PHYSIOLIGICAL PREPARDENESS' AND FUNCTRIONAL POTENIAL OF HARAMAYA UNIVERSITY YOUNG SOCCER TEAM FOR THE QUALIFYING COMPETITION S OF THE ETHIOPIAN NATIONAL LEAGUE TOURNAMANT

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1. Abstract

The purpose of this study is to find out how far our young University Soccer Team is physically prepared and functionally adapted to the given load of exercises and find out solutions to over come the problems they face. The dream of producing top level soccer players in a team is one of the hardest tasks of soccer coaches. Genetic factors do play an important factor in defining the players who are functionally adapted players. However, to produce top soccer players who are functionally adapted to the given load of exercise, a significant amount of coaching or playing the game is taken in to account. 11 Male soccer players of the university team aged 19 – 22 years old were taken part in the study. Methodological analysis of Physiological parameter tests, Hematological, and Bio – Chemistry tests of the players were employed. Descriptive Statistical analysis using Means, ± SD, T – test, and, r (Pearson Correlation) were performed. A $P \leq 0.05$ will be considered to be statically significant.

The information provided through testing and examining provides ample evidence with regard to their physical readiness and functional adaptability. Monitoring and evaluating players identifies their weaknesses and inefficiencies. In turn, this identifies the measure to be taken in order to overcome the problems in producing top level soccer players in the club as a whole in the National team of the country.

Key words. Soccer, Physiological preparedness' Hematological analysis, Heart rate, Shuttle running, Long jump tests.

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2. Introduction

Soccer is not an easy game to play and requires exhaustive practice, a whole bunch of regimen and determination when things get tough. A well conditioned body and mind therefore is required to inculcate the specific soccer skills.

An outstanding soccer player is one who has mastered all necessary techniques and skills required for the game, and one who knows the potential of his well developed functional capability and physiological profile in order to perform well in any level of the game in an indefatigable manner.

The assessment of fitness and physiological profiles of soccer players has become today very common, in order to produce top talented soccer players. Since the game requires utmost vigorous activity with high physical capability and functional adapted rather they focus only on tactical development. Most coaches today, particularly in underdeveloped countries do not emphasize on testing fitness training and skill acquisition development, rather they focus only on tactical development.

Testing soccer players' fitness is useful in evaluating their health status and the potentials of their physiological capability in executing the learned skills perfectly which they have gone through in the training to play 90 or 120 minutes of the game. Testing must also reflect the fitness requirement in soccer game like speed – endurance, aerobic endurance and agility of the player.

There has been significant accumulation of scientific data soccer physiology and medicine. Previous investigations (Raven, Gateman. Guttmann. Pollock & Cooper. 1976; Rhodes et al. 1986; Mangine. Noyes. Mullen & Barber. 1990; Bagsbo. Norregang & Thorso. 1991; Chin Lo. Li & so 1992; Davies. Brewer. & Atkin. 1992; Green.1992; Al - hazzaa et al, 2001) have evaluated ideal physiological and anthropometric profile of successful soccer players mostly from Western Europe and Latin America, although there is a lack of descriptive data concerning characteristics as far as our country soccer players are concerned.

Factors such as experience, balance between aerobic and anaerobic capacity, body composition, muscular endurance, functional development of endogenous organs of the elite soccer players are the primarily important factors to evaluate. (Ekoblem, 1986; Tumility, 1993; Rico – Sanz. 1998; Shepherd, 1999; Ostojic, & Zivanic, 2001; 2001 Ostojic 2003 a).

Finally the purpose of this test is to describe the physiological preparedness and functional capabilities of our university's young soccer players in the stage of their preparation for qualifying competitions of the Ethiopian National League tournament.

3. Method

11 Male soccer players of the university team aged 19 – 23 years old (With professional experiences of 3 to 4 years of playing the game and individuals representing the different Federal States of the country) have participated in the study. All of the subjects were given clear information of the consent and were asked their willingness to participate, according the Ethical Law of the country's Science & Technology Commission, All participants were fully informed verbally and in writing about the nature and demands of the study as well as the known health risks. They completed a health history and questionnaires, and were informed that they may withdraw from the study at any time even after the submission of their consent.

A day before the experiment all subjects will consume the same diet. (55% of the calories will be derived from carbohydrates, 25% from fat, and 20% from protein) and the last meal will be undertaken 24 hours before the test. After that subjects will not participate in any prolonged exercise.

We assessed the response of Hematological parameter tests and their relationships to an aerobic threshold **before** and **after exercise**.

On the first day at 6: 30am in the morning Anthropometric measurements were taken and then blood sample was collected from **Radial Vein** for determination of Hematological responses of the body. On the second day after 24 hour rest at 10:30a.m. The athletes had

their physiological tests. First 6X10m shuttle running was performed and 2 minutes rest was given, and then 1minute set – up test was performed and 1minute rest was given and finally 5 times consecutive Long jump was performed and immediately blood was taken from the same vein where after intensive exercise tests was performed for determination of Hematological response of the body. Physiological parameter tests were measured (with bare body except within the inner cloth). Standard Ht / Wt ratios were calculated before the match in the University Higher Health center. All players were assessed on the same day, and tests were performed in the same order.

Upon entering the Laboratory tests, Hematology (HB, WRC, WBC, HCT) and Clinically Chemistry tests (creatinine, Albumin, Globulin, Total Protein, Triglyceride, Sodium, Potassium and Uric Acid) will be measured and evaluated from the Normal Values of comparison with Huamcount Hematology analyzer and Jenway 6300 Spectrophotometer respectively. Esnophil is counted manually by procedure of manual different count in the Harayma University Higher Health Center. Body mass will be obtained to the nearest 0.1 kg using a balance scale meter. Circumferences of the upper extremity and lower extremity will be measured using the cm. The exact growth of Ht / Wt/ ratio was measured using the formula (Ht X Ht) X 24 before the exercise. (Leger & Lamber .1982).

The data will be expressed and measured as Descriptive Statistical analysis using Means, ± SD, T – test, and, r (Pearson Correlation) will be performed. A P value is greater than 0.05 will be considered to be statically significant.

4. Expected Result of the Research

1. To identify the nature of our university soccer player's physical capability and develop an individual physical profile.
2. To determine a procedure of training appropriate to the level of University oriented soccer players and to evaluate objectively the effect of a specific training program that we designed for training.

3. To identify and monitor the health status of our university soccer player's and find solutions to tackle the problem they face as far as quality of soccer training is concerned. And
4. To provide the position of basic ways of perfection to be employed for our University soccer players to be highly competent among their opponents.

5. Discussion

The major finding of this study, to our knowledge is that specifically designed soccer tests fulfill the criteria that our country soccer players lack the top competency as that of highly qualified soccer players in the world wide.

Presently, the overwhelming majority of soccer players are teenagers who are engaged in various games, and, are carriers of numerous endogenous risks of factors connected to the latent pathology with the side effects of various bodies and systems of an organism (Molla, D., 2006). With this position of endogenous risk of factors and a state of health of our University young soccer players prevailing among them, we conducted questionnaires, Physiological Profile presented on table I, table II physiological parameters results, table III, Hematological Analysis, table V, nutritional states of the players, and table V concentration of nitrogen compounds, before and after the game.

In our present study, we tried to find out the physiological readiness (anthropometrical structure), functional potentials and capabilities of our University young soccer players, since soccer game requires explosive running velocity, good jumping ability, and high capacity of releasing energy due to the fact that 90% of the game requires aerobic potentials.

Physiological Profile.

Age. According to various studies (Chin, M.K., Lo, V.S., and So, S.H. 1992, Green, S. 1992, Mangine, R.E., Noyes, F.R., et.el. 1990, Parente, C., Montagnari, et.el. 1992), top soccer team players have an average of 20 - 25 years. However, more and more teams are successfully introducing younger players and keeping veterans in their team. Better medical care and modern coaching will motivate and up grade the problems that most players may face today, provided if we apply the exact method of testing and evaluation is taken in to account.

Height, Weight, and Body Shape.

A scientific study showed that (Parente, C., Montagnari, et. el. 1992, Reilly, T., Bangsbo, J., 2000), a professional team had an average body weight of 77.7kg compared to 73.4kg for semi – professionals. Professional players do vary in weight and size especially when ethic influences are taken into account. For example, data on International Asian teams demonstrate that their players were smaller in physical size, especially when compared to European and Latin American teams. Mid fielders are often smallest whilst central defenders are often the tallest and heaviest out field players on the pitch.

Body Shape (Soma type) and muscular strength studies (Montagnari, et. el. 1992, Reilly, T., Bangsbo, J., 2000) indicate that professional players tend to belong to the Mesomorphy category, meaning a more muscular make up. Due to their muscular body shape, upper body strength in professional players would be expected to be higher than that of others. Professionals generally have a greater explosive muscular power.

The **Long Jump distance**, is a good measure of specific muscular power, particularly, Calf and Quadriceps muscles of soccer players. Which allow for more powerful jump, kicks, tackles, and sprints among other factors (Wisolf, U., Helgerud, & Hoff., 1998). We were found that most of our young players have shown less results of jumping power?

Further, we found that age, height, and weight were significantly different between our young soccer team players. Data on age, height, and weight of players from other studies (Green, S. 1992, Shepard, R.J., 1999) suggest that players vary widely in body size. Thus, these parameters are not sensational factors for success in soccer; more over, they might determine the playing position role (Reilly, T., 1996). A particular body shape and size may be an advantage in certain match – play situation while disadvantage in another.

The functional ability, physical vitality, health, longevity and the production and management of sustainable biological energy resources of soccer players is also determined by the Hematological analysis that is in your Blood, which take place inside each of our cell. Blood is life. It is the primary force that fuels the power and mystery of your physical

power (D'Adamo, J., 1998, Nomi, T., & Besher, A., 1983). Energy requires for soccer players. Our energy comes from the breakdown of the oxygen we breathe and the food we eat. People who exercise at greater intensity, and especially those activity grows muscle bulk, have significantly higher protein requirements. According to (Burke & Deakins, McGraw – Hill. 2006) active athletes playing power sports (such as soccer), those engaged in muscle – development training, and elite endurance athletes, all require approximately 2grams of protein per day kilogram of body weight, roughly double that of sedentary persons. This can be determined by the concentrations of **Albumin** and **Total protein** in the blood.

Albumin is a protein, soluble in water, synthesized in the liver and present in the blood plasma. Albumin, the most abundant protein, concentrates the blood and attracts water, and there by maintains the circulating blood volume.

In soccer game, meeting energy needs can help improve performance during the 90 minutes of the game as well as improve strength and endurance. Therefore based on the above ideas we have assessed from the P***opulation (Normative) medical values of point of view that, our young soccer players,*** Cretin phosphates concentration, volume of Red Blood Cell (erythrocytes), concentration of Hemoglobin (HB), total volume of White Blood cells (Leukocytes), average percents of Triglycerides, and Nitrogen – contain of Uric - acid in the blood are considered. Your Blood is the door to the primal force that fuels the physical power, physical vitality, energy buffer, transport of nutrients of ($O_2$and Co_2, micro and macro elements), relationship between heart rate and volume of Vo_2 Max and finally, manifestation of your intensity to exercise tolerance and withstand of fatigue during the game.

Nitrogen and its compound and metabolic (creatinine, total protein, urea) are important metabolic intermediate involved in many reactions within the body (Green, H. J., Fraser, I.G. 1998). Nitrogen intermediate metabolites concentrations in the blood change during to sub maximal intensity exercise (e.g. up to 50% max). (Bakonska – Pacon. Borkowski. 2003). Appreciable increase in creatinine, urea, total protein concentration in the blood become evident at exercise intensities in the range of 70 – 75% max. large increase found in athletes; probably reflect a greater mass of muscle, which depletes ATP to greater extent than typically untrained.

Uric – Acid, the main end product of PURIN. (a group of nitrogen – containing compounds that includes adenine and guanine, the basis whose sequence forms the genetic code) Uric acid is derived from ADENINE and GUANINE, two of the purines in DNA and RNA.

Cretin phosphate, concentration alternates continually as a result of the intermittent nature of the game. CP has a very important function as an energy buffer, making energy available for the muscle during rapid elevation in the exercise intensity. For elite male soccer player, the total duration of high intensity exercise during a soccer match was about seven minutes (Bangsbo, et.el.1991) this included about 19 sprints with mean duration of two seconds. Degradation of CP, and to a lesser extent stored, provides a considerable amount of energy during the sprinting efforts.

Red Blood Cell (erythrocytes), its major role is, to transport oxygen from the lungs to the body cells and to help transport carbon dioxide from the tissues to lungs, where it will be exhaled from the body. The average man has about 5, 5 million erythrocytes per cubic millimeter of blood, and average woman has about 4.8 million.

Hemoglobin, (HB), oxygen - carrying globular protein. Each adult hemoglobin molecule consists of 5% **heme**, an iron – containing pigment, and 95% goblin, a polypeptide protein. Its function depends on its ability to pick – up oxygen that has been inhaled into the lungs, to transport it via the blood vessels to the body tissues, and to release it as the tissues need it and to maintain a stable acid – base balance in the blood.

White Blood cells (Leukocytes) are able to obtain a continuous supply of energy, and their anabolic and catabolic chemical processes are much more complex than those of erythrocytes. For example, they can synthesize protein, and are able to produce RNA in their nuclei, where the total volume is 4000 – 11,000 cubic millimeters.

Triglycerides are used in the body mainly to provide energy for the different metabolic processes. An average of 30 to 50 percent of the carbohydrates ingested with meals is converted into triglycerides for energy (Fulico, A. J. (1974), Parizoval, J., (1973), Spitezer, J.J., (1973).

Therefore, as much as two third to three quarter of all energy derived directly by the cells is supplied by triglycerides rather than by carbohydrates. A soccer player needs a variety of elements to support the biomechanical process, which play a role as electrolytes in a structural of muscle contraction and relaxation. Therefore, we assessed the normal values of potassium and sodium in the blood of our young soccer players.

Potassium is essential for body growth, nerve conduction, muscle contraction, and water ion balance in the body fluids, and for electrolyte of heart & nerve muscles.

Sodium, component of extra cellular fluid, critical to nerve and muscle response, and maintains proper water balance in the blood (electrolyte)

6. Results

The major findings of this study specifically, designed to know how far our University soccer players are physically capable and endogenously healthy to carry out the given load of exercise to be competent players in the soccer match.

We assessed for the latent pathological conditions and the health status of the players and their families providing questionnaires. Of all evaluated players except the two players' families (asthma & high blood pressure) almost all (both families & players) were free of any latent pathological diseases and disorders.

In the present study, we found that our University young soccer players aging, 19 – 22 years of old, with professional experiences of 3 to 4 years of playing soccer game, their ages with the expected Ht / Wt ratio were significantly different between groups and not proportional growth according to their ages with their expected Ht / Wt ratios. We have used a formula to know the exact chronological age growth of the players using the formula (Ht X Ht) X 24 before the exercise. Circumferences of the upper and lower extremity are measured using the cm.

Here most of our young players are thin and lean rather than being Mesomorphic (more muscular category). This is due to improper growth of Ht/ Wt ratio and unbalanced diet application of our young sportsmen starting from their childhood.

Table I. Characteristics of Ht / Wt ratio and their differences of our young soccer players. Values are Mean, ± SD, r, and T – test.

No	Variables	Obtained Ht/Wt		Expected Ht/Wt ratio		Obtained differences Ht/ Wt ratio	
		Mean	± SD	Mean	± SD	T- test	r
1	Height	172.6	6.127	71. 57	5.04	.137	.402
2	Weight	61. 61	6.206	8.67	5.27	.137	.402

No strong correlation of Ht /Wt ration relations, i.e., There is no proper chronological age growth of our young soccer players.

Nature of relations between expected Ht / Wt ration and their difference

No	Variables	Expected results and their differences. (correlation)	
		T – test	r
1	Height	.341	.265
2	Weight	.265	.341

Regression (nature of relations between expected relation and their differences)

Coefficient (a)

Model	Un Standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	69.379	2.573		26.962	.000
VAR00001	.253	.256	.265	.989	.341

A Dependent Variable: VAR00002

Regression, Nature of relations between expected ratio and difference of Ht / Wt ratio is calculated by the formula, Y = 69379 +.253 X,

Where, Y= the expected ratio & X = Obtained differences

We can conclude that the majority of the players are not proportionally developed according to their Age, Ht / Wt ration.

To test the level of tolerance to intermittent exercises, field physiological parameters tests were conducted by the soccer players following a specific protocols, 6X10m Shuttle - run (Speed – endurance), 1minutes – set – up test (flexibility & agility), and 5X long jump (explosive power of Calf and Quadriceps muscle).

Table II. Physiological parameters of the field work tests of our players. Values are Mean, ± SD and T -test

No	Variables	Obtained Physiological tests			Standard Values
		Mean	± SD	T- test	
1	6 X 10 min. Shuttle Run	34.2	2.981	- 7. 27	≥ 35 min.
2	1min. Set – up Test	23.453	3.597	1.833	≥ 45- 55times.
3	5 X Long Jump	12. 564	0.572	-12.77	≥ 17 meters

Accept the hypothesis, that is, the mean of **Speed Endurance** 6 X 10 shuttle run is not greater than 35min.

So, mean value of **Strength Power** 5 X Long Jump is 12.564m, it is not greater than 17 meters.

So, accept the hypothesis that the mean of **Strength – Endurance** (1min. set – up test) is 23.45 times, which is not within or greater than 40 – 55 times.

Based on the t – table the value of t - α at α = 5% significance level, and t and (n – 2) d. f can be taken from the t – table which is next to the references.

In general we found significantly low results of physiological field work tests as compared with that of highly qualified soccer players.

We also assessed the response of Hematological and Bio – Chemistry tests (Pre & Post) exercises and their relationships to the tolerance of un due fatigue since, those results are the indicators of production and management of sustainable biological resource of energy of soccer players.

Table III. Hematological Laboratory tests results Pre & Post exercises.

Values are Mean, ± SD

No	Variables	Population Values (Normative)	Mean		± SD	
			1	2	1	2
1	Erythrocytes x 10^6 (mm^3)R.B.C.	4.5 – 6.5 mil/cumm	4.6982	4.6773	.53344	.42010
2	Hemoglobin (g/d)	13.0 – 18.0 gm/dl	14.7455	14.8182	1.22749	.80600
3	M.C.V. (μ^3)	76 -96 fl	95.0909	95.6364	4.86733	4.22546
4	Hematocrit (%)	42 -52	44.5182	42.1182	3.59967	9.38369
5	M.C.H.C. (%)	30 – 35 g /dl	33.1364	32.9788	.95841	1.11697
6	M.C. H. (p grams)	27 -32 picogram	31.5636	31.8182	2.23171	2.15259
7	Leucocytes x 10^3 ($/mm^3$) W.B.C.	4000 – 11,000 cumm	5.2255	7.7382	1.25643	2.10005
8	Eusinophils ($/mm^3$)	1.6 %	2.6364	5.2727	2.01359	2.37027
9	Platelets x 10^3 (mm^3)	1.5 – 4.0 lakh/cumm	165.27	183.72	59.0324	44.229

N. B. 1 – Identifies Pre - Exercise

2-- Identifies Post - Exercise

No significant differences of Erythrocytes concentration, Hemoglobin, and Hematocrit even before and after the tests. We assume that the physiological potential of our young soccer players is low as compared to those of top qualified soccer players. This is due to the low Hematological volume reduction, malnutrition and improper body muscle development.

Hematological Laboratory tests results Pre & Post exercises.

Values are T – test, and **r, Correlation. (Pearson Correlation)**

No	Variables	Obtained Results			
		Before Exercise		After Exercise	
		T- test	r	T- test	r
1	Erythrocytes x 10^6 (mm^3)R.B.C.	.225	-.399	.225	-.399
2	Hemoglobin (g/d)	.118	-.499	.118	-.499
3	M.C.V. (μ^3)	.673	-.144	.673	-.144
4	Hematocrit (%)	.742	-.112	.742	-.112
5	M.C.H.C. (%)	.267	.366	.268	.366
6	M.C. H. (p grams)	.606	-.176	.606	-.176
7	Leucocytes x 10^3 (/mm^3) W.B.C.	.214	-.407	.214	-.407
8	Eusinophils (/mm^3)	.492	.232	.492	.232
9	Platelets x 10^3 (mm^3)	.151	.463	.151	.463

No Significant Correlations is obtained before and after the exercises.

This shows that the Hematological Laboratory results (W.B.C., R.B.C., HB, M.V.C, HCT, M.C.H.) of our young soccer players were not Correlate within their normal standards

Measurements were also conducted to evaluate the Nutritional states of our young soccer players. They mainly produce energy for the different metabolic process & muscular development of the soccer players.

Table V. Mean values ± SD. for Protein. Albumin, Total lipids **(**Triglycerides)

No	Variables	Normative	Mean		± SD	
			1	2	1	2
1	Albumin	2.3 3.6 gm %	5.2027	4.9382	1.81947	1.77339
2	Triglycerides	60 – 165mg %	152.4545	121.1818	59.08699	63.07110
3	Creatnine	0.6 – 1.2 mg/dl	1.0518	1.1218	.24649	.14331

N. B. 1 – Identifies Pre - Exercise

2- Identifies Post - Exercise

T – test and r, (Pearson Correlation) for Protein. Albumin, Total lipids **(**Triglycerides).

No	Variables	Obtained Results			
		Before exercise		After Exercises	
		T – test	r	T – test	r
1	Albumin	.394	.286	.394	.286
2	Triglycerides	.365	.303	.365	.303
3	Creatnine	.684	.139	.684	.139

Correlation between the normative (population) values parameters analyzed was determined using the T- test of students and r, (Pearson Correlation).

And there were no significant correlation obtained between the variables. Poor muscular development and energy production was maintained.

Table VI. Concentration of Nitrogen compounds, (Urea, Creatinine (mM) and Uric – acid) and important Blood – Metals (Na^{+}, $K^{+,}$ $Fe^{++)}$ were also determined.

No	Variables	Normative	Mean		± SD	
			1	2	1	2
1	Uric Acid	--	5.4727	5.55382	1.75490	2.70182
2	Creatinine (mM)	0.6 – 1.2 mg/dl	1.0518	1.1218	.24649	.14331
3	Potassium	3.5 – 5.3 mEg/l	5.1991	5.7791	1.72258	2.09194
4	Sodium	137.0 – 150.0 mEg/l	140.7273	145.1455	8.41535	17.23116

N. B. 1 – Identifies Pre - Exercise

2- Identifies Post - Exercise

Table VI. Concentration of Nitrogen compounds, which raises metabolism concentration in the blood up – rising exercise intensities in the body. Reflecting a greater mass of muscular, this depletes ATP to greater extent than typically untrained. (Urea, Creatinine (mM) and Uric – acid) and important Blood – Metals (Na^{+}, $K^{+,}$ $Fe^{++)}$

Which maintains fluids balances in the body & muscle response to activity were also determined using the T- test of students and r, (Pearson Correlation). No significant correlation is obtained between the variables before and after the exercises.

No	Variables	Obtained Results			
		Before Exercise		After Exercises	
		T – test	r	T –test	r
1	Uric Acid	.687	.137	.687	.137
2	Creatinine (mM)	.684	.139	.684	.139
3	Potassium	.199	.419	.199	.419
4	Sodium	.473	-.242	.473	-.242

The obtained results show that there were no significant correlations obtained between the variables before and after the exercises. Which means Bio –Chemistry tests were also beyond their normal values; this might show the improper use of minerals, Vitamins and poor uses of nutritional feeding.

7. Conclusions

Soccer is a competitive acyclic activity of long duration game participated through intermittent movements with activities like running, sprinting, heading, and kicking. Physiologically, good aerobic, anaerobic function, with degree of intense energy – production system. (Stolen, T., Chamari, K., Castagna, C., Wisloff, U. 2005). And strength and agility is essential to maintain the optimal performance during the game. To evaluate these qualities we have chosen an appropriate test that identifies potentials of our University young soccer players. We came to conclusion that there were a lot of significant differences in anthropometric and physiological parameters test. Ht / Wt ratio were not related to their chronological ages.

We also observed no significant difference (before & after the exercise) in Hematological and Bio – Chemistry tests.

In our opinion this might be due to the psychological tensions that students are facing during classes and malnutrition's problems which they have from their childhood.

Therefore, further research is needed to highlight foreground these limitations and problems in order to cope –up and be top players as those of elite professional players.

8. Recommendation

1. Nutritional values that our youngster are feed on should be studied
2. The use of Vitamins, Minerals and high calories diet to soccer players should be taught and recommended before the game.
3. Further medical and physiological tests should be conducted

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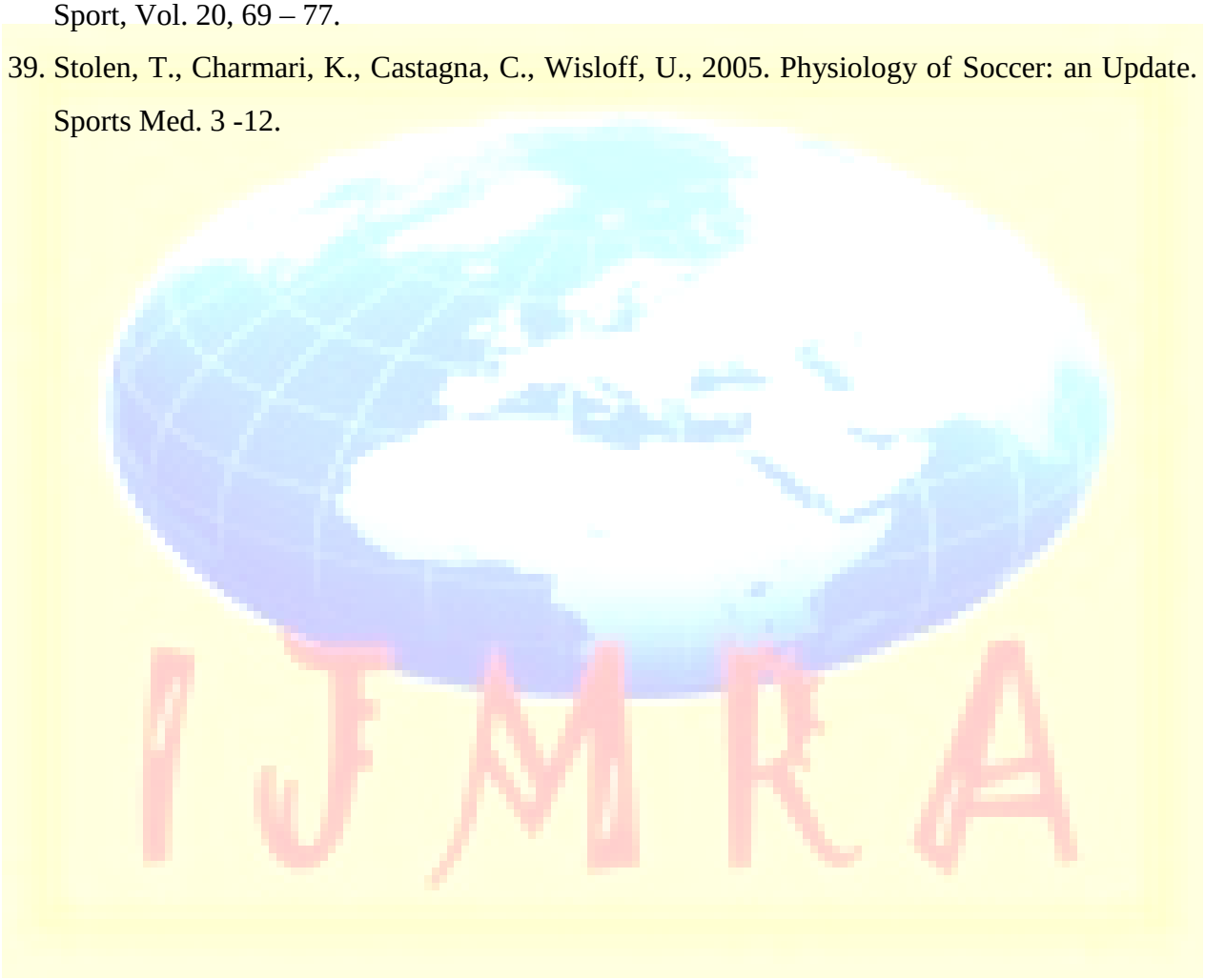
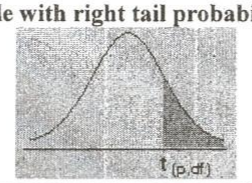


t table with right tail probabilities



df\p	0.40	0.25	0.10	0.05	0.025	0.01	0.005	0.0005
1	0.324920	1.000000	3.077684	6.313752	12.70620	31.82052	63.65674	636.6192
2	0.288675	0.816497	1.885618	2.919986	4.30265	6.96456	9.92484	31.5991
3	0.276671	0.764892	1.637744	2.353363	3.18245	4.54070	5.84091	12.9240
4	0.270722	0.740697	1.533206	2.131847	2.77645	3.74695	4.60409	8.6103
5	0.267181	0.726687	1.475884	2.015048	2.57058	3.36493	4.03214	6.8688
6	0.264835	0.717558	1.439756	1.943180	2.44691	3.14267	3.70743	5.9588
7	0.263167	0.711142	1.414924	1.894579	2.36462	2.99795	3.49948	5.4079
8	0.261921	0.706387	1.396815	1.859548	2.30600	2.89646	3.35539	5.0413
9	0.260955	0.702722	1.383029	1.833113	2.26216	2.82144	3.24984	4.7809
10	0.260185	0.699812	1.372184	1.812461	2.22814	2.76377	3.16927	4.5869
11	0.259556	0.697445	1.363430	1.795885	2.20099	2.71808	3.10581	4.4370
12	0.259033	0.695483	1.356217	1.782288	2.17881	2.68100	3.05454	4.3178
13	0.258591	0.693829	1.350171	1.770933	2.16037	2.65031	3.01228	4.2208
14	0.258213	0.692417	1.345030	1.761310	2.14479	2.62449	2.97684	4.1405
15	0.257885	0.691197	1.340606	1.753050	2.13145	2.60248	2.94671	4.0728
16	0.257599	0.690132	1.336757	1.745884	2.11991	2.58349	2.92078	4.0150
17	0.257347	0.689195	1.333379	1.739607	2.10982	2.56693	2.89823	3.9651
18	0.257123	0.688364	1.330391	1.734064	2.10092	2.55238	2.87844	3.9216
19	0.256923	0.687621	1.327728	1.729133	2.09302	2.53948	2.86093	3.8834
20	0.256743	0.686954	1.325341	1.724718	2.08596	2.52798	2.84534	3.8495

21	0.256580	0.686352	1.323188	1.720743	2.07961	2.51765	2.83136	3.8193
22	0.256432	0.685805	1.321237	1.717144	2.07387	2.50832	2.81876	3.7921
23	0.256297	0.685306	1.319460	1.713872	2.06866	2.49987	2.80734	3.7676
24	0.256173	0.684850	1.317836	1.710882	2.06390	2.49216	2.79694	3.7454
25	0.256060	0.684430	1.316345	1.708141	2.05954	2.48511	2.78744	3.7251
26	0.255955	0.684043	1.314972	1.705618	2.05553	2.47863	2.77871	3.7066
27	0.255858	0.683685	1.313703	1.703288	2.05183	2.47266	2.77068	3.6896
28	0.255768	0.683353	1.312527	1.701131	2.04841	2.46714	2.76326	3.6739
29	0.255684	0.683044	1.311434	1.699127	2.04523	2.46202	2.75639	3.6594
30	0.255605	0.682756	1.310415	1.697261	2.04227	2.45726	2.75000	3.6460
inf	0.253347	0.674490	1.281552	1.644854	1.95996	2.32635	2.57583	3.2905