

## **Incidence of Musculoskeletal Pain and Injuries in Lower Limbs in Marathon Runners**

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**Abstract:** *Background: The growing fame of marathons is bound to cause an upsurge in incidence of Running related injuries (RRIs). However their nature and relation with training parameters still remains uncertain in Indian population.*

*Objective: Assessing incidence of musculoskeletal pain in lower limb in marathon runners. Finding occurrence of musculoskeletal pain as per gender, age, training components. Studying distribution of lower limb musculoskeletal pain with respect to body part affected and pain intensity*

*Design: Cross-sectional survey*

*Methods: A self-made online form was formulated, authenticated and circulated amongst marathoners.*

*Results: The Incidence of musculoskeletal pain was 64.7% in lower limb in marathon runners with knee injury being commonest (19.33%) after that calf (9.95%) and shin (8.56%).*

*Conclusions: 64.7% runners complained of musculoskeletal pain in their legs. Commonest location of injury- knee. Majority (89%) complained of a moderate pain suggesting chronic musculoskeletal pain arising from overuse injuries. Female athletes showed a higher incidence.*

**Keywords:** *Marathon, Runners, Incidence, Lower limb, Musculoskeletal pain, Running related injuries, Overuse injuries*

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Date of Submission: 18-04-2019

Date of acceptance: 04-05-2019

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### **I. Introduction**

Running as a sport is gaining impetus worldwide. Similarly in India, its popularity is growing with every passing year. Masses are taking to streets, running marathons in increasing numbers with each passing year. Marathon culture was brought into lime light by the Standard Chartered Mumbai marathon- 2004. From two such events that year, marathons have seen an exponential growth reaching 1,000 mark in recent times<sup>[1]</sup>.

This rise being mainly attributed to an improved awareness amongst individuals concerning lifestyle related diseases. Awareness about the role of exercise, reducing the risk of and mortality due to cardiovascular malady along with its psychological advantages has further boosted the running culture in India especially amongst the urban population.

Probability and occurrences of injuries primarily in lower limb are greater with greater number of marathon enthusiasts. Recent years have thus seen a rise in research about running related injuries (RRIs). But, there is dearth of literature regarding RRIs on Indian population.

### **II. Materials And Methodology**

As a suitable questionnaire was unavailable, self-made questionnaire was formed which was reviewed by academics and departmental physiotherapists at MAEER's Physiotherapy college, Talegaon.

A pilot study was carried out, internal consistency reviewed.

It comprised 3 sections. Initial one gathered personal data accompanied by details pertaining to type, number of marathons, distance run per week, years of experience, footwear used and a warm-up and cool-down regime. Second and third sections collected info regarding existing and previous history of pain respectively along with its exact location, treatment sought if any and pain intensity as per the Visual Analogue Scale (VAS).

For ease of distribution the questionnaire was made available online.

### **III. Statistical Treatment**

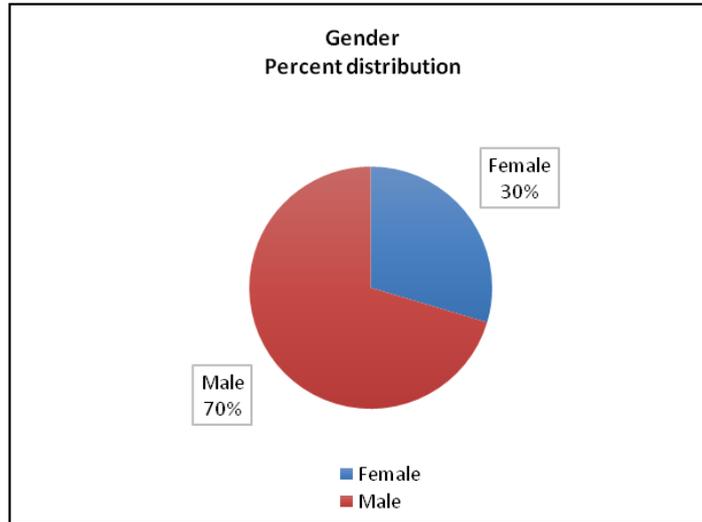
Descriptive statistics was used to summarize data. Most of the data being categorical was expressed as percentages.

### IV. Results

- ✓ 167 marathon runners answered the online questionnaire.
- ✓ Of these 46 (28%) were females and 121(72%) were males.
- ✓ The mean age of runners in this sample was 40.77 years.
- ✓ Amongst the 167 respondents, 108(65%) reported of having musculoskeletal pain.

**Table no. 1:** The incidence of musculoskeletal pain as per gender

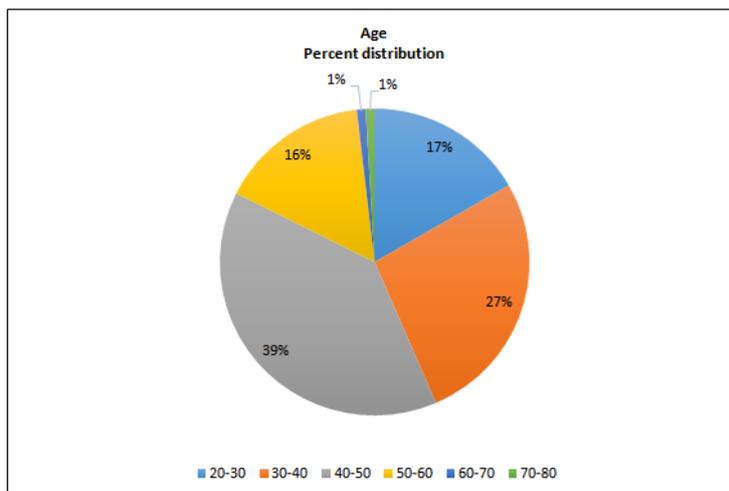
Gender	Total number	Pain	Percent distribution
Female	46	32(70%)	30%
Male	121	76(63%)	70%
Total	167	108	



- Of those who reported pain 30% consisted of females and 70% consisted of males.
- However incidence rates were higher in females (32 out of 46 i.e. 70%) than in males (76 out of 121 i.e. 63%).

**Table no. 2:**The incidence of musculoskeletal pain as per age group

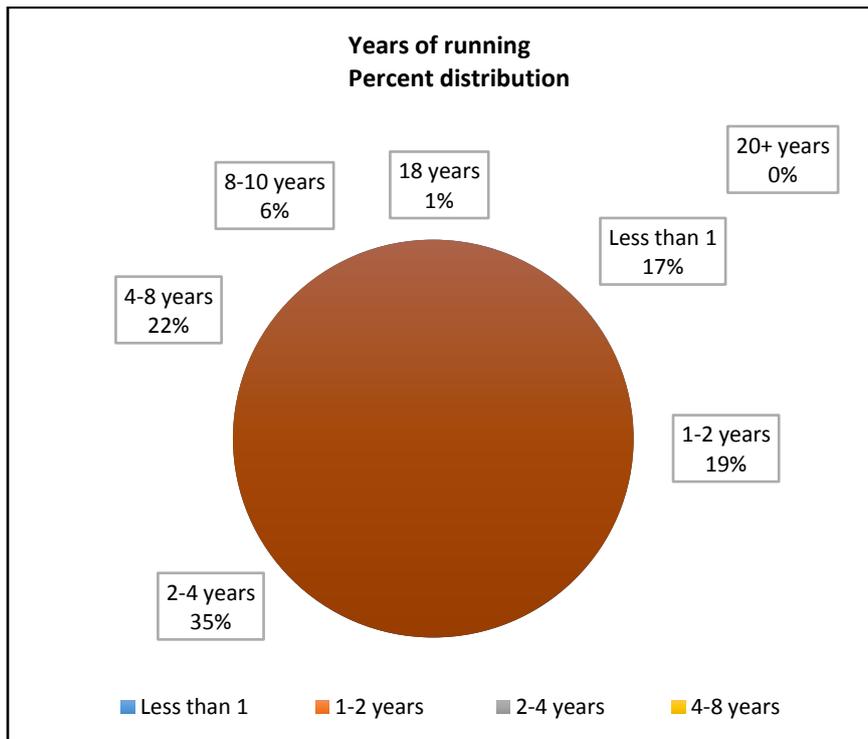
Age group	Total Number	Pain	Percentage distribution
20-30	30	18(60%)	17%
30-40	45	29(64%)	27%
40-50	62	42(68%)	39%
50-60	24	17(71%)	16%
60-70	5	1(20%)	1%
70-80	1	1(100%)	1%
Total	167	108	



- It was highest in the 40-50 year age group (39%)
- Followed by 30-40 year age group (27%)
- With a wide gap the 20-30 and 50-60 came in next at 17% and 16% respectively.

**Table no. 3:**The incidence of musculoskeletal pain as per years of running

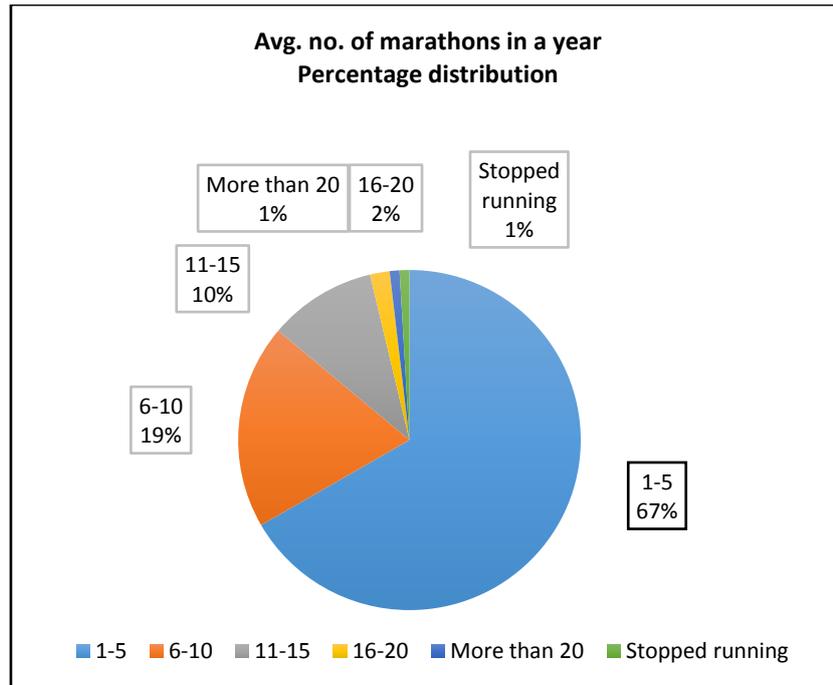
Years of running of running	Total number	Pain	Percent distribution
Less than 1	23	18	17%
1-2 years	38	21	19%
2-4 years	61	38	35%
4-8 years	34	24	22%
8-10 years	8	6	6%
18 years	1	1	1%
20+ years	1	0	0%
<b>Total</b>	<b>167</b>	<b>108</b>	



- It was highest in those with an experience of 2-4 years (35%)
- Followed by those with an experience of 4-8 year (22%), 1-2 years (19%) and less than 1 year (17%).
- While it was just 6% in those running for 8-10 years.

**Table no. 4:**The incidence of musculoskeletal pain as per avg. no. of marathons run per year

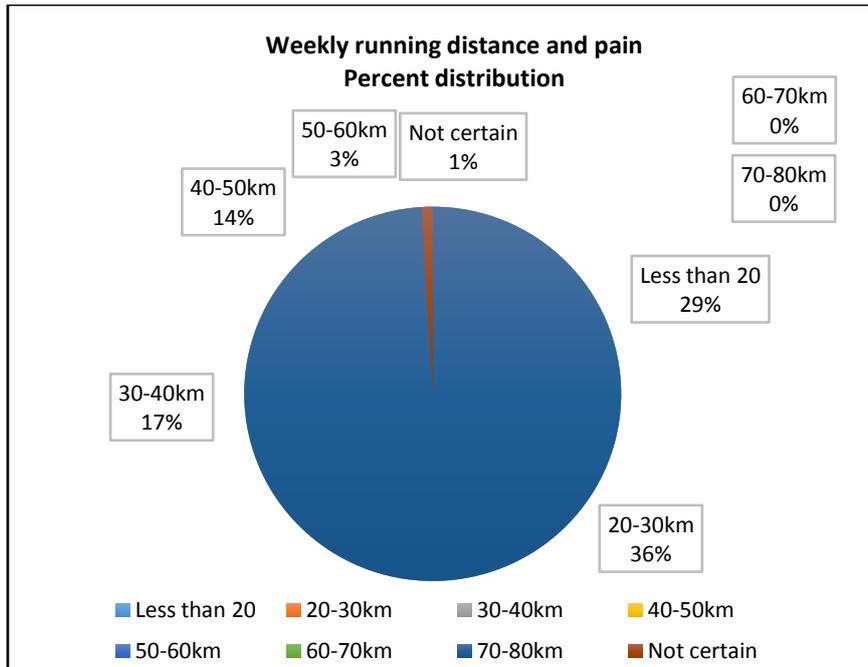
Number of marathons/year	Total number	Pain	Percent distribution
1-5	105	72(69%)	67%
6-10	36	21(58%)	19%
11-15	20	11(55%)	10%
16-20	3	2(67%)	2%
More than 20	1	1(100%)	1%
Stopped running	2	1(50%)	1%
<b>Total</b>	<b>167</b>	<b>108</b>	<b>67%</b>



- Incidence was maximum (67%) among those runners that ran 1-5 marathons a year.
- Followed by 19% in those running 6-10 marathons a year and 10% in the ones running 11-15 marathons a year.
- However it is necessary to note that maximum runners that participated in the study did in fact run 1-5 marathons in a year thus contributing maximum weightage to the injury load.

**Table no. 5:**The incidence of musculoskeletal pain as per weekly running distance

Weekly running distance	Total number	Pain	Percent distribution
Less than 20	48	32(30%)	30%
20-30km	59	39(36%)	36%
30-40km	28	18(17%)	17%
40-50km	25	15(14%)	14%
50-60km	3	3(100%)	3%
60-70km	2	0(0%)	0%
70-80km	1	0(0%)	0%
Not certain	1	1(100%)	1%
<b>Total</b>	<b>167</b>	<b>108</b>	

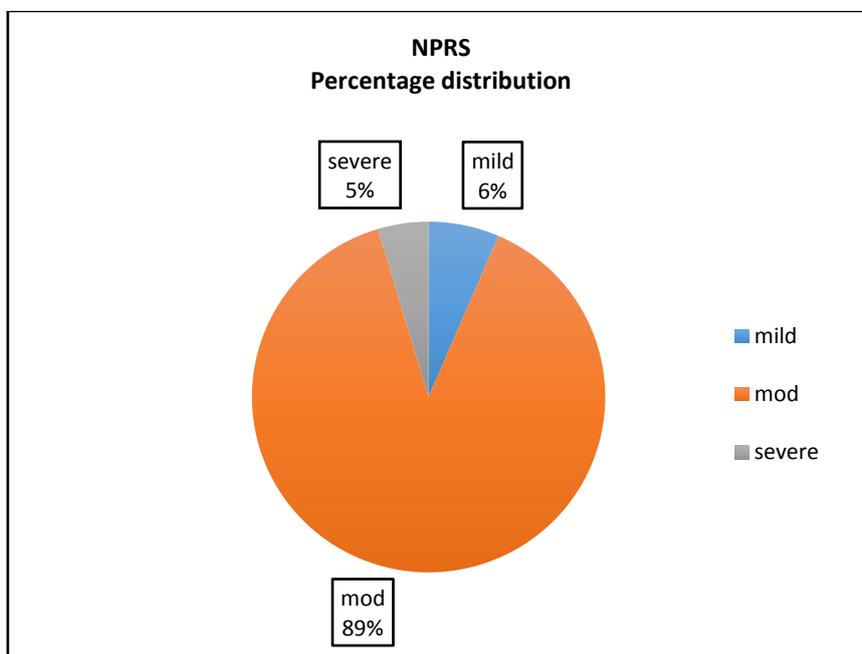


- Incidence was maximum in those with a weekly running distance of 20-30km (36%)
- Those running less than 20km per week came in next (30%)
- Those with a weekly running distance of 30-40km and 40-50km closely followed each other at 17% and 14% respectively.
- While those running 50-60km per week were only 3% of those who reported pain.

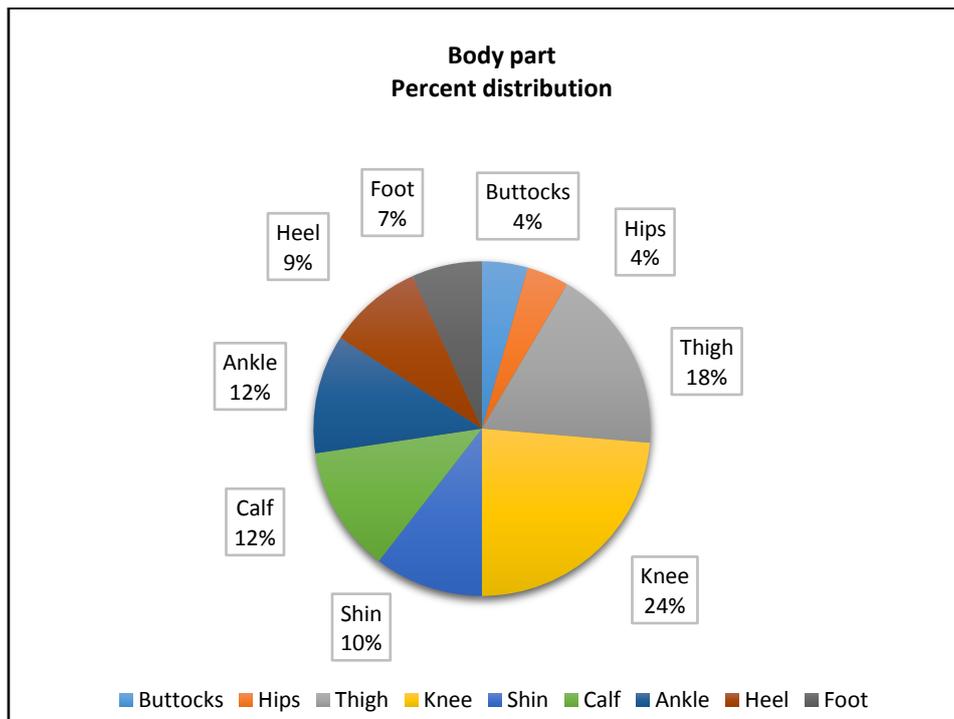
This cross sectional survey revealed that 64.7 % runners complained of musculoskeletal pain in their lower limb suggesting an injury.

**Table no. 6:** Distribution of musculoskeletal pain as per score on the NPRS

NPRS Score	Total number	Percentage distribution
1-2 (mild)	7	6%
3-7 (moderate)	96	89%
8-10 (severe)	5	5%
<b>Total</b>	<b>108</b>	



- 89% injured runners reported moderate pain on NPRS.
- 6% reported mild pain and 5% reported moderate pain.
- Areas with highest incidence of pain, as per this study was:
  - ✓ Knee (65%)
  - ✓ Thigh (49%)
  - ✓ Calf (33%)
  - ✓ Ankle (31%)
  - ✓ Shin (29%)
  - ✓ Heel (25%)
  - ✓ Foot (19%)
  - ✓ Buttocks (12%)
  - ✓ Hip (11%)



Also, it is necessary to note that of the 108 participants that complained of pain, only 31 (29%) were aware of their medical diagnosis.

**Table no. 7:** Medical diagnosis as reported by runners

Injury	Number
IT band tightness	6
Shin splints	5
Plantar Fasciitis	5
Achilles tendinopathy	4
Spur	3
Hamstring strain	2
Knee ligament injury	2
Meniscal injury	1
Groin pain	1
Pelvic bone injury	1
Sciatica	1
<b>Total</b>	<b>31</b>

Of those currently suffering from pain, 35% gave history of previous injury. Conversely, 76% of athletes who reported of a previous injury did currently suffer from RRIs.

## V. Discussion

This cross sectional survey revealed that 64.7 % runners complained of musculoskeletal pain in their lower limb suggesting an injury. 89% complained of moderate (3-7 on NPRS), 6% complained of mild (1-2 on NPRS), 5% complained of severe pain (8-10 on NPRS).

Areas having highest prevalence of pain, as per this study, was knee (65%) followed by thigh (49%), calf (33%), ankle (31%), Shin (29%), Heel (25%), Foot (19%), Buttocks (12%), Hip (11%). A number of studies have found that knee injuries make up close to half of the reported running injuries. <sup>[13, 28, 29]</sup> The next highly prevalent painful areas are the thigh & lower leg (calf, ankle and shin) suggesting an etiologically common mechanism of leg running injuries.

Most common overuse injury that is attributed to running is patellofemoral pain syndrome <sup>[28, 29, 30, 31]</sup> which might be a leading cause of pain in knee as reported by runners in this study. Additional common overuse running injuries include stress fractures, medial tibial stress (shin splints), patellar tendinitis, plantar fasciitis, and Achilles tendinitis <sup>[13, 28, 30]</sup> in conjunction with the medical diagnosis reported in this study.

In spite of the number of female runners being low, prevalence of running related pain in women was higher (70%) as compared to males (63%). Of those currently ailing from pain, 35% gave history of previous injury. Conversely, 76% of athletes who reported of a previous injury did currently suffer from RRIs. History of previous injury was shown to be a non-modifiable risk factor for injury. <sup>[27]</sup>

Prevalence of RRIs as found was consistent with existing literature (19%-79%). <sup>[27]</sup> This wide variance between studies originate from a non-uniform definition of RRI. Data analyzed from this study gives good indication of current scenario of leg pain in the target population.

Niemuth PE et al suggest, muscular imbalances in the hip muscles, especially weakness of hip abductors, may be a predisposing factor in lower-extremity, overuse injuries in runners. <sup>[32]</sup> Further research is needed to determine a direct cause and-effect relationship and whether distance runners can prevent injury with specific strengthening exercises.

Similar studies are needed on the Indian population especially with a blooming marathon culture. It will enable both athletes and clinicians to inhibit worsening of existing damage and occurrence of new injuries while modifying training protocols for the same.

While a retrospective management of running injuries may assist runners to heal following an overuse injury, a preferable approach to the problem would be to act proactively. A proactive approach could take many forms, such as the education of current and prospective runners regarding a sensible approach to training; proper fitting and selection of shoes; and establishing a screening process whereby medical practitioners could recognize runners who are at high risk for overuse injuries, and advise these runners accordingly.

The best advice to help avoid injury would be to pay close attention to the overall training load and use moderation with respect to increasing distance and number of consecutive days running. <sup>[15,33]</sup> It is especially important to be fully recovered from any and all injuries prior to any competition. <sup>[34, 35]</sup> Alternatives to running for injured runners could include running in water, swimming, biking and cross-country skiing to help reduce the training impact load.

All biologic structures such as muscles, tendons, ligaments, and bones, could adapt positively and negatively to the level of stress that is placed upon them. If the stress is below the tensile limit with adequate rest time in between a positive tissue remodeling will result. Similarly, if the stress is greater than the tensile limit or below the tensile limit but with inadequate rest time a negative tissue remodeling will result in an injury. <sup>[36]</sup>

A noteworthy fact is that only 29% of the injured runners were aware of a medical diagnosis. This indicates a reluctance to seek treatment amongst the runners in conjunction with that found by Maughan RJ et al. <sup>[37]</sup>

Finally, it is necessary to state that with growing awareness regarding benefits of running, there should be growing caution towards possible disadvantages. Response from athletes is equally vital as initiative by authors. Attitude of people towards research needs to become a little more welcoming rather than ignorant.

## VI. Conclusion

There remains a need for prospective studies that better define the underlying aetiology, epidemiology and potential risk factors of marathon running injuries.

However, several factors are cleared from this study:

1. 64.7% runners complained of musculoskeletal pain in their lower limbs
2. The knee was the commonest site of injury
3. Majority(89%) complained of a moderate pain suggestive of chronic musculoskeletal pain which is typical of overuse injuries[12]
4. Incidence was higher in female athletes(70%)

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