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OUR CONCERN ON THE USE OF ANABOLIC-ANDROGENIC STEROIDS IN SPORT

Anabolic steroids were supposedly used by the Germans during World War II to increase aggressiveness and, subsequently to that war, the Soviets began using them in athletes in the late 1940's. The United States started using them in the early 1950's. Subsequently, the first synthetic steroid, Dianabol (methandrostenolone) was developed.

The most abused category of drugs today is the group of drugs known as anabolic-androgenic steroids. Anabolic steroids are derivations of the male hormone testosterone, and are used for recuperation for body building. The anabolic effect implies the ability to promote tissue growth and/or repair. The androgenic effect implies the ability to produce male secondary sex characteristics, just as does testosterone. The anabolic effect of these steroids does increase lean body mass and reduces the percentage of body fat if they are used in conjunction with conventional methods of strength training and body building. Adequate caloric and dietary intake is necessary.

The anticatabolic effect is one of great interest because the athlete can recover quickly from a hard workout and train longer and harder. Are we missing some of the beneficial medical effects?

From a medical perspective, these drugs are seldom prescribed because of the rather serious and cumbersome adverse effects such as acne, overaggressiveness, gynocomastic, testicular atrophy, liver dysfunction, tumors, cholesterol changes and hypertension in males, increases in facial and body hair, deepening of the voice, enlargement of the clitoris, shrinking of breast size and irregular menstrual cycles in females, and acne, virilization and premature closure of the growth plates in adolescents.

As gevolg van die erns van die probleem, het die Suid-Afrikaanse Sportgeneeskunde Vereniging dit nodig gevind om 'n sterk standpunt in te neem teen die misbruik van anaboliese steroïede in sport. Ons is van mening dat baie meer gedoen moet word om jong mense op te voed insake die nadelige effekte van hierdie middels.

Gekontroleerde navorsing op hierdie terrein is beperk, daar is in der waarheid slegs enkele sterfgevalle aangeteken in die literatuur. Dit bring mee dat sportgeneeskundiges se kredietwaardigheid in twyfel getrek word. Die feit is egter dat navorsing op anaboliese steroïede in sulke hoë doserings nie toegelaat sal word nie, en gevolgtrekkings moet gemaak word op anekdotiese gevalle van steroïed misbruik. Dit is te verstane dat atlete uit vrees vir dissiplinêre optrede teen hulle, nie geneë is om vrywilliglik na vore te kom om oor gevolge te rapporteer nie.

Op grond van 'n uitgebreide literatuuroorsig, erken die Suid-Afrikaanse Sportgeneeskunde Vereniging dat die anaboliese steroïede wel spierkrag en spiermassa kan verbeter onder sekere omstandighede, en dat daar ernstige newe-effekte mag voorkom in mans, vrouens en adolessente. Die vereniging stem saam dat anaboliese steroïedgebruik teen die reëls van regverdige mededinging in sport is, en dat daar streng opgetree moet word teen atlete wat hierdie middels misbruik om hulle sportprestasies te verbeter.

Die Suid-Afrikaanse Sportgeneeskunde Vereniging beveel verder aan dat atlete beter opgevoed moet word en dat meer navorsing geïnisieer word insake anaboliese steroïedmisbruik. 'n Nasionale toetsprogram moet in werking gestel word wat deur alle sportliggame onderskryf word. Die mediese gebruik van hierdie middels moet heroorweeg word, en daar moet streng opgetree word teen die verskaffers van hierdie potensieel skadelike middels in supra-terapeutiese doserings.

Die standpunt van ons Vereniging is niks nuuts nie – in die Bybel word daar in 2 Timotius 2:5 die volgende waarheid kwytgeraak:

"'n Atleet wat aan 'n wedstryd deelneem, kan die prys wen slegs as hy volgens die reëls meeding."

Summary and Conclusions

Doping in sports has a negative effect on sports in the widest sense of the word and should be combatted on the basis of ethical and medical aspects. However, in combatting doping one should never lose sight of human dignity. This calls for a discriminatory approach in which doping control should never be a purpose in itself, but should be regarded as a protection of sports and its athletes.

Dr DP van Velden MBChB, M Prax Med
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PHYSIOTHERAPY AND THE SA SPORTS MEDICINE ASSOCIATION

In 1980, The South African Association for Physical Education and Recreation (now known as the Southern African Federation for Movement and Leisure Sciences) organized a conference in Port Elizabeth. Drs Tim Noakes and Dawie van Velden were requested to arrange a symposium as part of the conference which would bring together representatives of medical and allied professions who were involved in health promotion and physical activity and were using physical exercise as a treatment modality.

On the 20th June 1980, Dr Tim Noakes wrote a letter to the President of the South African Society of Physiotherapy, Mrs Molly Levy, inviting nominations for physiotherapists to speak at the symposium.

He also outlined the three fold objectives of the meeting:

1. to define the specific role of each group in the promotion of South Africa's health through physical activity and the treatment of disease;
2. to define the specific areas that each of these groups covered in the provision of health care to South Africans who were physically active either in sports or recreation;
3. to promote collaboration and to co-ordinate the work done by these groups through the formation of a multi-disciplinary Federation or Association for Recreational and Sports Sciences and Sports Medicine.

Dr Noakes ended his letter with the following paragraph: "We genuinely feel that this meeting will provide a really important chance for everyone interested in recreational health, to get together and delineate their collective roles. We cannot emphasize strongly enough how important we feel your contribution to this Symposium and to our proposed Federation will be".

As a result of Dr Noakes' invitation, Mrs Moira van Oordt and Miss Sally Eager presented papers relating to physiotherapy, while I was asked to represent the South African Society of Physiotherapy.

I knew that this initial meeting of disciplines was of great importance to physiotherapists in South Africa. We were being given the opportunity to develop alongside the medical profession in the service of sport, sportsmen and sports medicine in this country. I knew, too, the tremendous contributions which physiotherapists could make in the field. I hoped that from this early symposium a permanent association would be formed.

I still have a copy of Prof Noakes' letter and can review with real satisfaction, the growth of the South African Sports Medicine Association (SASMA) and the growth of the relationship between the Association and the physiotherapy profession.

Many problems were experienced in those early years but under the right leadership the Sports Medicine Association grew from strength to strength and is today a thriving association. It was a momentous occasion when, at the AGM of SASMA in Durban in 1988, the constitution was altered to allow physiotherapists and biokineticians to become associate members. A representative from each group was asked to serve on the executive committee.

Members of these diverse groups which now make up the Association, are able to share their knowledge through the *South African Journal of Sports Medicine*. It is to me a privilege to be given the opportunity to promote, through this journal, the role of the physiotherapist in Sports Medicine. Physiotherapy encompasses a wide scope, from the treatment of the acute injury to the final medical rehabilitation of the sportsman so that he might return to his sport.

The profession of physiotherapy has come a long way and today we are seen to be amongst the leaders of sports medicine in south Africa. It is thanks to the enthusiasm of leaders such as Dr Dawie van Velden, President of SASMA, Brig. Ettiene Hugo, Past President of SASMA, Mr Clive Noble, Editor of the Sports Medicine Journal and Prof Tim Noakes, President Elect of SASMA that we are where we are today, and we thank them.

Thus at the end of a decade of the growth of SASMA, I can look back and feel proud that I was present at its birth.

Mrs Joyce Morton
South African Society of Physiotherapy
Representative: SA Sports Medicine Association

THE ROLE OF A SYSTEM OF TWO REFEREES IN THE PREVENTION OF RUGBY INJURIES

JR Potgieter, JH Blaauw and JH Malan

In the quest for the prevention of injuries in rugby the referee has often been mentioned together with the coach and medical and paramedical personnel as having an important role to play. He is expected to apply the laws correctly and fairly while also maintaining the discipline necessary to curb foul play. In terms of injuries, the referee is expected to fulfil a preventative function.

In spite of the complexity of the game rugby and the dissatisfaction with referees, we persist with the use of one referee. This is in contrast to most other team sports.

Observation of the use of two referees in rugby matches at the University of Stellenbosch led those involved with the game to become convinced of the benefits of such a system. It was argued, amongst other advantages, that the use of two referees would result in a decrease in foul play. However, there was no objective proof that such a system would be effective. Protagonists based their support of the system on common sense and intuition. There were also individuals and groups who were not in favour of such an innovation. It is against this background that an empirical investigation was deemed necessary.

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The incidence of penalties for foul play was lower in the case of matches handled by two referees.

Twenty five first league matches played in the second semester of 1990 at the University of Stellenbosch were randomly monitored. Seven hostel matches are usually played on a Friday afternoon. For the purpose of this investigation, four of these matches were controlled by a single referee and three by two referees. A pool of 12 first league referees was used in the investigation. They were appointed for all the matches prior to the beginning of the semester. Owing to withdrawals due to illness and other commitments, alternative referees had to be used on some occasions. The referees were not informed about the purpose of the investigation but were told they should experiment with refining the system of double refereeing. This, however, did not work because the referees soon became aware that their games were being monitored for the purpose of comparing the two systems.

Students in their final year of human movement studies were used on a voluntary basis to monitor the matches. Because it involved a fair amount of commitment, only a few students were used. Two students were assigned to each match, one being solely reponsible for recording and playing time while the other recorded all the other information. As only trained students were involved in this investigation, substitutes could not be used when some of these students were unavailable due to illness or other commitments. This had an adverse effect on the number of matches recorded.

The students received verbal as well as written instructions regarding the recording procedures. After these had been discussed with them, they observed a video recording of a provincial rugby match. The tape was stopped at various stages to make sure that the students understood the procedure. The use of the data sheet was tested by the main author on three occasions before it was finalised.

Selected results are presented in Table 1. The incidence of penalties for foul play was lower in the case of matches handled by two referees. Although this difference was not statistically significant ($t = 0,462$; $p > 0,05$) note should be taken of the small number of penalties awarded. However, it must be pointed out that the durations of these games was 60 minutes only. The absence of statistical difference is dicussed at the end of the paper.

Questionnaires were distributed among coaches, first league players, first league referees and supporters (preferably committee members of the hostel clubs). Respondents had to indicate their preference for a system of single referees or two referees. In an open ended question they had to propose possible advantages and disadvantages of a system of double refereeing.

Space was also provided for any general comments. The results are presented in Table 2.

It can be concluded that a great majority of players, coaches and supporters were in favour of the system of double refereeing. Four of the 12 first league referees indicated that with regard to personal enjoyment and satisfaction, they would prefer handling matches as a single referee. However, all the referees are of the opinion that the system of double refereeing would be in the best interest of the game. All twelve referees were, therefore, in favour of the system of two referees.

The perceived advantages of a system of double refereeing are presented in Table 3. It is significant to note that a total of 90 respondents out of a possible 135 stated that a system of double refereeing would decrease the incidence of foul play.

Table 1: Comparison between matches handled by a single referee and matches handled by two referees

	Single referee n=13		Two referees n=12	
	M	(SD)	M	(SD)
Penalties for playing ball on the ground, obstruction and high tackles	2	(2,1)	1,6	(1,4)
Players in coolbox	0,07		0	
Players sent off	0		0	

Table 2: Preferences for a system of single or two referees

	In favour	Against	Total
Referees	12	0	12
Coaches	3	0	3
Players	87 (85%)	17 (15%)	104
Supporters	16	0	16
Total	**118**	**17**	**135**

All the referees are of the opinion that the system of double refereeing would be in the best interest of the game.

Table 3: Perceived advantages of a system of two referees

Decrease in the incidence of foul play (90)
Infringements identified more effectively (50)
Better control of the game (36)
Greater impartiality and objective decision making (24)
More flowing rugby (14)
Deliberate infringements prevented (14)
Off-side law applied more effectively (9)
Decreased incidence of injuries (5)
Improved standard of refereeing (3)
Referee less in way of players (1)
Referee less involved with spectators (1)
Creates a feeling of trust between referee and players (1)

Opposition to the system of two referees are usally based on the following arguments:

- Too much whistle would lead to an increase in stoppages and will negatively affect the flow of the game.
- Referees would get in the way of players.

Although the only statistical difference between the two systems was found in the number of penalties awarded for off-side at the line-outs ($t = 2,44$; $p < 0,05$), there was no evidence to support the above arguments.

The fact that two referees have been used over the past three seasons at the University of Stellenbosch could have contributed to the absence of statistical differences. Players may have become accustomed to the system and played the game in a more disciplined manner regardless of whether the match was controlled by one referee or two referees. A case in point is the fact that the incidence of foul play has decreased dramatically over the past two years. The number of first league matches played in the hostel league is approxi-

mately 100 per season. In the 1989 season not a single case of foul play was reported to this committee. The laws of the hostel league do not allow the referee an option and make it mandatory for him to order a player from the field if he kicks, tramples or hits an apponent, regardless of the seriousness of such action, making this absence of disciplinary actions even more remarkable. This was certainly not the case a few seasons ago.

While the stystem has been functioning for three years at the University of Stellenbosch, it is still in its infancy. The possibilities, however, have not been exploited and a great deal of refinement is still needed. At this stage the system is not being used very economically since the division of labour between the two referees is not being utilised to the full. To date the system has functioned mostly with both referees keeping the play between them and more or less looking at the same action from different angles or viewpoints with a limited division of labour. It is envisaged that other models could be experimented with, such as a system similar to that used in basketball. One of the local referees, for example, handled a tough non-university match with a colleague in a neighbouring town and reported that when tempers began to flare one referee took control and handled the match in the normal way as a single referee. His colleague was now completely free to "look for the trouble". He was not concerned with the technical aspects of the game but focussed his total attention on one specific aspect, namely the cause of the trouble. In fact, he identified the culprit, ordered him off the field and the game proceeded in an orderly fashion. This incident is an example of the possibilities in such a system.

Double refereeing will decrease the number of injuries that are a result of foul play.

It would be naive to believe that double refereeing is going to solve all problems and will certainly not prevent all types of injuries. However, it is our firm belief that it will at least decrease the number of injuries that are the result of foul play. This belief is based on common sense and on the subjective and objective observations made over the past three years.

PHYSIOLOGICAL PROFILE OF THE SENIOR SOUTH AFRICAN RUGBY PLAYER

JG Barnard and FF Coetzee

INTRODUCTION

The status of elitism in rugby is determined by the standards achieved during the participation in the specific competition season, although certain norms of basic fitness components could be useful to reflect the status of the player.

During the last decade standards have been raised in international sports which necessitate a greater understanding of the attributes required to produce outstanding performance. A further scientific technique that can be of assistance in player development is that of profiling.

Currently many detailed physiological profiles exist of athletes who participate in a wide variety of sporting activities. Although rugby is our National sport, a dearth of information exists with respect to the physiological characteristics of South African rugby players.

Comparisons of test scores by any player with data from a normative base elite players enable strengths and weaknesses to be identified. Selections and programmes should then be structured that take individual players characteristics into consideration.

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PURPOSE OF THE STUDY

The aim of this study is to build up a normative data base which should be used for profiling purposes.

PROCEDURES

Subjects

This study was conducted over a period of five rugby seasons (1981 – 1986). One hundred and seven senior players (54 forwards and 53 backs) were selected for this project representing the best and second best team (Currie Cup winners and runner-up) for that particular season.

Methods

A universal test battery was therefore developed with respect to the anthropometrical, physiological and motor characteristics. This test battery comprising sophisticated electronic equipment was designed and tested for reliability and validity.[4]

Within 10 days after the Currie Cup final the winning team was tested. The procedure was as follows: To register the name, age and performance history of the player; to determine standing height; body mass; vital capacity and forced expiratory volume in one second; anthropometrical measurements for the determination of somatotypes by the Heath-Carter[2] method as well as relative body fat[3]; isometric strength (grip and back); isokinetic strength (quadriceps/hamstrings, biceps/triceps); sprint (electronical timing of 5 intermittent meter distances to a total of 23 m); horizontal power; oblique step sprint (vertical displacement); vertical power; hip flexibility (hamstrings); target throwing (hand-eye coordination); equilibrium (stabilometer); plate tapping (horizontal arm movement) and endurance (VO_{2max} predicted by the indirect 12 min Coopers method). The final test battery catered for 8 anthropometrical measurements, 3 physiological measurements and 12 motor function tests. The average values of the measured, as well as the calculated variables are given in Table 1.

Results and discussions

Details of the physiological, anthropometric and motor function test results are presented in Table 1 with means of standard deviations for the forwards and back-line groups.

Body composition

Forwards differed significantly ($p < 0,05$) from backs in that they were taller (189 cm vs 177 cm), heavier (101 kg vs 79 kg), had higher relative body fat (15% vs 9%) and greater lean body mass (86 kg vs 71 kg). As would be expected, these findings are because of the different specific responsibilities required of the two groups in their respective playing positions.

Body mass is very important to forwards in the set scrums, mauls and rucks. The heavier the pack of forwards, the greater will be the inertia, moment of inertia, the stability of the scrum and the momentum (provided that speed is not negatively affected). This supports the need for evaluation of body type and positional stability of the forwards. Ideally a front-row forward should be strongly built, particularly in the back, shoulders and neck.

Table 1: Profile of the South African rugby player

Variable (units)	Rugby: Forwards (n = 54)		Rugby: Backs (n = 53)	
	X	s	X	s
Age (years)	23,9	3,1	23,6	2,7
Mass (kg)	101,2	13,3	78,8	7,9
Height (cm)	188,8	7,3	176,9	6,4
Area (m^2)	2,436	0,185	2,089	0,142
Vital capacity (1)	6,8	0,7	5,7	0,9
VC/FEV_1(%)	84,0	5,8	83,7	7,3
Body density	1,068	0,014	1,078	0,008
Body fat (Siri)	15,0	6,8	9,2	3,1
Endomorphy (cor.)	2,8	1,12	2,1	0,61
Mesomorphy	6,6	1,1	6,0	0,9
Ectomorphy	3,4	1,3	2,3	0,6
Grip strength (kg)	76,7	10,9	67,9	8,8
Back strength (kg)	217,1	30,9	185,5	34,1
Knee extension (kg.m)	29,7	5,9	27,7	6,2
Knee flexion (kg.m)	19,3	3,3	16,4	3,5
Elbow flexion (kg.m)	5,8	1,0	4,6	0,8
Elbow extension (kg.m)	8,0	1,8	6,8	1,3
Sprint 0-23 m (s)	3,6	0,1	3,4	0,1
Margaria 0-2 m (s)	1,4	0,2	1,4	0,1
Sit & reach (cm)	6,9	9,1	9,6	8,8
Accuracy (15)	5,4	0,3	5,9	0,4
Balance (s)	14,2	0,2	13,9	0,2
Tap test (s)	8,4	0,2	8,3	0,1
Cooper ($ml.kg^{-1}.min^{-1}$)	51,2	0,7	53,9	0,6

Where n = Number
X = Mean
s = Standard Deviation

The higher relative body fat of the forwards may be an advantage because it acts as a buffer during body contact, while the forwards are subjected to far more body contact than the back-line players. However, the negative correlation between body fat and motor fitness test scores are also very important.

Body contact is a significant aspect of rugby. Relatively large body size is important, though more important for some positions than others. The large body size of the player is a definite asset when considering body momentum and body contact, provided that the higher relative body fat does not interfere with velocity to the extent that it adversely affects momentum.

Age

The average age (23,8 yrs) of the group was older than most other national or provincial teams. As in other sports, it naturally takes time for players to develop their maximal potential. Because of their increased vulnerability to injury through lack of strength and/or inexperience young players (under the age of 21 years) should be prohibited from playing rugby at senior level.

Muscular strength and power

Significant differences between forwards and backs were found for the peak volitional handgrips strength, and back strength (as there is a relationship between body size and strength). Grip strength is very important to rugby players (backs and forwards) who need it when binding in the scrums, rucks and mauls or when handling the ball. Back strength is a necessity for the rugby forwards in the scrums, rucks and mauls. No significant differences were found between the absolute knee flexion and extension power as demonstrated by the Cybex.

Flexibility

A sit and reach test was used to assess hamstring muscle group and lower-back flexibility. Data differed significantly between the two groups. An adequate level of flexibility is important when forced to stretch and to prevent injuries to muscles and associated tissue.

Anaerobic power

No significant difference was found between the two groups for the 23 metre sprint or the Margaria test. As the Margaria test was similar in both groups the difference in power scores was caused by the differences in body weight. Despite their greater weight, the forwards were able to run as fast as the backs, which demonstrates their leg power.

Aerobic capacity

The aerobic capacity tests includes VO_{2max} values derived from the 12 minute Cooper test. The VO_{2max} values of this study (mean 52,5 ml. kg^{-1}. min^{-1}) are similar to those of the British rugby players.[4] Values reported for other SA Elite intermittent-sport athletes indicated (Table 2) that professional soccer, squash and field hockey players exhibit greater aerobic capacity than the rugby players.

Docherty[5] has postulated that the aerobic versus anaerobic energy demands of a rugby player game vary between 85% and 15% and depend upon the playing position. Players spend approximately 85% of their time in low intensity activity and 6% of the 15% (intense acitivity) is related to running and 9% to activitities such as competing for the ball tackling and pushing. This indicates that the game is more anaerobic than aerobic, suggesting the need for a greater emphasis on anaerobic fitness training. According to these authors training should focus on developing the power of this metabolic path-

Table 2: Body composition and VO_{2max}: A comparison between the SA senior rubgy player and data for SA elite athletes in other intermittent activity sports

Study	Age (yrs)	Height (cm)	Weight (kg)	Body fat (%)	VO_{2max} ($ml.kg^{-1}.min^{-1}$)
SA Rugby	23,8	188,2	90,2	12,5	52,5 n=107
Hockey[6]	21,5	178,4	72,0	9,9	54,1 n= 28
Squash[6]	25,7	179,4	75,3	8,6	58,8 n= 18
Soccer[6]	21,8	174,8	72,0	9,2	55,2 n= 36

way since only a few activites seem to extend beyond a 10 second duration. The ratio of playing time and recovery time should be considered because their intensity of effort is especially dependent on the ability to recover from anaerobic during the aerobic recovery phase. Aerobic conditioning should therefore be emphasized.

Multivariate analysis

A multivariate analysis used to compute the findings of 725 males participating in 28 categories represented by 20 sports in South Africa summarize the following results that are important for rugby: The rugby-forwards scored the best in elbow flexion and backstrength – the poorest in VO_{2max} and relative knee- flexion and extensions and the highest in mesomorphy.

Conclusion

This paper demonstrates the use of actual profiles structured from morphological, motor fitness and physiological data in assisting the coach, selector or the rugby player to improve the latters' playing ability.

It should be emphasised that the authors do not believe in a single entity of PHYSICAL FITNESS. Rugby demands a different combination of functional capacities and therefore, the fitness of an individual must be specific to the particular task in hand.[5]

These norms can be used to predict, within limits, aptitude for participation and to reflect shortcomings in specific fitness components, as well as improvement, through specific training programmes.

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SPORTS INJURIES ENCOUNTERED ON A FIVE WEEK INTERNATIONAL CRICKET TOUR

CA Smith

ABSTRACT

Keywords: Cricket, International tour, common injuries, physiotherapy

The injuries incurred by 16 international cricketers while on a 5 week tour have been recorded. The physiotherapy treatment for these injuries has also been briefly noted. The purpose of this article is to make the medical team managing a cricket team (or any touring sports team) more aware of the type and extent of common injuries to be expected on a tour. It was concluded that it is important to thoroughly screen each player before undertaking any tours of this nature to identify either present or past injuries. Therefore, a treatment/training programme for the players, with the aim of minimising the possibility of re-injury while on tour, can be advised.

INTRODUCTION

There is a considerable amount of literature discussing the common injuries associated with different elite sportsmen and their sporting activities.[1,2,3,4] However, the literature pertaining to the type and extent of injuries incurred with sports teams when on tour is scarce.[5] More specifically, although a fair amount of published research on cricket as a sport does exist,[6,7,8,9,10] there is little evidence describing the injuries which can be expected with a touring International Cricket Team. Therefore, the aim of this study was to highlight the common injuries associated with an international cricket team while on tour, and thus assist with the player's preparation for future such tours.

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BACKGROUND

Sixteen International cricketers visited South Africa on a 5 week tour, which included 1 five day Test match, 4 one day Internationals and 3 three day preliminary matches against provincial teams in South Africa.

Prior to departing from their home country, each player underwent a physical fitness examination. The examination consisted of muscle power testing on a cybex, measurement of oxygen uptake while pedalling on a cycle ergometer and an incremental running speed test on a treadmill. Each player was also examined by a physiotherapist, and in some cases an orthopaedic physician. Unfortunately, the testing was done too close to the time of departure, and the players never had sufficient time to improve the areas of fitness in which they were considered weak.

The cricketers' own domestic season ended in September 1989 and tour took place four months later in January 1990. The off-season break meant that players who did not maintain a reasonable standard of fitness over this period did not start the tour in the physical condition they would have been in, had the tour been closer to the end of their playing season. Although this could have contributed to some players incurring injuries early on in the tour when they were still not fully fit and conditioned, it could also have worked in the team's favour by assisting some players to recover from any injury of the previous season.

EXERCISE AND TRAINING REGIMEN

After arriving and before commencing with the first match, the team had 6 days to acclimatise themselves to the surrounding conditions, to increase their suppleness and flexibility, their general level of fitness and improve their cricketing skills, ie. batting, bowling and fielding. From the beginning, emphasis was placed on stretching and warming-up exercises before the prac-

tise sessions and matches, with the aim of keeping the injuries on tour to a minimum.

Practise sessions during the first week normally lasted between 2 to 3 hours, sometimes twice daily. The sessions started with a slow warm-up jog of 2 to 3 laps around the playing field. This was then followed by stretching exercises for about 20 minutes (the biceps, triceps, deltoids, trapezii and latissimus dorsi, quadriceps, hamstrings, gluteii, thigh abductors and adductors, the calf and abdominal muscles). Mobility exercises for the shoulder and hip joints as well as the entire spinal column were also performed.

Strengthening exercises, mainly for the leg, abdominal and shoulder girdle muscles were then done. These included sit-ups, leg throw-downs, leg anti-gravity exercises and press-ups. Short sprints and medium distance runs at 50 and 75% of maximum were also performed. The players then went to the nets to improve their batting and bowling skills and finished off with fielding practise.

UNDERLYING INJURIES ON ARRIVAL

Several players arrived with underlying injuries. Some injuries were a result of the previous cricketing season and others were of a more chronic long-standing nature. Although some of the injuries were not as a direct cause of the tour, they were aggravated by the tour's intense programme, and thus warranted treatment. Furthermore, some underlying conditions which were reported remained asymptomatic throughout the duration of the tour and never required treatment. All the underlying injuries were assessed and reported by the physiotherapist who had screened the players prior to their departure and were written up in a short report for each player. Some players who had more serious injuries were also examined by an orthopaedic surgeon.

One player had had a right knee arthroscopy in 1989 for an osteochondral lesion, and had recovered from this over the off-season. However, the injury was re-aggravated in his first match, which resulted in a synovitis. A further two weeks of rest and treatment was necessary before he could resume playing.

Another player was found to have "gross degeneration of the left hip" on x-ray coupled with a slight fixed flexion deformity and restricted abduction and medial and lateral rotation. These signs were not overly relevant, and the player only demonstrated moderate inflexibility at the hips with stretching exercises. He never complained of pain or discomfort during exercise and was able to play in all the games for which he was selected.

Another player complained of lumbar backache and stiffness. His medical report attributed this to the presence of a 6th lumbar vertebra with consequential loss of the normal lordotic curve. Mobility and stretching exercises for the thoracolumbar region were given to the player to ensure he remained asymptomatic.

One of the bowlers presented with a minor facet joint neck injury which recovered within the first week following mobilisation treatment. Another player arrived with a history of a chronic right achilles tendinitis. Regular stretching helped keep the condition pain free until the last week of the tour, but then team selection rather than the injury prevented the player playing.

Lastly, one of the bowlers had an asymptomatic unstable osteitis pubis which revealed a 1,5cm depression of the left pubic rami. He insisted that it never troubled him when he bowled, and this remained true for the duration of the tour.

INJURIES AND PHYSIOTHERAPY TREATMENT

A total number of 40 separate injuries were recorded on the tour (Table 1). There were 8 muscle injuries, 6 involving tendons, 5 ligaments sprains, 14 affecting either bone or joint structures, 3 to neural tissues, 3 to soft tissues and 1 other injury involving none of the above structures.

There were 24 minor and 16 major injuries. Minor injuries were considered to be those which took 3 treatments or less to recover and which did not rule a player out from team selection. Major injuries were those which warranted more than 3 treatments and might have prevented a player from playing.

All 16 individuals were treated with 166 treatment sessions in total given, at an average of 10,4 sessions per player. Treatment modalities included electrotherapy apparatus (interferential, ultrasound and laser), manual physiotherapy techniques (mobilisations, massage, exercises and taping procedures) and lastly, ice. In total, 405 treatment modalities were used in the 166 attendances, at an average of 2,5 modalities per session. The most common modality was ultrasound, followed by massage, laser, mobilisations, ice, interferential, strapping and exercises being used least.

Muscle Injuries

Two players were treated with deep massage for muscle scarring and mechanical tension in their shoulder girdle region. Three players strained their quadriceps muscle, two of them being mild grade one strains which responded to transverse friction treatment, the third taking slightly longer to heal as the player had previously torn the muscle. Two hamstring injuries were incurred, both the result of old injuries being re-aggravated. Since the one player filled a key position (wicket keeping) which kept putting strain on the muscle and played in all the matches, he did not have adequate time to rest and thus the injury never healed completely. The other hamstring injury only presented towards the end of the tour and did not limit the player to much extent. Both were treated with cross friction massage, ice, straight-leg raise stretching, ultrasound and laser therapy. The last injury was a minor strain of the calf muscle which responded to 2 treatment sessions of transverse frictions and ultrasound.

Tendon Injuries

The commonest tendon injuries on the tour were four groin strains, all of

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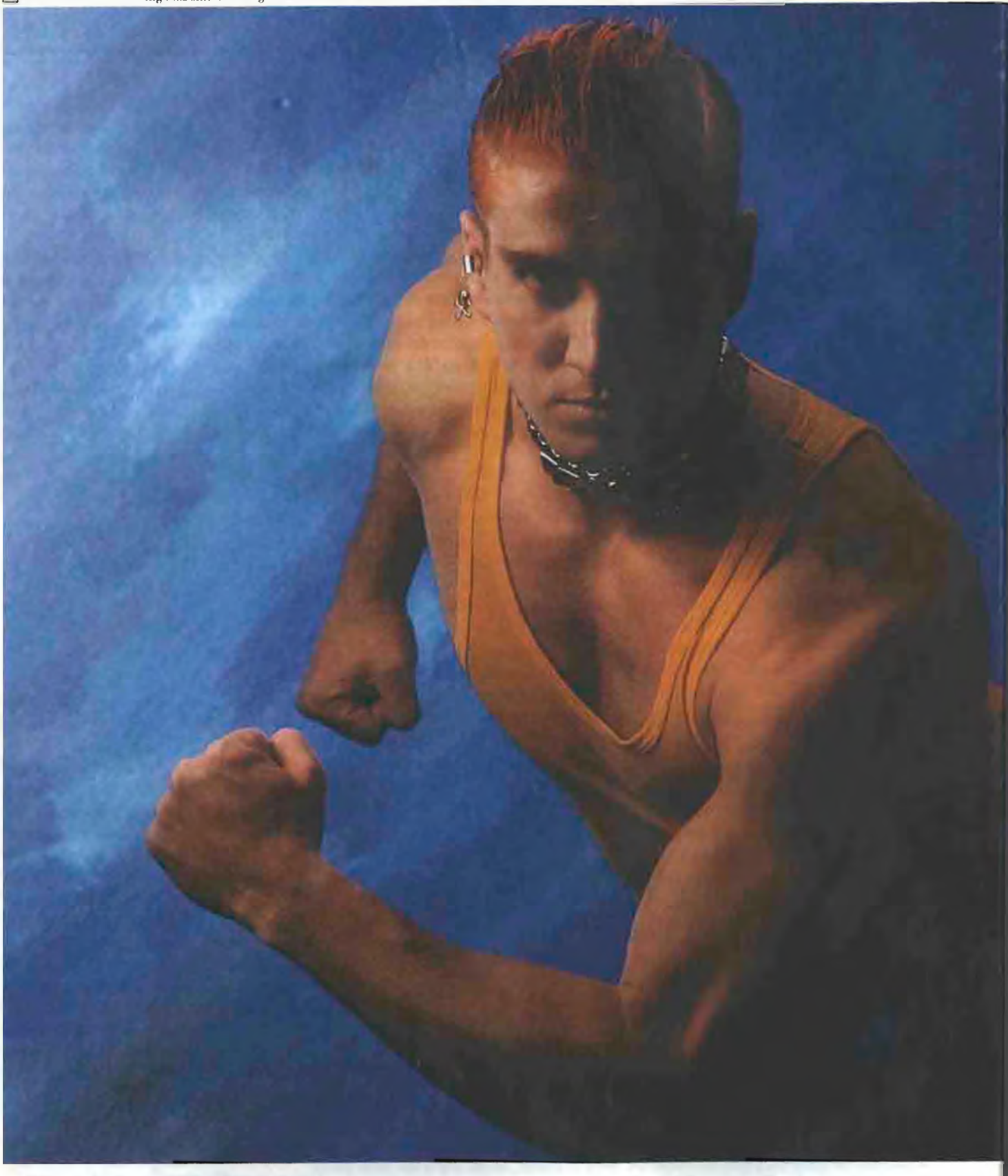

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Table 1: International Touring Cricket Injuries 1990.

Injury Statistics			
Muscles			8
Tendons			6
Ligaments			5
Bones/Joints			14
Neural Tissues			3
Soft Tissues			3
Other			1
		Total	**40**
Physiotherapy Treatment			
Individuals treated			16
Treatments given			166
Treatment modalities			
Electrotherapy:	*Interferential*	*21*	
	Ultrasound	99	
	Laser	61	
		Total	**181**
Manual:	Mobilizations		
	Vertebral	27	
	Peripheral	33	
		Total	**60**
	Massage		
	Specific	78	
	Non-specific	5	
		Total	**83**
Specific exercises			14
Strapping			16
Ice			51
Total Treatment Modalities			**405**

16 players received 405 treatment modalities, average 25,3
405 modalities in 166 treatment sessions, average 2,4.

which involved the adductor longus tendon on the left leg close to the ischial tuberosity insertion. Two occurred early on in the tour and responded well to treatment with transverse frictions, ultrasound and laser while the other two occurred in the final week and had not fully healed by the time the tour was over. One player had a small ganglion of his abductor pollicis brevis tendon of the right wrist. It took 5 sessions of laser and ultrasound therapy coupled with anti-inflammatory medication to relieve the pain. Lastly, one player presented with a grade one supraspinatus tendonitis. Two treatment sessions with friction massage and laser cured this injury.

Ligament Injuries

Two players complained of pain in the area of the soft ligamentous tissues surrounding the sacroiliac joint. Other ligamentous injuries included the anterior talar fibular ligament and nearby extensor retinaculum, the medial coronary ligament of the knee joint and the coracoclavicular ligament of the shoulder. Friction massage combined with ultrasound and laser were used in no more than 3 sessions to treat each of these injuries.

Bone/Joint Injuries

These were the most common injures observed on the tour (Table 1). Firstly, niggling injuries to the spinal column occurred at three levels; cervical and thoracic facet joint injuries in two player and lumbar facet joint pain and stiffness involving four others. The spinal injuries responded well to mobilisation and interferential therapy.

One of the commonest injuries in cricket, those involving the fingers, were seen in three players. A dislocated distal interphalangeal joint (DIP) of the little finger was immediately reduced and required 5 days rest and padded strapping until the player could play again. Another player was hit with the ball on the end of the little finger resulting in an impaction injury to the DIP joint and lateral displacement of the terminal phalanx, confirmed by x-ray analysis. The joint was padded, strapped and immobilised. A local anaesthetic injection was administered after the player insisted on returning to the field. A hairline fracture of the middle phalanx of the right index finger occurred in the third player. The finger was immmobilised and well padded, but never healed in time and prevented the player from playing again on the tour.

Two elbow injuries were also observed; firstly, non-localised pain in the olecranon region where the involved structure could not be clearly identified responded well to mobilisation treatment, and secondly, a capsulitis which presented with limited joint movement, pain and effusion. This was treated symptomatically to reduce the pain and swelling and the effusion was to be aspirated if it had not settled down once the player had returned home.

Two subperiosteal haematomas were the result of two players being struck by the ball, one on the radius and the

other on the tibia. The swelling in the forearm occurred in conjuction with tendon crepitus in the common extensor digitorum tendons. Treatment consisted of ice and ultrasound therapy. Lastly, an underlying osteochondral knee injury was re-aggravated on tour and also presented with a mild effusion. The player needed two weeks initial rest and treatment before playing again, and then further daily symptomatic treatment with interferential therapy and ice to reduce the swelling and pain and enable him to play the one-day matches.

Neural Injuries

Three injuries presenting with neural tissue signs and symptoms occurred in conjunction with or following other injuries. These comprised of adverse mechanical tension and friction syndrome of the sciatic nerve in the lower buttock in two players and an adherent lumbar nerve root in the lumbar spine of another. They were treated by mobilising and stretching the neural and connective tissue elements.

Soft Tissue Injuries

Two players developed soft tissue injuries as a result of being struck with the cricket ball. One player developed a para-nasal haematoma on the side of the nose, and the other player developed a contusion on the calf. Another player also had intermittent pain in the gluteal region similar to that of a gluteal bursitis. Treatment was confined to laser and ultrasound therapy, but did not provide complete relief of the symptoms.

Other Injuries

A subungual infection developed in a bowler, partly from friction rubbing of the players boot against the toenail of the great toe. The player made the necessary surgical adjustments to his bowling shoes and combined with relevant antibiotic therapy, the infection had cleared up within a week.

CONCLUSION

The injuries associated with 5 week International Cricket tour have been presented. The physiotherapy treatment which was administered is discussed.

The number of injuries encountered (40) might be considered high with respect to the tour's duration of 35 days. Even so, 20% of these were as a result of re-aggravated injuries from the previous cricket season. Therefore, the 4 month break in between the season and the tour could have been better utilised to prepare the individual players, by getting them fit and therefore preventing any recurrance of troublesome injuries.

The tour's intense programme of 16 match days and 14 practice days might have contributed to a larger volume of injuries. This was thought to have been prevented to some extent by the vigorous stretching and warming-up routines which preceded each practise session and match day.

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THE PHYSIOTHERAPY TREATMENT OF A HAMSTRING TENDON INJURY

In the past few years physiotherapists have noticed an increase in the number of patients complaining of pain, "High up, at the top of my leg under my buttock, and when I'm running, I feel that if I put my finger into the pain, it will help, but it does not".

Two different age groups complain of the problem. The first is the group of school children who participate in provincial athletics. They are often hurdlers and sometimes sprinters who have long hours of training. As can be expected, the more common age group with minor degeneration of tendons due to age, is the group between 45 and 55 years. These patients are usually long distance runners.

The school child presents a history of an acute injury, usually caused by inadequate or incorrect warm-up methods. There a sudden overload of the hamstring muscle, creates immediate pain in the area of the ischial tuberosity.

The older age group has a different history of pain occurring gradually over a long period of road running.

Because the pain may radiate down the back of the leg manifesting in the S1 dermatome, the physiotherapist, during her examination, always differentiates between an L5/S1 problem and a hamstring injury. The nerve innervation of the hamstrings is S1.

To differentiate, one asks the patient to touch his toes while keeping his knees extended and flexing his hips. This movement stresses the structures of the lumbar spine. If the patient repeats this movement with his lumbar spine either flattened or in a lordotic position, the hamstring muscle is stretched.

There are of course many other examination movements which the physiotherapist asks the patient to perform in order to reproduce the pain. Resisted flexion of the knee should reproduce the pain at the site of the hamstring tendon, but due to the structure and size of the muscle and tendon, it does not always do so.

Once the physiotherapist has diagnosed that the problem is a hamstring tendon injury, then the tendon is palpated and treated with transverse frictions. This is a deep massage with the force at right angles to the tendon. It is a very tiring treatment for the physiotherapist and even the patient usually sympathises. Different electrical modalities such as ultrasound and lazer are also used in order to decrease the inflammation and encourage healing. In resistant cases, if physiotherapy does not improve the condition the infiltration of the area with a steroid injection is the next step offered.

The physiotherapist does not allow the patient to participate in sport until he is pain free and his hamstring has returned to its original strength, power and flexibility. If available, the patient is tested on an isokinetic testing machine in order to ascertain his quadriceps/hamstring ratios and power. He is then given a programme of isometric or gymnasium exercises in order to correct his deficiencies. The isokinetic machine itself, can be used as a rehabilitation machine as well as a testing machine.

Once he returns to his sport, he can protect the tendon by using a thermal support. These supports are made from a nylon neoprene and are similar to a wetsuit material, but are thinner. They retain the body's natural heat, ensuring a good blood supply to the area. More and more top sportsmen are using these supports which are manufactured in South Africa. The sportsman wears it both while he is practicing and while he is playing his sport. It is a very cheap and effective form of protection following an injury and is also a preventative measure.

THE PREVENTION OF EXERCISE-RELATED INJURIES AMONG SOUTH AFRICAN ARMY RECRUITS: A REVIEW

HJ van Heerden

INTRODUCTION

The high incidence of exercise-related injuries, primarily in the form of overuse syndromes to the lower extremities, is a universal problem among recruits being subjected to an intensive physical conditioning programme (basic training) on entering the military service.[1-3] In this respect a varying incidence has been reported, with American army[1] and marine[2] recruits suffering a 26% and 37% rate of injury respectively, and the New Zealand[3] armed forces documenting an extreme 65,4% incidence of "work-related" injuries. The possibility that a similar situation may exist in the South African Defence Force (SADF) was first suspected by Cilliers and Gordon,[4] who suggested that the efficacy of the SADF basic training centres may be limited due to the particularly injurious nature of the physical training employed.

Subsequently, Gordon[5] critically evaluated the South African Army physical training programme in terms of fitness attained and injuries sustained. Results published from this research revealed unsatisfactory gains in endurance fitness,[6] and confirmed the afore mentioned hypotheseis by noting a 37,9% incidence of exertion-related injuries to recruits during basic training.[7]

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THE AETIOLOGY AND PREVENTION OF OVERUSE INJURIES

In review of the possible causes of overuse injuries to the lower extremities, numerous researchers [8-12] have identified certain common factors that should be considered when devising a preventative strategy. According the Renstrom and Johnson,[13] these factors can be classified into the following intrinsic and extrinsic categories:

Intrinsic factors	Extrinsic factors
Poor physical fitness	Training surfaces
Previous injury	Training methods
Excessive body mass	Footwear
Physical abnormalities	

Any of the above mentioned intrinsic risk factors may be observed in the new military recruit. As a result, strict compulsory medical examination and subsequent graded health classification of recruits prior to the start of basic training, should play a major role in identifying and protecting those with an inherent or acquired predisposition to injury.[2]

Training surface is another varied and complex factor affecting injuries,[14] and one that is difficult to standardize in and around basic training centres. The association of the remaining identified extrinsic factors ie. training methods[8,9,14] and footwear[10,12] with overuse injury, has received prominent focus in the literature.[15-17] The reason for this being their frequent implication and perhaps more importantly, particularly from a military perspective, their amenability to manipulation for the purpose of preventing injuries.[18]

Accordingly, since Gordons' initial exposition of the problematic high incidence of overuse injuries in the SADF,[5,7] two major intervention strategies have been considered, namely a revision of the South African Army physical training programme and the manipulation of military footwear. While the possible corresponding salutary effects on the physical fitness of recruits are currently under investigation,[19] the implementation of these preventative measures and their influence on the incidence of injury, merits further discussion.

TRAINING METHODS

Prior to 1986, South African Army recruits underwent a basic 10-week period of progressive physical conditioning consisting of four phases of increasing intensity.[20] Following the realisation of the injurious nature of this programme however, a revised cyclic-progressive physical training programme[21-23] was implemented, which stipulated that activities such as running, jumping, route-marches and drill-training be limited to the absolute minimum during every third week of training. This new programme was largely based on the pioneering research of Scully and Besterman[24] in the United States Army, concerning the successful manipulation of basic training programmes as prophylactic measure against the risk of overuse injuries, and stress fractures in particular, among recruits.

FOOTWEAR REGULATIONS

The extrinsic aetiological relationship between military footwear and the risk of exertion-related injuries to the lower extremities among recruits[25-27] has been highlighted. As a result, global attempts to manipulate footwear have been conducted in three spheres. Firstly the type of combat boot worn has been changed, albeit unsuccessfully.[2] Alternative approaches which have however, proved to be successful in reducing injuries, are:

- the alteration of wear regulation of boots;[3] and
- the placing of the shock-absorbing innersoles inside boots.[29-31]

All three of these approaches have been considered and experimented with by the South African Army,[21,22] and currently all running activities during organised physical training periods is carried out in running shoes with adequate shock-absorbing properties, and not in boots or "takkies" as was the case in the past.[21]

Furthermore, van Heerden *et al*,[32] and Schwellnus[33] have recently reported the significant reduction of overuse injuries among South African army recruits by the incorporation of shock-absorbing innersoles within combat boots, thus motivating the possible mandatory application of this preventive measure in the near future.

APPRAISAL OF PREVENTATIVE MEASURES

In a retrospective attempt to appraise the possible prophylactic effect of these intervention strategies employed by the SADF, the incidence of exertion-related injuries among recruits as reported by the study of Gordon *et al*[7] carried out in 1982, can be compared with another recent investigation[28-32] conducted five years later, after the introduction of the previously discussed preventative measures. In these studies, a uniform research protocol was used concerning the definition and classification of injury, as well as the method of data collection, thus allowing for a favourable comparison. As reflected in Table 1, both traumatic and overuse injuries, interpreted as being sustained in the presence or absence of a sudden precipitating event respectively, showed a substantial reduction from 1982 as opposed to 1987, in contributing to a total recruit injury incidence of 37,9% (pre-intervention) versus 17,1% (post-intervention). The incidence of overuse injuries, as distrubted over various anatomical sites of the lower extremities (Figure 1), has however not altered much.

Table 1: Recruit injury incidence and type/year

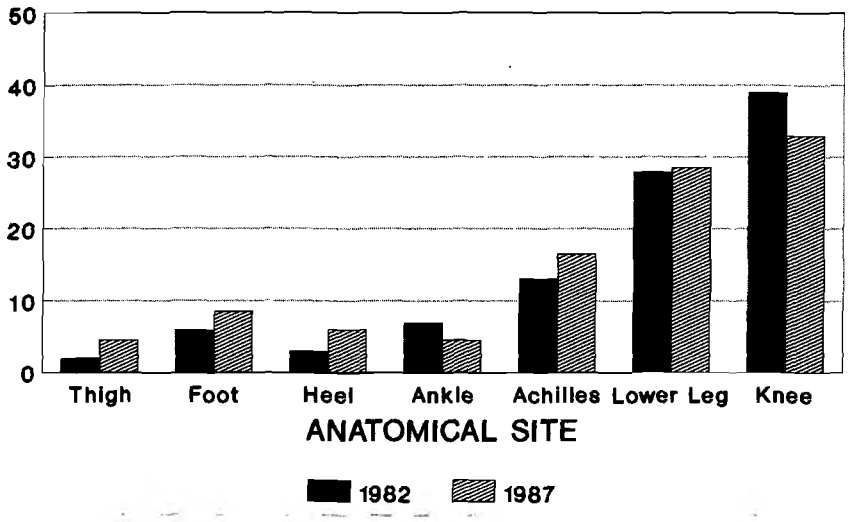
Injury type	1982+ %	1987* %
Traumatic	7,5	1,1
Overuse	32,4	16,0
Stress fractures	(4,1)	(0,4)
Total	**37,9**	**17,1**

\+ Gordon[7] *van Heerden *et al.*[32]
% Injury incidence expressed as a percentage of the total number of recruits observed in study
() Denotes a subset of injury type

CONCLUSION

It has been suggested[17] that the military is an ideal milieu in which to conduct epidemiological research due to its controlled nature. A practical problem is, however, encountered with recruits who serve as subjects leaving the service on completion of their period of conscription. As a result, longitudinal data reporting injury rates from independent studies, as in this case, precludes

FIGURE 1:
INCIDENCE OF OVERUSE INJURY (%)



an absolute comparative interpretation.[34] Notwithstanding this limitation, the observed data leads one to deduce that the introduction of the revised South African Army physical training programme and accompanying adapted footwear regulations, has brought about a viable decrease in the risk of exertion-related injuries. As a consequence, the efficacy of the SADF basic training centres should be enhanced by the diminished loss of training time and corresponding cost of medical care, while recruits may derive the optimum conditioning benefits presented during basic military training.

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FAT IN THE DIET

Mieke Faber

In general, fats may be defined as a group of organic substances which are greasy to touch, insoluble in water and are soluble in alcohol or ether. Chemically speaking fats are organic compounds of carbon, hydrogen and oxygen.

The fats in food are called triglycerides (neutral fats). Triglycerides are esters of glycerol (the water soluble component) and fatty acids which are the basic components of triglycerides.

Most fatty acids in foods are straight, even-numbered carbon chains, containing as few as 4 or as many as 24 carbon atoms. Short chain fatty acids contain 4 to 6 carbon atoms, medium-chain fatty acids contain 8 to 12 carbon atoms, and long-chain fatty acids more than 12 carbon atoms. Fatty acids can be divided into saturated fatty acids, monounsaturated fatty acids and polyunsaturated fatty acids. The state of saturation results from the ration of hydrogen atoms to carbon atoms in the basic carbon chain which forms the individual fatty acid. A fatty acid in which all of the carbon atoms in the chain have two hydrogen atoms attached to it is saturated. In unsaturated fatty acids a double bond is formed between the two adjoining carbon atoms of which hydrogen atoms are missing. Monounsaturated fatty acids have only one such double bond along the carbon chain. If two or more double bonds occur along the carbon chain of the fatty acid, it is called a polyunsaturated fatty acid.

A fatty acid that cannot be manufactured by the body and must therefore be obtained from the diet is known as an essential fatty acid (EFA). Linoleic acid is the major EFA in the diet. Two to 3% of the energy intake should be provided by EFA, ie. about 2 to 5 gram per day of linoleic acid for an adult.

Two to three percent of the energy intake should be provided by Essential Fatty Acids

The degree of unsaturation in any fat plays an important role in determining its physical nature. Fats consisting of predominantly saturated fatty acids containing more than 14 carbon atoms are solid at room temperature, while those with a high proportion of unsaturated fatty acids as well as those containing 12 carbon atoms or less are usually liquid at room temperature and do not solidify even at low temperatures. Vegetable and marine oil can be hardened and turned into solid fats by hydrogenation, a process in which unsaturated fatty acids are converted to saturated fatty acids by the introduction of hydrogen into the available double bonds of unsaturated fatty acids. This enables the manufacturing of margarine. In the manufacturing of vegetable shortenings and margarines, some, but not all, of the double bonds are hydrogenated.

Whether fatty acid is saturated or unsaturated determines the effect of the fat on plasma lipid levels. While saturated fat raises plasma cholesterol, polyunsaturated fat tends to lower it.

Any fatty acid which contains a double bond can exist in either of two geometrically isomeric forms. They can be either in the cis form or in the trans form. In the cis form the molecule folds back upon itself at each double bond. In the trans form the molecule extends to its maximum length. The natural unsaturated fatty acids in food exist in the cis form. During the hydrogenation some of the fatty acids are changed from the cis to the trans forms, but both forms are utilized by the body. Trans isomers of polyunsaturated acids do not have essential fatty acid activity and lack the ability possessed by cis isomers of lowering the level of lipoproteins in plasma.

Fats are mixtures of different triglycerides. Fats in food contain mixtures of short- and long-chain fatty acids and of saturated and unsaturated fatty acids. No natural fat is made up completely of either saturated or unsaturated fatty acids. Animal fats contain mainly saturated fatty acids. Most plant fats contain predominantly polyunsaturated fatty acids. Coconut oil is an exception in that it is a plant fat mostly made up of short-chain saturated fatty acids. Another exception is olive oil which is rich in monounsaturated fatty acids.

Fats such as butter, margarine, lard and oils are known as visible fats. This is, however, not the only source of fat in the diet. The fat present in foods such as in meat, whole milk, egg yolk, avocado and nuts are known as invisible fat or sometimes also called hidden fat.

The primary function of fat in the human diet is to supply the body's most concentrated source of energy. One

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gram of fat supplied 9 kcal. (Protein and carbohydrates provide 4 kcal/gram). Because of the high energy density of fat, high fat diets are almost always also high in energy so, except in the physically active, lead to obesity. Fat also plays a role in the satiety value of food. Meals that are moderate in fat content also have a greater satiety value than those that are low in fat. Another function of fat in the diet is as a carrier of fat-soluble vitamins namely vitamins A, D, E and K.

The amount of fat in the diet varies greatly. In most prosperous countries fat usually contributes 35 to 45% of the total energy. In some poor countries the figure is 15% or even lower. It is difficult to state a minimum requirement for fat intake. Because there is a correlation between fat intake and plasma cholesterol levels and since elevated plasma cholesterol levels are associated with an increased risk of coronary artery disease it is recommended that fat should not exceed 30% of the total daily energy intake. When fat intake is very low (10% of total energy) the volume of food that should be taken to meet energy needs might become a problem, eg. in children who are active and therefore have a high energy need, but with a small capacity for food. It is also recommended that the intake of saturated fat should be decreased to less than 10% of the energy intake. The use of polyunsaturated fat should be increased to 10% of energy intake. This could be achieved by substituting the use of animal products with plant fats.

It is also recommended that the intake of saturated fat should be decrease to less than 10% of the energy intake.

The amount of fat in 100g edible food as well as the amount of fat per portion of different types of food is listed in the table below.

Grams of fat per 100gm edible food as well as grams fat per portion size

Food	Fat per 100g	Portion size	Fat per portion
sugar	0	1 teaspoon	0
vegetable	0-1	1/2 cup	0-1
fruit	0-1	one	0-1
rice	0,1	1/2 cup	0,06
skim milk	0,2	250ml	0,5
breakfast cereal	0,3-3,4	1/2 cup	0,1-0,7
pasta	0,4	1/2 cup	0,3
dried beans, cooked	0,5	1/2 cup	0,5
white fish, eg. stock fish	0,8	90g	0,72
haddock	0,9	90g	0,81
sole	0,9	90g	0,81
2% milk	1,9	250ml	4,75
mussels	2,0	60g	1,2
oysters	2,2	60g	1,32
white bread	2,5	1 slice	0,75
whole milk	3,3	250ml	8,25
wholewheat bread	3,4	1 slice	1,02
medium fat fish, eg. snoek	3,7	90g	3,33
low fat cottage cheese	4,5	60g	2,7
trout	4,5	90g	4,05
lean beef	6,1	90g	5,49
chicken, whithout skin	6,7	90g	6,03
eggs	11,2	one	5,6
lean mutton	12,3	90g	11,07
chicken, with skin	12,6	90g	11,34
fatty fish, eg. butterfish	13,0	90g	11,70
lean pork	15,3	90g	13,77
avocado	15,3	30g	4,59
cheese sauce	15,4	1 tablespoon	3,85
pancake	15,5	one	10,85
cake	15,7	50g	7,85
doughnuts	15,8	one	7,9
ice cream	16,0	1 scoop	6,4
french fries	16,6	100g	16,6
cheese spread	21,2	10g	2,12
feta cheese	21,3	30g	6,39
samosa	25,7	one small	10,79
fatty pork	27,2	90g	24,48
polony	28,3	1 thin slice	4,53
fatty mutton	29,0	90g	26,1
fatty beef	29,1	90g	26,19
frankfurter	29,2	one	17,52
chocolate	30,3	50g	15,15
niknaks	31,3	40g	12,52
cheddar cheese	33,1	30g	9,93
cream cheese	34,9	1 tablespoon	13,96
whipping cream	37,0	1 table spoon	11,1
potato chips	40,3	10 nuts	9,28
peanuts	49,2	30g	14,76
bacon	49,2	1 rasher	4,92
sunflower seeds	49,6	1 tablespoon	7,44
peanut butter	51,1	10g	5,11
mayonnaise	53,5	1 tablespoon	12,31
walnuts	61,9	10 halves	18,57
hazel nuts	62,6	10 nuts	6,26
coconut	64,5	1 tablespoon	7,74
brazil nuts	66,2	10 nuts	19,86
margarine	81,0	1 teaspoon	4,05
butter	81,0	1 teaspoon	4,05
oil	100		5,0

Harvard expert on sports injuries in children for Sports Medicine Congress at Sun City

Big injuries to small athletes are frequently seen in clinical practice and are of great concern to both the medical and sporting communities.

Lyle J Micheli, Clinical Professor of Orthopaedic Surgery at Harvard Medical School and Consultant to the Boston Children's Hospital and the Boston Back Centre will be participating in this year's Sports Medicine Congress to be held at Sun City from 24-27 April 1991. Particularly well known for his contributions to the treatment of spinal injuries, including the hip and pelvis, Prof Micheli has developed a special interest in strength for children to prevent sports related injuries.

Other overseas guests at the Congress which focuses on prevention and rehabilitation of sports injuries include well known physiologist, Barbara Drinkwater, cardiac exercise specialist Prof Ralph Paffenbarger and cardiac rehabilitation practitioner, Dr Neil Gordon. Prof Drinkwater's research has concentrated on the female athlete, particularly with regard to the problem of osteoporosis and maximizing bone mass in the premenopausal years.

The themes of the Congress include rehabilitation of sports injuries, sport specific rehabilitation of specific rehabilitation and the role of exercise in the rehabilitation of various medical and psychological disorders. These include psychiatric disorders, organ transplantation, obesity, arthritis, hypokinetic disorders, physical disability and cardiovascular aspects.

Registration forms are available from the Congress Secretariat, Sports Medicine Association Congress, PO Box 13206, Clubview, 0014 or phone Riekie Labuschagne at (012) 663-3290.

SPORTS MEDICINE CONGRESS 24-27 APRIL 1991
NB: PLEASE DO NOT SEND ANY MONEY NOW

PRELIMINARY REGISTRATION FORM

I WISH TO:

a) attend the Congress YES/NO

b) present a paper on one of the following topics: YES/NO
1).....
2).....

c) present a poster on one of the following topics: YES/NO
1).....
2).....

d) attend a workshop on one of the following topics: (specify) YES/NO
1).....
2).....
3).....
4).....
5).....

e) present a workshop/s on the following

NAME: .....

INITIALS: ..... TITLE: .....

POSTAL ADDRESS: .....

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TEL (W): ..... (H): .....

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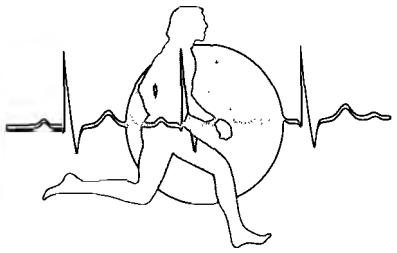
DATE: .....

Please forward this registration form to the following address:

Congress Secretariat
Sports Medicine Association
PO Box 13206
CLUBVIEW
0014



South African Sports Medicine Association

Suid-Afrikaanse Sportgeneeskunde-Vereniging

A Specialist group of the MASA (incorporated association not for gain)
'n Spesiale groep van die MVSA (ingelyfde vereniging sonder winsbejag)

PO Box 13206
CLUBVIEW
0014
February 1990

Dear Doctor,

The characteristic that distinguishes a professional from an educated person is the professional person's desire and responsibility to stay abreast of the developments of his or her field of expertise. The halflife of our professional knowledge is about 3 years, and for this reason it is vitally important to continuously refresh and supplement our knowledge.

Sports Medicine, the official mouthpiece of the SA Sports Medicine Association, has over the years become a treasured source of knowledge for the health care professional in the sports medicine arena. The journal features not only original research papers and articles by leading specialists in sports medicine, but also current news and relevant abstracts.

The publishing of **Sports Medicine** has been taken over by Medpharm Publications. The journal will be published quarterly namely, February, May, August and November.

Due to the present rate of inflation SASMA are no longer able to distribute **Sports Medicine** free of charge and have reluctantly introduced a subscription fee of R20,00 per annum (Members of SASMA will continue to receive the publication free of charge). In addition to managing costs, this will enable the editorial board maintain a high quality editorial content and render a more effective service to you, the health care professional.

Your subscription to **Sports Medicine** is an investment in your future and the future of the health care profession. We count on your continued support.

Regards,

CLIVE NOBLE
EDITOR
SPORTS MEDICINE

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Enclosed please find my cheque/postal order payable to SASMA for:

- R30 for FULL MEMBERSHIP* to SASMA
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- R25 for ASSOCIATE MEMBERSHIP** to SASMA
  (This includes receiving **Sports Medicine** free of charge)
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NOTE

* Full membership: Medical practitioner who is a member of MASA

** Associate membership: Members of supplementary Health Service professions, registered with the SAMDC and who are members of their own professional associations

*** Student Membership: Medical students who are in their clinical years