CORRESPONDENCE

Sleep, Muscle Mass and Muscle Function in Older People—a Cross-Sectional Analysis Based on Data From the Berlin Aging Study II (BASE-II)

by Dr. med. Nikolaus Buchmann, Dr. med. Dominik Spira, Priv.-Doz. Dr. rer. medic. Kristina Norman, Priv.-Doz. Dr. rer. nat. Ilja Demuth, Dr. med. Rahel Eckardt, and Prof. Dr. med. Elisabeth Steinhagen-Thiessen in issue 15/2016

Longitudinal Data Are Needed

Studies on the possible influence of sleep facets on health and disease promise important information and causal insights (1, 2). Generally, this is also true for the cross-sectional study by Buchmann et al. regarding “Sleep, Muscle Mass and Muscle Function in Older People” (3). Specifically, though, if we want to reliably judge whether observed associations are causal, longitudinal information should be considered. Initially, the authors avoid a reductionist approach when analyzing the role of “sleep” by considering several facets of sleep [including “sleep duration”, “sleep quality” and “sleep efficiency”]. However, that such study data are confined to cross-sectional information can lead to considerable problems when interpreting observations. As an illustration of this, recently, extensive meta-analyses of possible associations between facets of sleep such as “sleep duration”, “napping” and a category of “poor sleep” and incident cancers were published (4). One key result was that observational studies must consider longitudinal information on sleep facets to take note of the complexity of multidirectional relationships between “sleep and the development of cancer”. Epistemologically, the insight that sleep disorders can be cause and/or consequence of disease over time should not be confined to the endpoint “cancer”. Indeed, this rationale could be relevant for possible causal relationships between “Sleep, Muscle Mass and Muscle Function in Older People”—as mentioned by the authors—as well. Buchmann et al. discuss that the different results in men and women can not be unambiguously clarified because of the cross-sectional study design. Moreover, the authors conclude that longitudinal studies are necessary to deduce in what way muscle mass depends on sleep behaviour.

Overall, it cannot be emphasized too strongly that risks of diverse endpoints may be masked, but can also be spuriously elevated, in cross-sectional studies: Misclassifying variant sleep facets over years and decades as constant is a study limitation—not specified as such by the authors—which can disallow causal interpretations.

DOI: 10.3238/arztebl.2016.0615a

REFERENCES

1. Foster RG, Wulff K. The rhythm of rest and excess. *Nat Rev Neurosci* 2005; 6: 407–14.
2. Foster RG. A sense of time: body clocks, sleep and health. *Dtsch Med Wochenschr* 2010; 135: 2601–8.
3. Buchmann N, Spira D, Norman K, Demuth I, Eckardt R, Steinhagen-Thiessen E: Sleep, muscle mass and muscle function in older people—a cross-sectional analysis based on data from the Berlin Aging Study II (BASE-II). *Dtsch Arztebl Int* 2016; 113: 253–60.

4. Erren TC, Morfeld P, Foster RG, Reiter RJ, Groß JV, Westermann IK: Sleep and cancer: synthesis of experimental data and meta-analyses of cancer incidence among some 1,500,000 study individuals in 13 countries. *Chronobiol Int* 2016; 33: 325–50.

Prof. Dr. med. Thomas C. Erren, M.P.H., Inga K. Westermann, Dr. med. J. Valérie Groß
Institut und Poliklinik für Arbeitsmedizin, Umweltmedizin und Präventionsforschung (IPAUP), Universität zu Köln
tim.erren@uni-koeln.de

PD Dr. rer. medic. Peter Morfeld
Institut und Poliklinik für Arbeitsmedizin, Umweltmedizin und Präventionsforschung (IPAUP), Universität zu Köln
Institut für Epidemiologie und Risikobewertung in der Arbeitswelt (IERA), Evonik Industries

Prof. Russel J. Reiter Ph. D.
UT Health Science Center, San Antonio, Texas

Conflict of interest statement

PD Morfeld has a personal relationship with Evonik Industries.

Prof Erren, Inga K Westermann, Dr Groß, and Prof Reiter declare that no conflict of interest exists.

In Reply:

We can only agree with the comments by Erren et al., that causal conclusions cannot be drawn on the basis of cross-sectional data. Overall, we therefore attempted throughout our entire manuscript to avoid any implications of causality. In order to identify causal associations—especially in such a complex subject—results from longitudinal studies are required. Furthermore, a detailed assessment of sleep characteristics is desirable, and this is feasible to a limited extent only when using a questionnaire. The question also remains unanswered about the time period for which sleep changes would have to prevail in order to prove associations with muscle mass, especially in older persons.

Still, cross-sectional analyses are not only legitimate but have important functions in medical research. The associations found here, which are supported by pre-studies and theoretical explanatory models, do not permit causal conclusions, but they enable the gaining of insights that will then have to be proved or refuted in longitudinal studies. In the context of the Berlin Aging Study II (BASE-II), all that is currently available is cross-sectional information; the planned longitudinal observational study may provide deeper insights into the underlying mechanisms. Overall we agree with your comments and support your call for longitudinal studies of this complex topic in order to figure out causalities.

DOI: 10.3238/arztebl.2016.0615b

REFERENCES

1. Buchmann N, Spira D, Norman K, Demuth I, Eckardt R, Steinhagen-Thiessen E: Sleep, muscle mass and muscle function in older people—a cross-sectional analysis based on data from the Berlin Aging Study II (BASE-II). *Dtsch Arztebl Int* 2016; 113: 253–60.

Prof. Dr. med. Elisabeth Steinhagen-Thiessen

Dr. med. Nikolaus Buchmann
Forschungsgruppe Geriatrie
Charité – Universitätsmedizin Berlin
nikolaus.buchmann@charite.de

Conflict of interest statement

The authors declare that no conflict of interest exists.