Letter to the editor: “The association between cervical spine curvature and neck pain (D. Grob et al.)”

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Dear Editor

The recent paper by Grob et al. [1] described the lack of association between cervical lordosis and neck pain in an elderly population (mean age of 65 years) with a secondary complaint of neck pain who were matched to a control group. As authors of two previous papers showing a moderate association between cervical lordosis and neck pain in adults (mean age of 34–44 years) seeking treatment for neck pain matched to a population control [2, 3], our data is in opposition to the results from Grob et al. [1]. As such, Grob et al. [1] questioned the validity of our [2] methods and results. We have identified several items of contention in regards to this subject and would like to put the results of these papers in proper context.

To begin, Grob et al. [1] inaccurately characterized one of our papers [4] in their Table 4 by listing the number of kyphotic neck curvatures in our sample population of NO PAIN adults as 35%. Here, Grob et al. [1] incorrectly cited a letter to the editor as their Ref. 25 for this information. In our sample of 250 asymptomatic adults [4], no kyphosis was present at any cervical segmental level. Noteworthy; however, in a separate investigation on neck PAIN subjects, Harrison et al. [5] found the prevalence for cervical kyphosis was 35%. Grob et al. [1] inadvertently mixed these studies' data.

Our primary position for debate is that Grob et al. [1] opined that our results [2] are questionable due to improper

study design. Their main contention is that the larger mean cervical lordosis in our asymptomatic population [2] is likely due to improper group sampling and X-ray positioning issues arguing that this rationale explains why we [2] found differences between PAIN and NO PAIN groups and they [1] did not.

The larger mean C2–C7 cervical lordosis (34°) in our NO PAIN group [2] can be explained by the exclusion criteria in our study: (1) any segmental or total cervical kyphosis; only lordotic segments were included, (2) any moderate-severe degenerative disc disease (in our 2004 paper [2] we found an error stating ‘severe’ instead of ‘moderate-severe’), (3) any significant forward head posture. In looking at their Figs. 1 and 2, it is apparent that Grob et al. [1] were studying the degenerative elderly cervical spine as opposed to our younger adult population and aforementioned exclusion criteria.

The exclusion of moderate to severe degenerative joint disease would naturally increase the mean cervical lordosis. For example, Gore et al. [6] found an average increase in lordosis of 10° in their subjects without significant degenerative discs compared to subjects with moderate to severe degenerative discs. These same exclusion criteria were applied to our PAIN groups [2].

In terms of subject sampling, the same retrospective, random sampling was performed for both the NO PAIN and PAIN groups at the same facility by the same clinician [2, 4]. Furthermore, though our X-ray procedures were not detailed in our more recent paper [2], they were clearly described in our earlier report [4]. In fact, all subjects in our NO PAIN and PAIN groups received standing lateral cervical X-rays, at the same facility, using a standardized procedure that has been validated for its reliability [7].

Our third contention point is that Grob et al. [1] did not consider two of the more relevant papers from the literature

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[3, 8]. In a retrospective, random sample of an adult population (mean age 38 years) with neck PAIN matched to a NO PAIN control group, McAviney et al. [3] found that the C2–C7 lordosis less than 20° had good sensitivity (0.724) and specificity (0.737) for identifying those with PAIN and NO PAIN. Of importance, the 20° cutoff value is similar to what we found in our sample of PAIN and NO PAIN subjects with only lordotic curves [2]. In a prospective report, Nagasawa et al. [8] found loss of the cervical lordosis, using Ishihara's index, to be associated with tension headaches of a cervical origin in a PAIN group matched to a NO PAIN group (mean age 41–48 years).

We believe the controversial findings of Grob et al. [1] compared to ours [2, 3] and other reports in the literature [8] is mostly accounted for due to their [1] specific senior adult (mean 65 years) population having moderate-severe degenerative disc disease. Their [1] subjects' were not actively seeking treatment for cervical spine complaints but rather neck pain was a co-morbidity found upon questioning. Furthermore, 41–46% of their [1] subjects had signs of cervical radiculopathy. In contrast, our papers [2, 3] and others [8] investigated younger adult patients, with a primary PAIN complaint of cervical origin, who were actively seeking treatment compared to a NO PAIN control. These three reports [2, 3, 8] finding an association between cervical lordosis and neck pain represent distinctly different populations with different inclusion criteria than Grob et al. [1].

Fourth, Grob et al. [1] inaccurately cite Gore [6] in the English literature for the original usage of the C2–C7 global and segmental posterior tangent lines for cervical lordosis measurement. However, Jackson [9, 10] and Zatzkin and Kveton [11] utilized the C2–C7 global posterior tangent lines on C2–C7 much earlier (30 years) than Gore [6]. Likewise, Harrison [5, 12] had earlier used segmental posterior tangent lines on each segment, not just C2 and C7, to measure segmental and global spinal curvature from C2 to S1, inclusive.

Lastly, it is unclear as presented by Grob et al. [1] whether their NO PAIN subjects had complaints other than

neck pain (headache, radiation, etc...) as reported for their PAIN subjects in Table 1. We thank Grob et al. [1] for consideration of these points and the journal editor for the opportunity to discuss them.

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