Austin Journal of Endocrinology and Diabetes

Austin Publishing Group

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Editorial

Analysis of a Huge Accumulated Database of a General Population of People Who Underwent Medical Checkups: The Saitama Cardio metabolic Disease and Organ Impairment Study

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Received: February 05, 2014; **Accepted:** February 21, 2014; **Published:** February 26, 2014

Despite the endeavors of healthcare professionals worldwide, the incidences of cardio metabolic diseases and disorders affecting the artery, liver, kidney, pancreas, heart, brain, and lung have increased globally in recent years, including in Japan. In aging societies, in particular, chronic diseases with a high mortality rate have become prevalent. These diseases deteriorate activities of daily life in elderly people alongside a prolonged lifespan.

Numerous factors, including abnormal body weight (obesity or underweight) and unfavorable lifestyle factors (e.g., infrequent exercise, overeating, and skipping breakfast) contribute to the development and progression of cardio metabolic diseases, such as type 2 diabetes, hypertension, and dyslipidemia. However, the latent causes of such diseases and the mechanisms underlying the associations between these risk factors and diseases are still poorly understood. Furthermore, the potential treatments or early interventions, such as pharmacotherapy and dietary modifications, have not been fully examined.

The remarkable advances in information technology and medical equipment allow clinicians to collect and accumulate huge amounts of data over long periods of time from medical checkups. The resulting databases can be used by researchers to analyze the factors associated with diseases and simultaneously adjust for potential confounding factors in multivariate analyses.

In 2011, we implemented in a new composite research program, the Saitama Cardio metabolic Disease and Organ Impairment Study, which comprises cross-sectional and longitudinal studies [1]. This study involves individuals attending medical checkups in Saitama, near Tokyo, which has a total population exceeding 7 million people. The primary objective of our research is to explore the relationship between abnormal weight (obesity and underweight) and the etiology of cardio metabolic diseases because we believe that abnormal body weight has significant effects on the development, progression, and prognosis of key diseases, especially those related to diabetes and endocrine disorders [2,3] and because the associations involve multiple factors. Therefore, this multidisciplinary observational retrospective epidemiological study focuses on cardio metabolic diseases and related fields of internal medicine, as well as apparently unrelated fields such as orthopedics, otolaryngology, and ophthalmology. The study is also examining the possible effects of daily lifestyle factors, such as eating behavior and sleep duration.

One of the plausible strengths of our study is that the database includes a huge number of subjects without abnormal clinical data, a so-called healthy population, while a small proportion of subjects have borderline clinical findings consistent with preclinical/subclinical disease. The database also includes a very small proportion of subjects (typically 5–10%, depending on the disease) with overt disease and abnormal clinical data. These groups of subjects are either diagnosed for the first time with a disease based on the results of the medical checkup or they were diagnosed with a disease a long time before the checkups but avoided treatment until now.

When we deal with a vast amount of data in a cross-sectional study, we can find gradual changes in or effects of factors described above ranging from normal to subclinical and overt disease. Additionally, a broad spectrum of males and females aged 20–85 years have been enrolled, allowing us to consider or account for the possible effects of age on the etiology of a disease.

Longitudinal study conducted over several years allows us to examine, for example, the fluctuations in disease markers and relevant clinical factors. Such studies also allow us to speculate on the possible cause-and-effect relationship after determining the associations between changes in the prevalence of disease and its suspected causes, including abnormal clinical factors. If the overall prevalence of a condition or disease is <10%, we can use the odds ratio as an index of the relative risk [4].

Unfortunately, our composite study is not a randomized controlled trial or a prospective study, which are usually registered *a priori*. However, retrospective observational studies can also provide novel findings and provide insight into the potential etiology of a disease, as well as the mechanisms underlying fatal diseases, sometimes serendipitously.

Our ultimate goal is to help detect abnormal conditions associated with cardio metabolic diseases and organ impairment at an earlier

Citation: Nakajima K et al. Analysis of a Huge Accumulated Database of a General Population of People Who Underwent Medical Checkups: The Saitama Cardio metabolic Disease and Organ Impairment Study. Austin J Endocrinol Diabetes. 2014;1(2): 1008.

stage of the disease course than is currently possible based on the results of annual medical checkups. We also hope to determine the potential mechanism and possible treatments of these conditions, and provide further clinical relevance or support for conventional and routine tests performed in routine medical checkups. To achieve these goals, we have accumulated and are continuing to accumulate a huge amount of data from routine medical checkups performed to assess the clinical status of individual subjects, but have rarely been used for the purpose of multidisciplinary medical research in public healthcare settings.

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Austin J Endocrinol Diabetes - Volume 1 Issue 2 - 2014
ISSN : 2381-9200 | www.austinpublishinggroup.org

Citation: Nakajima K et al. Analysis of a Huge Accumulated Database of a General Population of People Who Underwent Medical Checkups: The Saitama Cardio metabolic Disease and Organ Impairment Study. Austin J Endocrinol Diabetes. 2014;1(2): 1008.