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Research Article

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Diabetes in Elderly Inpatients: Sociodemographic and Clinical Features in Internal Medicine and Geriatrics Department

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Abstract

Objectives: *Describe the sociodemographic and clinical features of elderly patients with diabetes who were admitted to an internal medicine and geriatrics department.*

Patients and methods: *In a retrospective study we collected the medical charts of patients admitted between 1 January, 2004, and 31 December 2007, to the Internal Medicine and Geriatrics Department of the Sainte Marguerite Teaching Hospital, Marseille, France. Patients aged 65 years or older who had diabetes according to the 1997 American Diabetes Association criterion of two fasting blood glucose levels equal to or greater than 1.26 g/L were involved in the study. We recorded the results of medical and the standardized geriatric evaluation routinely conducted in all patients admitted to our department. This evaluation includes assessments of depression, cognitive function, self-sufficiency, nutritional status, and co-morbidities through valided French version.*

Results: *We studied 145 diabetics on 1309 older patients (11.8%), average age to 79.6 years, the female was net, over three-quarters were dependent on their environment. In addition to Metabolic complications, falls and cardiovascular pathologies were frequent reasons for consultation. The standardized geriatric assessment find a cognitive impairment and dependence in respectively 61.5% and 60.7% of cases. Depression was found in 43.4% cases undernutrition in 25.5% of the cases. The co-morbidity were dominated by heart failure and pressure sores.*

Conclusion: *This comparative study shows diffenrences in term of morbidity and mortality in two populations of older patients. Polypharmacy, hypoglycemia, falls and cognitive impairment higher in diabetic patients cause loss of autonomy. Geriatric evaluation and better management of diabetes is necessary in diabetic patients to prevent this situation.*

Keywords: Diabetes, Elderly, Internal Medicine, Morbidity, Mortality.

Introduction

Diabetes in elderly individuals constitutes a major public health burden throughout the world, given its high prevalence and association with co-morbid conditions [1]. Among individuals older than 65 years of age, 10% may have diabetes (20% after 80 years of age) and a further 10% intolerance to glucose [2]. The number of elderly diabetic patients has risen in recent years as a result of both the aging of the population, since the risk of diabetes increases with advancing age, and a true increase in the incidence of diabetes. Diabetes is the sixth most common cause of death among older adults, with cardiovascular events contributing most of the diabetes-related deaths. A high cardiovascular risk strongly predicts loss of self-sufficiency and alterations in quality of life [3]. In elderly individuals, pre-existing or newly developed diabetes is often overshadowed by the presence of multiple co-morbidities and by the attendant polypharmacy. This situation may be particularly common among inpatients [4]. However, few studies have focused on elderly inpatients with diabetes. Whereas diabetes in younger patients is managed by specialists in the relatively narrow field of endocrinology, elderly diabetic patients are managed within the far broader field of internal medicine. This shift reflects

the need for careful attention in older patients to associated effects, potential drug-drug interactions, the cascade effect, and other characteristics of the elderly. Thus, the management of diabetes in the elderly raises specific challenges.

To optimize the management of diabetes in the elderly, data on the specific features of this patient population are needed. We therefore designed a study to describe the sociodemographic and clinical features of elderly patients with diabetes who were admitted to an internal medicine and geriatrics hospitalization.

Patients and Methods

We retrospectively reviewed the medical charts of patients admitted between 1 January, 2004, and 31 December 2007, to the Internal Medicine and Geriatrics Department of the Sainte Marguerite Teaching Hospital, Marseille, France. We included consecutive patients aged 65 years or older who had diabetes according to the 1997 American Diabetes Association criterion of two fasting blood glucose levels equal to or greater than 1.26 g/L. Of the 1309 patients admitted during the study period and aged 65 years or older, 145 met this criterion.

Data on these 145 patients were abstracted from the medical charts using a standardized form. For each patient, we recorded age, sex, and living arrangements (healthcare institution / nursing home or home; and help from family, healthcare professionals, or assistants). We also recorded the results of the standardized geriatric evaluation routinely conducted in all patients admitted to our department. This evaluation includes assessments of depression, cognitive function, self-sufficiency, nutritional status, and co-morbidities. Depression was assessed using the Mini-Geriatric Depression Scale (Mini-GDS) (appendix 1) and defined as a score greater than 0 on the 0-1 scale. To assess cognitive function, patients completed the Mini-Mental State Examination (MMSE) or Folstein test (appendix 2), which assesses memory, orientation, concentration, mental arithmetic, language, and praxis [5,6]. Scores lower than 24/30 indicates significant cognitive impairment of variable severity. Two scales were used to assess self-sufficiency, the Activities of Daily Living scale (ADL), which evaluates the ability to perform the basic activities of daily living; and the Instrumental Activities of Daily Living scale (IADL) (appendix 3), which investigates everyday activities of greater complexity. Dependency was defined as an ADL score no greater than 3/6 or as an IADL score no greater than 2/4 [7-9]. The Mini Nutritional Assessment was used to assess nutritional status (appendix 4) [10]. With this simple and well validated tool, scores lower than 11/14 indicates malnutrition. Finally, cardiovascular risk factors were assessed and the patients were examined for co-morbidities associated with diabetes including chronic organ failures (congestive heart failure, kidney failure, and respiratory failure), solid cancer and haematological malignancies, systemic disorders, and pressure sores.

The group of diabetic patients was compared to a control group composed of 150 patients. These 150 patients were selected at random among the 1164 non-diabetic patients aged 65 years or older who were admitted to our department during the study period.

Statistical analysis

Percentages were compared using the chi-square test and means using Student's test. Values of *p* smaller than 0.05 were considered significant. Statistical tests were performed using SPSS version 10.1 on Windows (SPSS Inc., Chicago, IL, USA).

Results

Of the 1309 patients admitted during the study period, 145 (11.1%) had diabetes. Their mean age was 79.6 years (range, 65-101 years), compared to 81.2 years (65-105 years) in the control group (p=0.238). The distribution of the diabetic patients by age and sex is shown in **(Table 1)**. The sex ratio was 0.58 in the group of diabetic patients and 0.72 in the control group (p=0.338).

Table 1: Distribution of diabetic patients by sex and age. The data are the numbers of patients (%).

Age groups	Women n=92 (63.4%)	Men n=53 (36.6%)	Total n=145 (100%)
65-74 years	21 (22.8%)	19 (35.8%)	40 (27.6%)
75-84 years	53 (57.6%)	21 (39.6%)	74 (51.03%)
≥ 85 years	18 (19.6%)	13 (24.5%)	31 (21.4%)

The data on living arrangements by age in the diabetic patients are reported in **(Table 2)**. The reasons for hospital admission in the group of diabetic patients and in the controls are reported in **(Table 3)**. **(Table 4)** shows the age-related disorders and co-morbidities.

Table 2: Distribution of the 145 diabetic patients by living arrangements and by age. The data are the number of patients.

Age groups	Institution, nursing home n=21	At home, with help n=101	At home, without help n=23
65-74 years	3	36	7
75-84 years	11	48	12
≥85 years	7	17	4

Table 3: Reasons for admission in the diabetic patients and controls. The data are the numbers of patients (%)

Reasons for admission	Diabetic patients, n=145	Non-diabetic controls, n=150	*p* value
Falls	20 (13.8)	11 (7.3)	<0.001*
hypoglycemia	18 (12.4)	00	<0.0001*
Neuropsychiatric disorders	18 (12.4)	22 (14.7)	0.371
Evidence of infection	12 (8.3)	12 (8.0)	0.465
Cancer	12 (8.3)	15 (10.0)	0.272
Haematological disorders	-	13 (8.7)	<0.0001*
Decline in general health	10 (6.9)	17 (11.3)	<0.001*
Gastrointestinal disease	9 (6.2)	3 (2.0)	<0.001*
Malaise and dizziness	8 (5.5)	8 (5.3)	0.47
Respiratory disease	6 (4.1)	14 (9.3)	0.068
Cardiovascular disease	6 (4.1)	2 (1.3)	<0.01*
Pain syndromes	5 (3.5)	6 (4.0)	0.315
Chronic kidney failure	4 (2.8)	00	<0.0001*
Anaemia	4 (2.8)	7 (4.7)	0.07
Water and electrolyte disturbances	3 (2.1)	3 (2.0)	0.46
Miscellaneous	10 (6.9)	17 (11.3)	0.082

Table 4: Age-related disorders and co-morbidities in the 145 diabetic patients and 150 controls

Disorders	Clinical characteristics	Diabetic Patients n=145	Non-diabetic controls n=150	*p* value
Age-related disorders	Depression	63 (43.4)	79 (52.7)	0.113
	Cognitive impairment	88 (61.5%)	63 (42%)	<0.001*
	Dependency	88 (60.7%)	76 (50.7%)	0.083
	Malnutrition	37 (25.5%)	68 (45.3%)	<0.0001*
Cardiovascular risk factors	Hypertension	93 (64.1%)	59 (39.3%)	<0.0001*
	Dyslipidaemia	68 (46.9%)	16 (10.7%)	<0.0001*
	Obesity	68 (46.9%)	18 (12%)	<0.0001*
	Current smoker	26 (17.9%)	26 (17.9%)	0.462
Malignancies	Haematological malignancies	12 (8.3%)	9 (6%)	0.237
Malignancies	Solid tumours	7 (4.8%)	16 (10.7%)	<0.001*
Chronic organ dysfunctions	Congestive heart failure	32 (22.1%)	16 (10.3%)	0.008*
	Renal failure	23 (15.9%)	26 (17.3%)	0.734
	Respiratory failure	13 (9%)	24 (16%)	0.068
Systemic diseasesa		10 (6.9%)	7 (4.7%)	0.198
Pressure sores		15 (10.3%)	3 (2%)	<0.001*

[a]Sarcoidosis, myasthenia, giant cell arteritis, thrombotic microangiopathy, dermatopolymyositis
*significant differences ($p<0.05$).

The rate of cognitive impairment increased with disease duration but was independent from the HbA1c increase (Table 5). When we separated the diabetic patients in two groups based on disease duration of 20 years or less versus more than 20 years, we found that the rate of cognitive impairment was significantly lower in the shorter-duration group (56% vs. 75%, p=0.002. The rate of cognitive impairment was not significantly different between the two groups defined based on an HbA1c level lower than 8% or equal to or greater than 8% (62.8% and 53.1%, respectively; p=0.403) **(Table 5)**.

Table 5: Influence of disease duration and metabolic control on the rate of cognitive impairments in the 145 older patients with diabetes. The data are the numbers of patients (%).

	Cognitive impairments n=88	*p* value
Diabetes duration		
≤20 years	61 (69%)	0.002
>20 years	27 (31%)	
HbA1c level		
≤8%	71 (81%)	0.403
>8%	17 (19%)	

Discussion

Among our inpatients aged 65 years or older, 11.1% had diabetes. As expected in a population of older individuals, females predominated among the diabetic patients (sex ratio, 0.58). Although 85.5% of the diabetic patients lived at home, more than two-thirds of these patients reported needing outside help to manage their diabetes. The main reasons for admission were falls, hypoglycaemia, and neuropsychiatric disorders; whereas among the non-diabetic controls the main reasons for admission were neuropsychiatric disorders, a decline in general health, and cancer. Compared to the control group, the diabetic group was characterized by a higher rate of cognitive impairment and by lower rates of malnutrition and cancer. As expected, more diabetic patients than controls had hypertension, heart failure, dyslipidaemia, obesity, and pressure sores.

The 11.8% rate of diabetes among our older inpatients was similar to rates found in other recent studies in France, namely, 10.3% in older community-dwelling adults in the 1997 PAQUID study, 11.2% in a nationwide survey conducted by the French health insurance agency in 2000, and 10.3% in older institutionalized individuals [11-13]. Also, a study of older community-dwelling individuals in the UK found a prevalence of 10.5% [14]. A considerably higher prevalence of 16% was noted in the older age groups of 13 European population-based cohorts in the DECODE (Diabetes Epidemiology: Collaborative Analysis of Diagnostic Criteria in Europe) study and of the 1999-2000 National Health and Nutrition Examination survey in the US [15,16]. We found twice as many women than men among our older patients with diabetes, in keeping with data from the community-based PAQUID study [11]. This distribution reflects the sex ratio in the overall population of older inpatients during the study period and in the general population of older individuals in France [17]. A similar predominance of women was found among older diabetic patients in the DECODE study in Europe [15].

Older patients with diabetes often have multiple co-morbidities that lead to complex reasons for admission. Falls contributed a larger proportion of admissions in our diabetic patients (13.8%) than in the controls (7.3%), in keeping with previous data showing that diabetes increased the risk of falls, in particular by causing visual disturbances [17]. In a study conducted in a short-stay geriatric department in France in 2002, cardiovascular disease was the leading reason for admission (16.3%), whereas falls led to only 6.9% of admissions [18].

Diabetes increases the frailty and disabilities that develop with advancing age, thereby decreasing the chances of successful aging. The main age-related impairments involve cognition, depression, dependency, nutrition, and co-morbidities. Cognitive impairment

was significantly more common in our patients with diabetes than in the controls. Although no such difference was noted in the PAQUID study, data from several observational and interventional studies indicate higher rates of cognitive impairment and dementia among diabetic patients [19].

Table 6: Prevalence of diabetes in older individuals (outpatients throughout the world)

Geographic area	1980	1990	2000
Europe		11.2%	16%
France	10.3%		
UK	10.5%		
USA		11.3%	16%
Canada		M: 12% F: 7.8%	M: 15.8% F: 12.8%
Asia			M: 9.2-19.9% F: 8.1%
Africa			5.2%-11.6%

We found that the rate of cognitive impairment increased with disease duration but was unaffected by the HbA1c level, whereas earlier data suggest that the severity of the cognitive impairments may correlate with both disease duration and metabolic control [20]. Although the discrepancies across studies offer room for controversy, diabetes is a well-established risk factor for vascular dementia [21]. In contrast, there may be little or no association between diabetes and Alzheimer's disease [22]. Malnutrition was significantly more common among our controls than among our diabetic patients. A possible explanation to this finding is the higher prevalence of obesity and overweight in the group of diabetics combined with the higher prevalence of solid cancers and declining general health among the controls. Older age is associated with depression, and the association is stronger in patients with than without diabetes. In our study, depression was found in similar proportions of diabetic and non-diabetic patients. Among our diabetic patients who lived at home, 69.7% reported being dependent on others to manage their diabetes. The proportions of patients with dependency were similar in the diabetic and non-diabetic groups. Factors that may have contributed to dependency in the diabetic patients include cognitive impairments and cardiovascular disease, most notably strokes and congestive heart failure. In the non-diabetic patients, dependency may have been related to poor general health, malnutrition, respiratory failure, and cancer.

Type 2 diabetes is usually associated with other cardiovascular risk factors such as hypertension, dyslipidaemia and, obesity. Thus, we found higher rates of hypertension, dyslipidaemia, obesity, and heart failure among our diabetic patients than among the non-diabetic controls. In the Framingham cohort, overweight was twice as common among diabetics than among non-diabetics after 60 years of age, with no difference between men and women [20]. A recent study showed that mortality decreased with increasing levels of BMI and physical activity. Chronic congestive heart failure, the leading co-morbidity in our study, was twice as common among diabetic patients than among controls. In a study of patients with congestive heart failure, 22% of men and 24% of women had diabetes [23]. The development of heart failure in patients with diabetes may correlate with the degree of metabolic control [23]. Diabetic heart disease is a form of cardiomyopathy that cannot be ascribed to hypertension, coronary artery disease, or other known heart diseases. This entity was described more than three decades ago but remains a focus of controversy [24]. Renal failure was present in similar proportions of patients in our two groups. Respiratory failure was less common in our diabetic patients than in our controls, although the proportion of smokers was similar in the two groups.

Among co-morbidities, systemic diseases were present in 6.9% and haematological malignancies in 8.3% of the diabetic patients in our study. Glucocorticoid therapy is needed to treat many of these diseases, most notably the vasculitides and lymphoma. Glucocorticoids increase the risk of poor metabolic control and may exacerbate the diabetes. Factors associated with the development of diabetes should be sought carefully before starting treatment with diabetes-inducing medications such as glucocorticoids. In our study, however, systemic diseases were found in similar proportions of diabetic and non-diabetic patients. Solid cancers were more common among the non-diabetic patients. In the PAQUID study, in contrast, cancer was more common among the diabetic patients, who had a higher mortality rate as a result [11].

Pressure sores were significantly more common in our group of diabetic patients than in the controls. The development of pressure sores in older individuals is a multifactorial process [25,26]. In addition to the diabetes itself, the higher rates of obesity and stroke in the group of diabetic patients may explain the higher rate of pressure sores. The geriatric assessment tools are essential for early diagnostic of frailty in patients with morbidity like diabetes; However a specific education program is also necessary in diabetic patients manage in geriatrics department [27-31].

The main weakness of our study is its retrospective single-centre design. However, our results are consistent with those found previously in larger prospective studies. An important strength of our study is the availability for all the diabetic patients and non-diabetic controls of extensive investigations to evaluate age-related disorders that may affect the management and outcomes of diabetes, such as cognitive impairments and dependency, as well as co-morbidities [32-36].

Conclusion

The 11.1% rate of diabetes in our study is at the lower end of the range reported in the literature. Falls and hypoglycaemia were among the main reasons for admission. This finding, together with the high rate of co-morbidities and polypharmacy, underlines the need for careful attention to hypoglycaemia prevention in older diabetic patients. The significantly higher rate of cognitive impairment in our diabetic patients compared to our controls is clinically relevant, as cognitive impairment creates challenges for the optimal management of diabetes. Older individuals with diabetes should undergo a careful geriatric evaluation in addition to the assessment of their diabetes. The optimal target blood glucose levels in older diabetic patients are not agreed on and these patients should therefore be managed on a case-by-case basis [37-41].

References

1. Letonturier P (2006) Le diabète du sujet âgé, un problème émergent et préoccupant. Presse Méd 35 4: 628-629.
2. Verny G, Neiss M, Rabier P, Lepeu Moinon I (2005) Diabète du sujet âgé. In traité de diabétologie Ed Flam 800-810.

3. Fagot-Campagna A, Bourdel-marchasson L, Simon D (2005) Burden of diabetes in an aging population: prevalence, incidence, mortality, characteristics and quality of care. Diabetes metab 31: 35-52.
4. Charles MA, Simon D, Balkau B, Vauzelle-Kervroedan F, Thibult N, et al. (1998) Révision des critères diagnostiques du diabète. Les raisons et les conséquences. Diabetes Metab 24: 75-79.
5. 5.Yesavage JA, Brick RL, Rose TL (1983) Development and validation of a geriatric depression screening scale: a preliminary report. J Psychiat Res 17: 37-49.
6. Derouesné C, Poitreneau J, Hugonot L, Kalafat M, Dubois B, et al. (1999) Le Mini Mental State Evaluation (MMSE): un outil pratique pour l'évaluation de l'état cognitive par le clinicien. Presse Med 28: 1141-1148.
7. Katz S, Downs TD, Cash HR, Grotz RC, Linda S. Noelker, et al. (1970) Progress in development of the index of ADL. Gerontologist 10: 20-30.
8. Katz S (1983) Assessing self Maintenance: Activities of daily living, Mobility, and Instrumental activities of daily living. J Am Geriatr Soc 31: 721-727.
9. Lawton MP, Brody EM (1969) Assessment of older people: self-maintaining and instrumental activities of daily living. Gerontologist 9: 179-186.
10. Guigoz Y, Lauque S, Vellas BJ (2002) Identifying the elderly at risk for malnutrition. The Mini Nutritional Assessment. Clin Geriatr Med 18: 737-757.
11. Bourdel-Marchasson I, Dubroca B, Manciet G, Sinclair AJ, Paulisso G, et al. (1997) Prevalence of diabetes and effect on quality of life in older French living in the community: the PAQUID epidemiological survey. J Am Geriatr Soc 45: 295-301.
12. L'épidémiologie du diabète en France Métropolitaine. Diabetes Metab (2000) 26: 11-24.
13. Pham M, Pinganaud G, Richard-Harston S, Decamps A, Bourdel-Marchasson I, et al. (2003) Prospective audit of diabetes care and outcomes in a group of geriatric French care homes. Diabetes Metab 29: 251-258.
14. Croxson SC, Burden AC, Bodington M, Botha JL (1991) The prevalence of diabetes in elderly people. Diabet Med 8: 28-31.
15. The DECODE study group. Age and sex-specific prevalences of diabetes and impaired glucose regulation in 13 European cohorts. Diabetes Care (2003) 26: 61-69.
16. Centers for Disease Control and Prevention (CDC). Prevalence of diabetes and impaired fasting glucose in adults-United States, 1999-2000. MMWR Morb Mortal Wkly Rep (2003) 52: 833-837.
17. Miller DK, Lui Ly, Perry HM, Kaiser FE, Morley JE, et al. (1999) Reported and measured physical functioning in older inner-city diabetic African Americans. J Gerontol A Biol Sci Med Sci 54: 230-236.
18. Etat de santé des 65 ans et plus. Etat de santé des populations, publications de l'ORS Bourgogne 2006.
19. Bordet-Marchasson I, Helmer C (2001) L'incidence de la démence au sein de la cohorte de sujets âgés PAQUID n'est pas modifiée par la présence de diabète. Revue Neurologique 157: 71-72.
20. Elias MF, Elias PK, Sullivan LM, Wolf PA, D'Agostino RB, et al. (2005) Neurobiology of Aging 26: 11-16.
21. Nissen SE, Tardif JC, Nicholls SJ, Revkin JH, Shear CL, et al. (2007) The DCCT/EDIC Study Research Group. N Engl J Med 356: 1304-1316.
22. Maggi S, Limongi F, Noale M, Romanato G, Tonin P, et al. (2009) Dement Geriatr Cogn Disord 27: 24-33.
23. Verny C (2007) Congestive heart failure in the elderly diabetic. Diabetes Metab 33: 32-39.
24. Davies MK, Hollman A (2006) Stamps in cardiology: diabetes. Heart 92: 295.
25. Meaume S, Senet P (1999) Prévention des escarres chez la personne âgée. Presse Méd 28: 1846-1853.
26. Norton D, Mc Laren R, Exton-Smith AN (1962) An investigation of geriatric nursing problems in hospital. Edinburgh, UK: Churchill, Livingston 1-300.
27. Qiao Q, Hu G, Tuomilehto J, Nakagami T, Balkau B, et al. (2003) DECODA Study Group. The DECODA study group. Age- and sex-specific prevalence of diabetes and impaired glucose regulation in 11 Asian cohorts. Diabetes Care 26: 1770-1780.
28. Sidibé EH (1999) Le diabète du sujet âgé au Sénégal. Rev. Fr. Endocrinol Clin Nutr Métab 40 2: 131-140.
29. Charles D, Gueye PM, Wade B (1997) Le diabète du sujet âgé: à propos de 52 observations consécutives. Méd. Afr. Noire 44: 18-23.
30. Oga AS, Tébi A, Aka J, Adouéni KV, Malan KA, et al. (2006) Le diabète sucré diagnostiqué en Côte d'Ivoire : des particularités épidémiologiques. Méd Trop 66: 241-246.
31. Baldé NM, Diallo I, Baldé MD, Barry IS, Kaba L, et al. (2007) Diabetes and impaired fasting glucose in rural and urban populations in Futa Jallon (Guinea): prevalence and associated risk factors. Diabetes Metab 3: 114-120.
32. Melton LJ, Palumbo PJ, Dwyer MS, Chu CP (1983) Impact of recent changes on diagnostic criteria on the apparent natural history of diabetes mellitus. Am J Epidemiol 117: 559-565.
33. Harris MI, Hadden WC, Knowler WC, Bennett PH (1987) Prevalence of diabetes and impaired glucose tolerance levels in US population aged 20-74 yrs. Diabetes 36: 523-534.
34. Institut National de la Statistique et des Etudes Economiques (INSEE). Recensement (2006) de la population française.
35. Nevanen S, Tambekou J, Fosse S, Simon D, Weill A, et al. (2005) Caractéristiques et état de santé des personnes diabétiques âgées et leur prise en charge médicale, Etude ENTRED 2001. Bull Epidémiol Hebdo 12-13: 51-52.
36. Blicklé JF, Attali JR, Barrou Z, Brocker P, De Rekeneire N, et al. (1999) Le diabète du sujet âgé. Diabetes Metab 25: 84-932.
37. Ferry M (2007) L'obésité de la personne âgée : faut-il conseiller une perte de poids. Diabète et Obésité 2: 165-169.
38. Alexopoulos GS, Meyers BS, Young RC, Mattis S, Kakuma T, et al. (1993) the course of geriatric depression with "reversible dementia": a controlled study. Am J Psychiatry 150: 1693-1699.
39. Donnet A, Azorin JM (1992) Les pseudo-démences dépressives. Année Gérontol. Paris 351-357.
40. Schooling CM, Lam TH, Li ZB, Ho SY, Chan WM, et al. (2006) Obesity, physical activity, and mortality in a prospective Chinese elderly cohort. Arch Intern Med 166: 1498-1504.
41. Jannot-Lamotte MF, Raccah D (2000) Prise en charge du diabète lors d'une corticothérapie. Presse Méd 29: 263-266.