OBSERVATIONS

Prevalence of the Metabolic Syndrome in the Elderly Population According to IDF, WHO, and NCEP Definitions and Associations With C-Reactive Protein

The KORA Survey 2000

Recently, the International Diabetes Federation (IDF) has formulated a new worldwide definition for the metabolic syndrome (1). In contrast to the previous World Health Organization (WHO) and National Cholesterol Education Program (NCEP) criteria, abdominal obesity was considered as a prerequisite (2,3). Population-based epidemiological data on the metabolic syndrome in Europe are rare, and the prevalence in Germany is unknown. Thus, we estimated sex-specific prevalences of the metabolic syndrome according to the IDF, WHO, and NCEP definitions in the population-based KORA Survey 2000 (Augsburg, Southern Germany, 711 men and 662 women, age-group 55–74 years) (4). The study was approved by the local ethical committee, and all subjects gave written informed consent.

Among women, 24, 38, and 46% were categorized as having the metabolic syndrome based on the NCEP, WHO, and IDF criteria, respectively. Among men, the prevalence range was even wider (NCEP 28%, WHO 50%, IDF 57%). Overall, agreement between two definitions was moderate (men κ 0.41–0.45, women κ 0.44–0.55). Only 47% of men with IDF-defined metabolic syndrome were insulin resistant (homeostasis model assessment of insulin resistance [HOMA-IR] ≥3.6), as compared with 64 and 61% of those with NCEP- and WHO-defined metabolic syndrome. Similar results were observed in women (IDF 41%, NCEP 52%, WHO 60%).

In men, IDF-defined (odds ratio 1.5 [95% CI 1.05–2.2]), WHO-defined (1.7 [1.3–2.2]), and NCEP-defined (2.0 [1.5–2.5]) metabolic syndrome were significantly associated with the odds of having increased C-reactive protein (≥3 mg/l) in logistic regression adjusting for age, smoking, alcohol intake, physical activity, and educational status. In women, the IDF-defined metabolic syndrome also showed the weakest association with elevated C-reactive protein (IDF 2.8 [2.0–4.1], WHO 3.2 [2.1–4.7], NCEP 3.4 [1.6–7.1]), which persisted when including all three metabolic syndrome criteria in one model.

The metabolic syndrome affects between one-quarter and one-half of the elderly population in Southern Germany, depending on the definition. The higher prevalence of the IDF-defined metabolic syndrome most likely reflects both the lower cutoffs for abdominal obesity and the larger importance given to this risk factor. On the other hand, less than half of those having IDF-defined metabolic syndrome showed insulin resistance according to HOMA-IR, which was lower than the prevalence among those with NCEP- and WHO-defined metabolic syndrome. In both sexes, the IDF criteria showed a weaker association with the atherosclerosis risk marker C-reactive protein than the other two definitions. Thus, the new IDF metabolic syndrome criteria may possibly lead to a larger misclassification with respect to the future risk of type 2 diabetes or cardiovascular disease in the elderly population than the previous criteria.

WOLFGANG RATHMANN, MD, MSPH[1]
BURKHARD HAASTERT, PHD[1]
ANDREA ICKS, MD, MPH[1]
GUIDO GIANI, PHD[1]
ROLF HOLLE, PHD[2]
WOLFGANG KOENIG, MD[3]
HANNELORE LÖWEL, MD[4]
CHRISTA MEISINGER, MD[4]

From the [1]Institute of Biometrics and Epidemiology, German Diabetes Center, Leibniz Institute at the Heinrich Heine University, Düsseldorf, Germany; [2]GSF National Research Center for Environment and Health, Institute of Health Economics and Health Care Management, Neuherberg, Germany; [3]University of Ulm Medical Center, Ulm, Germany; and [4]GSF National Research Center for Environment and Health, Institute of Epidemiology, Neuherberg, Germany.

Address correspondence to Prof. Dr. Wolfgang Koenig, Department of Internal Medicine II, University of Ulm Medical Center, Robert-Kochstr. 8, D-89081 Ulm, Germany. E-mail: wolfgang.koenig@medizin.uni-ulm.de.

References

1. International Diabetes Federation: The IDF consensus worldwide definition of the metabolic syndrome [article online]. Available at http://www.idf.org. Accessed 15 June 2005.
2. World Health Organization: *Definition, Diagnosis and Classification of Diabetes Mellitus and Its Complications: Report of a WHO Consultation*. Geneva, World Health Org., 1999 (WHO/NCD/NCS 99.2)
3. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults: Executive summary of the third report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA* 285:2486–2497, 2001
4. Rathmann W, Haastert B, Icks A, Löwel H, Meisinger C, Holle R, Giani G: High prevalence of undiagnosed diabetes mellitus in Southern Germany: target populations for efficient screening: the KORA Survey 2000. *Diabetologia* 46:182–189, 2003

Flare-Up of Serum Amylase Prior to Onset of Lethal Ketoacidosis in a Patient With Fulminant Type 1 Diabetes

Fulminant type 1 diabetes has been classified from a traditional type 1 diabetes and characterized by *1)* abrupt onset, *2)* diabetic ketoacidosis (DKA) at diagnosis, *3)* lack of islet-related autoantibodies, *4)* elevated pancreatic enzymes, and *5)* difficulty in diagnosis during routine screenings (1–4). Flare-ups of some pancreatic exocrine enzymes have been reported for a patient with fulminant type 1 diabetes before DKA onset (3). However, those enzymes are not measured in routine blood analyses.

This report describes a case of fulminant type 1 diabetes with a flare-up of serum amylase before DKA onset, which is easily detectable on routine emergent blood examinations. We discuss the importance of hyperamylasemia at initial diagnosis of the disease.

A 40-year-old pregnant female patient presented with malaise, sore throat, and cough with neither abdominal nor back pain at 36 weeks of gestation. She was in no acute distress. Her white blood cell count was 9.5×10^9/l, C-reactive protein 18 mg/l, plasma glucose 60 mg/dl, and serum amylase 683 IU/l. Ultrasonography yielded no medically or obstetrically abnormal findings. Lack of signs of acute pancreatitis suggested acute tonsillitis or a common cold as a preliminary diagnosis.

Five days after the initial visit, she was admitted to our hospital in a coma. Her blood pressure was 129/86 mmHg; her pulse was 70 bpm. Arterial blood gas analysis showed pH 7.055 and base excess $= -17.6$ mEq/l. Her marked elevation of ketone bodies reflected severe ketoacidosis. Plasma glucose was 936 mg/dl, HbA_{1c} 5.4%, serum C-peptide 0.15 ng/ml, and serum amylase 307 IU/l. Ultrasonography revealed an intrauterine fetal death and no abnormalities in her pancreas. After treatment for ketoacidosis improved her consciousness level, an emergent cesarean section was conducted. Serological testing for autoantibodies was later reported as negative for islet cell antibodies, glutamic acid decarboxylase autoantibodies, and insulinoma-associated protein 2 antibodies. Final diagnosis was made as fulminant type 1 diabetes.

A diagnosis of fulminant type 1 diabetes is not made without an initial occurrence of DKA (1–4). However, timely measurement of serum amylase in the appropriate high-risk group for fulminant type 1 diabetes might enable early diagnosis. Sekine et al. (3) recently reported the flare-up of trypsin, elastase I, and lipase before DKA occurrence in a patient who had never been diagnosed as having type 1 diabetes. In our case, the serum amylase concentration flared-up before DKA occurrence. It decreased gradually from 683 to 307 IU/l at the onset, which showed the same pattern of response as that reported by Sekine et al. (3), who provided no amylase levels. In patients with fulminant type 1 diabetes, hyperamylasemia at or after DKA onset is of diagnostic value (1–4). However, hyperamylasemia without the features of fulminant type 1 diabetes (absence of autoantibodies and normal HbA_{1c}) cannot be used to diagnose this disease because elevated amylase levels (although mostly of salivary gland origin) frequently accompany autoimmune DKA. On the other hand, we have also provided the time course of serum amylase before DKA onset, which might be of predictive value.

The cause of fulminant type 1 diabetes involves viral infection and pregnancy because flu-like symptoms are frequent (1,2), and some viral DNA have been detected in patients (2–4). Apparently, the disease's incidence increases in the latter term of pregnancy (2,4). In conclusion, pregnant women presenting with flu-like symptoms should have serum amylase levels measured. Subsequently, the time course of serum amylase concentration should be followed-up carefully to prevent this concealed life-threatening disease.

JIN TAKAHASHI, MD
KOJI NISHIJIMA, MD
KEN-ICHI SHUKUNAMI, MD
AKIRA YAKIHARA, MD
TORU SENDA, MD
YOSHIO YOSHIDA, MD
FUMIKAZU KOTSUJI, MD, PHD

From the Department of Obstetrics and Gynecology, University of Fukui, Fukui, Japan.
Address correspondence to Koji Nishijima, MD, Department of Obstetrics and Gynecology, University of Fukui Matsuoka-cho, Yoshida-gun Fukui 910-1193, Japan. E-mail: kojigyne@fmsrsa.fukui-med.ac.jp.

● ●

References
1. Imagawa A, Hanafusa T, Miyagawa J, Matsuzawa Y: A novel subtype of type 1 diabetes mellitus characterized by a rapid onset and an absence of diabetes-related antibodies. *N Engl J Med* 342:301–307, 2000
2. Imagawa A, Hanafusa T, Uchigata Y, Kanatsuka A, Kawasaki E, Kobayashi T, Shimada A, Shimizu I, Toyoda T, Maruyama T, Makino H: Fulminant type 1 diabetes: a nationwide survey in Japan. *Diabetes Care* 26:2345–2352, 2003
3. Sekine N, Motokura T, Oki T, Umeda Y, Sasaki N, Hayashi M, Sato H, Fujita T, Kaneko T, Asano Y, Kikuchi K: Rapid loss of insulin secretion in a patient with fulminant type 1 diabetes mellitus and carbamazepine hypersensitivity syndrome. *JAMA* 285:1153–1154, 2001
4. Shimizu I, Makino H, Osawa H, Kounoue E, Imagawa A, Hanafusa T, Kawasaki E, Fujii Y: Association of fulminant type 1 diabetes with pregnancy. *Diabetes Res Clin Pract* 62:33–38, 2003

Betel Nut Chewing Is Independently Associated With Urinary Albumin Excretion Rate in Type 2 Diabetic Patients

Betel nut chewing is associated with increased production of reactive oxygen species and inflammatory mediators (1), which could potentially cause kidney damage (2). This study investigated whether betel nut chewing could increase urinary albumin excretion rate (UAER) in 572 Taiwanese men (aged ≥45 years) with type 2 diabetes. Among them, 65 were chewers ≥5 years and 507 were nonchewers. Urinary albumin and creatinine concentrations, fasting plasma glucose and serum total cholesterol, triglycerides, and creatinine were measured as described elsewhere (3). Urinary albumin-to-creatinine ratio (ACR) ≥30.0 μg/mg was defined as albuminuria. Creatinine clearance (Ccr) was calculated from the Cockcroft-Gault formula (3). Statistical analyses were performed considering confounders including age, diabetic duration, smoking, BMI, blood pressure, metabolic control, and Ccr.

Results showed that chewers were significantly younger (56.4 ± 8.6 vs. 65.0 ± 9.5 years), had higher prevalence of smoking (89.2 vs. 62.2%), higher BMI (25.7 ± 3.5 vs. 24.8 ± 3.2 kg/m^2), poorer glycemic control (176.0 ± 71.9 vs. 158.8 ± 61.6 mg/dl), higher ln(ACR) (4.0 ± 1.7 vs. 3.5 ± 1.5 μg/mg), and higher prevalence of albuminuria (61.5 vs. 47.5%). However, diabetic duration, systolic and diastolic blood pressures, cholesterol, triglycerides, and Ccr were not significantly different. In multiple linear regression, the adjusted regression coefficient for ln(ACR) associated with betel nut chewing was 0.427 ($P < 0.05$). The multivariate-adjusted odds ratio for albuminuria in chewers versus nonchewers was 2.024 (95% CI 1.129–3.630). In stepwise models of multiple linear and logistic regression, betel nut chewing was selected as an independent variable associated with elevated ln(ACR) and albuminuria, respectively. Therefore, the kidney-damaging effect of betel nut chewing was consistent and independent of confounders.