

## Diabetes mellitus in ankylosing spondylitis

Ankylosing spondylitis is a systemic inflammatory disease which always influences the spine joints. The association between ankylosing spondylitis and multiple systemic comorbidities has been well assessed.<sup>1,2</sup> Recently, one meta-analysis conducted by Mathieu *et al* published in *Annals of the Rheumatic Diseases* reported that persons with ankylosing spondylitis were significantly associated with increased risks of myocardial infarction and stroke when compared with controls (risk ratio=1.44 for myocardial infarction, and risk ratio=1.37 for stroke).<sup>3</sup> Mathieu *et al*'s research is well performed and informative to the readers.

Diabetes mellitus is a well-established risk factor for myocardial infarction and stroke. One cross-sectional study reported that 13.64% of persons with ankylosing spondylitis had diabetes mellitus.<sup>4</sup> We make a rational hypothesis that diabetes mellitus could be involved in the association between ankylosing spondylitis and myocardial infarction and stroke. In order to add updated concepts to support the findings of Mathieu *et al*'s research, a preliminary nationwide cohort study was conducted to examine whether there is a link between ankylosing spondylitis and diabetes mellitus by using the 2005–2012 database of the Taiwan National Health Insurance Program with 23 million persons living in Taiwan.<sup>5,6</sup> Persons ages 20–84 years who had a new diagnosis of ankylosing spondylitis were assigned as the ankylosing spondylitis group based on International Classification of Diseases, Ninth Revision code (ICD-9 code 720.0). For every person with ankylosing spondylitis, four sex-matched and age-matched persons without a diagnosis of ankylosing spondylitis were selected as the non-ankylosing spondylitis group. The main outcome was a new diagnosis of diabetes mellitus (ICD-9 code 250). Table 1 illustrated that at the end of the cohort study, the overall incidence of diabetes mellitus was 1.21-fold higher in the ankylosing spondylitis group than in the non-ankylosing spondylitis group (1.43 vs 1.19 per 100 person-years, 95% CI 1.02 to 1.43,  $p=0.025$ ). As stratified by sex, the incidences of diabetes mellitus were all higher in the ankylosing spondylitis group than in the non-ankylosing spondylitis group, but only the male group reached statistical significance ( $p=0.033$ ).

In this preliminary study, persons with ankylosing spondylitis had a higher incidence of diabetes mellitus when compared with those without ankylosing spondylitis. Although the underlying mechanism regarding the association between ankylosing spondylitis and diabetes mellitus is beyond the scope of this study, surveillance bias contributing to a positive association cannot be ruled out. That is, persons with ankylosing spondylitis might receive frequent clinical care, such as periodically checking blood glucose. Then, diabetes mellitus, which usually cannot be early identified among persons without ankylosing spondylitis, is incidentally identified among those persons with ankylosing spondylitis. We suggest that more well-constructed studies are needed to determine whether there is a causal relationship between ankylosing spondylitis and diabetes mellitus.

Many unhealthy lifestyle habits have been found to be associated with increased risk of diabetes mellitus, including unhealthy dietary pattern, decreased physical activity, sedentary lifestyle, and smoking.<sup>7,8</sup> From a view of preventive medicine, we suggest that physicians who take care of persons with ankylosing spondylitis should consider aggressive modification of unhealthy lifestyle habits to reduce the risk of diabetes mellitus. Then, these persons might have a chance to further reduce the risks of myocardial infarction and stroke.

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**Table 1** Incidence of diabetes mellitus between ankylosing spondylitis group and non-ankylosing spondylitis group

Variable	Ankylosing spondylitis				Non-ankylosing spondylitis				Incidence rate ratio (95% CI)*	P value
	N	Event	Person-years	Incidence	N	Event	Person-years	Incidence		
All	2757	164	11 447	1.43	11 028	972	81 955	1.19	1.21 (1.02 to 1.43)	0.025
Sex										
Male	1633	99	6890	1.44	6532	552	48 496	1.14	1.26 (1.02 to 1.56)	0.033
Female	1124	65	4557	1.43	4496	420	33 459	1.26	1.14 (0.88 to 1.48)	0.338

Incidence: per 100 person-years.

\*Incidence rate ratio: ankylosing spondylitis versus non-ankylosing spondylitis (95% CI).