

Effect of Posture on Pulse Rate in Obese Young Adults of Bharuch City**Hardikkumar A. Mistry¹, Anita Jain², Swati Mahajan³, Narendra Pathak⁴**¹Associate Professor, Department of Physiology, Dr. Kiran C. Patel Medical College & Research Institute Bharuch, Gujarat, India²Associate Professor, Department of Physiology, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan³Associate Professor, Department of Physiology, GMERS Medical College, Panchmahal, Godhra, Gujarat, India⁴Professor & Head, Department of Physiology, Dr. Kiran C. Patel Medical College & Research Institute Bharuch, Gujarat, India

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Abstract:**Introduction:** Obesity is a major health burden as more than 3 million adults die worldwide. Body Mass Index (BMI) is an easy tool to classify person in normal to obese categories. Obesity leads to development of autonomic dysfunctions and alters pulse rate on changing posture of our body. This study compare and asses effect of posture on pulse rate in normal and obese young adults.**Materials & Methods:** This study involved 30 healthy male and female participants with BMI 18.5 – 24.9 as Normal, and 30 healthy male and female participants with BMI > 30 as obese. All participants were young adults from 18 to 25 years of age. Detailed history were recorded and Pulse rate (PR) measured for 1 minute after 5 minutes of rest in supine position first. Followed by immediate measurement of PR on change of sitting and standing positions. Data were collected and analysed.**Results:** We found increased PR on change in posture from supine to sitting to standing in both normal and obese participants. Additionally, significantly high PR in obese participants as compare to normal participants in sitting position. In supine position, Obese had significantly high PR than normal participants.**Conclusion:** We concluded that high PR in obese is due to imbalance in autonomic activity that leads to decreased parasympathetic activity. Hence they are at higher risk of developing cardiovascular disease in the future.**Keywords:** BMI, Pulse Rate.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Worldwide, obesity is increasing due to change in modern lifestyle and food patters. It is a major health burden as more than 3 million adults die across the globe. [1,2] Body Mass Index (BMI) is calculated by the Quetelet's Index and it is used to classify an individual from normal to obese. [3] Furthermore, obesity is one of the main risk factor for the development of non-communicable disease like hypertension, hyperlipidemia, diabetes etc [2,4] It leads to development of autonomic dysfunction that alters PR in different positions of our body. Previous studies have reported high heart rates at rest to be predictive of the future manifestation of development of hypertension and cardiovascular disease (CVD) in future. Furthermore, they have shown strong positive relationship of postural instability with body mass index (BMI) and mentioned poor postural stability in individual with BMI > 24. [5-8]. We conducted

this study to compare effect of posture on pulse rate in normal and obese young adults. This study will help community of young adults to motivate them to perform regular physical exercise and modify their food habits to become healthy so that they will reduce the risk of cardiovascular events in the future.

Materials & Methods

This study was conducted at the Department of Physiology, Dr. Kiran C Patel Medical College & Research Institute. Study was ethically approved by the College Ethical Committee. We recruited male and female young adults of age group 18 to 25 years from Bharuch city. General history and height, weight were taken from all participants and BMI were calculated.

$$\text{BMI} = \text{Weight in Kg} / \text{Height}^2 \text{ in meters [9]}$$

As per their BMI, 30 participants were selected as Normal with BMI 18.5 to 24.9, and 30 Participants as Obese with BMI > 30. At the time of study, all participants were free from any disease. Their pulse rate (PR) were measured by 3 finger method in right radial artery in supine position first, after 5 minutes of rest for 1 minute.

After that PR (for 1 minute) were measured on immediate change of posture in sitting and

standing. Data were collected and compared by using unpaired t-test. P value < 0.05 was considered as statistically significant, P value < 0.01 was considered highly significant. All statistical analysis were done in SPSS software version 17.

Observations & Results:

Table 1: Age, Height and Weight of Underweight and Obese young adults

| BMI | Normal (BMI 18.5 – 24.9 Kg/m ²) | Obese (BMI > 30 Kg/m ²) | P value |
|--------------------------|---|-------------------------------------|---------|
| Age | 18.23 + 0.81 | 18.5 + 0.93 | > 0.05 |
| Height (mt) | 1.65 + 0.09 | 1.59 + 0.11 | < 0.05 |
| Weight (Kg) | 56.5 + 6.56 | 83.29 + 11.60 | < 0.01 |
| BMI (Kg/m ²) | 20.73 + 1.61 | 32.72 + 2.21 | < 0.01 |

Table 2: Pulse rate values of Normal and Obese participants in sitting, standing and supine position

| | Normal (BMI 18.5 – 24.9 Kg/m ²) | Obese (BMI > 30 Kg/m ²) | P value |
|--------------------|---|-------------------------------------|---------|
| PR SUPINE (/min) | 76.16 + 7.83 | 81.45 + 8.55 | < 0.05 |
| PR SITTING (/min) | 78.96 + 9.21 | 84.03 + 8.05 | < 0.05 |
| PR STANDING (/min) | 85.46 + 10.55 | 86.35 + 8.62 | > 0.05 |

Results

Table 1 shows, Normal and obese participants were from same age group (p > 0.05). Obese BMI participants had significantly high (P < 0.01) weight as compare to normal BMI participants.

Table 2 shows increase of PR on change in posture from supine to sitting to standing in both normal and obese participants. It also shows significantly high (P<0.05) PR in obese participants as compare to normal participants in sitting position. In standing position, obese had high PR than Normal but it was not statistically significant (P >0.05). In supine position, Obese had significantly high (P<0.05) PR than normal participants.

Discussion

This study was conducted among normal and obese participants to assess postural change of PR as per increase in BMI. Table 1 shows non-significant difference in age of young adults in both groups suggested both groups were comparable.

We found increase in PR on change in posture from supine to sitting to standing in both normal and obese participants (Table 2). Katerina H et al. found 10 bpm increase of PR on supine to sitting and 30 bpm increase of PR on supine to standing posture in healthy middle-aged subjects. Similarly Francisco J et al. observed increased PR on changing posture from lying to sitting to standing. [10,11]

In our study, we found all participant pulse rate were fall in normal range 60 to 100 beats/minute. [12] However, obese participants have significantly increased PR in sitting position as compare to

normal (Table 2). Study by Wang W et al. have shown similar results and depicted high BMI was associated with high PR and mentions that increase in weight is associated with imbalance in autonomic activity. [13] Another study by Itagi ABH et al. mentioned that PR in obese subjects were in normal range but significantly high in obese than nonobese. Additionally they reported that 22.9 BMI participants had average resting heart rate is 75.5 beats/minutes that was increased to 78.1 beats/minute in participants with BMI 32.5. [14] Andrew J et al. conducted 8 year follow up study among subjects with and without obesity and found obese with high PR were more prone to development of atrial fibrillation than nonobese and concluded obesity is strongly associated with new diagnosis of atrial fibrillation. [15] Study by stated high PR in obese young adult is due to less efficiency of cardiac autonomic function. Moreover, it leads to decreased parasympathetic activity than sympathetic system. [16]

Conclusion

In this study we found increasing PR on change in posture from supine to sitting to standing in both normal and obese participants. Furthermore, we compared PR in normal and obese persons in similar posture and found significantly high PR in supine and sitting positions. We concluded that high PR in obese is due to imbalance in autonomic activity that leads to decreased parasympathetic activity in obese. Hence they are at higher risk of developing cardiovascular disease in the future.

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