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**Original Research Article**

# Chronic medical conditions and health care utilization in Indian marathon athletes: a cross-sectional observational study

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## ABSTRACT

**Background:** The purpose of this study was to investigate the prevalence of chronic medical conditions and healthcare utilization among Indian marathon athletes through a digital survey.
**Methods:** This was a cross-sectional, observational study that employed a questionnaire-based digital survey of Indian marathon athletes. The survey collected data on participants' demographics, training history, chronic medical conditions, and healthcare utilization. Descriptive statistics were used to analyze the data.
**Results:** A total of 224 marathon athletes participated in the survey from April 2023 to June 2023. The largest segment of respondents (40.6%) fell within the age bracket of over 50 years, and 82.3% were male. Among the participants, 84.9% were married, and 77% were employed in the private sector. About 56% were involved in some sports activity prior and 90% opined they follow a healthy lifestyle. On comorbidities, hypertension was most prevalent (23.2%) followed by diabetes (13%), hyperlipidemia (9.3%), and asthma (2.2%). About 95% do not take any pain medications during a marathon and 29 % were not aware of the precautions to be taken for running a marathon with chronic medical conditions. Around 69.6% do not consult a physician to get advice and approval before a marathon and 73.1% mentioned that they do not take regular medication for chronic medical conditions like diabetes and hypertension
**Conclusion:** Indian marathon athletes have a significant prevalence of chronic medical conditions, with hypertension, asthma, and diabetes being the most common. A substantial proportion of athletes sustain injuries during training and competition, leading to healthcare utilization, particularly for physical therapy. These findings highlight the importance of comprehensive pre-participation medical evaluations and targeted injury prevention strategies for this population.

**Keywords:** Chronic medical conditions, Healthcare utilization, Marathon athletes, Real world cross-sectional observational study

## INTRODUCTION

The history of the marathon race dates to ancient Greece, with the legendary story of the messenger Pheidippides running from the battle of marathon to athletes to deliver news of the greek victory over the Persians in 490 BC.[1] Since then, the marathon has evolved into one of the most popular worldwide mass sporting events, with over 2.1 million global annual participants as of recent years.[2] Participation in marathon running has grown significantly in recent years, with over 1.1 million marathon finishers in the U.S. alone in 2019.[3] Athletes are attempting various categories of marathons, such as full marathons, which cover 42.195 kilometers (26 miles and 385 yards), and half marathons, which cover 21.097 kilometers (13.192 miles). Any distance exceeding a full marathon is classified as an ultra-marathon. Marathon running has become increasingly popular in India, with numerous marathon events held across the country each year. As participation in these endurance events continues to grow, it is important to understand the medical conditions and healthcare utilization patterns of Indian marathon runners. Numerous studies have examined the health status and medical issues faced by marathon runners globally. A study of

ultramarathon runners found that the most common medical issues were blisters, accounting for 26.7% of medical encounters.[4] Another study comparing runners of different distances found that half-marathon runners had the highest overall health scores compared to 10 km and marathon/ultramarathon runners.[6]

Running has been shown to have significant positive implications for mental and physical health. Studies suggest that running, regardless of the length or intensity, can improve mood and mental health outcomes.[6] Even small amounts of running, as little as 5-10 minutes per day, have been linked to reduced risk of premature mortality and extended life expectancy by several years compared to not running at all.[7]

Runners generally have a 25-40% reduced risk of premature death and live about 3 years longer than non-runners.[8] The health benefits of running extend beyond just longevity, as it has been associated with reduced risk of cardiovascular disease, cancer, respiratory infections, and neurological conditions. Running can also enhance sleep, psychological well-being, cognitive function, and overall quality of life.[9]

Regular participation in recreational running has been shown to positively affect various health parameters, including body weight, body fat, blood pressure, blood glucose levels, insulin sensitivity, blood-lipid profile, and musculoskeletal health. Running can also favorably influence mood, well-being, and mental status. However, intensive and long-lasting endurance running, such as marathon and ultra-marathon running, can lead to several acute and potential long-term health problems. Acute health issues associated with marathon running include gastrointestinal complaints, symptomatic hyponatremia, exercise-induced asthma, and hay fever. Additionally, marathon running can significantly increase post-exercise levels of biomarkers related to cardiovascular damage and dysfunction, which is associated with an increased risk for race-related cardiac arrest.[10,11]

A study of over 15,000 marathon and half-marathon runners found that a significant proportion reported underlying chronic diseases, such as cardiovascular and respiratory conditions, as well as regular medication use. Runners with a history of chronic disease had a higher prevalence of exercise-associated muscle cramps (EAMC). The prevalence of a history of any cardiovascular disease (CVD) was 2.3% in the study population, and runners with a history of CVD had a 31% higher risk of EAMC compared to those without CVD. 16.1% of runners had a history of risk factors for CVD, and these runners had a 39% higher risk of EAMC. Runners classified as intermediate or experienced had a 34% and 97% higher risk of EAMC, respectively, compared to novice runners.[12] The use of over the counter (OTC) and prescription medications by marathon runners is a common way to persist running associated pain management. A comprehensive survey of 714 runners found that only 29.9% of runners took daily prescription medications for chronic conditions, while 52.4% took OTC medications before a run. The most used OTC medications were non-steroidal anti-inflammatory drugs (NSAIDs), with ibuprofen being the most popular choice.[13,14]

However, the existing research on marathon runners' health in India is limited. A study of over 1,200 ultramarathon runners found that they were generally healthier than the general population, with fewer serious illnesses. Yet, the specific medical conditions and healthcare utilization patterns of Indian marathon runners remain unclear.[15]

Exploring and managing these coexisting health issues holds overall importance for race organizers and medical providers to ensure appropriate medical support and services are available for marathon participants. Hence, this real-world cross-sectional study was planned to understand the role of concurrent health condition that exerts an influence on the marathon runners and to predict the better management strategies to handle coexisting health issues amongst the marathon runners for effective healthcare utilization of Indian marathon runners.

## METHODS

This was a real-world, cross-sectional, observational, nationwide, digital questionnaire-based study involving 224 marathon participants across India between April 2023 to June 2023. The questionnaire included a range of questions to assess the prevalence of chronic medical conditions, such as hypertension, diabetes, and respiratory issues, among athletes. It also inquired about their medical history, including any previous injuries or illnesses, and their current health status. Additionally, the survey sought information on the athletes' healthcare utilization patterns, including the frequency and type of medical consultations, hospitalizations, and medication use. Furthermore, it explored their awareness and knowledge about chronic medical conditions, their attitudes toward seeking medical care, and their perceived barriers to healthcare utilization. The survey also collected demographic data, such as age, gender, and occupation, to provide a comprehensive understanding of the relationship between chronic medical conditions and healthcare utilization among Indian marathon athletes.

## RESULTS

This research was conducted involving a total of 224 marathon runners, aiming to gather comprehensive data regarding various demographic characteristics and socio-economic factors. It was observed that a predominant proportion of the participants, specifically 184 individuals, (82.3%), were male. Furthermore, the data indicated that a significant majority of the respondents, accounting for 190 (84.9%) of the total sample population, reported being currently married. In addition, a substantial portion of the

participants, comprising 172 (77%) of the total sample, were currently engaged in employment within the private sector.

**Table 1: Demographic characteristics of the participants.**

| Characteristics | Numbers | % |
|---|---|---|
| **Gender** | | |
| Male | 184 | 82.3 |
| Female | 40 | 17.7 |
| **Age (in years)** | | |
| <30 | 30 | 13.39 |
| 30-39 | 40 | 17.85 |
| 40-49 | 63 | 28.12 |
| > 50 | 91 | 40.6 |
| **Status** | | |
| Married | 190 | 84.9 |
| Unmarried | 34 | 15.1 |
| **Dietary preference** | | |
| Vegetarian | 128 | 57 |
| Non-vegetarian | 96 | 43 |
| **Lifestyle** | | |
| Sedentary | 20 | 9.1 |
| Healthy | 204 | 90.9 |
| **Medical conditions** | | |
| Hypertension | 52 | 23.3 |
| Diabetes | 29 | 13 |
| Hyperlipidemia | 21 | 9.3 |
| Asthma | 05 | 2.2 |

The predominant group of participants, 91 (40.6%) of the total sample, were aged over 50 years. Furthermore, around 36 (85%) participants, of the respondents, were found to be married. Additionally, it was observed that more than half of the total participants, specifically 127 individuals accounting for 56.9% of the sample, adhered to a vegetarian diet. A substantial number of 125 (56%) participants, engaged in various sports activities. A vast majority of 201 (90%) respondents, affirmed that they followed a healthy lifestyle.

About 100 (44.9%) of the total participants, expressed a distinct preference for engaging in a marathon of precisely 21 kilometers in distance. Furthermore, a significant portion of 207 participants, representing 92.4% of the cohort, articulated that their primary motivation for participating in a marathon race revolves around the fundamental objective of maintaining a state of optimal health and physical fitness. Delving into the realm of comorbidities prevalent within the study population, it was discerned that hypertension emerged as the most reported health condition, with 52 (23.2%) individuals. In addition to hypertension, other comorbidities such as diabetes were cited by 29 participants, constituting 13% of the total, followed by hyperlipidemia with 21 individuals accounting for 9.3%, and lastly, asthma was indicated by 5 participants, making up 2.2% of the cohort (Figure 1).

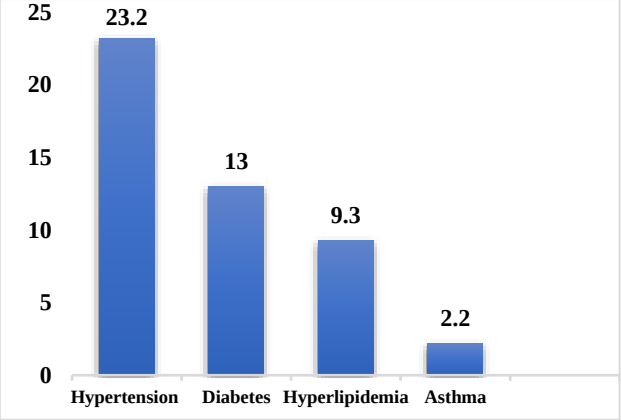


**Figure 1: Medical conditions of the marathon runners.**

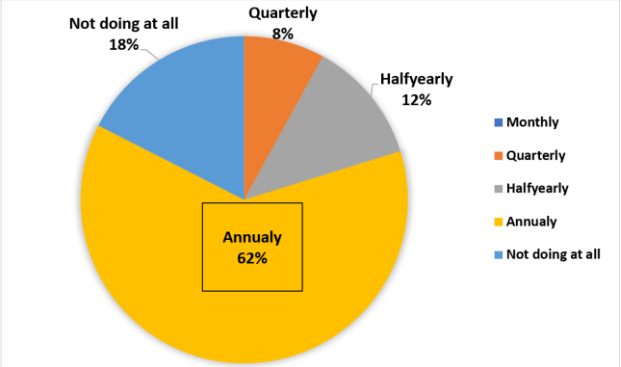


**Figure 2: Periodicity of the medical health checkups amongst the marathon runners.**

The vast majority of participants, specifically 164 individuals, constituting 73.1% of the total sample, explicitly stated that they do not adhere to a routine regimen of medication to manage their chronic medical ailments. It was observed that within the subgroup of individuals diagnosed with diabetes, the prevailing approach to treatment involved the utilization of oral antidiabetic drugs (OADs) as the primary form of pharmacological intervention.

Around 213 individuals constituting 95% of the total participants, opt not to utilize any form of pain-relieving medications while engaging in the strenuous activity of running a marathon. Moreover, a substantial proportion, specifically 147 individuals accounting for 65.5% of the participants, exhibit a certain level of knowledge regarding the potential risks and adverse effects associated with the consumption of such medications. A minority group of 65 individuals, representing 29% of the total participants, appear to lack awareness concerning the necessary precautions to be adhered to when taking part in a marathon, particularly individuals with chronic medical conditions. When considering the aspect of medical health checkups, to a significant proportion, namely 139 individuals accounting for 62.3% of the total participants, adhere to the practice of undergoing these checkups on an

annual basis (Figure 2). A majority of the participants, specifically 156 individuals, accounting for 69.6% of the total, opt not to seek guidance and endorsement from a medical practitioner before engaging in a marathon event. Furthermore, 98 participants, representing 44% of the sample, were satisfied with the running-related medical services they received, while 35 individuals, making up 15.5% of the participants, indicated a high level of satisfaction with these services. In essence, a significant portion of the participants, precisely 214 individuals accounting for 95.5% of the total, acknowledged that their involvement in marathons has had a positive impact on their overall quality of life.

## DISCUSSION

Regular participation in marathon running has been shown to have both beneficial and detrimental effects on health. Running contributes to the prevention of chronic diseases by lowering the risks, such as cardiovascular disease.[16] Marathon runners exhibit greater metabolic fitness, aerobic performance, exercise metabolism, and skeletal muscle mitochondrial protein levels compared to sedentary individuals with matched cardiovascular fitness, age, gender, and BMI. Marathon running has also been found to significantly diminish the risk of coronary plaque prevalence by reducing relevant risk factors like hypertension and hyperlipidemia. Distance runners, including marathoners, have comparable favorable health outcomes regardless of mileage.[17,18]

The data from the present study showed that hypertension condition was prominently higher among the other co-morbid conditions. Few studies have found that middle-aged male marathon runners with high blood pressure (hypertension) exhibit more excessive exercise habits compared to those with normal blood pressure. Specifically, marathoners with high blood pressure had longer marathon histories, higher exercise intensity and duration, and shorter marathon completion times compared to those with normal blood pressure.[19]

Exercise-induced hypertension (EIH), where blood pressure spikes excessively during exercise, may be a risk factor for the development of coronary artery plaque in these middle-aged male marathoners. The prevalence of coronary artery plaque was higher in marathoners with EIH compared to those with normal blood pressure.[20] Studies have shown that marathon runners had increased aortic stiffness (a measure of arterial aging) compared to controls, but this difference was attenuated after accounting for differences in blood pressure.[21]

Glycemic control is the main challenge for T1D runners and a key indicator of achievement in the "domestication" process. A study compared the prevalence of metabolic conditions like hypertension, hypercholesterolemia, and diabetes across different levels of marathon participation. The results suggest that more frequent marathon running is associated with lower prevalence of these conditions, even when accounting for total annual running mileage. However, the authors note that this cross-sectional association does not prove causality-individuals predisposed to these conditions may be less likely to participate in marathons in the first place.[22] Additionally, a study on continuous glucose monitoring in diabetic long-distance runners found that they experienced frequent glycemic excursions, both hypo- and hyperglycemic, during a marathon.[23] Athletes with mild to moderate asthma can possess high aerobic fitness and develop a high degree of endurance, allowing them to successfully participate in endurance running at a competitive level.[24]

A study found that 35.29% of marathon runners and 22.22% of half-marathon runners experienced a decline in forced expiratory volume in 1 second (FEV1) of ≥10%, indicating the presence of exercise-induced bronchoconstriction (EIB).[25] The data obtained from the present study highlights that diabetes, lipid alteration and asthmatic condition in marathon participants was prevalent, indicating that chronic co-morbid conditions affect the overall performance of the marathon runner. Developing a comprehensive treatment plan with a healthcare provider is crucial for the management of the co-morbidities and optimizing the running performance.

The data from the study suggested that most of the marathon runners undergo medical checkup once in a year. Periodic health checkups are crucial for marathon runners to mitigate the risks associated with intense physical activity. Several studies highlight the importance of pre-race medical screening and targeted educational interventions to reduce the likelihood of acute medical complications during a marathon.

A study discusses the demographic changes in marathon participants, with about 50% being older than 40 years. It highlights that medical staff encounter sudden deaths every 2 to 3 years and sudden cardiac arrests annually. The study suggests that online prerace medical screening and targeted educational interventions can significantly reduce the risk of acute medical complications during a race.[26] The understanding of the present data obtained collectively emphasize the necessity of periodic health checkups for marathon runners to ensure their safety and overall health.

This online survey has some potential limitations. Since data is only collected at a single point in time, it is difficult to determine whether the observed associations represent true causal effects or are simply correlation. Additionally, self-reported data collected through digital questionnaires may be subject to recall bias and social desirability bias. Respondents may not accurately remember or report their behaviours, attitudes, and experiences. Questionnaire-based studies provide a snapshot of a situation at a single moment, offering limited depth compared to other research methods.

## CONCLUSION

In summary, the research indicates a lack of awareness among many marathon runners. The findings of this study revealed a noticeable deficiency in understanding regarding comorbidities and the essentiality of adopting a healthcare-seeking approach among marathon runners. It is imperative to deliver targeted medical awareness and education to marathon runners, especially those with concurrent health conditions, as well as to the entire running community. This proactive approach aims to mitigate the broader impact of such health issues.

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