A STUDY TO ASSESS THE KNOWLEDGE REGARDING PREVENTION OF MUSCULOSKELETAL INJURIES DURING RUNNING AMONG MARATHON RUNNERS IN SELECTED REGIONS OF MAHARASHTRA IN VIEW TO DEVELOP THE INFORMATION BOOKLET

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ABSTRACT

Background:

Health and fitness as an invention presently drive India's metropolitan market. Publics are now prepared to expend a rational quantity of their money going to the gym, health devices such as Fit bit and much more. Running actions or we can say Marathon events are now a day's more and more popular in India, especially in Metropolitan cities. Marathons and also difficult races like the Devil Circuit and iron man races are a huge success in India. The number of professional athletes in India who trained year-round to participate in marathons is increasing at a rate of three times a year. Running is a popular activity among the many professionals and the general public due to its health advantages as well as its practicality and low cost.

Objectives

This research carried out by researcher with following objectives:-

1. *To assess the existing knowledge of marathon runners regarding prevention of musculoskeletal injuries during marathon.*
2. *To find out association between knowledge and demographic variables.*
3. *To find out the risk factors of musculoskeletal injury.*
4. *To develop and validate the information booklet for marathon runners.*

Methodology:

Research design

In this study, researcher uses the non-experimental research design with descriptive survey. Along with that researcher associate knowledge score which obtain by researcher with the help of questionnaire with demographic variables.

Tool and Technique

The tool prepared by the researcher consist of the questions to collect the data regarding demographic variables and knowledge-based questions related to marathon. The tool is divided into three parts as follows. ***Section I*** *Includes 7 items related to the demographic variables of respondents about age, gender, education, occupation, type of work, diet pattern, BMI.* ***Section II*** *Question related Health Habits and general information regarding marathon were included. In* ***Section III*** *total 22 questions were included in this section which were related to knowledge regarding Marathon. All questions are multiple choice based. Total score for the knowledge score is 60 which is divided in four categories. The four categories are excellent (above 71%), good (51 to 70%), average (36 to 50%) and poor (up to 35%). Content validity of a tool is established by obtaining the suggestions from the experts. Reliability was tested on 10% subjects by Test-retest method and it comes 0.89 which indicates an acceptable level of knowledge questionnaire tool and shows the tool is reliable.*

Major findings of the study:

Descriptive Statistics: *Frequency and Percentage distribution is used to analyse the selected demographic variables. Mean and standard deviation is used to assess the levels of knowledge score.*

Inferential Statistics: *ANNOVA test was used for the association of demographic variables and knowledge score of the participants.*

MAJOR FINDINGS OF THE STUDY:

In this research study, majority 236 (59.00%) samples were having good knowledge score, followed by 90 (22.50%) having excellent score, and 72 (18.00%) having average knowledge score and only 02 (0.50%) poor knowledge regarding marathon among total 400 study samples.

Regarding association of knowledge score with different demographic variables

For demographic variable age F value (2.22), education F value (6.52), diet F value (4.42) and BMI F value (3.36), are associated with knowledge score regarding prevention of musculoskeletal injury associated with marathon running shows corresponding p value is (0.001), (0.002),(0.001) and (0.001) respectively [with CI 95%] which is less than 0.05. (N = 400). Which means that they are associated with knowledge score regarding marathon preparation.For demographic variable gender F value (0.68), occupation F value (0.40), type of work F value (0.55), in association test with knowledge score regarding prevention of musculoskeletal injury associated with marathon running, whereas corresponding p value is (0.42), (0.42), and (0.55) respectively with [CI 95%] which is more than 0.05. (N = 400). Which means that they are not associated with knowledge score. That means in this research, H0 is rejected and H1 is accepted i. e. there is association of knowledge with demographic variables regarding running related musculoskeletal injuries occur during marathon among the participants of marathon. It is inferred by this research study that there is significant association between knowledge score of with selected demographic variables.

Regarding association of knowledge score with health habits and different marathon related questions

This study reveals that knowledge level regarding prevention of musculoskeletal injuries associated with marathon running among the samples of the research with selected variables of health habits and general information of marathon. ANNOVA test was carried out and the results shows that, how many times you take junk food in mouth? (F value 8.84) and corresponding p value (0.003), Daily exercise (F value 23) and corresponding p value 0.00, duration of exercise (F value 10.12)and correspondingp value 0.002 and previous participation of marathon (F value 12.48)and correspondingp value 0.001, would you consider yourself as? (F value 2.22) and corresponding p value 0.01, have you ever engaged in effort sessions, interval training, or speed workouts? (F value 4.41)and correspondingp value 0.001Do you think training is required for marathon running? (F value 12.22) and corresponding p value 0.002, Are you following a plan for marathon? (F value 6.6323)and correspondingp value 0.001. These questions have significant association with knowledge score as p value is less than 0.05 [with CI 95%]. Hence, the null hypothesis H0 is in rejection side and the alternative research hypothesis H1 is in acceptance side. It may be concluded that there was a strong correlation between the knowledge score and a selected demographic factors.

Conclusion:

In this researcher found that knowledge level among the participants of the marathon regarding prevention of running related musculoskeletal injuries not sufficient to prevent injuries. There are so many lacking areas where knowledge level can be increase. Also there is significant association between different demographic variables and marathon related variable. Furthermore different demographic variable age, gender, diet pattern, BMI and ill habits are some important risk factors for the runner identified by researcher. By this all researcher find out plethora of points where researcher added in the information booklet which will be helpful for the general people and marathon runners for their training.

Key worlds: *BMI:- Body mass index, WHO:- World health Organization. ECG:- Electrocardiogram*

Introduction:

Endurance running is a terrific approach to enhance endurance and help lower cholesterol for both leisure and competition. Running is an accessible and simple exercise that is practiced by strong people in various parts of the world. In affluent countries, the popularity of running has risen substantially in recent years, as evidenced by the proliferation of fun runs, marathons, and

fundraising activities. Musculoskeletal injuries are unfortunately a typical side effect of involvement, particularly among high-risk rookie users. Over the past 3-4 years, it has been seen at a maximum 5 and 10 km participation. 65% of runs in India are 10K or less. In the winter months of the calendar year after year, runners frequently cross a bit from spectators to participants, and it is evident that short runs are the money-makers. There are 50 full marathons in addition to the 1000 runs (42.195 km). One of the most popular sports in the world is running. Due to many health advantages and low operating expenses, the number of participants has steadily increased over the past few decades. A running injury, on the other hand, should not be taken lightly. Running injuries/bone injuries have been documented in varied degrees, depending on wounded people and educated sportsmen. Running delivers energy to the body two or three times the runner's weight through the repetitive force of each foot strike. Leg cramps, muscle spasms, and ankle and knee injuries are also common. During long distance races, 30 percent to 81 percent of marathon runners reported gastrointestinal (GI) issues. Constipation, cramps, nausea, vomiting, diarrhoea, and a loss of self-control are all possible side effects of running. Training for marathon run can disclose if you have a congenital or acquired heart problem, or if you have hypertension (HTN). An athlete's risk of sudden death is between 1.95 and 2.0, according to a prospective 21-year study of unexpected deaths among young and aged (12-35 years old) participating athletes. Hyponatremia is a significant adverse effect associated with a marathon's electrolyte. Hyponatremia can cause a variety of symptoms, including fainting, dizziness, and weakness, as well as unconsciousness, mood fluctuations, cerebral and pulmonary edema, coma, and death. Up to 75% of the energy generated in the body should be lost as heat during activity. Blood is diverted to the muscles during activity, which reduces renal perfusion. Exercise-induced renal impairment can range from minor alterations in kidney function to complete renal failure.

REVIEW OF LITERATURE:

Fredericson, M. et al. (2007) examined their research in relation to epidemiology and aetiology of marathon running injuries. Active marathons have seen a significant rise in popularity over the last 10-15 years. Runners of all ages have been injured in numerous articles, and the number of yearly injury cases has been estimated to be almost as high as 90% of marathon training. The majority of these investigations have been group and retrospective studies so far, with only a few potential studies. However, based on the research, it is obvious that experienced athletes have a decreased risk of musculoskeletal injury, with the couple of years running in relation to injury occurrence. It is critical for all runners to fully heal from any illness or injury before attempting a marathon. A graduate training programme appears to clearly aid prevent injury for people with limited experience, with extra care taken to avoid any rapid rise in endurance or strength, with the largest risk of injury occurring when the 40-

mile/week restriction is surpassed. The most prevalent injury in both men and women occurred well away from the knees, and was usually an interior issue (e.g. Patellofemoral syndrome). Men's knee injuries, Iliotibial band friction syndrome, plantar fasciitis, tibial stress syndrome, Achilles tendonitis, and plantar fasciitis were all addressed

Bojana Galic et al. (2014) On November 4, 2021, the Global Performance Statistics were revised. As per the "International Institute for Race Medicine" (IIRM) State of Running 2019 research, race involvement has drastically reducedabove the previous two years owing to chronic disease, although running is still a common form of fitness for many people worldwide. Over the past 10 years, there has been a more than 50% growth in race participation, with participants signing up for 5K, 10K, half-marathon, marathon, and other distances. The majority of racing takes place in Ireland, where around 24,500 persons, or about 0.5 percent of the population, participate in it. The Netherlands' population is racially varied to an extent of 0.2 percent (about 34,600 persons). Approximately 133,300 individuals, or 0.2% of the population of the United Kingdom, consider as ethnic. The US population as a whole only numbers 328,200 multiracial people, or 0.1 percent. When tried to compare to other distances, the Philippines, South Africa, and the United States always had the best results for 5K runners.When considered to other distances, the IIRM reports that the countries with the most 10K runners are Denmark and Norway. According to the IIRM, when compared to runners of other distances, the Czech Republic and France have the most half-marathoners. According to Run Repeat's Marathon Statistics 2019 Worldwide report, Switzerland has the fastest marathon runners in the worldwide, with an average time of 3 hours, 50 minutes. With an average finish time of 5 hours and 25 minutes, the Philippines is host to some of the quickest competitions. The State of Ultra Running 2020, a study released by Run Repeat, found that South Africans are the fastest ultramarathon runners, with an average pace of ten min and 36 seconds per mile.According to the International Trail Running Association, Finland holds the world's largest female trail race at 43%. (108)

Ristolainen, L. et al. (2010), A 12-month retrospective analysis was done. The injury profile of cyclist, long distance runners, swimmers, and soccer players is connected to the range of sports involved in the study. The prevalence of sports injuries was compared among 149 international cyclists, 143 long-distance runners, 154 riders, and 128 soccer players aged 15 to 35 during this 12-month study. Soccer had a substantially higher injury rate than other sports (5.1 per 1000 exposure period) (2.1-2.8, P 0.001). Athletes had more significant injuries that soccer players (59 percent vs. 42 percent, P = 0.005), despite the fact that soccer players, runners, and skiers were all found on foot. Swimmers experienced more serious shoulder injuries than ice skiers (40 percent vs. 1%, P 0.001), despite the fact that both sports put a lot of strain on the shoulders.

Skiers (80%) and swimmers (58%) had serious injuries, as did cyclists. The time spent out of sports due to injuries was substantially longer in football and running than in skiing and swimming. The incident did not result in permanent disability, but it did cause seven women to cease participating in sports. Finally, as evidenced by the disparity in shoulder injuries across swimmers and skiers across the country, the kind of giving load is highly associated with the site of injury severity. Outside of a major event, a high majority of serious injuries occur in several sports.

Krabak, B. J et al. (2011), Injury and illness rates in Multiday Ultramarathon Runners were studied. The main purpose of this study is to characterise the kind of injuries and diseases that athletes who compete in 7-day, 250-kilometer off-road ultra-marathons suffer from. Between 2005 and 2006, a total of 396 racers participated in the Racing the Planet 4 Desert Series ultramarathon competitions. The descriptive analytic method was used to examine overall injury/illness rates, injury or illness categories, and diagnose all medical visits. Multivariate line deflection was used to calculate the risk of injury or illness as well as the 95 percent confidence intervals for age, gender, and race time. The findings showed ageneral injury/illness rate of 3.86 per runner and 65 per 1000 km ran, with 85 % of the runners representing 1173 medical organizations in need of medical assistance. Due to muscular injuries (18.2%), skin problems (74.3%),and medical conditions, about 95 percent were modest in size (7.5 percent). On the first day of the race, medical negligence was more common, skin and musculoskeletal injuries were more likely on the third and fourth days. The rise was linked to 0.5 minor injuries or illnesses over ten years, and women had 0.16 more infections than men. Apart from the severe climate and challenging locations of multiday ultramarathon racing, the major injuries or illnesses are less natural, according to the findings of this study. Additional factors that lead to injury will need to be evaluated in future investigations.

Hsu C. L et al.(2020), from 2013 to 2018, researchers looked into frequent muscle injuries and related risks among Taroko Gorge marathon runners. The events and dangers linked with running injuries, such as person encountered while marathons, teach us a lot. However, a considerable number of accounts be in the appropriate literature for the gorge-terrain marathon. As a result, the purpose of this study is to look at the incidence of muscle injury among participants in the Taroko Gorge Marathons in Taiwan from 2013 to 2018, as well as the prevalence of running injuries and risk variables. A total 718 runners visited the physiotherapy station, providing medical and injury records as well as completing a list of injuries related to training and injuries for statistical analysis. Risk factors and their relationshipand injuries has been assessed by asset disposal. After the gorge marathon, the following parts of the lower extremity were injured: Knees are 28 percent, back calves are 20 percent, thighs are 13 percent, ankles are 10 percent, and feet are 8 percent.

Male runners had a greater risk of hamstring problem than female runners, according to injury risk-related risk variables. Athletes who were underweight had an increased incidence of hamstring problem (OR = 3.35, p = 0.006). Researchers infer that injuries to the knees, calf, thigh, and foot have increased significantly in the canyon race. The findings from this study can be used by medical experts, trainers, and runners to lessen the risk of injury when running marathons

METHODOLOGY:

In this study, the researcher used the Non-Experimental - Descriptive survey, Quantitative research approach, population of the research was a Clients who have participated in the marathon, target population of the research was Clients who have participated in the marathon of Metropolitan city, assessable population of the research was Clients who have participated and are going to participate in the marathon and available during the period of study and who meet the inclusion, Clients who have participated in the marathon and available at the time of study**,** in this study 400 samples (power analysis), Administration of Demographic data tool &the Questionnaire prepared by the researcher

Sampling:

The subjects of this study are those who have participated in or intend to enrol in the Maharashtra State Marathon and were present at the time the data were collected. Additionally, those who meet the inclusion and exclusion criteria established for the research project and are willing to take part in the study. The sample size was obtained using power analysis. Thus 400 samples were taken for the study.

Inclusion Criteria:

In this study-

- Clients who are willing to participate in the marathon race.
- Clients who are willing to participate in research study.
- Clients who are present during data collection.
- Clients who are mentally and physically fit.
- Clients with all age group and gender.

Data Collection Procedure:

Data is collected at various points and stages in time from a variety of samples because organisations and researchers always work hard to make effective judgments using data. Prior to starting data collection, formal administration permission was gained. The researcher prepared and adhered to the plan of the data gathering process as follows: -

- The researcher approached the various marathon organizer before a main study to obtain permission to conduct the study and collect the data from various group of the marathon.
- Before the study, necessary electronic consent forms were filled up by the subjects.

Period of data collection

The data gathering process commenced from 3rd July 2021 to 11th September 2021. The necessary approval and permission was

obtained from the marathon's organisers and relevant authorities.

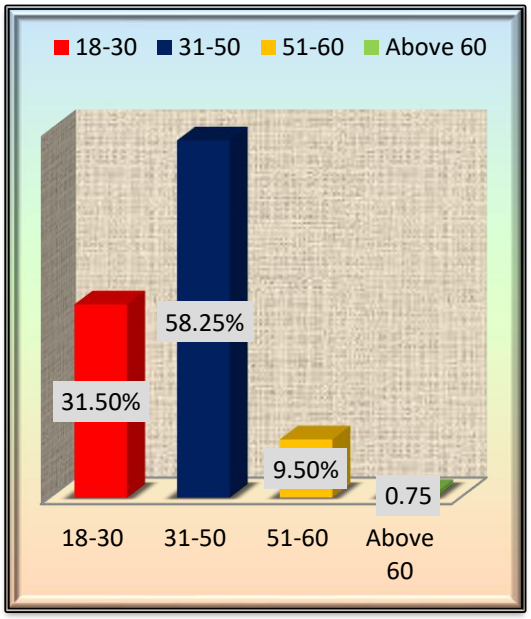
1. The researcher introduced self to the participants, then gave a brief explanation of the study's objectives, and informed the participants that the information they provided would be kept private. The subjects were then asked to electronically sign off on their involvement in the trial as covid - 19 illness background.
2. The researcher used a variety of strategies to choose the study samples for the research before settling on the non-probability handy sampling strategy.
3. The various group of the marathon were identified from various cities of Maharashtra and all participants were contacted with telephonic conversation on the covid – 19 background.
4. On an average, total 500 samples were included in the study and Google link was prepared by the researcher which include all the knowledge based questions. This link filled by the 400 samples.On an average, total 500 samples were included in the study and Google link was prepared by the researcher which include all the knowledge based questions. This link filled by the 400 samples.

DATA ANALYSIS & INTERPRETATION

The collected data was tabulated, organized and analysed by using descriptive and inferential statistics.

- Section I: Demographic Data of Respondent
- Section II: Question related Health Habits and general information regarding marathon
- Section III: Assessment of knowledge score regarding marathon
- Section IV: Association between knowledge and demographic variables
- Section V: Find out the risk factors of musculoskeletal injury
- Section VI: Develop and validate the information booklet for marathon runners and Assessment of risk factors of musculoskeletal injury.

Section I: Demographic Data of Respondent



In this research study, majority (58.25%) samples were from the age group 31-50, followed by (31.50%) were from the 18-30 years, (9.50%) were from the 51-60 years and (0.75%) were in age group of above 60 years. So, by this we can say that the maximum age group who participate in marathon is of 31 to 50 years age group. After the age of 60

years as the problems associate with the joints and other musculoskeletal problems increase the rate of participation decreases. Decreased muscle strength and flexibility resulting in aging have been stated and may contribute to specific biomechanical changes observed in an older athlete. Athletes who are usually classified as "older" are over 50 years old. Growing older is directly correlated with high impact force, high loading rate, and regulated running speed. Additionally, as time passes, the sagittal plane's knees move less often. Thus, the standing phase lowers their ability to absorb. Finally, elderly runners showed decreased rear foot dorsiflexion height and a range of motion in the tibial plane.For older women, intra-knee movement, ankle eversion movement, and knee lifting time decreases during running while loading rate is increased.

Section II: Question related Health Habits and general information regarding marathon.

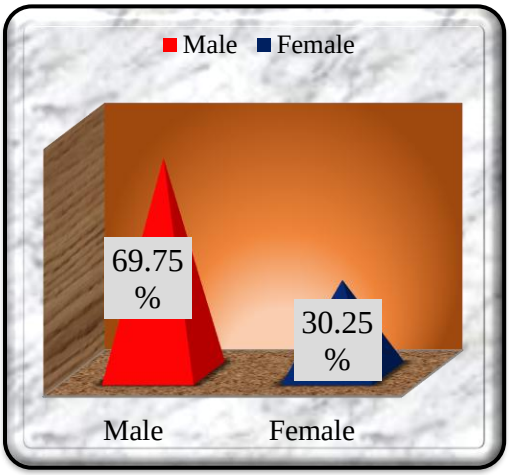
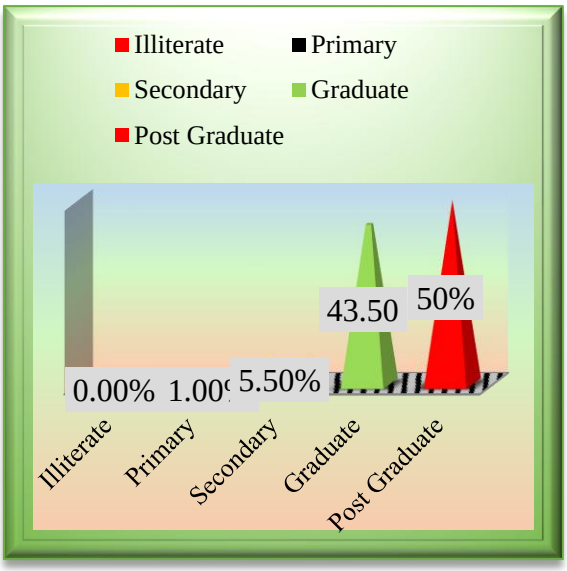


Figure No-4.2: Distribution of samples according to Gender

Above table and following figure depicts that, according to sex in the study most of them were males (69.75%), followed by (30.25%) were female. The participation interest among the male candidates is more in India. There are numerous studies shows that men have more interest in running marathon. In India, however, while women are still far from tilting the balance their way, they have been steadily closing the gender gap. When it comes to exercising, Indian women face a number of challenges, but they are making progress thanks to a women's-only running circle and a burgeoning network of athletes.

Section III: Assessment of knowledge score regarding marathon



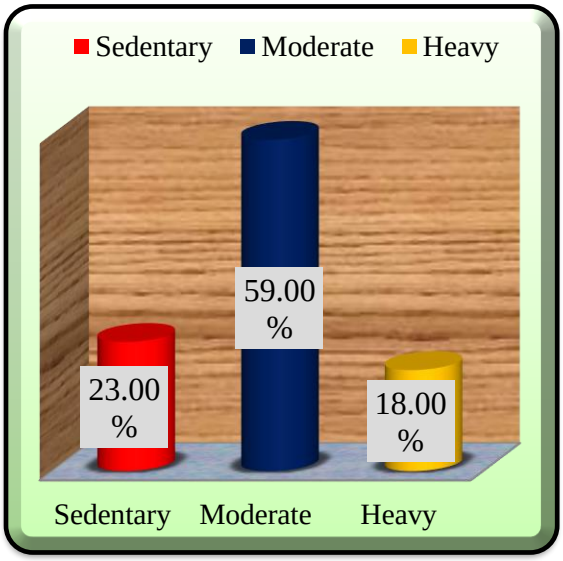
In this study, above table and following figure depicts that, according to Education participation interest is majority (50%)

samples were having Post Graduate and above education, followed by (43.50%) having Graduate, and (5.00%) having Secondary education, and only (1%) having Primary Education qualification. So, it can be stated that marathon is a race moreover run by literate people. Awareness regarding marathon competition is less at village level. Most of the runners in marathon run were found to be participate as their part of status.

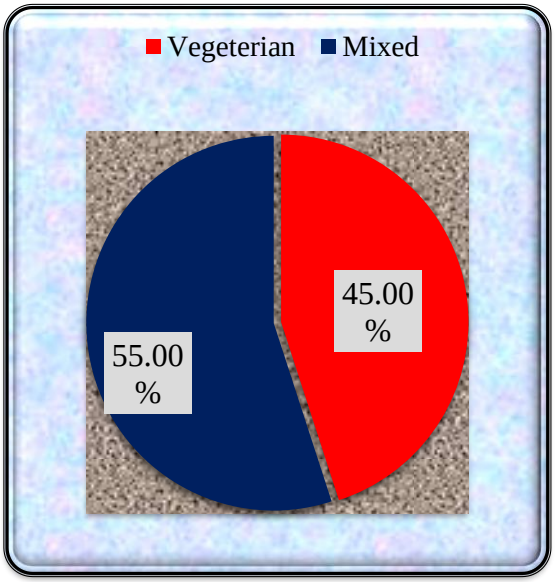
- Section IV: Association between knowledge and demographic variables

The figures in the above table and figure reveal that, majority (82.75%) samples were employed and only (17.25%) were unemployed. People will continue participate in marathons even if the cost of entry increases since they are very inelastic. Before the event ever takes place, the expenses of staging a marathon from licenses to advertising costs take months.

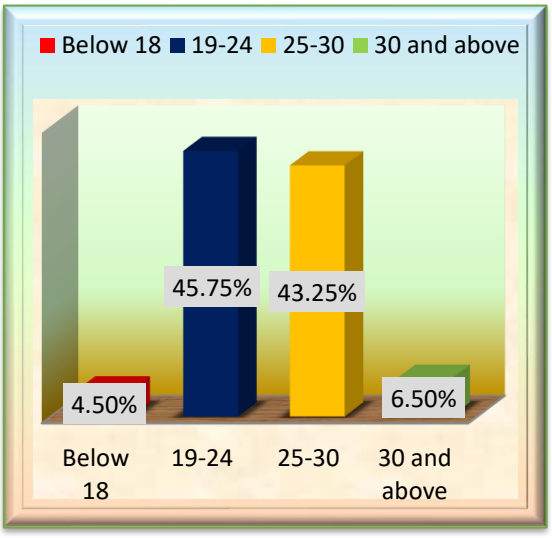
Section V: Find out the risk factors of musculoskeletal injury



In this study above table and figure depicts that, majority (59.00%) samples were doing moderate work, followed by (23.00%) having sedentary working style, and only (18.00%) having heavy type of work. Participation in marathon is more found among the moderate type of workers. Whereas very less participation was found among the sedentary as well as heavy types of workers in the past research studies. Moderate type of workers can get time for training as well as for participation than heavy workers.



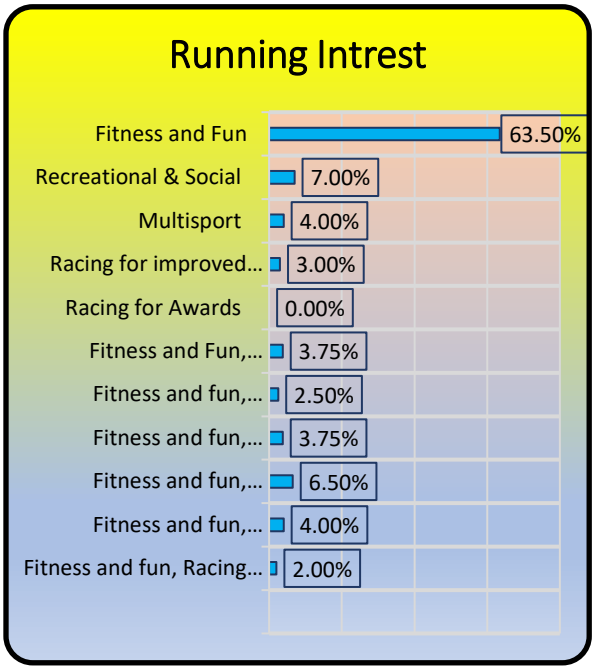
Section VI: Develop and validate the information booklet for marathon runners and Assessment of risk factors of musculoskeletal injury



In this study, the above table also the figures shows that majority (45.75%) samples were having BMI 19-24, followed by (43.25%) between 25-30 BMI score, (6.50%) 30 and aboveand (4.50%) below 18. Obesity is a worldwide problem, reaching epidemic proportions in several countries. According to the WHO, one in six people on Earth (about one billion) are overweight, and disturbingly, and over 300 million of them are obese. Obesity is becoming a global epidemic, including in India. Musculoskeletal injuries are more likely to occur as fat increases. Additionally, obese individuals require additional training to successfully complete the marathon. A useful performance measure is the body mass index (BMI).

Below the Distribution of the samples according to running interest

In this study running interest of samples in marathon shows that, majority (63.50%) samples were running for fitness and fun, rest all are less. (7%) samples are running for recreational and social purpose, and (6.5%) are running for fitness and fun, recreational and social, multisport, and (4%) samples are running for Multisport, and exactly same samples are running for fitness and fun, Multisport, followed by (3.75%) samples running for Fitness and fun, Recreational and social, and same number of samples are running for Fitness and Fun, Recreational & Social, Multisport, racing for improved performance, Racing for Awards. (3 %) samples are running for racing to improve performance and (2.5%) samples are running Fitness and Fun, Recreational & Social, Multisport, racing for improved performance and only (2%) samples are running for fitness and fun, racing for improved performance.



Conclusion:

In this research study, majority 236 (59.00%) samples were having good knowledge score, followed by 90 (22.50%) having excellent score, and 72 (18.00%) having average knowledge score and only 02 (0.50%) poor knowledge regarding marathon among total 400 study samples. Among the specific demographic variable age, gender, diet pattern, BMI and ill habits are some important risk factors for the marathon runners to cause musculoskeletal injury. As the age increases level of calcium in bones decreases i.e. hypocalcaemia and also muscle strength become less which prone the person for injury.

Recommendations:

On the basis of the findings of the study, following recommendation have been suggested;

- A large sample can be used for a comparable research.
- A comparative study can undertake to evaluate the knowledge level associated with prevention of musculoskeletal injuries among marathon runners of selected districts of Maharashtra.
- A study can be conducted to evaluate effectiveness of information booklet on prevention of running related injuries occur during and after marathon run.
- A comparative study can be conducted between varies district or group of marathon runners.
- A study can be conducted at various setting.
- A study can be carry out to assess the effectiveness of information booklet over the knowledge of participants.

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