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Risk factors of hypertension, diabetes and obesity in Italian psoriasis patients: a survey on socio-demographic characteristics, smoking habits and alcohol consumption

We evaluated risk factors such as socio-demographic characteristics, smoking habits and alcohol consumption, associated with hypertension, diabetes and obesity in psoriasis patients, in order to plan health education programs that could prevent the onset or progression of co-morbidities. The study population consisted of 1376 patients with psoriasis who were consecutively recruited at 21 Italian Departments of Dermatology. Information concerning socio-demographic variables, smoking and alcohol consumption, and the presence of chronic disorders such as hypertension, type 2 diabetes and obesity was collected. The risk of co-morbidities according to the various exposure variables was calculated using logistic regression models. Psoriasis patients living in extremely urban areas showed the highest risk of diabetes (OR = 1.99, 95% CI 1.06-5.23) and obesity (OR = 2.60, 95% CI 1.10-16.12), as compared to patients living in rural areas. The OR for hypertension was higher for smokers (> 15 cigarettes per day, OR = 1.37, 95% CI 1.01-2.03) and drinkers (> 2 glasses/day of wine, OR = 2.11, 95% CI 1.31-3.40). The OR for diabetes or obesity was higher for drinkers: 1 drink/day (OR = 1.93, 95% CI 1.01-3.67) and > 1 drink/day of spirits (OR = 2.90, 95% CI 1.43-5.82), respectively. The results of our survey highlight the need to detect psoriasis patients with different susceptibilities to co-morbidities in order to plan specific health campaigns aimed at changing people's lifestyles with respect to smoking, drinking and diet.

Key words: alcohol consumption, co-morbidities, psoriasis, rural/urban area, smoking habits

Chronic diseases are the leading cause of death in both males and females in all WHO regions [1]. Approximately 72% of all chronic diseases occur in people aged 30 years and older [2]. The causes of the main chronic disease epidemics are well known, whilst the most important modifiable risk factors are: unhealthy diet and excessive calorie intake; physical inactivity, tobacco and alcohol use. These causes are expressed through the intermediate risk factors of increased blood pressure, raised glucose levels, abnormal blood lipids and obesity. Individual characteristics (such as gender, ethnicity and genetic predisposition) and health protective factors (such as emotional resilience), together with social, economic and environmental factors (such as income, education, living geographic area and working conditions), determine differences in exposure and vulnerability of individuals to health-compromising conditions. Psoriasis is a chronic, immune-mediated inflammatory disease with a recognized genetic predisposition and an estimated prevalence of 2% of the world's population.

The (psychosocial) impact of psoriasis on patient's quality of life (QoL) is significant and is not always dependent on disease severity [3].

Several recent studies showed that psoriasis is often associated with other chronic disorders such as type 2 diabetes, obesity and cardiovascular disease [4-11]. The presence of these co-morbidities in psoriasis patients has important implications for their clinical management. Attention towards this issue is also crucial to decrease disease morbidity and mortality. In addition, co-morbidities certainly represent an additional economic burden for both patients and health care.

The aim of our study was to assess, in psoriasis patients, risk factors like socio-demographic characteristics, smoking habits, alcohol consumption and home location (rural/urban) that are associated with hypertension, type 2 diabetes and obesity, in order to plan health education programs aimed at preventing the onset or progression of co-morbidities.

Material and methods

The study population consisted of 1376 patients with psoriasis, aged 10-85 years (692 males and 684 females) who were consecutively recruited into the study from December 2004 to January 2006, at 21 Italian Departments of Dermatology. The methods to estimate sample size have been described elsewhere [12]. Verbal, informed consent was obtained from each patient before the data were collected; approximately 3% of the patients refused to be interviewed. Data were collected through questionnaires which psoriasis patients filled out at home and then returned to us. Patients reported on: socio-demographic variables (gender, age, marital status, education, occupational status and municipality of residence), smoking habits and alcohol consumption. Patients were also questioned on the presence of chronic diseases such as hypertension, type 2 diabetes and obesity and whether or not they were under specific treatment. To evaluate the effect of geographical distribution on co-morbidity, we used the urban-rural status of Italian municipalities, according to the classification proposed by Anania *et al.* [13], which identifies the following six groups: extremely urban, urban, weakly urban, weakly rural, rural and extremely rural municipalities.

Patients were divided into three groups: 1) hypertension patients (no. = 178), 2) diabetes patients (no. = 98) and 3) obesity patients (no. = 142). Each group was compared to the group without co-morbidities.

Evaluation of the risk of hypertension, type 2 diabetes and obesity according to the various exposure variables was performed using logistic regression models. Each risk was quoted with a 95% confidence interval (CI) and calculated using Wald's method. The significance of the linear trend in risk was assessed by the Mantel test at the level of $p < 0.05$.

SAS software was used for the statistical analysis [14].

Results

The mean age of patients was 47.9 (standard deviation [SD] \pm 14.8) years in males and 47.2 (standard deviation [SD] \pm 15.0) years in females. The frequency of the associated chronic diseases in psoriasis patients was: 12.9% (178/1376 patients) hypertension, 10.3% (142/1376) obesity and 7.1% (98/1376) type 2 diabetes. The results related to risk of hypertension, type 2 diabetes and obesity in psoriasis patients according to socio-demographic variables are summarized in *table 1*. In our series, the proportion of patients with hypertension was higher in males (107/692 [15.5%]) than females (71/613 [9.6%]) ($z = 3.108$, $p = 0.002$). Using females as the reference category, a 1.5 fold increase in hypertension risk was observed for males. The proportion of obese patients, on the other hand, was higher in females (84/684 [12.3%]) than in males (58/692 [8.3%]). Using males as the reference category, a 1.5 fold increase in obesity risk was found in females. No differences in risk between genders was found for type 2 diabetes. In order to evaluate the risk associated with age, patients were divided into 3 groups: ≤ 39 years (no. = 455), 40-59 years (no. = 597) and ≥ 60 years (no. = 324). The risk of either hypertension

or diabetes was directly related to the age group; it increased with increasing age. Using the ≤ 39 age group as the reference category, the odds ratio (OR) for hypertension was 7.92 (CI 4.19-15.84) and 10.9 (CI 5.91-22.16) for the 40-59 years and ≥ 60 years age groups, respectively. The OR for diabetes was 3.91 (CI 1.90-9.08) and 10.20 (CI 5.03-23.55) for 40-59 years and ≥ 60 years age groups, respectively. Obesity risk was highest in the 40-59 years age group (OR = 1.70; CI 1.10-2.58). No associations were found between marital status and either diabetes or obesity; whilst married psoriasis patients had a higher risk of hypertension (OR = 2.11, CI 1.49-2.99) as compared to not-married patients. Interestingly, houseworkers had a 2.4 and 2.6 fold increased risk of hypertension and diabetes respectively as compared to manual workers. Finally, we evaluated the occurrence of hypertension, diabetes and obesity in psoriasis patients according to urban or rural home location. No differences in risk were found for hypertension, however, psoriasis patients living in extremely urban areas showed the highest risk of diabetes (OR = 1.99, CI 1.06-5.23) and obesity (OR = 2.60, CI 1.11-6.12). None of the patients in our population lived in extremely rural municipalities.

Table 2 shows the risk of hypertension, type 2 diabetes and obesity in psoriasis patients in relation to smoking habits and alcohol consumption. The OR for hypertension was higher for both smokers (> 15 cigarettes per day) and drinkers (> 2 glasses/day of wine). The OR for either diabetes or obesity was higher for drinkers: 1 drink/day (OR = 1.93) and > 1 drink/day of spirits (OR = 2.90) respectively.

There were no patients with more than one co-morbidity (hypertension \pm diabetes \pm obesity), and therefore it was not possible to estimate the effects of two or more disease linked to the risk factors.

Discussion

The present study characterized Italian psoriasis patients with regards to socio-demographic variables, smoking habits, alcohol consumption, and related risk of co-morbidities. Our study provides further evidence that hypertension, obesity and type 2 diabetes are associated with psoriasis. Previous reports have, indeed, tried to establish whether associated diseases such as diabetes, hypertension and obesity precede the occurrence of psoriasis or are the consequence of it [4, 6, 8].

In line with previous reports [11, 15], we showed that hypertension was found to be the chronic disease most frequently associated with psoriasis.

In our study, a higher risk of hypertension was found in psoriasis patients aged > 40 years and in males. On the basis of our results showing an increased hypertension frequency with increasing age, it would be reasonable to assume that this might be linked to lifestyle rather than genetic factors. It should also be considered that the increase of hypertension with age might be due to a direct relationship with increased atherosclerosis.

Psoriasis patients who smoke more than 15 cigarettes per day and regularly drink more than 2 glasses of wine per day are at greater risk of hypertension. In these patients lifestyle modification is crucial, since myocardial infarction has a higher incidence in psoriasis patients as compared to general population [15]. Moreover, Mallbris *et al.* [16]

Table 1. Risk of hypertension, type 2 diabetes and obesity in psoriasis patients according to socio-demographic characteristics

Gender	Psoriasis patients with hypertension [§] without hypertension [§]		Psoriasis patients with type2 diabetes [§] without diabetes [§]		Psoriasis patients with obesity [§] without obesity [§]		OR	95% CI	OR	95% CI	Psoriasis patients with obesity [§] without obesity [§]	Psoriasis patients with type2 diabetes [§] without diabetes [§]	Psoriasis patients without obesity [§]	OR	95% CI			
	No. Cases %	No. Cases %	No. Cases %	No. Cases %	No. Cases %	No. Cases %										No. Cases %		
Males	107	60.1	585	48.8	1.58	1.2-2.2	47	48.0	645	50.5	1*	58	40.4	634	51.4	1*	-	
Females	71	39.9	613	51.2	1*	-	51	52.0	633	49.5	1.13	84	59.6	600	48.6	1.53	1.08-2.19	
Age group (years)**																		
≤ 39	11	6.1	444	37.1	1*	-	8	8.2	447	35.0	1*	35	24.7	420	34.0	1*	-	
40-59	98	55.1	499	41.6	7.92	4.19-15.84	39	40.2	558	43.6	3.91	73	51.4	524	42.5	1.70	1.10-2.58	
60+	69	38.8	255	21.3	10.9	5.91-22.16	50	43.6	274	21.4	10.2	34	23.9	290	23.5	1.41	0.86-2.31	
Marital status																		
Not married	49	27.6	533	45.5	1*	-	58	59.8	736	57.4	1.1	83	58.5	711	42.4	1.04	0.73-1.48	
Married	129	72.4	665	55.5	2.11	1.49-2.99	39	40.2	543	42.6	1*	59	41.5	523	57.6	1*	-	
Education																		
Primary school	54	30.7	293	24.7	1*	-	26	26.8	321	25.4	1*	36	25.5	311	25.4	1*	-	
Junior school	63	35.8	510	43.0	0.67	0.45-1.0	30	30.9	543	42.9	0.71	64	45.4	509	41.6	1.02	0.58-1.75	
High school	23	13.1	206	17.3	0.61	0.36-1.0	11	11.4	218	17.2	0.65	18	12.8	211	17.3	0.94	0.56-1.52	
University	36	20.4	178	15.0	1.1	0.69-1.73	30	30.9	184	14.5	2.1	23	16.3	191	15.6	1.38	0.73-2.66	
Occupational status																		
Manual worker	31	17.7	183	15.6	1*	-	15	15.6	199	15.9	1*	24	17.3	190	15.7	1*	-	
Office or professional worker	33	18.9	280	23.9	0.90	0.54-1.48	19	19.8	294	23.5	0.89	35	25.2	278	23.0	0.99	0.58-1.70	
Houseworker	32	18.3	100	8.5	2.44	1.44-4.13	21	21.9	111	8.9	2.60	14	10.1	118	9.8	1.05	0.54-2.15	
Retired	61	34.9	410	35.0	1.13	0.73-1.76	25	26.0	446	35.6	0.77	40	28.7	431	35.6	1.35	0.80-2.25	
Other	18	10.2	200	17.0	0.91	0.49-1.70	16	16.7	202	16.1	1.09	26	18.7	192	15.9	0.93	0.59-1.65	
Degree of urbanization																		
Rural	4	2.3	18	1.5	1*	-	0	0.0	22	1.7	-	0	0.0	22	1.8	-	-	
Weakly-rural	16	9.0	92	7.7	0.78	0.23-2.62	6	6.1	102	8.0	1*	6	4.2	102	8.2	1*	-	
Weakly-urban	44	24.7	319	26.6	0.62	0.20-1.92	22	22.4	341	26.7	1.33	34	23.9	329	26.7	2.14	0.87-5.21	
Urban	42	23.6	179	14.9	1.06	0.34-3.28	12	12.2	209	16.3	1.19	28	19.7	193	15.6	3.0	1.21-7.45	
Extremely urban	72	40.4	590	49.3	0.55	0.18-1.67	58	59.2	604	47.3	1.99	74	52.1	588	47.7	2.60	1.1-16.12	

The estimates of OR were evaluated only for contingency tables whose expected values were > 5 in each cell.

* Reference category.

** $\chi^2_{trend} < 0.0001$ (hypertension, diabetes), 0.04 (obesity).

§ ICD = IX Classification Diseases.

Table 2. Risk of hypertension, type 2 diabetes and obesity in psoriasis patients according to smoking habits and alcohol consumption

	Psoriasis patients with hypertension [§] No. Cases %	Psoriasis patients without hypertension [§] No. Cases %	OR	95%CI	Psoriasis patients with type2 diabetes [§] No. Cases %	Psoriasis patients without type2 diabetes [§] No. Cases %	OR	95%CI	Psoriasis patients with obesity [§] No. Cases %	Psoriasis patients without obesity [§] No. Cases %	OR	95% CI
Smoking consumption												
Non smoker	109	61.2	713	59.5	1*	-	65	67.0	757	59.2	1*	-
≤15 cigarettes/day	27	15.2	285	23.8	0.62	0.40-1.00	20	20.6	292	22.8	0.80	0.46-1.31
>15 cigarettes/day	42	23.6	200	16.7	1.37	1.01-2.03	12	12.4	230	18.0	0.61	0.31-1.10
Wine consumption												
No consumption	73	41.0	688	57.4	1*	-	59	60.8	702	54.9	1*	-
1-2 glasses/day	77	43.3	385	32.2	1.88	1.34-2.66	26	12.4	436	11.0	0.71	0.43-1.13
>2 glasses/day	28	15.7	125	10.4	2.11	1.31-3.40	12	26.8	141	34.1	1.01	0.51-1.87
Beer consumption												
No consumption	165	92.7	1039	86.7	1*	-	86	88.7	1118	87.4	1*	-
1-2 glasses/day	11	6.2	141	11.8	0.49	0.25-0.89	11	11.3	141	11.0	1.01	0.53-1.87
>2 glasses/day	2	1.1	18	1.5	0.70	0.11-2.45	0	0.0	20	1.6	-	-
Spirits consumption												
No consumption	159	89.3	1074	89.6	1*	-	83	87.6	1148	89.8	1*	-
1 drink/day	17	9.6	79	6.6	1.45	0.84-2.52	12	12.4	84	6.5	1.93	1.01-3.67
>1 drink/day	2	1.1	45	3.8	0.30	0.07-1.25	0	0.0	47	3.7	-	-

The estimates of OR were evaluated only for contingency tables whose expected values were > 5 in each cell.

* Reference category.

§ ICD = IX Classification Diseases.

reported that in psoriasis patients with a history of hospital admission due to psoriasis, there is an increase in cardiovascular death as compared to the general population.

In our study, the second disease most frequently associated with psoriasis was obesity, which is known to be a risk factor for both hypertension and type 2 diabetes. Females in the 40-59 year age group were found to be at greatest risk of obesity. A further significant finding that also emerged was that patients living in urban and extremely urban areas are at a higher risk of obesity. This is in line with the results of a large population-based study [17] that highlighted obesity in middle-aged women living in urban areas. This could be due to the fact that urban populations are becoming increasingly sedentary as a result of rapidly increasing levels of motorized transport, urban sprawl and reduced opportunities for daily physical activity in housing and occupational settings. Our modern "obsesogenic" environments, with the combination of unhealthy diet and physical inactivity, have serious implications for obesity levels, as well as the contribution they bring to other chronic diseases such as type 2 diabetes. Diabetes has been estimated to be the fifth leading cause of death globally [18]. Our results show that the risk of diabetes is higher for patients living in urban and extremely urban areas and increases with age. This higher risk could probably be linked to the changes in dietary patterns, physical activity and lifestyle that are associated with urbanization. Recent clinical trials provide evidence that physical activity associated with diet and weight loss can prevent diabetes in different populations and age groups [19-21]. Exercise training studies add evidence that physical activity improves insulin sensitivity, independently of any effect on weight loss and fat distribution [22].

The overall results of our study emphasize the need to detect psoriasis patients with different susceptibilities to co-morbidities, make patients aware of this and change their lifestyles. Planning a campaign to change the lifestyle of patients with psoriasis and co-morbidities requires a multidisciplinary approach, involving diabetologists, cardiologists and general practitioners, as well as than dermatologists. Concerted action is needed to re-orientate health systems and policies to provide long-term preventive care. ■

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