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Original article

Prevalence of type 2 diabetes and other cardiovascular risk factors in Mayotte in 2008: The MAYDIA study

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Abstract

Aim. – Mayotte, a French overseas territory located in the Indian Ocean, has never had a previous estimate of diabetes prevalence, but has recently undergone socioeconomic changes leading to lifestyle modifications. For this reason, a survey was carried out in 2008 to estimate the prevalence of diabetes and cardiovascular risk factors in the island's population.

Methods. – A three-step, randomized sample of 1268 individuals, aged 30–69 years, was home-screened, using capillary blood glucose and capillary HbA_{1c}, weight, height, waist circumference and two blood-pressure measurements. Those with a history of diabetes, glucose $\geq$1 g/L (fasting) or $\geq$1.40 g/L (non-fasting), or $HbA_{1c} \geq 6\%$, and a subgroup of those with normal results were examined at a healthcare centre to measure venous HbA_{1c} and glucose, and to diagnose diabetes, using an oral glucose tolerance test.

Results. – The weighted prevalence of diabetes (venous plasma glucose $\geq$1.26 g/L at fasting and/or $\geq$2 g/L at 2 h, or treatment with oral hypoglycaemic agents or insulin) was 10.5% (95% CI: 8.2–13.4%). This increased with age from 3% at age 30–39 years to 26% at age 60–69 years, with no gender differences. Also, more than 50% of those with diabetes were unaware of it, while half of those treated for diabetes still had HbA_{1c} levels >7%. The prevalence of overweight (BMI: 25–29 kg/m^2) was estimated to be 35% in men and 32% in women, while obesity ($\geq$ 30 kg/m^2) was estimated to be 17% in men and 47% in women.

Conclusion. – The high prevalence of obesity combined with a high prevalence of diabetes indicates a potential for further increases in the prevalence of diabetes and cardiovascular disease in Mayotte. Preventative action against obesity, diabetes and hypertension is required now, as well as plans for appropriate healthcare delivery in the island.

Keywords: Type 2 diabetes; Obesity; Hypertension; Epidemiology; Prevalence; Indian Ocean; Mayotte

Résumé

Prévalence du diabète de type 2 et des autres facteurs de risque cardiovasculaire à Mayotte, océan Indien, 2008. Étude MAYDIA.

Objectifs. – Mayotte est une collectivité territoriale française pour laquelle on ne dispose pas d'estimation de la prévalence du diabète et qui a vécu une transition socioéconomique récente qui a entraîné une modification des modes de vie. Une étude transversale en population générale a été réalisée en 2008 afin d'estimer la prévalence du diabète et des facteurs de risque cardiovasculaire dans la collectivité territoriale française de Mayotte.

Méthodes. – Un échantillon aléatoire de 1268 personnes âgées de 30 à 69 ans a été dépisté à domicile en réalisant une mesure de la glycémie et de l'hémoglobine glyquée sur sang capillaire ainsi que des mesures anthropométriques et deux mesures de pression artérielle. Les diabétiques connus et les personnes qui avaient une glycémie capillaire supérieure à 1 g/L à jeun ou supérieure à 1,4 g/L non à jeun ou une hémoglobine glyquée supérieure à 6 % ainsi qu'un sous-groupe de témoins sans anomalie glycémique ont été convoqués au centre de santé le plus proche de leur domicile pour une confirmation du diagnostic sur sang veineux.

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Résultats. – La prévalence du diabète (glycémie sur plasma veineux supérieure ou égale à 1,26 g/L à jeun et/ou supérieure ou égale 2 g/L après deux heures ou un diabète traité pharmacologiquement) s'élevait à 10,5 %, IC à 95 % [8,2–13,4]. La prévalence augmentait avec l'âge, de 3 % entre 30 et 39 ans à 26 % entre 60 et 69 ans. Plus d'une personne sur deux ignorait qu'elle était diabétique et l'équilibre glycémique n'était pas atteint ($HbA_{1c} > 7$ %) pour la moitié des diabétiques déjà connus. Le surpoids (IMC 25–29 kg/m^2) concernait 35 % des hommes et 32 % des femmes, et l'obésité (IMC $\geq$ 30 kg/m^2) concernait 17 % des hommes et 47 % des femmes.

Conclusion. – La prévalence élevée de l'obésité, en particulier chez les femmes, laisse craindre une augmentation importante du diabète à Mayotte dans le futur. La mise en place d'actions de prévention contre l'obésité et le diabète ainsi que le dépistage de l'ensemble des facteurs de risque cardiovasculaire et l'amélioration des conditions de prise en charge est préconisée.

Mots clés : Épidémiologie ; Population générale ; Prévalence ; Diabète de type 2 ; Obésité ; Hypertension ; Océan Indien ; Mayotte

1. Introduction

According to the World Health Organization (WHO), the prevalence of diabetes is increasing in every part of the world, and the impact is even greater in countries experiencing major socioeconomic development [1]. In mainland France, the prevalence of diabetes was estimated at 5.1% in 2006 in those aged 18–74 years on screening for fasting blood glucose [2], which is a low rate among European countries [3], and around 20% of cases had been undiagnosed. Also, the prevalence of impaired fasting glucose was estimated at 5.6%. Based on data from the French health insurance system, the prevalence of diabetes treated with oral hypoglycaemic agents or insulin was estimated to be 3.9% in 2007, with an estimated annual increase of 5.7% between 2000 and 2005 [4].

Compared with mainland France, the prevalence of diabetes is two to three times higher in the French overseas territories in the Indian Ocean and Caribbean islands [5]. This may be due to recent changes in the nutrition and lifestyles of young populations that may be more sensitive to such changes, as well as to their different genetic backgrounds or aetiopathogenesis. In the Indian Ocean, the REDIA study carried out in the French island of Reunion in 1999–2001 [6] resulted in an estimated 17.7% prevalence of diabetes, based on oral glucose tolerance tests (OGTTs), in a population aged 30–69 years. Furthermore, the percentage of undiagnosed cases was estimated at 36% (40% in men and 30% in women), and the prevalence of glucose intolerance at 13.4%. Estimates from non-French islands, which have been more widely studied for diabetes, are also high and on the increase [7].

Mayotte is a French overseas territory in the Indian Ocean that is part of the Comoros archipelago. Located 1500 km from Reunion Island, it has a different legal status from that of Reunion in relation to France. It includes two main islands and other minor ones, comprising an area of 374 km^2, and has a tropical climate. The population was estimated at 186,287 in 2007, with a high density of 498 inhabitants per kilometer square due to high birth and immigration rates from other islands in the archipelago. The population is young, with 54% of people <20 years of age and only 4% aged >60 years. Public healthcare delivery relies on a public hospital (Mamoudzou), five major health centres and 14 dispensaries. Individual healthcare relies on fewer than 20 general practitioners. According to local health professionals, diabetes was a major health problem in 2007, although no estimate of its prevalence was available at the time. For this reason, a survey was requested by the local health authorities to estimate the prevalence of diabetes and cardiovascular risk factors.

2. Methods

The present survey – dubbed MAYDIA -– was organized by the regional office of the French Institute of Health Surveillance (*institut de Veille-Sanitaire* [FIHS]). Its scientific committee included epidemiologists from the FIHS and the National Institute of Health and Medical Research (*Institut national de la santé et de la recherche médicale* [INSERM]) from mainland France and Reunion Island, and local health authorities and health professionals from Mayotte itself. The survey was approved by the French ethics committee, and informed consent was obtained from each survey participant.

The MAYDIA survey design was based on previous surveys carried out in Reunion [6] and in New Caledonia [8] to allow comparisons. MAYDIA took place from January to August 2008 (ending before Ramadan), and included adults aged 30–69 years living in Mayotte for at least 5 years. Those with major diseases (cancer, gastric surgery, major infectious disease) and pregnant women were excluded because of the potential glycaemic and nutritional changes related to those conditions, whereas individuals with chronic pancreatic disease, a potential cause of diabetes, were included. On the basis of 2007 census data, a three-step sampling procedure selected 72 of the 631 districts according to the proportional probability of the number of dwellings in each district. The aim was to include 17 dwellings per district using simple random sampling and to select one person per dwelling, according to the Kish method [9]. Overall, 3736 dwellings were selected to take into account the estimated rate of refusal (20%) and size of the eligible population per district.

The first step in the survey (Fig. 1) was home recruitment, which was conducted in each of the 3736 selected dwellings. In 1802 dwellings (48%), there were people who met the inclusion criteria; in 1256 other dwellings (34%), no one met the inclusion criteria (mainly because of age, as the Mayotte population is very young, as previously mentioned) and, in the remaining 678 dwellings (18%), no information was available to justify exclusion of these dwellings (refusal to communicate or absence of any inhabitants on several visits). The second step, home screening, involved 1268 individuals, equivalent to a 70% response rate in the 1802 selected dwellings. The third step was the offer of a