

## Type 2 diabetes among Asian Americans: Prevalence and prevention

Tam H Nguyen, Thuc-Nhi Nguyen, Taylor Fischer, Won Ha, Thanh V Tran

Tam H Nguyen, Taylor Fischer, William F. Connell School of Nursing, Boston College, Chestnut Hill, MA 02467, United States

Thuc-Nhi Nguyen, Thanh V Tran, Graduate School of Social Work, Boston College, Chestnut Hill, MA 02467, United States

Won Ha, Graduate School of Social Work Library, Boston College, Chestnut Hill, MA 02467, United States

**Author contributions:** Nguyen TH, Nguyen TN, Fischer T and Ha W helped search and review the literature; all authors helped draft and review the article.

**Conflict-of-interest:** Dr. Nguyen has nothing to disclose.

**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:** Tam H Nguyen, PhD, MSN/MPH, RN, Assistant Professor, William F. Connell School of Nursing, Boston College, 140 Commonwealth Ave, Cushing Hall 336C, Chestnut Hill, MA 02467, United States. [tam.nguyen@bc.edu](mailto:tam.nguyen@bc.edu)  
 Telephone: +1-617-5523669

Fax: +1-617-5523666

Received: November 28, 2014

Peer-review started: November 29, 2014

First decision: January 8, 2015

Revised: January 31, 2015

Accepted: February 10, 2015

Article in press: February 12, 2015

Published online: May 15, 2015

Asian American ethnic groups; with Filipino, Pacific Islander, Japanese, and South Asian groups consistently described as having the highest prevalence of T2DM. Disentangling and strengthening prevalence data is vital for on-going prevention efforts. The strongest evidence currently available to guide the prevention of T2DM in the United States comes from a large multicenter randomized clinical control trial called the Diabetes Prevention Program, which targets individual lifestyle behavior changes. It has been translated and adopted for some Asian American groups, and shows promise. However stronger study designs and attention to several key methodological considerations will improve the science. Increased attention has also been directed toward population level downstream prevention efforts. Building an infrastructure that includes both individual and population approaches is needed to prevent T2DM among Asian American populations, and is essential for reducing health disparities.

**Key words:** Type 2 diabetes mellitus; Asian American; Prevalence; Prevention; Health disparity

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

**Core tip:** Current estimates suggest that type 2 diabetes affects approximately 9% of Asian Americans overall. However, when examining disaggregated data across different ethnic groups Filipino, Pacific Islander, Japanese, and South Asian groups consistently have the highest prevalence of type 2 diabetes mellitus. This highlights how aggregating Asian Americans into one category can potentially mask the disease burden in high risk groups, while inflating the burden in low risk groups. Prevention efforts therefore need be culturally tailored to meet the unique needs of the various Asian American ethnic groups. In addition, prevention efforts should address both individual and population level strategies.

### Abstract

Type 2 diabetes mellitus (T2DM) is a growing problem among Asian Americans. Based on the Centers for Disease Control, the age-adjusted prevalence of T2DM for Asian Americans is 9%, placing them at "moderate risk". However differential patterns of disease burden emerge when examining disaggregated data across

Nguyen TH, Nguyen TN, Fischer T, Ha W, Tran TV. Type 2 diabetes among Asian Americans: Prevalence and prevention. *World J Diabetes* 2015; 6(4): 543-547 Available from: URL: <http://www.wjgnet.com/1948-9358/full/v6/i4/543.htm> DOI: <http://dx.doi.org/10.4239/wjd.v6.i4.543>

## INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a growing epidemic in the United States. In 2012, over 21 million people were diagnosed with the disease as compared to 1.6 million in 1958<sup>[1,2]</sup>. Moreover, the current cost associated with DM care in the United States is estimated at \$113 billion, and is expected to escalate to \$336 billion by 2034<sup>[3]</sup>. The high prevalence of T2DM has been well documented for Native Americans, non-Hispanic Blacks, and Hispanic Americans<sup>[4]</sup>. However, increasing attention has been drawn to the problem of T2DM among Asian Americans<sup>[5,6]</sup>, one of the fastest growing racial/ethnic minority groups in the United States<sup>[7]</sup>. Disentangling and strengthening prevalence data will provide more support for activities and resources to address this important health problem among Asian Americans. In addition, understanding best practices and building an infrastructure to prevent T2DM among Asian American populations is essential for reducing health disparities, and more broadly for curbing the growing epidemic of T2DM in the United States.

## PREVALENCE OF T2DM

For many years, health services for Asian American populations have been hampered by the model minority myth; the notion that Asian Americans are self-sufficient, well-educated, and have lower burdens of disease<sup>[8,9]</sup>. In large part, the myth was perpetuated by the lack of reliable data that often lumped Asian Americans into one large category, when in fact they represent a heterogeneous group. This issue is particularly relevant when examining the prevalence of T2DM among Asian Americans. For example, the 2014 Centers for Disease Control (CDC) report estimated that the age-adjusted prevalence of T2DM for Asian Americans as a whole was 9%. This rate is lower than that of Native Americans (15.9%), non-Hispanic Blacks (13.2%), and Hispanic Americans (12.8%), but higher than that of non-Hispanic Whites (7.6%); placing Asian Americans at "moderate risk" for T2DM<sup>[2]</sup>. When examining disaggregated data across various Asian American ethnic groups though, differential patterns of disease burden emerge.

For example, a study by Choi *et al.*<sup>[10]</sup> using population based data from the 2009 California Health Information Survey (CHIS) found that Native Americans, non-Hispanic Blacks, and Hispanic Americans had higher overall age-adjusted prevalence of T2DM than

Asian Americans (as a whole); supporting findings from the CDC report. However, a more complex story is revealed when the data for Asian Americans are disaggregated across six different ethnic groups. Based on disaggregated data, Filipinos had the highest age-adjusted prevalence (15.8% men, 9.4% women), followed by Japanese (11.8% men, 7.6% women), Korean (6.7% men, 5.1% women), South Asian (6.3% men, 2.7% women), Chinese (5.0% men, 3.6% women), and Vietnamese (2.5% men, 2.1% women). These results demonstrated that among some Asian American groups the age-adjusted prevalence of T2DM was even higher than in non-Hispanic Black (8.8% men, 13.3% women), and Hispanics American (6.7% men, 10.7% women) groups. In particular, Filipino (15.8%) and Japanese (11.8%) American men were found to have among the highest rates of T2DM. Other population based prevalence studies have reported similar findings, with Filipino, Pacific Islander, Japanese, and South Asian groups consistently described as having the highest prevalence of T2DM across all Asian American ethnic subgroups<sup>[11-14]</sup>. These examples highlight how aggregating Asian Americans into one category can potentially mask the disease burden in high risk groups, while inflating the burden in low risk groups.

While disaggregated data has clear advantages, much of the data available on the prevalence of T2DM among Asian Americans is at the aggregate level. When exploring aggregate data, there are some important patterns that can be used to underscore the urgency of addressing T2DM in Asian American populations. Specifically, when examining trends over time, several methodologically rigorous studies suggest that the prevalence of T2DM is increasing faster among Asian Americans than non-Hispanic Whites, non-Hispanic Blacks, and Hispanic Americans<sup>[15-17]</sup>. Moreover, in a study that used fasting plasma glucose test to estimate the prevalence of T2DM, Asian Americans had higher levels of "pre-diabetes" than non-Hispanic Whites, non-Hispanic Blacks, and Hispanic Americans<sup>[18]</sup>; foreshadowing further potential increases in the burden of T2DM among Asian Americans over the next few decades. Additionally, across DM prevalence studies that measure Body Mass Index (BMI), the relationship between T2DM and BMI appears to be different among Asians Americans than non-Hispanic Whites, with Asian Americans reporting T2DM at significantly lower BMI levels<sup>[12,13,16,19]</sup>. These data provide strong evidence of disparities in T2DM among and across various Asian American ethnic groups, and underscores the urgency of addressing T2DM in Asian American populations.

To strengthen future prevalence data, providing disaggregated rates across ethnic subgroups is important. In addition, to simulate demographic data collected at the state and national level, it is helpful to report prevalence rates based on aggregated categories of "Asian" and "Asian Pacific Islander"

groups. When the goal of measuring prevalence is to compare rates across groups and time, it is also important to make sure that: (1) data are collected using a random population-base sampling strategy rather than with convenient samples; (2) adjustments are made to account for age given that T2DM significantly increases with age; and (3) rates are reported with their associated 95% confidence interval, which highlight the fact that prevalence rates are estimates of the population burden and allow readers to assess the precision of the estimate. These strategies will ensure that high quality data are collected and reflective of the realities and needs of the diverse Asian American population. Continued work in this area is essential to garnering ongoing support and resources to address the growing problem of T2DM among Asian Americans.

## PREVENTION OF T2DM

The strongest evidence currently available to guide the prevention of T2DM in the United States comes from a large multicenter randomized clinical control trial ( $n = 3234$ ) called the Diabetes Prevention Program<sup>[20]</sup>. The program targets individuals with "pre-diabetes," and includes a 16-session "lifestyle" curriculum covering diet, exercise, and behavior change. Each session is taught on a one-to-one basis by a case manager trained in motivational interviewing techniques. In addition, six follow-up sessions are provided on a monthly basis to reinforce behavior changes. The main goals of this intervention include a 5%-7% weight reduction and  $\geq 150$  min of moderate physical activity per week. Study results demonstrated that this intervention reduced the development of diabetes by 58%<sup>[20]</sup>, and that the protective benefits persisted over 10 years<sup>[21]</sup>.

While the aims of the Diabetes Prevention Program are straight forward, the resource burden and lack of cultural relevance associated with the program have resulted in calls to test new models of program delivery, as well as to translate the program for use in minority populations<sup>[22]</sup>. Several studies have demonstrated success in adopting the program in a variety of different minority populations; however they have largely been done with non-Hispanic Black and Hispanic American groups<sup>[23,24]</sup>. Efforts to translate these findings with Asian American populations are limited, with most published studies designed at the pilot or quasi-experimental level, and focused on select Asian American ethnic subgroups including Chinese, Korean, Filipino, Pacific Islanders, and South Asians<sup>[14,25-28]</sup>. Continued work in this area is critical because the diets and cultural norms among Asian Americans are vastly different from the general population, and vastly differ across Asian American ethnic groups<sup>[29]</sup>.

This heterogeneity likely explains most of the variance in prevalence rates described earlier, and

highlights the importance of culturally tailoring prevention interventions for a given ethnic subgroup. In 2008, the National Institutes of Health held a workshop to discuss strategic options to further investigate cardio-metabolic diseases among Asian American populations in the United States<sup>[30]</sup>. Among their recommendations, the need to further understand dietary and physical fitness habits of Asian American subgroups was highlighted as a critical component to successfully tailoring interventions. Specifically, they suggests that more research is needed to understand the social context of eating, shopping, cooking, household dynamics on food choices (particularly related to influences on traditionally high carbohydrate diets and unhealthy eating patterns), as well as feasibility, perceptions, barriers (*i.e.*, social role strain), outliers, and motivators to exercising (perhaps by contrasting Asians who exercise and those who do not). To examine these topics, in-depth qualitative and mixed-methods studies will be vital. Of special note- given that the Asian American population represents individuals from over 60 countries with varying languages, cultures, and immigration status, a working group associated with the National Heart Lung and Blood Institute suggests clustering Asians into manageable groups that have similar risk profiles as a way to save cost and ensure broad generalization<sup>[31]</sup>. These groups include: East Asians, South Asians, Southeast Asians, and Hawaiian/Pacific Islanders.

In addition to exploring these topics, future work aimed at adopting and/or translating the Diabetes Prevention Program should also consider some of the following opportunities and challenges. First, given that Asian Americans tend to have T2DM at lower BMI levels, expanding the inclusion criteria to include individual with BMI values between 23-25 kg/m<sup>2</sup> may be warranted. Related to this, it is advisable to also measure waist circumference, a potentially stronger predictor of DM risk given that Asian Americans tend to gain weight around the abdomen (*i.e.*, central adiposity). Second, many of the existing studies highlighted earlier use community health workers (CHWs) as the "interventionist". Future studies should describe in more detail how standardized training was provided for CHWs; this will enhance intervention fidelity, and provide stronger evidence for the value and use of CHWs. Other "burning" questions that will help move the field forward include evaluating whether or not outcomes differ when the interventionist is a "Certified Diabetes Educator", a designation that requires advanced training and increased cost. Addressing these questions will further promote the benefits of interventions like the Diabetes Prevention Program, and make them more generalizable to Asian American populations.

While there are clear benefits to interventions that target individual lifestyle changes, our current efforts underestimate how hard it is to change behavior not just once or twice, but every day of our

lives. As such, efforts directed toward population level downstream prevention efforts have gained increased attention. Primordial prevention refers to activities (*i.e.*, interventions and policies) that are put in place to prevent the development of risk factors (*i.e.*, obesity, inactivity, poor diet, and chronic stress) in the first place<sup>[32]</sup>. Creating optimal defaults is the prevailing strategies for addressing primordial prevention. This involves creating environments that enables healthy choices and behaviors for all people across all age groups. This approach necessarily requires a population perspective that engages members of the community not traditionally involved with healthcare (*e.g.*, Boards of Education, Parks and Recreation, Department of Housing, Transportation, and Social Services). Engaging with communities and working with various stakeholders to change the environment (*i.e.*, improve social determinants of health) is especially essential in Asian American communities where coordinated advocacy work may not be as strong.

Whether prevention approaches are targeted at the individual or population level, some final thoughts that are important to consider include upfront planning to (1) estimate the cost and quality of these interventions, and (2) build in continuous longitudinal evaluation. This information will become increasingly relevant as the United States healthcare system enters an era of accountability. Together with improved reporting of prevalence data, these cumulative efforts will ensure that a strong infrastructure is built to prevent T2DM among and across Asian American populations.

## REFERENCES

- 1 **Centers for Disease Control and Prevention.** Long term trends in diagnosed diabetes (Accessed 2011 Oct). Available from: URL: [http://www.cdc.gov/diabetes/statistics/slides/long\\_term\\_trends.pdf](http://www.cdc.gov/diabetes/statistics/slides/long_term_trends.pdf)
- 2 **Centers for Disease Control and Prevention.** National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014. Atlanta, GA: U.S. Department of Health and Human Services, 2014. Available from: URL: <http://templatelab.com/national-diabetes-report-2014/>
- 3 **Huang ES, Basu A, O'Grady M, Capretta JC.** Projecting the future diabetes population size and related costs for the U.S. *Diabetes Care* 2009; **32**: 2225-2229 [PMID: 19940225 DOI: 10.2337/dc09-0459]
- 4 **Peek ME, Cargill A, Huang ES.** Diabetes health disparities: a systematic review of health care interventions. *Med Care Res Rev* 2007; **64**: 101S-156S [PMID: 17881626 DOI: 10.1177/1077558707305409]
- 5 **King GL, McNeely MJ, Thorpe LE, Mau ML, Ko J, Liu LL, Sun A, Hsu WC, Chow EA.** Understanding and addressing unique needs of diabetes in Asian Americans, native Hawaiians, and Pacific Islanders. *Diabetes Care* 2012; **35**: 1181-1188 [PMID: 22517939 DOI: 10.2337/dc12-0210]
- 6 **Hsu WC, Yoon HH, Gavin JR, Wright EE, Cabellero AE, Tenzer P.** Building cultural competency for improved diabetes care: Introduction and Overview. *J Fam Pract* 2007; **56**: S11-S14 [PMID: 18667134]
- 7 **Hoefel EM, Rastogi S, Kim MO, Shahid H.** The Asian population: 2010. 2010 Census Briefs. Washington, DC: US Census Bureau, 2012
- 8 **Chen MS, Hawks BL.** A debunking of the myth of healthy Asian Americans and Pacific Islanders. *Am J Health Promot* 1995; **9**: 261-268 [PMID: 10150729 DOI: 10.4278/0890-1171-9.4.261]
- 9 **Tendulkar SA, Hamilton RC, Chu C, Arsenault L, Duffy K, Huynh V, Hung M, Lee E, Jane S, Friedman E.** Investigating the myth of the "model minority": a participatory community health assessment of Chinese and Vietnamese adults. *J Immigr Minor Health* 2012; **14**: 850-857 [PMID: 21874359 DOI: 10.1007/s10903-011-9517-y]
- 10 **Choi SE, Liu M, Palaniappan LP, Wang EJ, Wong ND.** Gender and ethnic differences in the prevalence of type 2 diabetes among Asian subgroups in California. *J Diabetes Complications* 2013; **27**: 429-435 [PMID: 23743139 DOI: 10.1016/j.jdiacomp.2013.01.002]
- 11 **Gupta LS, Wu CC, Young S, Perlman SE.** Prevalence of diabetes in New York City, 2002-2008: comparing foreign-born South Asians and other Asians with U.S.-born whites, blacks, and Hispanics. *Diabetes Care* 2011; **34**: 1791-1793 [PMID: 21715521 DOI: 10.2337/dc11-0088]
- 12 **Karter AJ, Schillinger D, Adams AS, Moffet HH, Liu J, Adler NE, Kanaya AM.** Elevated rates of diabetes in Pacific Islanders and Asian subgroups: The Diabetes Study of Northern California (DISTANCE). *Diabetes Care* 2013; **36**: 574-579 [PMID: 23069837 DOI: 10.2337/dc12-0722]
- 13 **Rajpathak SN, Gupta LS, Waddell EN, Upadhyay UD, Wildman RP, Kaplan R, Wassertheil-Smolter S, Wylie-Rosett J.** Elevated risk of type 2 diabetes and metabolic syndrome among Asians and south Asians: results from the 2004 New York City HANES. *Ethn Dis* 2010; **20**: 225-230 [PMID: 20828094]
- 14 **Wang CY, Abbott LJ.** Development of a community-based diabetes and hypertension preventive program. *Public Health Nurs* 1998; **15**: 406-414 [PMID: 9874922 DOI: 10.1111/j.1525-1446.1998.tb00367.x]
- 15 **Diamant AL, Babey SH, Hastert TA, Brown ER.** Diabetes: the growing epidemic. *Policy Brief UCLA Cent Health Policy Res* 2007; **(PB2007-9)**: 1-12 [PMID: 17828827]
- 16 **Lee JW, Brancati FL, Yeh HC.** Trends in the prevalence of type 2 diabetes in Asians versus whites: results from the United States National Health Interview Survey, 1997-2008. *Diabetes Care* 2011; **34**: 353-357 [PMID: 21216863 DOI: 10.2337/dc10-0746]
- 17 **McBean AM, Li S, Gilbertson DT, Collins AJ.** Differences in diabetes prevalence, incidence, and mortality among the elderly of four racial/ethnic groups: whites, blacks, hispanics, and asians. *Diabetes Care* 2004; **27**: 2317-2324 [PMID: 15451894 DOI: 10.2337/diacare.27.10.2317]
- 18 **Thorpe LE, Upadhyay UD, Chamany S, Garg R, Mandel-Ricci J, Kellerman S, Berger DK, Frieden TR, Gwynn C.** Prevalence and control of diabetes and impaired fasting glucose in New York City. *Diabetes Care* 2009; **32**: 57-62 [PMID: 19114627 DOI: 10.2337/dc08-0727]
- 19 **Wang EJ, Wong EC, Dixit AA, Fortmann SP, Linde RB, Palaniappan LP.** Type 2 diabetes: identifying high risk Asian American subgroups in a clinical population. *Diabetes Res Clin Pract* 2011; **93**: 248-254 [PMID: 21665315 DOI: 10.1016/j.diabetes.2011.05.025]
- 20 **Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, Nathan DM.** Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002; **346**: 393-403 [PMID: 11832527 DOI: 10.1056/NEJMoa012512]
- 21 **Knowler WC, Fowler SE, Hamman RF, Christophi CA, Hoffman HJ, Brenneman AT, Brown-Friday JO, Goldberg R, Venditti E, Nathan DM.** 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet* 2009; **374**: 1677-1686 [PMID: 19878986 DOI: 10.1016/S0140-6736(09)61457-4]
- 22 **Hernan WH, Brandle M, Zhang P, Williamson DF, Matulik MJ, Ratner RE, Lachin JM, Engelgau MM.** Costs associated with the primary prevention of type 2 diabetes mellitus in the diabetes prevention program. *Diabetes Care* 2003; **26**: 36-47 [PMID: 12502656 DOI: 10.2337/diacare.26.1.36]
- 23 **Kramer MK, Kriska AM, Venditti EM, Miller RG, Brooks MM, Burke LE, Siminerio LM, Solano FX, Orchard TJ.** Translating the Diabetes Prevention Program: a comprehensive model for prevention training and program delivery. *Am J Prev Med* 2009; **37**:



- 505-511 [PMID: 19944916 DOI: 10.1016/j.amepre.2009.07.020]
- 24 **Jackson L.** Translating the Diabetes Prevention Program into practice: a review of community interventions. *Diabetes Educ* 2009; **35**: 309-320 [PMID: 19321809 DOI: 10.1177/0145721708330153]
- 25 **Islam NS**, Zanowiak JM, Wyatt LC, Chun K, Lee L, Kwon SC, Trinh-Shevrin C. A randomized-controlled, pilot intervention on diabetes prevention and healthy lifestyles in the New York City Korean community. *J Community Health* 2013; **38**: 1030-1041 [PMID: 23813322 DOI: 10.1007/s10900-013-9711-z]
- 26 **Islam NS**, Zanowiak JM, Wyatt LC, Kavathe R, Singh H, Kwon SC, Trinh-Shevrin C. Diabetes prevention in the New York City Sikh Asian Indian community: a pilot study. *Int J Environ Res Public Health* 2014; **11**: 5462-5486 [PMID: 24852392 DOI: 10.3390/ijerph110505462]
- 27 **Leake AR**, Bermudo VC, Jacob J, Jacob MR, Inouye J. Health is wealth: methods to improve attendance in a lifestyle intervention for a largely immigrant Filipino-American sample. *J Immigr Minor Health* 2012; **14**: 475-480 [PMID: 21647623 DOI: 10.1007/s10903-011-9487-0]
- 28 **Mau MK**, Keawe'aimoku Kaholokula J, West MR, Leake A, Efird JT, Rose C, Palakiko DM, Yoshimura S, Kekauoha PB, Gomes H. Translating diabetes prevention into native Hawaiian and Pacific Islander communities: the PILI 'Ohana Pilot project. *Prog Community Health Partnersh* 2010; **4**: 7-16 [PMID: 20364073 DOI: 10.1353/cpr.0.0111]
- 29 **Sadler GR**, Ryujin L, Nguyen T, Oh G, Paik G, Kustin B. Heterogeneity within the Asian American community. *Int J Equity Health* 2003; **2**: 12 [PMID: 14697098 DOI: 10.1186/1475-9276-2-12]
- 30 **Narayan KM**, Aviles-Santa L, Oza-Frank R, Pandey M, Curb JD, McNeely M, Araneta MR, Palaniappan L, Rajpathak S, Barrett-Connor E. Report of a National Heart, Lung, And Blood Institute Workshop: heterogeneity in cardiometabolic risk in Asian Americans In the U.S. Opportunities for research. *J Am Coll Cardiol* 2010; **55**: 966-973 [PMID: 20202512 DOI: 10.1016/j.jacc.2009.07.075]
- 31 **Jacob M**, Cho L. Asian Americans and cardiometabolic risk why and how to study them. *J Am Coll Cardiol* 2010; **55**: 974-975 [PMID: 20202513 DOI: 10.1016/j.jacc.2009.08.086]
- 32 **Weintraub WS**, Daniels SR, Burke LE, Franklin BA, Goff DC, Hayman LL, Lloyd-Jones D, Pandey DK, Sanchez EJ, Schram AP, Whitsel LP. Value of primordial and primary prevention for cardiovascular disease: a policy statement from the American Heart Association. *Circulation* 2011; **124**: 967-990 [PMID: 21788592 DOI: 10.1161/CIR.0b013e3182285a81]

**P- Reviewer:** Rajagopalan S, Zhao JB **S- Editor:** Tian Y

**L- Editor:** A **E- Editor:** Wu HL





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](mailto:bpgoffice@wjgnet.com)

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

<http://www.wjgnet.com>

