



## Research Article

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### A STUDY OF INTERRELATIONSHIP BETWEEN SEVERITY OF KNEE JOINT PAIN PERCEIVED WITH REFERENCE TO CHANGES IN CLIMATE

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#### ABSTRACT

Pain is the most important determinant to rule out that something is wrong. The observational finding is a byproduct of the main clinical trial conducted with approval from ethical committee at B.V.D.U.C.O.A.H, Pune, Maharashtra, India. Aim of the study was to determine the nature of the interrelationship between the severity of knee joint pain experienced and the climate changes (reduced temp. and humidity) in Pune city, Maharashtra, India. This clinical trial on retrospective study has revealed that there is a direct correlation between decrease in temperature and increase in severity of joint pain. Likewise, it has been found that joint pain increases with rainfall. A study of 236 patients having knee joint osteoarthritis was undertaken of which 36 were drop out cases. Patients residing in same geographical area were recruited. Patients were assessed over a period of one year and assessment of pain was done with VAS scale. Temperature readings were obtained from Indian Meteorological Department. A total of 200 patients were observed in which the above-mentioned relation has been established. But we may conclude that although a strong relation has been observed between severity of pain and decrease in temperature, increase in rainfall, pain is not an inevitable consequence of such weather conditions. When one is concerned with treatment, manipulation of microclimate and further such therapies should be studied upon to provide us with valuable solutions in providing analgesia.

**Keywords:** pain, temperature, knee joint, osteoarthritis, rainfall

#### INTRODUCTION

Pain is the most common symptom of which the human kind complains. Pain has been recognized by the world health organization as a problem of global proportions. It can be clearly observed that musculoskeletal pain increases with age.

Nowadays, individuals most seemingly deem to accept less responsibility for their own actions now, and the litigious nature of society will most certainly provide a fertile soil in which 'pain' can grow. Judging the current scenario, the symptom of pain has attained the status of an "epidemic" and hence the utmost important issue is to address it as to how we can influence it.

We also need to be more aware of the risk factors that may lead to the persistence of pain in an individual, particularly those psychological features that lead to somatisation. A fundamental and primary question that has always provoked physicians for deep thinking is what is it precisely that converts a person with pain into a patient with pain? There have been mixed results observed in previous research works regarding pain perception and changes in climate. It is observed that pain is related to weather condition. Especially pain increases during cloudy or cold weather. Some opine that cloudy weather is associated to a depressed mood, poor sleep quality, less physical activity and hence resulting in an increase in pain. Some say this correlation is of a mild significance. Others say it is of moderate significance. Rest feel that there is no correlation.

#### Factors affecting pain

1. Differing classifications of disease (RA, OA, fibromyalgia, gout, etc.), severity and duration of disease, age of patient, stress factor, psychological influence, exercise
2. Geographical area of residence, length of the time for which the patient is residing in that area, exposure to climate i.e. whether patient has been exposed to cold or hot climate
3. Inconsistent pain relief usage (NSAID'S and its dosage), inconsistency in medication
4. Weather-related conditions like temperature, barometric pressure, wind speed, precipitation, season, permutations of weather conditions)

Patients with any rheumatic disease associated condition conformingly believe that their pain is related to weather. Older patients with rheumatic disease-associated chronic pain, often consider and seek advice from their doctor about moving to warmer and drier climates in the belief that their symptoms will improve. There is a multiple factor that could mediate any observed relationship between the weather and reporting of pain which include depressed mood, poor quality of sleep and lack of exercise. Each of these has been correlated, prospectively, to the onset of chronic pain and each of these could most reasonably be associated with the weather<sup>1,2,3</sup>

#### Aim and objective

To determine the nature of the interrelationship between the severity of knee joint pain experienced and the climate changes (reduced temp. and humidity) in Pune city, Maharashtra, India.

**MATERIALS AND METHODS**

Type of study- Retrospective, Observational study

The findings observed with regards to pain and changes in weather is a byproduct of a clinical trial conducted at B.V.D.U.C.O.A.H., Pune, India. Ref. No. BVDU/Exam/446/2015-16

Open clinical trial was conducted with prior approval by ethical committee where the sample size was of 200 patients of established knee joint osteoarthritis. OA was diagnosed on the basis of American Arthritis RA criteria and X-ray of knee joint was done for inclusion of subject prior to beginning of trial. Total 236 patients were recruited for study of which 36 were drop out subjects. Common finding was observed that severity of joint pain increases in cloudy weather and in cold weather. Patients of joint pain observed for all 12 months of the year 2015-16. Pain assessment was done on VAS scale of 1 to 100. Daily Atmospheric Temperature was obtained was obtained from Indian Meteorological Department, Pune. Date of patient coming to outpatient department with complaints, severity, nature and duration of knee joint pain noted and correlated with weather and temperature. Patients staying in same geographical region were selected for study residing in and around Pune city.

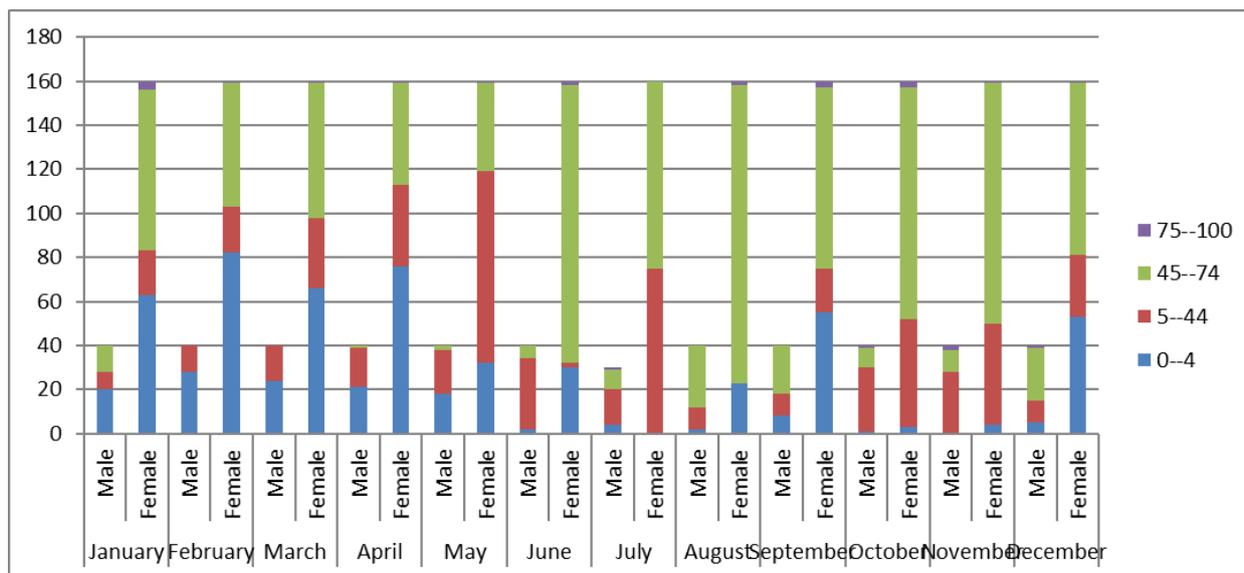
**Inclusion criteria**

- Age 18 to 80 years
- Patients of either gender
- K/C/O Osteoarthritis having symptom of knee joint pain since at least 2 years from a degree of mild to severe.

**Exclusion criteria**

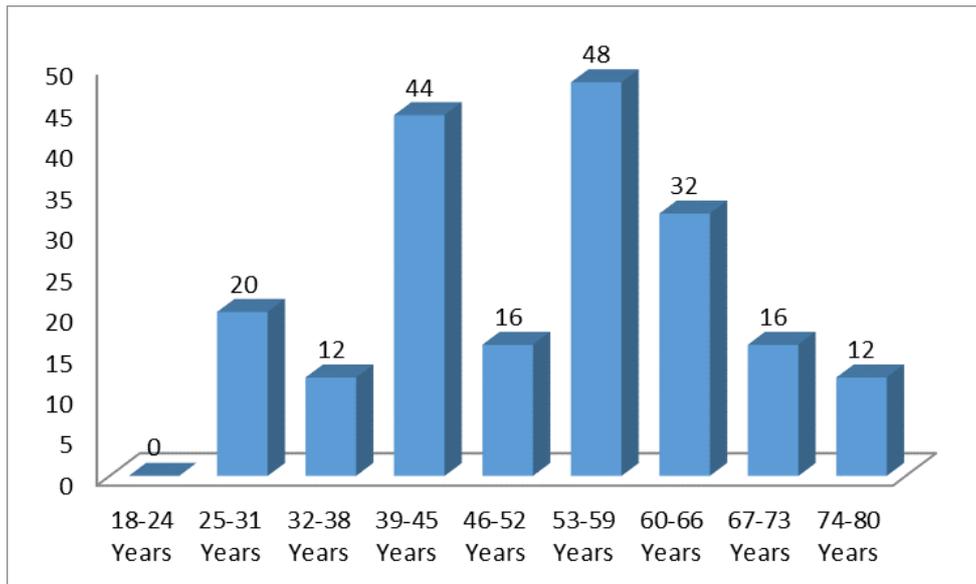
1. Any other type of arthritis other than osteoarthritis.
2. Patients recently undergone any major surgery
3. Known case of tumor of bones of knee joint of any joints.
4. Known case of osteomyelitis of knee joint of recent
5. Known case of dislocation of knee joint of recent
6. Known case of ligamentum tear of knee joint of recent
7. Known case of fracture of knee joint
8. Patients taking NSAID's, analgesics treatment for the same purpose
9. Pregnancy
10. Lactation

**RESULTS AND DISCUSSION**



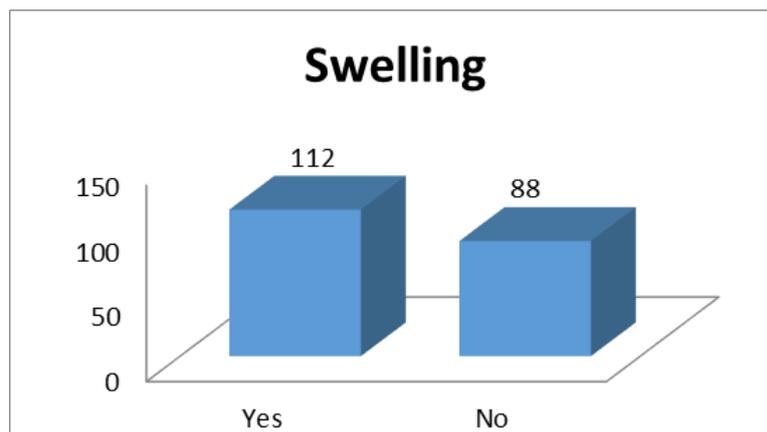
**Graph 1: Severity of pain perceived month wise**

Maximum pain was observed by females in rainy season followed by winter then summer season. Male patients experienced lesser pain level as compared to female patients of OA.



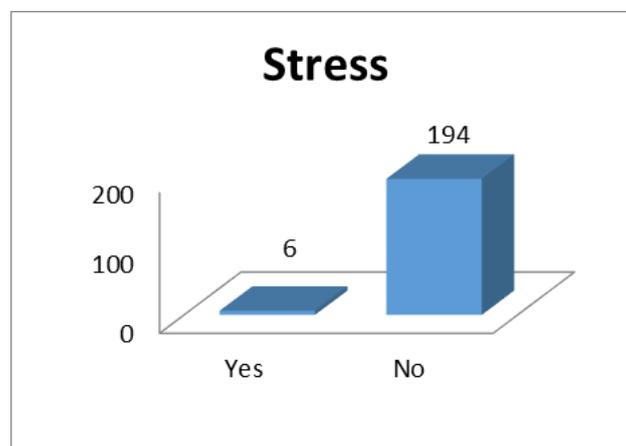
**Graph 2: Age distribution of patients having OA of knee joint**

Maximum patients from age of 39 to 66 are having OA of knee joint



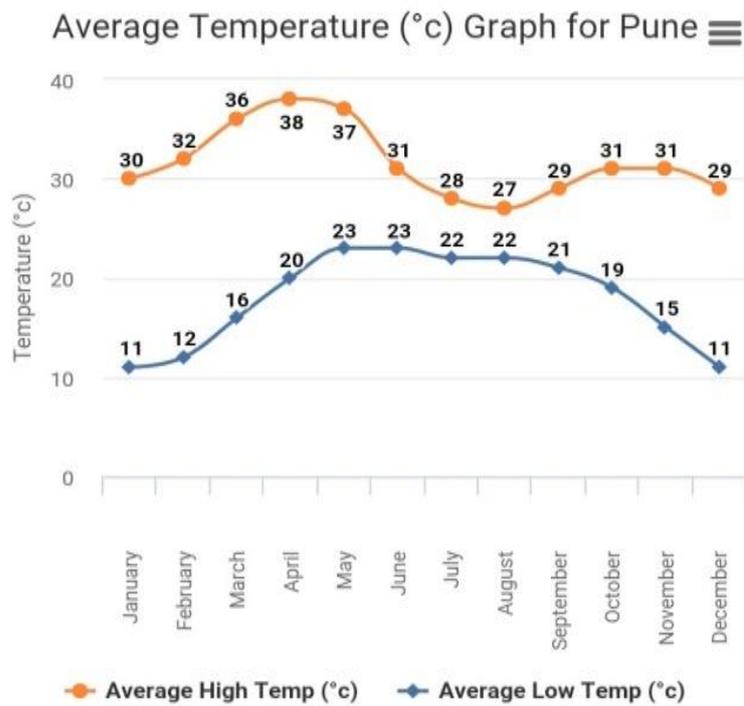
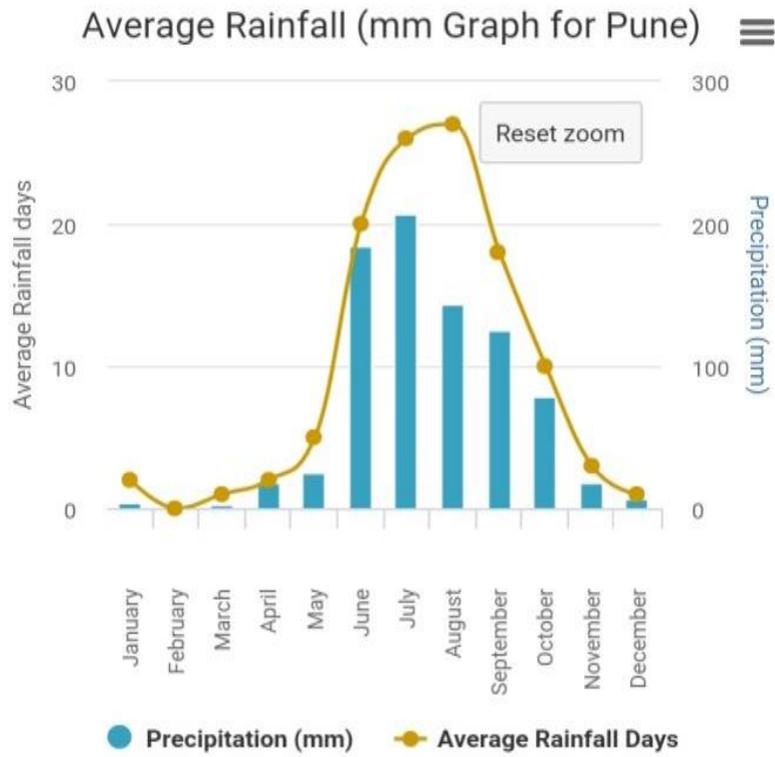
**Graph 3: Patients of OA having swelling**

Number of patients having swelling of knee joint was 112  
 Number of patients not having swelling of knee joint was 88.



**Graph 4: Stress level of OA patients**

Of 200 patients of knee OA which were observed, 6 patients had stress and 194 patients did not report of any stress



Tabular view for temperature and precipitation per month

| Months    | Temperature |         |         | Precipitation |
|-----------|-------------|---------|---------|---------------|
|           | Normal      | Warmest | Coldest | Normal        |
| January   | 20.5°C      | 29.9°C  | 11.0°C  | 0             |
| February  | 22.0°C      | 31.9°C  | 12.1°C  | 0             |
| March     | 25.6°C      | 35.4°C  | 15.8°C  | 0             |
| April     | 28.8°C      | 37.7°C  | 19.9°C  | 1             |
| May       | 29.7°C      | 36.9°C  | 22.4°C  | 3             |
| June      | 27.4°C      | 31.7°C  | 22.9°C  | 10            |
| July      | 25.3°C      | 28.4°C  | 22.2°C  | 17            |
| August    | 24.5°C      | 27.4°C  | 21.6°C  | 16            |
| September | 25.1°C      | 29.4°C  | 20.8°C  | 10            |
| October   | 25.0°C      | 31.4°C  | 18.5°C  | 5             |
| November  | 22.3°C      | 30.1°C  | 14.4°C  | 2             |
| December  | 20.2°C      | 28.9°C  | 11.5°C  | 0             |

It has been observed that a fall in temperature leads to an increase in the severity of joint pain perceived irrespective of the diagnosis. Seasonal changes play an important role in presentation of pain symptom. Every drop-in temperature corresponds to an increase in joint pain.

The study undertaken is a result of the observation that majority number of patients reported an increase in the severity of joint pain in the months of June to January that is especially in rainy and winter season. It can be understood from the observations that there is a high incidence of patients suffering from OA and have an increase in the severity of joint pain in rainy and winter season.

Knee joint is an important joint of our body since it is a weight bearing joint and its involvement is commonly seen in arthritis. Also, when severity of pain increases the ability of joint mobility reduces. Prevalence of people suffering from arthritis is increasing at an alarming rate especially knee joint arthritis which is a burden on society and a matter of global concern.

Ayurveda science has described seasonal regimen in precise detail. Accumulation of vata dosha (wind primordial element) occurs in summer season and hence not many cases were reported in the summer season since there was an increase in the temperature<sup>4</sup>. But, in Varsha rutu (rainy season), the aggravation of vata dosha (wind primordial element) occurs, the digestive fire of the person gets reduced and as a result the doshas get aggravated. Also precipitating factors like clouds hanging low in rainy season, blowing of cold winds leads to an increase in the severity of joint pain perceived. Ayurveda has strongly advocated the usage of oleation and sudation in such cases and hence because of which we can conclude that manipulation of microclimate plays a vital role in management of knee joint pain

Effect of oleation (snehan) on the body is that wherein massage of the body is done with warm oil. Peer reviewed medical researchers have shown and proved that there are plentiful benefits of massage which primarily include relief from pain, relief from emotional and mental stress, reduced trait in depression and anxiety, and it does temporarily reduce blood pressure and regularize the heart rate. Theories postulating role of massage and what it might do include blocking nociception (gate control theory), activating the parasympathetic nervous system which stimulate the release of endorphins and serotonin, preventing fibrosis or scar tissue, increasing the flow of lymph, and improving sleep, but such effects are yet to be supported by well-designed clinical studies. External snehan (abhyang) (body massage) is beneficial for patients with body pain, stiffness and loss of motor functions. Factorial design can be used to assess the effectiveness of treatments alone or in combination. Sweda(sudation) applied to the affected part of the body, which

is sandhichestakara (increases joint mobility), srotosuddhikara (cleanses bodily channels), agnideepaka (improves digestive fire), and kapha-vatanirodhana (arrests excess of water and wind primordial element in body), it decreases stambha (rigidity). It releases pain, relaxes the muscles, activates the local metabolic process, increases local blood flow, and thus increases the absorption of sneha (oleatory medicines) through the skin. After administration of swedana (sudation), it might produce a hypoanalgesic effect by diverted stimuli. Sweda(sudation) is vatashamaka (wind primordial element) by virtue of its ushna (hot), snigdha (lubricant) guna (properties). It combats with the properties of vata (wind primordial elements) like sheeta (cold), ruksha (rough) and laghu (light weight) guna (properties). Due to local rise of temperature, metabolic wastes are removed through increased blood circulation and sweat. The secretion of sweat is under nervous control, especially autonomous. Thus, sudation (swedana) can bring about changes indirectly.

The application of heat over joint promotes local circulation and metabolic activities and opens the pores of the skin to permit the transfer of medicaments and nutrients towards the affected site.<sup>5</sup>

It has been researched and found that effect of heat followed by stretching activity is beneficial. This treatment modality of heat followed by stretching is most commonly used in the treatment of joint stiffness found in rheumatoid arthritis or following joint surgery, also it is useful in the prevention and or treatment of joint contracture which is generally seen in bedridden or otherwise immobilized patients, and also most likely in patients with neurological disorder. In the branch of sports medicine, a common practice generally seen is externally applied heat which is used in the management of sore muscle, muscle injuries, so-called "short muscles" and soft tissue injuries. Active warming up is being advocated practiced with the purpose of increasing the strength and range of motion. Heat is used as a form of therapy because of its effect on the physical properties of connective tissue which are that it increases extensibility of collagen, decreases joint stiffness, relieves muscle spasm, and pain relief.<sup>5-8</sup>

## CONCLUSION

Research on pain should be interdisciplinary as it is a primary symptom of almost every disease and hence single line of management may not be advocated. It can be said that reduction in the temperature produces an effect on the severity of the pain. This study observation is a highly strong evidence providing with the likely correlation between atmospheric temperature and pain as it gives us a lead that pain increases during rainy and winter season and hence different management maybe required as per variation in season. It can also be concluded that pain is not an inevitable consequence of bad weather.

### Scope for further study

A detailed further study is required wherein a larger sample is taken and patients having joint pain irrespective of the disease should be undertaken and assessment of pain maybe done over a longer study duration to rule out fluctuation and interrelationship.

Also, when one is concerned with treatment, manipulation of microclimate and further such therapies should be studied upon to provide us with valuable solutions in providing analgesia.

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