


MEASUREMENT OF BLOOD PRESSURE AND BMI AMONG OVERWEIGHT, UNDERWEIGHT AND NORMAL WEIGHT MEDICAL STUDENTS OF AMU ALIGARH, U.P, INDIA: A CROSS SECTIONAL STUDY

SM Safdar Ashraf¹✉, Mohd Usman²✉ , Abdul Aziz Khan³✉, Mohd Akram⁴✉, M Aslam⁵✉

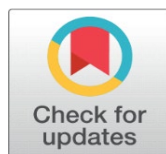
¹ Professor, Department of Tahaffuzi wa Samaji Tib, Aligarh Muslim University, Aligarh, Uttar Pradesh, India

² Assistant Professor, Department of Tahaffuzi wa Samaji Tib, School of Unani Medical Education and Research, Jamia Hamdard, New Delhi, India

³ Assistant Professor, Department of Tahaffuzi wa Samaji Tib, Aligarh Muslim University, Aligarh, Uttar Pradesh, India

⁴ Professor, Department of Tahaffuzi wa Samaji Tib, School of Unani Medical Education and Research, Jamia Hamdard, New Delhi, India

⁵ Ex-Assistant Professor, Department of Tahaffuzi wa Samaji Tib, Aligarh Muslim University, Aligarh, Uttar Pradesh, India



Received 29 June 2023
Accepted 31 July 2023
Published 15 August 2023

Corresponding Author

Mohd Usman,
mousman2010@gmail.com

DOI
[10.29121/granthaalayah.v11.i7.2023.5115](https://doi.org/10.29121/granthaalayah.v11.i7.2023.5115)

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Copyright: © 2023 The Author(s). This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

With the license CC-BY, authors retain the copyright, allowing anyone to download, reuse, re-print, modify, distribute, and/or copy their contribution. The work must be properly attributed to its author.

ABSTRACT

Background: Hypertension is known as a silent killer. Early detection is the key to successful management and treatment of hypertension. In maximum studies, higher BMI has been associated with an increased risk of elevated blood pressure. Weight-related problems have been detected in various university students in earlier studies. The medical students were found to be at a higher risk due to their sedentary lifestyle and other factors. The present study was undertaken to measure the blood pressure and BMI of undergraduate medical students and to detect the correlation between them.

Methods: 230 undergraduate Unani medical students were enrolled in the current study, and their information was evaluated. The subsequent variables were measured: height (m), weight (kg), and BMI (kg/m²).

Results: 68 males and 82 females had normal BMIs of 22.29 ± 2.03 and 21.50 ± 1.97 kg/m², respectively ($p = 0.001$). 13.04% and 21.73% of participants were found to be overweight and underweight, respectively. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) of subjects in the normal weight category were determined to be $120.13 \pm 7.53/79.71 \pm 4.17$ respectively in males and $112.80 \pm 5.76/75.54 \pm 5.34$ females ($p = 0.05$). Students were found to be normotensive, pre-hypertensive, and hypertensive in males 66.66%, 27.77%, and 5.55% and 75.71%, 21.42% and 2.85% of female cases, respectively. Both in males and females, a significant positive correlation of BMI was discovered with SBP and DBP. **In the current survey, a higher percentage of men (5.55%) were determined to be obese as compared to women (2.85%).**

Conclusion: There are weight-related concerns and associated complications like elevated blood pressure in medical students having elevated levels of BMI.

Keywords: Blood Pressure, Malnutrition, Stress, BMI



1. INTRODUCTION

Hypertension is known to be a silent killer. It can be characterised as having a systolic blood pressure (SBP) of at least 140 mmHg, a diastolic blood pressure (DBP) of at least 90 mmHg, or a condition needing the use of antihypertensive medication. In India, 57% of all stroke deaths and 24% of all deaths from coronary heart disease are directly attributable to hypertension. [Rodgers et al. \(2000\)](#)

In the history of Unani Medicine Hakeem Ajmal Khan was the pioneer researcher who worked on Asrawl (*Rauwolfia serpentina*) and highlighted the role of 'Ajmaline' and 'Serpentine' in the treatment and management of hypertension. In the Unani system of Medicine, the concept of hypertension is described as *Imtila bi Hasbil Auiya*. It is supposed to be due to *Sue-e-Mijaz damwi* and comes under the heading of *Imtila*.

According to Unani renowned physicians, *Yabusat e Mijaz* (dryness) leads to the hardening of *Urooqe damviya* (blood vessels) and narrowing of lumen of blood vessels. These changes may further develop as arteriosclerosis and atherosclerosis. The possible mechanism of infiltration in arteries may be due to an excess of blood from undigested foods which is more likely to change into putrid material. This material leads to thrombus formation or occlusion in coronary artery. The localized excess of blood that has accumulated in the veins can harm the overloaded vessels. During this sickness the blood can leak from the veins into the arteries. The flow of pneuma, or vital spirit, which was intended to be dispersed by arteries, would be hindered at this stage of saturation, which might result in coronary artery occlusion and possibly induce a heart attack.

In this perspective Unani physician's always emphasis on the Asbabe Sitta Zarooriya (Six essentials to keep body healthy) among them the food and drinks come on the second order which focused on the dietary modification for cardiac care especially advised to take such diet which makes the blood thin and less viscus to overcome such blockage.

Due to lifestyle modification and higher trends of junk food consumption containing fat, young boys and girls are becoming more prone to develop prehypertension and hypertension. In this regard several journals have reviewed trends of prevalence of hypertension in India. [Gupta et al. \(1996\)](#), [Gupta \(1999\)](#) Urban population, sedentary lifestyles, and higher levels of stress have been identified as key contributing factors. This suggests that the interactions between the environment and genes may be a cause of hypertension, [Gupta et al. \(1996\)](#), [Yusuf et al. \(2001\)](#) This raises the risk of numerous cardiovascular diseases. Early identification of hypertension and associated risk factors may consequently prevent cardiovascular issues in later life. [Ghadhban & Habib \(2011\)](#) It has been demonstrated by numerous studies that obese people were five times more likely to develop hypertension as compare to normal weight individuals. [Ranjani et al. \(2016\)](#)

There are a lot of other factors, which might be responsible for hypertension in teenagers and weight fluctuations such as stress, missing breakfast, and peer pressure. Similarly, more than normal BMI was found in 18.07% of males and 14.42% of females in a study by [Saeed et al. \(2013\)](#).

It has been detected that adipose tissue and the basal metabolic index are correlated. As per the recent studies, a higher BMI is always associated with an enhanced level of adipose tissue. Additional variables that may be elevated include

leptin and angiotensinogen, which are significant risk factors for cardiovascular diseases, including hypertension. [Saeed et al. \(2013\)](#), [Atanasova et al. \(2014\)](#), [Sb et al. \(2010\)](#) Although BMI cannot directly assess body fat, but it is linked with direct measurements of body fat.

In a study conducted by Atanasova et al., it was revealed that men were more likely to be overweight or underweight than women, with 16.7% of men and 9.5% of women being overweight or underweight. In their study, [Sb et al. \(2010\)](#) discovered that 31.73% of women and 29.52% of men had BMI which was less than normal values. [Atanasova et al. \(2014\)](#)

The current study was therefore done to measure blood pressure in various BMI categories and the association between the two was established considering the rising trends of weight-related concerns among university students. The study was also conducted with the understanding that pre-hypertension puts pupils at a higher risk for developing hypertension since it is like the tip of an iceberg. It takes hours to teach medical students about dietary changes and lifestyle changes that can prevent disease.

2. METHODOLOGY

The Department of Tahaffuzi wa Samaji Tib, AKTC, Aligarh Muslim University, Aligarh, Uttar Pradesh, India, commenced this cross-sectional study, which was carried out in the Ajmal Khan Tibbiya College Hospital during one year period. In this study, information from 230 undergraduate Unani medical students was evaluated. The following variables were measured: height (m), weight (kg), and BMI (kg/m²). The classification as per BMI was as follows: Normal: 18.5 to 24.9, underweight: BMI < 18.5 kg/m², and overweight: 25 kg/m² > BMI ≥ 23.0 kg/m², [Sb et al. \(2010\)](#)

Using a mercury sphygmomanometer and adhering to the established protocol and safety precautions, blood pressure (both systolic and diastolic) was measured. Based on the results, the subjects were categorized as normotensive (120/ 80 mmHg), pre-hypertensive (120-139/ 80-89 mmHg), and hypertensive (> 140/ > 90 mmHg). [Igho \(2015\)](#)

3. STATISTICAL ANALYSIS

SPSS was used to analyse the data, which was reported as mean ± SD. Chi-square test was used to analyse the non-parametric data. Systolic and diastolic blood pressures were compared between BMI groups using the unpaired t-test and ANOVA (normal, underweight, and overweight groups). Using Pearson's correlation, BMI was correlated with SBP and DBP in both overweight and underweight participants. P values below 0.05 were considered statistically significant.

4. RESULTS

68 males and 82 females had BMIs of 22.29 ± 2.03 and 21.50 ± 1.97 kg/m², respectively (p = 0.001) ([Table 1](#)). 17.39% of subjects were found to be underweight and 13.04% were found to be overweight ([Table 2](#)). SBP and DBP of subjects in the normal weight category were determined to be 120.13 ± 7.53/ 79.71 ± 4.17 and 112.80 ± 5.76/ 75.54 ± 5.34 mmHg, in males and females respectively (p = 0.05) ([Table 3](#)). Students were found to be normotensive, pre-hypertensive, and hypertensive in 66.66%, 27.77%, and 5.55% of cases, respectively ([Table 4](#)). Both in males and

females, a significant positive connection of BMI was discovered with SBP and DBP (Table 5).

Table 1

Table 1 BMI Status of Males (n = 90) and Females (n = 140)

BMI	Males		Females	
	Number (%)	BMI (kg/m ²)	Number (%)	BMI (kg/m ²)
Normal	68 (75.0)	22.29 ± 2.03	82 (58.57)	21.50 ± 1.97
Underweight	10 (12.0)	18.09 ± 0.26	40 (28.57)	17.96 ± 0.43
Overweight	12 (13.0)	26.78 ± 1.50	18 (12.85)	26.65 ± 1.76

Overall, in 68 males and 82 females, BMI was found to be 22.29 ± 2.03 and 21.50 ± 1.97 kg/m² respectively. The value was considered significant at p < 0.001.

Table 2

Table 2 Distribution of Subjects as per their Weight

BMI	Number	Percentage
Normal	150	65.21
Underweight	50	21.73
Overweight	30	13.04

In our study 21.73% students were underweight,13.04% were overweight and 65.21% were normal weight.

Table 3

Table 3 SBP and DBP in various Categories of BMI in Males and Females

BMI	Males		Females	
	SBP (mmHg)	DBP (mmHg)	SBP (mmHg)	DBP (mmHg)
Normal	120.13 ± 7.53	79.71 ± 4.17	112.80 ± 5.76	75.54 ± 5.34
Underweight	106.00 ± 3.84	74.57 ± 3.63	101.35 ± 4.40	70.80 ± 3.03
Overweight	132.28 ± 5.15	83.14 ± 5.31	125.64 ± 2.80	81.09 ± 3.72

Overall SBP and DBP in males and females were 120.54 ± 7.53/ 79.71 ± 4.17 and 112.80 ± 5.76/75.54 ± 5.34 mmHg respectively. SBP and DBP difference was significant at p < 0.001.

Table 4

Table 4 Distribution of Subjects as per Normo, Pre- and Hypertensive Males and Females

Category	Males		Females	
	n	%	n	%
Normotensive	60	66.66	106	75.71
Pre- hypertensive	25	27.77	30	21.42
Hypertensive	5	5.55	4	2.85

Overall, 166 (72.17%), 55 (23.91%) and 9 (3.91%) subjects were found to be normo, pre- and hypertensive respectively. In the current survey, a higher percentage of men (5.55%) were determined to be obese as compared to women (2.85%).

Table 5

Table 5 Correlation of BMI with SBP and DBP among Study Subjects				
Parameters	Male		Female	
	R	P	R	P
SBP	0.405	0.01	0.702	0.01
DBP	0.375	0.01	0.597	0.01

A significant positive correlation of BMI was seen with SBP and DBP among males and females. (R is called correlation coefficient & P is known as Predictive value)

5. DISCUSSION

The BMI calculation provides a measure of the thickness or thinness of an individual. It provides information on the underweight and overweight status despite being a simple tool. Being overweight or underweight can increase the risk of developing certain ailments. Underweight people are more frequently associated to impaired immunity, delayed puberty, osteoporosis, anaemia, and psychological disorders. [James et al. \(2014\)](#) Conversely, being overweight increases the risk of developing diabetes, cardiovascular disease, and pulmonary, chronic renal, musculoskeletal, GIT, hepatic, psychological, and low-functioning issues. [Kutty et al. \(2015\)](#) 17.39% and 13.04% of the 230 students in the current study were determined to be underweight and overweight, respectively.

Afzal et al. detected that 9.4% of 149 medical students were overweight and 28.9% were underweight. [Chan & Woo \(2010\)](#) In a study conducted by [Sarkar et al. \(2015\)](#) the prevalence of underweight and overweight subjects was observed to be 16.5% and 15.2%, respectively. [Afzal et al. \(2015\)](#) The higher percentage of underweight subjects can be attributed to the higher percentage of underweight females in the present study, which was 28.57% (40/140), There was a higher percentage of female underweight subjects in a study by [Rodgers et al. \(2000\)](#)

In the current survey, a higher percentage of men (5.55%) were determined to be obese as compared to women (2.85%). [Sheikh et al.](#) reported a low prevalence of obesity among women. [Kumar et al. \(2016\)](#) In a study by [Hamid et al.](#), it was discovered that females were twice as likely to be overweight as compared to males. [Sheikh et al. \(2014\)](#) The findings of the current study are contrary to the studies described above. Several factors, including the study's higher sample size and females' greater awareness of health than males, may account for the variations in the results.

Another intriguing claim that is worth acknowledging is that since the outing regulations for men are frequently harsher than those for women, more men tend to consume fast food and junk food. There has been evidence of a relationship between junk food and BMI. [Hamid et al. \(2015\)](#) According to a study by [Manojan et al.](#), people who adopted unhealthy lifestyles and indulged in fried and fast food had a high prevalence of obesity. [Shah et al. \(2014\)](#) According to Unani scholars, males with *Suemizaj damavi* and *Nabze mumtali* are more susceptible to diseases. Additionally, the current analysis contradicts studies that found no variations in weight or height as per gender.

It's interesting how genetics, especially in boys, can account for differences in weight, height, and BMI. On the other hand, environmental influences are quite important for girls. Socioeconomic position, parenting methods, how parents model

their own eating habits and lifestyles, conditions in which people eat at home, at school, and in the community, as well as the characteristics of the neighbourhoods, all play significant roles. Thus, the BMI is influenced by a combination of heredity and environment. [Yadav et al. \(2016\)](#)

In addition to genetics, the weight-issue medical students are facing may also be ascribed to the ever-increasing difficulties brought on by intense competition. The stress of the academic load is also significant along with another factor. In this scenario time management may play an important role to reduce both concerns.

Our study's findings are concordant with past studies in which more men were found to have hypertension and BMI positively associated. [Dubois et al. \(2012\)](#), [Manchukonda & Srivastava \(2015\)](#) SBP and DBP fell higher into the overweight BMI group in the current study. With a high BMI, SBP and DBP frequently increase. [Das et al. \(2013\)](#) In our study, both males and females had favourable correlations between BMI and SBP and DBP. There was a higher blood pressure in overweight students. Our study's findings are consistent with those of other studies that have shown a connection between BMI and blood pressure. [Trivedi & Anand \(2014\)](#), [Tesfaye et al. \(2007\)](#) The findings could be explained by the correlation between rising BMI and rising sympathetic nervous system activity, endothelial dysfunction, and cytokine levels. [Purohit et al. \(2015\)](#)

In our research analysis of the medical students in Aligarh Muslim University routine exercise, eating habits, and stress levels could improve the findings of our study. The study must be done on a bigger scale and with the incorporation of more variables that affect weight and blood pressure. [Goud et al. \(2016\)](#)

6. CONCLUSION

The study's findings suggest that medical undergraduate students have issues with their weight, BMI and both systolic and diastolic blood pressure have a favourable correlation. Medical students should be made aware of the health risks associated with obesity as soon as they enrol in medical school. Since the foundation for a better and more resilient India will be laid by healthy doctors. A routine examination for vulnerable group should be emphasized. According to the Unani physicians, proper diet and exercise should be advised and emphasis must be given to avoiding junk and fast food to prevent heart problems due to obesity. Early intervention should be required to avoid heart complications. Unani medicines like lehsun along with the bark of Terminalia arjuna will be helpful for the purpose.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

None.

REFERENCES

- [Afzal, M., Rizvi, F., & Rajput, A. M. \(2015\). Categories of Overweight and Underweight Students According to Body Mass Index in a Private Medical College. J. Islamabad med Dent Coll., 4\(1\), 27-30.](#)

- Ahmad, S. I. (1980). Introduction to Al Umur Al Tabiya principles of human physiology in Tibb (1st ed). Pahari Dhiraj 31, 49, 76, 77, 99-100, 222, 223. Saini Printer.
- Atanasova, V., Gatseva, P., Bivolarska, A., & Fronas, G. (2014). Body Mass Index And Food Frequency Intake Of Foreign Medical Students. *Trakia Journal of Sciences*, 12(1), 367-370.
- Chan, R. S., & Woo, J. (2010). Prevention of Overweight and Obesity : How Effective is the Current Public Health Approach. *International Journal of Environmental Research and Public Health*, 7(3), 765-783. <https://doi.org/10.3390/ijerph7030765>.
- Das, P., Basu, M., Chowdhury, K., Mallik, S., Dhar, G., & Biswas, A. (2013). Observational Assessment and Correlates to Blood Pressure of Future Physicians of Bengal. *Nigerian Journal of Clinical Practice*, 16(4), 433-438. <https://doi.org/10.4103/1119-3077.116884>.
- Dubois, L., Ohm Kyvik, K. O., Girard, M., Tatone-Tokuda, F., Pérusse, D., Hjelmberg, J., Skytthe, A., Rasmussen, F., Wright, M. J., Lichtenstein, P., & Martin, N. G. (2012). Genetic and Environmental Contributions to Weight, Height, and BMI from Birth to 19 Years of Age : An International Study of Over 12,000 Twin Pairs. *PLOS ONE*, 7(2). <https://doi.org/10.1371/journal.pone.0030153>.
- Ghadhban, A. F., & Habib, O. S. (2011). A Study on the Distribution of Blood Pressure Measurements Among University Students. *The Medical Journal of Basrah University*, 29(1), 43-50. <https://doi.org/10.33762/mjbu.2011.49482>.
- Goud, K. A., Kothapalli, J., Pyadala, N., Borugadda, R., & Rani, S. N. (2016). Assessment of Correlation Between Body Mass Index (BMI) and Blood Pressure (bp) Indices in Medical Students. *International Journal of Current Research*, 8(3), 28537-28541.
- Gupta, R. (1999). Hypertension in India - Definition, Prevalence and Evaluation. *Journal of the Indian Medical Association*, 97(3), 74-80. <https://doi.org/10.1001/jama.281.8.736>.
- Gupta, R., Al-Odat, N. A., & Gupta, V. P. (1996). Hypertension Epidemiology in India : Meta-Analysis of 50 Year Prevalence Rates and Blood Pressure Trends. *Journal of Human Hypertension*, 10(7), 465-472.
- Hamid, S., Rashid, A., & Najeeb, Q. (2015). Estimation of Body Mass Index (BMI) in First Year Medical Students of SKIMS Medical College, Bemina. *International Journal of Science and Research*, 4(1), 2654-2657.
- Igho, O. E. (2015). The Effect of Body Mass Index and Waist Circumference on Blood Pressure. *Br J Med Med Res*, 5(4), 466-471. <https://doi.org/10.9734/BJMMR/2015/9663>.
- James, P. A., Oparil, S., Carter, B. L., Cushman, W. C., Dennison-Himmelfarb, C., Handler, J., Lackland, D. T., LeFevre, M. L., MacKenzie, T. D., Ogedegbe, O., Smith, Jr., S. C., Svetkey, L. P., Taler, S. J., Townsend, R. R., Wright, Jr., J. T., Narva, A. S., & Ortiz, E. (2014, February 5). 2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8). *JAMA*, 311(5), 507-520. <https://doi.org/10.1001/jama.2013.284427>.
- Kumar, A., Midha, T., Nigam, S., Kaur, S., & Gupta, S. (2016). Correlates of BMI Among Medical Graduates in Kanpur. *Journal of Preventive Medicine and Holistic Health*, 2(2), 51-53. <https://doi.org/10.18231/2454-6712.2016.0006>.
- Kutty, N. A., Ru, T. Y., Chiang, V. H., & Zhi, W. Y. (2015). Association of Dietary Habits and Body Mass Index Among University Students in Malaysia : A Cross-Sectional Study. *IOSR Journal of Nursing and Health Science*, 4(5), 78-85.

- Manchukonda, R., & Srivastava, A. (2015). Estimation of Body Mass Index and Risk Evaluation of Diabetes and Cardiovascular Diseases In Undergraduate Students. *International Journal of Research in Medical Sciences*, 3(9), 2410-2418. <https://doi.org/10.18203/2320-6012.ijrms20150640>.
- Manojan, K., Benny, P., & Bindu, A. (2019). Prevalence of Obesity and Overweight among Medical Students based on New Asia-Pacific BMI Guideline. *Kerala Médical Journal*, 12(1), 13-15.
- Purohit, G., Shah, T., & Harsoda, J. M. (2015). Prevalence of Obesity in Medical Students and its Correlation with Cardiovascular Risk Factors: Emergency Alarm for Today? *Kathmandu University Medical Journal (KUMJ)*, 13(52), 341-345. <https://doi.org/10.3126/kumj.v13i4.16834>.
- Ranjani, H., Mehreen, T. S., Pradeepa, R., Anjana, R. M., Garg, R., Anand, K., & Mohan, V. (2016). Epidemiology of Childhood Overweight and Obesity in India : A Systematic Review. *Indian Journal of Medical Research*, 143(2), 160-174. <https://doi.org/10.4103/0971-5916.180203>.
- Rodgers, A., Lawes, C., & MacMahon, S. (2000). Reducing the Global Burden of Blood Pressure-Related Cardiovascular Disease. *Journal of Hypertension. Supplément*, 18(1), S3-S6.
- Saeed, S., Ali, A., Khawaja, R., Sheikh, I. A., Shah, I., Mustufa, M. W., & Mustafa, M. (2013). Relationship Between BMI and Blood Pressure Among Students of 3rd Year at Institute of Medical Technology (DUHS). *Médical Channel*, 19(4), 5-8.
- Sarkar, P., Mahadeva, S. K., Raghunath, H., & Kruthi, B. N. (2015). A Cross Sectional Study to Determine Overweight and Obesity Among Medical Students and to Correlate it With Parameters of Metabolic Syndrome. *International Journal of Clinical Biochemistry and Research*, 2(4), 210-215.
- Sb, S., Rk, D., Sm, M., Sa, A., & Vb, Y. (2010). Nutritional Assessment of Medical Students. *International Journal of Medical and Clinical Research*, 1(2), 6-10.
- Shah, T., Purohit, G., Nair, S. P., Patel, B., Rawal, Y., & Shah, R. M. (2014). Assessment of Obesity, Overweight and its Association With the Fast Food Consumption in Medical Students. *Journal of Clinical and Diagnostic Research*, 8(5), CC05-CC07. <https://doi.org/10.7860/JCDR/2014/7908.4351>.
- Sheikh, N. H., Haider, A., Khan, F. F., Khan, F. S., & Humayun, A. (2014). Body Mass Index and its Associated Factors in Young Medical Students. *Biomedica*, 30(4), 284-288.
- Tesfaye, F., Nawi, N. G., Van Minh, H. V., Byass, P., Berhane, Y., Bonita, R., & Wall, S. (2007). Association Between Body Mass Index and Blood Pressure Across Three Populations in Africa and Asia. *Journal of Human Hypertension*, 21(1), 28-37. <https://doi.org/10.1038/sj.jhh.1002104>.
- Trivedi, R. S., & Anand, A. K. (2014). The Study of Correlation Between Body Composition and Various Cardiovascular Parameters. *International Journal of Biomedical and Advance Research*, 5(8), 367-368. <https://doi.org/10.7439/ijbar.v5i8.843>.
- Yadav, S. S., Saini, P., Khan, Z. A., Bachloo, T., Kumar, R., & Singh, J. (2016). Assessment of Body Mass Index Among Undergraduate Medical Students-A Cross Sectional Study from the Medical College of Haryana. *International Journal of Medical Science and Public Health*, 5(4), 705-708. <https://doi.org/10.5455/ijmsph.2016.01092015116>.
- Yusuf, S., Reddy, S., Ounpuu, S., & Anand, S. (2001). Global Burden of Cardiovascular Diseases : Part I : General Considerations, The Epidemiologic Transition, Risk Factors, and Impact of Urbanization. *Circulation*, 104(22), 2746-2753.