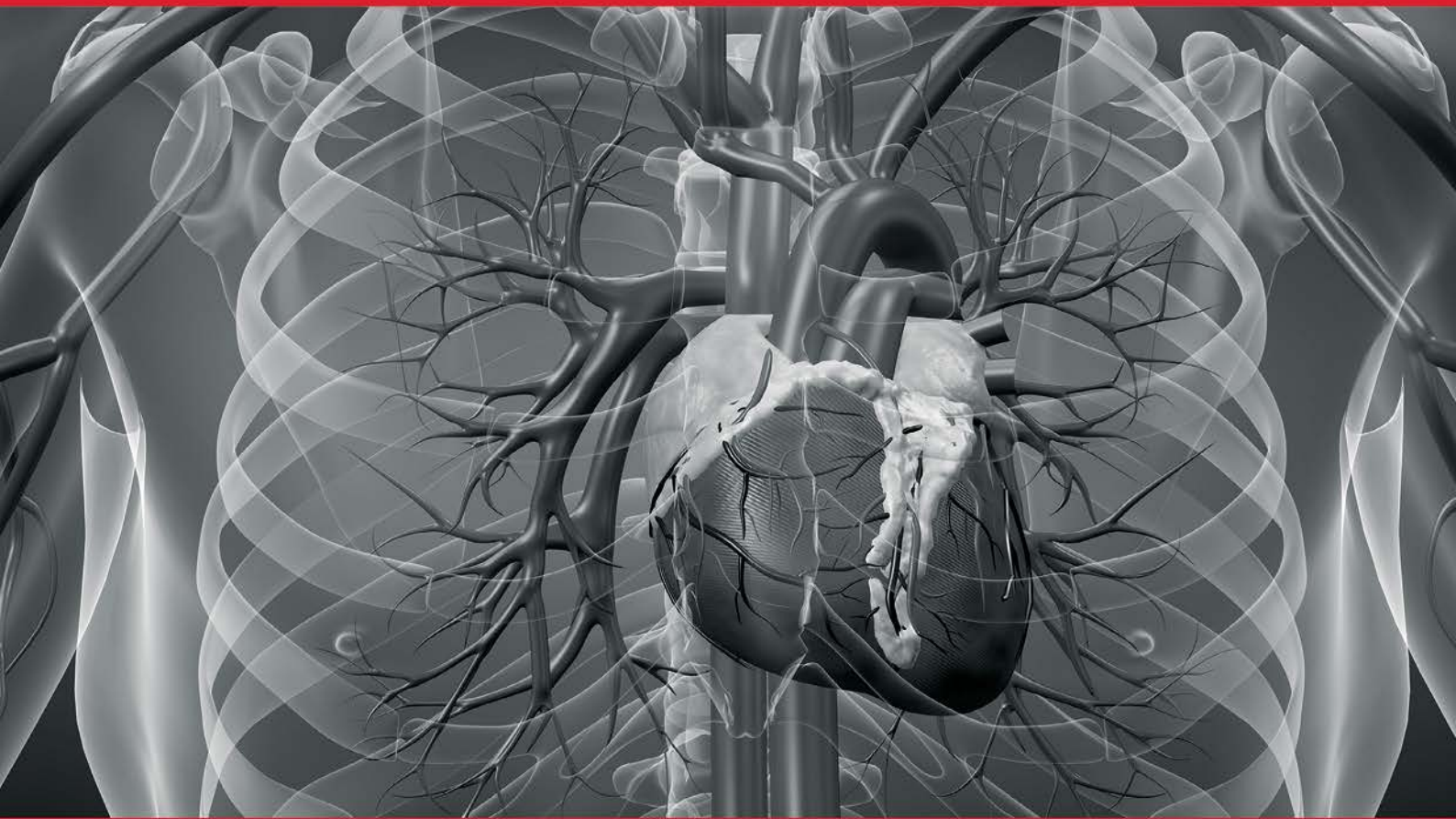


ISSN 2529-8127 (ONLINE)

ADVANCES IN  
**GENERAL PRACTICE**  
**OF MEDICINE** VOLUME 1  
ISSUE 1  
NOVEMBER 2017



Editor-In-Chief: Pietro Vajro

## Editorial Board

### **Editor-in-Chief**

**Prof. Pietro Vajro**

Faculty of Medicine-Pediatrics, University of Salerno, Italy

### **Editorial Board Members**

**Dr. Rajesh Nair**

Clinical Project Manager at St Joseph's General Hospital in Comox, BC, Canada

**Dr. Rositsa Dimova**

Department of Health Management and Health Economics, Faculty of Public Health,  
Medical University of Plovdiv, Bulgaria

**Assoc. Prof. Liu Yan**

Emergency Department, Second Hospital of Tsinghua University, Beijing, China

**Assoc. Prof. Zhao Weidong**

Pediatric Rehabilitation Department, Xinxiang Central Hospital, Xinxiang City, Henan  
Province, China

**Dr. Robert Paul**

Institute of Health Policy, Management and Evaluation, University of Toronto,  
Toronto, Ontario M5T 3M6, Canada

**Dr. Ruge Toralph**

Umea Univ, Dept Surg, Emergency Care, SE-90185 Umea, Sweden

**Dr. Vaona Alberto**

Osped Marzana, Azienda ULSS Verona 20, Primary Care, Piazzale Ruggero  
Lambranzi 1, I-37142 Verona, Italy

**Dr. Zhao Shuliang**

School of Public Administration, Shandong Technology and Business University,  
Yantai City, Shandong Province, China

## Contents

### REVIEW

**1 Total quality management of community health service**

Shuliang Zhao, Xianjie Jia

### CASE REPORT

**5 Clinical analysis of acute cerebrovascular disease accompanying  
brain-heart syndrome**

Weidong Zhao, Hongxia Hou

**7 Detection of serum bone alkaline phosphatase in 77 adolescents**

Dafang Wang, Dingping Shi, Yonggang Zheng

### RESEARCH ARTICLE

**9 Clinical analysis of 52 cases of neuromuscular examination for  
early screening of cerebral palsy in high risk premature infants**

Weidong Zhao, Shunyi Song, Bo Zhang

**13 The association between augmentation index and arterial  
stiffness index**

Yan Liu, Litong Qi, Ying Yang, Lei Meng, Baowei Zhang, Yong Huo

## REVIEW

# Total quality management of community health service

Shuliang Zhao<sup>1\*</sup> Xianjie Jia<sup>2</sup>

**Abstract:** At present, the community health service agencies need to build up total quality management (TQM) system. TQM is critical for community health service agencies to achieve sustainable development. Through measures such as perfecting the monitoring mode, strengthening the support of labor resources and building a comprehensive quality management system, the community health service agencies can boost staff members enthusiasm and initiative, promote the further change of quality concept and improve their services. This paper reviews the implementation of total quality management in community health service agencies and related issues.

**Keywords:** Community health services; Total quality management; Service agencies

In recent years, Community health services in China have developed rapidly. Although community health services are growing rapidly in quantity, the quality management has yet to be further improved. To explore how to help the Community Health Service agencies to improve the quality of service and to provide a reference for the service work.

## 1 Community health service management status and problems

### (1) The development of community health services.

At present, part of the regional base were in line with the standard from the Ministry of Health about the community health service center as a street to set, and the service population are 30,000 to 50,000.<sup>[1]</sup> Due to the nearest convenience, low cost, good service attitude, Community Health services are well received by the masses.

Currently, there are some community health service agencies try to implement total quality management in China. For example, the inspection model of "six reunification" has been implemented in Xuanwu District, Nanjing city, Namely: unified inspection standards, unified inspection methods, unified inspection time, unified

inspection of the contents of a unified inspection personnel, unified inspection purposes. The standard used was argument, and effectively meet the region special point of the integrated program, absorbing successful experience of total quality management from other areas, the content is divided into five areas: chronic disease management quality medical quality, medical technology pharmacy quality, nursing and nosocomial infection management quality and community health service management quality. By positive, the ability of total quality management improved, while the quality of the relevant staff improved also. The enthusiasm and initiative promote, the concept of quality changed, and achieved good results.

At present, although the management work of the community health service has been a certain development, there are still many problems, especially in community health services quality management are still obviously inadequate.

### (2) The problem of quality management in community health service agencies.

There are still weak points about community health service quality management work due to service facilities, medical facilities equipment, technical strength and other aspects of the restrictions, combined with health insurance and other policies system is not perfect, the quality of community health services to be a further level step up. With the liberalization of medical insurance policy, slow disease management release, collective access to individual medical institutions, drug prices, community Health service agencies, especially private institutions to

Received: July 11, 2017; Accepted: September 5, 2017; Published: October 20, 2017

\* Correspondence to: Shuliang Zhao, School of Social Development and Public Policy, Beijing Normal University, Beijing 100875, China; Email: 187365776@qq.com

<sup>2</sup> Department of Epidemiology, Bengbu Medical College, Bengbu 233000, Anhui, China

Citation: S.L. Zhao. Total quality management of community health service. *Adv Gen Pract Med*, 2017, 1(1): 1–4

Copyright: © 2017 Shuliang Zhao et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

survive the pressure increased year by year. Due to survival pressure and profitability, community health service agencies public welfare Service has not been fully reflected.

Community health service agencies in the human resources (HR) management mechanism need to be improved. The current community health professionals are mostly from the 'grass-roots' health members who are lack of the ability to meet the health services need and they can not adapt to the "six in one" comprehensive medical health service work needs.<sup>[2]</sup> Due to the human resource of community health service limits, coupled with a higher intensity of work, resulting in the number of staff is not enough and instability, then affecting the quality of service and level. In recent years, HR training have been on carried out in Shanghai city and areas where the community health services are better and achieved some performances. But the HR management mechanism of health service organization still needs further improve in whole country, especially in areas where medical and health resources are not sufficient.

Quality management evaluation work still need to improve. The current medical quality management model and quality evaluation system can not accurately reflect the difference between the health service centres, so the difference among the ratings of the hospital is not significant. The assessment and evaluation system need to be further improved and optimized and can reflect the quality of community health service accurately, objectively, impartially and comprehensively.

The task of community health service quality management is arduous. The quality management from the change of service places and objects and the updates of service contents and methods will bring new challenges. The Community Health Service work need to be further improved, although some exploration have been done, but are still limited, superficial and the recycling management operation mechanism is not perfect. Compared with the hospital, the quality management for community health service is more complex, heterogeneity and particularity because of the variety of disciplines, operational diversity, decent service, personnel technology, imbalance of capacity of quality control.

## 2 The significance of total quality management

In recent years, China's community health service agencies are experiencing a rapid changing. The government has developed and implemented a series of new policy and community health service work norms to deepen the reform of urban medicine health system, op-

timize the structure of urban health resources, the development of community health services, and strive to meet the basic needs of the masses of health services. In this process, total quality management is applied in community health services which brought a new quality management ideas to the community health service agencies and made the quality of community health services overall improved through the establishment of scientific and efficient quality management system.

Community Health Services is a special commodity, its quality of services includes the formation of quality of service and the quality of work. With the market economy continuous improvement and further deepening of health system reform, community health Service will gradually be pushed to the market. Only to improve the overall quality of service, the level of management and service, community health services can get faster development.<sup>[3]</sup>

The ultimate goal of quality management of community health services is to meet the needs of different levels of community health services. The purpose of quality management applied to community health services is to promote the community health services to build an effective and satisfying service environment of "patient-centred security" to improve the efficiency and quality. Therefore, the implementation of total quality management can not only improve the quality of product and service, but also have a profound impact at the level of transformation and reorganization of community health services.

## 3 The main content of total quality management

Total Quality Management was named by Fergenberg, the famous American expert in the 1960s.<sup>[4]</sup> It has now become a highly systematic science based on the tradition quality management with the development of science and technology.

Total Quality Management is a management methods centred by quality, based on full participation and the core is the customer's satisfaction and all members' benefits.<sup>[5]</sup>

The basic characteristics of Total Quality Management include the followings: (1) Comprehensive: all work of different departments comply with quality management. (2) All: all members must participate in learning, training. (3) Whole: from the beginning of the event to the end, all aspects of the entire process comply with quality management.

The basic working method of Total Quality Management is the Deming PDCA cycle work law, also known

as 'Deming ring' including four steps: (1) Planning stage: to find out the question of the quality, the cause of the quality problem, and the solutions. (2) Implementation phase: the solution policy seriously put into practice. (3) Checking stage: to investigate and analyse the effect of the implementation. (4) Processing stage: to summarize the successful experience, and put the problem into the next cycle.

#### 4 Model exploration of Total Quality Management

To implement a comprehensive quality management, community health service agencies should pass through all the staff and departments work together to establish a quality system during the whole process of community health services institutional activities, to ensure that "prevention first" work policy implementation, better "for the people's health services for the economy construction services. "As a system engineering, the requirements of 'Three Comprehensives, One Diverse'", that is, a comprehensive quality management, the whole process of quality management, full participate in quality management and scientific, diverse methods.<sup>[6]</sup>

To ensure and improve community health service quality system, all the work of the community health service should work move to form an effective unit and to carry out a comprehensive quality management from financing to human resources management, system construction, and so on.

The whole process of quality management should insist on the idea of prevention first, innovation and serving the customer.

To educate and train the whole staff; to develop personnel quality responsibility system for all departments, to carry out the responsibility, right and benefit, and to organize various quality management activities.

Adopt a variety of methods for quality management, such as to urge, evaluate, investigate the quality of community health services, and analysis and solve quality problems as well as to improve the evaluation system, to strengthen the quality of community health service management and the safety education, to enhance the sense of safety, and to improve the the quality and ability to consciously participate in quality management.

#### 5 Several issues about community health services

After the establishment of the health service organization management policy, it is very important to implement completely, to understand, be familiar with the

policy, and to integrate of the policy into every link of quality management, meanwhile to implement and adhere to quality training and quality management training, to establish a "full participation" of the concept of Total Quality Management.<sup>[7]</sup>

To establish and implement a standardized rational medication. To carry out the basic drug system pilot in the community, community health service agencies, the required drugs are from the government centralized procurement, unified distribution, to ensure that its price is lower than the average price in market. At the same time, explore the establishment of a zero-rate sales system for community health services, which can be sold to the community with a zero-percent rate of sales, and the difference will be compensated by the government.

To perfect the matching talent system, and build the quality of the talent team. To actively guide the high quality talents of urban health surplus personnel to transfer to community health service agencies.<sup>[8]</sup> To encourage senior health professionals to work part-time in the community. The whole staff in community health service shall be hired on contract, and the performance salary is the main income of employees through the number of services, quality of service, residents satisfaction and other indicators for performance verification, to encourage medical staff focus on community health management, prevention of health care and rehabilitation. To establish a relatively complete, mature, in line with market demand for health service personnel training system in all medical schools.

To strengthen the management of common and frequent disease. The appropriate community health technology should be vigorously promoted, to carry out comprehensive control and standardize the management of single disease such as high blood pressure, diabetes, and so on. For common diseases, frequent disease, the main work is to prevent, prevention and treatment combined, reasonable inspection, reasonable drug use, active service, to facilitate the patients, standard referral, and control the medical expenses.<sup>[9]</sup> In addition, community health services should strengthen the basic medical insurance, medical aid connection, guide the insured people make full use of community health services, to make a diagnosis and give treatment in community for those with common diseases, frequently disease and chronic diseases.

#### References

- [1] Ministry of Health and the State Administration of Traditional Chinese Medicine. *Urban Community Health Service Management Office Law (Trial)*, 2006
- [2] Dong YN, Liu LH, Liu BS, et al. Exploration of Community

- Health Service Quality Management. *Chinese J Pract Med*, 2012, **3**: 282–284
- [3] Liu C, Zhou L. Community health service institutions to implement the concept of brand strategy. *Med And Philos*, 2014, **28**: 7–9
- [4] Fergenberg. Total Quality Management. 1991, 25–26
- [5] Yu T, Shi PW and Zhu H. Health and disease prevention institutions to implement a comprehensive quality management work. *Chinese J Public Health Care*, 1999, **15**: 226–227
- [6] Yu Z, Zhang L. Total Quality Management and its application in hospital management. *J Hosp Adm*, 2006, **22**: 467–470
- [7] Wang YQ, Xu M, Mou WY, et al. On the comprehensive quality management of the hospital and the real. *Chinese Health Qual Manage*, 2004, **11**: 21–22
- [8] Wang CY. Implementation of Total Quality Management, improve the level of hospital services. *Health Dig*, 2006, **3**: 48–51
- [9] Chen Q. Community health service center medical quality management status and countermeasures. *Chinese Gen Pract*, 2006, **8**: 1003

## CASE REPORT

# Clinical analysis of acute cerebrovascular disease accompanying brain-heart syndrome

Weidong Zhao<sup>1\*</sup> Hou Hongxia<sup>2</sup>

Acute cerebrovascular disease (ACVD) induced cardiovascular dysfunction, myocardial infarction, myocardial ischemia, arrhythmia and heart failure and so on, which is defined as brain syndrome. Brain syndrome will cause not only cerebrovascular disease prolonged, but also sometimes can result in death. Our department admitted and analysed 22 cases of acute cerebrovascular disease induced brain heart syndromes, in order to achieve early diagnosis, correct treatment, reduce the rate of death from December in 2013 to November in 2014.

## 1 Clinical case data

### 1.1 General information

22 Cases were hospitalized patients, 16 males and 6 females. Aged 60 to 84 years, mean 73 years old. By Scanning the head of CT or MRI, it was confirmed that there were subarachnoid hemorrhage in 12 cases, cerebral hemorrhage in 7 cases, cerebral infarction in 3 cases. At the time of admission, 5 cases are in the coma state, 10 cases are in different degrees of language disorder.

### 1.2 Diagnostic criteria

(1) The diagnosis of acute cerebrovascular disease: sudden nerve system dysfunction and confirmed by head CT or MRI scan; (2) Cardiovascular function can be diagnosed by the obstruction: by colourful Doppler ultra-

sound examination, confirmed the heart of the patient room, valve, aorta, pulmonary artery and pericardium were not abnormal; ECG or Holter monitoring arrhythmia, ST segment decline, T wave significantly increased (Niagara Falls Such as changes in U waves, abnormal J wave, etc.); increased myocardial enzymes, especially in phosphate acid kinase, muscle - brain mixed creatine phosphatase isoenzyme increased significantly; (3) Anxious the incidence of cerebrovascular disease before the onset of heart symptoms in acute cerebrovascular disease for 6 h - 7 d; (4) Previous cases of similar cardiac damage are not included in the brain syndrome analysis.

### 1.3 Treatment and results

(1) Cerebral infarction patients were cured by anticoagulation, thrombolysis, defibrillation, anti-platelet aggregation and improve micro-circulation; (2) Hemorrhagic cerebrovascular disease patients were cured by dehydration reduce intracranial pressure, protect brain tissue and symptomatic support; (3) Protecting the myocardium. By hospital monitoring and hospital tracking (except for the death of 5 cases), 17 patients with current arrhythmia, myocardial abnormalities and ECG changes gradually returned to normal with the stability of the brain lesion and complete recovery more than a month later.

## 2 Discussion

The pathogenesis of acute cerebrovascular disease with brain syndrome is unclear and may be related to the following factors: the lesion involving the thalamus the lower part and the brain stem of the autonomic nerve regulation center, the occurrence of sympathetic nervous tension, adrenal cortical hyperfunction and blood catecholamine content increased, the occurrence of neurogenic fluid conditioning dysfunction and pulmonary

Received: July 1, 2017; Accepted: September 6, 2017; Published: October 23, 2017

\* Correspondence to: Weidong Zhao, Department of Neurology, Mianchi County People's Hospital, Henan Province, China; Email: [dczwd@126.com](mailto:dczwd@126.com)

<sup>2</sup> Department of Neurology, Mianchi County People's Hospital, Henan Province, China

Citation: W.D. Zhao. Clinical analysis of acute cerebrovascular disease accompanying brain-heart syndrome. *Adv Gen Pract Med*, 2017, 1(1): 5–6

Copyright: © 2017 Weidong Zhao *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



edema. In addition, according to the literature reported, frontal lobe frontal cortex lesions and island lesions can cause autonomic and cardiovascular dysfunction.<sup>[1]</sup> At the same time, acute cerebrovascular disease due to the application of dehydrating agents, electrolyte disorders, blood liquid concentration, the emergence of low potassium, low sodium, hypoxia, resulting in neurological disorders. Also by in some hemorrhagic brain disorders, the use of hemostasis or coagulant causes blood hypercoagulable state, can affect the heart function, causing a series of ECG changes. Acute cerebrovascular disease occurs in the elderly, and often associated with high blood pressure, diabetes, hyperlipidemia and other diseases affect the heart and brain blood, easy to cause heart change. In addition, brain-heart syndrome may be the intrinsic effect of encephalopathy.<sup>[2]</sup>

From the diagnosis point of view, acute cerebrovascular disease is more exposed, easy to diagnose, while the onset of heart symptoms hidden, often due to the onset of patients older and past no history of coronary heart disease and neglect. In the diagnosis and treatment of acute cerebrovascular disease must be highly alert the possibility of the occurrence of brain heart syndrome, once the following circumstances should be taken into account concurrent heart symptoms of the possibility: ECG abnormalities such as ST segment decline or elevation, T wave increased significantly (Niagara Falls change), Q-T interval extension, U wave obviously, abnormal J wave and so on. Arrhythmia is mainly manifested as sinus tachycardia (slow), various types of atrioventricular block, atrial fibrillation, ventricular contraction before wait. ECG abnormalities in the 6h-7d after the onset of abnormal waveforms are sustainable for 1 to 2 weeks, while the elderly up to 4 weeks.

From the incidence point of view, each reported different, 62% to 90% ECG different often, the highest incidence of subarachnoid hemorrhage, cerebral hemorrhage abnormal ECG. Secondly, followed by a large area of cerebral infarction can also occur, indicating bleeding stroke patients the impact on the heart than ischemic stroke patients.<sup>[3,4]</sup> In the subarachnoid space of this group, the highest incidence of bleeding was 54.55%, followed by cerebral hemorrhage (31.81%), cerebral infarction dead (13.64%). The incidence of hemorrhagic stroke complicated with brain - heart syndrome (86.36%) was significantly higher than that of ischemic stroke (13.64%) ( $P < 0.01$ ). Literature reports are basically the same.

From the treatment point of view, there are contradictions to treat the acute cerebrovascular disease complicated with brain-heart syndrome. During ACVD, most people advocate salt-based to the liquid input, and need limit the amount of salt to cardiac patients. In addition, for ACVD, particularly for bleeding brain vascular disease, the patients need to be given dehydration to reduce intracranial pressure, but the application of dehydrating agent mannitol can induce or aggravate heart symptoms, and most of the patients with ACVD disturbance of consciousness can not eat, required the amount of liquid more, which will increase the heart dirty burden. Therefore, in the treatment, the doctor need to weigh the pros and cons. If the heart dirty ischemic damage, the treatment is similar to cerebral infarction; if patients are with hemorrhagic cerebrovascular disease or large area of cerebral infarction with heart symptoms, the doctor should be strictly master dehydration treatment indications, the application of dehydrating agent with furosemide or glycerol fructose, without nectar alcohol to reduce the burden on the heart, to avoid heart failure, and pay attention to dehydration treatment of concurrent disease. The purpose of the treatment of cerebral infarction with cardiac drugs is to increase the amount of cardiac output, thereby increasing plus cerebral blood flow, so that the ischemic penumbra be restored, therefore, the application of cardiac drugs do not to be conservative, such as early in the presence of heart damage, including pulmonary edema, kidney changes.

Dynamic observation of ECG and myocardial enzymes in 22 patients with brain accompanying heart syndrome showed that it is meaningful for stroke patients to prevent brain-cardiac syndrome in the treatment of primary disease.

## References

- [1] Hu WM, Wang WZ. Neurology attending physician 900. *People's Health Health Publishing House*, 2007, 659–663
- [2] Long H. Brain Heart Syndrome. *Chinese J Pract Intern Med*, 2012, **17**: 648
- [3] Zhang H, Chen YL, Zhou B. Clinical analysis of acute stroke complicated with brain-heart syndrome. *Chinese J Pract Neuro*, 2014, **12**: 12
- [4] Chen ZL, Venkat P, Seyfried D, *etc.* BrainCHeart Interaction: Cardiac Complications After Stroke. *Circulation Research*, 2017, **121**: 451-468  
<https://doi.org/10.1161/CIRCRESAHA.117.311170>

## CASE REPORT

# Detection of serum bone alkaline phosphatase in 77 adolescents

Dingping Shi<sup>1\*</sup> Dafang Wang<sup>1</sup> Yonggang Zheng<sup>2</sup>

In the fast growing period of adolescent children, bone growth and bone mineralization are extremely active. Adulthood is the second peak of bone development, adolescent appropriate calcium intake into the ideal bone peak to achieve an important role.<sup>[1]</sup> It is important to make clear whether or not bone mineralization and to early intervene. Bone alkaline phosphatase (BALP) is the most correct indicator to reflect the whole process of bone change,<sup>[2]</sup> 177 Cases of adolescents were detected BALP in 2014 to evaluate the meaning of this measurement .

## 1 Objects and methods

### 1.1 Objects

177 Health children aged 12 to 14 years old (84 male cases, 93 female cases) from schools in Beijing, without diseases in heart, liver, kidney, skeletal systems or others.

### 1.2 Methods

Using the "whole blood dry immune enrichment method Dingbang alkaline phosphatase diagnostic kit"(BALP KIT, Lot number 02050124) developed by Wang Jiayi from Beijing Zhongsheng Engineering high-tech companies. Collected the finger peripheral blood test at the same time .

Received: July 1, 2017; Accepted: September 2, 2017; Published: October 23, 2017

\* Correspondence to: Dingping Shi, Department of Pediatrics, Yuquan Hospital, Tsinghua University, Beijing 100049, China; Email: dpshi@163.com

<sup>2</sup> Department of Clinical Laboratory, Yuquan Hospital, Tsinghua University, Beijing 100049, China

Citation: D.P. Shi. Detection of serum bone alkaline phosphatase in 77 adolescents. *Adv Gen Pract Med*, 2017, 1(1): 7–8

Copyright: © 2017 Shi Dingping *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## 1.3 Measurements

Lower than 200 nmol / (L° S) is a normal range; 200 to 300 nmol / (L° S) means early bone mineralization; higher than 300 nmol / (L° S) means exciting stage;<sup>[2]</sup> higher than 200 nmol / (L° S) means the total number of abnormalities.

## 2 Results

The total abnormalities of bone alkaline phosphatase in adolescents were 53.1% (94 /177), the total number of males was higher than that of females, the difference was significant (P <0.01). See [Table 1](#).

**Table 1.** Comparison of BALP values for different genders

Groups	Cases	≤ 200	200-300	≥ 300	Total abnormalities
Male	84	24 (28.6)	37 (44.0)	23 (27.4)	60 (71.4)*
Female	93	59 (63.4)	21 (22.6)	13 (20.0)	34 (36.6)
Total	177	83 (46.9)	58 (32.8)	36 (20.3)	94 (53.1)

Note:  $\chi^2 = 34.92$ ,  $P < 0.01$ , compared with female

## 3 Discussion

Bone mass is the amount of mineral deposits in the bone. Most of the accumulation of bone mass occurs in children or adolescents. Adolescent calcium metabolism is different from children and adults, which is in the second peak of accelerated growth. Bone tissue normal growth and development need appropriate calcium intake, especially for young people, this supplementation of calcium can increase the deposition of bone minerals. The amount of bone calcium is 25 to 30 g for new born, account for 1% of body weight, and that is 1200 g in adult bone calcium content, which increased 40 times higher than the newborn.<sup>[1]</sup> The accumulation of calcium in the premenstrual bone is 140 to 165 mg/d, adolescence can be as high as 400 to 500 mg/d, this period

of intestinal absorption rate is very high, up to 40%.<sup>[3]</sup> Increased bone content in young people with long-acting effect, bone containing magnitude and bone loss rate are important for adult fractures and osteoporosis notice parameters.<sup>[3]</sup> Mainly happened in adults with bone loss, bone tissue micro-knot degenerative features become osteoporosis, may begin to happen in childhood. Calcium intake is sufficient in childhood, but for adult, osteoporosis or fracture seldom happened,<sup>[1]</sup> so it is very important to know more about the amount of normal bone mineralization of adolescents, to promote the healthy growth of bones and prevent adult osteoporosis. The deficiency of pubertal bone mineral is a problem easy to ignore. Most are in subclinical conditions without clinical symptom, and it is difficult to detect, so we randomly screen the BALP for healthy school children.

Vitamin D is closely related to calcium, phosphorus metabolism. Calcium and phosphorus absorption is affected and the bone mineral content is relatively insufficient when vitamin D is deficiency, which result in osteogenesis disorders, bone cell compensatory hyperplasia, osteoblast activity increased, BALP (the main activity of bone calcification substance) increased, plasma BALP levels also increased. So it is believed that serum BALP is the most accurate indicator of the whole process of bone change around the world.<sup>[2]</sup> Total activity of Alkaline Phosphatase (ALP) was firstly used to evaluate bone calcification biochemical indicators. The specificity of ALP is poor. Besides the ALP in bone, ALP also exists in liver, gallbladder, intestinal and lung in plasma of children. ALP in liver and gallbladder can be identified by the occurrence of jaundice. The largest interference is from the ALP in intestinal, pulmonary and bone-like ALP.<sup>[2]</sup> Although there have been no morphological changes when the amount of BALP increased, there have

been different degree of bone calcification disorder,<sup>[2]</sup> especially for healthy children screening. BALP is from bone cell synthesis, and is the most sensitive indicator of bone formation rate, as well as is valuable for bone calcification.<sup>[2]</sup> Severe vitamin D deficiency can cause bone mineral abnormal or short. Vitamin D is extremely important to normally metabolised of bone and cartilage during development phase, especially in the fast-growing period of adolescents, vitamin D deficiency can occur with rickets. Adolescence lack of vitamin D can cause pelvic dysplasia.<sup>[3]</sup> In this investigation, the results of BALP determination from 177 cases of healthy adolescent showed that more than half of healthy children have bone mineralization in adolescence, the abnormal rate of boy is 71.4% (60 / 80), and the abnormal rate of girl is 36.6% (36/93), which may be resulted from boys being faster growth and development than girls, being stronger than girls, exercise more than the girls, and being lack of calcium.

Therefore, adolescent students should be advised to add milk after class. To those with abnormal BALP, calcium and vitamin D supplement should be advised, meanwhile, should strengthen physical exercise, increase extracurricular activities and expose to the sun more to improve vitamin D.

## References

- [1] Li HQ, Zheng HL. The best calcium nutrition and bone development. *Foreign Med*, 2007, **25**: 87
- [2] Yu SM, Shen SL, Qiu JS. Some points on some indicators of rickets diagnostic criteria. *Chinese J Pediatr*, 2012, **40**: 52–53
- [3] Ding ZY. Nutrition and Development of Children's Bones. *Chinese J Pediatr*, 2011, **40**: 20–22

RESEARCH ARTICLE

## Clinical analysis of 52 cases of neuromuscular examination for early screening of cerebral palsy in high risk premature infants

Weidong Zhao<sup>1\*</sup> Shunyi Song<sup>2</sup> Bo Zhang<sup>2</sup>

**Abstract:** **Objective** To investigate the effect of 52 neurological tests on early screening of cerebral palsy in high-risk premature infants. **Methods** 52 Neurological examination were conducted in 363 cases with high-risk preterm aged 28 to 32 weeks at 1 month, 3 months, 6 months respectively after they were birthed from 2009 to 2012. If the children were checked with abnormal items (2 results of checked items were abnormal), they will be closely observed and urge their parents to recheck 1 month later. If the check results were still abnormal, the children would start to be early intervention treated immediately in our department; if the children were checked to have more than 3 items abnormal, they will start to be early intervention treated immediately. Meanwhile, 302 cases of health premature children without early screening were set up as control group. All children were followed up for 36 months. With the Gesell scale to evaluate the child's intelligence and sports development. **Results** 81 Cases of suspected cerebral palsy were found by this method, including 52 cases of early intervention group and 10 cases of untreated group. Another 10 cases were developed for a transient exercise. The positive rate of screening was 92.85%, and the incidence of cerebral palsy was 3.0%. After early intervention, early intervention in the preterm children group were diagnosed cerebral palsy in 5 cases 36 months later, 17 cases of non-intervention group. **Conclusion** 52 Neurobehavioral examinations are a effective method for early detection of cerebral palsy in premature children, and it is helpful for early detection of cerebral palsy in premature children, early intervention, as well as to significantly reduce the incidence of cerebral palsy in premature children.

**Keywords:** 52 neurological examination; premature children; cerebral palsy; screening; high risk

Cerebral palsy is primarily a disorder of movement and posture. It is defined as an "umbrella term covering a group of non-progressive, but often changing, motor impairment syndromes secondary to lesions or anomalies of the brain arising in the early stages of its development" [1]. With the progress of pediatric intensive care, the success rate of premature delivery of children was greatly improved in recent years. Preterm birth is an independent risk factor for cerebral palsy in children. Timely detection of prenatal morbidity and early intervention, is the key to the morbidity of cerebral palsy to reduce premature children. 52 Items of nerve motion examination was used to early screen cerebral palsy from preterm children aged 28 to 32 weeks from 2009 to 2012, and achieved the anticipated target. The results and follow-up report are as follows.

## 1 Materials and methods

### 1.1 Research object

363 Cases of premature children aged 28 to 32 weeks who were treated in our department from November in 2009 to October in 2012 were as screening group, and those with birth weight of 1.0 to 2.1 kg, suffering from genetic metabolic diseases, epilepsy and chromosomal diseases such as premature children were not included in this study. 302 Cases of health premature children with a routine physical examination in our hospital children's physical examination center were as the control group. There was no significant difference between the two groups of children in gender, gestational age, birth weight and so on ( $P < 0.05$ ). See [Table 1](#).

### 1.2 Methods

2 Groups of preterm children in the corrected age of 3 months, 6 months were tested with 52 neurological examinations. If the children were checked with abnormal items (2 results of checked items were abnormal), they will be closely observed and urge their parents to recheck 1 month later. If the check results were still ab-

Received: July 8, 2017; Accepted: September 3, 2017; Published: October 23, 2017

\* Correspondence to: Weidong Zhao, Department of Pediatric Rehabilitation, Xinxiang City Center, Xinxiang 453000, China; Email: [dczwd@126.com](mailto:dczwd@126.com)

<sup>2</sup> Department of Pediatric Rehabilitation, Xinxiang City Center, Xinxiang 453000, China

**Citation:** W.D. Zhao. Clinical analysis of 52 cases of neuromuscular examination for early screening of cerebral palsy in high risk premature infants. *Adv Gen Pract Med*, 2017, 1(1): 9–12

**Copyright:** © 2017 Weidong Zhao et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

**Table 1.** Comparison of the basic situation of the two groups of children

Groups	n	Gender		Average gestational age (weeks)	Body weight (kg)	NBNA scale (28 d)
		male	female			
Screening group	363	192	171	31.84±2.04	1.71±1.04	29.71±5.28
Control group	302	164	138	31.71±3.12	1.65±1.23	28.67±4.16
Statistic		x <sup>2</sup> =0.2314		u=0.2985	u=0.0147	u=0.4752
P value		>0.05		>0.05	>0.05	>0.05

normal, the children would start to be early intervention treated immediately in our department; if the children were checked to have more than 3 items abnormal, he will start to be early intervention treated immediately. The control group was given routine parenting guidance, and the patients were followed up at 12, 18, 24, 30, and 36 months. Using the Gesell scale the child's intelligence and movement.

### 1.3 Quantification

"52 Neurological examination method" items was divided into five dimensions: (1) Head growth: head circumference as the main judgment indicators; (2) Social interaction: including the object of the awakening of the state, feeding, crying, ear and eye tracking test; (3) Passive muscle tension examination: including adductor muscle angle, nest angle, Bragard's test, opisthotonus; (4) Sports activities: whether there is hemifacial spasm, limb function or continued hand fist; (5) Reflection: knee reflection, Babinsky sign, sucking action, embracing reflection, grasping reflection, automatic step reaction, asymmetric tension of the neck reflex. Each item's scoring method is: 0 Point means typical results in the normal range. Recorded as 0 points of the item, indicating the central nervous system of the subject with normal performance; 1 Point means moderate abnormality: item marked as 1 point, indicating that the subjects' central nervous system with moderate abnormalities in this aspect of the performance of light, such as adduction muscle angle  $\leq 30^\circ$ ; 2 Points means severe anomalies: 2 points for the item, indicate that the central nervous system in this area is characterized by severe abnormalities such as gaze and tracking reaction. If each dimension of the item is only scored 1 point, then the dimension is rated as 1 point; as long as any dimension is recorded 2 points, this dimension is rated as 2 points.

The final assessment of this study is the extent of the central nervous system development abnormal and the barrier. The criteria of severe defect for central nervous system development is that at least 4 dimensions scored 2 points in 5 groups, and the moderate defects is that the

5 dimensions mostly scored 1 points or only few scored 2 points (no more than 2 items).

The staff to evaluate is a long-term medical practitioner with experience of child care, and all of them must be gave professionally training before assessment. Special staff was responsible for the work to follow-up. The professional medical staff who have obtained intelligence assessment is responsible for the Gesell scale assessment.

### 1.4 Statistical analysis

All data was proceeded by SPSS 13.0 statistical software. Measurement data was showed with the mean  $\pm$  standard deviation, and enumeration data were compared between groups using  $\chi^2$  test.  $P < 0.05$  for the difference indicate statistical significance.

## 2 Results

### 2.1 Test results

84 Cases of children were tested being abnormal from 2 groups of children with 52 neurological examination including 48 cases from screening group, 35 cases with moderate abnormalities and 13 cases with severe abnormalities. 30 Cases from the control group include 19 cases with moderate abnormalities and 11 cases with severe abnormalities. Another 6 cases were transient developmental retardation of motion. The positive rate of screening was 92.85%. The Mental Development Index (MDI) and Exercise Development Index were significantly higher than the control group through early intervention therapy screening. 3 Cases were diagnosed cerebral palsy in screening group 36 months later, the incidence of cerebral palsy was 8.2%; 17 cases diagnosed cerebral palsy in the control group, the incidence of cerebral palsy was 5.6%. The criterion of diagnosis of cerebral palsy was from the National Cerebral Palsy Conference in 2010.

**Table 2.** Comparison of MDI of the two groups of children ( $\bar{x}\pm s$ , score)

Groups	n	12 months	18 months	24 months	30 months	36 months
Screening group	363	92.71±8.36	94.84±7.62	95.93±9.48	96.92±7.13	97.18±9.25
Control group	302	73.39±14.54	74.15±15.82	75.24±16.97	76.71±13.45	77.36±14.67
t value		5.2364	5.8369	6.8693	8.6141	9.0443
P value		<0.05	<0.05	<0.05	<0.05	<0.05

**Table 3.** Comparison of PDI of the two groups of children ( $\bar{x}\pm s$ , score)

Groups	n	12 months	18 months	24 months	30 months	36 months
Screening group	363	70.68±13.58	79.22±13.32	84.61±14.26	88.24±9.33	90.57±9.81
Control group	302	66.24±10.36	66.71±11.58	67.86±11.67	68.43±11.56	69.26±12.82
t value		1.6374	4.6496	6.3797	7.3968	7.4239
P value		>0.05	<0.05	<0.05	<0.05	<0.05

**Table 4.** Compare the prognosis between the two group after 36 months)

Groups	n	Cerebral palsy	Hearing impairment	Language barriers	Cognitive disorders
Screening group	363	3	5	8	4
Control group	302	17	22	34	28
$\chi^2$ value		6.9541	5.3687	4.9633	20.3561
P value		<0.05	<0.05	<0.05	<0.05

## 2.2 Comparison of Gesell scale

See Table 2,3.

## 2.3 Comparison of the prognosis

Compare the prognosis between the two group after 36 months, the screening group are significant better than control group ( $P<0.005$ ). See Table 4.

## 3 Discussion

### 3.1 The necessity for neurological examination

The incidence of premature children and very low weight birth weight infants was significantly high as the development of intensive care and the success rate of neonatal rescue in recent years. Premature children prone to brain damage. In the leading risk factors for cerebral palsy, premature birth is recognized as an independent risk [2], and the smaller the gestational age, the greater the probability of occurrence. About 10% of these children develop to be cerebral palsy, 25% to 50% of the development of mild neurodevelopmental disorders [3]. If the abnormalities of nervous system was not early diagnosed, it will lead to cerebral palsy or irreversible consequence. Therefore, it is imperative for pediatric doctors to choose a kind of early neurological examination for cerebral palsy screening of preterm in-

fants, and conduct early intervention to reduce disability.

Early diagnosis indicate to make a diagnosis within 6 months, and make a diagnosis within 3 months known as ultra-early diagnosis [4]. The development of early symptoms of infantile cerebral palsy is dynamic, and the clinical manifestations are complex but generally with sports development backward or active movement reduction, abnormal reflex, postural abnormalities or muscle tension abnormalities. So how to accurately detect these four aspects of the abnormalities is the key for early diagnosis of cerebral palsy. Screening should be detailed about the birth and gestational age, and track the development of movement and mental, especially to those younger gestational age and lighter weight of the children. To early effective intervene those dysplasia children uesting "52 Neurological examination method" items, and then to avoid the occurrence of disability. In this study, 48 cases were found abnormalities in the screening group, moderate abnormalities in 35 cases, severe abnormalities in 13 cases; moderate abnormalities in 19 cases and severe abnormalities in 11 cases from control group. After rehabilitation, 3 cases were diagnosed being cerebral palsy and 17 cases were diagnosed being cerebral palsy in control group 36 months later, which were helpful for early detection and early intervention. After rehabilitation, the exercise development index and intelligence development index of screening group of abnormal children were significantly higher

than the control group, and the sequelae was significantly reduced.

### 3.2 The feasibility of the neuronography examinations

Majority of parents, and even the part medical workers are not yet aware of the importance of early screening, and for preterm infants, there is no consensus on the method of screening. This study shows that 52 cases of nerve transport dynamic examination can be used to early find out the development of preterm infants with cerebral palsy tendencies, especially birthed in 3 months, 6 months. This method is simple and easy to conduct. Through the system observation, neural development process of preterm children was clear, so as to make objective and accurate judgments, and can be used as early intervention for premature birth. The positive rate of screening was 92.85% in screening group, 3 cases of cerebral palsy were diagnosed, the incidence of cerebral palsy was 8.2%; 17 cases with diagnosis of cerebral palsy in control group, the incidence of cerebral palsy was 5.6%. Screening physicians should be careful to know more about the baby's gestational age, receive an appropriate training to understand the characteristics of infant neurodevelopment well, have a high sense of responsibility for checking, and have an ability to communicate with the baby, so that children cooperate smoothly. The age of month for assessment refer to the corrected one. Screening room should be quiet to avoid

noisy which may disrupt the baby's attention. Screening should be done within about 15min, some abnormal children usually need 2 screening physician to confirm the results. The parents should get a detailed instructions after the the inspection. With the consent of the parents, early intervention should be conducted. If the early screening network can be established, which will play a greater role. But the examination also has limitations, which is not a complete neurological assessment, neither including the assessment of the brain, muscle disease and other factors, nor including the spirit motion detection, and therefore limited to play a role in testing the abnormalities of behaviour, social or mental movements.

### References

- [1] Rosenbaum P. The definition and classification of cerebral palsy. *Dev Med Child Neurol Suppl*, 2007, **109**: 8–14  
<https://doi.org/10.1542/neo.7-11-e569>
- [2] Li XY, Song ZG and Li YF. Clinical characteristics of cerebral palsy in children. *Chinese J Pract Nerv Dis*, 2012, **15**: 13–15
- [3] Kidokoro H, Anderson PJ, Doyle LW, *et al*. Brain injury and altered brain growth in preterm infants: predictors and prognosis. *Pediatrics*, 2014, **134**: e444  
<https://doi.org/10.1542/peds.2013-2336>
- [4] Grisoni CA. Early diagnosis of cerebral palsy in children. *Archivio Italiano Di Pediatria E Puericoltura*, 1967, **25**: 1

## RESEARCH ARTICLE

# The association between augmentation index and arterial stiffness index

Yan Liu<sup>1\*</sup> Litong Qi<sup>2</sup> Ying Yang<sup>2</sup> Lei Meng<sup>2</sup> Baowei Zhang<sup>2</sup> Yong Huo<sup>2</sup>

**Abstract: Objective** To explore the association between arterial system augmentation index(AI) and brachial-ankle pulse wave velocity (baPWV). **Methods** All subjects were selected from a local community. The study included 1752 people living in Shijingshan district, Beijing during April to June, 2010. Subjects whose age ranged from 23 to 90 years old [(59.82±11.88) years old] were included and 56.7% of the subjects were women. Pulse wave at the left radial artery was measured and the AI was calculated by Colin pulse wave detection device HEM9000AI. baPWV and ankle-brachial index (ABI) were measured using Colin noninvasive arteriosclerosis tester VP-1000. Color doppler flow imaging was used to measure intima-media thickness (IMT) of the bilateral carotid artery. **Results** The baPWV was significantly higher in ABI≤0.9 group and IMT≥0.9 mm group, while there was no significant difference of AI<sub>75</sub> between groups. AI had a low correlation with baPWV (r = -0.068, P = 0.005). Partial correlation analysis showed that there was no significant association between AI and baPWV (r = -0.033, P = 0.17). In multiple stepwise regression analysis, the factors of AI included gender, age, BMI, waist-to-hip ratio, heart rate, ABI and systolic pressure. **Conclusion** No significant correlation can be found between AI and baPWV. Various factors may influence the measurement of AI. This study suggests that AI may not be a sensitive and reliable index for the evaluation of arterial stiffness.

**Keywords:** blood vessels; augmentation index (AI); atherosclerosis

Noninvasive method for detecting arterial stiffness to early screen atherosclerosis and cardiovascular risk became the focus of doctors in recent years. Augmentation index (AI) which can be sensitive to the pressure caused by changes in elasticity of large and small arteries wave reflection condition is considered to be a common indicators to evaluate the stiffness of arterial system. The current study shows that AI is independent of cardiovascular events risk factors and can be as an independent predictors of adverse cardiovascular events.<sup>[1-3]</sup> But there are also research result contrary to this conclusion.<sup>[4]</sup> This study was designed to analyze the relation and influencing factors between AI and Brachial-ankle pulse wave velocity (baPWV) which is as the gold standard of arterial stiffness, to explore the meaning of AI as an indicator of arteriosclerosis.

## 1 Objects and methods

### 1.1 General information

A cross-sectional survey of residents from Shougang community in Shijingshan District from April to June in 2010, 1752 persons were selected from the general data with full information including 759 males and 993 females aged 23 to 90 years old, the average age is (59.82±11.88) years. Exclusion criteria: cardiac insufficiency, cardiomyopathy, arrhythmia, valvular disease, arterial occlusive disease and other serious heart vascular disease, or with liver, kidney dysfunction, respiratory failure or with known to suffer from cancer or pregnant women. All selected subjects signed the informed consent.

### 1.2 Methods

A cross-sectional survey was conducted. To collect the subjects information through questionnaires and physical check. Brachial artery blood pressure was measured for three times to get the average value, detect the ECG, extract the venous blood, leave the urine fluid specimens, detect the blood glucose, blood lipids, urinary creatinine and microalbumin and other biochemical index.

Subjects took a check after a quiet rest for 15 minutes. Left radial artery pressure waveform was measured for 30 seconds by Colin HEM-9000 AI detector collec-

Received: July 10, 2017; Accepted: September 6, 2017; Published: October 23, 2017

\* Correspondence to: Yan Liu, Department of Emergency, Yuquan Hospital, Tsinghua University, Beijing 100049, China; Email: 36784645@qq.com

<sup>2</sup> Department of Vasculocardiology, Peking University First Hospital, Beijing 100034, China

Citation: Y. Liu. The association between augmentation index and arterial stiffness index. *Adv Gen Pract Med*, 2017, 1(1): 13–16

Copyright: © 2017 Yan Liu et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



**Table 1.** General information of different age groups

Item	18-40 years	40-50years	50-60years	60-70years	≥70 years
Cases(male/female)	67 ( 26/41 )	275 ( 113/162 )	646 ( 250/396 )	335 ( 155/180 )	429 ( 215/214 )
Age	31.66±5.23	46.75±2.48	55.04±2.71	65.48±3.22	75.36±3.89
BMI ( kg/m <sup>2</sup> )	24.24±4.48	25.21±3.86	25.37±3.55	25.35±3.46	24.97±3.41
Waist-hip ratio	0.83±0.09	0.86±0.07	0.87±0.06	0.88±0.06	0.90±0.06
Fasting glucose ( mmol/L )	4.86±1.40	5.22±1.47	5.54±1.69	5.83±1.71	6.08±2.01
TriglycerideS ( mmol/L )	2.03±2.63	1.84±1.79	1.80±1.55	1.58±0.95	1.68±1.66
Total cholesterol ( mmol/L )	4.55±0.84	4.84±0.80	5.11±0.94	4.97±1.01	5.00±1.04
Low density lipoprotein-cholesterol ( mmol/L )	2.42±0.77	2.79±0.72	2.99±0.85	2.96±0.86	2.92±0.83
Microalbuminuria/Urine creatinine ( g/mol )	8.61±18.33	11.74±28.47	13.65±46.69	16.56±86.61	33.06±163.31

tion, the instrument automatically output AI value, and AI converted to the standard correction value of AI<sub>75</sub> when the heart rate was 75 times / min. The instrument calculates the standard deviation (AI-SD) of the AI, AI-SD control in the range of ±5.6

Application of Colin noninvasive arteriosclerosis analyzer VP-1000 measurement baPWV and ankle-brachial index (ABI), the bilateral carotid artery images were collected by color Doppler ultrasonography measurement of bilateral carotid intima - media thickness (IMT).

According to age, subjects were divided into 5 groups: 18 to 40 years group, 40 to 50 years group, 50 to 60 years group, 60 to 70 years group, and older than 70 years old group. According to baPWV, subjects were divided into baPWV < 1400 cm/s group and baPWV ≥ 1400 cm/s group. According to ABI points, ABI > 0.9 group and ABI ≤ 0.9 group. According to the largest IMT is divided into IMT < 0.9 mm group and IMT ≥ 0.9 mm group.

### 1.3 Statistical methods

Application of SPSS 19.0 statistical software, measurement data were showed by  $\bar{x} \pm s$ , and the comparison between groups using independent samples t test and variance analysis. Data are expressed in terms of rate or percentage, and the comparison between groups is based on the test Pearson correlation analysis and multivariate regression analysis were used.

## 2 Results

### 2.1 Baseline data

Among the 752 selected subjects, 929 (53.0%) subjects with high blood pressure, 385 cases of diabetes (22.0%) and dyslipidemia in 657 cases (37.5%). Baseline data for all age groups are shown in Table 1.

### 2.2 Differences of baPWV and AI<sub>75</sub> among groups

Subjects were grouped by age, gender and baPWV. Compared between baPWV 1400 cm/s group and baPWV < 1400 cm/s group, the difference of AI<sub>75</sub>, are statistically significant except for the male 40 to 49 years group [(74.54±10.80)% in the group of baPWV < 1400 cm/s vs. (79.96±9.83)% in the group of baPWV ≥ 1400 cm/s, P = 0.008]. There was no statistical significant difference of AI<sub>75</sub> between groups in other age and female groups.

Subjects were grouped according to gender, IMT and ABI, comparing ABI > 0.9 group and ABI ≤ 0.9 group, IMT < 0.9 mm group and IMT ≥ 0.9 mm between groups baPWV and AI<sub>75</sub>. The results showed that there was a statistically significant difference between baPWV and IMT and ABI stratification righteousness, and AI<sub>75</sub>. There was no significant difference between the two groups. See Table 2.

### 2.3 Correlation analysis between AI and baPWV

Pearson correlation analysis showed that AI was associated with baPWV (R = -0.068, P = 0.005) in control of age, heart rate, waist to hip ratio, body mass index, systolic and diastolic blood pressure after partial phase. Analysis showed that there was no correlation between AI and baPWV.

### 2.4 AI multiple linear regression analysis

Age, sex, body mass index, waist to hip ratio, heart rate, ABI, baPWV, maximum IMT and systolic blood pressure as independent variables and AI as dependent variable, multiple linear regression analysis was conducted, inclusion criteria and rejection criteria was 0.05 and 0.1 respectively. The results showed that gender, age, physical means number, waist-to-hip ratio, heart

**Table 2.** Comparison of AI<sub>75</sub> and baPMV in groups of gender, ABI and IMT

Item	ABI>0.9	ABI≤0.9	P vale	IMT<0.9 mm	IMT≥0.9 mm	P vale
Male						
AI75 ( % )	77.25±10.98	79.78±11.71	0.18	76.79±10.56	77.72±11.29	0.26
baPWV ( cm/s )	1 670.76±360.99	1 797.68±350.15	0.04	1 646.68±370.20	1 741.84±363.77	0.001
Female						
AI75 ( % )	85.81±9.80	86.10±10.28	0.85	85.74±9.46	85.92±10.27	0.78
baPWV ( cm/s )	1 604.34±381.07	1 749.35±408.29	0.02	1 518.79±346.74	1 724.71±395.76	< 0.001

rate, ABI and systolic blood pressure are impact factors of AI ( $R^2 = 0.62$ ,  $P < 0.001$ ).

### 3 Discussion

AI and pulse wave velocity are commonly used to assess noninvasive detection indicators of arterial stiffness, and can be obtained by the calculation of non-invasive detection equipment through the induction pulse wave waveform. Studies have shown that<sup>[3]</sup> AI elevation suggests early arterial lesions which can predict the risk of adverse cardiovascular events and the risk of death. PWV is a noninvasive index that evaluates arterial stiffness.<sup>[5]</sup> Predict the independent impact factor of cardiovascular event mortality, which has been clinically widely used.<sup>[6]</sup> In theory, AI is affected by PWV, PWV and AI will increase when the reflected wave increases. But actually, AI reflecting the flexibility of the entire arterial system, can not distinguish between aorta and small move pulse, and PWV is mainly reflected in the arterial stiffness, depends on in the arterial lumen diameter and wall elasticity. This study shows that there is no correlation between AI and baPWV after control the factors of age, heart rate, waist and hip than the body mass index, systolic blood pressure and diastolic blood pressure and other indicators.

ABI is a noninvasive index that reflects the elasticity of peripheral arteries and has a high sensitivity and specificity to diagnose peripheral arterial disease. Carotid pulse IMT can be used for early evaluation of atherosclerosis, and it is important to measure cardiovascular events. This study shows that for baPWV, there was a statistically significant difference between ABI and IMT stratification groups, while for AI<sub>75</sub>, the difference between the groups was not statistically significant. Suggesting that AI can not predict ABI and IMT abnormal changes in the assessment of atherosclerosis in terms of no baPWV sensitive, and wick can not be independent as a sensitive and reliable prediction index.

AI have more influential factors, theoretically by the pulse wave propagation speed degree, the distance of the

reflection point and the reflection coefficient,<sup>[7]</sup> so any factors that can influence these AI values, such as age, obesity, dyslipidemia, insulin resistance<sup>[8]</sup> and those may lead to increase vascular stiffness, affecting PWV, and elevating AI finally. The distance between the spot and the reflex coefficient is closely related to the height and the large blood vessel bifurcation point location, and AI value will decrease in persons with tall, obese, large blood vessels bifurcated close heart of the crowd. AI value of female is higher, perhaps because the body short stature and radial diameter of the smaller diameter.<sup>[9]</sup>

The noninvasive detector is calculated by recording the left radial artery waveform AI, and the accuracy of the numerical values of AI may be affected by the method of operation and the subject, such as the instrument probe placed position, angle, the subject hand shaking moving and so on. This measurement was conducted to minimize the impact of human factors by special staff, strictly comply with the operation steps of the instrument and quality control range. In addition, the AI value from no invasive radial artery waveform detector was transferred using a fixed formula conversion AI, and there may be defective, which may lead to conversion of the AI value is not accurate, coupled with the community crowd contains more confounding factors, leading to AI and its arterial elasticity assessment index compared to the lack of sensitivity and reliability. Therefore, at present, AI can not be used as an independent risk indicator to assess the valvular stiffness and arteriosclerosis.

### References

- [1] Weber T, Auer J, O'Rourke MF, (et al). Arterial stiffness, wave reflections, and the risk of coronary artery disease. *Circulation*, 2007, **109**: 184–189  
<https://doi.org/10.1161/01.CIR.0000105767.94169.E3>
- [2] Weber T, Auer J, O'rourke MF, (et al). Increased arterial wave reflections predict severe cardiovascular events in patients undergoing percutaneous coronary interventions. *Chinese J Pract Nerv Dis*, 2012, **26**: 2657–2663  
<https://doi.org/10.1093/eurheartj/ehi504>
- [3] Barnes JN, Nualnim N, Sugawara J, et al. Arterial stiffening, wave reflection, and inflammation in habitually exercising

- systemic lupus erythematosus patients. *Am J Hypertens* , 2011, **24**: 1194–1200  
<https://doi.org/10.1038/ajh.2011.143>
- [4] Hope SA, Antonis P, Adam D, *et al.* Arterial pulse wave velocity but not augmentation index is associated with coronary artery disease extent and severity: implications for arterial transfer function applicability. *J Hypertens* , 2007, **25**: 2105–2109  
<https://doi.org/10.1097/HJH.0b013e3282a9be41>
- [5] Pannier BM, Avolio AP, Hoeks A, *et al.* Methods and devices for measuring arterial compliance in humans. *Am J Hypertens* , 2011, **15**: 743–753  
[https://doi.org/10.1016/S0895-7061\(02\)02962-X](https://doi.org/10.1016/S0895-7061(02)02962-X)
- [6] Koivisto T, Virtanen M, Hutri -Kahonen N, *et al.* Arterial pulse wave velocity in relation to carotid intima-media thickness, brachial flow-mediated dilation and carotid artery distensibility: the Cardiovascular Risk in Young Finns Study and the Health 2000 Survey. *Atherosclerosis* , 2012, **220**: 387–393  
<https://doi.org/10.1016/j.atherosclerosis.2011.08.007>
- [7] Khan AA, Bhatti SN, Khan G, *et al.* Clinical and radiological findings in Arnold Chiari malformation. *J Ayub Med Coll Abbottabad* , 2010, **22**: 75–78
- [8] Yu ZM, Hong K, Bian KJ, *et al.* Hypertensive patients with central arterial reflex enhancement and insulin resistance index . *Hainan Med J*, 2011, **2**: 62–64
- [9] Mitchell GF, Parise H, Benjamin EJ, *et al.* Changes in arterial stiffness and wave reflection with advancing age in healthy men and women: the Framingham Heart Study. *Hypertension* , 2011, **43**: 1239–1245  
<https://doi.org/10.1161/01.HYP.0000128420.01881.aa>