

Are Indians and Females Less Tolerant to Pain? An Observational Study Using a Laboratory Pain Model

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SUMMARY

In Malaysia, it is a common belief among health care workers that females and Indians have lower pain threshold. This experience, although based on anecdotal experience in the healthcare setting, does not allow differentiation between pain tolerance, and pain expression. To determine whether there is a difference in the tolerance to pain between the three main ethnic groups, namely the Malays, Chinese and Indians as well as between males and females. This was a prospective study, using a laboratory pain model (ischaemic pain tolerance) to determine the pain tolerance of 152 IMU medical students. The mean age of the students was 21.8 years (range 18-29 years). All of them were unmarried. The median of ischaemic pain tolerance for Malays, Chinese and Indians were 639s, 695s and 613s respectively ($p=0.779$). However, statistically significant difference in ischaemic pain tolerance for males and females Indian students were observed. Possible ethnic difference in pain tolerance in casual observation is not verified by this laboratory pain model. Difference in pain tolerance between genders is shown only for Indians.

KEY WORDS:

Ischaemic pain tolerance (IPTO), Gender, Race, General Health Questionnaire (GHQ)

INTRODUCTION

Pain plays a central role in the body's response to nociceptive stimuli, acting as a warning signal that something is amiss, and also serving to minimise damage because the movements of the painful part of the body is unconsciously minimised. Nobody likes pain, and it is a symptom that causes the patient to seek professional help.

The perception of pain has a very strong affective component, and is coloured by past experience, culture and social backgrounds, as well as gender roles. Numerous clinical and experimental studies investigating a wide variety of painful conditions have noted ethnic differences in the prevalence and severity of pain¹⁻³. An expanding literature indicates that gender is an important influence on pain tolerance and pain expression⁴. Considerable evidence also suggests that females and males experience pain differently, and gender-related influences on pain responses recently have received a great deal of scientific and clinical attention^{4,5}. Some studies demonstrated that both pain threshold and pain tolerance were significantly higher in men^{4,6}. Kenneth M. Woodrow *et al* showed that, on the average, pain tolerance decreases with age and men tolerate more pain than women⁶.

Malaysia is a unique mixture of many ethnic groups, the three main ethnic groups being Malays, Chinese and Indians. It is a common belief among health care workers that Indians and females have lower pain threshold. To a certain extent this is supported by observational studies showing higher rates of musculoskeletal pain in Indian females⁷, over-representation of Indian patients in primary care patients with pain morbidity⁸ and more Indians needed injections in general practice clinics⁹. At this point in time, it is uncertain if the "Indian factor" in pain prevalence or treatment, vis-à-vis other ethnic groups, is due to differences in consultation behaviour, pain perception or tolerance. In this study we used a laboratory pain model to verify, if any, the perceived ethnic and gender difference in pain tolerance.

MATERIALS AND METHODS

This was a prospective study, using a laboratory pain model (ischaemic pain tolerance) to determine the pain tolerance of 152 medical students from International Medical University (IMU). Those students who volunteered for the study were recruited randomly. We intended to recruit a sample size of 180 students (30 in each ethnic-gender subgroup). However, there were fewer Malay and Indian male students in the final sample due to relatively fewer students in these ethnic groups in IMU.

The "Ischaemic Pain Tolerance" (IPTO) test⁹ is based on the principle that ischaemia induces pain. A blood pressure cuff was applied to the right arm of each participant. Prior to applying the cuff, the subject was made to raise the arm above the head, and then told to exercise the hand after the cuff had been applied. The cuff was then inflated to 200 mmHg, so that arterial blood flow to that forearm was occluded and ischaemic pain was induced. The cuff was deflated when the participant was unable to tolerate the pain, or at a maximum of 20 minutes. The time the cuff was kept inflated was recorded in seconds.

Prior to the IPTO measurement, students completed a questionnaire about background demographic data, pain symptoms and a 12-item General Health Questionnaire (GHQ-12). In this study GHQ-12 questionnaire was scored by the standard GHQ method (0-0-1-1 is scored for each category, and a sum is generated by adding up all 12 items). Psychological distress was assumed if the total score was 3 points or higher¹⁰. This study was approved by the IMU Research & Ethics Committee. All research subjects provided signed informed consent prior to the study.

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Statistical analysis was done using SPSS version 11.5. The dependent variable (IPTO) was not normally distributed when assessed by Kolmogorov-Smirnov test and Shapiro-Wilk test. Therefore non-parametric tests were used for comparison between two or more groups (Mann-Whitney U test and Kruskal-Wallis test, respectively). Comparison of categorical variable (comparison by gender of those who did and did not achieve maximal tolerance) was made using chi-square test. Linear correlation between IPTO and GHQ scores were assessed using Spearman correlation. Statistical significance was set as $p < 0.05$.

RESULTS

Demographic data

A total of 152 students volunteered for this study. There were 84(55.3%) females and 68(44.7%) males. Malays made up 30.3% (n=46, male=18, female=28), Chinese 40.8% (n=62, male=32, female=30), and Indians 28.9% (n=44, male=18, female=26). Their mean age was 21.8 years (range 18-29 years).

Ischaemic pain tolerance

The median time of ischaemic pain tolerance (IPTO) for males and females were 718s and 539s respectively ($p=0.007$). IPTO for Malays, Chinese and Indians was 639s, 695s and 613s respectively ($p=0.779$) (Table II). These differences were not statistically significant. However, when the IPTO for gender was compared separately by each ethnic group, only the difference between Indian male and female students were statistically significant ($p=0.009$) whereas the difference observed between male and female Malay or Chinese students did not reach statistical significance. Forty-two students (27.6%) reached the maximal 20 minutes tolerance of IPTO. The proportions reaching this was not statistically significant by gender (males 35.3%, female 21.4%, $p=0.057$) or ethnicity (Malays 26.1%, Chinese 27.4%, Indians 29.5%, $p=0.934$).

Influence of psychological distress

Psychological distress ($GHQ \geq 3$) occurred in 32.5% of respondents. The prevalence of psychological distress or the GHQ scores did not differ significantly by gender or ethnicity. The IPTO was also not statistically different between subjects with and without psychological distress (674s vs 643s, $p=0.925$). We thus did not find any significant correlation between IPTO and GHQ score (Spearman correlation=0.04, $p=0.681$).

DISCUSSION

The pain tolerance of an individual is a complex process that has a multitude of influences. In the Malaysian context, it is a common perception among healthcare workers that females

in general and the Indian ethnic group have lower pain thresholds. Such observations in the clinical settings are often confounded by the presence of clinical problems of variable severity. It is also impossible to distinguish between pain perception, pain tolerance and pain expression (including differences in health-seeking behaviour, and cultural norms of demonstrating pain to others). Laboratory pain measures have the potential of isolating one specific aspect of pain experience for an objective study.

To our knowledge, only a few studies have been conducted to compare pain perception or tolerance among the common ethnic groups in this part of the world¹¹⁻¹³. Thumboo *et al*⁸ found significantly lower bodily pain reporting by Chinese patients with knee and hip osteoarthritis (compared to non-Chinese). Ho *et al*¹² reported that headache prevalence did not vary by ethnicity in Singapore but non-Chinese reported significantly more frequent and intense headaches. These studies would suggest that the Chinese have a higher pain tolerance compared to other races in the face of disease, or perhaps they differ from other ethnic groups in their health-seeking behaviour. Yosipovitch *et al*,¹³ did not find any significant difference in the thermal pain thresholds among Malays, Chinese and Indians in Singapore. The study by Yosipovitch and colleagues, like ours, used objective measurement of pain threshold, in contrast to the studies by Ho and Thumboo that relied on self-reports. In spite of the difference in the method of pain threshold measurement, both our study and that of Yosipovitch *et al* negate the common belief that Indians as a race have a lower pain threshold.

Literature indicates that gender has an important influence on experiences of pain⁴. Researchers have generally concluded that women and men differ in their perception and experience of pain. Women also tend to experience more pain-related disability^{4,6} and to receive unwarranted psychogenic attributions for pain by health professionals. Our study suggests that females have a lower pain tolerance than males (only among the Indians). There may be a hormonal basis to account for this gender difference. The linking of pain sensitivity and regulation to reproductive hormones—particularly oestrogen is well documented¹⁴. The menstrual cycle in humans and other primates involve constantly changing levels of reproductive hormones in the

Table I: Demographic characteristics of respondents

	Males	Female
Malay	18 (39.1)	28 (60.9)
Chinese	32 (51.6)	30 (48.4)
Indian	18 (40.9)	26 (59.1)
Total	68 (44.7)	84 (55.3)

Numbers in brackets are percentages.
All percentages are "row percent".

Table II: Median ischaemic pain tolerance by gender and ethnic groups

Gender	Median (range) of IPTO (in seconds) by ethnic groups			
	Malay	Chinese	Indian	Overall
Male*	711	726	776	718 (67-1200)
Female*	590	659	424	539 (22-1200)
Overall	639 (22-1200)	695 (48-1200)	613 (46-1200)	644 (22-1200)

* $p=0.009$ for comparison of IPTO between males and females Indian students, comparison between male and female Chinese or Malay students was not statistically significant

blood and in the brain. Menstrual phase and reproductive status also affect pain ratings, although the actual nature of the variation is inconsistent and variations are not always observed, especially if thermal or ischaemic stimuli are used¹⁴. There are sex and hormonally-dependent differences in other neuroactive substances that could produce both sex differences and hormonally-dependent differences in pain modulatory situations¹⁵⁻¹⁶. Therefore straightforward comparisons of males and females may not be conclusive because of the cyclical nature of reproductive hormone production in females.

When dealing with patients in pain in the clinical setting, some healthcare workers may not take the patients' pain complaint seriously if they feel that they have "lower" pain tolerance. Our study showed that there is possibly no ethnic difference in pain tolerance among healthy Malay, Chinese and Indian adults in Malaysia. However, we have not addressed the issue of whether this pain tolerance may be modified by the presence of clinical disease or perhaps lowered by the patients' concerns for his/her health. Nonetheless, it is important for healthcare practitioners to guard against stereotyping certain ethnicities (e.g. Indian) as a subgroup with low pain tolerance. Psychological distress did not have significant influence on the pain tolerance measurement in our laboratory pain model, in contrast to its impact on pain perception and report in the clinical context.

In conclusion, our study of laboratory pain failed to demonstrate any significant ethnic difference in ischaemic pain tolerance. However, a significant gender difference of pain tolerance was shown among the Indians.

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