

Original ARTICLE

Comparison of pain perception in young adult males with normal and increased BMI

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ABSTRACT

Background: The sensation of pain is a universal phenomenon and is an indication of disease or tissue damage. The intensity with which pain is perceived by an individual varies widely, being influenced by the nature of the noxious stimulus, as well as by genetic, racial, cultural, and socioeconomic factors. Obesity is associated with disability in adults with chronic pain, such that individuals in overweight and obese weight categories report more inactivity, higher levels of depression, lower physical health-related quality of life, and are more likely to be completely disabled than those in a normal weight category. **Aim of the study:** To compare pain perception in young adult males with normal and increased BMI. **Materials and methods:** The present study was conducted in the Department of Anesthesiology of the Medical institutions. The ethical clearance for the study was approved from the ethical committee of the hospital. A total of 100 volunteers were selected for the study which consisted of underweight, normal weight, overweight and obese young adults with age ranging between 12 to 25 years. The subjects were grouped based on their body weights. The subjects completed questionnaires stating their age, sex, education level, health condition and drugs used (if any), as well as exercise performance and frequency, followed by a brief interview. Pressure pain was conducted first, followed by a 10-minute rest period before conduction of cold-pressor pain procedures in separate session, to avoid carry-over effect. **Results:** A total of 100 subjects were enrolled in the study. There were 52 males and 48 females in the study population. Based on BMI of the subjects, 22 subjects were underweight, 25 subjects were normal weight, 29 subjects were overweight and 24 were obese. We observed that threshold for cold pressor pain shows BMI dependent variation, with underweight subjects having highest threshold (less pain) and obese subjects having lowest threshold (higher pain) (Figure 2), but cold pressor pain tolerance do not show statistically significant variation, though underweight subjects had the lowest tolerance among the test groups. **Conclusion:** Within the limitations of the present study, it can be concluded that high BMI is related to decreased pain threshold among young population. Obese subjects in this study were found to have a significantly lower cold pressor pain threshold than underweight subjects, but no difference on cold pressor pain tolerance.

Keywords: Obese, pain, chronic pain, pain tolerance

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INTRODUCTION

The sensation of pain is a universal phenomenon and is an indication of disease or tissue damage. The intensity with which pain is perceived by an individual varies widely, being influenced by the nature of the noxious stimulus, as well as by genetic, racial, cultural, and socioeconomic factors.^{1,2} Gender differences in pain perception have been observed, with women exhibiting lower pain tolerance than men. Elderly people tend to suffer more from chronic and acute pain episodes that may be due to higher prevalence of degenerative changes in the musculoskeletal system. However, the effect of age on pain sensitivity is unclear, with various studies reporting decrease, increase or no change in pain sensitivity with age.^{3,4}

Obesity is associated with disability in adults with chronic pain, such that individuals in overweight and obese weight categories report more inactivity, higher levels of depression, lower physical health-related quality of life, and are more likely to be completely disabled than those in a normal weight category.⁵ Much less is known about the prevalence and impact of obesity among youth with chronic pain, although there is some evidence that obesity adds to further reductions in health-related quality of life outcomes in this population. Children and adolescents with chronic pain may be at increased risk for obesity due to changes in their ability to participate in vigorous activities. Participation in physical activity is often limited among children and adolescents with chronic pain.⁶ Hence, the present study was conducted to o

compare pain perception in young adult males with normal and increased BMI.

MATERIALS AND METHODS

The present study was conducted in the Department of Anesthesiology of the Medical institutions. The ethical clearance for the study was approved from the ethical committee of the hospital. A total of 100 volunteers were selected for the study which consisted of underweight, normal weight, overweight and obese young adults with age ranging between 12 to 25 years. The subjects were grouped based on their body weights. A written informed consent was obtained from each participant after explaining them the protocol of the study verbally. Subjects were excluded if they had prior or present alcohol abuse issues, use daily analgesics, a disorder that would interfere with pain perception and pain report, or any symptoms or signs of any neurological or inflammatory disease that could interfere with pain perception. Responses of each individual subject to pain stimuli were observed and recorded. The subjects completed questionnaires stating their age, sex, education level, health condition and drugs used (if any), as well as exercise performance and frequency, followed by a brief interview. Pressure pain was conducted first, followed by a 10-minute rest period before conduction of cold-pressor pain procedures in separate session, to avoid carry-over effect. Subjects were randomly assigned to one of three possible testing orders. BMI (kg/m²) was calculated as the ratio of the subject's weight (kg) divided by the square of subject's height (m²). The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

A total of 100 subjects were enrolled in the study. There were 52 males and 48 females in the study population. Based on BMI of the subjects, 22 subjects were underweight, 25 subjects were normal weight, 29 subjects were overweight and 24 were obese. (Table 1 and Fig 1). Table 2 shows effect of BMO of cold pressor pain responses. We observed that threshold for cold pressor pain shows BMI dependent variation, with underweight subjects having highest threshold (less pain) and obese subjects having lowest threshold (higher pain) (Figure 2), but cold pressor pain tolerance do not show statistically significant variation, though underweight subjects had the lowest tolerance among the test groups.

Table 1: Demographic characteristics of the subjects

Characteristics	Frequency	
Sex	Male	52
	Female	48
BMI	Underweight	22
	Normal	25
	Overweight	29
	Obese	24

DISCUSSION

In the present study, a total of 100 subjects were enrolled in the study. We observed that threshold for cold pressor pain shows BMI dependent variation, with underweight subjects having highest threshold (less pain) and obese subjects having lowest threshold (higher pain), but cold pressor pain tolerance do not show statistically significant variation, though underweight

subjects had the lowest tolerance among the test groups. The results were compared with previous studies from the literature.

Fig 1: Demographic data

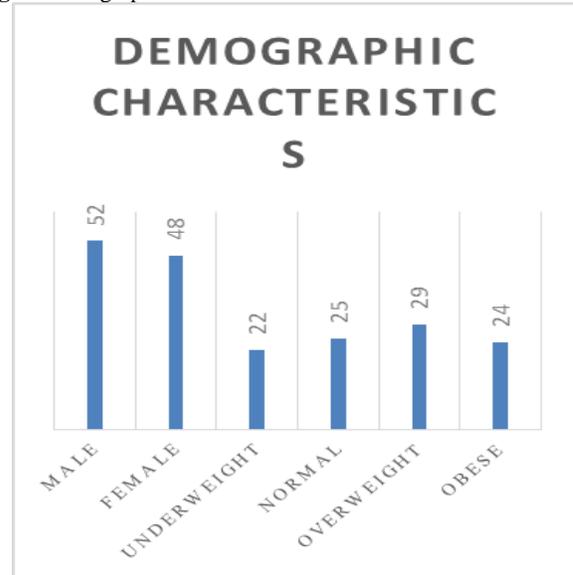
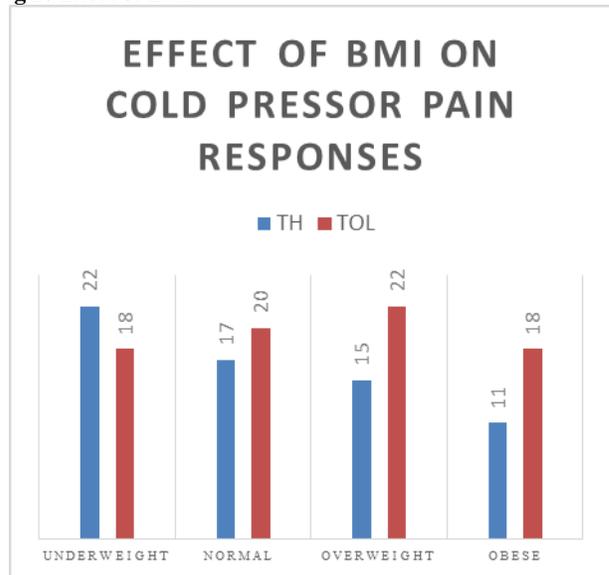


Table 2: Effect of BMI of cold pressor pain responses

Parameter	Underweight	Normal	Overweight	Obese
TH	22	17	15	11
TOL	18	20	22	18

TH: Threshold, TOL: Tolerance

Fig 2: Effect of BMI



Saxena I et al investigated the effect of age on pain sensitivity and cardiovascular reactivity produced by experimental pain. The study was conducted on 83 Indian males of different age groups. The volunteers were divided into 4 groups: Children, Young Adults, Middle-Aged Adults and Old Adults; and their basal parameters (BMI, resting pulse and blood pressure) were

recorded. Selected volunteers were subjected to cold pressor task (CPT). Pain sensitivity (PS) (pain threshold, tolerance and pain rating on a visual analog scale) and cardiovascular reactivity (CVR) (increase in pulse and blood pressure) were recorded. Many volunteers had abnormal values of BMI and resting blood pressure and had to be excluded from the study. PS and CVR between different groups were compared by one-way ANOVA. Significant differences in PS were observed, with highest pain sensitivity in Children and lowest in Old Adults. No significant differences were observed in the CVR. In conclusion, the high numbers of volunteers with abnormal basal parameters (BMI and resting blood pressure) show an urgent need to educate the general public about the dangers and risk factors of obesity and hypertension. Less exposure of children to painful encounters may be responsible for their high pain sensitivity while higher values of resting blood pressure and decreased sensitivity of the sensory systems with advancing age may be responsible for the hypoalgesia observed in old adults. Kozak AT et al investigated whether overweight (body mass index [BMI] 25–<30 kg/m²) and obese (BMI ≥ 30 kg/m²) young adults have poorer HRQoL 20 years later. The authors studied 3014 participants in the Coronary Artery Risk Development in Young Adults (CARDIA) study, a longitudinal, community-dwelling, biracial cohort from four cities. BMI was measured at baseline and 20 years later. HRQoL was assessed via the physical component summary (PCS) and the mental component summary (MCS) scores of the Medical Outcomes Study 12-Item Short Form Health Survey at year 20. Higher PCS or MCS scores indicate better HRQoL. Mean year 20 PCS score was 52.2 for normal weight participants at baseline, 50.3 for overweight, and 46.4 for obese. This relation persisted after adjustment for baseline demographics, general health, and physical and behavioral risk factors and after further adjustment for 20-year changes in risk factors. No association was observed for MCS scores. They concluded overweight and obesity in early adulthood are adversely associated with self-reported physical HRQoL, but not mental HRQoL 20 years later.^{7,8}

Wilson AC identified the prevalence of overweight and obesity in children and adolescents receiving treatment for chronic pain, and examined associations between Body Mass Index (BMI), pain intensity, and activity limitations in this population. Data was obtained from records of 118 patients, ages 8 to 18, seen in a multidisciplinary pediatric pain clinic. Information about age, gender, pain problem, duration and severity, medical diagnoses, medications, height and weight were collected from medical records and intake questionnaires. The CDC's pediatric BMI calculator was used to obtain percentile and category (underweight, healthy weight, overweight, obese). Children and parents completed the Child Activity Limitations Interview-21 (CALI-21), a self-report measure of activity limitations. A significantly higher rate of overweight and obesity was observed among youth with chronic pain compared to a normative sample. BMI percentile was predictive of concurrent limitations in vigorous activities, according to parent report. They concluded that BMI percentile and weight status may contribute to activity limitations among children and adolescents with chronic pain. Weight status is an important factor to consider in the context of treatment of chronic pain and disability in children and adolescents. Santos M et al studied that pediatric obesity and chronic pain are 2 of the most significant public health crises affecting youth today. Despite the high number of youth experiencing both chronic pain and obesity, little research has been done examining their relationship. Their study aimed to both

replicate and extend this research base. A retrospective chart review of 99 patients presenting for evaluation in a pediatric pain clinic was conducted. Demographic information, including patient weight status, and self-report measures completed by both patients and their parents, including the Pain Frequency-Severity-Duration scale, the Functional Disability Inventory, and the Pain Catastrophizing Scale were examined. Abdominal pain was the most frequently reported primary pain diagnosis category, with headache, diffuse musculoskeletal, localized musculoskeletal, and back pain categories reported from greatest to least frequency. Results show that 29% of our sample was obese. Age was related to weight status such that older children were more likely to have a higher body mass index. Among school-aged children, a higher body mass index percentile was associated with greater parent-reported pain catastrophizing. Obese youth had higher parent-reported Functional Disability Inventory scores than those in the normal weight group. Post hoc comparisons identified that this finding was only significant for girls. Further, obese youth were more likely to have a longer pain duration than those classified as normal weight. The results of their study add to the growing literature regarding the importance of taking weight status into account when intervening with youth with chronic pain.^{9,10}

CONCLUSION

Within the limitations of the present study, it can be concluded that high BMI is related to decreased pain threshold among young population. Obese subjects in this study were found to have a significantly lower cold pressor pain threshold than underweight subjects, but no difference on cold pressor pain tolerance.

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