Review Article

Hyperhidrosis prevalence and its impact on population

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Abstract: Hyperhidrosis is a disorder characterized by excessive sweating which beyond the physiological need for body thermoregulation. It brings about a deep social, psychic, professional and emotional constraint, compromising the quality of life of its patients. The prevalence data available in the literature are practically nonexistent up to the beginning of the 21st century. The objective of this present study is to review the literature as a quest for studies that evaluated the prevalence of hyperhidrosis and its impact on the quality of life of individuals. The bibliographic review was carried out by using the PubMed database. During the search 16 articles were found which evaluated the prevalence of hyperhidrosis and out of these, 5 evaluated the impact in the disorder as to the quality of life. The prevalence found in the articles varied from 0.072% to 16.3%. As to the impact on the quality of life, all articles have shown that such disorder affects in some way the life of the individuals. Although the methodology is quite different among the studies and though some prevalence data are questionable, the undertaking of this kind of study is important for the scaling of the problem and the establishment of measures that seek the improvement of the quality of life of its patients.

Keywords: Hyperhidrosis; prevalence; quality of life

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Introduction

Hyperhidrosis is characterized by excessive sweating which goes beyond the physiological need for body thermoregulation (1-4). As far as etiology is concerned, it may be primary (idiopathic), the result of a hyperactivity of the sympathetic nervous system (5,6) or secondary to other diseases, such as infections, neurological or metabolic disorders, neoplasms, spinal cord injuries, anxiety and stress (3,6-9).

When it comes to the primary hyperhidrosis, the excessive sweating is usually bilateral, symmetrical and the commonly affected locations are the scalp/face, hands, armpits and the feet (7,10). Its severity may vary from a light humidity to a serious dripping. Such disorder brings about a deep social, psychic, professional and emotional constraint, thus compromising the quality of life of its patients (11-15). The compromising of the quality of life is compared to individuals that have chronic diseases such as severe psoriasis, renal insufficiency and rheumatoid arthritis in an advanced level (16).

The data available in the literature regarding the prevalence of hyperhidrosis in the world population are practically nonexistent until the beginning of the 21st century, therefore up to some time ago little was known about the number of individuals bearing this disorder. The

Table 1 Studies that evaluated the prevalence of hyperhidrosis (author, year and country of publication, prevalence, population included in the study and the performance of medical evaluation)

Author [year] Place	Prevalence	Population included	Medical evaluation
Adar [1977], Israel	0.6% to 1%	Young Israelis	No
Strutton [2004], the United States	2.8%	American households	No
Li [2007], China	4.36%	High school and university students	Yes
Tu [2007], China	4.59%	High school and university students	Yes
Felini [2009], Brazil	9%	Individuals at an urban terminal	No
Chu [2010], Taiwan	0.072%	National Health Insurance Database	Yes
Westphal [2011], Brazil	5.5%	Medicine students	Interviewer (doesn't say if he is a doctor)
Stefaniak [2013], Poland	8%	Medicine and dentistry students	No
Fujimoto [2013], Japan	12.76%	Employees of companies and school students	No
Augustin [2013], Germany	16.3%	Employees of 52 German companies	Yes
Lima [2015], Brazil	14.76%	Medicine students	Yes (only 22.72% were evaluated)
Lai [2015], China	2.08%	University students	Yes
Liu [2016], China/Canada	14.5%/12.3%	Patients of dermatology clinics	Yes
Shayesteh [2016], Sweden	5.5%	Population of Sweden	No
Doolittle [2016], The United States	4.8%	American population	No
Hasimoto [2018], Brazil	0.93%	Population of the city of Botucatu	Yes

objective of the present study is to carry out a bibliographic review of the studies that evaluated the hyperhidrosis prevalence on the world population and its impact in the quality of life of its patients.

Studies that evaluated the prevalence of hyperhidrosis and its impact on the lives of its patients

The bibliographic review was done by using the PubMed database (until January 10th 2019). Sixteen articles (17-32) that evaluated the prevalence of hyperhidrosis were found in the research, 15 (18-32) of them were published from the 21st century. The prevalence of hyperhidrosis found in the articles ranged from 0.072% to 16.3% (*Table 1*). As to the places of publishing, seven articles were published in Asian regions (Israel, China, Taiwan and Japan), seven in countries of the American continent (The United States, Canada and Brazil) and three articles in European countries (Germany, Poland and Sweden) (*Table 1*).

The first citation found in the literature about the prevalence of hyperhidrosis is from 1977 (17). Adar *et al.* refers to a pilot epidemiological study, not published, carried out with young Israelis, where the reported incidence was from 0.6% to 1%. Although the study was previously quoted by several authors, the used methodology was not described. The only available data is that the study included young Israelis with hyperhidrosis in many locations and severities.

The first published work with methodological description was the one by Strutton *et al.* in 2004 (18). In this great American study, a formulated questionnaire was sent to 150,000 households aimed at identifying possible individuals who suffer from hyperhidrosis. Sixty-four percent of these were completely answered. The prevalence found was 2.9% (6,800 individuals) and the prevalence projected for the United States was 2.8% (7.8 million individuals). It is concluded in this research that hyperhidrosis affected a proportion of individuals much larger than previously expected, up to then only the prevalence published in 1977 had been known.

In 2007 China published two studies (19,20) about the prevalence of hyperhidrosis. In the first one published by Tu *et al.*, a stratified cluster sampling was carried out,

involving adolescents aged between 15 and 22 years in the city of Fuzhou, where 13,000 teenagers were included, as well as high school and university students. At first a questionnaire was applied and the students suspected of being bearers were interviewed by a doctor in order to confirm the diagnosis. The prevalence of palmar hyperhidrosis was 4.59%. In the second study, the same Chinese team, extended the research to two other Chinese cities, Quanzhou and Xiamen. This study involved 33,000 teenagers with the same characteristics of the previous study. The prevalence of palmar hyperhidrosis found in these three cities in the southeast of China was 4.36%. The methodology used in both studies was the same, both in the selection as well as in the identification of the suspected individuals and in the diagnostic confirmation.

The two first Brazilian works were published in 2009 and in 2011, by Felini *et al.* (21) and Westphal *et al.* (22), respectively. In the first study, 500 individuals, aged 18 or over were randomly approached in the urban terminals of the city of Blumenau and were invited to respond to a questionnaire. The evaluation of such questionnaires revealed a 9% hyperhidrosis prevalence, the highest one published so far, however, the individuals did not have their diagnosis confirmed by a doctor. In the work of Westphal *et al.*, 293 students of a medicine course at the Federal University of Amazonas were included. At the first phase a questionnaire was applied in order to evaluate the presence of hyperhidrosis and at the second phase, the individuals were interviewed by a trained researcher for the diagnostic confirmation. The prevalence found was 5.5%, however, both the students that had already undergone sympathectomy for the treatment of primary and the bearers of secondary hyperhidrosis were excluded.

The lowest prevalence of published hyperhidrosis was 0.072%, by Chu *et al.* (23). The information was collected in the National Health Insurance database of Taiwan, using the standardized code by the 9th edition of the International Classification of Diseases (ICD-9). Such prevalence represents only the individuals who sought for medical treatment.

In 2013, Stefaniak *et al.* (24) conducted a work in Poland which included 253 students of medicine and dentistry. At first, a questionnaire was applied (subjective test) and a gravimetric test (objective test), aimed at comparing the results. Through this questionnaire 16.7% of the students claimed to have hyperhidrosis, however, with the objective test, the percentage dropped to 8%. This work has concluded that only data collected from questionnaires can lead to false positive results.

Fujimoto *et al.* (25) published a research in Japan in 2013, by means of applying questionnaires in companies and schools where 5,807 individuals were analyzed, with ages ranging from 5 to 64 years old. The prevalence found was 12.76% and the individuals did not have the diagnostic confirmed by a doctor.

The highest prevalence published among all published papers was the one by Augustin *et al.* in 2013 (26). This study included 14,336 employees from 52 German companies. The prevalence found was 16.3% and all of the individuals were evaluated by a dermatologist. However, cases of secondary hyperhidrosis were included, since 68% of the patients reported generalized hyperhidrosis and only 28% hyperhidrosis located in the hands, armpits, feet and other areas.

The third Brazilian work was published in 2015 by Lima *et al.* (27) and 447 students of the medicine course from two universities of the State of Sergipe were included. The prevalence found was 14.76%, a high prevalence compared to other studies in the same country. The students were interviewed by academics and only 22.72% of them had the diagnostic confirmed by a doctor.

A new study was published by the Chinese group in 2015 (28), this time involving 70,000 students with aged between 18 and 23 years from 31 Chinese provinces. The methodology used was similar to the studies published in 2007 (19,20); however, the research involved seven geographical areas of continental China. The prevalence found was 2.08% and the individuals had their diagnostic confirmed by a doctor. As the authors themselves put it, the main issue of this work was the inclusion only of the teenagers from colleges that is why the results do not inform about the prevalence of hyperhidrosis in other age groups.

In 2016, with the objective of evaluating the prevalence of hyperhidrosis in different ethnic groups, a work was done by Liu *et al.* (29), applying the same methodology in two ethnically different cities, Shanghai and Vancouver. In Shanghai, 1,010 consecutive patients were assisted in the dermatology clinic and 1,018 patients in Vancouver. The prevalence found was 14.6% in Shanghai and 12.3% in Vancouver. The patients who reported late onset hyperhidrosis (onset of symptoms at 30 years old or over) were excluded. Although some authors claim that hyperhidrosis has greater prevalence in certain regions, for instance, in the Asian southeast (33), no statistically significant difference was found in this study among patients

from different geographical locations.

The last European published work was in 2016, by Shayesteh *et al.* (30). In this work 5,000 Swedish individuals were randomized, aged between 18 and 60 years. Out of the sent questionnaires, 1,353 (27%) were answered and the prevalence of hyperhidrosis in this population was 5.5%. In this work, the individuals did not have their diagnostic confirmed by a doctor.

In 2016, Doolittle *et al.* (31) sent by e-mail an invitation to 275,904 people to participate in an online survey. Out of the answered questionnaires, 8,160 people (3%) provided information about the existence or not of hyperhidrosis. The current study sample was balanced to represent the United States census parameters. The prevalence found was 4.8%, which represents around 15.3 million people when extrapolated to the American population. The diagnostic was not confirmed by a medical interview and the participants that reported sweating with characteristics of being associated with menopause were excluded.

The most recent work about the prevalence of hyperhidrosis belongs to our group, published in 2018 (32). We undertook a systematic sampling of clusters by using the census maps of the city constructed at the time of the census of the Brazilian Institute of Geography and Statistics for population counting. The sample size was done, considering the prevalence of 2.8% of hyperhidrosis found in the work of Strutton *et al.* (18). The work included 1,351 households, rounding up to 4,113 dwellers. For those who reported the presence of excessive sweating, a second specific questionnaire was applied for the evaluation of hyperhidrosis and the same were invited to a medical interview for the confirmation of the diagnostic. At first 2.07% of the interviewees reported having hyperhidrosis, however, after the medical evaluation the prevalence dropped to 0.93%.

As far as the impact of hyperhidrosis in the quality of life is concerned, some of the studies of prevalence evaluated this data. The first one was Westphal *et al.* (22), in it the authors applied a questionnaire developed by them and 60% of the interviewees considered that being with friends in public places was a bad or very bad activity; 68.8% had quit dancing socially; 31.3% reported that they had already had problems at school or at work; 31.3% reported that they had already received demonstrations of rejection due to excessive sweating and 25% reported feeling uncomfortable shaking hands with acquaintances.

In another Brazilian study of Lima *et al.* (27), 25 participants (37.9%) reported some kind of impairment in their daily activities, whether it is mental, in the studies, at work or social, bearing in mind that the biggest interference was observed in social activities (17 individuals) followed by interference in the studies (12 individuals).

Sayesteh *et al.* (30) used the SF-36 questionnaire (36-item short form) to evaluate the quality of life related to hyperhidrosis and the result was that in patients with severe primary hyperhidrosis, a reduction was observed (the lower the score, the worse was the quality of life), statistically significant in the scores of mental and physical components. And when scales or domain were evaluated, the impact of the pathology was mainly vitality, social function, social aspects, emotional aspects and mental health.

In the study of Doolittle *et al.* (31), 70% of individuals reported having a severe excessive sweating in at least one area of the body and about three fourths of the interviewees reported at least some negative impact in their lives, in their emotional and mental health. Besides, 35% agreed that they have already sacrificed important things in their lives because of excessive sweating, 85% considered excessive perspiration embarrassing and 54% would be willing to pay anything for a treatment that solved the problem.

In our work we applied the questionnaire developed by de Campos *et al.* (34), and 45% of the individuals with primary hyperhidrosis reported having a bad or very bad quality of life related to hyperhidrosis and the most frequent psychosocial effect was the embarrassment reported by 33.3% of individuals, followed by shame in 25% of the cases.

Discussion

From the 21st century onward, studies that evaluated the prevalence of hyperhidrosis started to be published. However, the methodology used is very different from one study to another, what makes comparisons difficult.

The first great difficulty in the comparison of data has to do with the evaluated population, some studies included only high school and university students (19,20,28), others evaluated students of medicine and/or dentistry courses (22,24,27), patients undergoing outpatient follow-up in dermatology wards (29), individuals users of urban terminals (21) and company employees (25,26) (*Table 1*). Few were the studies that accomplished a stratified sample of clusters in the attempt to select a representative population (19,20,28,32).

Besides, some studies included individuals with a restricted age range, for example, the Chinese studies (19,20,28) which included high school teenagers and

university students, the Brazilian and Polish studies that included students of the medicine course and dentistry (22,24,27). This represents a selection bias, once these samples are not representative of a population and besides that, it is known that the prevalence of hyperhidrosis is usually higher in this age group (children and teenagers) what may have led to an increase of the prevalence in these studies.

Another important data is that not all the individuals included in the researches as bearers of hyperhidrosis were evaluated by a doctor for diagnostic confirmation (*Table 1*). This may have led to the inclusion of individuals bearers of normal sweating and/or secondary hyperhidrosis, raising in some studies the real prevalence. This was observed in our study (32), after the medical evaluation the prevalence of hyperhidrosis dropped from 2.07% to 0.93%. As concluded in the study of Stefaniak *et al.* (24), the use only of a subjective test may lead to false positive results, raising the prevalence of hyperhidrosis. It would be ideal that the studies associated a subjective test with an objective one (gravimetric test) or the diagnostic confirmation by a doctor.

In regard to the two Chinese studies (19,20), reference is made to the prevalence of palmar hyperhidrosis, consequently the cases of hyperhidrosis in other locations (facial skull, axillary and plantar) were not evaluated. In the study of Chu *et al.* (23), only individuals who sought medical treatment were included, but not all the hyperhidrosis bearers looked for medical assistance, what may justify the low prevalence found in this study.

In the Brazilian work of Westphal *et al.* (22), the individuals who had already undergone thoracic sympathectomy for the treatment of primary hyperhidrosis were excluded; therefore, the actual prevalence in the studied population could be bigger than the one that has been found.

All the published works used a questionnaire that evaluated the presence or not of hyperhidrosis, but in some works, though the number of questionnaires sent initially were suitable for the sample size, the response rate in some of them was low (30,31), what may represent a selection bias.

In his work, Adar *et al.* (17), cites an ethnic predisposition, with a higher prevalence of hyperhidrosis in Jews from North Africa, Yemen and the Balkans if compared to Jews from Persia and Iraq. If we group the studies as to the place of publication (Asia, America and Europe) and evaluate the prevalence found, the highest prevalence in Europe was 16.3% (26), in America 14.76% (27) and in Asia 14.5% (29), that means there were not great differences from one continent to another. However, as it has been said previously, the comparison of the data found may not be the ideal in view of the different methodologies used.

The impacts of hyperhidrosis in the quality of life of the individuals are well known in daily practice and are confirmed by means of the applied questionnaires aimed at measuring the severity and the interference of the disorder in the daily life of its patient. Obviously, the higher the severity, the higher is the impairment in the quality of life. Therefore, the impairment of all spheres of the patient, emotional, social, professional and educational is unquestionable.

Conclusions

The existing data of hyperhidrosis prevalence in the world population are well varied and questionable due to the heterogeneity of methodologies used in several studies. However, in spite of the difficulty in comparing data, the achievement of this kind of prevalence study shows the concern in trying to determine the quantity of individuals affected by the disorder. The scaling of the problem is important for the establishment of measures that take into consideration the identification, orientation and treatment, aimed at improving the quality of life of its patients.

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Footnote

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aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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