



## Young hypertension: A Case Series

<sup>1</sup>Gayathri Konduri, <sup>2</sup>Lavanya Neerudi, <sup>3</sup>Nanditha Doddikindi, <sup>4</sup>Pallavi Bejjarapu, <sup>5</sup>Ramya Balaprabha

<sup>1,2,3,4</sup> Pharm D intern, Department of Pharm D.CMR College of Pharmacy, Kandlakoya, Hyderabad, India 501401.

<sup>5</sup> Assistant professor, Department of Pharm D. CMR College of Pharmacy, Kandlakoya, Hyderabad, India 501401.

### ABSTRACT

Young hypertension is a global concern. young adult hypertension is a prevalent illness that increases mortality and damages organs.

In order to further minimize cardiovascular illnesses, public health policy should take into consideration the epidemiological research' findings that early life determinants are significant. Strokes in young adults are said to be rare, accounting for 10% to 15% of all stroke cases. Stroke is the primary cause of disability. Recent articles have shown an increase in the incidence of stroke in young adults. Both younger and older age groups have the same modifiable risk factors. The most common risk factors for heart disease in older persons are high blood pressure, heart disease (including atrial fibrillation), and diabetes mellitus. The initial step in treating hypertension in young adults includes changes in lifestyle such as limiting alcohol use, giving up smoking, losing excess weight, engaging in regular cardiovascular activity, and limiting salt intake. ntihypertensive medications such as diuretics (thiazides, chlorthalidone, indapamide), beta blockers, calcium channel blockers, angiotensin converting enzyme inhibitors, and angiotensin receptor blockers are advised. In this case series discussion the age group of patients was 16-23 years. The most common chief complaint during admission was headache followed by vomiting in 2 cases and seizures in 2 cases. 3 out of 4 cases were diagnosed with stroke in which 2 were ischaemic stroke and 1 was a haemorrhagic stroke. Complications developed in case 1 was Stroke, pedal edema, SOB; case 2 was diabetes mellitus and AKI; case 3 was stroke, ; case 4 was haemorrhagic stroke

Keywords: Young hypertension, stroke, cardiovascular illness, diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors.

### Introduction

Hypertension in young has become a serious concern due to its high prevalence and its complications. While cardiovascular complications are more addressed, there are many other complications such as stroke which should be taken more seriously as the recovery rate is shortened. Strokes in young adults are said to be rare, accounting for 10% to 15% of all stroke cases. However, compared to stroke in older adults, stroke in young people has huge economic cost since victims become disabled before their most productive year<sup>1</sup>.

Stroke incidence among young adults has risen, according to recent papers. The main reason for disability is stroke. Young adults do not typically get strokes, according to published research, but in daily clinical practice, we encounter this age group's acute neurologic symptoms, thus stroke should be evaluated as a differential diagnosis. Knowledge gained from research on older patients cannot always be applied to young adults since the nature and etiology of stroke in young adults differ from that in older patients, which has an impact on diagnostic evaluation and treatment<sup>2</sup>.

#### 1.1 RISK FACTORS:

Both younger and older age groups have the same modifiable risk factors. The prevalence of these risk factors is different in these two age groups. Among elderly people, the most prevalent risk factors are hypertension, cardiac disease (including atrial fibrillation), and diabetes mellitus<sup>3</sup>.

On the other hand, among 1,008 young patients with stroke in Finland, dyslipidemia (60%) and smoking (44%), as well as hypertension(39%) , were the most prevalent vascular risk factors<sup>4</sup>.

In the People's Republic of China and New Zealand, studies have shown that young stroke patients frequently had typical vascular risk factors such hypertension, dyslipidemia, and smoking<sup>5</sup>.

#### 1.2 PREVENTION:

Primary prevention seeks to lower the risk of stroke in asymptomatic individuals. It focuses on identifying and managing known vascular risk factors, such as arterial hypertension, disorders of lipid metabolism, and diabetes mellitus, as well as non-drug strategies and lifestyle changes, such as quitting

smoking, limiting alcohol consumption, lowering elevated body weight, increasing regular aerobic physical activity, and consuming a healthy diet with more fruit and vegetables and less salt<sup>6</sup>. Over 50% of stroke episodes occur as a result of hypertension. High blood pressure is associated with the risk of occlusive stroke and recurrent stroke, as well as intracerebral or subarachnoid hemorrhage. Recent clinical trial results show that antihypertensive medication significantly lowers the risk of all types of stroke, as well as stroke-related death and disability<sup>7</sup>.

Diabetes mellitus is not a prevalent risk factor in young adults, but it is two to six times more likely in diabetic patients. Glycemic management lowers micro vascular problems; however there is no proof that it also lowers the risk of stroke in people with diabetes mellitus. Treatment of hyperlipidemia and blood pressure control in younger diabetics should be prioritized, especially in those with additional risk factors. Treatment for younger diabetics should focus on blood pressure control (130/80 mmHg) and treating hyperlipidemia, especially in those with additional risk factors. Another risk factor that needs to be addressed as part of primary prevention in order to reduce total cardiovascular risk is high blood lipid levels. The initial strategy should be therapeutic lifestyle adjustments<sup>8</sup>. Young stroke morbidity and mortality are mostly reduced through prevention; however, there are no precise guidelines.

## Cases Description

### 2.1 Case 1-

A 23-year-old female patient was admitted to the female medical ward with chief complaints of pedal edema for 2 months, shortness of breath for 1 month, heavy menstrual bleeding for 3 months. Her history of past illness revealed that she had an atrial septal defect (ASD) closure 5 years back, chronic hypertension since 7 months, stroke 5 months ago. Past medication history include T.Acitrom 1mg OD, T.Ecosprin 75mg OD, T.Dytor 5mg OD, T.Telma 20mg OD. She had a family history of bypass surgery of coronary artery disease (mother).

On examination pallor+ and was found to be afebrile, BP of 150/90mm of Hg, Spo2 of 98%, pulse rate of 124bpm, chest examination revealed bilateral air entry positive, CVS sounds were heard, respiratory rate of 26 per minute.

Renal function test and liver function test revealed that Blood urea was 21.07mg%, serum creatinine was 0.70mg%, total serum protein of 7.24g%, albumin of 3.23g%. Direct bilirubin of 0.22mg/dl, total bilirubin of 1.16mg/dl, SGOT of 38.6IU/L, SGPT of 14.6 IU/L, ALP of 98.8 IU/L, prothrombin time of 41.0, INR of 3.26. The Complete blood picture was found to be as follows: Haemoglobin- 6.4g/dl, RBC- 2.7cells/mm<sup>3</sup>, WBC- 10000 cells/mm<sup>3</sup>, Platelet- adequate. Serum electrolytes of Na+ of 132meq/l, k+ of 3.5meq/l, cl- of 101meq/l.

ECG shows sinus tachycardia abnormality in high lateral leads, CT scan shows Ischemic infarct in Brain.

Initially she was treated with inj vitamin k 10mg IV OD, Tab Telma 20mg OD, T.ecosprin 75mg OD, inj tranexa 500mg IV SOS, Inj Lasix 40mg IV. On the second day, a metallic clicking sound was heard in the aortic area, and she was diagnosed with hemoptysis. The medications prescribed on the day of admission and on the next day were Inj vitamin k 10mg IV OD, inj tranexa 500mg IV SOS, Inj Lasix 40mg IV, Inj metrogyl 100ml IV TID, Inj augmentin 1.2g IV BD, Tab Telma 20mg OD, Tab ecosprin 75mg OD, Tab lasilactone 20/50 mg OD, Tab multivitamin OD

### 2.2 CASE 2-

In this case, a 20 years female was admitted in General medicine with chief complaints of loss of appetite, giddiness, vomitings- 15 episodes/day since three days followed by generalized body weakness for one week and increased levels of random blood sugar(RBS) – 480mg/dl two days back followed by seizure- like activity – 1 episode. On examination, Blood pressure-180/120mm Hg, Pulse rate-124bpm, SPO2-95% on RA and GRBS- 190mg/dl on the same day at 09:30am GRBS – 300mg/dl. The patient had developed Type1 diabetes mellitus and secondary hypertension 15 days back.

Her lab investigations show the following results: Total RBC-4.37millions/mm<sup>3</sup> normocytic, normochromic, microcytopenia; Hb-11.3gm/dl, WBC- 15.70. thousands cells/mm<sup>3</sup> leucocytosis, Platelets-354 thousands/UL adequate, Blood urea-36mg/dl, poly microbial growth seen, Serum cholesterol- 224mg/dl, Total serum bilirubin- 1.24mg/dl, SGPT-9.3, SGOT-15, Alkaline phosphatase- 85, Sodium- 135mEq/l, Potassium- 3.4 mEq/l, Chloride- 99mEq/l, Triglycerides- 260mg%, HDL-45mg% borederline.

Ultrasonography of abdomen Kidney shows Bulky hypoechoic bilateral kidney. Acute kidney injury minimal ascites, Colour doppler study Bilateral Grade II RPC (Radial peripapillary capillary), ECG: Inferior/lateral T wave abnormality is non-specific, borderline ECG,spot PCR: Spot urine protein- 130mg%, Spot urine creatinine- 25mg%, Protein/ creatinine ratio- 5.2

Initially, on the day of admission, she was treated with Inj. Piptaz 2.25gm IV TID, Inj. HAI according to GRBS TID, T. Nicardia 10mg PO BID, Syp. Citralka 10ml PO TID, Inj. Pan 40 mg IV OD. The same treatment has been continued on the second day. On the third day same treatment has been continued and additionally some drugs were included i.e; T. Atorvas 20mg OD, Inc. Optineuron 1amp in 100ml NS IV OD. On the fourth day same treatment has been continued and further some drugs were included Inj. Lasix 20mg IV BID, T.Enam 2.5mg BID, T. Prazosin 2.5mg OD as it was continued till eight day.

The medications that were administered to the patient were T. Enam 2.5mg BID, T. Nicardia 20mg TID, T. Atorvas 40mg OD HS, Inj. Insulin mixtard 12U BID, T.IFA BID, T. Vitamin C OD, T. Calcium OD

### 2.3 CASE 3-

A 16 year old female patient was admitted with the complaints of fever associated with chills and rigors insidious in onset, associated with headache which is increased in past 3 days (more in frontal region), non-productive cough since 7 days before admission, No SOB, 5 to 6 episodes of projectile vomitings with food particles 3 days ago, 10 TO 15 episodes of GTCS type seizures

On examination, her vitals were Bp- 160/110mm Hg, afebrile, CVS- S1S2 +, pallor +, peripheral pulses +, pupils 5mm reacting to light. Her birth history, family history were normal. The patient has not attained menarche yet. Her height was 142cm, Weight was 28kg and BMI was 13.9 kg /m<sup>2</sup>.

The patient's MRI revealed s/o restricted diffusion in left cerebellar cortex, Edema involving B/L frontal, parietal, subcortical white matter, and B/L cerebellar white matter. Carotid Doppler revealed normal caliber B/L Common carotid artery, External carotid artery, internal carotid artery, vertebral artery. Patient's LFT, RFT were normal except for alkaline phosphatase which had a value of 204.3 U/L on the day of admission, 280.7 U/L on day 7 and 289.3 U/L on day 10[normal range:40 to 150 U/L]. Serum cortisol was 1.873 mcg/dl.[Normal range- 5-23MCG/DL]. Vitamin D3 level was low i.e. 15.29 ng/ml[normal range-25-80 g/ml]. Her USG revealed coarse echotexture of liver, cholelithiasic, hypoplastic uterus. 2D ECHO was normal and ANA was negative. From Day 7, gait instability, surging, hypotonia were present.

Initially, the patient was diagnosed with acute cerebella infarct left side with hypertension [PRES], status epilepticus. Based on the subjective and objective findings, the final diagnosis was acute cerebellar infarct with short stature and delayed puberty.

Her treatment included Inj Paracetamol 1g IV BID, Inj Eptoin[Phenytoin] 100mg IV BID, Inj. Midazolam 2cc in 3cc NS[4mg] SOS IV, Inj ceftriaxone 1g IV BID, Inj pantoprazole 40mg IV OD, Inj. Mannitol 100ml IV TID, Inj. Optineuron 1 amp in 100ml NS IV Tab. Mito Q7 OD, Inj. Ondansetron 4mg IV OD, Tab. Vitamin D3 60K QW (4 weeks), Tab. Vit C OD, Tab. BC OD. Discharge medications included Tab Eptoin 100mg BID, Tab BC OD, Tab Vit C OD, Tab Pantoprazole 40mg OD, Tab. Vit D3 60k QW.

### 2.4 Case 4-

A 42 year old female patient was admitted with the complaints of giddiness, altered sensorium since 10 days, weakness of upper limb and lower limb sudden in onset, diffuse headache. The patient is a known case of hypertensive since 20 years and on medication.

When the physician examined, the patient was unconscious, afebrile, pulse rate- 80/min, BP- 150/80mm HG, CVS- S1S2+. The creatinine value was 3.7 mg/dl, urea level was 234.3mg/dl, sodium was 154 mmol/l.

CT Brain showed Intra-cranial bleed in CINGULATE GYRUS REGION. Initially the treatment was done with Inj. Mannitol 20% IV TID. For hypertension, T. Nifedipine 20mg was prescribed. However, the BP was 250/120mm Hg regardless of the treatment on day 2. From Day 4, the BP was reduced considerably and was maintained at 140/90 mm HG and patient gained consciousness.

The treatment included Inj. Mannitol 20% IV TID, T. Nifedipine 20mg TID, Inj. Pantoprazole 40mg OD, Inj. Zofer 4mg IV, BID. The patient was treated for 10 days and was discharged on day 10 with syp. Glycerol 20% 10ml in a glass of water for 10 days TID, T. Nifedipine 20mg TID, T. Pantoprazole 40mg, OD, Advised for physiotherapy.

### Discussion

Young hypertension is a global concern. The stroke in the young adults has emerged as a growing public health problem in many countries such as US. Increasing strokes in young adults seems to be primarily driven by increase in ischemic stroke, further it includes the prevalence of modifiable risk factors such as hypertension, hyperlipidemia, obesity and smoking<sup>9</sup>. Young hypertension is a common condition which increasing the cause mortality and results in organ damage. The epidemiological studies suggest that the early life factors are important and should be addressed by public health policies to reduce cardiovascular diseases further<sup>10</sup>. Mostly in young hypertension the prevalence of elevated systolic blood pressure is correlated with age, but the individuals have a tendency for developing diastolic hypertension<sup>11</sup>. The primary care in young hypertension case is required and in young adults with hypertension had a slower rate of antihypertensive medication initiation when compared to older adults with hypertension<sup>12</sup>. The first step to be taken in treating of hypertension in young adults includes changes in lifestyle such as limited alcohol consumption, smoking cessation, over weight reduction, regular aerobic exercise, restriction of salt intake. If the blood pressure level remains more than the normal level even after undergoing the life style changes then antihypertensive drugs such as diuretics (thiazides, chlorthalidone, indapamide), beta blockers, calcium channel blockers, angiotensin converting enzyme inhibitors, and angiotensin receptor blockers are recommended either alone or in combination therapies. Angiotensin converting enzyme inhibitors, angiotensin receptor blockers and direct renin inhibitors are strictly contraindicated in pregnant women with hypertension because of severe fetotoxicity mainly in second and third trimesters. Diuretics should be avoided in pregnant women with hypertension because it may decrease the blood flow in the placenta<sup>13</sup>. In this case series, the age group of patients was 16-23 years. The most common chief complaint during admission was headache followed by vomiting in 2 cases and seizures in 2 cases. 3 out of 4 cases were diagnosed with stroke in which 2 were ischemic stroke and 1 was a hemorrhagic stroke. The other patient has developed acute kidney injury and also had past history of diabetes mellitus. 2 out of 4 patients were on antihypertensive medications. On examination, the BP was high in all the patients where the systolic pressure was markedly high compared to diastolic. Pallor is also present in 2 cases. Pulse rate is also remarkably high in 2 cases. ECG was abnormal in 2 cases and CT/MRI revealed infarcts in 2 patients and bleed in one and no abnormality in one.

Treatment included anti-hypertensive in which most commonly used are Angiotensin receptor blockers, Angiotensin converting enzyme inhibitors, Diuretics, calcium channel blockers, anti-epileptics and antiemetics.

Table 1: Case Description				
	Case 1	Case 2	Case 3	Case 4
AGE	23	20	16	42(20 yrs back diagnosed)
COMPLAINTS:				
Headache			✓	✓
vomitings		✓	✓	
seizures		✓	✓	
MEDICATION USAGE IN PAST	✓			✓
BP: Systolic	↑	↑	↑	↑
Diastolic	normal	↑	↑	normal
PR	↑	↑	normal	Normal
PALLOR	✓		✓	
LAB INVESTIGATIONS	Anaemic	Borderline hyperlipidemia	LFT abnormal	Creatinine, BU, Sodium(↑)
ECG	Sinus tachycardia	T wave abnormality	Normal	Normal
MRI/CT	Ischaemic infarct	Normal	Edema, cerebellar infarct	IC bleed
TREATMENT	ARB Diuretics	ACE antihyperlipidemics	Anti epileptics Diuretics	Calcium channel blockers Diuretics
DIAGNOSIS	Anemia with thrombocytopenia		Acute cerebellar infarct, status epilepticus	
COMPLICATIONS	Stroke Pedal edema SOB Menstrual issues	Diabetes mellitus AKI	Stroke Seiures	Hemorrhagic stroke

## Conclusion

Young hypertension is a very serious concern and there needs of further research to find out about its long term complications. Hypertension if diagnosed early can be treated and further complications can be avoided. To effectively target both objectives (hypertension and stroke), it is helpful to understand the pathophysiological mechanisms that cause hypertension in this patient group. It is clear that additional research is required to lessen this burden due to the rising incidence of stroke in young people.

## Acknowledgements

We are grateful to our guide and management for providing us resources necessary for successful completion of this study.

## References

1. Smajlović D. Strokes in young adults: epidemiology and prevention. *Vasc Health Risk Manag.* 2015 Feb 24;11:157-64. doi: 10.2147/VHRM.S53203. PMID: 25750539; PMCID: PMC4348138.
2. Kissela BM, Khoury JC, Alwell K, et al. Age at stroke: temporal trends in stroke incidence in a large, biracial population. *Neurology.* 2012;79:1781-1787
3. Smajlović DŽ, Salihović D, Ibrahimagić OĆ, Sinanović O. Characteristics of stroke in young adults in Tuzla Canton, Bosnia and Herzegovina. *Coll Antropol.* 2013;37:515-519.
4. Putaala J, Metso AJ, Metso TM, et al. Analysis of 1008 consecutive patients aged 15 to 49 with first-ever ischemic stroke: the Helsinki Young Stroke Registry. *Stroke.* 2009;40:1195-1203
5. Wu TY, Kumar A, Wong EH. Young ischaemic stroke in South Auckland: a hospital-based study. *N Z Med J.* 2012;125:47-56.
6. Polívka J, Rohan V, Ševčík P, Polívka J Jr. Personalized approach to primary and secondary prevention of ischemic stroke. *EPMA J.* 2014;5:9.
7. Stone NJ, Robinson J, Lichtenstein AH, et al. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic cardiovascular risk in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation.* 2014;129 Suppl 2:S1-S45.
8. Stone NJ, Robinson J, Lichtenstein AH, et al. 2013 ACC/AHA guideline on the treatment of blood cholesterol to reduce atherosclerotic

---

cardiovascular risk in adults: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;129 Suppl 2:S1–S45.

9. Yahya T, Jilani MH, Khan S, Mszar R, Hassan SZ, Blaha MJ, et al. Stroke in young adults: current trends, opportunities for prevention and pathways forward, *American Journal of Preventive Cardiology*. 2020 September (3).
10. Thomas CH, Zoe HA, Richard PB, Investigation and treatment of high blood pressure in young people, 2019 November 18. Pg no:16-22
11. Pawliczak F, Maciejewski M, Banach M, Treating mild hypertension in young adults: is pharmacotherapy necessary? 2020 February 06, 21(10); pg no: 1115-8.
12. Heather MJ, Carolyn T, antihypertensive medication initiation among young adults with regular primary care use, 2014 February 04, 29(5): pg no: 723-31,
13. Battintoni A, Canichella F, Pignatelli G, Ferrucci A, Hypertension in young people: epidemiology, diagnostic assessment and therapeutic approach, 2015 July . 22(40).