

Health professionals' adherence to evidence-based obesity guidelines: a cohort study.

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Research

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Abstract

BACKGROUND The prevalence of obesity is on the increase worldwide and yet scientific evidence shows that primary care professionals are not adequately addressing overweight and obesity. In this study, we evaluate how obesity guidelines are being implemented in routine clinical practice.

METHODS The study obtained the following data on a cohort of 209 obese patients attending primary care consultations: electronic medical records, body mass index (BMI), waist circumference (WC), cardiovascular risk factors, comorbidities and whether or not their health professional adhered to obesity evidence-based guidelines.

RESULTS 57.9% of the participants were women and their average age was 65.8 ± 12.7 years. Only 25.4% of the medical records met all the criteria established in the therapeutic guidelines regarding diet prescription. This percentage was significantly higher in males than females (36.4% vs 17.4, $p = 0.002$). 1.4% met the criteria for physical activity and 1.5% for behavioural change activities. In the multivariate analysis, the variable associated with the most favourable BMI and WC figures, after adjusting for age, was a follow up by health professionals on physical activity ($\beta=0.347$, $p=0.027$, $CI=0.429-6.868$; $\beta=0.367$, $p=0.024$, $CI=1.256-17.556$) during routine check-ups with women.

CONCLUSIONS We detected low adherence to the evidence-based guidelines among professionals. Recording dietetic prescription and physical exercise in the patient's medical record is associated with a better control of obesity. This data suggest that primary health care should be improved for obese patient.

Background

The prevalence of obesity is increasing among people of all ages in countries with varying income levels. Obesity raises the risk of several conditions including type 2 diabetes mellitus (T2DM), hypertension, dyslipidemia, cardiovascular disease, osteoarthritis, sleep apnea and some cancers [1]. It also implies a significant burden on health services [2].

In European countries, the current prevalence of obesity in adults is high; 28.1% in England and 23.8% in Spain [3]. The obesity prevalence in the USA is even higher than in Europe, at 36% [4].

To stop this pandemic, effective strategies need to be developed and applied to both prevent and treat obesity. The current clinical practice guidelines on obesity recommend carrying out a series of interventions to improve diet and the level of physical activity through behavioural change techniques [5].

Primary care professionals (doctors and nurses) play a key role in advising and motivating obese patients on the health benefits of weight loss. However, despite the obesity epidemic, scientific evidence shows that we are not adequately addressing overweight and obesity [6].

Different studies have evaluated the effectiveness of primary care interventions in treating obesity but few studies have evaluated how patients with obesity are really managed in primary care or how well evidence-based guidelines are implemented in routine clinical practice [7–10]. To achieve weight loss, these guidelines recommend a comprehensive approach: Diet, physical activity and behaviour therapy. Our hypothesis was that adherence to guidelines is low and that this is associated with a low control of obesity.

The aim of this study was to analyse the clinical evolution of obese patients over a 5-year period in the primary care setting and to examine how evidence-based guidelines are implemented in routine clinical practice.

Methods

Study design and Participants

A cohort of obese patients who attended consultations at a primary care centre in Guadalajara, Spain, was selected from the Public Health Service's electronic health records. The inclusion criteria were as follows: adults over 18 years old with a diagnosis of obesity recorded in their electronic medical record from at least 5 years before. Exclusion criteria were: obesity secondary to genetic syndromes; hypothalamic or hormonal alterations; any hepatic, cardiac or renal disease that causes body edema; terminal illness; pregnancy or lactation; cognitive deterioration; patient absenteeism for primary care consultations for over a year; and institutionalised patients. Taking into account a population of 510 obese people in the 2016 period and assuming a 20% estimated proportion of weight management intervention [11], the required sample size to achieve 4% precision and a confidence level of 90%, was calculated at 177 patients. We contacted all eligible participants, and 209 subjects who met the inclusion criteria decided to participate. We adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cohort studies (Additional file 1).

Data collection

We obtained the variables from the primary care consultation, through patient interviews and electronic medical records. From the consultation, we obtained: demographic data, personal history, BMI, WC, blood pressure, any cardiovascular risk factors diagnosed (smoking habit, hypertension, hypercholesterolemia or T2DM), major comorbidities associated to obesity (acute myocardial infarction, AMI; and obstructive sleep apnea syndrome, OSAS) [12], type of treatment prescribed for obesity, adherence to treatment (diet, physical exercise and behavioural change) by closed-ended question (yes or no). The variables obtained from the electronic medical record included whether or not pharmacological treatment for obesity had been prescribed, BMI and WC recorded in the annual review five years before, previous cardiovascular risk factors, figures for each of these at the time of the survey and 5 years before (systolic and diastolic blood pressure, HDL-cholesterol, LDL-cholesterol, triglycerides, and glycosylated hemoglobin -HbA1c- in diabetics), major comorbidities (AMI and OSAS) suffered by patients over the five year period prior the time of the study and biochemical analysis of the blood in the last annual review.

The study also examined the health professionals' adherence to evidence-based obesity guidelines over the previous five years and whether records were kept in the medical history and followed up. Adherence was recognised by the existence of any record in the medical history during the study period regarding: 1. Prescription of diet, type of prescribed diet and follow-up of the diet in medical appointments. 2. Prescription of physical activity, type of physical activity, frequency, duration and follow-up. 3. Prescription of behavioural change activities, type of prescription and follow-up. Behavioural counseling addresses behaviours that require change in order to successful weight loss such as self-monitoring food intake (e.g. dietary record), physical activity and body weight. They include techniques which control the process of eating; slow the rate of eating; advise on decreasing the size of food portions, avoiding snacking between meals, not skipping breakfast, avoiding eating at night time, manage and reduce episodes of loss of control or binge eating, practice stimulus control and reinforcement as well as relaxation techniques [12–14]. The main measures were: the record in the clinical history of diet prescription, physical activity and behavioural therapy in the medical history, a follow-up in consultation and compliance with the obesity guidelines recommendations.

Analysis

For the statistical analysis, the SPSS v 23.0 program was used. For the comparison of means, the Student t-test was used when the variables presented normal distribution, and the Mann-Whitney U test and Wilcoxon tests if the variables were not normally distributed. For the comparison of proportions, the Pearson Chi-square test / Fisher's exact statistic was used. The comparison of prevalence at the beginning and end of the study was carried out using the Mc Nemar test. Multivariate linear regression analysis was performed to examine the association of the variables studied with the BMI and waist circumference. Two-side p values < 0.05 were considered significant.

Results

Characteristics of the participants

The general characteristics of the participants are shown in Table 1.

57.9% of the participants were female and the average age was 65.8 ± 12.7 years. A small reduction in BMI was observed throughout the study period (34.6 ± 4.2 vs 34.2 ± 4.4 kg / m², p = 0.037), while the WC increased 4.4 cm (107.0 ± 9.9 vs 111.4 ± 12.0 , p < 0001) (Table 2).

The prevalence of cardiovascular risk factors increased significantly except for smoking. There was a significant increase in the prevalence of acute myocardial infarction (6.7% vs 10.5%, p = 0.008) and obstructive sleep apnea syndrome (3.3% vs 9.6%, p <0.0001) (Table 2).

Health professional's adherence to obesity guidelines

79.9% of the electronic medical histories recorded diet prescription, 88.5% advised physical activity and 2.9% recommended behavioural change. With respect to follow-up consultations with a health

professional 69.9% of the medical records recorded a follow-up regarding diet, 76.6% for physical activity and 1.9% for behavioural change (Table 3).

Drug treatment was indicated in 96.2% of the patients' notes studied, as recommended in the obesity guidelines, but medication was only prescribed in 1.4% (Table 3). The hypocaloric diet was only registered in 28.2% of the clinical histories.

The type of physical activity was recorded in 82.8% of the patients' histories. The time, intensity and frequency were detailed in 64.1%. However, only 1.9% specified that there had to be an increase in baseline physical activity. Some type of behavioural change advice was registered in 1.5% of the medical histories.

Only 25.4% of medical records met all the criteria established in the therapeutic guidelines regarding diet prescription. This was significantly higher in males than females (36.4% vs 17.4, $p = 0.002$). 1.4% met criteria in terms of physical activity and 1.5%

With respect to the adherence of patients to treatment, only 12.4% reported following the advice on diet, significantly higher in males than females. 23.4% of patients carried out physical activity in line with the recommendations given in the health centre and 0.5% followed recommendations on behavioural change.

The patients whose records mentioned diet prescription and physical activity and who received follow-up consultations for both factors had lower average BMI and WC. This occurred mainly in women (Table 4). In the multivariate analysis (Table 5), the variable associated with the most favourable BMI and WC figures, after adjusting for age, was a follow up regarding physical activity in women's routine check-ups.

Discussion

Among the findings of our study, it is worth noting that while BMI decreased slightly ($0.4 \text{ kg} / \text{m}^2$), over the period studied, WC increased by 4.4 cm. In a longitudinal retrospective study conducted in the UK that analysed the records on obesity found in primary care electronic clinical histories over 12 years, the authors observed initial BMI figures similar to ours ($34.3 \text{ kg} / \text{m}^2$ in males and $35.7 \text{ kg} / \text{m}^2$ in women) which increased to 1.2 kg/m^2 and 1.3 kg/m^2 respectively in the 12-year period analysed [15].

In relation to the increase in WC observed in our study, this coincides with another recent study carried out in the USA, in which the authors found that although the prevalence of obesity seemed to have stabilised, the average abdominal circumference of the Americans had continued to increase [16]. Currently, therapeutic intervention is recommended in overweight patients with abdominal obesity [17].

The prevalence of cardiovascular risk factors increased significantly over the 5 years analysed and this coincides with Noël et al. in their North American study that found a prevalence of hypertension, hyperlipidemia and T2DM in people with obesity of 83.8%, 78.0% and 45.4% respectively [18]. In addition, we observed an increase in the prevalence of severe comorbidities related to obesity, such as AMI and

OSAS, over the five-year study period. This indicates that these patients would need intensive treatment for excess body weight.

Adherence to health care provision recommended by the decision algorithms regarding diet prescription, physical activity and behavioural change, was only fulfilled in 25.4%, 1.4% and 1.5% of the clinical histories respectively. Booth et al. studied therapeutic interventions in overweight and obese patients in primary care in the UK and they found that 80.2% patients with non-severe obesity had no recorded intervention during the seven-year study period [11]. The authors concluded that this could be due to a poor record keeping of the advice provided, but it could also indicate a deficiency in the treatment of obesity in primary care.

Noël et al. observed that only 34% of the obese patients studied in primary care received advice on diet and physical activity [18]. Ma et al. observed that 70% of obese subjects in primary care were not correctly diagnosed with obesity and 63% of obese patients did not receive any advice on diet or physical activity [19]. This may mean that undiagnosed patients are not treated properly.

Waring et al. reviewed the recommendations recorded in the clinical histories of obese patients and found that 76% of the histories featured records on dietary advice and 60% referred to some prescription about physical activity [20]. Farran et al. analysed the degree of adherence of health professionals to therapeutic guidelines for obesity before and after an educational session on obesity management in primary care centres [21]. After this educational session, there was an increase in recording dietary advice, physical activity and behavioural change in medical records.

We observed a low adherence among health professionals to the behavioural treatment recommended by the therapeutic guidelines on obesity. This could be due to insufficient training, lack of time, absence of institutional support or fear of a negative reaction from patients [22–24].

With regard to pharmacotherapy, we observed that only 1.4% of patients were prescribed drugs for obesity (Table 3). In the study by Noël et al., only 0.4% of patients received drug therapy [18]. Patterson et al. and Samaranayake et al. reported 5.8% and 2.2% respectively [25, 26]. Although anti-obesity drugs may provide benefits, it seems that their use has been limited due to safety concerns, a small effect size and even a lack of knowledge of what drugs are available and their indications among professionals.

Regarding the prescription of specific medical advice for obesity, in the study by Banegas et al., the physician said that healthy diet advice was provided to 89.9% of patients, but only 57.8% of them were given written dietary advice. Appropriate advice on physical activity was given to 80% of patients [27]. It is important to include obesity management and the prescription of diet, physical activity and behavioural advice in the primary care indicators for quality of care if obesity is to be controlled [28].

With regard to the adherence of patients to the prescribed treatment for obesity, only 12.4% of patients indicated carrying out the advice on diet and only 23.4% of the patients reported carrying out physical activity. In the study by Samaranayake et al., 60.3% of subjects with obesity changed their diet and less

than 40% did physical activity during the 12 months preceding the study [26]. To improve adherence, it is essential that primary care professionals are involved in the treatment and follow-up of obese patients [29]. Our results show that the patients whose medical histories recorded advice given on diet and physical activity in addition to receiving a follow-up, presented lower BMI and WC. Moreover, the variable associated with lower BMI and WC was the follow-up of physical activity in women's consultations. This could help us to improve treatment for people with obesity [30].

Limitations

This study has some limitations. The average age of the population studied was 65.7 ± 12.7 years, so it would be interesting to extend the study to a more diversified sample in terms of age. Likewise, the period of time studied was five years which could be extended to evaluate changes for the longer term variables.

On the other hand, in the data collected from the electronic medical records, an infra-registration of some variables may have occurred. The same does not occur, however with the data collected at the time of the study since all the patients were interviewed and anthropometric and analytical measurements for all the patients were taken. Thus, we assessed the real situation of each one.

Finally, due to the study's design, no causal relationships can be extracted from the associations observed. However, the work provides enough information to be able to investigate more possible causes of the results obtained.

Conclusions

We have observed a significant increase in the prevalence of all cardiovascular risk factors (with the exception of smoking) and comorbidities related to obesity, which suggests that these patients are in a critical situation regarding the risk of cardiovascular events and death which requires close monitoring.

At the same time, a low adherence of professionals to the evidence-based guidelines has been detected. Records of dietetic and physical exercise prescription in the medical histories were associated with a better control of obesity. All these data suggest that healthcare in patients with obesity should be improved and promoted in primary care.

Electronic medical records should allow professional advice and follow-ups to be registered. Professionals should also have simple protocols that include recommendations from updated clinical guidelines.

Abbreviations

AMI

acute myocardial infarction

BMI

body mass index
HbA1C
glycosylated hemoglobin
OSAS
obstructive sleep apnea syndrome
STROBE
Strengthening the Reporting of Observational Studies in Epidemiology
T2DM
type 2 diabetes mellitus
WC
waist circumference

Declarations

Ethics approval and consent to participate

The study was conducted under the standards and ethical criteria established in the latest Declaration of Helsinki (Fortaleza, Brazil) and were approved by the Clinical Research Ethics Committee at the Guadalajara University Hospital. All participants were asked for informed consent.

Consent for publication

Not applicable

Availability of data and materials

The data is available.

Competing interests

The authors have no conflicts of interest to disclose.

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Authors' contributions

The authors have participated in the design of the work and have read and approved it for submission

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Not applicable.

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Tables

Table 1. Sociodemographic, clinical and laboratory characteristics of obese primary care patients.

	Total	Men	Women	p
% (n)	209	42.1 (88)	57.9 (121)	
Age	65.8±12.7	63.2±13.6	67.6±11.8	0.015
BMI	34.2±4.5	33.5±4.1	34.7±4.7	0.059
WC	111.4±11.6	116.2±10.1	107.9±11.5	<0.0001
HBP % (n)	85.6 (179)	89.8 (79)	82.6 (100)	0.166
T2DM % (n)	38.8 (81)	38.6 (34)	38.8 (47)	1
HC % (n)	62.2 (130)	62.5 (55)	62.0 (75)	1
Smoker % (n)	12.9 (27)	20.5 (18)	7.4 (9)	0.007
SBP mmHg	133.0±13.5	136.2±13.0	130.7±13.5	0.004
DBP mmHg	81.6±8.5	82.6±8.4	80.8±8.5	0.135
c-LDL mmol/l	3.0 0.7	3.0 0.8	3.1 0.7	0.215
c-HDL mmol/l	1.2 0.3	1.1 0.3	1.3 0.3	<0.0001
TG * mmol/l	1.4 (1.9- 1.0)	1.5 (2.0- 1.2)	1.3 (1.7- 1.0)	0.016
HbA1c % IQR *	6.2 (7.1-5.9)	6.2 (7.1-5.8)	6.1 (7.0-5.9)	0.952

BMI, body mass index; WC, waist circumference; HBP, high blood pressure; T2DM, type 2 diabetes mellitus; HC, hypercholesterolemia; SBP, systolic blood pressure; DBP, diastolic blood pressure; c-LDL, cholesterol-LDL; c-HDL, cholesterol-HDL; TG, triglycerides; IQR, interquartile range. * Mc Whitney.

Table 2. Evolution of patients' medical status over studied time (five years).

	5 years before	Current	p
n	209	209	
Age	-	65.8±12.7	-
BMI kg/m²	34.6±4.2	34.2±4.5	0.037
WC cm	107.0±9.9	111.4±11.6	<0.0001
HBP % (n)	77.0 (161)	85.6 (179)	<0.0001
T2DM % (n)	27.3 (57)	38.8 (81)	<0.0001
HC % (n)	45.0 (94)	62.2 (130)	<0.0001
Smoker % (n)	16.7 (35)	12.9 (27)	0.021
SBP mmHg	135.4±12.9	133.0±13.5	0.012
DBP mmHg	82.7±8.5	81.6±8.5	0.077
c-LDL mmol/l	3.3± 0.9	3.0 0.7	<0.0001
c-HDL mmol/l	1.2 0.3	1.2 0.3	0.256
TG mmol/l IQR *	1.4 (1.8-1.0)	1.4 (1.9-1.0)	0.463
HbA1c % IQR *	6.0 (6.9-5.6)	6.2 (7.1-5.9)	0.074
AMI % (n)	6.7 (14)	10.5 (22)	0.008
OSAS % (n)	3.3 (7)	9.6 (20)	<0.0001

BMI, body mass index; WC, waist circumference; HBP, high blood pressure; T2DM, type 2 diabetes mellitus; HC, hypercholesterolemia; SBP, systolic blood pressure; DBP, diastolic blood pressure; c-LDL, cholesterol-LDL; c-HDL, cholesterol-HDL; TG, triglycerides; IQR, interquartile range. * Wilcoxon test. AMI: Acute myocardial infarction; OSAS, obstructive sleep apnea syndrome.

Table 3. Treatment recorded in medical history and health professionals' adherence to obesity evidence-based guidelines.

% (n)	Total (n=209)	Men (n=88)	Women (n=121)	p
Prescription of Obesity drugs recorded	1.4 (3)	1.1 (1)	1.7 (2)	1.000
Indication of obesity drug	96.2 (201)	96.6 (85)	95.9 (116)	1.000
Health professionals adherence to the guidelines	1.4 (3)	1.1 (1)	1.7 (2)	1.000
Prescription of diet recorded	79.9 (167)	81.8 (72)	78.5 (95)	0.603
Hypocaloric diet	28.2 (59)	38.6 (34)	20.7 (25)	0.005
Recorded follow up	69.9 (146)	73.9 (65)	66.9 (81)	0.291
Health professionals adherence to the guidelines	25.4 (53)	36.4 (32)	17.4 (21)	0.002
Prescription of physical activity recorded	88.5 (185)	90.9 (80)	86.8 (105)	0.389
Type of physical activity (e.g. walking, running, etc.)	82.8 (173)	83.0 (73)	82.6 (100)	1.000
Duration, frequency and intensity of physical activity	64.1 (134)	65.9 (58)	62.8 (76)	0.664
Increasing physical activity	1.9 (4)	2.3 (2)	1.7 (2)	1.000
Recorded follow up	76.6 (160)	81.8 (72)	72.7 (88)	0.139
Health professionals adherence to the guidelines	1.4 (3)	1.1 (1)	1.7 (2)	1.000
Prescription of behaviour change recorded	2.9 (6)	3.4 (3)	2.5 (3)	0.698
Type of behaviour change	1.5 (2)	1.8 (1)	1.3 (1)	1.000
Recorded follow up	1.9 (4)	2.3 (2)	1.7 (2)	1.000
Health professionals adherence to the guidelines	1.5 (2)	1.8 (1)	1.3 (1)	1.000
Patient adherence to treatment %(n)				
Adherence to the prescribed diet % (n)	12.4 (26)	19.3 (17)	7.4 (9)	0.018
Adherence to the prescribed physical activity % (n)	23.4 (49)	26.1 (23)	21.5 (26)	0.509
Adherence to the prescribed behaviour change % (n)	0.5 (1)	0.0 (0)	0.8 (1)	1.000

Table 4. Mean BMI, mean WC patients with/without records diet/PA prescription; diet/PA follow up.

PRESCRIPTION	Total	Recorded	Unrecorded	p
TOTAL				
Diet, n	209	167	42	
BMI	34.2±4.5	33.9±4.1	35.5	0.037
WC	111.5±11.6	110.8±11.5	113.8±11.9	0.139
AF, n	209	185	24	
BMI	34.2±4.5	33.9±4.2	36.6±5.9	0.006
WC	111.4±11.6	111.0±11.5	115.2±12.2	0.093
MEN				
Diet, n	88	72	16	
BMI	33.5±4.0	33.4±4.1	33.9±4.1	0.591
WC	116.2±10.1	116.2±10.1	116.4±10.4	0.933
PA, n	88	80	8	
BMI	33.5±4.1	33.3±4.0	35.7±4.0	0.108
WC	116.2±10.1	115.7±10.2	121.2±8.4	0.144
WOMEN				
Diet, n	121	95	26	
BMI	34.7±4.7	34.2±4.1	36.4±6.1	0.037
WC	108.0±11.5	106.8±10.9	112.2±12.6	0.032
PA, n	121	105	16	
BMI	34.7±4.7	34.3±4.2	37.0±6.8	0.036
WC	108.0±11.5	107.3±11.1	112.2±12.9	0.114
FOLLOW UP				
TOTAL				
Diet, n	209	146	63	
BMI	34.2±4.5	33.6±3.8	35.5±5.5	0.005
WC	111.4±11.6	110.6±11.2	113.5±12.5	0.102
AF, n	209	160	49	
BMI	34.2±4.5	33.5±3.9	36.5±5.5	0.000
WC	111.4±11.6	110.4±11.4	115.0±11.8	0.014
MEN				
Diet, n	88	65	23	
BMI	33.5±4.1	33.2±4.0	34.4±4.3	0.221
WC	116.2±10.1	115.8±9.7	117.5±11.3	0.486
PA, n	88	72	16	
BMI	33.5±4.0	33.1±4.0	35.3±4.2	0.050
WC	116.2±10.1	115.6±9.8	118.8±11.2	0.254
WOMEN				
Diet, n	121	81	40	
BMI	34.7±4.7	33.9±3.7	36.1±6.0	0.015
WC	108.0±11.5	106.4±10.5	111.1±12.7	0.033
PA, n	121	88	33	
BMI	34.7±4.7	33.8±3.8	37.1±6.0	0.000
WC	108.0±11.5	106.0±10.8	113.2±11.8	0.002

BMI, Body mass index; WC, Waist circumference; PA, Physical activity.

Table 5. Lineal regression model (**women**): A) **BMI** (dependent variable) B) **WC** (dependent variable).

A) BMI	standardized β	p	CI 95%
Prescription of diet recorded	0.115	0.448	- 2.091 / 4.706
Follow up diet recorded	- 0.132	0.430	- 4.616 / 1.980
Prescription of PA recorded	- 0.119	0.370	- 5.275 / 1.979
Follow up PA recorded	0.347	0.027	0.429 / 6.868
Age	- 0.257	0.007	- 0.176 / - 0.29
B) WC	Standardized β	p	CI 95%
Prescription of diet recorded	0.172	0.273	- 3.824 / 13.383
Follow up diet recorded	- 0.163	0.351	- 12.296 / 4.403
Prescription of PA recorded	- 0.141	0.309	- 13.918 / 4.446
Follow up PA recorded	0.367	0.024	1.256 / 17.556
Age	- 0.71	0.466	- 0.255 / 0.117

BMI, Body mass index; WC, Waist circumference; PA, Physical activity. A) Model adjusted $R^2 = 0.125$. B) Model adjusted $R^2 = 0.054$.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- STROBEChecklist.doc
- STROBEChecklist.doc