

Observational Study

Epidemiological study of elderly constipation in Beijing

Mei Zhang, Xiao-Jiao Yang, Hong-Ming Zhu, Zhe Tang, Bang-Yi Li, Dan-Dan Zhao

Mei Zhang, Hong-Ming Zhu, Zhe Tang, Bang-Yi Li, Dan-Dan Zhao, Department of Gastroenterology, Xuanwu Hospital, Capital Medical University, Beijing 100053, China

Xiao-Jiao Yang, McGill University, 845 Sherbrooke Street West, Montreal, Quebec H3A 0G4, Canada

Author contributions: Zhang M designed the research; Tang Z and Zhu HM performed the research; Yang XJ performed data and statistical analyses; Zhao DD and Li BY analyzed data; Zhang M wrote the paper.

Institutional review board statement: The study was reviewed and approved by the Department of Gastroenterology of Xuanwu Hospital, Capital Medical University.

Informed consent statement: All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

Conflict-of-interest statement: There are no conflicts of interest to report.

Data sharing statement: No additional data are available.

Open-Access: This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Correspondence to: Dr. Mei Zhang, Department of Gastroenterology, Xuanwu Hospital, Capital Medical University, No. 45 Changchun Street, Xuanwu District, Beijing 100053, China. zhang2955@sina.com
Telephone: +86-10-83198899
Fax: +86-10-83198899

Received: June 12, 2015

Peer-review started: June 12, 2015

First decision: August 26, 2015

Revised: September 9, 2015

Accepted: November 13, 2015

Article in press: November 13, 2015

Published online: December 21, 2015

Abstract

AIM: To investigate the present situation of elderly constipation in urban and rural areas of the Beijing region.

METHODS: A total of 1942 cases (≥ 60 years) were selected in the Beijing region for investigation. Constipation-related data collection was carried out *via* hierarchical status, segmentation, and random cluster sampling. Patient data concerning constipation-related demographic indicators, education level, occupation, economic status, and history of gastrointestinal disease was obtained *via* questionnaires and surveys. Constipation was defined according to the Rome III criteria, with the following constipation judgment indicators: defecation less than 3 times per week, stool weight less than 35 g/d, dry and hard stool, and difficulty in defecating during more than 25% of evacuation attempts.

RESULTS: Of the 1942 cases, 634 were diagnosed with constipation, and the total prevalence rate was 32.6%, which increased with age. There was a statistically insignificantly higher prevalence of constipation in females (compared to males) and urban areas (compared to rural areas). There was a statistically insignificantly higher prevalence in the illiterate group compared to the literacy group. Those engaged in mental work suffered from statistically significantly higher constipation prevalence than those engaged in physical labor. A total of 1847 cases did not suffer from gastritis, of which 595 cases were constipated; although the prevalence rate was 32.2%, showing a higher incidence of constipation in patients with gastritis, no significant statistical difference between the two groups was found. A total of 59 cases

with a past history of biliary tract disease were found, of which 26 had constipation; constipation prevalence was 44.1% (far higher than other groups), which was a statistically significant difference.

CONCLUSION: The prevalence of elderly constipation in the Beijing region closely resembles Western countries, and is significantly affected by region, age, and past history of other related illnesses.

Key words: Constipation; Elderly; Epidemiology; Prevalence; Factors

© **The Author(s) 2015.** Published by Baishideng Publishing Group Inc. All rights reserved.

Core tip: Constipation is a common clinical symptom of gastrointestinal dysfunction. Only a few people suffering from constipation problems will seek medical advice. This article concerns the latest epidemiological studies on elderly constipation in Beijing, China.

Zhang M, Yang XJ, Zhu HM, Tang Z, Li BY, Zhao DD. Epidemiological study of elderly constipation in Beijing. *World J Gastroenterol* 2015; 21(47): 13368-13373 Available from: URL: <http://www.wjgnet.com/1007-9327/full/v21/i47/13368.htm> DOI: <http://dx.doi.org/10.3748/wjg.v21.i47.13368>

INTRODUCTION

Constipation is a common clinical symptom of gastrointestinal dysfunction. Since only a few people suffering from constipation will seek medical advice^[1], the exact epidemiological prevalence is difficult to determine. A recent study of evidence-based medicine reported a total global prevalence of 0.7%-79%, with an average of 16%^[2]. The prevalence rate was 3%-11% in our country of China^[3-9]. Constipation can be acute, with mild symptoms and acute onset, but defecation difficulty and other symptoms can soon be completely relieved. Constipation can also be chronic and develop from acute constipation, with chronic constipation mainly referring to symptoms persisting for at least six months. As an individual's age increases, so too does their constipation prevalence. Older individuals are therefore significantly more frequently affected than younger individuals. Elderly constipation is caused by a variety of factors, all of which interrelate to cause a complex problem for geriatric medicine^[10]. Constipation prevalence has recently been on rise throughout the world. Therefore, in order to investigate the prevalence of elderly constipation and its related factors in Beijing, China, we carried out an epidemiological investigation into elderly constipation in different regions of Beijing in 2010.

MATERIALS AND METHODS

Research subjects

In 2010, Beijing patients aged ≥ 60 years from rural (Huairou, Daxing) and urban (Xuanwu) centers were stratified, segmented, and randomized, using the cluster sampling method. The target survey objective was 1959 cases, with an actual survey of 1942 cases and a response rate of 99.1%. Patient characteristics were as follows: 822 urban (42.3%), 1120 rural (57.7%), 921 male (47.4%), and 1,021 female (52.6%). Although there were no significant differences ($P > 0.05$) between urban/rural, elderly age, and gender, there was a significant difference with regards to cultural background ($P < 0.01$).

Research method

Questionnaires and surveys were carefully designed *via* centralized and household questionnaires. Survey questions covered demographic-related indicators, constipation-related indicators, education level, occupation, economic status, and medical history (including any history of other digestive diseases). The Rome III criteria for constipation were taken as standard reference with the following constipation judgement indicators: defecation less than 3 times per week, stool weight of less than 35 g/d, dry and hard stool, and difficulty in defecating during more than 25% of evacuation attempts.

Statistical method

SPSS 11.5 software was used for calculations. The χ^2 test was performed to analyze the data. $P < 0.05$ was considered statistically significant.

RESULTS

Age

Of a total of 1942 patients from both urban and rural areas, 634 were diagnosed with constipation. The total prevalence rate was 32.6%, which increased with age: 21.1% for 60- to 65-year-olds; 21.3% for 65- to 70-year-olds; 30.4% for 70- to 75-year-olds; 37.2% for 75- to 80-year-olds; and 44.8% for ≥ 80 -year-olds. The difference was statistically significant ($\chi^2 = 81.779$, $P = 0.00$) (Table 1).

Area

Of the 634 cases of patients with constipation, 297 cases were from urban areas and 337 were from rural areas; prevalence rates were 36.1% and 30.1%, respectively. In the urban regions, 152 cases of acute constipation and 145 cases of chronic constipation were found, with a prevalence rate of 18.5% and 17.6%, respectively. In rural areas, 180 cases of acute constipation and 157 cases of chronic constipation

Table 1 Urban and rural prevalence of different age groups

Age (yr)	Cases	Constipation	Prevalence (%)	Constipation frequency, <i>n</i> (%)	
				Acute	Chronic
60-65	261	55	21.1 ^b	36 (13.8)	19 (7.3)
65-70	301	64	21.3	46 (15.3)	18 (6.0)
70-75	444	135	30.4	71 (16.0)	64 (14.4)
75-80	519	193	37.2	90 (17.3)	103 (19.8)
80-	417	187	44.8	89 (21.3)	98 (23.5)
Total	1942	634	32.6	332 (17.1)	302 (15.6)

^b*P* < 0.01.**Table 2** Different gender, age, region, and education level epidemiological characteristics of elderly patients with chronic constipation

Item	Cases	Constipation	Prevalence (%)	Constipation frequency, <i>n</i> (%)	
				Acute	Chronic
Sex					
Male	921	284	30.8	145 (15.7)	139 (15.1)
Female	1021	350	34.3	187 (18.3)	163 (16.0)
Age (yr)					
< 75	1006	254	25.2 ^a	153 (15.2)	101 (10.0)
≥ 75	936	380	40.6	179 (19.1)	201 (21.5)
Area					
Urban	822	297	36.1 ^a	152 (18.5)	145 (17.6)
Rural	1120	337	30.1	180 (16.1)	157 (14.0)
Education					
Literate	1217	385	31.6 ^a	212 (17.4)	173 (14.2)
Illiterate	725	249	34.3	120 (16.6)	129 (17.8)

^a*P* < 0.05.

were found, with a prevalence rate of 16.1% and 14.0%, respectively. Constipation prevalence was higher in urban than for rural areas, but the difference was not statistically significant ($\chi^2 = 8.193$, *P* = 0.017) (Table 2).

Gender

Of the 1942 total patients, 921 were male with 284 cases of constipation (prevalence: 30.8%) and 1021 were female with 350 cases of constipation (prevalence: 34.3%). Although there was a higher female prevalence compared to males, the difference was not statistically significant ($\chi^2 = 2.612$, *P* = 0.105) (Table 2).

Literacy

Of the 1942 total patients, 1217 were literate and 725 were illiterate. The literate group had 385 cases of constipation (prevalence: 31.6%), of which 212 were acute (prevalence: 17.4%) and 173 were chronic (prevalence: 14.2%). The illiterate group had 249 cases of constipation (prevalence: 34.3%), of which 129 were acute (prevalence: 16.6%) and 129 were chronic (prevalence: 17.8%). Although there was a higher prevalence in the illiterate group compared to the literate group, the difference was not statistically significant ($\chi^2 = 7.86$, *P* = 0.02) (Table 2).

Occupation

Of the 1942 total patients, 959 were engaged in occupations that mostly required mental effort, while 983 had occupations that mostly required physical effort. The mental group had 342 cases of constipation (prevalence: 35.7%), of which 177 were acute (prevalence: 18.5%) and 165 were chronic (prevalence: 17.2%). The physical group had 292 cases of constipation (prevalence: 29.7%), of which 155 were acute (prevalence: 15.8%) and 137 were chronic (prevalence: 13.9%). The mental group showed a statistically significantly higher constipation prevalence than the physical group ($\chi^2 = 7.86$, *P* = 0.02) (Table 3).

Relationship between elderly constipation and gastrointestinal tract diseases

Of the 1942 total patients, 1934 completed the gastrointestinal disease history questionnaire. There were 87 cases with a history of gastritis, of which 37 had constipation; a prevalence of 42.5%. Of the 1847 total cases that did not suffer from gastritis, 595 had constipation; a prevalence of 32.2%. There was a higher incidence of constipation in patients with gastritis, but no significant statistical difference between the two groups was found. There were 59 cases with a past history of biliary tract disease, out

Table 3 Prevalence of constipation affected by different occupations

	Cases	Constipation	Prevalence (%)	Constipation frequency, <i>n</i> (%)	
				Acute	Chronic
Mental work	959	342	35.7 ^a	177 (18.5)	165 (17.2)
Manual work	983	292	29.7	155 (15.8)	137 (13.9)
Total	1942	634	32.6	332 (17.1)	302 (15.6)

^a*P* < 0.05.**Table 4** Prevalence of constipation affected by gastritis

Chronic gastritis	Cases	constipation	Prevalence (%)	Constipation frequency, <i>n</i> (%)	
				Acute	Chronic
No	1847	595	32.2	312 (16.9)	283 (15.3)
Yes	87	37	42.5	18 (20.7)	19 (21.8)
Total	1934	632	32.7	330 (17.1)	302 (15.6)

Table 5 Prevalence of constipation affected by biliary tract disease

Biliary tract disease	Cases	Constipation	Prevalence (%)	Constipation frequency, <i>n</i> (%)	
				Acute	Chronic
No	1875	605	32.3 ^a	320 (17.1)	285 (15.2)
Yes	59	26	44.1	10 (16.9)	16 (27.1)
Total	1934	631	32.6	330 (17.1)	301 (15.6)

^a*P* < 0.05.

of which 26 had constipation; a prevalence of 44.1%, which was far higher than other groups and was a statistically significant difference. ($\chi^2 = 6.378$, *P* = 0.041) (Table 4 and Table 5).

DISCUSSION

Elderly constipation has recently become a worldwide problem. It is related to many factors, including such as pelvic floor aging, decreased social activity, psychological disorders, co-morbidity, and effects from multiple drug usage. A recent evidence-based study has shown an incidence rate of 33% in Western countries^[2]. Patients with chronic constipation constitute an elderly population with a high disease burden. The mean annual constipation-related health care cost, adjusted for potentially confounding factors, was €951 per patient in Sweden^[11]. Constipation not only causes mental distress to elderly patients, but also leads to a variety of sub-health symptoms and is a major factor in inducing gastrointestinal tumors^[12]. Previous epidemiological studies have shown a difference in constipation prevalence rates between the East and the West; Asian countries had a lower prevalence rate than Europe and the United States^[2], which may be due to differences in culture, diet, genetics, environment, socio-economic conditions, and health-care system. With the improvement of living standards and social aging process, the prevalence of constipation in our country also seems to be increasing

rapidly. An epidemiological survey implemented in 1997 by Yu *et al.*^[3] with 1434 elderly patients in Beijing showed the constipation prevalence rate of individuals over 60 years to be 20.3%. However, our research shows a prevalence rate of 32.6%. Over the past decade, the prevalence of elderly constipation in Beijing was found to be rising to levels almost equivalent to those found in the West, which is deeply concerning.

In the Beijing region's elderly population (> 60-years-old), constipation prevalence was 32.6% and the epidemiological characteristics are as follows: (1) there are regional differences for elderly constipation, with urban areas having a higher prevalence than rural areas. There is no specific conclusion in either domestic or international research to explain this difference. Studies by Johanson found that the highest prevalence was in rural areas, the lowest was in urban areas, and the prevalence in cities was in-between. A study by Li *et al.*^[13] has shown that the constipation prevalence in rural areas was higher than that in cities. However, a study by Kan *et al.*^[8] showed that there was no difference in the constipation prevalence between urban and rural areas, and that the regional differences in urban and rural areas had little impact on prevalence. The difference in regional prevalence for constipation requires further studies; (2) the prevalence of constipation increases with age^[3,14,15], which was consistent with domestic and international reports. While aging is obviously a risk factor for

constipation, the prevalence in females is higher than males, but not to a significant degree; (3) education level has a negative correlation with constipation. Research by Johanson in the United States found that a population with a lower education level had a higher prevalence of constipation. However, there is no clear conclusion concerning the nature of the relationship between constipation prevalence with literacy level. A large sample of clinical studies is required for further confirmation; and (4) in elderly patients with constipation, the prevalence of gastritis and biliary tract diseases is higher than normal. Constipation is often associated with a variety of other digestive diseases. Previous studies have shown that patients with constipation often have associated diseases, such as functional dyspepsia and gastro-esophageal reflux disease. Physicians should pay special attention to such patients during clinical work.

Constipation has a serious effect on the quality of life, social functions, and daily living activities of the elderly^[16]. Choung *et al*^[17] randomly selected 4850 cases in various regions of different countries and carried a longitudinal cohort study on constipation for 20 years, of which there were 2853 respondents. His study found that patients with persistent constipation for 20 years were only 3% of cases, while non-persistent constipation was 21%. Choung *et al*^[18] surveyed the incidence of chronic constipation in a definite population in Olmsted Village in the United States from 1988 to 2003 *via* questionnaire letters and telephone interviews. The criteria for chronic constipation was defined as symptoms such as difficulty in defecation, straining stool, hard stool, and poor bowel, with at least two symptoms out of four and symptoms occurring at least 25% of the time. At the beginning of the survey there were a total of 4235 respondents (79%), while a reinvestigation of this population in 2003-2004 had only 2298 (55%) respondents. The cumulative total incidence of chronic constipation was 17.4%.

Our research shows that there is a difference in the prevalence rate of elderly constipation for different age groups, regions, and education levels. The incidence of acute constipation was higher than chronic constipation. The incidence of constipation increased with age, as primary constipation can persist. With increasing age, the incidence of acute constipation, increased co-morbidities, and increased secondary diseases (such as Parkinson's and diabetes) may increase^[19-21]. Chronic constipation rarely occurs during a long period of time, with previous cross-sectional studies apparently appearing to have exaggerated its prevalence. In order to reduce elderly constipation and its adverse effects, more attention from clinicians, early intervention, treatment, and improvement of the quality of life of the elderly is of utmost importance.

In conclusion, the prevalence of constipation was higher in the elderly population in the Beijing area. The prevalence of constipation closely resemble that found

in Western countries, and is significantly affected by region, age, and past history of other related illnesses.

COMMENTS

Background

With the increasing life expectancy of society, more elderly people will suffer from constipation. Constipation not only brings mental distress to the elderly, but also leads to a variety of sub-health symptoms and is a major factor in inducing gastrointestinal tumors. Therefore, to investigate the prevalence of elderly constipation and its related factors in Beijing, the authors carried out an epidemiological investigation into elderly constipation in different regions of Beijing in 2010. The Rome III criteria for constipation were taken as standard reference.

Research frontiers

Over the past decade, the prevalence of elderly constipation in Beijing was found to be rising, almost to the levels found in the West, suggesting we should be more concerned about the increasing prevalence of elderly constipation in the region. With regards to the differing prevalence between urban and rural areas, there as of yet no specific explanation to be found in either domestic or international research. This is also the case with the relationship between constipation prevalence and literacy level. A large sample of clinical studies is required for further confirmation.

Innovations and breakthroughs

In the Beijing area, there has been no large sample epidemiological investigation of elderly constipation in the past 10 years. There is little research on the epidemiology of constipation according to the Rome III criteria. The authors carried out an epidemiological investigation into elderly constipation in the Beijing area using the Rome III criteria.

Applications

The constipation prevalence in the Beijing region elderly closely resembles that found in Western countries. Elderly constipation is significantly affected by region, age, and past history of other related illnesses.

Terminology

The Rome III criteria for constipation was taken as standard reference, with the following constipation judgment indicators: defecation less than 3 times per week, stool weight less than 35 g/d, dry and hard stool, and difficulty in defecating during more than 25% of evacuation attempts.

Peer-review

This is a very interesting study about the epidemiology of elderly constipation in Beijing. In this study, the authors investigated the present situation of elderly constipation in urban and rural areas in the Beijing region.

REFERENCES

- 1 Fang X, Lu S, Pan G. [An epidemiologic study of bowel habit in adult non-patient population in Beijing area]. *Zhonghua Yixue Zazhi* 2001; **81**: 1287-1290 [PMID: 16200717]
- 2 Mugie SM, Benninga MA, Di Lorenzo C. Epidemiology of constipation in children and adults: a systematic review. *Best Pract Res Clin Gastroenterol* 2011; **25**: 3-18 [PMID: 21382575 DOI: 10.1016/j.bpg.2010.12.010]
- 3 Yu P, Li Z, Zheng H, Zhu H, Li X, He Q, Wang J, Yuan K, Jiang Z, Duan C, Gao F. Elderly constipation preliminary analysis of epidemiological characteristics. *Zhongguo Laonianxue Zazhi* 2001; **20**: 132-134 [DOI: 10.3760/j.issn:0254-9026.2001.02.015]
- 4 Yu X, Chen M. Guangzhou residents epidemiological investigation of functional constipation. *Weichangbingxue He Ganbingxue Zazhi* 2001; **10**: 150-155 [DOI: 10.3969/j.issn.1006-5709.2001.02.015]
- 5 Guo X, Ke M, Pan G, Han S, Fang X, Lu S, Guo H. Beijing area adult chronic constipation cluster, stratified, randomized

- epidemiological survey and analysis of relevant factors. *Zhonghua Xiaohua Zazhi* 2002; **22**: 637-638 [DOI: 10.3760/j.issn.0254-1432.2002.10.025]
- 6 **Xiong S**, Chen M, Chen H, Xu A, Wang W, Hu P. Guangdong Province community population epidemiological study of chronic constipation. *Zhonghua Xiaohua Zazhi* 2004; **24**: 448-449 [DOI: 10.3760/j.issn.0254-1432.2004.08.011]
 - 7 **Lv N**, Xie Y, Huang D, Wang C, Yuan Z, Hu J, Li G, Xiong W. Nanchang part of the population in the epidemiological investigation of chronic constipation. *Zhongguo Shiyong Neike Zazhi* 2005; **25**: 236-237 [DOI: 10.3969/j.issn.1005-2194.2005.03.021]
 - 8 **Kan Z**, Yao H, Long Z, Liu Z, Han Y, Zhang Z, Wang D, Yang Q, Ding G. Tianjin adult chronic constipation investigation and related factors. *Zhonghua Xiaohua Zazhi* 2004; **24**: 612-613 [DOI: 10.3760/j.issn.0254-1432.2004.10.011]
 - 9 **Liu Z**, Yang G, Shen Z, He W, He F, Yuan Y. Hangzhou City epidemiological survey of constipation. *Zhonghua Xiaohua Zazhi* 2004; **24**: 435-436 [DOI: 10.3760/j.issn.0254-1432.2004.07.019]
 - 10 **Costilla VC**, Foxx-Orenstein AE. Constipation: understanding mechanisms and management. *Clin Geriatr Med* 2014; **30**: 107-115 [PMID: 24267606 DOI: 10.1016/j.cger.2013.10.001]
 - 11 **Bruce Wirta S**, Hodgkins P, Joseph A. Economic burden associated with chronic constipation in Sweden: a retrospective cohort study. *Clinicoecon Outcomes Res* 2014; **6**: 369-379 [PMID: 25143749 DOI: 10.2147/CEOR.S61985]
 - 12 **Wald A**, Sigurdsson L. Quality of life in children and adults with constipation. *Best Pract Res Clin Gastroenterol* 2011; **25**: 19-27 [PMID: 21382576 DOI: 10.1016/j.bpg.2010.12.004]
 - 13 **Li Z**, Yu P, Shi Q, Jiang Z, Chu D, Lv X. Beijing urban and rural parts of the current status of investigations elderly constipation. *Zhongguo Laonianxue Zazhi* 2000; **20**: 1-2 [DOI: 10.3969/j.issn.1005-9202.2000.01.001]
 - 14 **Campbell AJ**, Busby WJ, Horwath CC. Factors associated with constipation in a community based sample of people aged 70 years and over. *J Epidemiol Community Health* 1993; **47**: 23-26 [PMID: 8382251 DOI: 10.1136/jech.47.1.23]
 - 15 **Stewart RB**, Moore MT, Marks RG, Hale WE. Correlates of constipation in an ambulatory elderly population. *Am J Gastroenterol* 1992; **87**: 859-864 [PMID: 1615939]
 - 16 **Belsey J**, Greenfield S, Candy D, Geraint M. Systematic review: impact of constipation on quality of life in adults and children. *Aliment Pharmacol Ther* 2010; **31**: 938-949 [PMID: 20180788 DOI: 10.1111/j.1365-2036.2010.04273.x]
 - 17 **Choung RS**, Locke GR, Rey E, Schleck CD, Baum C, Zinsmeister AR, Talley NJ. Factors associated with persistent and nonpersistent chronic constipation, over 20 years. *Clin Gastroenterol Hepatol* 2012; **10**: 494-500 [PMID: 22289877 DOI: 10.1016/j.cgh.2011.12.041]
 - 18 **Choung RS**, Locke GR, Schleck CD, Zinsmeister AR, Talley NJ. Cumulative incidence of chronic constipation: a population-based study 1988-2003. *Aliment Pharmacol Ther* 2007; **26**: 1521-1528 [PMID: 17919271 DOI: 10.1111/j.1365-2036.2007.03540.x]
 - 19 **Gage H**, Kaye J, Kimber A, Storey L, Egan M, Qiao Y, Trend P. Correlates of constipation in people with Parkinson's. *Parkinsonism Relat Disord* 2011; **17**: 106-111 [PMID: 21130017 DOI: 10.1016/j.parkreldis.2010.11.003]
 - 20 **Chen H**, Zhao EJ, Zhang W, Lu Y, Liu R, Huang X, Ciesielski-Jones AJ, Justice MA, Cousins DS, Peddada S. Meta-analyses on prevalence of selected Parkinson's nonmotor symptoms before and after diagnosis. *Transl Neurodegener* 2015; **4**: 1 [PMID: 25671103 DOI: 10.1186/2047-9158-4-1]
 - 21 **Rodrigues ML**, Motta ME. Mechanisms and factors associated with gastrointestinal symptoms in patients with diabetes mellitus. *J Pediatr (Rio J)* 2012; **88**: 17-24 [PMID: 22344626 DOI: 10.2223/JPED.2153]

P- Reviewer: Mullan MJ **S- Editor:** Gong ZM

L- Editor: Rutherford A **E- Editor:** Liu XM





Published by **Baishideng Publishing Group Inc**

8226 Regency Drive, Pleasanton, CA 94588, USA

Telephone: +1-925-223-8242

Fax: +1-925-223-8243

E-mail: bpgoffice@wjgnet.com

Help Desk: <http://www.wjgnet.com/esps/helpdesk.aspx>

<http://www.wjgnet.com>



ISSN 1007-9327

