CHAPTER-II

REVIEW OF RELATED LITERATURE

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2.1 Review of Related Literature

In order to acquire a complete picture of what has been done and proposed with reference to the subject under study, a review of pertinent and related literature is a necessary first step. Such a review results in greater understanding and a clearer perspective of the entire field. A brief summary of the research articles that have been published in connection with the current study has been provided by the researcher.

Kumar (2022) study is to determine the effects of various repetition endurance training packages on the physiological, psychological, and physical fitness of middle distance runners from polytechnic institutions. 60 male middle distance runners between the ages of 16 and 18 were chosen as subjects for the purpose from different polytechnic institutes in the Kanchipuram District of Tamil Nadu. Three experimental groups and one control group were divided equally into four groups. Before the training began, pre-tests were administered to all subjects on a set of dependent variables. Experimental group I received package I of repetition-based endurance training, experimental group II received package II of repetition-based endurance training, experimental group III received package III of combined repetition-based endurance training, and control group received no additional training beyond their regular routine. The experimental groups could only train for a total of 12 weeks. After a 12-week training session, post-tests were administered. The gathered data were analysed using ANCOVA and Scheffe's post hoc test. According to the study, compared to all other groups, the combined repetition endurance training package significantly improved on the selected dependent variables, including speed endurance, aerobic endurance, resting pulse rate, respiratory rate, vital capacity, anxiety, stress, and aggression.

Assefa (2020) in this study, 30 long distance runners from the Dembecha Beruh Tesfa U-17 athletics project were examined to see how continuous and non-continuous training methods affected their levels of aerobic endurance. The remaining 15 participants were divided into two groups: continuous training (15) and non-continuous training (15). The mean chronological age and training age for the continuous training group were determined to be 15.73 and 3.2, respectively, whereas 15.733 and 3.33 for the non-continuous training group. In order to gauge the athletes' level of aerobic endurance, this study also included performance evaluation tests, such as the 3-minute step test, 12-minute run test, and 2.4-kilometer run test. To determine whether there was a significant difference between pre- and post-test results after 8 weeks of continuous training and non-constant training, a paired sample t-test was used to assess the effects of both training modalities. An independent sample t-test with an alpha value of p .05 was used to compare the results of the two groups on athletes' aerobic fitness as well. The results of this study showed that non-contiguous training groups produce greater improvements in aerobic fitness tests than continuous training methods (i.e., in the 3 minute step test, the non-continuous training group's mean score was 84.21.567 and 86.41.549, respectively, at p=0.000; in the 2.4 km run test, the non-continuous group's mean was 0:07:05.340:00:02.66 and 0:07:09.720:00:03. The study therefore came to the conclusion that an 8-week non-continuous training programme was more effective than a continuous programme at increasing an athlete's aerobic fitness.

Krishnan et al. (2020) study's objective was to determine how continuous training and interval training affected university and college-aged male students' resting pulse rates, vital capacities, and VO2 max. To fulfil the study's objectives, 45 male students from Delhi University College in Delhi, India, were chosen at random to serve as subjects. The person is between the ages of 18 and 25. Three groups—Experimental group I, Experimental group II, and Control group III—were formed from the subject. Group III served as the control group; they only engaged in their regular activities. Experimental groups I and II had continuous training, while experimental group III underwent interval training. Using a conventional test, the following physiological factors were evaluated. Digital Heart Rate Measuring Machine, Model No. EW, measures resting pulse rate. Astrand-Rhyming Nomogram Test unit of measurement ml/kg/min, Vital Capacity assessed in millilitres by the spirometer, and VO2Max measured in beats per minute (bpm). Data from three groups' pre- and post-experimental periods were gathered. Using Analysis of Covariance (ANCOVA), the raw data for Resting Pulse Rate, Vital Capacity, and VO2 Max was statistically analysed. To ascertain the differences between the paired adjusted means that were statistically significant, Scheffe's post hoc test was used. The 0.05 level of significance was set in each case. The study's findings indicated that the resting pulse had greatly improved. The study's findings indicated that, when comparing the experimental group to the control group, there was a substantial improvement in resting pulse rate, vital capacity, and VO2 max.

Kumar and Kumar (2020) study aims to determine how specific physiological factors in long-distance runners are affected by uphill training. Male long-distance runners from the Hyderabad district are used as the research's data sources in this study. It was decided to focus on 30 male long-distance runners who had competed in collegiate competitions for this study's subject matter. The subject matter's age ranged from 18 to 25 years old. Below are the criteria measurements used in the study to measure the physical and physiological characteristics. The effect of uphill training on specific physical variables and physiological variables among long-distance runners was examined using the independent "t"-test with a 0.05 level of significance to measure the physical variables, 600 m run for speed endurance, 12 min run and walk for cardio respiratory endurance, pulse count for resting pulse rate, and Harvard step test for VO2 max. The experimental groups differed significantly in terms of VO2 max, resting heart rate, cardiopulmonary endurance, and speed endurance.

Paavolainen et al. (2020) 10 experimental (E) and 8 control (C) endurance athletes trained for 9 weeks to examine the impact of concurrent explosive-strength and endurance training on physical performance attributes. Both groups received the same amount of training overall, but 32% of the training in group E and 3% of the training in group C were substituted by explosive-style strength training. On a track, measurements were taken during a 5-km time trial (5K), running economy (RE), maximal 20-m speed (Vo2 max), and 5-jump (5J) tests. Maximal oxygen uptake (VO2 max) and maximal velocity in the maximal anaerobic (VMART) and aerobic treadmill running tests were calculated. Compared to C, E showed improvements in the 5K time, RE, and VMART (P 0.05). V20m and 5J were found to be higher in E (P 0.01) and lower in C (P 0.05). V O2max rose in C (P 0.05), but E showed no changes. The increases in RE (O2 uptake (r = 0.54) and VMART (r = 0.55) during the nine weeks of training were correlated (P 0.05) with the changes in 5K velocity in the pooled data. The present concurrent explosive-strength and endurance training, in well-trained endurance athletes, enhanced the 5K time without affecting their

VO2 max. This improvement was brought about by better neuromuscular traits, which also led to better VMART and running economy.

Vigneshwaran and Sundar (2020) study is to determine how long distance athletes' fitness levels are affected by interval training and strength endurance training. The athletes competing in intercollegiate athletic competitions were the subjects chosen. The courses were chosen at the Alagappa Government Arts College and the Alagappa University College of Physical Education in Karaikudi. The students are chosen at random, and they range in age from 18 to 23. The chosen subjects (N=30) were proportionately and randomly split into three groups. College distance runners were put into two equal groups at random. Each group had ten participants. Group II experienced strength and endurance training, Group III served as the control group, and Experimental Group I underwent interval training. For an eight-week period, the experimental groups received their respective instruction for one and a half hours per day, three days each week. Speed, Cardio respiratory Endurance and Muscular Strength are all measured in seconds, metres, and counts, respectively. To ascertain the variance in group means, the dependent 't' test was used. to determine whether the experimental and control groups differed in any way that was significant. A predetermined level of confidence of 0.05 was used to examine the level of significance of the difference between the means. The study's findings indicate that long-distance athletes' speed, cardio respiratory endurance, and muscular strength have all significantly improved. Conclusion: Long distance athletes benefit from consistent practise of Interval and Strength Endurance training since it improves speed, cardio respiratory endurance, and muscular strength.

Arunprasanna et al. (2019) study is to determine the effects of continuous running, running at a different pace, and combined training on the selected motor fitness variable (muscular endurance), physiological variable (breath holding time), and hematological variable (red blood cells) in male athletes from colleges that are affiliated with Alagappa University. A total of 40 athletes between the ages of 17 and 25 were chosen at random for the study, and they were separated into four equally sized groups: experimental groups A, B, C, and D, which each contained 10 athletes. The groups underwent the training exercises for a total of twelve weeks on a three-a-week schedule, while the control group did nothing.

Analysis of Covariance was used to analyse the data collected before and after the training programme, with a fixed level of significance set at 0.05. In order to assess the differences that occur significantly between the paired means, Scheffe's test was conducted at the significance of the F ratio. The results of the study showed that the combined group with the two endurance trainings outperformed the other groups in the selected variables.

Mena (2019) Effect of resistance training on high-level 800 m athletes' physical performance. A comparison between circuit training with high-speed resistance training. This study investigated how two resistance training regimens affected high-level 800 m athletes' physical performance and hormonal reaction over the course of 25 weeks. The high-speed resistance training group (RTG) (n = 6) and the circuit training group (CTG) (n = 7) were each made up of 30 male athletes. Sprint and 800 m running, strength training, and blood hormone testing were all part of three tests (T1, T2, and T3).The 800 m performance of both groups improved. Hoverer, RTG, improved further in 200 metres. Squats and countermovement jumps (CMJ), whereas CTG reached unclear/possibly negative effects in the other strength metrics examined. In terms of hormones, RTG caused a likely increase in testosterone (from T1 to T3), while CTG shown a likely increase in cortex (from T2 to T3), leaving the remaining hormones analysed undetermined. These findings show that high-speed, low-volume resistance training, as opposed to circuit training, improved strength and running performance more effectively and with less change in hormone response.

Panneerselvam (2019) study looked at the effects of step aerobic exercise and uphill training alone and in combination on a number of long distance runners' physical, physiological, and hematological characteristics. Sixty long distance runners from the Pudukkottai area of Tamil Nadu state, India, were chosen for this study's goal. The subject was between the ages of 18 and 25. The chosen participants were separated into four equal groups, each with fifteen participants, including a control group made up of long-distance runners and three experimental groups. For a period of twelve weeks, the experimental groups I and II conducted step aerobics training, uphill training, and step aerobics training with uphill training, respectively. The control group wasn't participating in any of training. Before the exercise period, a pre-test was conducted, and immediately following the twelve-week training session, a post-test was conducted. The training session lasted 90 minutes and involved three training groups. The four groups' collected data were statistically examined for significance using the analysis of covariance (ANCOVA), and the F ratio was calculated. To ascertain the paired mean when there are discrepancies, the Scheffe's test is used as a post-hoc test. For all situations, the level of significance was set at the.05 level of confidence. Long distance runners who underwent the chosen three training interventions significantly differed from the control group in terms of selected physical, physiological, and homological measures.

Prasanna and Vaithianathan (2019) study is to ascertain the impact of fartlek, continuous run, and alternative pace run training on the physiological variable (resting pulse rate) in male athletes from colleges that are associated with Alagappa University. 50 athletes between the ages of 17 and 25 were chosen at random for the study, and they were divided into five equally sized groups: experimental groups A, B, C, and D, each with 10 athletes, and control group E. The groups underwent the training exercises for a total of twelve weeks on a three-a-week schedule, while the control group did nothing. Analysis of Covariance was used to analyse the data collected before and after the training programme, with a fixed level of significance set at 0.05. In order to assess the differences that occur significantly between the paired means, Scheffe's test was conducted at the significance of the F ratio. The results of the study showed that the combined group with the three endurance trainings outperformed the other groups in the physiological variable that was chosen.

Engel et al. (2018) to evaluate original studies on HIIT's potential to improve anaerobic and endurance performance in juvenile and teenage athletes. The following were the inclusion requirements: (i) controlled trials comparing HIIT to an alternate training programme with a pre-post design; (ii) healthy young athletes (under the age of 18); and (iii) measuring variables relating to exercise performance and endurance. For the purpose of comparing any outcome between the experimental (HIIT) and alternative training protocols, Hedges' g effect size (ES) and related 95% confidence intervals were computed. This evaluation comprised 24 studies that involved 577 athletes with a mean age of 15.5 2.2 years. Peak oxygen consumption (VO2peak), running performance, the ability to sprint repeatedly, jumping performance, and sub maximal heart rate were not affected by HIIT or only slightly. Although the average increase in VO2peak from pre to post HIIT-interventions was 7.2 6.9% compared to 4.3 6.9% with any other alternative intervention, the mean ES for changes in VO2peak with HIIT is minimal (mean g = 0.100.28). Running speed and oxygen consumption at different lactate- or ventilator-based thresholds, as well as sprint running performance, were significantly and favorably influenced by HIIT. Calculations revealed negative mean ES for peak blood lactate concentrations (small) and change-of-direction abilities (big). The average length of each training session for HIIT was less time (28 15 min vs. 38 24 min) than for control therapies. The current research suggests that young athletes who engage in HIIT may enhance several critical elements of aerobic and anaerobic performance. When compared to other training methods, HIIT improved the majority of endurance-related metrics more than those others. HIIT did not, however, clearly outperform the alternative training protocols based on ES. However, because HIIT requires less time per training session, it may assist young athletes since it frees up more time for developing sport-specific skills.

Kumar (2018) study is to determine how hill training and fartlek training affect middle- and long-distance runners' development of aerobic fitness. 45 middle and long-distance runners between the ages of 18 and 20 who have competed in several middle and long-distance competitions over the past three years make up the study's sample. Three equal groups of 15 were formed by randomly dividing the chosen subjects. Experimental Hill Training Group, Experimental Fartlek Training Group, and Control Group make up Group I, Group II, and Group III, respectively. For 12 weeks, in addition to their regular practice on other days, the experimental groups received training on alternate days. The Control Group received customary instruction. The 12 Minute Run Cooper Test was used to collect data for the Pre-Test and Post-Test for all groups. ANCOVA was used to statistically analyse the data that had been gathered. According to the study's findings, the experimental groups' aerobic fitness significantly increased as a result of hill training and fartlek training. Conclusion: Hill running and fartlek running are good for intermediate and long-distance runners because they make their lower body muscles stronger and increase their resistance to exhaustion, among other things. It promotes the growth of aerobic fitness.

Beattie et al. (2017) study was to examine the impact of a 40-week strength training intervention on competitive distance runners' strength (maximal and reactive strength), V-O2 max, economy, and body composition (body mass, fat mass, and lean mass). Twenty competitive distance runners were split into a control group (n = 9) and an intervention group (n = 11; 29.5 10.0 years; 72.8 6.6 kg; 1.83 0.08 m). Each participant underwent three examinations at weeks 0, 20, and 40. At weeks 20 (p 0.05) and 40 (p 0.05), the intervention group demonstrated significantly improved maximal and reactive strength characteristics, RE, and VO2max. At either time point, the control group didn't exhibit any discernible changes. Body composition characteristics did not differ significantly across or among groups. This study shows that 40 weeks of strength training can considerably enhance RE, VVO2max, and maximal and reactive strength qualities in competitive distance runners without causing concurrent hypertrophy.

G. Molina et al. (2017) study compared the impact of concurrent plyometric and running training for 8 weeks on rookie runners' spatiotemporal characteristics and physiological variables. 25 male participants were divided into two training groups at random: a running group (RG) with 11 participants and a running + plyometric group (RPG) with 14 individuals. Only the RPG conducted a concurrent plyometric training programme (two sessions per week), whereas both groups engaged in an 8-week running training regimen. Before and after the intervention, anthropometric, physiological (VO2max, heart rate, and RE) and spatiotemporal characteristics (contact and flight times, step rate, and length) were registered. When compared to RG, the RPG decreased step rate and lengthened flight times while maintaining the same running speeds (P .05), but contact times did not change. RPG for the squat jump and the five-bound test showed significant increases between pre- and post-training (P .05), whereas RG remained unaltered. Although peak speed and VO2max increased more in the RPG than in the RG, peak speed, ventilator threshold (VT) speed, and respiratory compensation threshold (RCT) speed increased (P .05) for both groups. In summary, concurrent plyometric and running training results in a decrease in step rate as well as gains in peak speed, VT speed, RCT speed, and VO2max. Plyometric exercise could be beneficial for athletes to increase their strength, which would help them run faster.

Periadurai (2017) study was to determine the impact of rigorous interval and fartlek training on a number of the physical and physiological characteristics of football school boys. In order to fulfil the study's objectives, 45 football players from the Tirunelveli district of Tamil Nadu, India, who competed at the district level, or n=45, were chosen. The chosen participants were divided into three equal groups of fifteen (n=15), including experimental and control groups. Analysis of covariance (ANCOVA) was performed to determine the significant difference between the experimental and control groups. The 't' test was employed to determine the significant improvement between pre and post-test means of both groups. The Scheffe's test was used as a post-hoc test to determine the paired mean difference whenever the adjusted test's 'F' ratio was determined to be significant. The 0.05 level of significance was set in each case to test the hypothesis. For district level school football players, the intensive interval training group had a much stronger impact on speed, speed endurance, and muscle endurance than fartlek training.

Sharma et al. (2017) identify the impact of training at 2100 m natural altitude on running speed (RS) during workouts of various intensities relevant to middle-distance running performance. Methods: In an observational study, 19 elite middle-distance runners (mean SD age 25 5 y, VO2max, 71 5 mL • kg-1 • min-1) completed either a 4- to 5-wk natural altitude-training camp living at 2100 m and training at 1400-2700 m (ALT, n = 12) or 4-6 weeks of sea-level training (CON, n = 7). A GPS watch was used to record each training session, and athletes also submitted a session rate of perceived exertion (sRPE) score. Groups of training sessions were created based on their length and rigour. Within ALT, RS (km/h) and sRPE were compared from paired training sessions finished at sea level and 2100 m, with sessions finished at sea level in CON indicating normal variance. Results: RS decreased in ALT when compared to sea level, with the highest decreases occurring during threshold and VO2max intensity sessions (5.8% and 3.6%, respectively). At a substantially higher sRPE (P =.04 and.05, respectively), the velocity of low-intensity and race-pace sessions done at a lower altitude (1400 m) and/or with additional rest was maintained in ALT. At any intensity in CON, there was no variation in either velocity or sRPE. Conclusion: At 2100 m natural altitude, RS in top middle-distance athletes is severely affected, with the degree of impairment varying with training load. A greater sense of exertion may be felt if RS is maintained at particular intensities when training at altitude.

Silva et al. (2017) examined how a 4-week high-intensity interval training programme affected the pacing tactics used by runners during a 5-km running trial. A total of 16 male recreational long-distance runners were randomly allocated to either the high-intensity interval training (HIIT) or control groups (CON, n=8). While the CON group continued their regular training regimen, the HIIT group engaged in twice-weekly high-intensity interval training. The runners underwent an incremental exercise test to exhaustion before and after the training period in order to gauge the start of blood lactate accumulation, their maximum oxygen uptake (VO2max), and their peak treadmill speed (PTS). A 5-km running trial on an outdoor track to determine pacing strategy and performance as well as a sub-maximal constant-speed test to assess running economy (RE) were also completed. Rating of perceived exertion (RPE) and time to complete the 5-km trial (T5) were recorded during the 5-km running trial. The HIIT group showed significant improvements of 7 and 5% for RE (P=0.012) and PTS (P=0.019) during the training period. VO2 max (P=0.495) and the start of blood lactate buildup (P=0.101) did not significantly differ across the groups. The parameters assessed during the 5-km trial conducted prior to the training period did not differ between HIIT and CON (P>0.05). These results indicate that 4 weeks of HIIT can enhance some physiological indicators that are traditionally connected to endurance performance (RE and PTS), but it has no effect on perceived effort, pace, or overall performance during a 5-km running trial.

Lum et al. (2016) impact of plyometric and intermittent sprint training on endurance running performance. The plyometric training group (n = 7) or the intermittent sprint training group (n = 14) was assigned to the moderately trained male endurance runners. For the preliminary testing, participants had to complete a 10-kilometer time trial, a countermovement leap test to determine peak power, and a treadmill-based graded exercise test. Twelve sprint or plyometric training sessions, done twice a week, were part of the workout. Post-tests were administered after the intervention was complete. During the intervention period, both groups demonstrated a significant decrease in weekly training mileage from pre-intervention. Peak power and performance in the 10-kilometer time trial both saw considerable gains. Additionally, both groups' relative peak power significantly increased. There was a moderate inverse connection between the 10-km time trial performance and relative peak power. These results demonstrated that, despite a decrease in training mileage, both intermittent sprint and plyometric training enhanced 10-kilometer running performance. Peak power also improved along with the improvement in running performance, and it exhibited an inverse connection with relative peak power.

Mallol et al. (2016) study was to look into how a 4-week HIIT programme affected the performance of runners and cyclists. Four conventional training weeks were completed by twelve skilled triathletes as a control period. Then, at random, they were placed in a run or cycle HIIT programme, completing two HIIT sessions per week. Prior to and following the HIIT programme, participants completed a 20-minute cycling time trial and a maximal aerobic power test on the treadmill. Both the bike and run HIIT groups increased their velocity at 2 mm by 6.7 and 2.1% and decreased their heart rate at 2 mm by 6.4 and 8.4%, respectively. The run HIIT group's peak velocity fell by 1.9%, and the HR at 4 mm group's fell by 1.8%. In the bike group, the velocity peak dropped by about 2% while the HR maximum stayed the same, whereas there was a slight decline in the run group. In a cycle time trial, the cycling HIIT group showed a considerable gain in average speed (8.8%), whereas the run training group's speed was significantly lower (-3.5%). In triathletes with moderate to good training, a 4-week cycling HIIT programme enhanced running performance. However, in our study, a 4-week HIIT running programme did not improve bike performance. This may be because of the run group participants' accumulated weariness.

Etxebarria et al. (2014) Coaching cyclists to train well for triathlons is difficult. We investigated the impact of two cycles of high-intensity interval training (HIT) on the cycling and running specific to triathlons. Fourteen men triathletes with moderate training ([Formula: see text]) O2peak: 58.7 8.1 mL kg (-1) min(-1); mean SD; maximal incremental test peak and maximal aerobic power done on separate occasions; 16 20 s sprints on the bike; a 1-hour triathlon-specific cycle followed immediately by a 5-kilometer run time trial. Following pair-matching, participants were randomly allocated to either a long high-intensity interval training (LONG) (6–8–5–min efforts) or a short high-intensity interval training (SHORT) (9–11–10–20–40–s efforts) HIT cycle training intervention. Participants went through six training sessions spread out over three weeks before repeating the baseline assessment. O2peak increased by about 7% in both groups (SHORT 7.3%, LONG 7.5%, LONG 7.5%, 1.7%) (Formula: see text). The last eight 20-second sprints saw a modest increase in mean power for both the SHORT (10.3%, 4.4%) and LONG (10.7%, 6.8%) groups. During the 1-hour triathlon-specific riding, both groups experienced a slight to moderate decrease in heart rate, blood lactate, and perceived exertion, but only the LONG group experienced a significant decrease in the time required to complete the subsequent 5-km run (64, 59 s). Short and extended high-intensity intervals should be used by moderately trained triathletes to enhance their cycling physiology and performance. Performance over a 5 km run is more likely to be improved by longer 5-min cycling intervals.

Gleason et al. (2014) depending on the available pertinent research, offer training regimens for improving performance on 1.5- and 2-mile runs. Design: A succinct review piece. Methods: Used search terms like "aerobic power," "military physical fitness test," "strength training, resistance training, endurance training, high intensity interval training," "running economy," "3 km run," "5 km run," and "1.5/2 mile run" to gather relevant research papers. Results: The combination of conventional strength training, high intensity interval training, and distance training has been found to increase running performance. Conclusion: To improve running performance on the 1.5 and 2-mile run tests used by the military, a mix of conventional strength training, high intensity interval training, and distance training should be used.

Chtara et al. (2005) to investigate the effects of tailored intermittent endurance training and muscle strengthening on aerobic capacity and performance. Methods: Based on their maximum aerobic speeds (V O2MAX), 48 male sport students (mean (SD) age 21.4 (1.3) years) were sorted into five homogenous groups. Four groups participated in the following training regimens for a total of 12 weeks (two sessions per week): Running endurance training (E) (n = 10) and strength circuit training (S) (n = 9) were mixed in different orders within the same training session, as were E+S (n = 10) and S+E (n = 10) respectively. As a control, Group C (n = 9) was utilised. Four tests were used to assess each subject both before (T0) and after (T1) the training period: (1) a time trial over 4 kilometres. Four tests—a 4 km time trial run, an incremental track test to estimate VO2MAX, a time to exhaustion test (tlim) at 100% VO2MAX, and a maximum cycling laboratory test to determine V O2MAX—were used to evaluate each individual before (T0) and after (T1) the training period. Results: With an interaction effect, training significantly increased performance and aerobic capacity throughout the 4 km time trial (p 0.001). The E+S group showed considerably greater improvements than the E, S+E, and S groups: 8.6%, 5.7%, 4.7%, and 2.5% for the 4 km test (p0.05); 10.4%, 8.3%, 8.2%, and 1.6% for VO2MAX (p0.01); and 13.7%, 10.1%, 11.0%, and 6.4% for VO2MAX (ml/kg0.75/min) (p0.05). Tlim and the second ventilator threshold (VO2MAX) both showed statistically significant outcomes in a similar manner. Conclusions: The 4 km time trial and aerobic capacity improved more after circuit training followed by customised endurance training in the same session (E+S) than they did after doing the training plans individually or in the opposite order.

Brandon (1995) popular race distances are included in middle distance running, and performance depends on a variety of physiological parameters. Successful runners have different physiological traits than sprinters and long-distance athletes. Long-distance running performance has been demonstrated to be constrained by maximal oxygen uptake (VO2max), running economy, and the anaerobic threshold, whereas sprinting performance has been constrained by quick velocity and anaerobic factors. The integration of aerobic and anaerobic factors is necessary for middle distance runners to succeed since it enables them to sustain a high speed throughout a race. Distance, intensity, and the runner's physiological capabilities all affect how much one energy system contributes relative to the other. This distinguishes middle distance runners from long distance runners because middle distance runners can succeed with physiological profiles that encompass a variety of aerobic and anaerobic capabilities.