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Trends in Prevalence of Hipercholesterolemia Among Catalan Adults 2001-2018 (Osona–Barcelona)

Joan Deniel-Rosanas ^a, Jordi Prat-Quinzaños ^b, Pere Roura-Poch ^c, Maria-Àngels Casas-Capdevila ^d, Victor Farré-Guerrero ^e

^a Medical Specialist in Family and Community Medicine of the Manlleu (Barcelona, Spain) Primary Health Area. Head of Studies of the Teaching Unit of Family and Community Care of Central Catalonia of the Catalan Institute of Health.

^b Medical Specialist in Laboratory Medicine. Clinical Laboratory, Vic University Hospital, Vic (Barcelona, Spain).

^c Medical Specialist in Preventive Medicine. Epidemiology Unit, Vic University Hospital, Vic (Barcelona, Spain).

^d Pharmacist Specialist in Clinical Chemistry. Clinical Laboratory, Vic University Hospital, Vic (Barcelona, Spain).

^e Medical Specialist in Laboratory Medicine. Head of Service, Clinical Laboratory, Vic University Hospital, Vic (Barcelona, Spain).

Address for correspondence:

Joan Deniel-Rosanas

Institut Català de la Salut - CAP Manlleu

17, Castellot street. E-08560-Manlleu (Barcelona, Spain)

Telephone: +34.93 850 64 84, GSM: +34.638 68 09 60.

Email: jdeniel.cc.ics@gencat.cat

Abstract

Background: The total cholesterol values of the Spanish population are high. The Preventive Activities Programs developed are not being sufficiently effective in improving population cholesterolemia. The involvement of other elements of society (education, the media, the food industry, etc.) may be essential in controlling the population's cholesterol.

Aim: To compare the evolution of serum concentrations of total cholesterol in a population between the years 2001, 2006 and 2018.

Design and setting: Cross-sectional study comparing the evolution of serum total cholesterol concentrations in a population between the years 2001-2018. It has been carried out on patients who have been visited in health centers in the Osona county (Barcelona, NE Spain).

Methods: Cross-sectional observational study. Total serum cholesterol (TC) values of patients studied between September and December 2001 were compared with patients analyzed during the same period of 2006 and 2018.

Results: The values of the population cholesterol means, according to sex and age strata in 2018 are lower than those of the previous periods (2001 and 2006).

The average decrease in cholesterol concentration between 2001 and 2018 is 10mg / dL for women (corresponding to a 5% reduction) and 17mg / dL for men (8% reduction).

Discussion and conclusions: The causes of this trend towards a decrease in the total cholesterol level can be explained in a multifactorial way: interventions in all healthcare settings, self-awareness of the health problem and preventive population campaigns on this issue.

In conclusion, in recent years there has been a marked reduction in the average level of total cholesterol in Osona county population. However, hypercholesterolemia still remains a highly prevalent cardiovascular risk factor, accounting for 48% of the population studied in 2018.

Keywords: Population cholesterol, Primary care, Prevention, Cardiovascular disease.

How this fits in:

During the period studied (2001-2006-2018), a decrease in the mean values of total cholesterol was observed in all age groups and in both sexes.

The percentages of patients who are above the optimal level decrease with respect to the first period studied (2001).

The Preventive Activities Programs and the involvement of other elements of society are being effective in the fight against hypercholesterolemia.

Introduction

Atherosclerosis is one of the main causes of mortality, both in men and women, worldwide. It has been widely demonstrated that control of the main risk factors for cardiovascular diseases (smoking, arterial hypertension, hypercholesterolemia, diabetes, obesity and a sedentary lifestyle) contributes to the prevention and reduction of mortality due to atherosclerosis.

Various studies (1-3) confirm that the prevalence of dyslipidemia and other cardiovascular risk factors are high in the population of different territories of the Spanish State. They have also shown that the fight against hypercholesterolemia is one of the pending issues for our society, since, otherwise, it could clinically translate into an increased incidence of cardiovascular diseases in the long term.

The present work focuses on hypercholesterolemia, a risk factor for cardiovascular disease, which participates in the pathogenesis of arteriosclerosis. Its objective is to observe the evolution of mean serum cholesterol values in a population sample from the Osona region (Barcelona), over a time interval of 18 years, and to verify whether the pattern of change corresponds to that of other studies carried out in other geographic areas.

Method

Design and setting: Cross-sectional study carried out during three time periods: 2001, 2006 and 2018. Non-institutionalized patients from Osona county (Barcelona, NE Spain) from primary care and other specialties were included, who underwent a study of blood lipids.

Main measurements: The total serum cholesterol (TC) values of the 10,435 patients studied between September and December 2001 were compared with the 14,360 patients analyzed during the same period in 2006 and with the 17,681 patients studied during the same months in 2018 (Table 1).

Table 1: Cases studied by sex, age group and % versus total population

Age (years) and sex	2001			2006			2018			
	Cases studied N	Total population N	%	Cases studied N	Total population N	%	Cases studied N	Total population N	%	
19-30	Men	409	12.598	3,2	450	13.429	3,4	386	10.219	3,8
	Women	896	11.462	7,8	1.082	12.227	8,8	711	9.706	7,3
31-40	Men	523	10.758	4,9	659	12.989	5,1	595	11.716	5,1
	Women	771	9.961	7,7	1.053	11.078	9,5	878	11.181	7,9
41-50	Men	701	9.542	7,3	1.023	11.539	8,9	977	13.375	7,3
	Women	949	9.000	10,5	1.290	10.550	12,2	1.304	11.950	10,9
51-60	Men	878	6.783	12,9	1.270	8.230	15,4	1.465	11.250	13,0
	Women	995	6.863	14,5	1.414	7.987	17,7	1.823	10.991	16,6
61-70	Men	987	5.723	17,2	1.226	5.532	22,2	1.964	8.089	24,3
	Women	1.020	6.509	15,7	1.358	6.088	22,3	2.030	8.318	24,4
71-80	Men	783	5.723	13,7	1.109	5.116	21,7	1.460	4.533	32,2
	Women	931	6.204	15,0	1.400	6.818	20,5	1.636	5.649	29,0
>80	Men	181	1.459	12,4	372	2.019	18,4	932	3.116	29,9
	Women	411	3.213	12,8	654	3.846	17,0	1.520	5.681	26,8
Total	Men	4.462	52.586	8,5	6.109	58.854	10,4	7.779	62.298	12,5
	Women	5.973	53.212	11,2	8.251	58.594	14,1	9.902	63.476	15,6
Total		10.435	105.798	9,9	14.360	117.448	12,2	17.681	125.774	14,1

Results:

The mean cholesterol values, according to sex and age group in 2018, are lower than those of the previous periods (2001 and 2006): the negative difference is statistically significant for both sexes and by age groups between 2018 and 2001. The average decrease in cholesterol concentration between 2001 and 2018 is 11mg/dL for women (which corresponds to a 4% reduction) and 16mg/dL in men (8% reduction) ([Table 2](#)).

Table 2: Cases studied, statistical data by age group and sex

Women

Age group (years)	19-30			31-40			41-50			51-60		
Period	2001	2006	2018	2001	2006	2018	2001	2006	2018	2001	2006	2018
N	896	1.082	711	771	1.053	878	949	1.290	1.304	995	1.414	1.823
Mean	177	179	171	194	191	184	208	208	198	231	228	221
SD	34,20	36,55	32,85	34,52	36,21	35,90	37,62	39,54	36,41	41,83	40,35	38,07
p	$\geq 0'05$		$< 0'05$	$\geq 0'05$		$< 0'05$	$\geq 0'05$		$< 0'05$	$\geq 0'05$		$< 0'05$

Age group (years)	61-70			71-80			>80			All age groups		
Period	2001	2006	2018	2001	2006	2018	2001	2006	2018	2001	2006	2018
N	1.020	1.358	2.030	931	1.400	1.636	411	654	1.520	5.973	8.251	9.902
Mean	230	224	220	223	217	209	211	207	200	212	209	206
SD	39,74	40,06	39,65	41,10	40,11	40,33	42,86	40,75	41,14	43,21	42,39	41,34
p	$< 0'05$			$< 0'05$			$< 0'05$			$< 0'05$		

Men

Age group (years)	19-30			31-40			41-50			51-60		
Period	2001	2006	2018	2001	2006	2018	2001	2006	2018	2001	2006	2018
N	409	450	386	523	659	595	701	1.023	977	878	1.270	1.465
Mean	177	177	170	208	205	193	220	213	206	219	215	204
SD	38,42	37,81	37,46	46,25	47,22	39,74	43,40	43,45	44,35	39,59	43,36	44,05
p	$\geq 0'05$		$< 0'05$	$p \geq 0'05$		$< 0'05$	$< 0'05$			$< 0'05$		

Age group (years)	61-70			71-80			>80			All age groups		
Period	2001	2006	2018	2001	2006	2018	2001	2006	2018	2001	2006	2018
N	987	1.226	1.964	783	1.109	1.460	181	372	932	4.462	6.109	7.779
Mean	218	207	195	206	198	185	197	186	175	211	204	192
SD	40,62	40,09	41,19	39,40	38,72	39,17	42,251	41,47	38,08	43,00	43,26	42,63
p	$< 0'05$			$< 0'05$			$< 0'05$			$< 0'05$		

2001 vs 2006: Anova - Bonferroni: p not significant ($p \geq 0'05$)

The other contrast: 2001 - 2006, 2006 - 2018 and 2001 - 2018 are significant ($p < 0'05$)

Despite this significant reduction, high mean cholesterol values (>200mg/dL) are still observed in both sexes: in women mainly in the 51-75 age group (5%), and in men in the 41-65 age group (53%). The distribution of mean values by sex and age group is parallel in the three periods studied (Figure 1). In women, TC levels rise progressively until the 51-60 age group and subsequently decrease. In men, the mean TC rises until the 41-50 age group, remains high in the 51-60 age group, and then decreases.

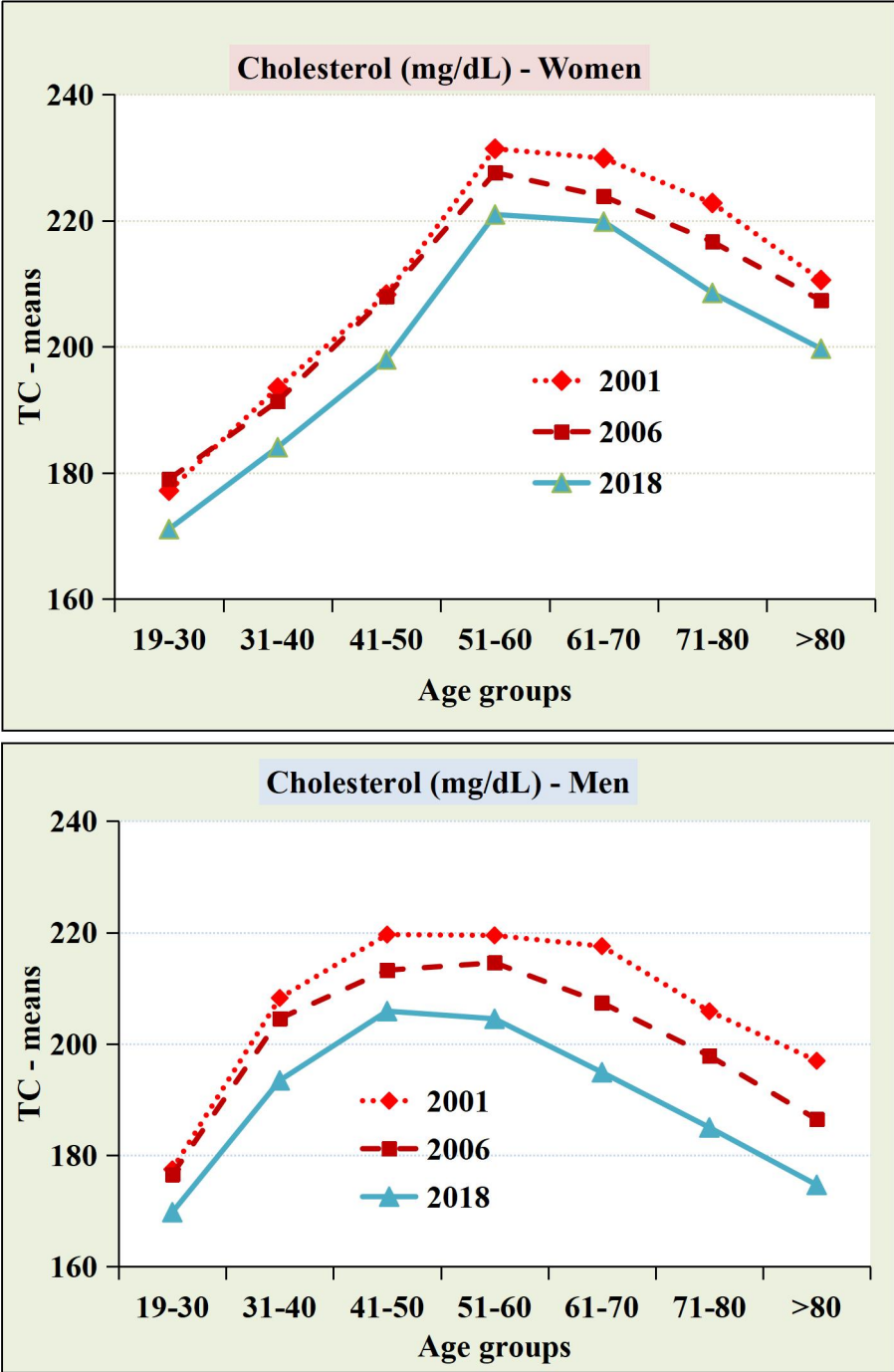


Figure 1: Total Cholesterol means for both sexes and by age group in the periods studied (2001, 2006, 2018)

Discussion and conclusions:

The data obtained in this study (4) provide consistent results and enhance the objectives set. The percentage of patients in the four blood cholesterol levels (≤ 200 mg/dL, optimal, 200-220 mg/dL, suboptimal, 220-250 mg/dL, high and >250 mg/dL, pathological) improve in this eighteen-year study (Table 3 and Figure 2).

Table 3 : Evolution 2001, 2006, 2018, of the percentage of cases located in the four Total Cholesterol (mg/dL) ranges: (≤ 200 , 201 to 220, 221 to 250 and > 250), distributed by age group and sex

		Age group: 19 - 30 years			
		% of cases			
	Cholesterol (mg/dL)	≤ 200	201-220	221-250	>250
Women	2001	77	12	8	2
	2006	76	12	7	4
	2018	84	9	6	2
Men	2001	77	12	8	4
	2006	78	10	8	4
	2018	80	12	4	4

		Age group: 31 - 40 years			
		% of cases			
	Cholesterol (mg/dL)	≤ 200	201-220	221-250	>250
Women	2001	64	18	13	6
	2006	65	17	13	6
	2018	71	15	10	4
Men	2001	50	16	18	16
	2006	49	20	19	11
	2018	62	15	13	9

		Age group: 41 - 50 years			
		% of cases			
	Cholesterol (mg/dL)	≤ 200	201-220	221-250	>250
Women	2001	45	21	21	13
	2006	47	21	20	12
	2018	57	18	18	8
Men	2001	34	19	25	22
	2006	40	19	24	18
	2018	46	20	21	14

Table 3: (continuation)

		Age group: 51 - 60 years			
		% of cases			
	Cholesterol (mg/dL)	<= 200	201-220	221-250	>250
Women	2001	25	16	28	31
	2006	25	19	28	27
	2018	31	20	28	21
Men	2001	34	19	27	20
	2006	38	19	25	18
	2018	47	20	18	15
		Age group: 61 - 70 years			
		% of cases			
	Cholesterol (mg/dL)	<= 200	201-220	221-250	>250
Women	2001	23	20	29	28
	2006	28	21	27	24
	2018	30	22	28	20
Men	2001	37	16	26	21
	2006	43	20	23	13
	2018	56	18	18	8
		Age Group: 71 - 80 years			
		% of cases			
	Cholesterol (mg/dL)	<= 200	201-220	221-250	>250
Women	2001	30	18	28	24
	2006	33	22	27	19
	2018	42	21	23	14
Men	2001	46	19	21	13
	2006	55	18	17	9
	2018	67	15	13	5
		Age group: 81 and more years			
		% of cases			
	Cholesterol (mg/dL)	<= 200	201-220	221-250	>250
Women	2001	42	19	22	17
	2006	44	18	24	14
	2018	52	19	19	10
Men	2001	54	20	17	10
	2006	64	16	12	7
	2018	77	11	9	3

		All age groups: 19 - > 81			
		% of cases			
	Cholesterol (mg/dL)	<= 200	201-220	221-250	>250
Women	2001	42,7	17,6	21,7	17,9
	2006	43,6	18,8	21,5	16,2
	2018	46,5	18,9	21,4	13,3
Men	2001	43,5	17,4	22,1	16,9
	2006	48,3	18,3	20,3	13,0
	2018	59,1	16,8	15,3	8,8

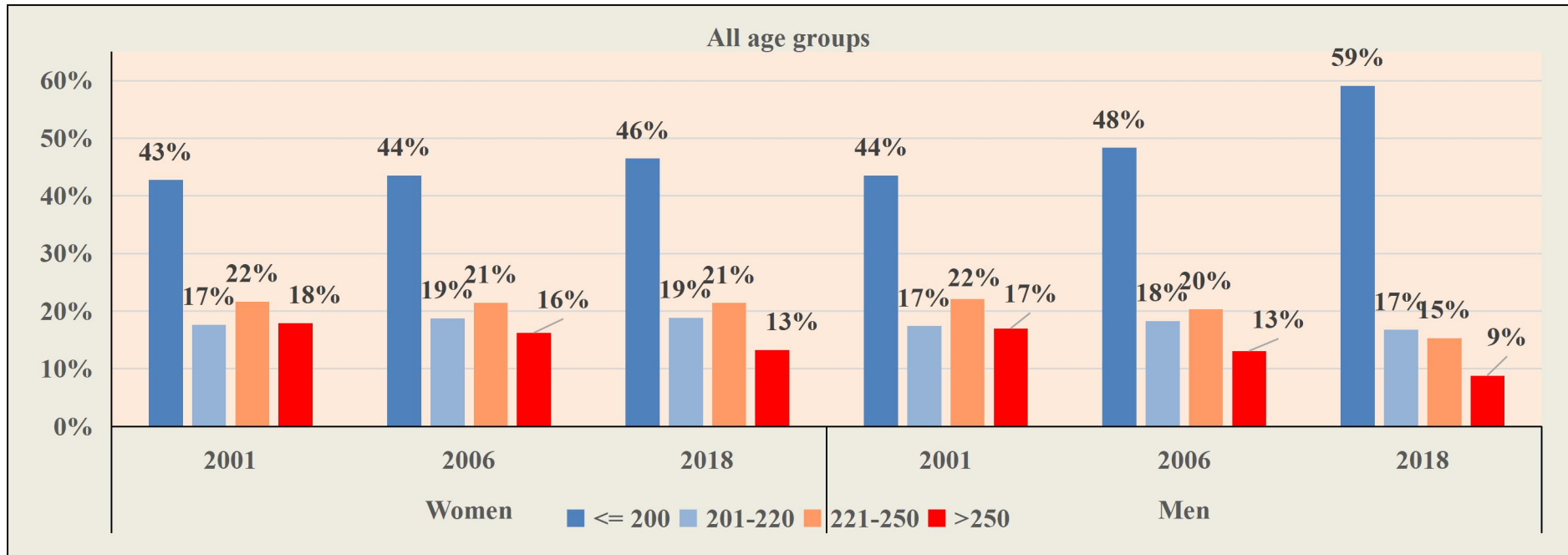


Figure 2: Evolution 2001, 2006, 2018, of the percentage of cases located in the four Total Cholesterol (mg/dL) ranges: (≤ 200 , 201 to 220, 221 to 250 and > 250), distributed by sex

Our results are similar to and follow the same favorable trend as those published by Nirav Patel et al. (5) in 2019, which is why this commentary has been written. Other studies also corroborate these results (6-8).

Despite this downward trend in population TC levels, the prevalence of hypercholesterolemia remains high: in the total population included in this study, the percentage of people with a TC level of > 200 mg/dL was 48% in 2018.

The causes of this trend towards a decrease in TC levels are multifactorial. First, due to intervention in all healthcare areas: primary care, preventive medicine, cardiology, endocrinology and internal medicine, among others. Here we need to highlight the extremely important role played by primary care teams, for whom this healthcare problem is very frequent and a priority. Second, due to the people in the general population who have knowledge and self-awareness of the health problem, which results in a greater adherence to the prescribed health interventions. Third, due to the national health administration and the different social organizations (scientific associations and others) that have launched public preventive campaigns on this issue.

In conclusion, in recent years there has been a marked reduction in the mean level of total cholesterol in the population in Osona county. However, hypercholesterolemia still remains a highly prevalent cardiovascular risk factor, accounting for 48% of the population studied in 2018.

Awards

Work awarded in the XXXVIII edition of Osona Health Awards of the Barcelona College of Physicians in the category of Original work Unpublished work (Vic, November 30, 2020).

Abbreviations

TC: Serum total cholesterol

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