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Original Research Article

Comparison of pain tolerance in different age group in community dwelling normal healthy adults

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Abstract

Introduction: Pain Tolerance is that greater level of stimulus at which the subject request stimulus cessation**.** Various factors responsible for variation in pain tolerance are-Method of experimental pain induction, age, gender, race, and exercise, Different levels of anxiety, depression, or previous painful experiences of each subject can alter the reports of pain. The common ways to induce experimental pain in pain tolerance and threshold assessment studies are pressure, thermal, electrical, laser, cold induced pain. We in present study have use pain induced by pressure. Note that pain in these experimental study designs refers to the somatosensory aspect of pain.

Aim: To compare pain tolerance in different age group in community dwelling normal healthy adults.

Method: 90 asymptomatic community dwelling normal healthy adults were tested. Pressure algometer was used to measure pain tolerance. Algometer was placed on dorsal surface of middle segment of distal phalanges of middle finger. Initial reading of algometer should be 0 lbs. Pressure should be progressively increased until maximum pain which subject can experienced is reached. Subject should be instructed to announce stop verbally at that point and experimenter immediately retracts the algometer. Three readings were taken best of three was selected.

Conclusion: For experimental induced pain by pressure- In community dwelling normal healthy adults pain tolerance decreases with an increase in age with maximum tolerance in age group ranging from 15-24 (young adult) and minimum in 45-64(old adult) and is not affected by sex of adult

Keywords: Pain Tolerance, Pressure algometer, Adults.

1. Introduction

Pain is an unpleasant, subjective experience that consists of sensory and emotional aspects [1]. It is a multi-factorial phenomenon influenced by tissue injury and emotional, socio-cultural, and environmental aspects. It has subjective characteristics, and each individual learns and uses this term based on their previous experiences. We consider this sensation to be a protective mechanism of the body against tissue damage, acting as a psychological adjunct to a protective reflex that causes the affected tissue to diverge from harmful and/or noxious stimuli [2].

The sensory aspect of pain contains the transmission of signals from periphery through lateral thalamus and somatosensory cortices (S1 and S2), as well as the posterior insular cortex. The affective-motivational component (emotional pain) refers to the emotional responses to a painful stimulus and primarily involves the limbic system. It activates the ACC and the anterior insular cortex components of the limbic system. It has been shown that physiologic responses to pain are mediated by neural substrates related to but distinct from the somatosensory aspect of pain.

Pain is broadly of two type-

1) Fast Pain: It is felt within about 0.1 second and A- delta fibers are used.

2) Slow Pain: Begins after minimum of one second and slowly increases with time C-fibers are used. The mechanism responsible for sensory component of pain is- from peripheral sites around the body such as skin and

visceral organs sensation are transmitted to spinal cord and from there to brain by sensory nerve fiber.

There are two ways to classify nerve fiber 1) General classification- fibers are divided - type A & C. Type A fibers are further divided into Alpha, Beta, Gamma and Delta fiber.2) Sensory nerve classification-fibers are divided -group 1A,1B,2,3,4[1].

1.1 Pain Tolerance

Pain Threshold

It is commonly defined as least experience of pain which a subject can recognize [1].

Pain Tolerance

It is that greater level of stimulus at which the subject request stimulus cessation [3].

Various factors responsible for variation in pain tolerance are-

Method of experimental pain induction [2,4], age, gender, race[5], exercise[6], Different levels of anxiety, depression, or previous painful experiences of each subject can alter the reports of pain[2].

There are several studies that examine differences between age and pain tolerance. However, the results are controversial. Some studies indicate older adults are more sensitive to experimental pain than young adults, whereas others suggest a decrease in sensitivity with age [3]. In order to assist in obtaining parameters on pain, this study aims to compare pain tolerance in different age group in community dwelling normal healthy adults

The common ways to induce experimental pain in pain tolerance and threshold assessment studies are pressure, thermal, electrical, laser, cold induced pain [1]. We in present study have use pain induced by pressure. Note that pain in these experimental study designs refers to the somatosensory aspect of pain.

2. Materials and Methods

2.1 Experimental design and ethical aspects

Type of study is observational cross sectional study. Study set up was VSPM'S College of Physiotherapy, Nagpur. Requisite permission from head of the institute was taken. Ethical clearance was done. Subjects were explained about the study and inform consent form was asked to fill. Subject performed the test under guidance. Data was collected and analyzed.

2.2 Participants

90 asymptomatic community dwelling normal healthy adults [45 male and 45 females] of age ranging between15-64 were selected. The selection criteria for age was set according to Provisional Guidelines on standard International age Classification. Subjects were divided into three group's young, middle and old adults of 30 each [15 males and 15 females].

2.3 Material used

Pressure Algometer

Firm Chair

Table

2.4 Procedure

The subjects were properly accommodated in an acclimatized room in a comfortable posture and free of any situation that could cause distraction and thus interfere with the results of the experiment and procedure is explained. Pressure Algometer [7] was used to measure pain tolerance. He was then asked to place his dominant hand on table with hand resting on it. Algometer was placed on dorsal surface of middle segment of distal phalanges of middle finger [8]. Initial reading of algometer should be at 0 lbs. Pressure should be progressively increased until maximum pain which subject can experience is reached. Subjects were instructed to announce stop verbally at that point and

experimenter immediately retracts the algometer. Gaze of subject should be straight and not on display of algometer or skin area to be tested, suggesting no participation bias. Three readings were taken best of three was selected.

2.5 Statistical analysis

The obtained data was spread in Microsoft excel 2007 and was statistically analyzed using Open Epi software version6. For finding for any significance in pain tolerance in both the genders t-test was applied. For finding relationship of age and pain threshold in normal healthy adults ANNOVA test was applied. The data was further studied by multiple comparison Bonferroni test. To correlate age and pain tolerance Pearson's correlation test was applied. The level of significance was set at $P \leq 0.05$.

3. Results

Subjects were divided into 3 groups of age group ranging between 15-24, 25-44, and 45-64. Each group has 30 subjects 15 male and15 females.

The mean pressure in both genders is male-18.09 lbs and female -16.4lbs. On application of t-test: p-value was found to be 0.149 thus we could say that no significant difference was found.

The mean pressure in different age group were 19.37 in young adults (15-24),17.1 in middle adults (25-44), 15.27 in older adults (45-64). On application of ANOVA test: P=0.015, thus significant difference of pain tolerance with changing age was found and thus the data was further studied for multiple comparison by Bonferroni test. And mean difference between groups were 2.267, 4.100 and1.833 in age group of 15-24 and 25-44, 15-24 and 45-64, 25-44 and 45-64 respectively. Thus maximum mean difference can be found in age group of 15-24 and 45-64. On application of Pearson's correlation test to correlate age and pain tolerance we found a Negative correlation that as age increases pain tolerance decreases with r = -0.20.

Table 1: Distribution of age group

	Frequency	Percentage
15-24	30	33.33
25-44	30	33.33
45-64	30	33.33
Total	90	100

Figure 1: Distribution of age group

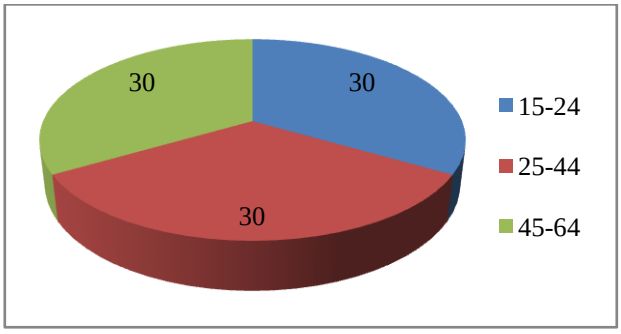


Table 2: Distribution of gender

	Frequency	Percentage
Male	45	50
Female	45	50
Total	90	100

Figure 2: Distribution of gender

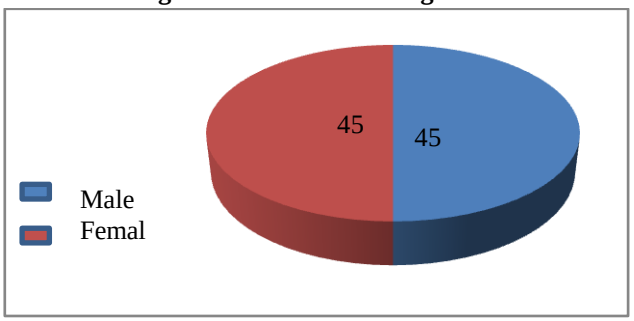


Figure 3: Comparison of mean pressure in both genders

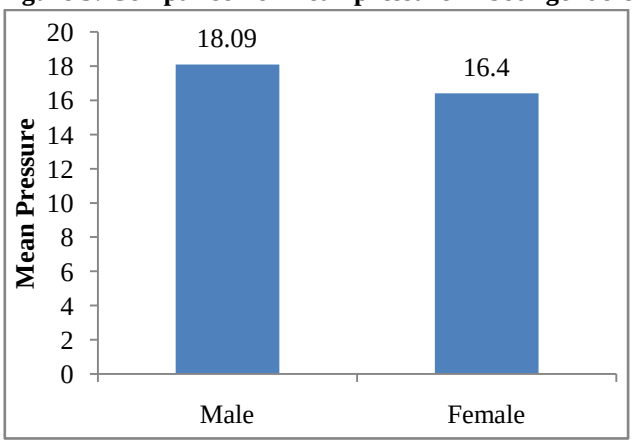


Table 3: Comparison of pain threshold in both genders

Group Statistics							
	Sex	N	Mean	Std. Deviation	Std. Error Mean	t-value	p-value
Pressure	Male	45	18.09	5.927	0.884	1.45	0.149
	Female	45	16.40	5.056	0.754		

p-value: - 0.149 for pain tolerance in both the genders.

Figure 4: Comparison of mean pressure in different age group

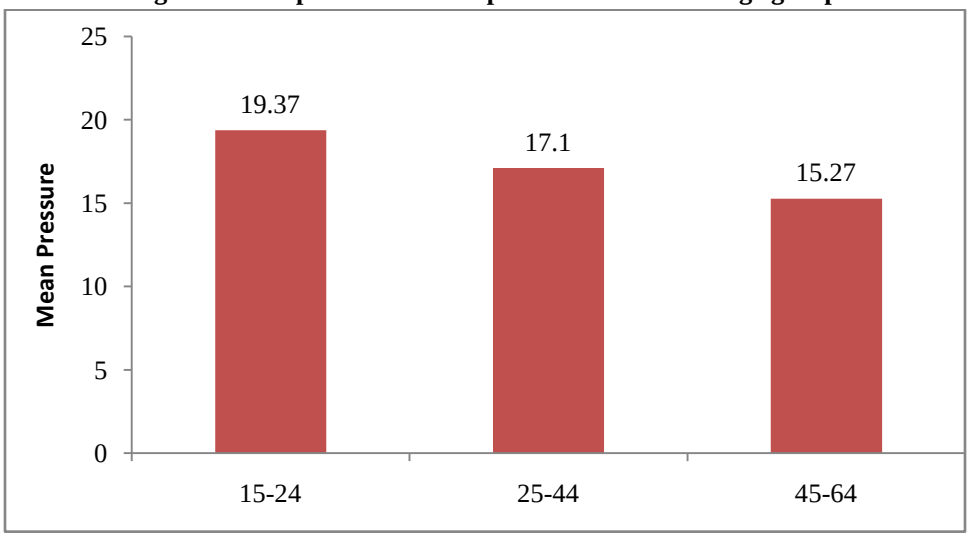


Table 4: Comparison of pain threshold in different age

ANOVA					
Pressure					
	Sum of square	**df**	**Mean square**	**F**	**p-value**
Between groups	253.089	2	126.544	4.437	0.015
Within group	2481.533	87	28.523		
Total	2734.622	89			

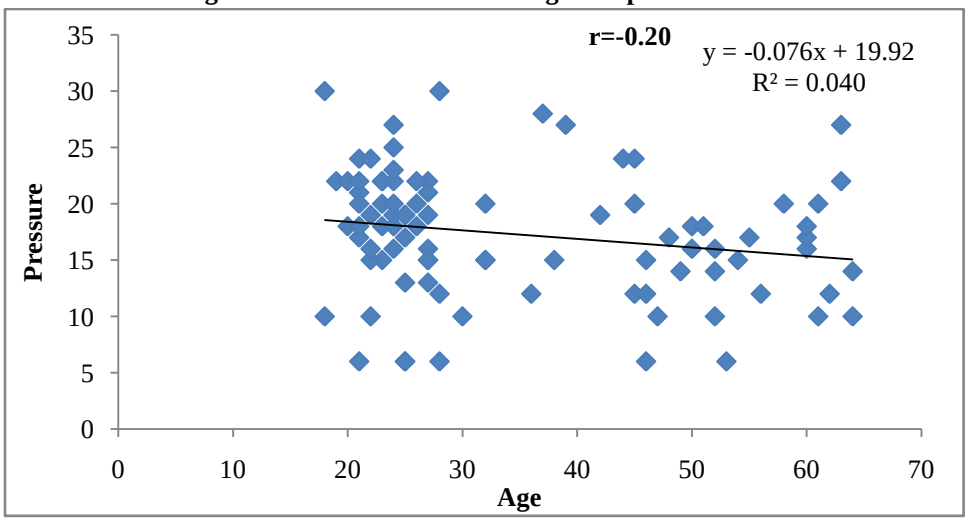
p-value:-0.015 for pain tolerance in different age groups of healthy adults.

Table 5: Multiple Comparison Bonferroni test.

Multiple Comparisons				
Dependent Variable: pressure Bonferroni				
(I) Age Group	(J) Age Group	Mean Difference (I-J)	Std. Error	Sig.
15-24	25-44	2.267	1.379	0.312
15-24	45-64	4.100*	1.379	0.011
25-44	45-64	1.833	1.379	0.561
*. The mean difference is significant at the 0.05 level.				

Highest mean difference is between age group: 15-24 and 45-64.

Figure 5: Correlation between age and pain tolerance



Negative correlation was found between age and pain tolerance. r-value= (-0.20).

4. Discussion

The aim of our study was to compare pain tolerance in community dwelling normal healthy adults by using pressure as a mode to induce experimental pain. Adults were divided into 3 groups according to age 15-24(young adult), 25-44(middle adult), 45-64(old adult)[9]. frequency of each group was 30 with 15 male and 15 females. We found that there is significant difference for pain tolerance in different age groups (p=0.015) and as age increases pain tolerance decreases with maximum in young adults and minimum in older adults

The similar studies done before found-

1) Andrade and colleagues-advanced age results in loss of pain perception [2].
2) Somatosensory thresholds [warmth, cold, vibration] for non-noxious stimuli increase with age whereas pressure pain thresholds decrease and heat pain thresholds show no age-related changes [4].
3) Experimental pressure pain detection thresholds and pressure pain tolerance thresholds significantly decreased with age. No gender differences were observed in the report of intensity and unpleasantness of the stimulations [10].
4) One's expectations of the pain experience of another person are influenced by the stereotypes one has about different genders, races, and ages [5].
5) On the average, a) pain tolerance decreases with age; b) men tolerate more pain than women; and c) Whites tolerate more pain than Orientals, while Blacks occupy an intermediate position [3].

The factors responsible for this are

1) Age-related anatomical, physiological, and biochemical changes as well as compensatory changes in homeostatic mechanisms and intrinsic plasticity of somatosensory pathways involved in the processing and perception of pain [11].
2) Often people themselves assume that ageing is associated with both a loss in their ability to perceive pain and an increase in non-specific pain-related suffering [12].
3) One's expectations of the pain experience of another person are influenced by the stereotypes one has about their age, gender and races. Like in elderly Misconception that pain is normal course of aging stops person from reporting pain [13], Gender roles [14].
4) Elderly persons also may be reluctant to report pain because of their fear that pain is indicative of severe pathology or even impending death and because of their fear of the consequences of acknowledging pain such as the need for hospitalization, diagnostic tests or medications that have undesirable side effects, additional expenses, or loss of independence [15].

We did not found any significant change in pain tolerance in both the genders, studies as far done have controversial results and find no consensus as to which gender is more sensitive to pain

4. Conclusion

For experimental induced pain by pressure- In community dwelling normal healthy adults pain tolerance decreases with an increase in age with maximum tolerance in age group ranging from15-24(young adult) and minimum in 45-64(old adult) and is same in both genders and is not affected by sex of adult.

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