Reviewer’s report

Title: The relation between body mass index and musculoskeletal symptoms in the working population.

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Reviewer: Rahman Shiri

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The relation between body mass index and musculoskeletal symptoms in the working population

Overall, this is an interesting study, investigating interesting research questions. However, I think the authors need to do more, especially to better control the confounding factors and assess the interactions in their analyses.

Major Compulsory Revisions

1) In this study, confounders were not well controlled. Only age and gender adjusted models were reported. The outcomes of the study are common and sample size is large. Most of the important confounders, such as physical and psychosocial factors were not controlled for. Some existing confounders were included in the models only as dichotomized variables, such as smoking, physical activity. The sample size is large enough to control for many confounders. It is not justify ignoring those factors that change the crude effect size less than 10%.

2) The rate of overweight/obesity, exposure to physical load factors, and occurrence of musculoskeletal symptoms differ in men and women. The effects of obesity on musculoskeletal symptoms may also differ in men and women. No gender-specific analysis was performed in this study. If findings are similar for men and women, then only gender-combined results would be reported.

3) In the methods section, effect modification was defined as a significant interaction term (p<0.05) between physical workload and BMI. However, the results on Table 3 show that stratified analysis was used to assess effect modification, but not including the product term of physical workload x BMI in the models. How p-value was estimated for interaction using stratified analysis?

4) Why an interaction between physical workload and BMI was explored using a cross-sectional design, not using a cohort design?

5) Using a variable with 6 categories will provide better estimates than splitting the sample.

1. Normal BMI and no exposure to physical loads
2. Normal BMI and exposure to a physical load
3. Overweight and no exposure to physical loads
4. Overweight and exposure to a physical load
5. Obesity and no exposure to physical loads
6. Obesity and exposure to a physical load

6) In this study, the response was weighed for gender, age, sector, ethnic origin, level of urbanization, geographical region and level of education. However, weights were not taken into account in the analysis, and survey data analysis was not used.

7) Only two physical load factors were assessed. There was no information on other physical load factors such as working with hands above shoulder level, kneeling, squatting, using a vibrating tool, repetitive hand motions, work demanding keyboard use, and long period sitting or standing.

8) Force and working in awkward positions were aggregated in a single variable. This is OK only for subgroup analysis. The combined variable does not control for possible joint effect of these two physical factors. Moreover, it is unclear whether exposure to force and working in awkward positions indicates current exposure, or ever exposure.

9) Was the sample representative of the Dutch workforce? The response rate was extremely low. The possible effects of selection bias on the observed associations were not well discussed.

10) Weight and height were not measured. They were based on self-reports. Were the associations of BMI with musculoskeletal symptoms underestimated or overestimated?

11) Smoking and physical activity were included the models as dichotomized variables. Was information gathered regarding current, past smoking, or intensity and duration of physical activity?

12) In Table 1, only proportions were reported. Therefore, there is no need to repeat “%” in each row. In this table, for some characteristics column proportion and for some other characteristics row proportions were reported. It is difficult to compare the proportions across BMI categories.

13) Patients having pain at one location are more likely to have musculoskeletal pain in another location. Was there an association between BMI and musculoskeletal pain only in those with multisite pain, but not in the subjects with pain in a single location only?

14) Was there an interaction between physical activity and obesity?

15) In Table 2, unadjusted results would be replaced by age-and gender-adjusted results (or age-adjusted results for gender-specific analysis), and age-and gender-adjusted results (or age-adjusted results) replaced by full-model results (adjusted for all measured confounders).
16) Table 3, full model needs to be reported, not age and gender adjusted.

Minor Essential Revisions
1) In the Introduction on page 4, the hypothesis on the joint effect of physical load and obesity is not well formulated. Physical load loads are also associated with shoulder, elbow, wrist, and back symptoms. Only OA is mentioned. If the hypothesis is that there is an interaction between obesity and physical load factor, why subgroup analysis was performed?
2) Were age and education included in the models as continuous or dichotomized variables?
3) On page 7, last paragraph, please change “en” to “and”.
   was associated with upper en (AND) lower extremity symptoms
4) How the lower limit confidence interval of OR = 1.05 can be 1.14 (CI 1.14-1.98).
5) What is the reason for reporting some texts in italic?

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.