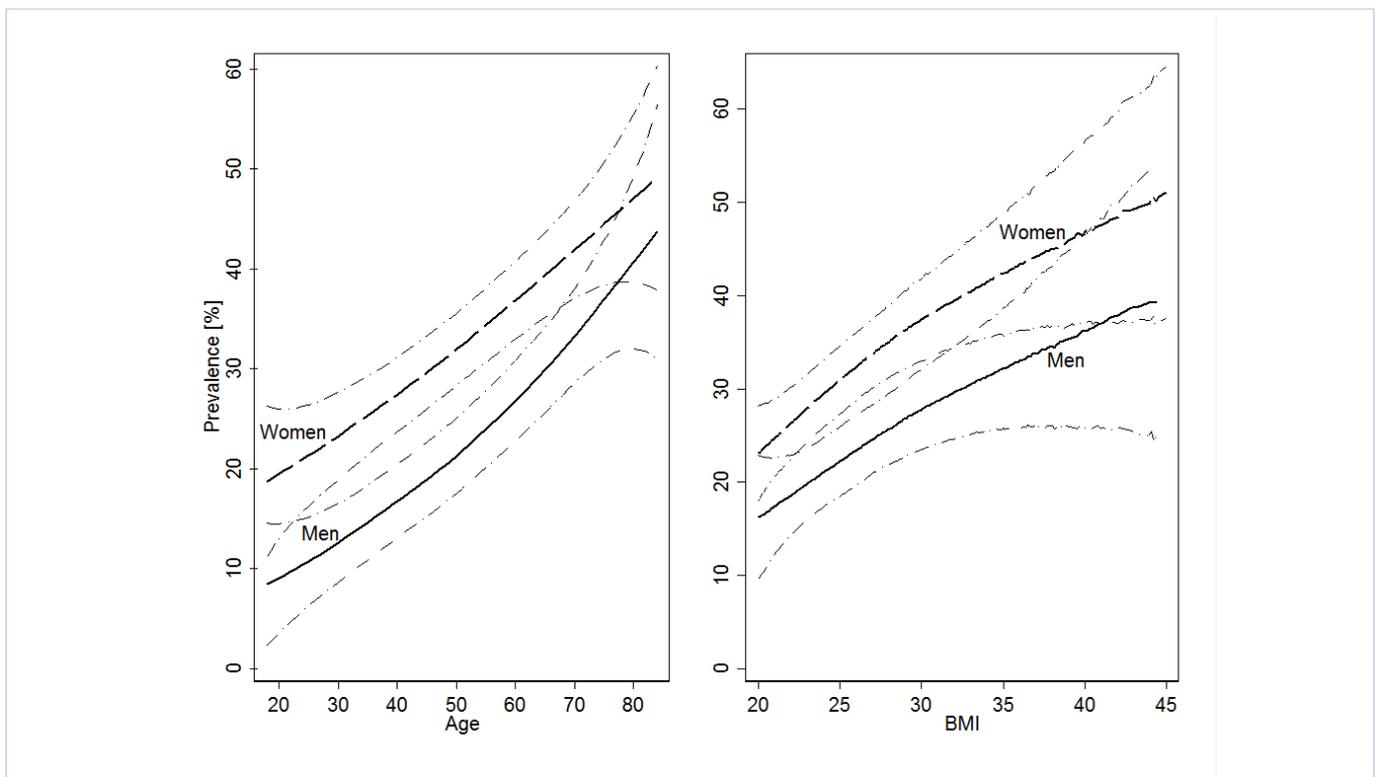

Figure 4: Predicted mean prevalence of self-reported hip disability, with confidence bounds (dash-dotted lines) in different ages, adjusted for BMI (left), and for different BMI, adjusted for age (right), for men solid lines and for women dashed lines.

difference in prevalence of hip disability became even larger, between men and women, after adjustment for age and BMI.

There were differences in the prevalence curves when comparing unadjusted (figure 1) and adjusted analysis (figure 4). The discrepancy may be explained by the difference between men and women in the relationship between age and BMI (figure 3). The BMI levelled out and decreased after 50 years of age for men, but for women it levelled out and stayed almost constant after age 60. For subjects older than 70 years the BMI was approximately the same for men and women.

Strength of the study is that it is population based in contrast to studies where the study group is recruited from the health-care system. A weakness is the low response rate, 53%.

Compared to a population-based study in the south of Sweden with people between 38-77 years (where the same questions concerning hip disability, although translated to hip

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disorder, were used [12],), we found in our study almost the same prevalence, 34% compared to 32% in their study.

Hip OA is the most common disorder causing hip disability. But we don't know anything about the prevalence of hip OA in this study and we did not ask for previous diagnosis of hip OA. In a cross sectional survey of people aged ≥40 years (n=195), mean age 63 years, presenting with a new episode of hip pain recruited from general practitioners in UK, 44% had evidence of radiographic change [3]. In our sample the mean age for people with hip disability was lower, 58 years, so radiological evidence of hip OA should be <44%.

People with hip disability in this study, were less physically active compared to those without hip disability. Information about physical activity (not too much and not too little), exercise and weight control, leading to better self-management, delivered as OA schools [18, 19] have together with PaP® (and other physical activity enhancing tools) the potential to prevent and reduce pain, stiffness and weakness [18], lowering the risk of anxiety and depression [20], and lowering the risk of inactivity induced illness and premature death [21]. Exercise may also have metabolic effects influencing OA progression, including suppression of inflammation and catabolic activity, enhancing anabolic activity, and maintaining metabolic homeostasis [22] and can also improve the GAG content in the cartilage [23]. Leisure time with physical activity can prevent end-stage OA [24] and one study has suggested that exercise therapy in addition to patient education can, at least, postpone the need for THR in patients with hip OA [25]. When people with hip disability visit health care services, they should be referred to OA schools, unless the disability is caused by other diseases, disorders, or injuries than hip OA.

Further studies are needed to develop effective strategies to help people to prevent hip disability and when it is present, promote physical fitness to reduce the risk of serious health consequences [26].

Hip disability is common in the general population. People with hip disability have higher BMI and lower physical activity which can threaten their health.

Acknowledgements

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