

Prevalence of hyperhidrosis among medical students

Prevalência de hiperidrose entre estudantes de medicina

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A B S T R A C T

Objective: To identify the prevalence of hyperhidrosis among medical students of Manaus, State of Amazonas, Brazil. **Methods:** We conducted an observational, transversal, survey which examined the prevalence of primary hyperhidrosis among medical students of the Federal University of Amazonas and its relation to body mass index (BMI) and stress. Students were weighed and interviewed. We used questionnaires with questions recommended by the International Hyperhidrosis Society to relate hyperhidrosis to the daily activities of each person. Results were given by calculating the prevalence ratios and confidence intervals. **Results:** Among the 293 students examined, it was found that a total of 16 (5.5%) students had barely tolerable or intolerable excessive sweating, interfering with daily activities. None had known causes of hyperhidrosis and 50% had family history. In all suffering from the condition the disease was bilateral, the mainly affected locations being: hands (35.7%), legs (21.4%), axilla (17.9), face (10.7%), back (7.1%), chest (3.6%) and abdomen (3.6%). There was no predominance regarding gender, age or BMI. We found a positive relationship with BMI and observed a prevalence ratio of 2.48 higher in overweight students than in normal weight or underweight ones. **Conclusion:** The prevalence of primary hyperhidrosis among medical students of Manaus was 5.5%. There is a positive non-statistical relationship with overweight and obesity. It was further noted an observational relationship with stress.

Key words: Hyperhidrosis. Prevalence. Students, medical. Stress, psychological. Body mass index.

INTRODUCTION

Primary hyperhidrosis is a benign disease with a prevalence of 1% in the Western world, characterized by excessive production of sweat in one or more anatomical regions. It has a genetic (3-57%) and environmental backgrounds, significant climatic influences being observed in patients with this disease¹⁻³.

Hyperhidrosis can also occur secondarily in patients with hyperthyroidism, diabetes mellitus, hyperactivity of the pituitary gland and in conditions where there is increased production of catecholamines, such as shock, hypoglycemia and pheochromocytoma⁴. The disease has no predilection for sex, but is more noticeable in women¹.

Treatment of hyperhidrosis can be accomplished by the application of botulinum toxin or with minimally invasive surgery, when sympathectomy is used^{5,6}.

In the northern region of Brazil there is neither data on the prevalence of this disease, nor any study assessing the relationship between sweating and body mass index (BMI). The present study, conducted in the

state of Amazonas, is thus the first about prevalence of the region.

This paper aims to estimate the prevalence of primary hyperhidrosis and to evaluate its possible correlation with stress and BMI among students of the Faculty of Medicine, Universidade Federal do Amazonas, in Manaus, State of Amazonas, whereas the Amazon region has a climate different from the rest of the country. The capital of Amazonas is the eighth most populous city in Brazil and most of its inhabitants have half-breed ancestry⁷.

METHODS

It is a descriptive, observational, transversal, survey, conducted from August 2008 to July 2009, which describes the prevalence of hyperhidrosis in the population studied and analyzes the relationship of this disease with BMI and the level of stress. The survey was conducted at the Faculty of Medicine, Universidade Federal do Amazonas (UFAM). The participating population includes

Work conducted at the Universidade Federal do Amazonas - AM-BR.

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students from the Medical School of Universidade Federal do Amazonas. The study population corresponds to the students with primary hyperhidrosis. The sample used in the analysis was calculated based on the estimated prevalence of hyperhidrosis of 5%, accuracy 95% and margin of error of 2.5%, totaling 293 students of Medicine from the Universidade Federal do Amazonas, in Manaus/AM, duly enrolled in school years 2008 and 2009, who voluntarily agreed to participate in the study after signing the consent form. The estimated prevalence of 5% was used according to a previous study on the prevalence of primary hyperhidrosis in college and high school students⁸.

Was excluded students who refused to participate and those who had undergone surgery (sympathectomy), as well as patients with secondary hyperhidrosis. This study was approved by the Ethics in Research Committee of Universidade Federal do Amazonas, CAAE - 0119.0.115.000-08.

Data were collected following standard questionnaires (Figure 1A and B) prepared by the researchers with questions related to hyperhidrosis and recommended by the International Hyperhidrosis Society, such as patient identification (name, age, sex), sweating pattern (location, intensity, frequency, area involved, symmetry), questions related to the impairment of daily activities as a function of hyperhidrosis, age of beginning of symptoms and family history⁹.

The research was divided in two phases. In the first the study population comprised the medical students of the Universidade Federal do Amazonas, from the 1st to the 12th periods, who answered a questionnaire capable of identifying the presence of hyperhidrosis, with questions related to the presence or not of the disease (Figure 1A).

This questionnaire was then evaluated by the researchers, who identified individuals with hyperhidrosis. Were also collected measures of weight and height to calculate the BMI. In the second phase the students who were diagnosed with hyperhidrosis according to the first questionnaire underwent an interview with trained researchers that proceeded to differentiate between primary and secondary hyperhidrosis. For this interview another standard questionnaire was used (Figure 1B).

Data were presented in charts and frequency tables. Absolute and relative frequencies were calculated for qualitative data and mean and standard deviation (SD) for quantitative data.

In the analysis of categorical data by sex and BMI in relation to hyperhidrosis, we also calculated prevalence ratios and respective confidence intervals at 99%. The separation between cases and controls was made as follows: cases were students who were diagnosed with hyperhidrosis and controls were students without the diagnosis of hyperhidrosis. The risk factor studied was the students' BMI with overweight and obesity (BMI >25kg/m²). After the selection of the participants, we compared the frequency of exposure of students with hyperhidrosis with students without hyperhidrosis, thus estimating the relationship between BMI of the conditions of overweight and obesity and the prevalence of hyperhidrosis by prevalence ratio, which is the prevalence of hyperhidrosis in students with BMI above 25kg/m² divided by the prevalence of hyperhidrosis in students with a BMI less than 25kg/m².

When comparing the means, as data were normally distributed, we calculated the statistical Student's t test. For the calculation of confidence intervals we used the chi-square test.

QUESTIONNAIRE 1

PERSONAL DATA

NAME: _____

AGE: _____ GENDER: () MALE () FEMALE

1-SWEAT INTERFERENCE in DAILY ACTIVITIES

- () a) my sweat is never seen and it doesn't interfere in my daily activities
 () b) my sweat is tolerable, but sometimes it interferes with my daily activities
 () c) my sweat is hardly tolerable, and it often interferes with my daily activities
 () d) my sweat is intolerable, and it always interferes with my daily activities

IF YOU ANSWERED THE LETTERS C AND D, ANSWER TO THE QUESTIONS BELOW:

2 - WHERE DO SWEAT MUCH?

- () ARMPIT
 () FACE
 () HANDS
 () FEET
 () SOME PLACE ELSE

3 - IS THE SWEAT ON BOTH SIDES?

- () NO, THE SWEAT IS ONLY ON ONE SIDE
 () YES. THE SWEAT IS TWO-SIDED

4 - WHEN DID IT STARTED? _____

5 - DOES SOMEONE IN YOUR FAMILY ALSO HAVE THE SAME PROBLEM OF EXCESSIVE SWEATING?
() NO () YES6 - DO YOU SWEAT WHILE SLEEPING?
() NO () YES**A****QUESTIONNAIRE 2**

Name: _____

In General, you would say that your quality of life related to Hyperhidrosis is:

- Excellent _____ 1
 Very good _____ 2
 Good _____ 3
 Bad _____ 4
 Too bad _____ 5

1 - SOCIAL-FUNCTIONAL Domain: In relation to this set of functions or acts, how would you rate your quality of life on the following items:

- Writing ()
 Manual tasks ()
 Favourite hobby ()
 Sports practicing ()
 Holding objects ()
 Shaking hands (people) ()
 Being with friends (public places) ()
 Dancing socially ()

2 - EMOTIONAL Domain – OWN and WITH OTHERS: How would you rate the fact that, after sweating excessively:

You have to be justified ()
Others demonstrate rejection ()

3 - SPECIAL CONDITIONS Domain: How would you rate your quality of life when you were:

- In hot/closed environments ()
 Tense or preoccupied ()
 Thinking on the subject ()
 Before a test/ speaking in public ()
 Using Sandals/barefoot ()
 Using colorful clothes ()
 School/work problems ()

4 - Select the conditions present:

- Hyperthyroidism ()
 Hyperpituitarism ()
 Diabetes mellitus ()
 Pregnancy ()
 Pheochromocytoma ()
 Carcinoid syndrome ()
 Acromegaly ()

B

Figure 1 - Standardized questionnaire used in the interviews.

RESULTS

The study included 293 medical students. The age ranged from 16 to 46 years (mean 21.3 ± 3.5), with 166 (56.7%) females and 127 (43.3%) males. The weight ranged from 41 to 110kg (mean 64.4 ± 13.0), the height from 1.5 to 1.95 (mean 1.7 ± 0.1) and BMI 16.4 to 41.9Kg/m² (average 22.7 ± 3.6). Students were classified according to BMI as underweight (21.5%), normal weight (59%), overweight (14.3%) and obesity (5.2%).

In assessing the prevalence of hyperhidrosis there was a total of 16 students, the prevalence being 5.5% (16/273) with 95% CI from 3.2 to 8.7, with excessive sweating barely tolerable or intolerable, interfering with daily activities. Of these, none had known causes of hyperhidrosis and eight (50%) had a positive family history (Figure 2).

In 100% of cases the disease was bilateral, being mainly affected in: hands (35.7%), legs (21.4%), axilla (17.9), face (10.7%), back (7.1%), chest (3.6%) and abdomen (3.6%) (Figure 3).

As for the distribution of hyperhidrosis in relation to gender, we found a prevalence ratio of 0.8 for females with 95% CI.

When comparing patients with BMI >25kg/m² with those with BMI less than this value, the prevalence ratio was 2.48 (95% CI 1.12 – 5.48) for those who are overweight or obese (Table 1).

We observed that the life of students with hyperhidrosis is affected in all aspects, such as in personal, interpersonal and professional relationships. As for the functional-social domain, five students (31.3%) reported difficulties in writing, three (18.8%) reported difficulties in performing manual tasks, five (31.3%) had difficulty performing hobbies, four (25%) considered "bad", and five (31.3%) "very bad", the practice of any physical activity or sports, four (25%) felt uncomfortable to shake hands with acquaintances, eight (60%) considered "bad" or "very bad" being with friends in public places; 11 (68.8%) were unable to dance socially. When it comes to emotional control or with others, six students (37.6%) reported having to excuse themselves all the time, while five (31.5%) said they received demonstrations of rejection due to excessive sweating (Figure 4).

Under special conditions, eight students (68.8%) found unpleasant stay indoors, ten (62.5%) considered themselves to be tense or worried, four (25.1%) did not stop to think about it, ten (62.6%) had difficulties in answering tests and doing public presentations, nine (56.3%) had problems getting barefoot and wearing sandals, four (25.1%) could not wear colored clothes and five (31.3%) had problems at school or at work.

DISCUSSION

A recent epidemiological study with 150,000 families revealed that focal hyperhidrosis had a prevalence of 2.8% in the general population. This condition struck men and women alike, and the highest prevalence was between 25 and 64 years old. The average age of onset was 25 years. Palmar and axillary hyperhidrosis were the types that arose earlier, with 13 and 19 years respectively. This study involved only one questionnaire, which was then analyzed by researchers¹⁰.

Another study in China⁸ evaluated adolescents aged between 15 and 22 years in the cities of Fuzhou, Quanzhou and Xiamen. Thirty high schools and ten colleges

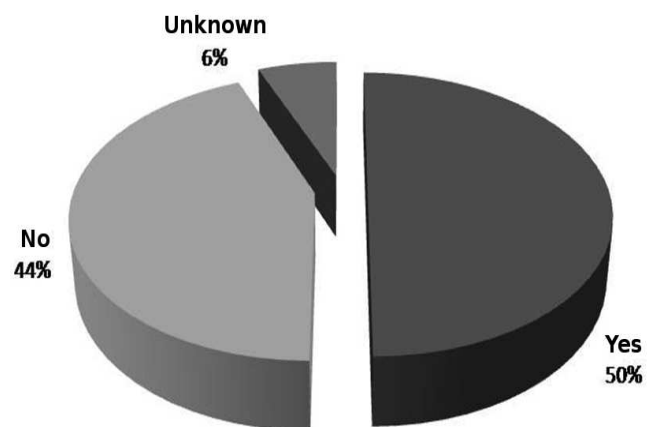


Figure 2 - Relation family.

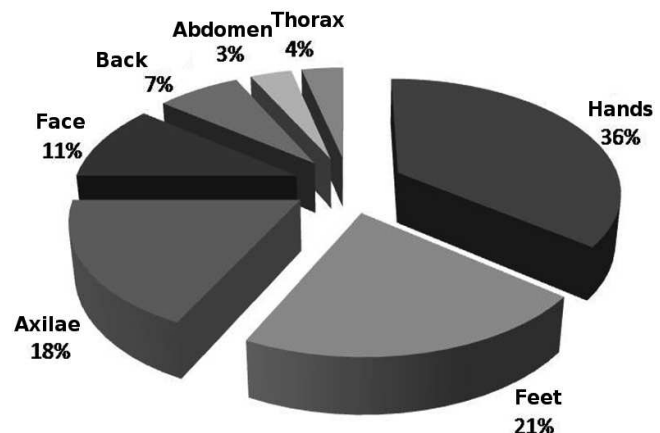


Figure 3 - Location of the most frequent hyperhidrosis.

Table 1 - Comparison between cases and controls for BMI.

	With Hyperhidrosis	Without Hyperhidrosis	
IMC > 25	6	51	57
IMC < 25	10	226	236
	16	277	293

PR = 2.48 (1.12 – 5.48) $p < 0,1$

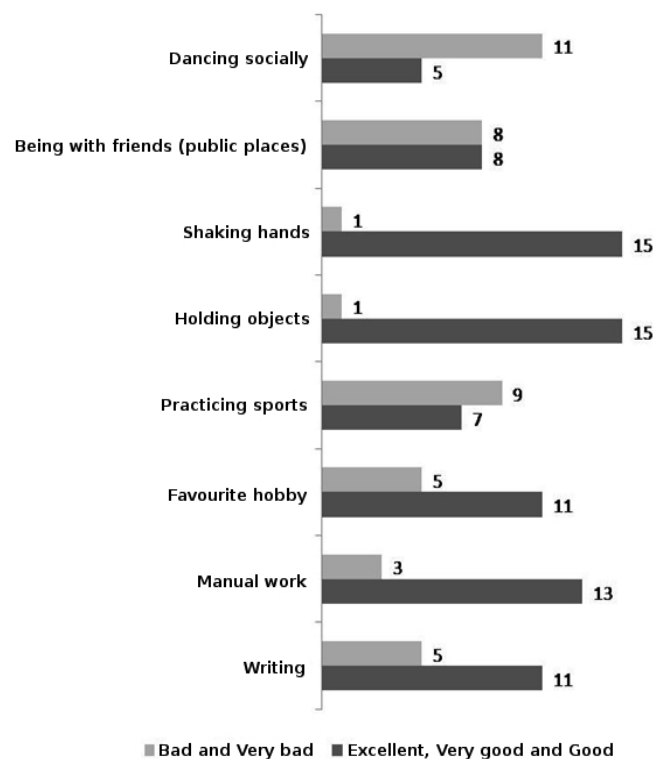


Figure 4 - Functional-Social Features of the affected individuals.

were randomly chosen and a total of 33,000 students were included in this work. The questionnaire was applied to 97.43% of the students and, of these, 69% were enrolled in high school and 31% in higher education; the average age was 17 years. In this study they found a prevalence of 4.36% of hyperhidrosis among students.

A recent study estimated the incidence of axillary hyperhidrosis in 1.4% of the U.S. population, which corresponds to four million individuals, and in a third of these cases it has been reported very little tolerance or intolerance for symptoms of hyperhidrosis on daily life activities¹⁰. In Israel, an incidence of 1% was found¹¹. Family history is also positive in 30 to 50% of patients¹².

Regarding the prevalence of hyperhidrosis, several studies^{8,11-13} show different percentages, ranging from 0.6 to 4.36%. Our study shows that 5.5% of the interviewed population of medical students at UFAM are affected by primary hyperhidrosis, higher than the cited prevalence^{8,11-13}.

We did not find any disease that featured secondary hyperhidrosis, such as hyperthyroidism, hyperpituitarism, diabetes mellitus, pregnancy, pheochromocytoma, carcinoid syndrome and acromegaly. There was also no history of night sweats in the affected individuals, a fact that would exclude the diagnosis of primary hyperhidrosis.

As for the distribution of hyperhidrosis by gender, we found a prevalence ratio of 0.8 for females. Despite this difference between genders, there was no statistical

significance at 5% level. This fact agrees with other studies^{8,10}.

In other studies a positive relationship between heredity and primary hyperhidrosis was found^{1,12}. One report showed that 15.3% of adolescents had a positive family history for hyperhidrosis⁸. In another the incidence varied between 12 and 33%¹⁴. In our work we observed that 50% of patients with primary hyperhidrosis have a positive family history, a percentage higher than that of literature.

When comparing patients with BMI greater than 25kg/m² with those with BMI less than 25kg/m², the prevalence ratio is 2.48 for those with BMI above normal (CI 1.12 to 5.48, $p < 0.1$). No studies were found that statistically compared BMI and hyperhidrosis. Other studies corroborate these findings, relating the presence of hyperhidrosis with high BMI. It is also known that BMI above 25kg/m² is a contraindication to surgical treatment, since the presence of overweight and obesity increases the compensatory sweating in the sympathectomy postoperative period¹⁵⁻¹⁷.

A study comparing BMI and the level of sympathectomy section with compensatory hyperhidrosis showed that the higher the BMI, the more intense the compensatory hyperhidrosis, although this had no relation with the level of patient satisfaction¹⁷.

In 100% of patients the disease was bilateral, mainly affecting: hands (35.7%), legs (21.4%), axilla (17.9), face (10.7%), back (7.1%), chest (3.6%) and abdomen (3.6%), consistent with the distribution of studies in the literature¹⁰. The limitations of daily activities encountered by respondents were consistent with those most affected. There was no positive or negative relationship of BMI or stressful situations with any specific location of hyperhidrosis.

Despite not being a life-threatening disease, hyperhidrosis is an extremely unpleasant and embarrassing condition that adversely affects the routine life of affected individuals, causing social, occupational, psychological and relationship disorders. Many of these individuals end up socially isolated and acquire habits that hide their problem. Worsening of sweating was observed in relation to indoor, hot environments and stress situations, in which respectively 63% and 69% of affected individuals reported "bad" or "very poor" quality of life.

The discomfort caused by hyperhidrosis can be of great intensity, creating problems in the emotional, professional, educational and social spheres¹⁸. The abundant palmar sweating can cause difficulties in social contact, in writing, in manual activities to control and manipulate objects, often rendering these individuals unable to work¹⁹. In assessing some of the everyday situations affected by hyperhidrosis, situations like dancing socially are characterized as "bad" or "very bad" by 69% of patients, staying in public places by 50% and playing sports by 56%.

Axillary hyperhidrosis can cause social problems for the patient, since it makes clothes too wet, in most cases causing individuals to wear only white or black. Unlike

other work¹⁹, which states that there is great difficulty for patients with hyperhidrosis to use colored clothes, in our study 75% of the affected did not report this problem.

Students of Medicine from UFAM in Manaus/AM have a prevalence of hyperhidrosis of 5.5%. There

was no predominance of gender or age. An association with BMI was found (PR = 2.48), while the relation to stress was observational, given that, among the cases found, the so-called stressful situations increase the episodes of hyperhidrosis.

R E S U M O

Objetivo: Identificar a prevalência de hiperidrose entre os estudantes de Medicina de Manaus/AM. **Métodos:** Estudo observacional, transversal, do tipo inquérito que analisou a prevalência de hiperidrose primária entre os alunos de Medicina da Universidade Federal do Amazonas e sua relação com o índice de massa corporal (IMC) e o stress. Os alunos foram pesados e entrevistados. Utilizou-se questionários com perguntas preconizadas pela International Hyperhidrosis Society, para relacionar a hiperidrose com as atividades diárias de cada pessoa. A análise dos resultados se deu com o cálculo da razão de prevalências e do intervalo de confiança. **Resultados:** Entre os 293 estudantes analisados, verificou-se que um total de 16 (5,5%) estudantes apresentavam sudorese excessiva dificilmente tolerável ou intolerável, interferindo em suas atividades diárias. Nenhum apresentava causas conhecidas de hiperidrose e 50% possuíam história familiar. Em todos o acometimento foi bilateral, sendo os locais mais afetados: mãos (35,7%), pés (21,4%), axila (17,9), rosto (10,7%), costas (7,1%), tórax (3,6%) e abdome (3,6%). Não houve predomínio em relação ao sexo, idade ou IMC. Encontrou-se relação positiva com o IMC evidenciando sobrepeso e obesidade, sendo observado uma razão de prevalências de 2,48 superior em relação aos estudantes com peso normal ou abaixo do peso. **Conclusão:** A prevalência de hiperidrose primária entre os estudantes de Medicina de Manaus/AM foi de 5,5%, existindo uma relação positiva não estatística com o sobrepeso e a obesidade. Foi constatada ainda uma relação observacional com o stress.

Descritores: Hiperidrose. Prevalência. Estudantes de medicina. Estresse psicológico. Índice de massa corporal.

REFERENCES

- Cavalcante JF, Araújo CAA, Netto MX, Costa FER, Diniz Filho FF, Medeiros AC. Efeitos da simpaticotomia endoscópica sobre as artérias carótidas e vertebrais na terapêutica cirúrgica da hiperidrose primária. *Acta cir bras* 2005; 20(supl.1):146-51.
- Kao MC, Lin JY, Chen YL, Hsieh CS, Cheng LC, Huang SJ. Minimally invasive surgery: video endoscopic thoracic sympathectomy for palmar hyperhidrosis. *Ann Acad Med Singapore* 1996; 25(5):673-8.
- Barrichello APC, Cecílio LB, Monteiro R, Jatene FB, Bernardo WM. Hiperidrose vs sudorese compensatória: benefício de um tratamento ou risco de um novo problema? *Rev Assoc Med Bras* 2007; 53(5):383.
- Young O, Neary P, Keaveny TV, Mehigan D, Sheehan S. Evaluation of the impact of transthoracic endoscopic sympathectomy on patients with palmar hyperhidrosis. *Eur J Vasc Endovasc Surg* 2003; 26(6):673-6.
- Campos JRM, Kauffman P. Simpatectomia torácica por videotoracosopia para tratamento da hiperidrose primária. *J bras pneumol* 2007; 33(3):xv-xvii. (Editorial)
- Naumann M, Lowe NJ. Botulinum toxin type A in treatment of bilateral primary axillary hyperhidrosis: randomised, parallel group, double blind, placebo controlled trial. *BMJ* 2001; 323(7313):596-9.
- Instituto Brasileiro de Geografia e Estatística. IBGE [online]. Contagem da população 2007. Brasil. 2007 [acessado em 11 nov. 2009]. Disponível em: www.ibge.gov.br/home/estatistica/populacao/contagem2007/popmunic2007/layoutTCU14112007.pdf
- Tu YR, Li X, Lin M, Lai FC, Li YP, Chen JF, et al. Epidemiological survey of primary palmar hyperhidrosis in adolescent in Fuzhou of People's Republic of China. *Eur J Cardiothorac Surg* 2007; 31(4):737-9.
- Campos JRM, Kauffman P, Werebe EC, Andrade Filho LO, Kusniek S, Wolosker N, et al. Questionnaire of quality of life in patients with primary hyperhidrosis. *J pneumol* 2003; 29(4):178-81.
- Strutton DR, Kowalski JW, Glaser DA, Stang PE. US prevalence of hyperhidrosis and impact on individuals with axillary hyperhidrosis: results from a national survey. *J Am Acad Dermatol* 2004; 51:241-8.
- Adar R, Kurchin A, Zweig A, Mozes M. Palmar hyperhidrosis and its surgical treatment: a report of 100 cases. *Ann Surg* 1977; 186(1):34-41.
- Stolman LP. In hyperhidrosis (excess sweating), look for a pattern and cause. *Cleve Clin J Med* 2003; 70(10):896-8.
- Coelho MS, Lira EJR, Zanin AS, Gonçalves JL, Bergonse Neto N, Stori Júnior WS, Guimarães PS. Simpatectomia torácica por videotoracosopia no tratamento da hiperidrose palmar e axilar. *An bras dermatol* 2002; 77(2):171-83.
- Alric P, Branchereau P, Berthet JP, Léger P, Mary H, Mary-Ané C. Video-assisted thoracoscopic sympathectomy for palmar hyperhidrosis: results in 102 cases. *Ann Vasc Surg* 2002; 16(6):708-13.
- Kauffman P, Campos JRM. Simpatectomia torácica videoassistida no tratamento da hiperidrose axilar. *J bras pneumol* 2011; 37(1):4-5.
- Miller DL, Bryant AS, Force SD, Miller JJ Jr. Effect of sympathectomy level on the incidence of compensatory hyperhidrosis after sympathectomy for palmar hyperhidrosis. *J Thorac Cardiovasc Surg* 2009; 138(3): 581-585.
- de Campos JR, Wolosker N, Takeda FR, Kauffman P, Kusniek S, Jatene FB, et al. The body mass index and level of resection: predictive factors for compensatory sweating after sympathectomy. *Clin Auton Res* 2005; 15(2):116-20.

18. Montessi J, Almeida EP, Vieira JP, Abreu MM, Souza RLP, Montessi OVD. Simpatectomia torácica por videotoroscopia para tratamento da hiperidrose primária: estudo retrospectivo de 521 casos comparando diferentes níveis de ablação. *J bras pneumol* 2007; 33(3):248-54
19. Leão LE, de Oliveira R, Szulc R, Mari JdeJ, Crotti PL, Gonçalves JJ. Role of video-assisted thoracoscopic sympathectomy in the treatment of primary hyperhidrosis. *Sao Paulo Med J* 2003; 121(5):191-7.

Received on 10/12/2010

Accepted for publication 15/02/2011

Conflict of interest: none

Source of funding: none

How to cite this article:

Westphal FL, Carvalho MAN, Lima LC, Carvalho BCN, Padilha R, Araújo KKL. Prevalence of hyperhidrosis among medical students. *Rev Col Bras Cir.* [periódico na Internet] 2011; 38(6). Disponível em URL: <http://www.scielo.br/rcbc>

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