



Full Length Research Article

KNOWLEDGE AND PRACTICES TOWARDS RISK FACTORS FOR HYPERTENSION AND ITS RELATION TO SOCIO-DEMOGRAPHIC FEATURES AMONG URBAN AND SUBURBAN BANGLADESHI HYPERTENSIVE SUBJECTS

^{1,*}Dr. Nazma Akter and ²Dr. Ashrafuzzaman, S. M.

¹Department of Medicine, MARKS Medical College and Hospital, Dhaka, Bangladesh

²Department of Endocrinology, BIRDEM General Hospital and IMC, Dhaka, Bangladesh

ARTICLE INFO

Article History:

Received 19th June, 2016
Received in revised form
18th July, 2016
Accepted 20th August, 2016
Published online 30th September, 2016

Key Words:

Risk factors for Hypertension,
Knowledge,
Practices,
Urban; Suburban,
Socio-demographic features.

ABSTRACT

Background: Hypertension is one of the most common chronic disease and crucial health problems in developed and underdeveloped countries. Assessment of knowledge and practices is a crucial element of hypertension control. Prevention plays significant role; which is achieved by increasing the knowledge & awareness of the public and changing their attitude & practice.

Objective: To assess and compare knowledge & practice pattern towards risk factors for hypertension & its relation to socio-demographic features among urban and suburban Bangladeshi hypertensive subjects.

Methods: The cross-sectional observational study was carried out in MARKS Medical College & Hospital, Dhaka, Bangladesh during April to September 2014. 352 diagnosed hypertensive subjects [male 43.20%, female 56.80%] were selected randomly from outpatient department. With informed consent, set-written questions were asked by investigator. Statistical analysis was done with SPSS version 16.

Results: Among study subjects, 222(63.06%; male=50%, female=50%) and 130(36.93%; male=31.53%, female=68.46%) lived in urban & suburban area respectively. Though there were significant difference at educational [p0.000], occupational [p0.001] & monthly income [p0.002] status but overall knowledge & practice pattern about risk factors did not differ significantly or satisfactory among them. Except for Knowledge of avoid smoking (p0.034), sedentary life style (p0.013) & obesity (p0.007) and practice of avoid higher salt consumption (p0.030). Educational status showed significant difference in their knowledge & practice pattern. (p<0.05)

Conclusion: Risk factors of hypertension knowledge & practice pattern among urban and suburban Bangladeshi hypertensive subjects were not much different or satisfactory. Level of educational difference was a strong barrier among them.

Copyright©2016, Nazma Akter and Ashrafuzzaman. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Hypertension (HTN), a silent killer is a major risk factor for cardiovascular disease worldwide and is one of the most important reasons to visit to physician (Lewington *et al.*, 2002). It is one of the most common health problems in developed and underdeveloped countries, (Grove and Laennec, 2005; Gascon *et al.*, 2004) and can be a significant cause of mortality due to coronary artery disease, brain stroke, and renal failure (Rahimi, 2006; Andreolee, 2002).

Rapid rise of this non communicable disease has been considered as a major health challenge in the present century, which threatens social and economic development of communities and people health (World Health Organization, 2005). Such diseases impose half of the burden of diseases cost in the world (World Health Organization, 2010; Habib and Saha, 2010; World Health Organization, 2004). It is essential to control hypertension to minimize the side effects of hypertension. Rates reported for hypertension control were disappointing (Pickering, 2001), which were suggested to be 13 to 56 percent around the world (Lee *et al.*, 2010; Xu *et al.*, 2010; Roca *et al.*, 2005; Wu *et al.*, 2008). Considering its prevalence and complications, it seems that several factors and barriers are associated with controlling this disease. The most

*Corresponding author: Dr. Nazma Akter,
Department of Medicine, MARKS Medical College and Hospital,
Dhaka, Bangladesh

important barrier in diagnosis and control of this condition is the lack of knowledge and awareness about various aspects of hypertension (Viera *et al.*, 2008). Increasing the knowledge, awareness, and control of hypertension will reduce morbidity and mortality (Susan *et al.*, 2005). Studies suggested low levels of knowledge on hypertension among patients (Lee *et al.*, 2010; Ma *et al.*, 2012; Osthega *et al.*, 2007) and lack of correct information and improper understanding of hypertension did not appertain to rural sites; it has been widely reported in urban environments and industrial countries, too (Li *et al.*, 2013; Sanne *et al.*, 2008). The aim of this study was to assess the awareness, knowledge, attitude, and practice of hypertensive patients towards risk factors and its relation to socio-demographic features among urban and suburban population of Bangladesh.

MATERIALS AND METHODS

The study utilized a cross-sectional observational design, was conducted in MARKS Medical College & Hospital, Mirpur, Dhaka, Bangladesh. As it is situated in the northeast end of the city, patient both from urban and suburban area attended the hospital regularly to get treatment. Sample frame comprised of known cases of hypertension of both sexes attending in the outpatient department of Medicine from April to September in 2014. The total number of 352 subjects [male 43.20%, female 56.80%, aged >18 yrs] were included. After taking informed consent, participants were interviewed using a pre tested questionnaire that comprised the socio-demographic characteristics, hypertension-related information, and knowledge & practice pattern towards risk factors of hypertension. Socio-demographic data included data on age, gender, residence (urban or suburban), educational level (illiterate, primary school, secondary school and graduation), occupational status (Service holders, businessman, housewife and others; including retired persons, farmer etc), monthly income in Bangladeshi taka (BDT); upper (≥ 100000 BDT), middle (≥ 50000 BDT < 100000) and low (<50000 BDT). Body mass index (BMI; calculated as weight/height²) was divided into 4 categories: below normal weight (BMI < 18.5), normal weight ($18.5 \geq$ BMI < 25.0), overweight ($25.0 \geq$ BMI < 30.0), and obese (BMI \geq 30.0) (World Health Organization, 1999). Waist circumference (WC) measurement was performed with the patient in a standing position with abdomen relaxed, arms at the sides, and feet together, using a non extensible tape measure. The tape involved the individual in the largest abdominal diameter. The measurement was carried out at the completion of the patient's normal expiration (Lee *et al.*, 2008). Hip circumference was measured over light clothing at the widest point over the buttocks when viewed from the side. Waist hip ratio was obtained by dividing the waist circumference by hip circumference (World Health Organization, 1998). BP was measured in a sitting position after a minimum of 5 minutes of rest by using a sphygmomanometer machine. A person who has been smoking at least a cigarette per day for at least six months from study period and a person who has been taking alcohol at least 30 ml. per day for at least six months from study period were defined as smoker and alcoholic respectively. Diet consisting of higher fat, saturated fat, cholesterol and lack of K⁺ etc was considered as unhealthy diet. Data was analyzed

using SPSS (Statistical Package for Social Science) version 16.

RESULTS

Socio-demographic characteristics of the study population:

Among study subjects, 222(63.06%; male=50%, female=50%) and 130(36.93%; male=31.53%, female=68.46%) lived in urban & suburban area respectively. The mean age of respondents (Mean \pm SD), urban vs. suburban was 49.44 \pm 1.10 vs. 52.59 \pm 1.10, $p=0.011$. Average duration of HTN (Yrs) was 5.57 \pm 4.44 vs. 5.97 \pm 4.51 (Mean \pm SD), $p=0.421$; in urban and suburban subjects respectively. And average blood pressure (Mean \pm SD) was 132 \pm 1.29 vs. 132.3 \pm 1.23, $p=0.998$ & 83.49 \pm 8.09 vs. 82.57 \pm 8.33, $p=0.312$ respectively. Family history of hypertension was more positive among urban subjects (73.42% vs. 64.61%, $p=0.081$). Frequency of smoking was comparatively less in both groups (23.42% vs. 16.92%, $p=0.149$). Regarding education, lack of literacy was more among suburban population than urban (22.30% vs. 13.96%, $p=0.000$). Low income was pronounced among suburban population (41.53% vs. 24.74%, $p=0.002$). Most of the female from suburban area were housewife (47.69% vs. 40.54%, $p=0.001$). Urban people were more over weight but less obese than suburban (38.21% vs. 37.69% and 12.16% vs. 13.07% respectively, $p=0.607$) (Table 1).

Hypertension Knowledge and Practice

Though there were significant difference at socio-demographic features like educational status, occupation & monthly income level among urban and suburban population. But overall knowledge & practice about risk factors for HTN did not differ significantly and were not satisfactory between urban & suburban hypertensive subjects. Except the Knowledge of avoid smoking, sedentary life style & obesity as risk factors for HTN were more among urban population than suburban population (88.28% vs. 80.0%, $p=0.034$; 51.35% vs. 37.69%, $p=0.013$; 82.43% vs. 70.0%, $p=0.007$ respectively) Practice of avoid higher salt consumption was more among urban than suburban population (69.81% vs. 58.46%, $p=0.030$). Table 2 represents comparison of patient's knowledge and practice pattern towards risk factors of hypertension. But comparison of educational status of both urban and suburban hypertensive subjects showed significant difference in their knowledge & practice pattern towards risk factors for hypertension ($p < 0.05$) (Table 3)

DISCUSSION

Improving knowledge, treatment, and control on hypertension could decrease high rates of mortality by cardiovascular diseases (Barengo *et al.*, 2009). It has been studied that in west 82% know the meaning of hypertension, while 90% high blood pressure patients know that normalization will improve their health (Oliveria *et al.*, 2005). In our study, sample frame comprised of known cases of hypertension. Among them, 222(63.06%; male=50%, Female=50%) and 130 (36.93%; male=31.53%, female=68.46%) lived in urban & suburban respectively. The mean age of respondents (Mean \pm SD), urban vs. suburban was 49.44 \pm 1.10 vs. 52.59 \pm 1.10, $p=0.011$.

Table 1. Comparison of Socio-demographic and Clinical Features of Urban & Suburban Hypertensive Subjects (n =352)

	Urban [N= 222(63.06%)]	Suburban [N= 130 (36.93%)]	p value
Age (Mean ±SD)	49.44±1.10	52.59±1.10	.011
Sex			
Male [N (%)]	111(50.0%)	41(31.53%)	.001
Female [N (%)]	111(50.0%)	89(68.46%)	
BMI(kg/m ²)	25.83±3.99	25.49±4.03	.439
Over Weight [N (%)]	85(38.21)	49(37.69)	.607
Obese [N (%)]	27(12.16)	17(13.07)	.607
WHR (Mean ±SD)	0.95±.04	0.94±.05	.290
Smoker [N (%)]	52(23.42)	22(16.92)	.149
Alcoholic [N (%)]	3(1.35)	4(3.07)	.263
Positive Family History [N (%)]	163(73.42)	84(64.61)	.081
Duration of HTN(Yrs) (Mean ±SD)	5.57±4.44	5.97±4.51	.421
Systolic Blood Pressure (mm of Hg)(Mean ±SD)	132±1.29	132.3±1.23	.998
Diastolic Blood Pressure ((mm of Hg)(Mean ±SD)	83.49±8.09	82.57±8.33	.312
Educational Status [N (%)]			
Illiterate	31(13.96)	29(22.30)	
Primary	49(22.07)	48(36.92)	.000
Secondary	85(38.28)	51(39.23)	
Graduate	57(25.67)	2(1.53)	
Occupation [N (%)]			
Service Holder	54(24.32)	13(10.0)	
Businessman	36(16.21)	14(10.76)	.001
Housewife	90(40.54)	62(47.69)	
Others	42(18.91)	41(31.53)	
Monthly Income [N (%)]			
Upper	41(18.46)	13(10.0)	
Middle	126(56.75)	63(48.46)	.002
Low	55(24.74)	54(41.53)	

N.B.: Among 352 subjects, 222(63.06%) were urban and 130 (36.93%) were suburban population. There were no significant difference of BMI (kg/m²), WHR, Duration of HTN, SBP, DBP in between subjects of urban & suburban population. But there were significant difference at educational status [p0.000], occupation [p0.001] & monthly income [p0.002] level in between urban & suburban population.

Table 2. Comparison of Knowledge and Practice Pattern of Risk Factors of Hypertension among Urban and Suburban Hypertensive Subjects (n =352)

Risk Factors of Hypertension	Urban [N= 222(63.06%)]	Suburban [N= 130 (36.93%)]	p value
Avoid Alcohol Intake			
Knowledge	195(87.83)	105(80.76)	.051
Practice	213(95.94)	123(94.61)	.563
Avoid Smoking			
Knowledge	196(88.28)	104(80.0)	.034
Practice	184(82.88)	112(86.15)	.418
Higher Salt (Na ⁺) Consumption(>5 gm/Day)			
Knowledge	199(89.63)	110(84.61)	.144
Practice	155(69.81)	76(58.46)	.030
Low Intake of K+ Containing Foods			
Knowledge	88(39.63)	48(36.92)	.613
Practice	85(38.28)	43(33.07)	.327
Unhealthy Diet			
Knowledge	184(82.88)	100(76.92)	.172
Practice	170(76.57)	100(76.92)	.941
Stress			
Knowledge	178(80.18)	96(73.84)	.167
Practice	122(54.95)	71(54.61)	.951
Sedentary Lifestyle			
Knowledge	114(51.35)	49(37.69)	.013
Practice	74(33.33)	30(23.07)	.058
Obesity			
Knowledge	183(82.43)	91(70.0)	.007
Practice (physical activity)	109(49.09)	53(40.76)	.130
Drugs Induced			
Knowledge	54(24.32)	21(16.15)	.071
Practice	117(52.70)	60(46.15)	.236

N.B.: Knowledge & practice about risk factors for HTN were not satisfactory and did not differ significantly between urban & suburban hypertensive subjects except for Knowledge of avoid smoking (p0.034), sedentary life style (p0.013) & obesity (p0.007) and practice of avoid higher salt consumption (p0.030).

Chow *et al.* (2013) reported that the rate of treatment and control of hypertension in high-, average-, and poor-income countries is low (Chow *et al.*, 2013), results from the studies in Asia suggested similar findings (Xu *et al.*, 2010; Ha *et al.*, 2013; Wang *et al.*, 2014). In our study, low income was pronounced among suburban population ($p=0.002$). Most of the female from suburban area were housewife ($p=0.001$). Another finding from a study suggested a statistically significant correlation between hypertension control and patients education. The higher their education level, the higher the control rate among patients so that patients having university degrees showed higher control on their hypertension which was in accordance with results from other studies (Xu *et al.*, 2010; Azizi *et al.*, 2008; Joffres *et al.*, 2013; Wu *et al.*, 2009), though it was different from study by CHPSNE which reported lower control on hypertension among individuals with lower education (Tian *et al.*, 2011). In present study, lack of literacy was more among suburban population than urban ($p=0.000$). Educational status of both urban and suburban hypertensive subjects comparably showed significant difference in their knowledge & practice pattern towards risk factors for hypertension ($p<0.05$). Knowledge, attitude & practice (KAP) assessment from population surveys invariably poses the problem of social desirability, whereby respondents are reluctant to admit socially poorly acceptable KAP to avoid giving a negative impression (Welte and Russel, 1993; Nothwehr *et al.*, 1994). Aware hypertensive (AH) knew more often, for example, their own BP values or normal BP values and reported making a greater effort to eat small amounts of salt. This is consistent with the facts that AH visit a doctor more often and may be more receptive to hypertension-related education from medical or mass media sources (Aubert *et al.*, 1998).

Our findings suggest, though there were significant difference at educational status, occupation & monthly income level among urban & suburban population. But overall knowledge & practice about risk factors for HTN did not differ significantly and were not satisfactory between urban & suburban hypertensive subjects except at the point of Knowledge of avoid smoking ($p=0.034$), sedentary life style ($p=0.013$) & obesity ($p=0.007$) as risk factors for HTN were more among urban population than suburban population. And practice of avoid higher salt consumption was more among urban than suburban population ($p=0.030$). The present study showed that, most persons have average knowledge but few show real motivation (practices) to change behavior. Various explanations underlie low outcome expectation on chronic disease control and resistance to actually adopting healthy lifestyles. First, lay persons may underestimate the serious consequences of hypertension because of its silent evolution, chronic nature, and delayed impact on health outcomes. Second, lifestyle patterns prevailing in a society at a certain time are shaped by common attitudes, beliefs, behaviors, and social conditions and tend to be stable over time. Third, individual indulgence in immediately "pleasurable" behaviors (e.g., enjoying fatty and salty food, avoiding physical exercise, and smoking) is a powerful deterrent for adopting behaviors such as regular physical exercise, moderation in salt, alcohol and caloric intake, or abstinence from smoking (Silagy *et al.*, 1993).

Conclusion

Risk factors of hypertension knowledge & practice pattern of urban and suburban Bangladeshi hypertensive subjects were not much different or satisfactory. There is still lack of information on the actual knowledge and practices on this condition among them. The most important barrier was educational status. Considering the low rate of knowledge and practice of patients on hypertension, more activities should reinforce to help to improve patients' knowledge level, through focusing on identifying risk factors to hypertension, good nutrition, physical activity, and changing and informing lifestyles of patients with hypertension.

Acknowledgments

We would like to thank authorities of MARKS Medical College & Hospital and all participants in the study.

REFERENCES

- Andreolee, T. 2002. In: Principles of Cecil's internal medicine. Aghazadeh B, Shahverdi M, Ghazi Jahani B, translators. Tehran: Golban Publication.
- Aubert, L., Bovet, P., Gervasoni, J.P., Rwebogora, A., Waeber, B., Paccaud, F. 1998. Knowledge, Attitudes, and Practices on Hypertension in a Country in Epidemiological Transition Hypertension, 31:1136-1145, doi:10.1161/01.HYP.31.5.1136
- Azizi, A., M. Abasi, and G. Abdoli, 2008. "The prevalence of hypertension and its association with age, sex and BMI in a population being educated using community-based medicine in Kermanshah: 2003," *Iranian Journal of Endocrinology and Metabolism*, 10(4):323-329
- Barengo, N.C., M. Kastarinen, R. Antikainen, A. Nissinen, and J. Tuomilehto, 2009. "The effects of awareness, treatment and control of hypertension on cardiovascular and all-cause mortality in a community-based population," *Journal of Human Hypertension*, 23(12):808-816.
- Chow, C. K., K. K. Teo, S. Rangarajan *et al.*, 2013. "Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries," *Journal of the American Medical Association*, 310(9): 959-968.
- Gascon, J.J., Sanchez-Ortuno, M., Llor, B., Skidmore, D., Saturno, P. J. 2004. Why hypertensive patients do not comply with the treatment: results from a qualitative study. *Fam Pract*, 21(2):125-30.
- Grove, C., Laennec, N. J. 2005. Disorders of the cardiovascular system. In: Kasper DL, Harrison TR, editors. Harrison's principles of internal medicine. New York: McGraw-Hill, Medical Pub; p. 230.
- Ha, D. A., R. J. Goldberg, J. J. Allison, T. H. Chu, and H. L. Nguyen, 2013. "Prevalence, awareness, treatment, and control of high blood pressure: a population-based survey in Thai Nguyen, Vietnam," *PLoS ONE*, 8(6).
- Habib S. H., and S. Saha, 2010. "Burden of non-communicable disease: global overview," *Diabetes & Metabolic Syndrome: Clinical Research and Reviews*, 4(1):41-47

- Joffres, M., E. Falaschetti, C. Gillespie *et al.*, 2013. "Hypertension prevalence, awareness, treatment and control in national surveys from England, the USA and Canada, and correlation with stroke and ischaemic heart disease mortality: a cross-sectional study," *BMJ Open*, 3(8), Article ID e003423, 2013.
- Lee, H.S., Y.M. Park, H.S. Kwon *et al.*, 2010. "Prevalence, awareness, treatment, and control of hypertension among people over 40 years old in a rural area of South Korea: the Chungju Metabolic Disease Cohort (CMC) study," *Clinical and Experimental Hypertension*, 32(3): 166–178
- Lee, K., Song, Y. M., Sung, J. 2008. Which obesity indicators are better predictors of metabolic risk?: Healthy Twin Study. *Obesity (Silver Spring)* 16(4):834-40.
- Lewington, S., Clarke, R., Qizilbash, N., Peto, R., Collins, R. 2002. Prospective Studies Collaboration. Age specific relevance of usual blood pressure to vascular mortality: a meta-analysis of individual data for one million adults in 61 prospective studies. *Lancet*, Dec 14;360:1903–13.
- Li, X., N. Ning, Y. Hao *et al.*, 2013. "Health literacy in rural areas of China: hypertension knowledge survey," *International Journal of Environmental Research and Public Health*, 10(3) :1125–1138.
- Ma, W. J., J. L. Tang, Y. H. Zhang *et al.*, 2012. "Hypertension prevalence, awareness, treatment, control, and associated factors in adults in Southern China," *American Journal of Hypertension*, 25(5): 590–596.
- Nothwehr, F., Elmer, P., Hannan, P. 1994. Prevalence of health behaviors related to hypertension in three blood pressure treatment groups: the Minnesota Heart Health Program. *Prev Med.*, 23:362–368.
- Oliveria, S., Chen, R., McCarthy, B., Davis, C., Hill, M. 2005. Hypertension knowledge, awareness, and attitudes in a hypertensive population. *J Gen Intern Med.*, 20: 219–25.
- Osthega, Y., C. F. Dillon, J. P. Hughes, M. Carroll, and S. Yoon, 2007. "Trends in hypertension prevalence, awareness, treatment, and control in older U.S. adults: data from the National Health and Nutrition Examination Survey 1988 to 2004," *Journal of the American Geriatrics Society*, 55(7): 1056–1065.
- Pickering, T. G. 2001. "Why are we doing so badly with the control of hypertension? Poor compliance is only part of the story," *The Journal of Clinical Hypertension*, 3(3): 179–182
- Rahimi, B., Rahimi, M. Research [MD Thesis] Isfahan: Isfahan University of Medical Sciences; 2006. Evaluation of Relationship Between Doctor- Patient Communication and Adherence of Hypertensive Patient; p. 2–3.
- Roca, G. C. R., L. M. A. Ródenas, J. L. L. Caro *et al.*, 2005. "Control of hypertension in elderly patients receiving primary care in Spain," *Revista Española de Cardiología*, 58(4) :359–366
- Sanne, S., P. Muntner, L. Kawasaki, A. Hyre, and K. B. Desalvo, 2008. "Hypertension knowledge among patients from an urban clinic," *Ethnicity and Disease*, 18(1) :42–47.
- Silagy, C., Muir, J., Coulter, A., Thorogood, M., Roe, L. 1993. Cardiovascular risk and attitudes to lifestyle: what do patients think? *BMJ*, 306:1657–1660
- Susan, A., Roland, S., Bruce, D., Catherine, Martha, N. 2005. Hypertension Knowledge, Awareness, and Attitudes in a Hypertensive Population. *J Gen Intern Med.*, 20: 219–225.
- Tian, S., G.H. Dong, D. Wang *et al.*, 2011. "Factors associated with prevalence, awareness, treatment and control of hypertension in urban adults from 33 communities in China: the CHPSNE study," *Hypertension Research*, 34(10):1087–1092.
- Viera, A.J., Cohen, L.W., Mitchell, C.M., Sloane, P.D. 2008. High blood pressure knowledge among primary care patients with known hypertension: a North Carolina Family Medicine Research Network (NC-FM-RN) study. *J Am Board Fam Med.*, 21(4):300–8.
- Wang, J., L. Zhang, F. Wang, L. Liu, and H. Wang, 2014. "Prevalence, awareness, treatment, and control of hypertension in China: results from a national survey," *American Journal of Hypertension*, 27(11): 1355–1361.
- Welte, J. W., Russel, M. 1993. Influence of socially desirable responding in a study of stress and substance abuse. *Alcohol Clin Exp Res.*, 17:758–761.
- World Health Organization, 1998. Obesity- preventing and managing the Global Epidemic: Report of a WHO consultation on obesity. Geneva: World Health Organization.
- World Health Organization, 1999. "Obesity: preventing and managing the global epidemic: report of a WHO consultation," WHO Technical Report Series 894, World Health Organization, Geneva, Switzerland.
- World Health Organization, Global Recommendations on Physical Activity for Health, World Health Organization, Geneva, Switzerland, 1st edition, 2010.
- World Health Organization, Proceedings of the 15th Annual Conference of the Indian Society of Hypertension and 4th International CME on Atherosclerosis, Hypertension and Coronary Artery Disease, World Health Organization (WHO), New Delhi, India, 2005.
- World Health Organization, The Global Burden of Disease: 2004 Update, WHO, 1st edition, 2008.
- Wu, Y., E. S. Tai, D. Heng, C. E. Tan, L. P. Low, and J. Lee, 2009. "Risk factors associated with hypertension awareness, treatment, and control in a multi-ethnic Asian population," *Journal of Hypertension*, 27(1): 190–197.
- Wu, Y., R. Huxley, L. Li *et al.*, 2008. "Prevalence, awareness, treatment, and control of hypertension in China data from the China National Nutrition and Health Survey 2002," *Circulation*, 118(25) : 2679–2686.
- Xu, T., Y. Wang, W. Li *et al.*, 2010. "Survey of prevalence, awareness, treatment, and control of hypertension among Chinese governmental and institutional employees in Beijing," *Clinical Cardiology*, 33(6) :E66–E72.
