Reviewer's report

Title: Vitamin D levels and deficiency with different occupations: a systematic review

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Reviewer: KATHRYN HART

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Vitamin D levels and deficiency with different occupations: a systematic review.

An interesting angle on a global health problem assimilating a large number of studies via an extensive review.

I do however feel that the impact of the paper and its findings is reduced by the inclusion of some poorly defined occupational groups and unnecessary figures and that by clarifying aspects of the methodology and, where necessary, tightening the inclusion criteria a more impactful output could be produced.

Abstract:

Rates of vitamin D deficiency among healthcare professionals - could this data be presented in descending order of prevalence?

The abstract gives no indication of how the potential confounding by factors such as gender and body composition (which would be expected to differ significantly between occupational groups) may have been accounted for. Could this be added?

Background:

A Japanese study demonstrated no significant differences in serum 25-(OH)D levels in shiftworkers working rotating shifts, including night shifts - can this sentence be expanded to clarify what the comparator to shift work was?
I am not convinced of the argument for using occupation status as a factor in risk screening over and above factors such as sunlight exposure which would be assumed to be directly related to vitamin D status. How would this improve the screening that is already possible, i.e. if we ask people about sunscreen use and time spent outdoors is occupational status likely to be a better marker or likely to improve screening substantially given the likely variability in behaviours even within a specific job-family? The rationale for either asking about occupation in addition to or instead of current risk markers should be clarified.

Define geriatric as it relates to this study. Were all subjects over a certain age excluded or only those who were not working?

Did you also record the cut offs used to define deficiency and insufficiency in each paper as presumably these varied?

The use of Vitamin D-specific quality criteria is appropriate but I wonder whether a more general assessment of paper quality, suitable for cross-sectional studies, could also be employed? The two paragraphs beginning on line 4 and line 22 of page 10 could be combined and tightened up to make the assessment of quality more succinct.

'Whenever there were three or more studies from an occupational group…' - how was the breadth of an occupational group defined and/or the number (3) deemed sufficient decided upon? Given that one occupational group, such as healthcare, could be much broader than another, e.g. miners, I am not sure of the validity of applying a quantitative cut off. Please can you clarify if your occupational groups were defined a priori?

Is Cochrane handbook webpage needed in the main text since you also provide a citation?

'Some of the studies reported averages as geometric means without indication of a measure of spread and these were not included in the computation of the overall mean' - this could be combined with the sentence describing the same process for medians without IQR (line 20)
Not clear whether, when authors had already calculated % deficient/insufficient you utilised that data (if means were also provided) or calculated your own percentages. If author calculated % were used assume these were only allowable if they reported using the IOM cut offs? Please clarify.

Results:

'Of the excluded articles, two were in Persian and one each was in Korean and Turkish.’ As this only accounts for 4 of the 21 papers excluded perhaps indicate what the other main causes for exclusion were OR do not report in this and just give total number excluded.

'Where reported, the proportion of participants who were women ranged from 0% to 100%’. - give this wide range would the median gender split be more informative?

'Based on the latitudes of study locations, the included studies spanned a range of latitudes' (Fig. 6A). - again not very informative. Could the exact latitudes be given (at the extremes of the range) or this sentence omitted?

Did the shift work category exclude health care workers or was there overlap between these categories? If authors of the original articles did not report that their samples of health care worked excluded shift workers, or that their sample of shift workers excluded healthcare workers were these studies excluded?

What was the benefit of including the studies where subjects were classified as 'other' or miscellaneous? How would the vitamin D levels of this group help to address your question when their occupation could not be defined? Could you omit these from the paper and as such provide a more clearly defined sample?

The section relation to quality assessments is very long and repetitive. This information may be better presented in table format indicating the quality assessments for each paper and occupational group. The text could then focus on just the overall summary of the data, i.e., the overall % of studies that were high/medium/low (not divided by occupational group) and the overall frequency of different assay types.
From results presented it seems that you did not calculate your own percentage deficiency/insufficiency although this was suggested in the methods? Was this done for any studies or were all % values provided by the original authors?

How confident are you that your 'other' healthcare group did not include members of the specific professions already mentioned, e.g. nurses? (Especially since their results were not significantly different from nurses and nurses are presumably the largest sub-division or healthcare worked). If this cannot be assured should these be excluded since there may be considerable overlap between the two groups and therefore this 'other' group does not add substantially to your findings. If there 'other' status can be assured please describe.

The paper is very long. I feel it could be improved by removal of all potential ambiguous groupings and data so that the focus is firmly on those studies and participants from clearly defined occupational groups, e.g. excluding studies of unknown/miscellaneous occupation and of 'other' healthcare. The data from these groups do not add to your conclusions. Similar there are a large number of figures presenting very similar data, e.g. % deficiency by latitude. These should be rationalised to focus on the key messages/outcomes of interest.

Clinical implications

Given the high prevalence if deficiency you have reported is screening, for example in shift workers, really a justifiable approach? Given the logistical and financial implications of routine Vit D screening would attention be better focused at addressing assumed deficiency/insufficiency rather than further attempts to check this is occurring?

Limitations:

'In the present study, we used the IOM's definition of vitamin D deficiency and insufficiency' - as mentioned previously please clarify whether by this you mean that values were recalculated or that only studies already reporting deficiency rates according to IOM cut offs were used.

Some of the potential confounders, such as gender and diet, are touched on but this does not acknowledge the limitations inherent in the occupational categories used which would seem to have a great potential for overlap and as such under or overestimating effects related to these
artificial groupings. If the suggestions for removing ambiguous groupings are acted on this may be resolved but any remaining ambiguity should be addressed here.

References

Is it appropriate to present only a web link for an online reference, e.g. reference 2? I would expect to see additional information regarding author, site or document name and date accessed.

Tables:

Please ensure these are formatted according to standard publication guidelines/ journal specific guidance.

Could the date of the publication be included in the table? I appreciate numerical referencing is used but there is space under the authors to add a date and this would make the table much easier to interpret without needing to cross reference to reference list to see date.

Figures:

See previous comments about the number of figures currently presented.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

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