


Abnormalities in circulating lipids, body fat and body fat distribution have been repeatedly reported in shift workers. However, not all findings are consistent, and few researchers have examined the impact of shift work on the composite that forms the ‘metabolic syndrome’. Even though clinicians had occasionally observed changes in individual components of the metabolic syndrome, they did not combine these measures to obtain an overall view. Their aim was to cure the patients’ symptoms or to manage single adverse biochemical findings. Further, nearly all previous studies on aspects of the metabolic syndrome in shift workers were, until recently, of cross-sectional design, which limited possible interpretations on causal links.1

In this new article from Belgium, ‘Rotating shift work and the metabolic syndrome: a prospective study’ by De Bacquer et al.,2 a successfully designed follow-up study (>6 years), with reasonable confounding control, has been conducted. The results show adverse patterns of high-density lipoprotein cholesterol, triglycerides, blood pressure and anthropometrical data in subjects engaged in shift work compared with day workers. The authors show adverse outcomes both for combinations of metabolic data, using standard definitions of the metabolic syndrome, and for several isolated metabolic variables. Additionally, an anticipated dose–response effect is observed and discussed, although admittedly the exposure categories for shift workers are rather crude, or include only a few participants. The limitations of the study that might limit interpretation are well discussed and do not compromise the main findings. However, a difficulty arises with inclusion of the persons already affected by disease in the cohort as the direction of causality, and mechanisms underlying disease cannot be determined.

Why has it been, and why is it still, difficult to explore metabolic syndrome data similar to those found in the De Bacquer study among shift workers?
First, there are circadian variations in lipid and lipoprotein profiles, not only within but also between individuals, that have to be estimated and considered.

Secondly, evidence of elevated blood pressure in shift workers compared with day workers has not been convincingly demonstrated. However, a few cohort studies, notably from Japan, have confirmed a greater impact on hypertension progression in shift workers. Ambulatory blood pressure monitoring provides more complete information on blood pressure itself and its variation over a 24-h period when an individual is engaged in routine activities. Future studies may wish to employ this technique to provide a better assessment of the impact of shift work on blood pressure. Importantly, loss of nocturnal dipping of blood pressure has adverse consequences in terms of cardiovascular risk, and may not be evident from daytime measurements alone, therefore assessment of nocturnal blood pressure may be particularly important in this regard.

Thirdly, not only blood insulin levels, but also blood glucose levels have an intrinsic circadian rhythm that again may make the results difficult to interpret.

Finally, an important consideration in this regard is body fat and its distribution, as this is unlikely to be prone to serious diurnal variation, and, given its stability, and ease of measurement, provides a robust, longer-term view of the effects of shift work on cardiovascular risk factors. Of course, selection effects could still limit the value of associations between shift work and body fatness in cross-sectional studies.

Are there any other long-lasting metabolic outcomes due to shift work in the scientific literature? That cardiovascular disease risk is increased among shift workers has been repeatedly demonstrated during 20 years of research.

Risks of incident diabetes depend upon early changes in metabolic status, largely circulating glucose and insulin levels. If these metabolic changes are adversely affected by shift-work exposure, it is likely that the development of diabetes itself may also be adversely affected by shift work. But it is difficult to show an increased risk of a common diagnosis with a multifactorial aetiology in a given population. However, in a Swedish study of male workers working three rotating shifts, the risk of having diabetes as a diagnosis on the death certificate was increased and dose-dependent compared with day workers in the same factory. Similar findings have been observed in women engaging in rotating night shift work.

What are the major conclusions of all the present findings? It seems that different mechanisms can explain overt disease due to the risk factors that are affected by shift work. Several explanations are possible, but the exact biological mechanisms are still being discussed. However, increasing evidence suggests that disruption of the biological bodyclock could possibly be the villain here, at least in animal studies. Confirmation of these findings is required in human studies.

Sleep problems or sleep disturbances due to shift work are common in humans and are associated with negative metabolic outcomes, although the exact link between sleep disorder and insulin resistance requires further careful exploration.

Therefore, it is important to survey shift workers as a group more carefully and to give reasonable and sustainable health promotion advice. By doing so as physicians or other health advisers, we intervene in real working life to good purpose, and the necessity to do this has become more important today as a consequence of the De Bacquer study.

Conflict of interest: None declared.

References