Prevalence of chronic diseases and risk factors among the spanish prison population

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ABSTRACT

Background: chronic diseases are responsible for 60% of deaths and 75% of spending on public health. There are few works on the prevalence of this type of pathology in prison.

Objective: Describe the prevalence of chronic major diseases in the population and the major risk factors observed.

Methods: Multicenter transversal descriptive study. The sample size was 1,170 people, who were selected through sampling stratified with simple allocation by strata among 9 prisons in the country. There were interviews and physical examinations between May and June 2013. Variables were collected: socio-demographic, diagnostic, anthropometric, clinical-analytical and risk factors. A descriptive and subsequent comparative analysis was carried out using non-parametric tests for quantitative variables using the Mann-Whitney test and a Ji-square test for categorical variables. Subsequently, binary logistic regression models to evaluate the influence of factors of risk in major pathologies. The manuscript was approved by the Ethics Committee for clinical research of the University General Hospital of Castellon.

Results: 1 of every 2 inmates has some type of chronic disease out of the 1,077 participated (92.1). Median age of 37.4 years IQR (30.0 to 44.8). 95 males, 40.6 foreigners. Prevalence: dyslipidemias (34.8); arterial hypertension (17.8); Diabetes (5.3); asthma (4.6); COPD (2.2); ischaemic heart disease (1.8) and (1.5) cardio-circulatory pathologies. Main risk factors: smoking, obesity, abdominal fat distribution, consumption of cocaine and age.

Conclusions: It would be interesting to establish early diagnosis, encourage giving up smoking, and physical activity and dietary advice to combat the major modifiable risk factors.

Key words: Chronic diseases; risk factors; prisons; dyslipidemias; hipertensión; diabetes mellitus; asthma; pulmonary disease chronic obstructive; coronary disease.

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INTRODUCTION

Chronic noncommunicable diseases are defined as incurable processes which impose an important social burden both due to the disability and impairment entailed and from an economic point of view. Such processes have a multiple etiology and their development remains fairly unpredictable since they are of long duration (with remission and relapse periods). They are not caused by infectious agents but instead, several concurrent causes are involved in their etiology and even one factor may lead to different diseases.

The World Health Organization (WHO) states that chronic diseases account for 60% of deaths worldwide and for 75% of public health expenditure [1]. In fact, the leading causes of mortality in developed countries are such noncommunicable diseases

(NCD), hence their importance. In our country the leading cause of mortality in 2010 were cardiovascular diseases (myocardial infarction, angina and cerebrovascular diseases), which accounted for 31.2% of all deaths. They were followed by cancer-related causes (cancer of the lung and bronchus first and next, colorectal cancer) which were responsible for 28.1% of all deaths. Both types experienced an increased trend over previous years [2].

As far as the incarcerated population is considered, the leading causes of mortality in 2011 were also cardiovascular diseases which accounted for 19.5% of all deaths, followed by those caused by digestive diseases which were responsible for 10.7% of deaths (mainly related to cirrhotic processes). The third cause of mortality was respiratory diseases (7.4%) and the fourth were cancer-related causes (mainly lung cancer, oropharyngeal cancer and esophageal cancer) [3] which were responsible for 6.7% of deaths. Prisons have experienced a relevant change as far as causes of mortality are concerned. Until not that long ago the leading cause was represented by infectious diseases, in particular the infection by HIV (Human Immunodeficiency Virus) which today accounts for around 6% of deaths while cardiovascular diseases have become the leading cause[4]. On the other hand, the age of the imprisoned population has experienced a progressive increase and we now find older patients who therefore present more chronic diseases, with prevalence rates similar to those presented by the general population.

It has been estimated that in Spain patients suffering from NCDs include over 13.5 million people with hypertension, 4 million people with diabetes, 2 million people with asthma, 1.8 million people with COPD and similarly a relevant number of people suffering from chronic heart disease: 1.6 million with heart failure and 1.2 million with ischemic heart disease [1]. Based on this information we are aware of the relevance of these diseases and their consequent impact in prisons, both due to the provision of healthcare and the impact on pharmaceutical expenditure. There's a lack of studies addressing chronic diseases from a general approach and the existing reports focus more on hypertension [5] or diabetes [6] by reason of their leading frequency. We have yet not found any similar study based on the Spanish incarcerated population. Therefore, the interest of this study precisely lies in establishing the prevalence of chronic diseases in prisons. And so we have defined our main objective as the description of the prevalence of major chronic diseases in Spanish prisons and the secondary objective as the description of the main risk factors involved.

MATERIAL AND METHOD

Design: Descriptive, cross-sectional, multicenter study.

Participants:

Reference population: all individuals deprived of liberty hosted in Spanish prisons.

Eligible population: Those among the reference population who fulfill the following inclusion criteria: being over 18 years old, being imprisoned under ordinary regimen conditions and providing written informed consent before participation. Those under open regimen conditions or who are hosted in social inclusion facilities will be excluded from the study.

Study population: All those individuals deprived of liberty who fulfill the inclusion criteria and who are hosted in the following penitentiary facilities: Castellón I, El Dueso (Cantabria), Huelva, Madrid II, Madrid VI, Murcia I, La Moraleja (Palencia), Quatre Camins (Barcelona) and Zuera (Zaragoza).

Sample: We considered that the approximate number of inmates under ordinary regimen conditions was 61,294 (as of February 1st 2013) [7] including those of the autonomic region of Cataluña (where all penitentiary competences have been fully transferred). Since we wanted to determine the prevalence of several chronic diseases and each presents a different proportion in the general population we considered an overall proportion of 50% -therefore maximizing the sample size. With a 95% confidence interval and for an accuracy of 3% with a 10% correction range due to potential losses or negatives to participate, we estimated that the minimum necessary sample was 1,170 individuals. The selection was carried out by means of stratified simple allocation sampling in the population of each of the aforementioned facilities as of 1/2/2013. 130 individuals were randomly obtained from each facility.

Proceedings: Fieldwork was mainly conducted throughout May and June 2013, by means of individual surveys to all the selected individuals and the collection of data from all the participating facilities. Inmates were alphabetically listed and numbered from A to Z and candidates were selected according to the numbers provided by the sampling method. Afterwards, each researcher interviewed the selected inmates and explained orally as well as in writing the importance of the research and the terms of their

participation, therefore requiring written informed consent (IC) which was later included in their clinical record. Once the IC had been obtained, the researcher collected anthropometric measurements such as: size, weight, waist circumference, pulse oximetry and blood pressure. If the first determination was ≥ 140 mmHg for systolic blood pressure (SBP) and/or ≥ 90 mmHg for diastolic blood pressure (DBP) the measurement was repeated up to three times separated by at least 5 minute periods. Inmates were questioned on sociodemographic factors, risk factors, chronic diseases and ongoing treatments-information which was later compared with their clinical record and completed with blood test results. Such results were only considered to be valid if they were not older than 6 months. If no blood test results were available or if such results were older than 6 months, inmates were scheduled for a new blood test. Chronic patients who had already been diagnosed or who already took a specific treatment were considered separately from those who didn't have a previous diagnosis of chronic disease but who fulfilled criteria for 3 of the main pathologies considered: hypertension, diabetes and dyslipidemia. Therefore hypertension was considered when an arithmetic mean over 140/90 was concluded after three separate measurements (separated by 5 minute intervals); dyslipidemia was defined for total cholesterol results of over 200 mg/dl and/or triglycerides > 150 mg/dl and diabetes for blood glucose levels of over 126 mg/dl after at least a 8 hour long fasting period.

Variables collected:

Sociodemographic variables: penitentiary facility, length of stay, age, gender, origin, ethnicity, education, working status (information collected by means of the interview). Diagnostic variables: presence of chronic disease, ongoing treatment, hypertension, diabetes, dyslipidemia, asthma, COPD, cardiovascular disease or ischemic heart disease (data collected by means of the survey and from the clinical record). Anthropometric variables: weight (kg), size (cm), body mass index (kg/m2), waist circumference (cm), blood pressure (mmHg) (data collected by means of physical examination conducted at the time of the interview). The measurements were taken by qualified nursing staff by means of standard criteria regarding both the collection of measurements and information. Such criteria were previously agreed by all researchers. Regularly calibrated measuring instruments were also used. Clinical and analytical variables: oxygen saturation (%), total cholesterol (mg/dl), low-density lipoprotein (LDL) cholesterol (mg/dl), high-density lipoprotein cholesterol (mg/dl), triglycerides (mg/dl), blood glucose levels (mg/dl), glycated hemoglobin (%) only for diabetic patients and HIV serology. Risk factor related variables: quantified smoking status (regularly smoking over 1 cigarette per day), waist circumference (over 88 cm in women and over 102 cm in men), cocaine use (both regularly and sporadically), caffeine (over three cups of coffee per day) or energy drinks (on a daily basis), overweight (BMI 25.0 to 29.9 kg/m2), obesity (BMI≥ 30 Kg/m2) and sedentary lifestyle (moderate physical activity of < 30 minutes per day).

Data processing: Once all data had been collected it was entered by one person into a database created on Access 2007 and later analyzed by IBM Statistics SPSS v.20 software. Prior to the materialization of calculations, data was cleansed by means of two different techniques: range tests and the distribution of unknown values.

Statistical analysis: An initial descriptive analysis of the sample was carried out. As far as quantitative variables are considered, a Kolmogorov-Smirnov normality test was used and according to the type of distribution results were expressed either as arithmetic means with 95% confidence intervals or as medians with corresponding interquartile range (IQR). Qualitative or categorical variables were expressed by means of absolute and relative frequencies. As for the estimation of the prevalence, the overall prevalence of each of the diseases under study was determined, including their corresponding 95% confidence intervals although these may vary since weighted determinations were not carried out. Then we compared healthy individuals and chronic patients as well as risk factors and gender aspects. For quantitative variables comparing two separate categories with non-normal distributed data non parametric tests such as the Mann-Whitney U test were used. Qualitative or categorical variables were compared by means of Pearson's chi-squared test. To conclude the analysis, binary logistic regression models were used to establish the odds ratio regarding risk factors and specific chronic diseases. We will consider in all cases an alpha level of under 0.05 for statistical significance.

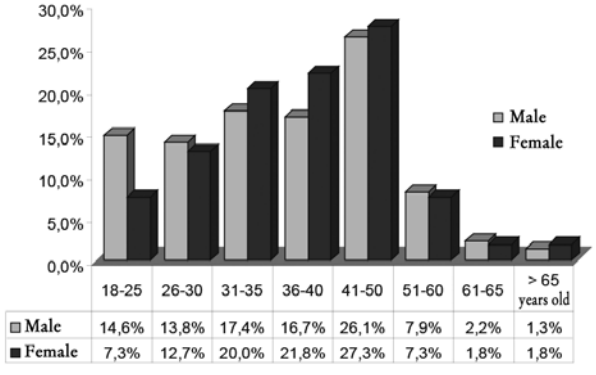
Administrative and ethical issues: The study protocol was approved by the Clinical Research Ethics Committee (CREC) of the General Hospital of Castellon, the reference hospital of the prison which promoted the study. We can hence assume that there is

no specific CREC for penitentiary facilities to grant unified criteria as established by Article 16 of the Act 14/2007 as of July 3rd on Biomedical Research and Article 19 of the Royal Decree (RD) 223/2004 as of February 6th, on the regulation of clinical trials with medicines. Then the compulsory authorization by the Secretary General of Penitentiary Issues and the Department of Justice of Cataluña was sought in accordance with the Circular Order 11/2005 on studies and research carried out in prisons passed by the Secretary General of Penitentiary Institutions. As for the confidentiality of patients we considered what the Organic Law 15/1999 on Personal Data Protection establishes.

RESULTS

The participation rate has been surprisingly high (92.1%) involving a total of 1077 individuals being interviewed. Both losses and negatives to participate accounted for no more than 8%- under the estimation of 10% which was predicted during the determination of the sample size. Table 1 depicts the participation of each facility.

The median age of inmates included in the study was 37.4 (IQR 30.0 to 44.8), yet older for chronic patients. As you can see in Figure 1 the main age group is that ranged between 41 and 50 years old. 95% of the sample was males and foreigners accounted for 40.6%. The rest of the major social and demographic features are depicted in Table 2.



	18-25	26-30	31-35	36-40	41-50	51-60	61-65	> 65 years old
Male	14,6%	13,8%	17,4%	16,7%	26,1%	7,9%	2,2%	1,3%
Female	7,3%	12,7%	20,0%	21,8%	27,3%	7,3%	1,8%	1,8%

Figure 1. Proportions according to age and gender

The prevalence of several chronic diseases is depicted in Table 3 according to both of the groups considered: previously diagnosed patients and patients without diagnosis but who fulfilled clinical diagnostic criteria. Overall and in order of prevalence we can quote the following: dyslipidemia 34.8% (95% CI: 32.0 to 37.7), hypertension 17.8% (95% CI: 15.6 to 20.2), diabetes 5.3% (95% CI: 4.0 to 6.8), respiratory processes such as asthma 4.6% (95% CI: 3.5 to 6.1), COPD 2.2% (95% CI: 1.4 to 2.7) and cardiovascular diseases 1.5% (95% CI: 0.9 to 2.4). The diseases most frequently treated with drugs are heart and respiratory diseases, and to a lesser extent dyslipidemia. Major risk factors according to gender are depicted in Table 4 and Table 5 shows how different risk factors such as age, obesity, lipid alterations or cocaine influence chronic diseases.

DISCUSSION

Chronic noncommunicable diseases in prison behave very much like an iceberg: you can only see the part above the sea level yet the vast majority remains submerged, invisible. 19.7% of the sample had been previously diagnosed with some type of NCD (the visible part of the iceberg) yet there was a series of individuals (32.3%) without a diagnosis who fulfilled criteria for some diseases (invisible part). The disease with a higher prevalence was the alteration of the lipid profile, including both simple and combined hyperlipidemia. This affected mainly patients who had not been previously diagnosed. In fact new cases were up to four times higher than previously diagnosed cases. There is a specific group within prisons represented by HIV patients under highly active antiretroviral therapy HAART), some of which (especially protease inhibitors) greatly influence the metabolism of lipoproteins [8]. This study concluded an HIV prevalence of 10.3%, among which 63.3% of patients are under treatment. Of those under treatment 23% presented some kind of alteration of the lipid profile.

As for the rest of diseases, other reports on prisons from other countries [9-10] concluded the following results: prevalence of hypertension between 18.8% and 25.8% (29.3% for the Spanish general population [11]); prevalence of diabetes between 12.3% and 18.8% (4.8% to 18.7% for the Spanish general population [12]); asthma between 5.4% and 24.4% (4.9% for the Spanish general population[13]); ischemic heart disease ranged between 1.7% and 6.3% (in the Spanish general population it did so between 7.3% and 7.5% [14]). The prevalence of cardiovascular diseases in such studies was 0.23% and for the Spanish general population it ranged between 2.4% and 3.7%[14]. That of COPD was 0.96% and for the Spanish general population it was up to 9.1% [15]. Since the differences are minimal we can conclude, that in spite of the specific features of each population under study, the results

Table 1. Participation data regarding each facility.

Facility	Sample	Surveys carried out	Response rate	Negatives to participate	Losses
Castellón I	130	126	96.9%	0.0%	3.1%
El Dueso (Cantabria)	130	117	90.0%	3.1%	6.9%
Huelva	130	116	89.2%	6.2%	4.6%
Madrid II (Alcalá)	130	122	93.8%	2.3%	3.8%
Madrid VI (Aranjuez)	130	128	98.5%	1.5%	0.0%
Murcia I	130	124	95.4%	4.6%	0.0%
Palencia (Dueñas)	130	103	79.2%	10.0%	10.8%
Quatre Camins (Barcelona)	130	126	96.6%	3.1%	0.0%
Zuera (Zaragoza)	130	115	88.5%	10.0%	1.5%
TOTAL	1170	1077	92.1%	4.5%	3.4%

Table 2. Main social and demographical features of the sample

Variable		Total sample N=1077 (100%)	Healthy Patients n=518 (48.1%)	Chronic Patients n=559 (51.9%)	Significant difference (p)
Median age (years old) (P_{25}-P_{75})		37.4 (30.0-44.8)	34.6 (27.8-41.5)	40.4 (32.7-48.4)	0.0001
Median stay in prison(P_{25}-P_{75})		15.3 (6.7-32.8)	14.4 (6.5-31.5)	16.1 (7.2-34.7)	0.094
Gender	Male	1022 (94.9%)	499 (96.3%)	523 (93.6%)	0.093
	Female	55 (5.1%)	19 (3.7%)	36 (6.4%)	
	National	640 (59.4%)	299 (57.7%)	341 (61.0%)	0.273
	Foreign	437 (40.6%)	219 (42.3%)	218 (39.0%)	
Ethnicity	Caucasian	633 (58.8%)	290 (56.0%)	343 (61.4%)	0.082
	Latin	151 (14.0%)	77 (14.9%)	74 (13.2%)	0.475
	Maghreb	150 (13.9%)	83 (16.0%)	67 (12.0%)	0.071
	Gipsy	73 (6.8%)	35 (6.8%)	38 (6.8%)	0.904
	Black	59 (5.5%)	27(5.2%)	32(5.7%)	0.821
	Asian	9 (0.8%)	5 (1.0%)	4 (0.7%)	0.838
	Others	2 (0.2%)	1 (0.2%)	1 (0.2%)	0.495
Education	Illiterate	86 (8.0%)	41 (7.9%)	45 (8.1%)	0.993
	Primary	445 (41.3%)	224 (43.2%)	221 (39.5%)	0.242
	Secondary	334 (31.0%)	159 (30.7%)	175 (31.1%)	0.883
	Vocational training	130 (12.1%)	60 (11.6%)	70 (12.5%)	0.719
	University	82 (7.6%)	34 (6.6%)	48 (8.6%)	0.263

P25= 25th percentile. P75= 75th percentile

concluded in our sample are reasonably consistent with such studies.

We could have improved this research by including psychiatric diseases as part of NCDs due to their relevance within prisons. It has been estimated that the presence of psychiatric disorders is up to 4 times higher than in the general population[16]. Nevertheless, we believe that in view of their relevance and prevalence psychiatric diseases could be exclusively addressed in another study.

On the other hand it has also been found that there is a high percentage of individuals who had not been diagnosed even though they fulfilled diagnostic criteria. This may lead us to consider the need of routine screening for such diseases as to establish early therapies. Therefore, the progression of many of these diseases could be avoided so that patients would benefit from an improved management of their disease or at least a slowdown of the progression of their disease without early complications.

Smoking was identified as the major risk factor with a prevalence of 70.4% over an estimated prevalence between 30% and 33% in the Spanish general population[17-18]. Its influence on the development of chronic disease such as asthma, COPD, cardiovascular and ischemic diseases has been clearly established. Although we have not been able to establish a statistically significant relationship between smoking and the pathologies considered we have concluded an approximation in respiratory conditions such as asthma.

The second modifiable risk factor was obesity. Overweight and obesity had an overall prevalence

Table 3. Prevalence of chronic noncommunicable diseases and patients under treatment.

Diseases % (95%CI)	Previously diagnosed	With diagnostic criteria but without previous diagnosis	Total Prevalence	Patients under treatment
Dyslipidemia	7.5% (6.0 to 9.3)	27.3% (24.7 a 30.1)	34.8% (32.0 to 37.7)	17.9% (14.1 to 22.1)
Hypertension	8.9% (7.3 to 10.8)	8.9% (7.3 to 10.8)	17.8% (15.6 to 20.2)	49.5% (42.2 to 56.8)
Diabetes	3.7% (2.7 to 5.0)	1.6% (0.9 to 2.5)	5.3% (0 to 6.8)	64.9%(51.1 to 77.1)
Asthma	4.6% (3.5 to 6.1)	-	4.6% (3.5 to 6.1)	88.0%(75.7 to 95.5)
COPD	2.2% (1.4 to 3.3)	-	2.2% (1.4 to 3.3)	79.2%(57.8 to 92.9)
Ischemic heart disease	1.8% (1.1 to 2.7%)	-	1.8% (1.1 to 2.7%)	100%
Cardiovascular disease	1.5% (0.9 to 2.4)	-	1.5% (0.9 to 2.4)	81.3% (54.4 to 96.0)

Patients under treatment: patients who undergo treatment for a diagnosed disease. The proportion is calculated over the overall prevalence of each disease. COPD= Chronic Obstructive Pulmonary Disease.

Table 4. Major risk factors according to gender.

Variables		Total (N=1.077)	Males (n=1.022)	Females (n=55)	Significance
Weight	Average	518 (48.1%)	490 (47.9%)	28 (50.9%)	0.668
	Overweight	426 (39.6%)	412 (40.3%)	12 (25.5%)	0.028
	Obesity	133 (12.3%)	120 (11.7%)	12 (23.6%)	0.009
Risk waist circumference		185 (17.2%)	155 (15.2%)	30 (54.5%)	0.0001
Smoking	Current	758 (70.4%)	726 (71.0%)	32 (58.2%)	0.042
	Former	100 (9.3%)	93 (9.1%)	7 (12.7%)	0.367
Risk atherogenic index		362 (43.2%)	351 (44.4%)	11 (23.9%)	0.006
Sedentary lifestyle		415 (38.5%)	387 (37.9%)	28 (50.9%)	0.053
Cocaine use	Common	328 (30.5%)	314 (30.7%)	12 (25.5%)	0.408
	Sporadic	284 (26.4%)	271 (26.5%)	13 (23.6%)	0.637
Coffee (> 3 cups/day)		452 (42.0%)	424 41.5%)	28 (50.9%)	0.168
Energy drink		417 (38.7%)	398 (38.9%)	19 (34.5%)	0.514

Risk waist circumference=over 102 cm in men and 88cm in women.
Risk atherogenic index= Total cholesterol/HDL cholesterol over 4.5.
Sedentary lifestyle= moderate physical activity for less than 30 minutes per day.

Table 5. BIVARIATE analysis of the influence of some of the risk factors associated to major pathologies.

Risk factors	DYSLIPIDEMIA			HYPERTENSION			DIABETES			CHRONIC DISEASE		
	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI
Age (years old)	0.072	1.014	0.999-1.029	0.0001	1.054	1.037-1.072	0.0001	1.056	1.031-1.082	0.0001	1.057	1.044-1.070
Gender (male)	0.316	1.441	0.705-2.943	0.119	1.900	0.849-4.253	0.351	1.998	0.467-8.544	0.041	0.553	0.313-0.977
Origin (national)	0.848	1.034	0.732-1.461	0.210	1.261	0.787-1.810	0.077	1.725	0.949-3.159	0.274	1.146	0.898-1.462
Overweight	0.759	0.948	0.675-1.333	0.0013	1.566	1.101-2.228	0.020	0.488	0.267-0.893	0.026	1.322	1.034-1.690
Obesity	0.047	1.542	1.005-2.365	0.001	2.041	1.324-3.146	0.0001	4.183	2.352-7.439	0.0001	3.854	2.505-5.930
Risk waist circumference	0.224	1.271	0.864-1.869	0.0001	2.638	1.780-3.910	0.001	2.629	1.497-4.617	0.0001	3.512	2.449-5.037
Risk atherogenic index	0.0001	3.550	2.315-5.443	0.0011	1.681	1.127-2.506	0.670	0.874	0.469-1.626	0.0001	5.392	3.984-7.299
Smoker	0.244	1.296	0.861-1.803	0.003	1.770	1.220-2.570	0.045	0.564	0.322-0.987	0.479	1.113	0.827-1.498
Cocaine use	0.133	1.295	0.924-1.816	0.0001	1.897	1.333-2.702	0.523	1.196	0.691-2.069	0.011	1.368	1.074-1.745
Coffee	0.736	1.061	0.752-1.498	0.019	0.645	0.447-0.931	0.524	0.830	0.468-1.471	0.04	0.776	0.609-0.989
Energy drinks	0.926	0.983	0.689-1.403	0.173	0.771	0.530-1.121	0.685	0.886	0.492-1.594	0.001	0.660	0.516-0.845
Sedentary lifestyle	0.191	0.792	0.558-1.124	0.337	1.192	0.833-1.707	0.028	1.853	1.069-3.213	0.423	1.106	0.865-1.413

Table 5 (Continued). BIVARIATE analysis of the influence of some of the risk factors associated to major pathologies.

Risk factors	ASTHMA			COPD			ISCHEMIC HEART DISEASE			CARDIOVASCULAR DISEASE		
	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI
Age (years old)	0.04	0.959	0.932-0.986	1.172	1.025	0.989-1.061	0.0001	1.137	1.185-1.192	0.0001	1.084	1.038-1.132
Gender (male)	0.639	0.771	0.261-2.278	0.646	1.610	0.211-12.27	0.466	0.571	0.127-2.574	0.975	1.033	0.133-8.052
Origin (national)	0.289	1.398	0.752-2.600	Unable to assess			0.016	12.09	1.603-91.25	0.252	1.951	0.621-6.130
Overweight	0.059	0.545	0.291-1.023	0.595	0.796	0.342-1.850	0.379	1.509	0.603-3.773	0.935	1.043	0.383-2.841
Obesity	0.519	1.262	0.623-2.556	0.774	1.159	0.423-3.179	0.78	1.173	0.381-3.611	0.507	1.477	0.467-4.679
Risk waist circumference	0.603	0.831	0.413-1.670	0.341	1.527	0.639-3.648	0.233	1.785	0.689-4.627	0.089	2.398	0.876-6.563
Risk atherogenic index	0.003	0.354	0.180-0.696	0.536	0.752	0.305-1.855	0.966	0.979	0.372-2.577	0.715	1.255	0.372-4.233
Smoker	0.05	2.108	1.000-4.441	0.145	2.249	0.757-6.684	0.109	0.472	0.188-1.183	0.312	1.925	0.541-6.843
Cocaine use	0.03	1.988	1.07-3.692	0.014	3.513	1.293-9.546	0.331	0.632	0.25-1.595	0.448	0.679	0.249-1.848
Coffee	0.649	1.147	0.636-2.067	0.053	2.272	0.99-5.21	0.255	0.548	0.195-1.544	0.901	0.937	0.336-2.615
Energy drinks	0.999	1.001	0.542-1.847	0.215	1.683	0.737-3.832	0.475	0.685	0.242-1.932	0.815	0.88	0.301-2.569
Sedentary lifestyle	0.005	2.306	1.282-4.149	0.088	2.044	0.898-4.650	0.068	2.375	0.94-6.004	0.295	1.701	0.629-4.604

p= test significance; O.R= odds ratio; 95% CI= Odds ratio 95% confidence interval.
Risk abdominal circumference= over 102 in men and over 88cm in women.
Risk atherogenic index= Total cholesterol/HDL cholesterol over 4.5.
Sedentary lifestyle= moderate physical activity for less than 30 minutes per day.
Unable to assess= impossible to do so because one of the groups lacks the corresponding risk factor.

of 51.9% in our sample and 17.2% of the population presented risk waist circumference measurements. Abdominal obesity has been related to the physiopathology of insulin resistance and of a high percentage of patients with hypertriglyceridemia or low HDL cholesterol levels. This obviously plays an important role in the development of diseases such as hypertension, diabetes or cardiovascular diseases, as some Spanish reports have concluded[19].

Together with overweight and obesity there is another index derived from blood lipid levels which refers mainly to cardiovascular risk and which can be calculated from total cholesterol and HDL cholesterol levels. This is known as the atherogenic or Castelli index. In our sample, 43.2% of patients had an index over 4.5 and hence had a high probability for the development of atheromatous plaques and cardiovascular diseases.

Smoking, dyslipidemia and obesity must be considered as major objectives when designing specific action programs for the prevention of chronic diseases.

In prisons we can also find a higher number of drug users. As far as the use of cocaine is respected it has been proven that it can duplicate the risk of hypertension. Other substances such as coffee in quantities over three cups a day or the use of energy drinks such as taurine, theine or ginseng have not shown important relationships.

Sedentary lifestyles have been associated with the development of chronic diseases, especially with diabetes. Thorough epidemiological research [21] has proven that activity plays a protective role in the development of ischemic heart disease, hypertension and cerebrovascular disease. Furthermore, it has been proven that low activity levels are important determinants in the development of overweight and obesity as well as the clear relationship between sedentary lifestyles and diabetes.

The main limitations of this study are related to the cross-sectional design which clearly impairs the extrapolation of conclusions. The determination of overall prevalence rates restricts the possibility of making statistical inferences from confidence intervals. On the other hand, we also consider whether the sample of our 9 facilities is representative of the overall imprisoned population or if it would have been different if it had been selected from other facilities. This always happens when you don't take total samples. Generally speaking, the profile of our sample presents no significant differences between facilities or among individuals. We therefore believe it to be representative or at least proximate to the issue that we intended to depict. We aimed at raising awareness on the relevance of chronic diseases in prisons. The studies on prevalence of disease within prisons have traditionally addressed infectious diseases, yet there were no previous reports on the prevalence of chronic diseases in prison. Therefore this report intends to set a reference point on this issue for future research.

A potential bias that may have occurred is what we know as classification bias when establishing the threshold for the estimation of what we consider prevalent or not. Generally speaking we have followed the recommendations by current clinical practice guidelines.

Finally, now we know the extent of the issue we intend to design and implement specific nursing intervention guidelines which can be of use for those of us developing our work in prisons, and mainly aimed at the intervention on the major modifiable risk factors observed.

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