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ORIGINAL

BIOMECHANICAL ANALYSIS OF RUNNING TECHNIQUES: IMPLICATIONS FOR INJURY PREVENTION AND PERFORMANCE

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ABSTRACT

Running is a physical activity executed by many individuals globally; it is considered a highly effective exercise promoting health benefits. At the same time, with a lot of benefits running provides, it also causes major injuries that create hindrances to its continuity. A current Meta-analysis demonstrated that the injury rate ranges from 2.5-33.0 per 1000 hours of running, depending on the type of running activity, injury description and duration of follow-up. Running injuries are considered a crucial public health issue, so injury prevention approaches should be highlighted. The research based on primary data analysis to determine these studies used smart PLS software and generated informative results, including descriptive statistical analysis, the confidence interval, and the significant analysis between them. However, it is essential to understand the aetiology of the different factors and mechanisms to reduce the injuries. Injury prevention can be improved if the factors related to injury can be variable biologically. The biomechanical Analysis is related to enhancing performance to increase the body's stability, and better stability leads to effective performance. Secondly, by biomechanical analysis, the strength and power of the body increase, and such strength and power help a lot in maintaining better energy in the body to enhance the performance of the athlete. Overall, research found that biomechanical analysis shows a significant link with them. By learning from biomechanical Analysis, the body's speed increases because an athlete learns to use its muscles properly to enhance the body's speed.

KEYWORDS: Biomechanical Analysis (BMA), Running Techniques (RT), Injury Prevention (IP), Performance (PP)

1. INTRODUCTION

The word biomechanical Analysis can be defined as the study and analysis of motions in living organisms. When we are talking about biomechanical analysis of running techniques, we refer to the study of aspects of motion in athletes relative to force and pressure. Running is the basic exercise in training of athletes irrelevant of the type of sport they are involved in. So, in This study, we are going to overview which running techniques are used according to biomechanical Analysis in athletes, which can help in the prevention of Injury and enhance the performance and endurance of athletes(Šuc, Šarko, Pleša, & Kozinc, 2022; Vancini, Andrade, De Lira, & Russomano, 2023). Biomechanical analysis is very important in understanding running techniques because it provides information about the effects of forces on the body, the type of motion, and their results. In this way, a better understanding of biomechanical analysis and running techniques can be adopted, which will enhance performance and reduce injury risk. Different types of Running Techniques are suggested for every type of athlete. For example, the first technique is proper foot strike. As we know, the body must have an optimal balance between the fore and hind limbs. We also know that the correct strike of the foot may result in better performance, but a poor foot strike may result in failure and injury to the ankle or knee joint. This injury can be fatal and hinder how athletes Return to play. So, biomechanical analysis has proved that the forefoot and midfoot can bear more pressure and stress than the hind foot(Sugimoto et al., 2015). So, for any kind of running, there must be more pressure on these mentioned parts to enhance the performance and endurance of the athlete. Along with it, the risk of injury will also be reduced. The other technique is proper rotation and alignment of the pelvic portion of the athlete (Oliveira, Barcelos, & Siqueira, 2022; M. C. Ryan & Deepak, 2022).

As we know, the pelvic part of the body can bear more stress. This part of the body also helps maintain the correct balance during running. If there is any carelessness in rotation or alignment of the pelvic portion in athletes, it may result in Injury to pelvic bones or skeletal muscles which can prove disastrous. To avoid any such injury, there must be proper rotation and alignment of the pelvic portion of athletes, which can only be learned by biomechanical Analysis(Silva-García, 2024).The proper rotation and alignment can also increase the efficiency level of an athlete to an extent. The other techniques are the arm's drive and the leg's swing. There is no doubt that hind limbs can bear more pressure than forelimbs, but we cannot say that forelimbs do not play a role in body balance and enhanced running. The proper drive of the forearm will help an athlete overcome air friction, so the body will use less energy. As a result, the performance of athletes may be enhanced. Secondly, leg swing is a decisive factor in running because proper and timely leg swing may increase the athlete's running speed to an extent. However, poor and improper leg

swings may reduce performance levels and result in injuries. To prevent such risk of injury, there is a need for a better understanding of leg swing and arm drive, which can only be acquired through biomechanical analysis of running techniques(Sun, Lam, Zhang, Wang, & Fu, 2020). The other technique is the body's main stability, which depends on the balance of core muscles. By understanding biomechanical analysis correctly, the control of core muscles can be learned, and such learning will play a role in maintaining the stability of the body. When the body is balanced and stabilized in a better way, the performance and endurance level of the Athlete increases with minimum risk of injury to any core muscle. However, if such understanding is not learned through biomechanical analysis, it can result in muscle fatigue, cramps, soreness, inflammation, and other problems. The other important running technique is the activity of breathing and relaxation in the body of an athlete. The breathing activity in athletes is directly related to the amount of Oxygen in blood for body use. If the breathing pattern is not proper and coordinated, it may result in life-threatening problems for athletes because the amount of oxygen in the body may be affected(McSweeney et al., 2021). So this is the aspect of learning that an athlete must have control of breathing patterns to control their body. The second factor is relaxation in the body. Relaxation in the body is also related to breathing activity. The factor of relaxation plays a very important role in enhancing the performance of athletes because a relaxed body has a relaxed and stress-free mind. Such a stress-free mind contributes to better performance, endurance, and injury prevention to the body(Fox, 2018). Not only speed but the overall efficiency of athletes also improves in the aspect of sports(Anderson, Bonanno, Hart, & Barton, 2020). A better understanding of biomechanical Analysis is related to injury prevention as well. When athletes have learned biomechanical Analysis, they know what will be the reaction to any action. In this way, most of the injuries related to sports can also be reduced. By biomechanical Analysis, in Case of injury, the recovery can be made swiftly, and the rehabilitation period can also be reduced (Anderson, Martin, Barton, & Bonanno, 2022). An athlete's overall health also improves a better understanding of biomechanical Analysis because an athlete learns to use his body properly without any external damage to it. The biomechanical Analysis has gained much importance in recent years in the aspect of performance and preventing Injury in athletes because of its vast applications(Subotnick, 1985).

1.1 Research Objective

The main objective of this research is to understand the biomechanical Analysis of Running Techniques. This study has also enumerated how biomechanical Analysis can help enhance performance and prevent injuries in athletes. The research determines that Biomechanical Analysis of Running Techniques. The research paper is divided into four sections. The first portion represents the introduction, including the objective of the research. The second

section describes the literature review, and the third portion represents the results and description. That this portion describes the theoretical analysis. the last section summarizes the overall research and presents recommendations for research.

2. Literature Review

The purpose of this survey was to blend the proof contrasting non-rear foot strike and retro calcaneal racing examples according to wound and racing frugality (essential point), & and kinesiology. The connection between the whack examples and wound hazard is still up in the air, as the present proof is restricted to review discoveries. Taking into account the absence of proof to help any enhancements in racing frugality, joined with the related change in stacking contour (for example., more prominent lower leg and plantar flexor stacking) established in this audit, varying whack design can't be suggested for a healthy rear foot strike sprinter(Anderson et al., 2020). Studies explain that a sympathetic study of the mechanics of a living body of racing has lent suggestions for the anticipation of hoof wounds. These bionic contemplations, the two practical & non-useful, should be assessed by the game's medication specialist. The system and aftereffects of examination conflict with the immediate consistency of different abuse wounds in light of bionic anomalies as well as conducive elements(Subotnick, 1985). Researchers investigate the arrangement among bionic suggestions for anterior cruciate ligament wound avoidance and execution with respect to course adjustment moves. Definite bionic techniques intended to lessen anterior cruciate ligament wound hazard were connected to decreased shift in course execution.

The discoveries of this audit underscore the necessity to examine the two anterior cruciate ligament wound hazard and execution while analyzing the study of the mechanics of a living body of course adjustment moves(Fox, 2018). Researchers reveal that worldwide cooperation in racing keeps on expanding, particularly among teenagers. Subsequently, the quantity of racing-associated wounds in teenagers is growing. Arising proof currently proposes that abuse type wounds including developing ivory (for example., ivory pressure wounds) & delicate tissues (for example., tendonitides) prevail in young people that take part in racing-associated athletics. This viewpoint study gives analysis and well-qualified assessment encompassing the condition of information and subsequent bearings for explore in young adult racing the study of the mechanics of a living body, wound anticipation and additional preparation(McSweeney et al., 2021). Studies suggest that the job of footwear developments on racing wound and execution has been broadly explored, deliberate surveys on the footwear development impacts on racing kinesiology were seldom detailed. Accordingly, this survey centers around the applicable examination surveys reviewing the bionic impact of racing footwear

developments on decreasing racing-linked wounds and upgrading execution. Whilst footwear developments may successfully impact racing kinesiology, a survey on certain developments containing shoestring, impact point flicker, impact point flail foot, Mosaic Shoeless Innovations, shoe support, and higher oblige additional examination prior feasible logical rule may be formed(Sun et al., 2020). Scholars suggest that athletics technology is a definite assessment of game movements that assists with diminishing the gamble of wounds & works on sports execution. Athletic and workout kinesiology is the logical investigation of person development artificers. It alludes to the point-by-point examination and assessment of the way people shift while participating in athletics. Generally, the outcomes concluded that development in elevated-influence athletics demonstrates adverse and critical connection with wound anticipation. This may antagonistically influence the corporeal and mental prosperity of the competitor and their group(Silva-García, 2024). Studies elaborate that anticipation of front CL wound is probably the best procedure to diminish unsought well-being results containing recreational medical procedures, large haul restoration, and untimely arthrosis events. Myoneural proof possibly connected with the anterior cruciate ligament wound was evaluated. Proposals for anticipation projects for anterior cruciate ligament wounds in macho competitors were created in view of the union of the bionic and myoneural qualities(Sugimoto et al., 2015). This study gives a thorough assessment of the most recent headways in the development of prostheses and their suggestions for athletics execution upgrades and wound counteraction. The study centers around a few essential regions: mechanical developments in the development of prostheses, bionic examination of athletics developments, wound counteraction techniques, and the combination of bionic examination into reasonable sports preparation. The discoveries and conversations introduced in this audit are planned to illuminate specialists, experts, and competitors, adding to the upgrade of athletics science exercises and competitor security(Vancini et al., 2023). In this study, researchers intend to sum up the proof in regards to the impacts of resistance exercise on racing frugality, racing development of prostheses, & racing-relevant wound hazards in perseverance sprinters. The proof powerfully demonstrates that lessened appendage resistance exercise is successful for working on racing frugality and execution, along with a mix of solidarity and explosive exercises preparing being prescribed to further develop resistance exercise. Isobaric preparation is as well arising as a potential choice to execute throughout times of elevated generally preparing burden(Šuc et al., 2022). Scholars examine the connections among the rates of racing-associated wounds in non-world class sprinters with bionic and outer muscle factors. This precise survey establishes that right now accessible writing doesn't, by and large, help bionic or outer muscle estimates as hazard elements for running-related injury in non-first class sprinters(Peterson et al., 2022). Researchers claim that bionic surveys

examine execution and human knee burden factors autonomously. This is astonishing on the grounds that caustic is a significant activity connected to the execution of contactless front CL wounds. Professionals ought to be aware of this contention while teaching slicing strategies to upgrade execution whilst limiting human knee stacking, & and ought to, subsequently, guarantee that their competitors have the actual limit (for example, myoneural management, co-withdrawal, & fast power creation) to endure and uphold the human knee stacking while caustic(Dos' Santos, Thomas, McBurnie, Comfort, & Jones, 2021). Scholars explain that tossing athletics remains a well-known side interest and a continuous wellspring of outer muscle wounds, especially the elbow and jostle. Bionic examinations of tossing competitors have recognized path mechanic elements that incline hurlers toward wound or terrible showing. Such variables, or essential execution pointers, are a continuous subject of exploration, along with objectives of further developed wound forecast, counteraction, and restoration(Trasolini et al., 2022). Studies claim that late examination has given a more noteworthy understanding of the dangers that past wounds & absence of whole restoration might show in sporting sprinters beginning a preparation scheme. Factors connected with exorbitant back foot inversion and foot curve are every now and again located in blend along with the occurrence of explicit wounds; in any case, the job of effect attributes stays in banter.

Equicinetic examination of butt gluteus capability assists with connecting how we might interpret lessen furthest point kinetics, yet compels better exploration to be demonstrated as a causal variable(M. B. Ryan, MacLean, & Taunton, 2006). Scholar studies reveal that athletic development of prostheses portrays person development from a presentation upgrade and a physical issue decrease point of view. In this regard, the motivation behind athletics researchers is to help mentors and doctors with solid data about competitors' procedure. As worries the elevated goal procedure, outcomes demonstrated that the extent of the front cruciform and sidelong guarantee tendons diminished, whilst that of the profound heap of the average insurance tendon expanded fundamentally over bending. Varieties of the back cruciform and the shallow heap of the average insurance tendon extents were disguised via exploratory indefiniteness(Bergamini, 2011). The basic purpose of this study is to outline the reasonable health advantages that might be acquired from the protective development of prostheses implemented to the anterior cruciate ligament, along with the necessity and possibility for the expansive execution of such standards. Examiners have recognized neuro cardiac preparation conventions that cover for and right the fundamental bionic shortfalls that prompted anterior cruciate ligament wounds. The far reaching execution of protective development of prostheses ideas might significantly influence the area of athletics medication with at least starting venture(Hewett & Bates, 2017). Studies show that athletics development of prostheses assists one with

understanding the game developments and assists increment the exhibition of people and forestall wounds. Computerized advances assist in comprehending athletics developments and powers created over movement and give appropriate direction that may be pursued to stay away from wounds and upgrade execution. The parts of bionic examination of athletics, wounds and their motives in athletics, different strategies for registering and examination of athletics developments, and, in conclusion, execution advancement and forestalling wounds utilizing the examination are talked about in this section(Kumaran, Baig, Avvari, & Arunachalam, 2022). Scholars reveal that the quantity of sprinters and the rate of racing-associated wounds are on the ascent. Continuous bio-feedback step reeducation presents an encouraging way to deal with running-related injuries counteraction. But, because of the variety in concentration on plans and detailed results, there is residue vulnerability in regards to the viability of various types of criticism on racing stride development of prostheses(Shen, Yu, Frias Bocanegra, Wheeler, & Fong, 2024). Studies examine various detached & racing strategy variables to be related to planned racing-associated wounds amid sporting sprinters. Except for wound past, the variables distinguished as being essentially connected with wound might be adjustable and consequently, might frame the premise of mediations. Scope of movement, space-time boundaries and force estimates were not related to the wound, and in this way, their usage in wound counteraction exercises ought to be rethought(Dillon et al., 2023). Studies sum up the ongoing writing in regard to the examination of racing stride. It is contrasted with strolling and running. The present status of information is introduced as it suits the historical backdrop of the examination of development. The situation with shoe wear writing, changes in development methodologies, the job of Biarticular brawns, and the spring-like capability of ligaments are tended to. This sort of data may give an understanding of wound instruments and preparation systems(Novacheck, 1998). Studies survey a progression of review adding to a system for forestalling front cruciform tendon wounds in athletes. As most of such wounds are contactless in character, hypothetically, such wounds are adjustable. By facilitating the experimental proof of adjustable bionic antidotes of anterior cruciate ligament wound danger, researchers may perceive better exercises for creating mediations on a large amount to forestall anterior cruciate ligament wounds in the donning local area(Weir, 2022). This survey expects to brief normal diminish appendage wounds in soccer & comprehend the development of prostheses of the soccer squawk especially from the wound danger perspective also execution. Soccer wounds are generally common with lessen appendage being the more impacted. The sport of soccer is filling in India & wounds are turning out to be progressively normal, influencing the performer's vocation and group's exhibition. The development of prostheses investigation of tarsus kick gives indispensable contributions to the wound hazard and execution improvement(Sivaraman et al., 2020). The survey led on handling

has been restricted to a thought of tossing modes embraced in athletics. An assortment of tossing strategies is taken on over a regular athletic however tip top performers generally embrace a bayonet strategy while getting back to basics as fast as could really be expected. Athletics science & athletics medication survey can possibly provide fundamentally to execution improvement & wound anticipation later on(Flyger, Button, & Rishiraj, 2006). Researchers suggest that execution in high-intensity games like racing, pedaling & marathon has for some time been explored according to a corporal point of view. A solid connection among racing frugality and length racing execution is deeply grounded in the writing. There are additionally elements apart from preparing framework that might impact racing frugality & Neuromuscular transformations. For instance, uninvolved mediations, for example, footwear and in boots implants, also the appearance of outer muscle wound, might be reviewed significant adjusters of Neuromuscular manage & race execution(Bonacci, Chapman, Blanch, & Vicenzino, 2009). Scholars explain that adjustable (bionic & contractile organ) front CL wound damage elements have been distinguished in research facility sites. Such gamble elements were thusly utilized in anterior cruciate ligament wound avoidance estimates. Because of the absence of natural legitimacy, the utilization of on area information in the anterior cruciate ligament wound gamble covering is progressively upheld. The bionic contrasts among laboratory and handle setups recommend the use of setting affiliated variations in woman soccer players & have suggestions in anterior cruciate ligament wound anticipation techniques(Di Paolo et al., 2023). Researcher studies reveal that development of prostheses essentially influences athletics execution and wound counteraction. This audit highlights critical holes in one-dimensional Statistical Parametric Mapping survey inside athletics development of prostheses. Main points of contention incorporate an absence of concentrates past lab setups, under-valuation of different games and wounds, and orientation variations in explore populaces. Tending to such holes may altogether improve the use of one-dimensional Statistical Parametric Mapping in athletics execution, wound examination, & recovery(Yona, Kamel, Cohen-Eick, Ovadia, & Fischer, 2024).

3. Theoretical Analysis

The world gained remarkable success in every field of life ranging from the communication field to health-related sectors. As the progression of health sciences keeps increasing, a new branch of sciences becomes evident known as biochemical analysis or biochemistry(Vincent, Brownstein, & Vincent, 2022). In this branch, different mechanical factors in living organisms relevant to force have been studied. Biochemical analysis is done in high-impact sports and used for insinuation of injuries in players. Usually, athletes are more susceptible to injuries due to their traumatic duration of performance and constant physical activity(Zago et al., 2021). Hence, it is recommended that there should be

various strategies to prevent any kind of injury. High-impact sports include sports that require more input energy and give stress as output such as badminton, cricket, hockey and many others. There are various movements associated with these sports such as running, jumping, punching, kicking and many others. These movements caused various types of injuries in athletes but with the help of biochemical analysis the basic science about these movements can be studied injuries can be prevented and the performance of athletes can be improved. When the athlete understands the source and impact of stress (force), he will be able to perform efficiently (Palareti et al., 2016; Silva-García, 2024). Moreover, the injury prevention factors will work efficiently if the etiology parameters are changeable according to biological mechanisms. In current studies, the research highlighted the main mistakes in training responsible for the risk of causing injuries in athletes. Sports-related injuries can be caused due to the training practices athletes follow. It is important to understand the force applied on each part of the body to comprehend the science behind it, this will help the researchers to find out the prevention approaches for athletes(Soligard et al., 2016). Over a few decades running shoes gained marvelous alterations from very less to more supportive shoes then again to minimal to more supportive shoes. Due to advancements in technology various types of shoes such as cushioned stable and minimalistic, have been launched for running to prevent injuries. However, a cushioned type of shoe reduces the force applied on the foot and also decreases the deceleration of the body. It was studied that using cushioned shoes reduces the rate of injuries and improves the performance of running. Therefore, sports field and research move towards the approaches to reduce injuries and improve performance levels through comfortable running shoes(Sun et al., 2020). Running is considered as the most popular type of sports worldwide and there are many studies that focused on the injuries experienced by runners and why. While, the runners who are experienced have less risk of getting injured but still constant running causes many injuries in athletes. It depends on the duration and type of running that induce the issues like muscle inflammation, joint problem and fractures. There are many people who run to stay healthy, but prevention from injuries is also important to get benefits from running activity(Papagiannaki, Samoladas, Maropoulos, & Arabatzi, 2020). The increased number of sports competitions increases the demands of research on the topic of reducing health injuries and increasing improve the performance of athletes. Sports scientists studied how athletes adopt training methods and competitions by considering the different physical, chemical and biological parameters. Currently, physiologists of exercises work on the molecular and cellular changes in athletes that lead to the adaption of the overall body. Advanced technology related to genetic and biological analysis methodology allows researchers to discover the markers that measure the changes in the body of athletes(Ginevičienė et al., 2022).

3.1 Numerical Analysis

3.1.1 Descriptive Statistic

Table 1: Result of Descriptive Statistic

NAME	NO.	MEAN	MEDIAN	SCALE MIN	SCALE MAX	STANDARD DEVIATION	EXCESS KURTOSIS	SKEWNESS	CRAMÉR-VON MISES P VALUE
BMA1	1	1.633	2.000	1.000	3.000	0.629	-0.603	0.490	0.000
BMA2	2	1.510	1.000	1.000	3.000	0.610	-0.305	0.794	0.000
BMA3	3	1.776	2.000	1.000	4.000	0.736	0.273	0.709	0.000
BMA4	4	1.612	2.000	1.000	3.000	0.633	-0.577	0.556	0.000
RT1	5	1.551	1.000	1.000	3.000	0.608	-0.484	0.641	0.000
RT2	6	1.408	1.000	1.000	3.000	0.569	0.200	1.063	0.000
RT3	7	1.653	2.000	1.000	3.000	0.591	-0.614	0.291	0.000
RT4	8	1.469	1.000	1.000	3.000	0.575	-0.329	0.788	0.000
RT5	9	1.469	1.000	1.000	3.000	0.575	-0.329	0.788	0.000
IPP1	10	1.408	1.000	1.000	3.000	0.531	-0.509	0.803	0.000
IPP2	11	1.490	1.000	1.000	3.000	0.576	-0.453	0.703	0.000
IPP3	12	1.469	1.000	1.000	3.000	0.538	-0.915	0.530	0.000
IPP4	13	1.612	2.000	1.000	3.000	0.565	-0.758	0.239	0.000
IPP5	14	1.531	1.000	1.000	3.000	0.575	-0.634	0.541	0.000

The above result shown in table 1 demonstrates that descriptive statistical analysis result shows that mean values, median rate, the minimum value, maximum value, the standard deviation rate also that explain the probability value between them. the first variable is BMA1 shows that mean value is 1.633 the standard deviation rate is 62% the skewness value is 49% respectively. The BMA2,3 and 4 shows that mean value is 1.510, 1.776 and 1.612 shows that positive average value of mean. The standard deviation rate is 61%, 73% shows positive deviate from mean. According to the result overall minimum value is 1.000 and maximum value is 3.00 according to the result shows probability value is 0.000 its means 100% significant level between them. the result describes RT1,2,3,4 and 5 plays as mediator variable result represent that mean value is 1.469 the standard deviation is 57%, 59% respectively. The IPP consider as dependent variable result shows that 1.490, 1.612, 1.531 positive average rate. The standard deviation value is 53%, 57%, 56% respectively.

3.2 Smart PLS Algorithm Model

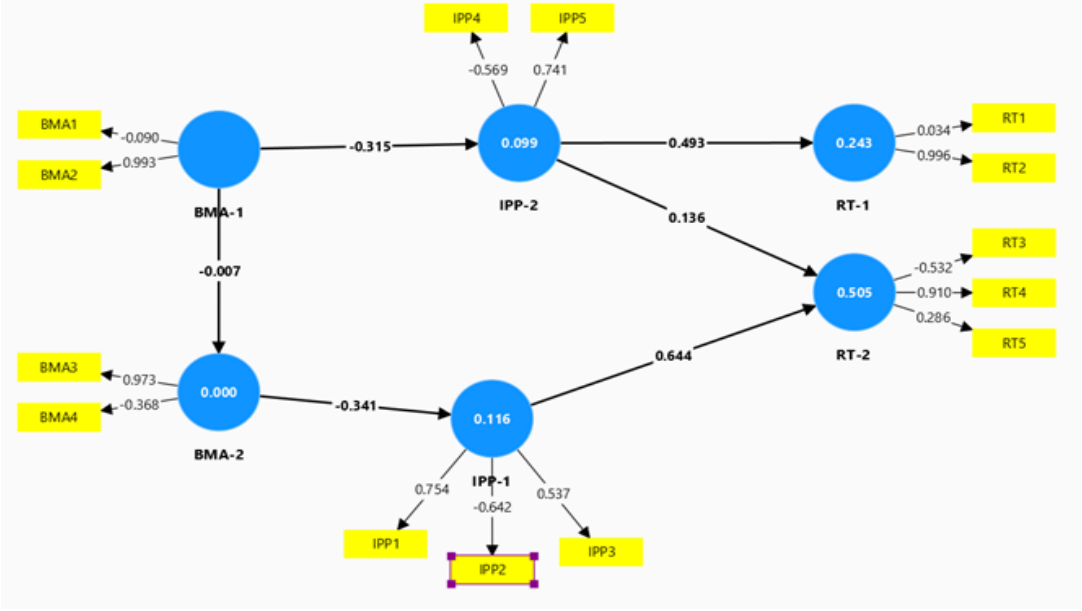

Figure 1: Smart PLS Algorithm Model

The above model of figure 1 represents that smart PLS Algorithm model in between BMA-1, BMA-2 result shows that -0.007 present negative link between them. the BMA shows 31% significant link with IPP-2. The result shows that RT-1 its present 0.034 and 0.996 3% and 9% positive and significant value. According to the above model its present that 75%, 64% and 53% significant level between them.

3.3 Significant Analysis

Table 2: Result of Significant Analysis

MATRIX	ORIGINAL SAMPLE (O)	SAMPLE MEAN (M)	STANDARD DEVIATION (SD)	T STATISTIC	P-VALUES
BMA-1->BMA-2	-0.007	0.109	0.243	0.031	0.097
BMA-1->IPP-2	-0.315	-0.160	0.329	0.959	0.0337
BMA-2->IPP-1	-0.341	-0.156	0.347	0.983	0.0326
IPP-1->RT-2	0.644	0.632	0.215	3.003	0.003
IPP-2->RT-1	0.493	0.358	0.372	1.327	0.185
IPP-2->RT-2	0.136	-0.005	0.228	0.598	0.550

The above result shown in table 2 represent that significant analysis of dependent and independent variables. the BMA-1->BMA-2 is first matrix its shows that original sample value is -0.007 the sample mean value is 0.109 shows that 10% average value of mean. The standard deviation rate is 24% deviate from mean. According to the result T statistic value is 0.031 and its p value is 0.09 shows that 9% significant level in between BMA-1 and BMA-2.

Similarly, the BMA-1->IPP-1 its shows that negative original sample value the t statistic value is 98% also that its p value is 32% respectively. The IPP-2->RT-1 shows that t statistic value is 1.327 the probability value is 18% significantly between them. the last factor is IPP-2 and RT-2 shows that 59% and 55% significantly levels between them.

3.4 Confidence Interval

Table 3: Result of Confidence Interval

MATRIX	ORIGINAL SAMPLE (O)	SAMPLE MEAN (M)	2.5%	97.5%
BMA-1->BMA-2	-0.007	0.109	-0.404	0.490
BMA-1->IPP-2	-0.315	-0.160	-0.599	0.533
BMA-2->IPP-1	-0.341	-0.156	-0.584	0.540
IPP-1->RT-2	0.644	0.632	0.275	0.860
IPP-2->RT-1	0.493	0.358	-0.558	0.759
IPP-2->RT-2	0.136	-0.005	-0.431	0.394

The above result shown in table 3 describes that confidence interval of each matrix result present 2.5% interval and 97.5% confidence interval of each matrix. The first matrix is BMA-1->BMA-2 its shows that original sample value is -0.007 the mean value is 10% also that its 2.5% interval level is 40% and 97.5% interval level is 49% respectively. Similarly, the BMA-1->IPP-2 shows that 59% and 53% respectively. The last matrix is IPP-2->RT-1 shows that 13% original sample value the mean value is -0.005 the confidence interval is 43% and 39% respectively.

4. Conclusion

Trail running is a running technique that exists off the road, and on natural surfaces, Athletes know-how many types of experiences such as elevation move from mountains to deserts and many others. This technique has short distance ranges from a few kilometers to 80 km, and it is a single-day or multi-day performance. This running technique faced many injuries such as sores, rubbing, ankle injuries and many others; ankle injury is the most common injury faced by runners. These injuries caused due to the insufficient balance of motor neurons, running through tiredness and irregular kinematics. The prevention of injuries can be possible with the help of multifactorial strategies, schooling, strengthening, and exercise for controlling motor neurons. Four important rules are used to teach runners to prevent injuries. These rules include; running stops instantly when feeling pain, pain in the joint should not upsurge by 24 hours, preexisting pain should not increase after running and run training should stop during pain. Understanding the physiological factors is important in sports training; as specific sports are linked with the specific physiological trait and secondly, it helps in training in understanding the aerobic, anaerobic, power and functional aspects. The research study based on primary

data analysis for measuring the data used smart PLS software analysis. The most common variable in running activity is to measure aerobic performance. The research on how athletes perform at low levels at varying efforts and intensities is increasing day by day, but not in marathon type of running activity. The overall research concluded that significant link between them. One study on marathons demonstrated that there is a strong connection between the speed of athletes and anaerobic threshold and also with the vVO2 max that is relevant to maximum uptake of oxygen. Thus, biochemical analysis is important to reduce the injuries in running activities and improve the performance of athletes.

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