

# Assessment of Important Biochemical Parameters in Urban Hypertensive Adolescents

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## ABSTRACT

The prevalence of Hypertension among youth is increasing and hence its early diagnosis in adolescent population, detection of metabolic defects, and their clinical management are important. Hence, various biochemical parameters including Fasting glucose, LFT, RFT, Electrolytes, Lipid profile, Hs-CRP and Homocysteine) among HT- Adolescents (HT-A) and Control Adolescents (C-A) were assessed. The study revealed decrease (10-20%) in the biochemical parameters viz. ALP, BUN, UA, Calcium, and the Electrolytes of confirmed HT-adolescent subjects of age group 13-18 years, while Hs-CRP (41.3%) and Homocysteine (75.6%) levels were found elevated.

**KEY WORDS:** adolescents, homocysteine, hs-CRP, hypertension

## INTRODUCTION:

Hypertension is fourth most prevalent killer disease in the world<sup>[1,2]</sup>. This is silent killer- disorder by itself and can lead to stroke, renal damage, congestive heart failure and similar disorders. Hypertensives mostly suffer from these complications and organ damage, which initially remains undetected and untreated<sup>[3,4]</sup>. The prevalence of Hypertension in the young Indian population, age group <40 years, is also increasing.

Hence it is important to diagnose these conditions in the early age and to try to reverse the high blood pressure in order to avert damage of the target organs<sup>[4,5]</sup>. The study was focused on the adolescent group.

## MATERIALS AND METHODS:

The study was conducted on confirmed young essential Hypertensives of 13-18 year, not on any antihypertensive medications, attending Hypertension OPD of speciality clinic of General Medicine Department of K.E.M. Hospital, Parel, Mumbai, the

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Tertiary Care Hospital in Mumbai. The population of students of local School from 8th standard to 10th standard and Junior College children studying up-to age 18 years were considered for screening (N=5000). The ethical permission was obtained by the local Institutional Reference Committee (IRC-I) for the study and all other permissions were taken. Their relevant anthropometric data were collected.

The comparative aspects of important biochemical parameters (Fasting glucose, LFT, RFT, Electrolytes, Lipid profile (all on Autoanalyzer), hs-CRP (Nephelometric Method) and Homocysteine (Nephelometric Method) from fasting blood samples of HT- Adolescents as Test group and Normal Adolescents as Control group were studied. The results were statistically analysed (N=10) using Students 't' table.

## RESULTS:

The observations of this study are useful in understanding the trends of studied parameters of Hypertension in the adolescent-groups. The BMI was higher in the Test group (Table 1). This might be due to higher obesity, less physical activity in this group. All members in this group were Male.

The study conducted on confirmed male Hypertensive-Adolescents noted marginal decrease (10-20%) in biochemical parameters viz. Fasting glucose, Total proteins and Albumin contents, the enzymes (Alkaline phosphatase (ALP), Aspartate aminotransferase (AST) and Alanine amino

**Table 1:** Anthropometric parameters in Test and Control Adolescents.

Parameters	Test Group	Control Group	p-value
Weight (Kgs)	52.73+7.80	53.10 + 8.10	N S
Height (Cms)	147.7+ 25.0	150.0+23.	N S
BMI	34.4+2.1	32.4+ 2.5	N S
Blood Pressure			
Systolic (mm of Hg Column)	134+ 16	114 + 4.0	<0.001
Diastolic (mm of Hg Column)	94+ 6	80 +6.0	≤0.001
Pulse	86+10	72+4	≤0.001
Fasting Plasma Sugar (mg%)	105.5+10.5	114 + 20	N S
Total Protein Contents (g%)	6.9+1.2	7.2+0.5	N S
Albumin Contents (g%)	4.6+0.8	5.0 + 0.8	N S
BUN (mg/%)	28.83+4.0	25.0 + 4.7	N S
Creatinine (mg/%)	0.7+0.2	0.6+ 0.2	N S
Uric Acid (mg/%)	3.38+1.7	3.20 + 0.8	N S
Calcium (mg/%)	10.5+0.8	9.9+0.5	N S
Phosphorous (mg/%)	3.9+0.5	3. 6 + 0.7	N S
Alanine Aminotransferase ALT (IU/L)	39.33+ 7.5	35.33 + 6.9	N S
Aspartate Aminotransferase AST (IU/L)	31.43+ 7.0	36.10 +4.0	N S
Alkaline Phosphatase ALP (IU/L)	105+18.0	117.0 + 20.0	N S
Sodium (mEq/l)	133.66	140.50	N S
Potassium(mEq/l)	4.1+0.3	4.5 +0.2	N S
Chloride(mEq/l)	97.6+1.2	100.5 +3.2	N S
Total Cholesterol (mg/%)	180.0 + 18.0	168.0+ 13.0	N S
Triglycerides (mg/%)	135.4+10.3	130.4 + 12.2	N S
HDL-Cholesterol(mg/%)	37.6+6.2	45.5+10.2	N S
LDL-Cholestrerol (mg/%)	129.5+16.7	100.5+ 11.2	N S
VLDL-Cholesterol (mg/%)	33.0 + 11.6	23.0 + 12.8	N S
Total Bilirubin(mg/%)	1.4+0.3	1.4+0.2	N S
Direct Bilirubin(mg/%)	0.6+0.1	0.5+0.2	N S
Homocysteine(mg/%)	23.8+3.4	13.2+2.7	<0.001
Hs-c-Reactive Protein(Hs-CRP)(mg/l%)	14.13+2.1	10.1+2.3	<0.001

transferase (ALT), Blood Urea Nitrogen (BUN), Uric Acid (UA), Creatinine, Calcium, and Electrolytes (Sodium, Potassium and Chloride contents) of confirmed Hypertensive adolescent subjects. These values were within normal range and were statistically insignificant.

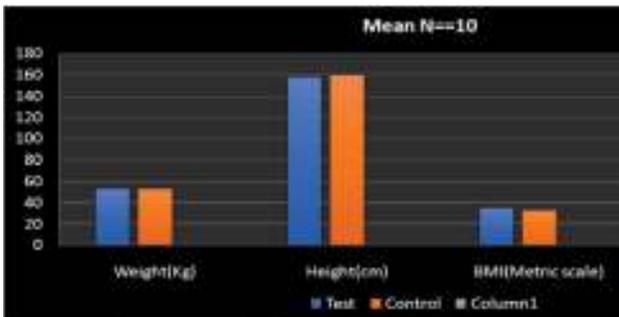
In case of lipid profile, comparative analysis of the Total Cholesterol contents and its other fractions (HDL-C, LDL-C) along with TGs exhibited insignificant decrease in the test group. In fact, the higher values are noticed in respective control groups.

The elevations were observed in hs-CRP (41.3%) and Homocysteine (75.6%) levels in Test groups. It revealed early alterations in the Hypertensive adolescents. These were statistically

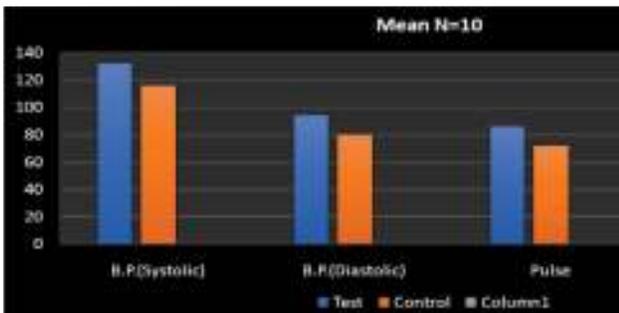
significant in either case. It indicated that Homocysteine and Hs-CRP are the parameters which could be considered as the bio-markers of Hypertension in young hypertensives. Early diagnosis and detection of metabolic defects of Hypertensive patients are crucial. The causes and the metabolic changes in the disorders may be obscure, but later their effects are dangerous and fatal (4,5).

The study included confirmed Hypertension patients between 13 years to 18 years. Homocysteine and hs-CRP are the parameters which can be considered as the biomarkers of Hypertension in young hypertensives, while other routine parameters failed to show any significant alterations. The observations were useful in checking the trends in the adolescent-groups. The BMI was higher in the Test

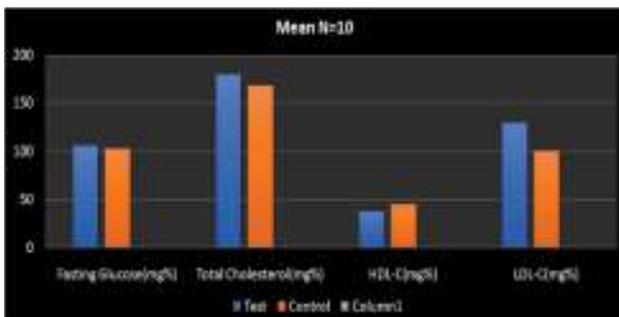
**Graph 1:** Anthropo-physical parameters in HT-Adolescents.



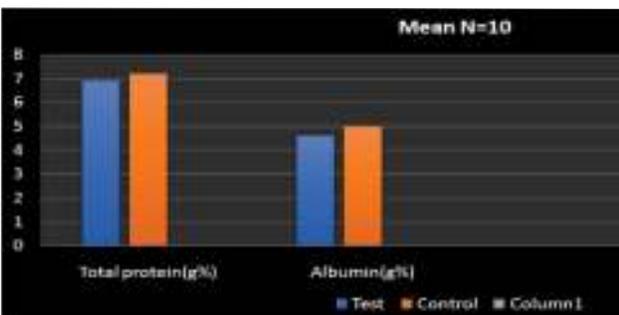
**Graph 2:** B.P. & Pulse of the HT-Adolescents.



**Graph 3:** Important Biochemical Parameters.

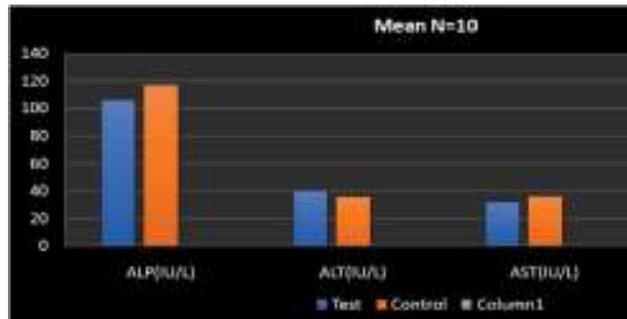


**Graph 4:** Serum Total Protein & Levels of Albumin..

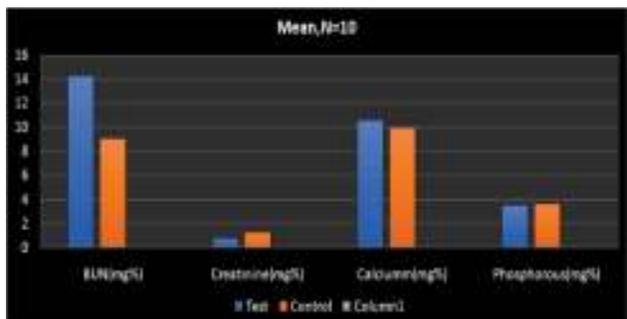


group (Table 1). This might be due to higher obesity, less physical activity in this group, especially in males. It could be associated with stress in the academics like assessment patterns and competitiveness at various levels. Various all India-entrance examinations, their results and selection of career, threat of failure, and

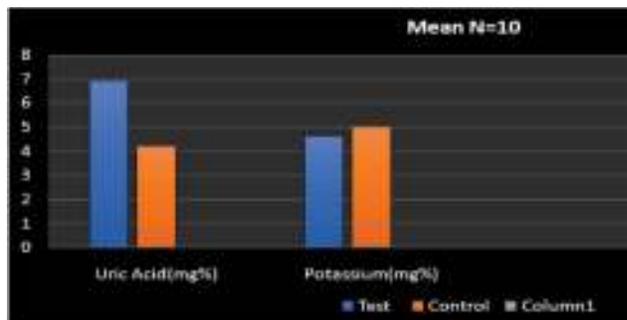
**Graph 5:** Important Enzymes in HT-Adolescents.



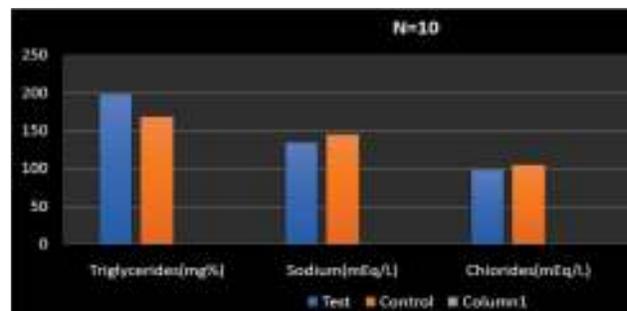
**Graph 6:** Levels of BUN, Serum Creatinine, Calcium, Phosphorous.



**Graph 7:** Levels of Serum uric acid and Potassium.



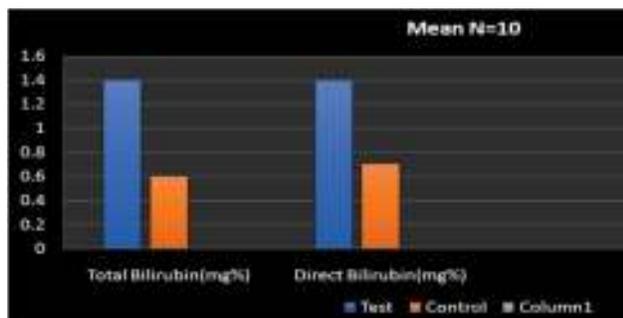
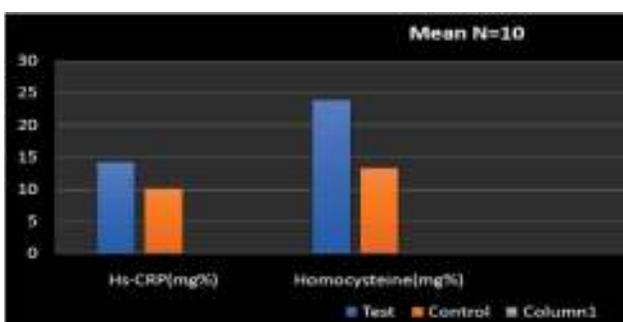
**Graph 8:** Levels of TGs, Sodium and Chlorides.



coping with learning of new professional courses may be influential factors.

**DISCUSSION:**

Around 40% adult population of more than 40

**Graph 9:** Total Bilirubin and Direct Bilirubin in Test & Control groups.**Graph 10:** Hs-CRP and Homocysteine Levels.

years suffer from Hypertension worldwide. Younger population is also vulnerable to Hypertension. Out of 5000 screened adolescents, 10 male adolescents were clinically confirmed as the essential hypertensives (1,2,5-7). The prevalence of 1:500 and only of male population are the facts needed to be confirmed with large data<sup>[3,4]</sup>.

The fasting blood samples of the group were analysed for the important biochemical parameters (Graphs 1,2). The changes in height, weight and BMI were statistically insignificant in the Hypertensive group which might be due to variable and fast growth in this phase of life<sup>[8,9]</sup>. There was 10-20% decrease in the contents of Blood glucose, Total Proteins & Albumin of the Test group (Graphs 3, 4), which were statistically insignificant. Total Cholesterol and its fractions along with TG levels also exhibited insignificant effect in the essential Hypertension group (Graph 3, 8). The hypertension in the Test group could not be correlated to these parameters in early stages. Other researcher could establish such correlation in the adult hypertensives<sup>[7,8,9]</sup>.

In the current study, the liver enzymes, minerals and electrolytes levels were within normal range in early Hypertensives (Graphs 5, 6,7). This indicated metabolic scenario among hypertensives in

the beginning. Later on, with involvement of the other organs, these parameters showed elevated levels which was also discussed by other research scholars<sup>[9,10,11 & 12]</sup>. Significant changes were observed for Homocysteine and Hs-CRP levels (Graph 10). These parameters also formed early markers of adolescent hypertension. This has been confirmed in the studies of the other adult hypertensive cases<sup>[3,13]</sup>. The increased homocysteine contents could be the result of deficiency of Vitamin B12 in this population. In this case it would be worth assessing Vitamin B12 contents and trying supplementation of same in the urban essential hypertensive adolescents<sup>[13,14,15]</sup>.

## CONCLUSION:

This study identified hypertension in urban adolescents although the prevalence is low. There is need to keep regular check -ups for this population as they are subjected to number of stresses in this age-group. The Homocysteine and Hs-CRP profiles from large data would be of great help to confirm and assess the causes of hypertension for this population.

## ACKNOWLEDGMENT:

The authors are thankful to 'The Research Society' of KEM Hospital, Parel, Mumbai-400012 for providing financial support to carry out this Research Project.

## REFERENCES:

1. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Angelantonio ED, et al.: Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertens*. 2014; 32(6): 1170-1177. doi: 10.1097/HJH.000000000000146.
2. Falkner B. Hypertension in Children and Adolescents : Epidemiology and Natural History. *Pediatr Nephrol*: 2010;25: 1219-1224. DOI 10.1007/s00467-009-1200-3
3. Gan S K E, Loh CY, Seet B. Hypertension in young Adults-An Under -Estimated Problem. *Sing Med J*. 2003; 44(9): 448-452.
4. Arya SN. The challenge of Resistant Hypertension -The Way Out Medicine Update, 2015, Book Pub. Chapter34.pp166-170.
5. Joshi SR, Parikh RM. India- Diabetes capital of the World : Now Heading Towards Hypertension. *JAPI*. 2007;55.
6. Shanthirani CS, Pradeepa R, Deepa R, Pemplatha G, Saroja R, mohanv. Prevalence and Risk factors of Hypertension in a selected south Indian population - The Chennai Urban population study. PMID 12693

- 449 [www.biomedcentral.com/1471-2458/3/1](http://www.biomedcentral.com/1471-2458/3/1)
7. Bharucha NE, kurivilla T. Hypertension in the Parsi community of Bombay: a study on prevalence awareness and compliance to treatment. *BMC Public Health*. 2003; 3:1-3.
  8. Chandwani S, Pandor J, Jivarajani P, Jivarajani H. Prevalence and correlates of hypertension among adults in urban of Jamnagar, Gujarat, India- *Electronic Physician*. 2020;2:1-5.
  9. Das SK, Sanyal K, Basu A. Study of Urbancommunity survey in India : Growing trends of high prevalence of hypertension in a developing country. *Int J Med Sci*. 2005; 2.
  10. Tirupati AP. Prevalence and risk factors of hypertension in adults in urban slum., *Pak J physiol*. 2008;4(1).
  11. Serum homocysteine concentrations in patients with hypertension. *Hypertension in the young adult – come feel the pulse. Singa Med J*. 2000;41(5):235-238.
  12. Hsu LF, Sin Fai Lam KN, Rajasoorya C, Che LS. Hypertension in the young adult – come feel the pulse. *Hypertension. Singpaure Med J*. 2000;41(5):235-8.
  13. Dar MS, Pandith AA, Sameer AS, Sultan M, Yousuf A, Mudassar S. Hs-crp: a potentioal markar for hypertension in kashmiri population). *Indian J Clin Biochem*. 2010;25(2):208-212.
  14. Ridkar PM, Stampfer MJ, Rifai N. Noval risk factors for systemic atherosclerosis: a comparison of C-reactive protein, fibrinogen, homocystine, lipoprotein (a) and standard cholesterol screening as predictors of peripheral arterial disease. *JAMA*. 2001;285:2481-5.
  15. Llanes MG, Nóbrega YG, González EC, Rodríguez EG, Sáez JG, Camacho MCL. Biochemical Markers and Hypertension in Children. *MEDICC Review*. 2019;21(2–3).10-15.

Cite this article as: Shinde U, Chaudhari S, Salagre S. Prevalence of Potentially Malignant Disorders of the Oral Cavity in Bhopal. *PJSR*;2020;13(1):15-19.  
Source of Support : Nil, Conflict of Interest: None declared.