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EDITORIAL BOARD

Editorial Comment

The Ghana Journal of Health, Physical education, Recreation, Sports and Dance (GJHPERSD) is a journal that published twice a year by the Department of Health, Physical Education and Recreation, University of Cape Coast, Ghana in which topical issues concerning exercise physiology, administration, health, biomechanical and behavioural aspect of physical and health education are publish. Majority of the articles are derived from researches and scientific investigation. Manuscripts in the present volume are selected by the Editorial Board from among submissions made by interested contributors. In these two issues, articles were compiled on differences in body anthropometry, factors influencing integration of primary school PE curriculum, food hygiene practices, safety measures of oil marketing company and reconciling the grading of students on teaching practice. The final determination is made on the basis of the professional and scientific relevance, need and extent of information to Health and Physical Education. The Editorial Board is receptive to suggestions concerning selections of potential manuscripts and topics worthy of publication. For the present volume, the Editorial Board wishes to acknowledge the contributions of our consultants and reviewers in the manuscripts.

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Ghana Journal of Health, Physical Education
Recreation Sports and Dance (GJOHPERSD)

GHANA JOURNAL OF HEALTH, PHYSICAL EDUCATION RECREATION SPORT AND DANCE

Vision

GJHPERSD is a peer-reviewed, DOUBLE BLIND, Professional Journal intended to meet the needs of Education, Health, Physical Education, Exercise Physiology, Sports Psychology, Nutrition, Sports Education, Sports Administration, and Sports Kinesiology. The journal publishes research that contributes to the knowledge and development of theory as new information, reviews, substantiation or contradiction of precious findings or as application of new or improved techniques to serve as a forum for socioeconomic, educational and ethical issues.

GUIDELINES FOR AUTHORS

The Editorial Board of the Ghana Journal of Health, Physical Education Recreation, Sports and Dance (GJHPERSD) is pleased to invite research articles, from interested scholars in both local and international community for consideration and subsequent publication. The journal is managed by the Department Health, Physical Education Recreation (HPER), under the Faculty of Science and Technology Education of the College of Education Studies, University of Cape Coast, Ghana.

Manuscript submitted to GJOHPERSD must not be published or submitted for publications simultaneously to other journal. Authors are responsible for the scientific content and legal aspect of the articles. There is 15 page limitation for the manuscript, including references. Manuscript acceptance is based on originality of materials significance to GJOHPERSD profession, validity and adherence to the prescribed submission requirements.

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Manuscript should be submitted electronically as e-mail attachment to

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All submission must include a cover letter which should be sent as e-mail text; gjohpersd@ucc.edu.gh.

Manuscript Preparation

Manuscript should conform to the Publication manual of the American Psychology Association (APA, 6th edition) style and typed using 12 points Times News Roman with 1.5 line spacing including the following sections in articles. A length of 9-12 pages is a typical size for a manuscript, per the editorial policy of GJOHPERSD.

Title – Capital letters

Authors - Surname followed by initials, academic degree, position, and institutional affiliations of all the authors as well as corresponding author's mail address and telephone numbers.

Abstract - An abstract of not more than 250 words should include the purpose of the study, methods, major findings and conclusions. It should be typed using single line spacing. A maximum of 5 key words typed on a separate page

Text - The text should include the following headings

- Introduction
- Methods and Materials
- Results

- Discussion
- Conclusion
- Acknowledgement (if any)
- Reference and
- Appendices (if appropriate)

References – The American Psychological Association (APA 6th edition) format should be used and only references cited in the text should be alphabetically listed in the reference section.

The Review Process

The editor reviews all manuscripts for appropriateness of topics and conformity to GJOHPERSD writing style. If the topic and style are deemed appropriate, manuscripts are sent to at least 2 reviewers (DOUBLE BLIND REVIEW) with expertise in the topic area. Allow four 2 to 4 weeks for the review process.

GJOHPERSD now promotes OPEN ACCESS - OPEN PEER REVIEW SYSTEM and selects the best manuscripts for publication. Thus, the journal promotes total transparency and collaboration between author(s) and reviewer(s). The final decision is taken by the editor based on discussions and clarifications author - reviewer, and based on the final report on the manuscript.

The editorial staff requires that all manuscripts that are sent for publication to be evaluated.
A reviewed manuscript will be subjected to one of four possible outcomes regarding publication in GJOHPERSD.

1. Accept the paper in its current format if manuscript scores 80-100.
2. Accept the paper with minor changes; 65-79.
3. Resubmit with the major changes; 50-64.
4. Reject the manuscript; 0-49.

The decision will be communicated to the author(s) in a strictly anonymous form.

Publication Charges

Articles accepted for publication will attract publication charges that will be communicated to authors. The Accepted articles will be published online on the University E-Journals Website before the print copies. Manuscript will be printed in the earliest appropriate and available issue following acceptance. Authors will receive a complimentary copy of the issue in which their article appears.

A Journal of the Department of Health, Physical Education and Recreation (HPER), University of Cape Coast, Ghana.

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A COMPARISON OF PATTERNS OF SPORTS INJURY BETWEEN ELITE PLAYERS OF BEACH SOCCER AND ASSOCIATION FOOTBALL IN NIGERIA

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Abstract

It is the dream of every nation, and its athletes to excel in all sport competitions and tournaments, so as to maximise the benefits of success associated to excellence in performance. However, injury is a major factor militating against success of athletes; it is considered as a potential threat in sports. This study was a retrospective one, designed to compare the patterns of sports injury between a group of elite players of beach soccer and their counterparts of association football in Nigeria. For this purpose, 46 players (23 from each sport) were purposively selected to participate in the study. A self developed questionnaire titled ***Questionnaire on sports Injury among athletes (QSIA)*** *with* ***0.78*** *reliability level was used for data collection, and the data collected were analysed using frequency, simple percentage, mean and independent t-test. Results showed that there are variations in the pattern of sports injuries sustained by beach soccer players and association footballers. These variations are noticeable in the types of sports injuries they sustained, the regions of the body affected by the injuries, the preceding incidents to the injuries, and the levels of intensity of the injuries.*

Key Words: *Association Football, Beach Soccer, Sports Injury, Intensity, Elite Players.*

Introduction

Sport in the contemporary society is more than small business, as it has wide range of benefits accrues to it beyond the individuals who participate. According to Kumar (2014), beyond health and social benefits of sports to individuals, the education and economic impact that sport has on nations are unquantifiable. It is the dream of every nation, and its athletes to excel in all sport competitions and tournaments, so as to maximise the benefits of success associated to excellence in performance. However, injury is a major factor militating against success of athletes; it is considered as a potential threat in sports (Haghighi, et al, 2012). Sports represent an important source of injury that often leads to impairment in physical and social activities (Michard, Renaud & Narring, 2001). According to Pray and Pray (2004), sports cause up to seven million injuries among Americans; with the highest incidence of such injury in children who are within the age-range of 5 to 15 years, having 59.3 injuries per 1,000; compared to 25.9 injuries per 1,000 in the general population. Also adolescents and young adults within the age range of 15 to 24 years recorded 56.4 per 1,000 incidences of injury.

There is a wider range of studies into sports injury carried out on association football when compare to beach soccer. Association football, among all sports has been reported to have recorded the highest percentage of sports injury at any point in time (FIFA Medical Assessment and Research Centre F-MARC, 2006; Medical News Today, 2005; Turner, Barlow & Healthcote-Elliott, 2000; Egwu, Uche-Nwachi & Adeniran, 1994; Adelekan, 1991 and Onifade, Agbojinmi & Ososanya, 1991). There is relatively dearth of sports injury report on beach soccer, especially in Nigeria.

Beach soccer is a branch of association football that has gained popularity among countries. According to Beach Soccer Worldwide (BSW, 2015), it is the most popular sport on sand across the globe. Though not as popular as the association football, but very exciting due to its beautiful acrobatic moves that make it a high-impact, and attractive (Haghighi, Zamanian & Zameni, 2012). History has it that beach soccer started in Brazil in the 1930s; originally then, it was conceived as a different form of soccer

played on a sand surface, with the main purpose of maintaining the trained players' technical skills during the summer break (Rosario et al, 2015).

Obviously, over the years, beach soccer increased its popularity worldwide, and it is played in different formats. According to Rosario et al (2015), USA hosted the first professional international competition in Miami (Florida, USA) in 1993. Thereafter, beach soccer has become a truly global sport, as evidenced by the participation of teams, coming from 16 countries of the world, in the 2009 FIFA Beach Soccer World Cup (Dubai, United Arab Emirates). In Africa, the CAF Beach Soccer Championship is the main international championship for beach soccer, mirroring that of the African Cup of Nations in association football. Wikipedia (2015) states that this championship is also known as the FIFA Beach Soccer World Cup qualifiers for CAF; the championship was established in 2006 after FIFA made requirements for all confederations to begin holding a qualification tournament to determine the best national team(s) in the region and hence those who would proceed to represent their continent in the World Cup. This is a clear indication of acceptability and popularity of the sport all over the world, including Africa, and Nigeria to be specific.

Various epidemiological studies revealed a large number of sports injuries across various sports globally (Turner, Barlow & Healthcote-Elliott, 2000; Egwu, Uche-Nwachi & Adeniran, 1994). Injury is an unwanted phenomenon whose occurrence lowers efficiency. Injury gives rise to pain, loss of function and deformity. Immobilization leads to decreased in strength of ligaments and muscles. The overall result of this is reduction in the performance of the sportsmen and women (Kellett, 2003). A sports injury is the result of a complex interaction of various risk factors in the course of time; and sportsmen are at increased risk of certain sports-related injuries, particularly those involving the knee. Participation in competitive sports sets high demands on the sportsman's physical skills. As a result, the injury frequency is rather high among sportsmen (Ivarsson, 2008).

The incidence of sports injury is not a new phenomenon. It is as old as sports itself, and as long as men compete with themselves in contact or non-contact sports, there is likely be one form of injury or another. Despite the risks involved, individuals continue to engage in sporting activities, because sports these days have gone commercial. Also, the spirit of patriotism makes sportsmen, trainers, managers and even spectators attach an exaggerated sense of importance to victory in international sports engagements. Sportsmen therefore literally put in all in terms of physical and mental strength; and in some cases, they do so unscrupulously, to achieve peak performance. Particularly for beach soccer, not only is running in sand physically taxing, it is also extremely dangerous. DelVecchio (2012) observes that limbs and joints flex in ways that they are not supposed to flex when players are running on an unstable surface such as sand; hence, high likelihood of occurrences of injuries.

Since injury in sports (to a large extent) is inevitable, and it has been recognized as constituting a threat to good performance, health and even lives of sportsmen, it is essential that the causes and the patterns of these injuries be identified as a vital step towards prevention of injury in sports. This study therefore sought to compare the pattern of sports injuries between a group of elite players of beach soccer and their counterparts of association football in Nigeria. The specific focus was to make comparison on:

i. the type of sports injury sustained by the players;
ii. the regions of the body affected by the sports injury sustained;
iii. the preceding incidents to the injuries; and
iv. the intensity of sports injury sustained.

Methods

Research Design

This is a retrospective study that compared data from two independent groups; therefore, the research design that was adopted for the purpose of this study is the ex-post-facto design. The design is appropriate because the population of the study is a naturally occurring group, and the study was interested in "after the fact" of sports injuries among the groups.

Participants

The population of the study was elite players of beach soccer and association football in Nigeria. The beach soccer players that participated in this study were those who had at one time or the other represented states or the nation in national and international competitions, and the association football players had represented states at the national level. Out of these, 46 participants (23 for each sport) that were purposively selected for the study, 33 (71.7%) of them were below the age of 30 years, while 13 (28.3%) were above the age of 30 years.

Instrumentation

A self developed questionnaire titled ***Questionnaire on sports Injury among athletes [QSIA]*** was used for data collection in this study. The questionnaire has two sections. Section A sort information on demographic data of the participants, which include their gender, age, national/international experience and sports of participation. Section B dealt with data on types of sports injury sustained by the athletes, the regions of the body affected, preceding incidents to the injuries, and severity of the injury. Copies of the instrument were served to three experts in physical education and sports science for validity; the questionnaire was thereafter subjected to test-retest method of reliability test that gave r value of 0.78.

With the aid of three trained research assistants, copies of the validated questionnaire were administered to the participants who were association football players of this study during the 17th National Sports Festival held (Garden City Games 2011) in Port-Harcourt, Rivers State Nigeria. The participants were visited in their various venues of event, and the copies of questionnaire administered to them were retrieved immediately to avoid loss. The researcher personally contacted three of the beach soccer players who assisted in administering the questionnaire to their colleagues. Of the 60 copies that were administered, 71.7% were retrieved, and this is considered adequate for the study.

Data Analysis

The injuries sustained by the participants of this study were scored based on their severity as defined by Federation Internationale de Football Association (FIFA) Medical Assessment and Research Centre (F-MARC, 2006) and Union of European Football Association [UEFA] Consensus Discussion (Hagglund, Walden, Bahr, & Ekstrnad, 2005). The cut-off points for the different categories of injury severity were then allotted points as follows:

- ✓ *slight (1-3 days) =1 point*
- ✓ *minor (4-7 days) =2 points*
- ✓ *mild (8-15 days) =3 points*
- ✓ *moderate (16-28 days) =4 points; and*
- ✓ *major (above 28 days) =5 points.*

Days in the brackets indicate number of days the injured players spent out of active participation.

Frequency of sports injury was also coded as:

- ✓ *frequent = 1 point*
- ✓ *more frequent = 2 points*
- ✓ *most frequent = 3 points*

The data collected and coded for the purpose of this study were analysed using simple percentage, mean and independent t-test. Pictorial analytical tool of component bar chart was used to further describe the results, and inferences were made at 0.05 level of significance.

Results

Table 1: Mean and t-test results on types of sports injury sustained by athletes

Injury	Sport	No		SD [±]	dif.	t-test	df	Sig.
Fracture	B. Soccer	23	0.13	0.34	0.61	-2.46	44	0.20
	A. Football	23	0.74	1.13				
Sprain/Strain	B. Soccer	23	1.47	0.99	0.31	-0.98	44	0.46
	A. Football	23	1.78	1.13				
Dislocation	B. Soccer	23	1.26	0.96	1.13	-	44	0.00

	A. Football	23	2.39	0.72		4.50		
	B. Soccer	23	2.39	0.72				
Muscle Cramp					0.96	3.86	44	0.00
	A. Football	23	1.44	0.95				
Contusion	B. Soccer	23	2.74	0.45				
					1.50	4.22	44	0.001
	A. Football	23	1.44	0.95				

The results presented in table 1 shows differences in the mean-score on types of sports injury sustained by players in the two groups of this study. The mean-score of beach soccer players (0.13±0.34) was less than that of the association footballers (0.74±1.13) for fracture, while the mean-scores were higher for beach soccer players in muscle cramp (2.39±0.72) and contusion (2.74±0.45) than their counterparts in association football who recorded a mean-score of 1.44±0.95 each for both muscle cramp and contusion. There are significant variations between the two categories of players in dislocation (t= -4.50; α0.00), muscle cramp (t= 3.86; α0.00), and contusion (t= 4.22; α0.001). Fracture (t= -2.46; α0.00), and sprain/strain (t= -0.98; α0.46) show no significant difference in the frequency of sports injury sustained by the players of the two categories.

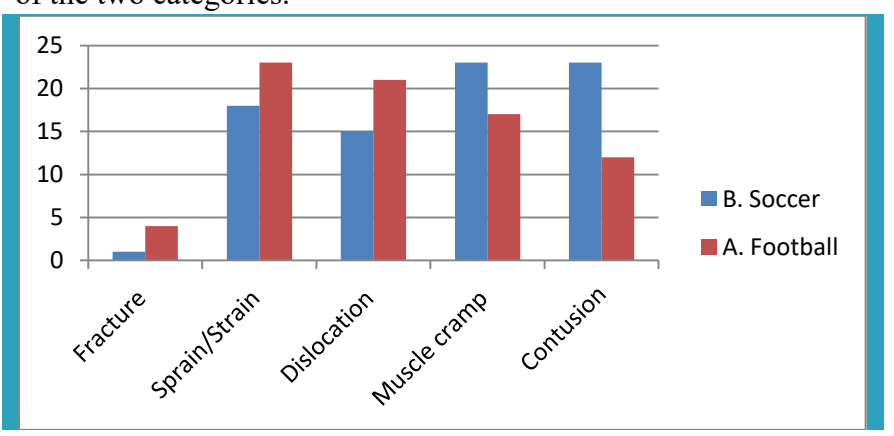

Figure 1: Component bar chart on types of sports injury sustained by players

Figure 1 descriptively compared the types of sports injury sustained by the players. It shows that fracture is the list sustained injury among the players, though it is more frequent among association footballers than the beach soccer players. Figure 1 further revealed that sprain, strain and dislocation are common to the two groups of players, but are higher in frequency among association footballers than beach soccer players. However, muscle cramp and contusion are more frequent among the beach soccer players than their counterpart in association football.

Table 2: Mean and t-test results on regions of the body affected by sports injuries

Body Part	Sport	No		SD [±]	dif.	t-test	df	Sig.
Head/Neck	B. Soccer	23	0.48	0.73	0.39	-1.60	44	0.70
	A. Football	23	0.87	0.92				
Trunk	B. Soccer	23	0.22	0.60	0.22	-1.11	44	0.08
	A. Football	23	0.44	0.73				
Arm/Finger	B. Soccer	23	0.48	0.67	0.30	-1.41	44	0.34
	A. Football	23	0.78	0.80				
Knee	B. Soccer	23	0.70	0.82	0.96	3.92	44	0.00
	A. Football	23	1.65	0.83				
Ankle	B. Soccer	23	1.65	0.65	0.17	0.86	44	0.94
	A. Football	23	1.82	0.72				
Chin	B. Soccer	23	2.61	0.50	1.83	9.85	44	0.001
	A. Football	23	0.78	0.74				
Foot/Toe	B. Soccer	23	2.87	0.34	2.61	22.11	44	0.001
	A. Football	23	0.26	0.55				

The results presented in table 2 shows differences in the mean-score on body regions affected by sports injury sustained by players in the two groups of this study. The mean-score of beach soccer players (0.70±0.82) was less than that of the association footballers (1.65±0.83) for knee injury, while the mean-scores were higher for beach soccer players in chin (2.61±0.50) and foot/toe (2.87±0.34) than their counterparts in association football who recorded a mean-score of 0.78±0.74 and 0.26±0.55 for

injuries to the chin and foot/toe respectively. Results in the table further shows no significant difference in the sports injuries that affected head and neck (t= -1.60; α0.70), trunk (t= -1.11; α0.08), arm and finger (t= -1.41; α0.34), and ankle (t= 0.86; α0.94). However, it indicates significant difference in the sports injuries that affected knee (t= 3.92; α0.00), Chin (t= 9.85; α0.001), and Foot/toe (t= 22.11; α0.001).

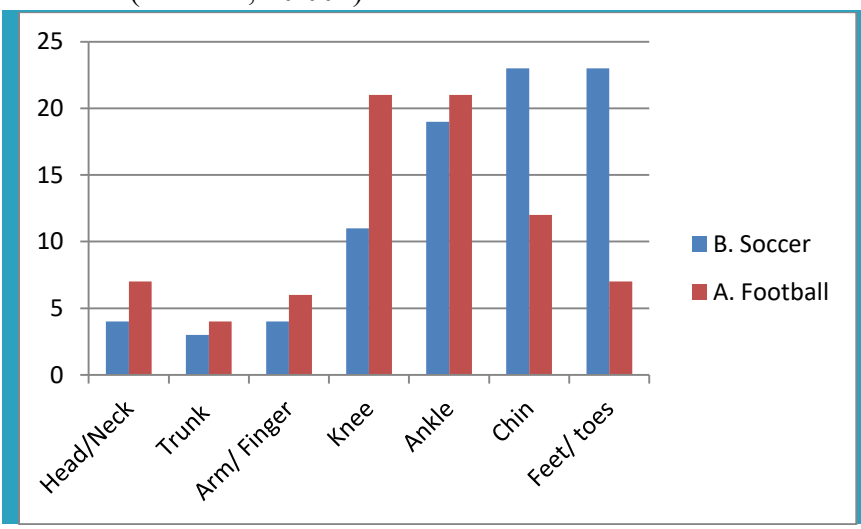

Figure 2: Component bar chart on body regions affected by sports injuries sustained by players

Comparing sports injuries sustained by the players in the two categories by body regions, figure 2 shows high frequencies of injuries for both groups at the knee, ankle, chin foot and toe. On another hand, the figure shows that beach soccer players frequently sustained injuries to the chin, foot and toe more than their counterparts in association football. But the association football players have higher frequency of sports injuries at the knee and ankle.

Table 3: Mean and t-test results on preceding incidents to sports injuries sustained by players

Incident	Sport	No		SD [±]	dif.	t-test	df	Sig.
Blocking/Tackling	B. Soccer	23	1.48	0.99	0.83	-3.16	44	0.003
	A. Football	23	2.30	0.77				
Shooting	B. Soccer	23	2.52	0.59	1.78	8.52	44	0.00
	A. Football	23	0.74	0.81				
Landing from Jump	B. Soccer	23	2.70	0.47	2.26	13.35	44	0.00
	A. Football	23	0.44	0.66				
Acrobatic Stunt	B. Soccer	23	2.83	0.39	2.26	14.13	44	0.00
	A. Football	23	0.57	0.66				
Diving	B. Soccer	23	0.52	0.79	0.35	1.90	44	0.07
	A. Football	23	0.17	0.39				

The results presented in table 3 shows differences in the mean-score of the two groups of players by the incident that preceded sports injury sustained by the players. The mean-score of beach soccer players (1.48±0.99) was less than that of the association footballers (2.30±0.77) for blocking and tackling, while the mean-scores were higher for beach soccer players in landing from jump (2.70±0.47) and acrobatic stunt (2.83±0.39) than their counterparts in association football who recorded a mean-score of 0.44±0.66 and 0.57±0.66 for injuries sustained via landing from jumps and acrobatic stunts respectively. Results in the table shows no significant difference in the sports injuries sustained as a result of diving (t= -1.90; α0.07), but there are significant variations in the sports injuries sustained via blocking and tackling (t= -3.16; α0.003), shooting (t= 8.52; α0.00), landing from a jump (t= 13.35; α0.00) and acrobatic stunt (t= 14.13; α0.00).

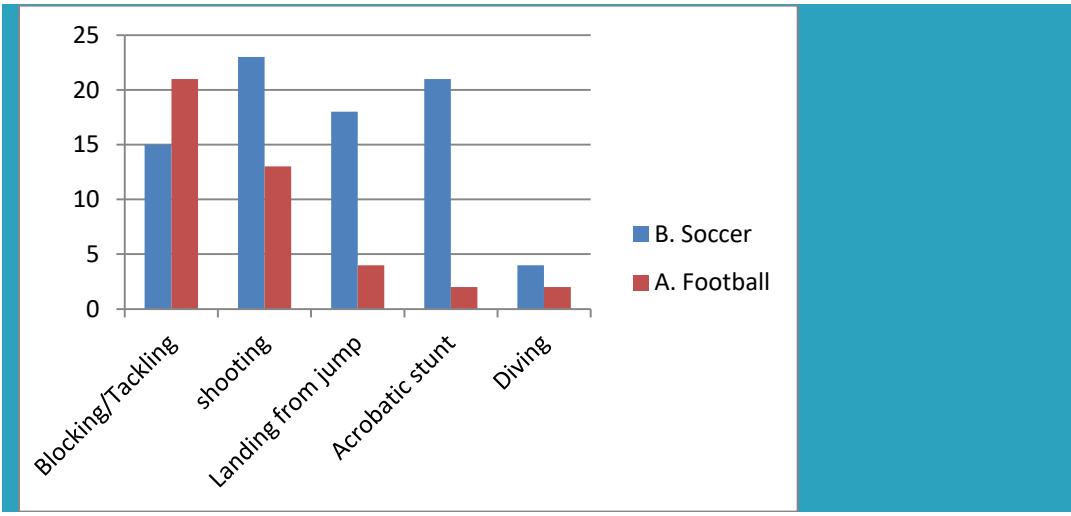

Figure 3: Component bar chart on preceding incidents to sports injuries sustained by players

Comparing sports injuries sustained by the players in the two categories by preceding incidents, figure 3 shows high frequencies of injuries for both groups in blocking and tackling, and shooting. Again, the figure shows that beach soccer players frequently sustained injuries via landing from jumps and acrobatic stunts more than their counterparts in association football. But the association football players have higher frequency of sports injuries via blocking and tackling.

Table 4: Mean and t-test results on intensity of sports injuries sustained by players

Intensity	Sport	No		SD [±]	dif.	t-test	df	Sig.
Slight	B. Soccer	23	2.74	0.45	0.13	0.93	44	0.08
	A. Football	23	2.61	0.50				
Minor	B. Soccer	23	2.44	0.59	0.09	0.48	44	0.64
	A. Football	23	2.35	0.65				
Mild	B. Soccer	23	2.09	1.20	0.13	0.40	44	0.31
	A. Football	23	2.22	1.08				

Moderate	B. Soccer	23	1.87	0.87				
	A. Football	23	2.61	0.58	0.74	-3.39	44	0.02
	B. Soccer	23	1.39	0.99				
Major	A. Football	23	2.26	0.69	0.87	-3.46	44	0.01

The results presented in table 4 shows differences in the mean-score of the two groups of players by the intensity of sports injury sustained by the players. The mean-score of beach soccer players (1.87±0.87 and 1.39±0.99) were less than those of the association footballers (2.61±0.58 and 2.26±0.69) for moderate and major intensities of sports injuries respectively, while the mean-score was higher for beach soccer players in injuries with minor intensity (2.44±0.59) than their counterparts in association football who recorded a mean-score of 2.35±0.65 for injuries with minor intensity. Results in the table shows no significant difference in the sports injuries with, slight intensity (t= 0.93; α0.08), minor intensity (t= -0.48; α0.64), and mild intensity (t= -0.13; α0.31), but there are significant variations in the sports injuries moderate intensity (t= -3.39; α0.02), and major intensity (t= -3.46; α0.01).

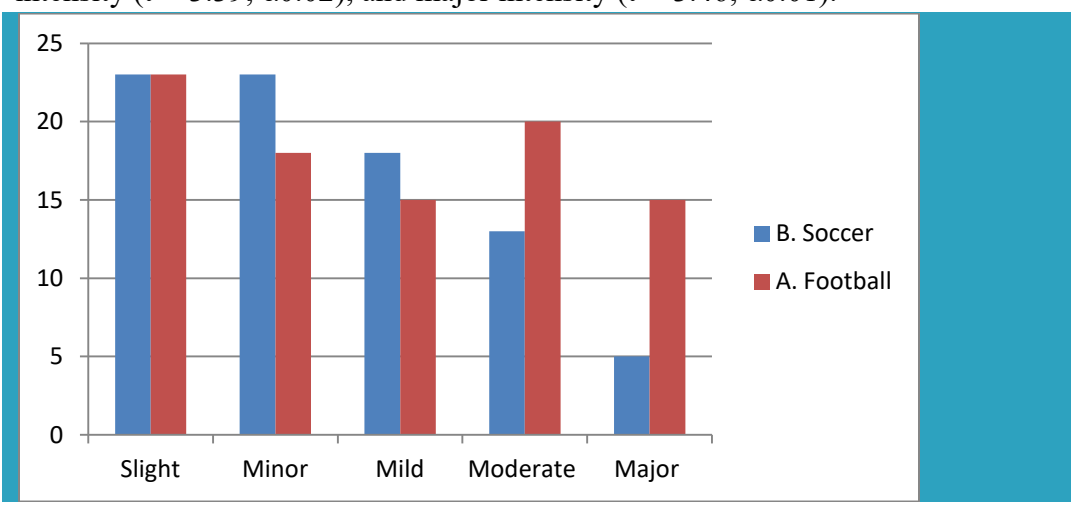

Figure 4: Component bar chart on intensity of sports injuries sustained by players

Comparing sports injuries sustained by the players in the two categories by levels of intensity, figure 4 shows high frequencies of injuries for both groups in slight, minor, mild and moderate intensities. Again, the figure shows that beach soccer players frequently sustained minor injuries more than their counterparts in association football. But the association football players have higher frequency of moderate and major sports injuries than the beach soccer players.

Discussion

Results in this study show significant variations between the beach soccer players and association footballers in dislocation, muscle cramp, and contusion. In relation to fracture, sprain and strain there was no statistical significant difference in the frequency of sports injury sustained by the players of the two categories (see table 1). Results further show that sprain, strain and dislocation are common to the two groups of players, but are higher in frequency among association footballers than beach soccer players (see figure 1). This finding agrees with that of Dansu and Okuneye (2013) who reported sprain and strain scoring high percentage of sports injury among a group of association footballers. In a similar manner, Haghighi, et al (2012) reported high frequency of sprain among a group of beach soccer players.

Also, this study reveals that muscle cramp and contusion are more frequent among the beach soccer players than their counterpart in association football. This finding also tallies the report of Haghighi, et al (2012) that contusion recorded the highest form of injury among the beach soccer players in their study. According to Rosario et al (2015), in beach soccer it has been shown that running on sand surfaces is affected by the density and distribution of the sand (i.e. deep or easy moving sand), and determines a higher work load due to the increased work done by the lower extremity. This observation expressed on the playing surface, and the fact that it differs from that of association football may be a strong factor in the higher frequency of muscle cramp and contusion among the beach soccer players.

This study shows significant difference in the sports injuries as they affected knee, chin, and Foot/toe of the two groups of players

(see table 2). It reveals a higher frequency of knee injury among the association footballers, but higher frequency of injuries to the chin, foot and toe among the beach soccer players. However, ankle injury was high for both groups of players (see figure 2). This finding is in line with the report of Turner, Balow and Healthcote-Elliott (2000) that the most common injuries in football are sprains and strains; affecting mainly the ankle and knee joints. According to Turner, Balow and Healthcote-Elliott (2000), knee injury, particularly crutiate ligaments (anterior-ACL and Posterior-PCL), accounted for nearly half (49%) of all injury in enforced premature retirement from active football. Walker (2003) in a report also affirmed that ankle sprain is the commonest injury among professional football players; accounting for more than 1 in every 10 of total injury. Haghighi, et al (2012) in their study on beach soccer players reported foot, toes, chin and achill tendon as the commonest body regions affected by sports injury among the beach soccer players.

Considering preceding incidents to sports injury, this study shows significant variations in the injuries sustained via blocking and tackling, shooting, landing from a jump and acrobatic stunt. In this study also, the beach soccer players frequently sustained injuries via shooting, landing from jumps and acrobatic stunts more than their counterparts in association football. This is quite expected considering the nature of beach soccer. According to Haghighi, et al (2012), beach soccer is a sport that is associated with beautiful acrobatic moves which make it a high-impact game. Acrobatic moves are high risk initiatives that make players vulnerable to injuries. The fact that rules do not permit the use of shoes or any other foot protective materials may be responsible for injuries acquired via shooting.

This study shows no significant difference in the sports injuries with, slight, minor and mild intensities, but significant variations in injuries with moderate and major intensities. It further reveals that the beach soccer players frequently sustained more minor injuries and the association football players have higher frequency of moderate and major sports injuries (see table 4 & figure 4). Dansu and Okuneye (2013) found a similar result in their study on a

group of association footballers. They reported higher percentage of minor and mild severity levels of injury than slight and moderate levels. Jackson and Feagin (2013), in their study also found that 47 of 65 injuries recorded were mild, while 7 were moderate. Haghighi, et al (2012) are of the opinion that meticulous analysis of incidence of injuries and risk factors for health is the foundation of prevention plans. More so that it has thus been discussed as a necessity in medical congresses that athletes must become more familiar with the causes and mechanisms of injuries; especially young athletes who are more prone to injuries due to their physical, motor, and psychological characteristics.

Conclusions and Recommendations

Based on the findings of this study, it is concluded that there are variations in the pattern of sports injuries sustained by beach soccer players and association footballers. These variations are noticeable in the types of sports injuries they sustained, the regions of the body affected by the injuries, the preceding incidents to the injuries, and the levels of intensity of the injuries. Therefore, it is recommended that issue of injury prevention among the players of both sports should be given special attention. Players should be should be educated in both theory and practice, on strategies to prevent sports injury. Also, rules of beach soccer should be critically looked into with the aim of reviewing it to accommodate inclusion and/or modification of acceptable protective materials for the players, as this will further reduce the incidence of sports injury among the players without loss of the beauty and uniqueness of the game.

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HANDGRIP AND PINCH STRENGTH CHANGES OF TYPE II DIABETES MELLITUS PATIENTS FOLLOWING A 12-WEEK STRENGTH TRAINING PROGRAMME

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Abstract

The purpose of this study was to establish the efficacy of a 12-week strength training (ST) programme on handgrip and pinch strength in Type 2 Diabetes Mellitus (T2DM) patients in a tertiary health institution in Benin-City. This study was a pre-test, post-test control group design. A total of 36 T2DM patients participated in the study. Handgrip and pinch strength were measured using electronic hand dynamometer (in kg) and mechanical pinch gauge (in kg) respectively prior to and following a 12-week ST programme. Data generated were analyzed using inferential statistics of one way analysis of variance (ANOVA) and the statistical significance was accepted for p value of <0.05.The findings of the study showed that ST programme had significant effects on handgrip and pinch strength of T2DM patients. It was concluded that ST programme can substantially optimize handgrip and pinch strength of patients with T2DM. Therefore, ST programme should be considered a key element in the management of T2DM patients.

Keywords: Strength training, handgrip and pinch strength, type 2 diabetes mellitus

INTRODUCTION

Strength training (ST) provides greater strength and endurance, and is primarily used as a tool in sports and rehabilitation medicine. Muscular strength is the amount of force a muscle can produce with a single maximal effort. However, diminished grip and pinch strength can significantly limit daily activities such as carrying an objects, laundry, turning a doorknob, vacuuming, and sporting events like wrestling, tennis, football, basketball, and gymnastics (Ruprai, Tajpuriya& Mishra, 2015). Physiologically, ST brings about enhanced muscular strength and regained loss of muscle mass in diabetes, obesity and other metabolic syndrome (Hunter, Wetzstein, Fields, Brown &Bamman, 2000). The impairment of insulin action in major target organs such as liver and muscles is a common pathophysiological feature of T2DM. It has been observed that the activity of the mitochondrial electron transport chain is reduced in the muscles of patients with T2DM, and that muscle mitochondria are smaller in these individuals (Sreekumar& Nair, 2007).In addition, Helmersson, Vessby, Larsson and Basu (2004) believed that diabetes causes a reduction in the number of mitochondria in the muscle cells, a decrease in glycogen synthesis and an increase in the amount of circulating systemic inflammatory cytokines, all of which have a detrimental effect on the skeletal muscles. Reliable and valid evaluation of hand strength can provide an objective index of general upper body strength. Grip strength is the result of forceful flexion of the finger joints with a maximal voluntary force that a person is able to exert under normal biokinetic conditions. Hand grip strength (HGS) is an important component to perform precise and refined fine motor activities. This is because hand functionality is considered to be vital in most of the tasks involving upper limb. HGS has long been thought of as a possible predictor of overall body strength (Smith, Smith, Martin, Henry, Weeks, & Bryant, 2006).

The hand of human is the effector organ of the upper limb as it is capable of performing countless actions including prehension, precision, adaptation, exploration, perception and manipulation.

The hand is not only a motor organ but also a very sensitive and accurate sensory receptor, which feeds back information essential for its own performance. The hand is greatly affected by diabetic musculoskeletal complication. Adequate muscle power is required for optimum productivity while decreased muscle strength is a predictor of physical limitations (Magee, 2002). Without adequate grip, pinch and forearm strength, patients with diabetes stand the risk of developing hand and forearm problems that could result in reduced performance. Often overlooked or taken for granted, the strength of one's grip plays a key role in injury prevention and overall strength development. Patients with T2DM have been reported to be more disabled in self-care tasks and other daily living activities than non-diabetic subjects because of many hand complications. The higher the gradient of the disease, the greater will be reduction of hand grip strength, agility and function (Bardan& Lather, 2012). Furthermore, grip and pinch strength testing are commonly used to evaluate hand function for disability ratings and to assess responses to various forms of therapy. Moreover,Savas, Koroglu, Koyuncuoglu, Uzar, Celik and Tamer (2007) demonstrated that reduced grip and pinch strength was related to disability of the hands and suggested that negative influence of diabetes and obesity on muscle quality could all contribute to poor muscle function and hand weakness. It was stated by Jacquemin, Burns and Little (2004) that weakness of hand muscles is a symptom of large number of pathologies which could result in loss of hand function. Grips reflect the strength generated by the contraction of the various arm and hand muscles involved in the activity of the hand. The amount of strength generated can then be used as a quantitative measurement of the development of hand function (Mitchell, 1976).

Furthermore, Komal and Suvarna (2015) found a significant effect of ST on grip strength and hand function in diabetic patients but they did not test for pinch strength in their study. Contrarily, Anderson, Gadeberg, Brock, and Jakobsen (1997) and Andersen, Nielsen, Mogensen and Jakobsen (2004) concluded that hand grip strength is not compromised in T2DM following ST programme. It

was also reported by Ozdirenc, Biberoglu, and Ozcan (2003) that hand grip strength value was found to be significantly lower in the diabetic group compared with the control group. Again, the key pinch strength value for the right hand was significantly lower in the diabetic group, whereas for the left hand, the value was lower than in the control group but was insignificant following few weeks of ST programme. A similar study by Cetinus, Buyukbese, Uzel, Ekerbicer and Karaoguz (2005) showed that grip strength and key pinch power values were found to be significantly lower in patients with T2DM than in age-matched control subjects following ST programme. It was concluded in a study that was conducted by Santos, Montrezol, Pauli, Sartori-Cintra, Colantonio and Pauli (2014)on undulatory physical resistance training programme in elderly type 2 diabetics that resistance training programme used with weekly differential overloads was effective and efficient in providing significant increases in maximal muscular strength, both in lower and upper limbs in T2DM individuals. Another significant study was carried out by Kwon, Han, Ku, Koo, Kim and Min (2010) and they concluded that low intensity ST was effective in increasing muscle mass and strength and reducing total fat mass without change of insulin sensitivity in T2DM patients. In the same view, an observational study carried out by Shambhuvani, Diwan and Vyas (2015) on the effect of longstanding T2DM on handgrip strength showed that grip strength was significantly reduced in diabetic individuals as compared to non-diabetic individuals. However, they also observed significant difference in dominant and non dominant handgrip strength in diabetic group and non-diabetic group and thereafter submitted that the causes of lower quantitative values of hand grip strength and pinch power in patients with T2DM are unclear.

There is no doubt that improving the handgrip and pinch strength of diabetes patients through strength training programme will go a long way in improving their functional status to meet with their life challenges. Since diabetes patients' care requires a multidisciplinary approach and guidance, this study is intended to

approach the diabetes patients' care through strength training programme. Furthermore, little or no known researches have been undertaken in Nigeria and in Edo state in particular, regarding handgrip and pinch strength changes through exercise therapy. This observed gap in knowledge and research efforts informed the need for the present study.

Research hypotheses

The following hypotheses were formulated and tested at the 0.05 alpha level.

1. There is no significant difference in the handgrip strength of T2DM patients prior to and following a12-week ST programme.

2. There is no significant difference in the pinch strength of T2DM patients prior to and following a12-week ST programme.

MATERIAL AND METHODS

This study was a pre-test, post-test control group experimental design of the effects of a 12-week ST programme on handgrip and pinch strength of T2DM patients.The population of this study included 54T2DM patients between the biological ages of 51 to 73 years who were receiving treatment at the Endocrinology Unit of Internal Medicine Department, University of Benin Teaching Hospital, Benin-City, Nigeria.A total of 36 patients with T2DM in the above mentioned hospital participated in this study. They were recruited using the simple random sampling technique. Balloting without replacement was used to select two-third (2/3) of the population for the study. The names of the patients were written on pieces of paper each and these pieces of paper were put in a bag from where one piece of paper was picked at a time and the name on the piece of paper picked was recorded. This process was repeated until the desired sample size

was obtained. Thereafter, the recorded names were also assigned randomly into two (2) groups (experimental and the control groups). Eighteen (18) participants were assigned to experimental group and the other eighteen (18) to the control group using the same process. The first name in the list was assigned to experimental group and the second name to the control group, the procedure was continued till the last name in the list was assigned.

The research instrument for this study was an adaptation of Sharkely (1990) experimental protocols.

Hand grip strength of both hands was measured using a Camry Electronic Hand Dynamometer (Model: EH101). It comes with dual scale readout of forces in kilograms and pounds and however, all readings were recorded in kilograms in the present study.Also,mechanical pinch gauge was used to measure the three basic pinch tests of both hands including key pinch (lateral pinch) - thumb pad to lateral aspect of middle phalanx of index finger, palmer pinch (chuck pinch) - thumb pad to pads of the index and middle fingers, and tip pinch (thumb-index pulp pinch) - thumb tip to index fingertip. It is calibrated in pounds and kilograms of force and all readings were equally recorded in kilograms in the present study.

The test instrument was an adaptation of Sharkely (1990) experimentation. However, the test instrument was certified by experts in exercise physiology and physiotherapy as appropriate for the study. The validation was effected at the Outpatients Unit of Physiotherapy Department, University of Benin Teaching Hospital, Benin-City. The following variables were measured: the handgrip and pinch strength as well as hand function of T2DM patients. It was observed that the use of the facility and procedure were feasible for the conduct of the study. This department was equally served as the project site. Also, a pilot study was conducted to establish the suitability of using the instrument for T2DM to which eight (8) T2DM patients, four (4) per group were used. The split-half method of reliability was used in obtaining the

data that were subjected to Pearson Product Coefficient of Correlation. A Coefficient of 0.79 was obtained and it was considered high reliability and therefore justified the suitability and relevance of using the instrument and protocol for the study.

The study received ethical approval from the Research Ethics Committee of the hospital to conduct this study. All the participants were recruited consecutively through their hospital files at the Endocrinology Unit of Internal Medicine Department, University of Benin Teaching Hospital, Benin-City. Prior to ST programme, a detailed explanation of the test, training programme and the objectives of the study was provided for the participants who signed informed consent form. Thereafter, the participants were randomly assigned to experimental and the control groups. The handgrip and pinch strength of both groups were measured before the training and then the participants were subjected to a 12-week ST programme of a frequency of 3 times per week (Monday, Wednesday, and Friday) with each session lasted for 50 minutes at 70% one-repetition maximum (70% 1RM) consisted of 2 sets of 8 repetitions for each muscle group with 3 minutes rest between sets. Periodization of the training was based on the recommendation of progressive ST for adults and T2DM (American College of Sports Medicine position stand, 2009). In this way, the protocol consisted of a weekly alteration of the intensity divided into a week of moderate overload (70% of 1RM, 8 repetitions).The ST programme was purely on upper limbs muscle strengthening that was aimed at improving handgrip and pinch strength of the participants. The training programme included bench press, military press, arm curl and latissimus pull, which were performed on a multi weight-lifting machine. Thereafter, handgrip and pinch strength of the participants was equally measured after the training.

Grip strength measurement

To standardize the measurement, the following guidelines were established; the arm positioning followed the American Society of Hand Therapists guidelines (Fess, 1992), with the

subject comfortably seated with the shoulder slightly forward and the elbow flexed at a 90° angle, with the forearm and wrist in a neutral position. A demonstration of how to use the device was first given to each participant by the researcher, to familiarize the participant with the use of the apparatus and to eliminate the element of fear. Alternately, three maximum power gripping efforts were made by each hand of the participant, with three-second contractions and ten-second rest periods between the attempts and only the best of the three attempts was recorded. Motivation, such as verbal encouragement and competition between group members was used maximally. No assistance of the hand under test was allowed, but facial grimaces and associated movements of the other hand were not discouraged. The device was adjusted for different hand sizes and preferences by adjusting the centre knob and its calibration was also assessed periodically throughout the study.

Pinch strength measurements

The following guidelines were followed in the measurements of pinch strength; the gauge was "zeroed" before each pinch test by rotating the small curled knob on top of the dial indicator in a counterclockwise direction until it rests against the black pointer at the zero marking. As in grip strength measurement, test instructions and motivation were equally provided.

Key pinch (lateral pinch): The participant comfortably seated or upright, test arm at the side with elbow flexed 90°, palm facing inward, pinch gauge between flexed PIP joint of index finger and thumb, the researcher stood in front of the participant to the side stabilizing the pinch gauge and then had the participant to squeeze, hold and release the pinch gauge (i.e. participant applied pinch force at the pinch groove while holding the pinch gauge between his/her thumb and index fingers). Here, as muscle fatigue begins with the first concentrated effort, a single maximum effort only was recorded.

Palmer pinch (chuck pinch): The participant comfortably seated or upright, test arm at the side with elbow flexed 90°, palm facing downward, pinch gauge between thumb and the index and middle fingers, the researcher's position and duty were the same as in key pinch measurement and also a single maximum effort was recorded.

Tip pinch (thumb-index pulp pinch): Here, the measurement protocol is the same as in palmer pinch (chuck pinch) except that the pinch gauge was between thumb and test finger without interference of other fingers.

Method of Data Analysis

An inferential statistics of one-way analysis of variance (ANOVA) was used to test the hypothesis. Then, Turkey's honesty significant difference post-hoc test was used to identify the source of the difference between the groups. Statistical significance was accepted for p value of <0.05

Results

The results are presented in Tables 1 - 4.

Table 1: Analysis Of Variance (ANOVA) Showing Difference in the Handgrip Strength of the Participants

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	108.365	3	36.122	3.420	.022
Within Groups	718.221	68	10.562		
Total	826.586	71			

Df-degree of freedom, F-test is a ratio of sample variance, Sig.-the two-tailed p-value associated with the null that the groups have the same variance.

From Table 1, difference in the handgrip strength prior to and following a 12-week ST programme was determined using one way analysis of variance (ANOVA). The F-value of 3.420 with 3 and 71 degree of freedom was found to be statistically significant

at 0.05 (p<0.05). Thus, the hypothesis which stated that therewould be no significant difference in the handgrip strength of T2DM patients prior to and following a12-week ST programme was rejected. It therefore implies that ST had substantial effect on the handgrip strength ofT2DM patients. This however, necessitated probing into the post-hoc test to identify the source of the significance.

Table 2: Turkey's Honesty Significant Difference Post Hoc Test Showing Difference in the Handgrip Strength of the Participants

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
	Post-exp	-3.11667*	1.08331	.027
Pre-exp	Pre-control	-.45000	1.08331	.976
	Post-control	-.51111	1.08331	.965
	Pre-exp	3.11667*	1.08331	.027
Post-exp	Pre-control	2.66667	1.08331	.075
	Post-control	2.60556	1.08331	.086
	Pre-exp	.45000	1.08331	.976
Pre-control	Post-exp	-2.66667	1.08331	.075
	Post-control	-.06111	1.08331	1.000
	Pre-exp	.51111	1.08331	.965
Post-control	Post-exp	-2.60556	1.08331	.086
	Pre-control	.06111	1.08331	1.000

Turkey's honesty significant difference test was carried out to determine the difference in variation in the hand grip strength of the participants. However, all the pair wise of mean difference were found to be statistically insignificant (p>0.05) except pre-exp versus post-exp (-3.11667*) as shown in Table 2. This implies that the entire pair wise mean had variation. Therefore, the treatment influenced the variation of the handgrip strength of the participants.

Table 3: Analysis Of Variance (ANOVA) Showing Difference in the Pinch Strength of the Participants

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	187.330	3	62.443	12.017	.000
Within Groups	353.348	68	5.196		
Total	540.678	71			

Df-degree of freedom, F-test is a ratio of sample variance, Sig.-the two-tailed p-value associated with the null that the groups have the same variance.

From Table 3, difference in the pinch strength prior to and following a 12-week ST programme was determined using one way analysis of variance (ANOVA). The F-value of 12.017 with 3 and 71 degree of freedom was found to be statistically significant at 0.05 (p<0.05). Thus, the hypothesis which stated that there would be no significant difference in the pinch strength of T2DM patients prior to and following a12-week ST programme was rejected. It therefore implies that ST had substantial effect on the pinch strength ofT2DM patients, hence the probe into the post-hoc test to identify the source of the significance presented in Table 4.

Table 4: Turkey's Honesty Significant Difference Post Hoc Test Showing Difference in the Pinch Strength of the Participants

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
	Post-exp	-4.08333*	.75985	.000
Pre-exp	Pre-control	-.60556	.75985	.856
	Post-control	-.60000	.75985	.859
	Pre-exp	4.08333*	.75985	.000
Post-exp	Pre-control	3.47778*	.75985	.000
	Post-control	3.48333*	.75985	.000
	Pre-exp	.60556	.75985	.856
Pre-control	Post-exp	-3.47778*	.75985	.000
	Post-control	.00556	.75985	1.000
Post-control	Pre-exp	.60000	.75985	.859

Post-exp	-3.48333*	.75985	.000
Pre-control	-.00556	.75985	1.000

Turkey's honesty significant difference test was carried out to determine the difference in variation in the pinch strength of the participants. However, all the pair wise of mean difference were found to be statistically insignificant (p>0.05) except pre-exp versus post-exp (-4.08333*), post-exp versus pre-control (3.47778*), post-exp versus post-control (3.48333*), pre-control versus post-exp (-3.47778*) and post-control versus post-exp (-3.48333*) as shown in Table 4. This implies that the entire pair wise mean had variation. Therefore, the treatment influenced the variation of the handgrip strength of the participants.

Discussion

This study showed that the ST programme administered had substantive impact on the participants' handgrip strength. This finding is in agreement with Komal and Suvarna (2015); Sheri, Ronald, Bo, Judith, Bryan, Richard and Barry (2010); Bacchi, Negri, Targher, Faccioli and Lanza (2013);Kwon, Han, Ku, Koo, Kim and Min (2010)and Chou, Hwang and Wu (2012) submissions thatST programme had significant effect on handgrip strength in T2DM patients. It was also concluded in the study that was conducted by Santos, Montrezol, Pauli, Sartori-Cintra, Colantonio and Pauli (2014)on undulatory physical resistance training programme in elderly type 2 diabetics that resistance training programme used with weekly differential overloads was effective and efficient in providing significant increases in maximal muscular strength, both in lower and upper limbs in T2DM individuals. In contrast, Anderson, Gadeberg, Brock, and Jakobsen (1997) and Andersen, Nielsen, Mogensen and Jakobsen (2004) concluded that hand grip strength is not compromised in T2DM following ST programme. These contrasting findings might not be unconnected to variation in study methodology including subject

characteristics or differences in measuring instruments of handgrip strength.

Moreover, the significant effect of ST programme on handgrip strength found in this study can probably be explained by its effects on the activity of the mitochondrial electron transport chain via increasing the size of mitochondria which is ordinarily smaller in the muscles of patients with T2DM. It could also be that the ST programme brought about quality changes in the muscles and increases muscle fibres' cross-sectional area or causea higher proportion of type IIA fibres at the expense of type IIB fibres, in other words a change towards higher oxidative capacity and slower contraction speed which could enable sustained handgrip strength. In addition, the ability of ST programme to combat a reduction in the number of mitochondria in the muscle cells, a decrease in glycogen synthesis and an increase in the amount of circulating systemic inflammatory cytokines which all have a detrimental effect on handgrip strength of T2DM patients may be responsible for a significant increase in handgrip strength observed in these individuals.Similarly, the present study also revealed that the ST programme administered had significant effects on pinch strength of the participants. This finding is supported by the study of Komal and Suvarna (2015). On the contrary, the study is not in agreement with the studies of Ozdirenc, Biberoglu, and Ozcan (2003) and Cetinus, Buyukbese, Uzel, Ekerbicer and Karaoguz (2005). These contrasting findings can be viewed in two different perspectives. Firstly, differences in the gradients or clinical characteristics of T2DM morbidity as the root of initial episode of variation. Secondly, the ST programme administeredimpacted strongly on both the intrinsic and extrinsic muscles of the hand which couldexplain the better pinch strength gain observed in the present study.However, the limitations of this study were that only the ST was considered because of difficulty in monitoring other activities of the participants, such as prescribed medications and other home programmes and, the severity of T2DM was not taken into consideration due to inadequate clinical investigations and porosity in documentation.

CONCLUSION

This study therefore concluded that the ST programme can substantially optimize handgrip and pinch strength gains of patients with T2DM. Therefore, the ST programme is a good training modality for improving handgrip and pinch strength of patients with T2DM.

Based on the findings, the following recommendations were made:

1. ST programme should be considered a key element in the management of T2DM.
2. Handgrip and pinch strength measures should be introduced into clinical practice.

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Knowledge of the Perceived Influence of Nutritional Supplements on Sexual Performance of Male Undergraduates in University of Ilorin, Nigeria

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Abstract

This study investigated on Knowledge of the perceived influence of food supplements on sexual performance of male Undergraduates in University of Ilorin. Nutritional supplements are products intended to make up for a poor diet or to support our health in the same way that nutritious food will perform. This study investigated (i) influence of ginger as a nutritional supplement on sexual performance among male Undergraduates, University of Ilorin (ii) influence of watermelon as a nutritional supplement on sexual performance among male Undergraduates, University of Ilorin (iii) influence of banana as nutritional supplement on sexual performance among male Undergraduates, University of Ilorin. A descriptive research design of survey type was employed for this study. The population consists of all male undergraduates in University of Ilorin. A multistage sampling technique was used for the study. Simple random sampling technique was used to select four hundred and twenty seven (427) respondents for the study. Researcher's designed structured questionnaire which was validated by four experts from the Department of Health Promotion and Environmental Health Education; University of Ilorin was used for data collection. A correlation co-efficient of .82r was obtained through test re-test method using Pearson Product Moment Correlation .Data collection was conducted by the researcher and four trained research assistants. The three postulated null hypotheses were tested using the inferential statistics of chi-square @0.05 alpha level. The findings from this study

reveal that; ginger as a nutritional supplement significantly influences sexual performance of male undergraduate with the calculated chi-square (χ^2) value of 311.010 is greater than the table chi-square (χ^2) value of 16.92 at the freedom (df) 9 @ 0.05 alpha level; Watermelon as a nutritional supplement significantly influences sexual performance of male undergraduate with the calculated chi-square (χ^2) value of 543.013 is greater than the table chi-square (χ^2) value of 21.03 at the freedom (df) 12 @ 0.05 alpha level and Banana as a nutritional supplement significantly influences sexual performance of male undergraduate in University of Ilorin with the calculated chi-square (χ^2) value of 629.021 is greater than the table chi-square (χ^2) value of 25.00 at the freedom (df) 15 @ 0.05 alpha level. Based on the findings of the study, it was concluded that ginger, watermelon and banana as a nutritional supplement influenced sexual performance among undergraduates, University of Ilorin. Therefore, it was recommended that male undergraduate students should be encouraged on the consumption of ginger which will serve a body building stimulant and increases the production of sperm motility, regular intake of watermelon which serves as hormone regulator and inhibitor to sexual performance should be taking more often among male undergraduate and knowledge of the consumption of banana intake as a treatment of intestinal disorders and erectile dysfunction should be intensified among male undergraduate students.

Introduction

Loss of sexual desire and function is a sign of physical illness and mental depression. Sexual arousal and intercourse are successful only when the nerves and blood vessels that service the sexual organs are healthy (Kunin, 2010). Marriage is the most important and most enjoyable of all human relationships. It is the true basis of all family life, and the importance of sex can never be underestimated in any marriage relationship, for this is the highest expression of physical love that human beings can enjoy. Many things can make a man not to be able to fulfill his sexual obligation to his partner (Bamidele, 2009). A man who is not able to perform sexually would experience emotional torment. Such an individual would not be regarded as a total man, especially of ours. Frigidity or sexual coldness in women is caused by lack of sufficient foreplay by men. Men tend to forget that women, by their nature are more slowly aroused sexually, and as a result they are often left unsatisfied and disappointed. However, men may be incapable sexually. This means that a man could also be defected sexually, and if care is not taken with the problem addressed on time, it may lead to impotence or other sexual defects such as sexual weakness, lack of exciting sexual drive, unsatisfactory sexual performance or weak erection (Bamidele, 2009).

Nutritional supplements are products intended to make up for a poor diet or to support our health in the same way that nutritious food will perform. Nutritional supplements are items that are usually considered non-food items that are used to enhance nutritional programme. Many supplements contain active ingredients that have strong biological effects in the body. They include a wide range of substances, including vitamins, minerals, amino acids and enzymes; herbs and other botanicals; and products like probiotics, glucosamine and fish oils (Bailey, 2010). Food supplements are food products, even though they may look like and be used in the same way as medicinal products. Food supplements include products for the intake of vitamins, minerals, fibre and fatty acids and various herbal products. The ingredients used must not have medicinal effects and they must not have been approved for medicinal use. Food supplements are normally used

for one of their nutritional characteristics, for instance as sources of vitamins, minerals or fatty acids, in order to supplement the diet. They may also have a physiological effect, for instance on digestion, blood pressure or cholesterol level. The natural product business has categorized food supplements in the following way, they include, Vitamins and minerals, Products containing plants or plant extracts, Fibre and weight control products, Lecithin and fatty acid products, Algae products, Bee products, Sports nutrients and other food supplements (Food supplements guide, 2008).

Bananas are excellent for improving male sexual function and lasting longer in bed. They provide the energy and nutrients our body needs to perform better in the sack. Bananas contain Vitamin B and Potassium which both play very important roles in the body's ability to make sex hormones. When a man's body has what it needs to produce male sex hormones, he will have a lot chance of lasting longer in the bedroom. Bananas are referred to as natural remedy for weak penile erection. It is a libido enhancing natural therapy that has no dangerous effect on the body organs like the heart as that of Viagra (Bamidele, 2009).

Ginger contains manganese. This mineral, found throughout the body, is essential to neurological health. By helping to form and trigger the release of the sex hormone testosterone, manganese is vital to your sex drive and sperm production (Morakinyo, Adeniyi & Arikawe, 2008). Ginger helps to increase the flow of blood around the body and to the genitals and the herb has the same vacillating properties as green tea to dilate the blood vessels so they are wider and be able to carry more blood. Ginger inhibits the build-up of cortisol which can cause weak erections or erectile dysfunction and works to maintain healthy blood pressure and reduces cholesterol which if both are high, can reduce the flow of blood into the penis. Finally, the herb acts as an overall heart and circulatory and immune system tonic. Ginger, a known aphrodisiac, has been used for many years in arousing desire and enhancing sexual activity. Ginger's scent has its unique allure that helps in establishing the connection. Not to mention, ginger also help the blood circulation, hence blood flows more easily to the mid-section of the body (Ogungbemi, 2006).

Watermelons have naturally occurring nutrients that can produce healthy reactions in the body. One of those nutrients is citeulline, which is converted to arginine through reactions initiated by enzymes. Arginine is a compound known to improve blood circulation throughout the entire body. Arginie boosts nitric oxide, which relaxes blood vessels, the same basic effect that Viagra has, to treat erectile dysfunction and even prevent it. Watermelon is used in the treatment of hypertension, prostrate cancer and heart diseases. Erectile dysfunction can be caused by stroke, hypertension, atherosclerosis, stress, radiation therapy to the testicles, multiple sclerosis etc. Not only does watermelon make a healthy summertime snack, it also has some nice sexual health benefits. Some who eat watermelon may achieve enhanced sexual intercourse within a short time after eating. The reason this fruit can help last in the bedroom by supplying nutrients that cause your body to increase blood flow down there (Pete, 2008).

Booth, Nowson, Worsley, Margerison & Jorna (2008) added that despite males having a shorter life expectancy and being more susceptible to the medical consequences of chronic disease compared to their female counterparts, participation in preventive health services are lower amongst males. “Healthy eating” messages are presented by a range of media sources, especially internet based media, which can provide contradictory nutritional messages to readers or messages based on evidence with unknown scientific quality. For males, who most often do not seek professional consultation , this can lead to self-monitoring of their current health status based on instinctive assumptions from questionable evidence or utilizing uninformed partners and friends as a source of advice regarding diet and lifestyle behavior changes (Booth et al, 2008). There is relationship between food and sexuality in various ways throughout history. Foods such as chocolate, oysters are said to be aphrodisiacs. In some cultures, human testicles and other items are also consumed to increase sexual potency. (O’connor & Anahad, 2006). Rosati (2015) affirmed that eating a healthy variety diet of nutritious foods rich with vitamins, minerals, antioxidants and pythonutrients such as

carotenoids help us resist disease. The carotenoids found in most fruits and vegetables give our skin a healthy glow.

Statement of the problem

It was observed that many students do not have knowledge of specific nutritional supplements or some certain nutrients which enhances sexual performance. It was also observed that some students do not know the danger in taking certain diets as it affects their sexual performances. In addition, adequate attention is yet to be given on the need to educate the society at large on diets and its contribution to a healthy sexual life. Several studies have shown that the number of couples unable to achieve pregnancy is on the rise. Indeed, more men are firing blanks as a result of low sperm count and quality. Sometimes, the causes of low sperm count are infections. The infections, according to experts, affect the quality of semen by damaging the gonads. But there are many natural herbal and nutritional aphrodisiacs that enhance sexual drive and pleasure in both men and women, increase libido, improve sexual performance, blood flow, boost fertility, increase force and intensity of ejaculation (Hum, 2010).

Sexual health issues are not often linked to general health conditions that are caused by poor nutrition and lack of activity. Rarely will nutrition be examined, which is a problem, as it is a major factor in most illnesses. Many physicians simply provide prescription medications to address symptoms rather than helping the patient to explore helpful education that may promote natural, nutritional and sexual changes that address the core issue. After all, when one's diet affects things such as hormone levels, energy levels, mental health and physical and sexual performance, one must question why this is not the first area that is explored in addressing these issues as related to diet instead of a prescription drug (Lawless, 2013).The majority of sexual health problems can be attributed to bad nutrition. With diseases that contribute to sexual dysfunction, such as diabetes, high blood pressure, depression, poor blood flow, heart and thyroid conditions are all to lower the sexual performance level in the body. In addition, many people themselves have become unmotivated to make changes to

their diet. It is imperative for one to understand that not taking care of one's nutritional needs may not just cause general health and sexual health problems temporarily but also cause permanent damage and chronic disease. A little effort everyday can make the difference between a long, healthy and sexual fulfilling life and a life that is riddled with health problems including the inability to have sex (Lawless, 2013).According to Taboola (2015), many men suffer from a low sex drive, sexual performance problems, and an overall lack of male virility. These problems can negatively impact a man's self-esteem, sense of self-worth, and the quality of his romantic relationships. However, problems with male virility and sexual functioning can be, in most cases, be remedied through dietary factors that promote strong male virility and improve sexual function and performance.

Due to the large number of undergraduates that are yet to get married and those that are married, there is need for them to be educated on the importance of some certain healthy foods that may enhance their sexual performance. Therefore, in line with above statements and other scholarly reports, the researcher investigates the knowledge of the perceived influence of nutritional supplements on sexual performance of male Undergraduates, University of Ilorin.

Research questions

The following research questions were raised to guide the study

1. Will knowledge of ginger as a nutritional supplement be perceived as influencing sexual performance of Male Undergraduates in University of Ilorin?
2. Will knowledge of watermelon as a nutritional supplement be perceived as influencing sexual performance of Male Undergraduates in University of Ilorin?
3. Will knowledge of banana as a nutritional supplement be perceived as influencing sexual performance of Male Undergraduates in University of Ilorin?

Research Hypotheses

The following research questions were formulated to guide the study

1. Knowledge of ginger as a nutritional supplement will not be perceived as influencing sexual performance by Male Undergraduates in University of Ilorin.
2. Knowledge of watermelon as a nutritional supplement will not be perceived as influencing sexual performance by Male Undergraduates in University of Ilorin.
3. Knowledge of banana as a nutritional supplement will not be perceived as influencing sexual performance by Male Undergraduates in University of Ilorin.

Methodology

Descriptive research design of the survey method was used for the study. The population consists of University of Ilorin students which comprised students from the fifteen (15) Faculties with a total number of thirty-six thousand four hundred and thirty five (36,435) undergraduates as at the time of this study. The target population is all 300 level and 400 level male undergraduates in all faculties for 2015/2016 session and their total population is seven thousand eight hundred and sixty nine (7,869) from five selected Faculties in the University of Ilorin, Ilorin. A multistage sampling procedure of simple random sampling technique and proportionate sampling technique of ten percent (10%) was used for the study. Simple random sampling technique was used to select five (5) faculties from the fifteen (15) faculties in the University. Based on the nature and resources needed to carry out the study, the researcher selected five (5) out of fifteen (15) available faculties using simple balloting technique, to select the faculties, the researcher wrote all the faculties name on a different sheet of paper, folded and placed in a container, someone picked five (5) needed faculties that was used for the study out of the fifteen (15) faculties named in the container. The first five picked faculties were used for the study. Purposive sampling technique was used to select 300 & 400 level based on their experiences and years spent

in the university. Proportionate sampling technique was used to select ten percent (10%) samples from the five (5) faculties' selected based on population. Simple random sampling technique was used to select the actual respondents for the study.

Table 1

	Faculties	**Population of male Undergraduate students (300 & 400 level)**	**Sample Percentage (10%)**	**Total Sample**
1	Agriculture	369	36.9	37
2	Arts	557	55.7	56
3	Communication & Information Sciences	412	41.2	41
4	Education	1553	155.3	155
5	Physical Sciences	1383	138.3	138
Total	**5**	**4274**	**427.4**	**427**

10% of each faculty will be samples for this study.

A researchers' developed four likert rating scale questionnaire was used in data collection for the study. The questionnaire consists of two sections namely: section A and B. Section A elicits information on the demographic variables of the respondents, while Section B elicits information on the variables under study. To ascertain the validity of this instrument, the researcher gave three copies to three experts in the Department of Health Promotion and Environmental Health Education, University of Ilorin. Their comments and suggestions in line with recommendations of the supervisor were carefully studied and used to improve the quality of the instrument. To determine the reliability of this instrument, the researcher adopt a test re-test method, questionnaire was administered to twenty (20) respondents from another Faculty from Kwara State University, Malete outside the area of study. Two weeks were allowed

between the first and second administration. Both results were compared using Pearson Product Moment Correlation statistical analysis. A reliability coefficient 'r' of 0.82 was obtained and this was considered high enough for the study. In order for the researcher to gain the recognition from the respondents, a letter of introduction that was duly signed by the Head of Department of Health Promotion and Environmental Health Education, University of Ilorin. This letter was used for the purpose of instrument administration. The researcher made every effort with other three trained research assistants in administering the instruments and protected the confidentiality of the research participants. The data for this study was collected, sorted, coded and subjected to appropriate statistical analysis. Section A contains the demographic data of the respondents, was analyzed using descriptive statistics of frequency counts and simple percentage and non-parametric of inferential statistics of chi-square was used to analyze the stated hypotheses at 0.05 alpha level of significance using Statistical Package for Social Science (SPSS) version 20.0.

Test of Hypotheses

Hypotheses 1: Ginger as a nutritional supplement will not be perceived as influencing sexual performance of male undergraduates in University of Ilorin.

Table 1: Chi-square analysis of Ginger as a nutritional supplement will not significantly influence sexual performance of male undergraduates in University of Ilorin.

S/N	ITEMS	SA	A	D	SD	ROW TOTAL	Df	CAL χ^2 VALUE	TABLE χ^2 VALUE	REMARKS
1	Ginger prevents blood clothing which further increases sexual performance	106 (24.8%)	217 (50.8%)	93 (21.8%)	11 (2.6%)	427				
2	Ginger intake serves as a body building stimulant which increases sexual performance	83 (19.4%)	207 (48.5%)	122 (28.6%)	15 (3.5%)	427				
3	Consumption of ginger as a healthy food stimulates the production of sperm which enhances sexual performance	94 (22.0%)	277 (64.9%)	50 (11.7%)	6 (1.4%)	427	9	311.010	16.92	Ho Rejected
4	Ginger intake as a healthy food restores sperm motility which enhances sexual performance.	121 (28.3%)	233 (15.3%)	63 (14.8%)	10 (2.3%)	427				
	Column Total	**404**	**934**	**328**	**42**	**1708**				

@0.05 alpha level

Table 1 revealed that the calculated chi-square value is 311.010 and the table χ^2 value is 16.92 with the degree of freedom 9 @0.05 alpha level. Since the calculated χ^2 value of 311.010is greater than the table χ^2 value of 16.92 at 9 degree of freedom. Therefore, null hypothesis is rejected. This implies that Ginger as a nutritional supplement has significant influence sexual performance of male undergraduates in University of Ilorin. This implies that ginger stimulate the production of saliva and sperm in male which enhances sexual performance among male undergraduates in University of Ilorin.

Hypotheses 2: Watermelon as a nutritional supplement will not be perceived as influencing sexual performance of male undergraduates in University of Ilorin.

Table 2: Chi-square analysis of watermelon as a nutritional supplement will not significantly influence sexual performance of male undergraduates in University of Ilorin.

S/N	ITEMS	SA	A	D	SD	ROW TOTAL	Df	CAL χ^2 VALUE	TABLE χ^2 VALUE	REMARKS
5	Intake of watermelon regulates the body hormones and increases sexual performance	55 (12.9%)	104 (24.4%)	256 (59.9%)	12 (2.8%)	427				
6	Watermelon intake provides energy which enhances sexual performance	65 (15.7%)	301 (70.1%)	54 (12.6%)	7 (1.6%)	427				
7	Watermelon intake serves as a body stimulants which increases sexual performance	71 (16.6%)	215 (50.1%)	110 (25.8%)	31 (7.5%)	427	12	543.013	21.03	Ho Rejected
8	Watermelon intake fights against low libido which enhances sexual performance	70 (16.4%)	223 (52.2%)	110 (25.8%)	24 (5.6%)	427				
9	Watermelon contains citrulline which improves erectile function and further increases sexual performance	83 (19.4%)	234 (54.8%)	102 (23.9%)	8 (1.9%)	427				
	Column Total	**344**	**1077**	**632**	**82**	**2135**				

@0.05 alpha level

Table 2 revealed that the calculated chi-square value is 543.013 and the table χ^2 value is 21.03 with the degree of freedom 12 @ 0.05 alpha level. Since the calculated χ^2 value of 543.013 is greater than the table χ^2 value of 21.03 at 12 degree of freedom. Therefore, null hypothesis is rejected. This implies that watermelon as a nutritional supplement has significant influence sexual performance of male undergraduates in University of Ilorin. This implies that intake of watermelon regulates the body hormones and increases sexual performance among male undergraduate in University of Ilorin.

Hypotheses 3: Banana as a nutritional supplement will not be perceived as influencing sexual performance of male undergraduates in University of Ilorin.

Table 3: Chi-square analysis of banana as a nutritional supplement will not significantly influence sexual performance of male undergraduates in University of Ilorin.

S/N	ITEMS	SA	A	D	SD	ROW TOTAL	Df	CAL χ^2 VALUE	TABLE χ^2 VALUE	REMARKS
10	Banana intake contains vitamin B which increases energy and boost sexual performance	81 (18.9%)	207 (48.5%)	134 (31.4%)	5 (1.2%)	427				
11	Intake of banana as a food increases libido level with the aid of an enzyme called bromelain which increases sexual performance	102 (23.9%)	203 (47.5%)	110 (25.8%)	12 (2.8%)	427				
12	Banana contain potassium used in producing sex hormones and sex drive which improves sexual performance in	92 (21.5%)	126 (29.5%)	184 (43.1%)	25 (5.9%)	427	15	629.021	25.00	Ho Rejected
13	Regular intake of banana as a food helps to improve the blood flow that aids sexual performance	75 (17.6%)	162 (37.9%)	176 (41.2%)	14 (3.3%)	427				
14	Banana is a rich source of vitamin A which stimulate the production and improve sexual performance	51 (11.9%)	71 (1.8%)	273 (63.9%)	32 (7.5%)	427				
15	Banana intake reduces the problem of erectile dysfunction which boost sexual performance	114 (26.7%)	117 (27.4%)	174 (40.7%)	22 (5.2%)	427				
	Column Total	**515**	**886**	**1051**	**110**	**2562**				

@0.05 alpha level

Table 3 revealed that the calculated chi-square value is 629.021 and the table χ^2 value is 25.00 with the degree of freedom 15 @ 0.05 alpha level. Since the calculated χ^2 value of 629.021is greater than the table χ^2 value of 25.00 at 15 degree of freedom. Therefore null hypothesis is rejected. This implies that banana as a healthy food has significant influence on sexual performance of male undergraduates in University of Ilorin. The implication of this is that banana intake reduces the problem of erectile dysfunction which boosts sexual performance of male undergraduate students in University of Ilorin.

Discussion of findings

Hypotheses I: -Stated that knowledge of ginger as a nutritional supplement will not be perceived as influencing sexual performance by Male Undergraduates in University of Ilorin. The analysis of the calculated chi-square calculated χ^2 value of 311.010 is greater than the table χ^2 value of 16.92 at 9 degree of freedom. Therefore, null hypothesis is rejected. This implies that Ginger as a nutritional supplement has significant influence on sexual performance of male undergraduates in University of Ilorin. This finding is in line with Ogungbemi (2006) who affirmed that ginger helps to increase the flow of blood around the body and to the genitals and the herb has the same vacillating properties as green tea to dilate the blood vessels so they are wider and be able to carry more blood. This finding was further supported with Amir, Eldin and Hamza (2007) who opined that ginger displays anti-inflammatory properties and can be used to treat rheumatoid arthritis, osteoarthritis, and various other muscular disorders and production of saliva and sperm needed in enhancing sexual performance.

Hypotheses II: -Stated that knowledge of watermelon as a nutritional supplement will not be perceived as influencing sexual performance by Male Undergraduates in University of Ilorin. The analysis of the calculated chi-square calculated χ^2 value of 543.013 is greater than the table χ^2 value of 21.03 at 12 degree of freedom. Therefore, null hypothesis is rejected. This implies that watermelon as a nutritional supplement has significant influence on sexual performance of male undergraduates in University of Ilorin. This finding is in line with Carrieri, Cormio and Lorusso (2011) who explained that watermelon is a natural alternative treatment for mild and moderate erectile dysfunction in men who fear the drug's effects on the body and it contains citrulline which helps in excretory pathway further increases sexual performance.

Hypotheses III: -Stated that knowledge of banana as a nutritional supplement will not be perceived as influencing sexual performance by Male Undergraduates in University of Ilorin. The analysis of the calculated chi-square calculated χ^2 value of 629.021 is greater than the table χ^2 value of 25.00 at 15degree of freedom.

Therefore, null hypothesis is rejected. This implies that banana as a nutritional supplement has significant influence on sexual performance of male undergraduates in University of Ilorin. This finding is in line with Bamidele (2009) who affirmed that bananas are natural remedy for weak penile erection. It is a libido enhancing natural therapy that has no dangerous effect on the body organs like the heart as that of Viagra. Bamidele (2009) also explained that bananas are high in bromelain and b vitamins, both of which are potent sexual hormone regulators that can help improve sexual function, sexual desire and sexual virility and boost sexual performance.

Conclusion

Based on the findings of the study, the following conclusions were made:

1.) Ginger as a nutritional supplement influenced sexual performance of male Undergraduates in University of Ilorin.
2.) Watermelon as a nutritional supplement influenced sexual performance of male Undergraduates in University of Ilorin.
3.) Banana as a nutritional supplement influenced sexual performance of male Undergraduates in University of Ilorin.
4.)

Recommendation

Based on the conclusion of the study, the following recommendations were made:

1. Male undergraduate students should be encouraged on the consumption of ginger which will serve a body building stimulant and increases the production of sperm motility.
2. Regular intake of watermelon which serves as hormone regulator and inhibitor to sexual performance should be taking more often among male undergraduate.
3. Knowledge of the consumption of banana intake as a treatment of intestinal disorders and erectile dysfunction should be intensified among male undergraduate students

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OPTIMIZING MOTOR SKILLS THROUGH CLASSICAL CONDITIONING THEORY

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Abstract

Over the years, experts have sought varied means of enhancing the learning of motor skills and optimizing motor performance. The role of learning theories in the learning of motor skills has been studied. Classical conditioning is a reflexive or automatic type of learning in which a stimulus acquires the capacity to evoke a response that was originally evoked by another stimulus. This study explains the role of classical conditioning on motor learning and performance. Classical conditioning should be applied in the teaching of the practical aspects of physical education to students especially in the early stages of their learning. This would help in motivating them and consequently optimizing their motor skill learning and performance. One must be able to practice and master a task effectively before embarking on another one. This means that a student needs to be able to respond to a particular stimulus (information) before he/she can be associated with a new one. Classical conditioning should be used by Coaches and Sports Psychologists in helping Athletes overcome their fear of failure or opponents. There is the need for more studies on the optimizing of motor outcomes via classical conditioning to be conducted.

Keywords: Motor Skills, Classical Conditioning, Stimulus, Response

Introduction

A theory is a set of generalized statements supported by experimental evidence. It is based on the preliminary findings of previous researchers. Several theories have therefore evolved about how people learn. While some theories are better than others in explaining types of learning. However, no particular or single theory is sufficient to explain how all learning takes place. Classical conditioning is a reflexive or automatic type of learning in which a stimulus acquires the capacity to evoke a response that was originally evoked by another stimulus. It is sometimes referred to as "Pavlovian" conditioning and was developed by Ivan Pavlov a Russian physician and researcher who did a lot of important work studying the digestive system. Pavlov redirected the animal's digestive fluids outside the body, where they could be measured and noticed that his dogs began to salivate in the presence of the technician who normally fed them, rather than simply salivating in the presence of food. Pavlov called the dogs' anticipatory salivation "psychic secretion." Putting these informal observations to an experimental test, Pavlov presented a stimulus (e.g. the sound of a metronome) and then gave the dog food; after a few repetitions, the dogs started to salivate in response to the stimulus. Pavlov concluded that if a particular stimulus in the dog's surroundings was present when the dog was given food then that stimulus could become associated with food and cause salivation on its own. He called the stimulus the conditioned (or conditional) stimulus (CS) because its effects depend on its association with food (Douglas, Brian & Arthur, 2009). He called the food the unconditioned stimulus (US) because its effects did not depend on previous experience. Likewise, the response to the CS was the conditioned response (CR) and that to the US was the unconditioned response (UR). Pavlov reported many basic facts about conditioning; for example, he found that learning occurred most rapidly when the interval between the conditioned stimulus and the appearance of the unconditioned stimulus was relatively short (Brink, 2008).

Classical conditioning occurs when a conditioned stimulus is paired with an unconditioned stimulus. Usually, the conditioned stimulus (CS) is a neutral stimulus (e.g the sound of a tuning fork), the unconditioned stimulus (US) is biologically potent (e.g the taste of food) and the unconditioned response (UR) to the unconditioned stimulus is an unlearned reflex response (e.g., salivation). After pairing is repeated (some learning may occur after only one pairing), the organism exhibits a conditioned response (CR) to the conditioned stimulus when the conditioned stimulus is presented alone. The conditioned response is usually similar to the unconditioned response, but unlike the unconditioned response, it must be acquired through experience and is relatively impermanent (*Cherry & Kendra, 2003*). In classical conditioning, the conditioned stimulus is not simply connected to the unconditioned response; the conditioned response usually differs in some way from the unconditioned response, sometimes significantly. For this and other reasons, learning theorists commonly suggest that the conditioned stimulus comes to signal or predict the unconditioned stimulus, and go on to analyze the consequences of this signal (Shettleworth, 2010).

A basic characteristic of classical conditioning, in comparison to another popular model, operant conditioning, is that the learning is automatic and non-conscious. Pavlov identified four basic components in this classical conditioning model. The unconditioned stimulus is the stimulus that naturally and instinctively elicits the target response, which, in the case of his classic experiment is the meat powder. The conditioned stimulus is the stimulus that comes to elicit the target response, which was the tone in Pavlov's experiment. The unconditioned and conditioned responses are a little trickier to identify in that they are often the exact same behavior. For example in Pavlov's experiment they are both salivation. The fundamental difference is that the unconditioned response occurs as a result of the unconditioned stimulus, and the conditioned response occurs in response to the conditioned stimulus. In Pavlov's experiment, the unconditioned response is salivation in response to the meat powder, and the

conditioned response is salivation in response to the tone. One special and very powerful example of classical conditioning is taste aversion. Taste aversion is a case where an organism learns to have an aversion to the taste or smell or other characteristics of some food or drink. For example, after consuming too much alcohol, it's not unusual for someone to associate the smell or even sight of the alcohol with the sickness that resulted from consuming the alcohol.

While Ivan Pavlov showed that classical conditioning applied to animals, Watson and Rayner (1920) in a famous (though ethically dubious) experiment showed that it also applies to humans. They performed their experiment on a 9-month-old infant "Little Albert" who was tested on his reactions to various stimuli. He was shown a white rat, a rabbit, a monkey and various masks. Albert described as "on the whole stolid and unemotional" showed no fear of any of these stimuli. However, what did startle him and cause him to be afraid was if a hammer was struck against a steel bar behind his head. The sudden loud noise would cause "little Albert to burst into tears. When Little Albert was just over 11 months old the white rat was presented and seconds later the hammer was struck against the steel bar. This was done 7 times over the next 7 weeks and each time Little Albert burst into tears. By now little Albert only had to see the rat and he immediately showed every sign of fear. He would cry (whether or not the hammer was hit against the steel bar) and he would attempt to crawl away. In addition, Watson and Rayner found that Albert developed phobias of objects which shared characteristics with the rat; including the family dog, a fur coat, some cotton wool and a Father Christmas mask! This process is known as generalization. Watson and Rayner had shown that classical conditioning could be used to create a phobia. A phobia is an irrational fear, i.e. a fear that is out of proportion to the danger. Over the next few weeks and months Little Albert was observed and 10 days after conditioning his fear of the rat was much less marked. This dying out of a learned response is called extinction. However, even after a full month it was still evident, and the association could be

renewed by repeating the original procedure a few times. If for example a college student instinctively fears tests and is taking a general psychology class in which the instructor always wears a black jacket on test day. Thus, the black jacket eventually comes to serve as a conditioned stimulus in that it elicits fear in the student, independent of the test. For the record, this last example is actually a "second order" classical conditioning in that in "pure" classical conditioning, the unconditioned stimulus – unconditioned response contingency should be basic and instinctive. Students don't actually have an instinctual fear of tests; rather, this is something that is itself classically conditioned at an earlier age. However, note one important thing about all these examples, which is that they all involve a target/learned behavior that is non conscious and basic, usually involving some response of the autonomic nervous system (e.g., fear, sadness, anxiety, excitement, or joy).

Characteristics of Classical Conditioning

There are, different variables that can affect the degree to which classical conditioning will or will not occur in different situations. The study of classical conditioning can become quite complex through the consideration of these different variables, and learning researchers have examined many over the years. One of such variables is the time difference between the conditioned stimulus and the unconditioned stimulus which is referred to as latency. Worthy of note is that the conditioned stimulus is supposed to come first. For example, if Pavlov always sounded the tone after the dog got meat powder, the tone, in the absence of the meat powder, would signal that the dog somehow missed getting it's meat powder so, in fact, it might as well not salivate. Given that the conditioned stimulus does precede the unconditioned stimulus, the general rule of thumb is that the shorter the latency the more likely it is that the conditioning will occur. Another interesting phenomenon that Pavlov identified was a phenomenon now known as "spontaneous recovery". This is the re-occurrence of a classically conditioned response after extinction has occurred. Extinction refers to the fact, that, if the conditioned and

unconditioned stimuli are not paired for a given number of trials an organism will stop exhibiting the conditioned response. For example, the student mentioned above will, perhaps, some day come to really like black jackets again. However, after he or she has gotten over the fear of black jackets, the fear may suddenly reappear. This would be spontaneous recovery. A final important characteristic of classical conditioning is referred to as generalization. This is the case where stimuli that are like the conditioned stimulus come to elicit the same response. A classic example is "Little Albert" allegedly became fearful of other animals and even his Mother's fur coat.

John Watson proposed that the process of classical conditioning (based on Pavlov's observations) was able to explain all aspects of human psychology. Everything from speech to emotional responses were simply patterns of stimulus and response. Watson denied completely the existence of the mind or consciousness. He believed that all individual differences in behavior were due to different experiences of learning. He famously said:

"Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select - doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and the race of his ancestors" (Watson, 1924, p.104).

Learning

Burns (1995) regards learning as a relatively permanent change in behaviour, which includes both observable activity and internal processes such as thinking, attitudes and emotions. Learning occurs right from the birth of the child and proceeds until he/she dies. Learning is acquired due to the prior experience one has gained. A child may learn from his/her environment (teacher) consciously or unconsciously, and in the process, his/her behaviour is being modified either negatively or positively. However, the

essence of enrolling in the school by the students is to acquire desirable/positive behaviour under the tutelage of the teacher. To this end, learning can be described as a process by which an individual:

1. Aquires a novel idea or experience to a situation.
2. Retains and applies the idea, skills and knowledge in solving the confronting problems.
3. Modify one's behaviour by the experience gained in the past and making the change permanent.

In view of the above points, learning is considered as:

1. A relatively permanent change in behavior.
2. Not just a visible but also manifest responses of the learner
3. Modifying the learner's behaviour.
4. Being dependent on previously acquired experience.

Some behaviour cannot be described as being learnt because they occur at the moment of anatomical maturation. This type of learning occurs as one matures physically. For example, a child does not learn how to walk, eat or talk but acquires these skills as he/she advances in age. This behaviour is regarded as "specie-specific behaviour" (Ayeni, 1991).

The Concept of Motor Learning

Motor learning is the acquisition, completion and utilization of motor information, knowledge, experience, and motor programmes (Adams, 1976). It is closely connected with mental abilities, motor abilities, foreknowledge, cognitive and connative characteristics of an individual as well as his familiarity with the theoretical bases of movement technique. Abernethy, Kippers, Mackinnon, Neal and Hanrahm (1997) distinguished between three phases in the process of motor learning: the verbal-cognitive phase during which a new movement structure is first identified and then understood; the

associative phase during which several elements of the movement structure are integrated and adapted to the changing circumstances; and the autonomous phase during which movement becomes automatic and results in few errors. During the first phase, a beginner executes a series of unnecessary movements, activates muscles that are not relevant and is unable to bring them into balance. Consequently, his starting position and movement rhythm are incorrect, while his posture is stiff. This phase of motor learning lasts from 15 to 30 hours. In the second, associative phase, the quality of movement improves substantially. Movements are already smoother and more relaxed, while superfluous movements gradually vanish. In the motor part of the central nervous system a notion appears as a motor stereotype. This phase lasts from 3 to 5 months. The third, autonomous phase is that of movement automation, where the individual kinematic and dynamic parameters of movement are optimally integrated. This lasts for several years and is never quite finished. The motor stereotype collapses only in extremely unpredictable circumstances such as fatigue, enormous pressure or stress

Motor learning can be defined as a "set of internal processes associated with practice or experience leading to relatively permanent changes in the capability for skilled behavior." In other words, motor learning is when complex processes in the brain occur in response to practice or experience of a certain skill resulting in changes in the central nervous system that allow for production of a new motor skill. There are three stages in which motor learning occurs:

1. **Cognitive Stage**– During this initial stage of motor learning, the goal is to develop an overall understanding of the skill. The learner must determine what the objective of the skill is and begin to process environmental factors that will affect their ability to produce the skill. The teacher must do their best to provide an optimal environment for learning, which may mean removing large distracters. During this stage, the learner mostly relies on visual input and trial and error to guide learning. Example: Before a child

masters walking, they will most likely look a bit awkward and will definitely stumble a few times. The reality is that the process of learning how to walk begins way before your child actually takes their first assisted or independent step as they have been visually observing others around them walking and beginning to understand the purpose. So while they make look clumsy during this stage of learning, they are only just beginning to transition from understanding the skill to executing it.

2. **Associative Stage** – During this stage, the learner begins to demonstrate a more refined movement through practice. Now that the learner has had some practice and has identified various stimuli that may occur, they can focus on "how to do" moving on from the "what to do" in the first stage. Here, visual cues become less important and proprioceptive cues become very important. Proprioceptive cues refer to the learner focusing more on how their body is moving in space and what input is being felt from their joints and muscles. The more practice, the more proprioceptive input the learner receives to aide learning. Therefore, the more practice the better! Example: Let's continue with walking. During the initial clumsy stage your child may demonstrate small, choppy steps, wide base of support, arms up high in a guarded position, and little to no trunk rotation. In this stage, you may see your child taking longer, more controlled steps, narrowing their base of support, and allowing their arms to relax at their sides. These behaviors indicate that your child has moved past the initial stage of learning and has progressed to a more refined movement.

3. **Autonomous Stage** – During this final stage of learning, the motor skill becomes mostly automatic. Progression to this level of learning allows the learner to perform the skill in any environment with very little cognitive involvement compared to the first stage. Example: Your child will now be able to walk in a predictable environment such as your home or an unpredictable environment such as a crowded birthday party at the park on grass without difficulty.

Keep in mind that the learning process can take different lengths of time for every individual and progression can be dependent on a variety of factors such as motivation of the learner, feedback received, environmental stimuli, organization of practice, and the presence of musculoskeletal or neuromuscular impairments. Talk with your therapist for more suggestions to optimize motor learning more specifically for your child.

Interrelationship between Classical Conditioning and Motor Learning

Most of the emotional responses can be learned through classical conditioning. A negative or positive response comes through the stimulus being paired with. For example, providing the necessary school material for primary school pupils will develop good feelings about school and learning in them while undue punishment might discourage them from attending the school.

Athletes who associate positive physiological responses, such as relaxation and appropriate arousal level, and enhancing emotions, such as joy and satisfaction with their sports and training are more likely to love their sport and come to practice highly motivated to train. This would lead to a high level of performance both in training and competitions. Therefore, to increase motivation, coaches need to condition their athletes to respond positively to not only their sport but the many aspects of their sport, such as training, stretching, conditioning, drill and skill work, and competing. For many athletes, especially young ones, a positive conditioned response is what brings them back each day, each week, each month, and each season.

Athletes need to have positive physiological and psychological responses to their sport. Athletes who have an interest and love for their sport (training and competition) will be engaged and motivated. You can facilitate a positive response by continually pairing positive conditioned stimuli with positive unconditioned

stimuli. A significant way to create a positive response is to facilitate success and mastery during practice, make practice and competition fun, and focus on effort.

In the teaching of motor skills to school children especially at the early stages, it has been observed that there is a general apathy towards learning of physical education most especially the practical aspects of the course. A lot of students have associated the course 'physical education' to undue stress. Classical conditioning can be used to correct this anomaly by associating field work or practical sessions with fun especially at the early stages of student participation. This could involve introducing activities like music, dancing etc. The primary aim of this is to help the students to be conditioned in such a way in which they will associate field work with fun.

Conclusion

Classical conditioning is a reflexive or automatic type of learning in which a stimulus acquires the capacity to evoke a response that was originally evoked by another stimulus. Motor skill learning which is in the domain of learning of physical skills involve three different stages; the cognitive, associative and autonomous stages. Experts in the fields of sport science, coaching, physical education and other areas have sought for different ways of optimizing motor outcomes among Athletes, school children and in individuals with movement restrictions. Classical conditioning can provide the needed assistance in achieving these much needed goals.

Classical conditioning can be used in helping Athletes who have an unusual fear for opponents or for competitions which could be due to past failures, or any other factor in overcoming their fear and facing their opponents with the needed confidence and courage. It can also be used in assisting school children and new Athletes in developing the needed love and motivation for field work or sports. To the best of the researches knowledge, researches on the

effect of classical conditioning on the learning of motor skills are very few.

Recommendations

1. Classical conditioning should be applied in the teaching of the practical aspects of physical education to students especially in the early stages of their learning. This would help in motivating them and consequently optimizing their motor skill learning and performance.

2. One must be able to practice and master a task effectively before embarking on another one. This means that a student needs to be able to respond to a particular stimulus (information) before he/she can be associated with a new one.

3. Teachers should know how to motivate their students to learn. They should be versatile with various strategies that can enhance effective participation of the students in the teaching-learning activities.

4. Classical conditioning should be used by Coaches and Sports Psychologists in helping Athletes overcome their fear of failure or opponents.

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THE DILEMMA ON THE POLICY OF CLASSROOM TEACHER AS AGAINST SUBJECT TEACHERS, TEACHING IN PRIMARY SCHOOLS IN GHANA: THE WAY FORWARD FOR PHYSICAL EDUCATION AS A CORE SUBJECT

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ABSTRACT

Teachers who are employed to teach in the basic schools in Ghana, either ply their trade in the primary schools or the junior high schools (JHS). The primary classes comprise of classes 1-6, and the junior high schools are made up of JHS 1-3. The primary school teachers are termed as "classroom teachers", because a teacher is allotted a particular class and he or she is responsible for teaching all the subjects on the time table to the pupils throughout the duration the class is assigned to that teacher. In the case of JHS teachers, they are termed subject teachers because they don't have permanent classes they stick to throughout the year, but rather move from class to class, teaching their specialized subjects to various classes and levels in the school. The writer's concern in this paper is whether pupils in the primary schools are better off with the classroom teacher policy, or assigning them with subject teachers will be an improvement on the current policy of the Ghana Education Service. Considering the kind of training student-teachers receive during their formation periods in the Colleges of Education, are they better off with the current policy, or will be better off with the subject teaching option. Dose the curricula of Physical Education in particular and other core subjects in general in their present form

at the colleges of education, favour the classroom arrangement over the subject teacher option after completion of the training of the newly trained teacher? The advantages and disadvantages of the two polices is discussed in this paper.. The way forward on the issue under discussion so far as Physical Education as a subject is concerned is also assessed in this paper. The interdisciplinary approach of learning is also discussed as one of the ways forward in addressing the classroom/subject teacher dilemma.

Keywords:

Introduction

The dilemma, on the policy of either to make classroom teachers teach all subjects or subject teachers to teach specialized subject at the primary school started from the post independent era. The philosophies on classroom teachers and subject teachers issues can be traced back to Dr. Kwame Nkrumah, Ghana's first president's statement that…… "only with a population so educated can we hope to face the tremendous problems which confront any country attempting to raise the standard of life in a tropical zone" (McWillieam, & Kwamena-Poh, 1975, p.94). Base on this dream, the free and compulsory primary and middle school education was implemented in 1960 to ensure quality education for national development under Dr. Kwame Nkrumah's regime. To realize this dream, training of teachers and their welfare became paramount to the promotion of quality primary education.

The decline of academic performance of students in public's schools puts pressure on the ministry of education under every government to research on the causes of low performance of students for educational reforms. Even though the issues were caused by multiple factors such as inadequate teacher preparation, poor teacher motivation, inadequate teaching and learning materials and effective policy implementation among the basic education sector the classroom teacher teaching or the subject teacher teaching philosophy is an elusive phenomenon researchers and stakeholders in Ghana need to consider (Acquah, Eshuni & Afful-Broni, 2013). For years now, many countries including Ghana and organisations like British Educational Research Association and other researchers have been looking at ways of refining their primary school system to enhance quality education.

In the course of solving this issue came up the dilemma in the policy of whether the classroom teachers or the subject teachers should teach physical education in the primary schools in Ghana (Rose & Woodhead, 1992). Although, the traditional system of the classroom teachers (generalist teacher) teaching all subjects in the primary schools in Ghana is making a significant

impact, the current Organizations for Economic Cooperation and Development's (DECD) publication in 2015 on global school ranked Ghana at the bottom of 76 countries with other African nations at lowest whiles Asians at the top five places. This indicates a positive relationship between education and economic growth (Coughlan, 2015).

Currently, the teacher preparation in Ghana is based on the policy of generalist ideology. This means that most teachers trained from colleges of education when posted to the primary schools should be able to teach all subjects irrespective of the credits hours the teachers as trainees used to study the subjects. Those who had the chance of specializing in a particular subjects as elective teach all subject when posted to the primary school. Despite the fact that teacher quality has shown by several studies to influence learning (Aaronson, Barrow, & Sander, 2007), the knowledge level of the teachers on subjects had also shown to be significantly and consequently related to students achievement level (Hanushek & Rivkin, 2006). This paper aims to identify the advantages and disadvantages of classroom teachers and subject teacher role in teaching in the primary schools in Ghana and the way forward.

The Classroom Teacher

The traditional model of teaching physical education in the primary schools in Ghana concerns a classroom teacher being responsible for the teaching of all curriculum subjects to his or her class has been in place for century not only in UK (Blaw & Capel, 2011) but Worldwide (Tasngaridon, 2012). In Ghana the policy in still that teacher in the primary schools should teach all subjects regardless of whether the teacher studied the course for just a terms in teacher tanning colleges This really serve as the pivot of the issue for contention due the resultant effect on our innocent children poor parents will be investing all their harvest in life with the hope for future. No matter what we say currently Ghanaian policy is that classroom teachers should teach all subjects in the public schools in Ghana irrespective of how well they are prepare.

Advantages of Classroom Teachers Teaching in the Primary Schools

These are the findings on advantages and disadvantages of classroom teachers (Sarfo, Adusei, 2015 & Hansen, 2008).

1. The classroom teachers serve as pseudo parents to students in the class. They give children an extension of parental care and relationship by being with them in the class throughout.
2. They are able to ensure class discipline and control. Since it is a single teacher that teach all subjects he is able to implement the established routines and instill morals in the learners.
3. They serve as role model which positively influence students' life through the daily interactions and counseling.

Disadvantages

1. Boredom sets in due to continuous interaction with the same teachers for the whole year.
2. Low expertise and poor performance of the classroom teacher due to insufficient time spent in learning non specialized subject at the teacher training colleges as a core.
3. Lack of confidence in teaching due to low content knowledge. This can lead to teaching wrong skill skills which in the long round will have untold effects on the lives of our children.
4. Poor performance of students can also results in lacks of motivation and teaching of wrong sills.
5. Lesson delivered are also narrow and restrictive in content due to low content skill and acquisition.
6. Teaching absenteeism effects especially in under staffing schools.

The Subjects Teachers

The effort of researchers to find out cause of low performance of classroom teachers led to the comparisons of the quality of achievement of student at the private schools based on the subject teachers teaching at the primary schools. It seems due

to this some head teachers in the unofficially have stated experimenting subject teaching in their school in Ghana.

Subject teaching is a phenomenon that focuses on the principles that teachers who have specialized in a particular subject like physical education as a major should be allowed to teach the subject in the primary schools as it is done at the Junior High Schools and Senior High Schools in Ghana.

Advantages for Subject Teachers Teaching in the Primary Schools

1. Subject content knowledge and expertise: The specialists by their expertise are able to plan, teach give corrective feedback to learners for correct mastery of skills.
2. Ensures quality teaching and learning of physical education in the primary schools.
3. Hold high standards of physical education: This high standards leads to setting high expectation for children doing physical education leading to quality physical education
4. Systematic implementation of physical education curriculum: As a specialist he will be able to plan and implement the physical education curriculum systematically based on students previous knowledge for quality since he or she is in charge of the whole primary classes.
5. Developmentally appropriate physical activities: Specialist in physical education will be able to select and develop appropriate activities for all ability level to obtain success during physical education lessons.
6. Motivation: Subject teacher with their pedagogical and technological skills are able to motivate all learners in class using differential or inclusion approach to enable learners to be successful in class

Disadvantages

1. Subject teachers are limited in terms of scope due to their concentration on and specializing in one subject.
2. They are also limited in effective communication since they may not be able to contribute fluently outside their subject area.

3. They will not be able to handle classes of generalist teachers during their absence.
4. They have limited employment chances since they cannot handle other subjects effectively.

The way forward

Having looked at the earlier argument about who should be allowed to teach physical education in Ghana, one may be tempered to say that with the current curriculum reforms it will be better if subject teacher are allowed to teach various subjects at the primary school. This is because the current curriculum content for primary school is not for those whose total encounter with P.E. is just twelve weeks introduction of the subject in their entire three years of training as teachers as is currently the case in Colleges of Education in Ghana. It needs teachers with the content and pedagogical knowledge to be able to meet the needs of the current learners for quality teaching. This can be effectively implemented if the policy mandates the Colleges of Education that train teachers for the primary school to work in that direction. By so doing, Colleges of Education will review their curriculum and align it with the primary schools curriculum for quality preparation of teachers for quality teaching (Hanushek & Rivkin, 2006). It could be started with subject teaching at the upper primary (P4-P6) as a pilot programme to confirm its effectiveness before extending it to the lower primary schools (P1-P3) where generalists with little in-service training can confidently perform the role of a classroom teacher.

Another way to resolve this dilemma in the current era of education and economic integration is to use interdisciplinary approach. The interdisciplinary education need to supplement disciplinary teaching and learning in 21st so that students can learn how to respond to challenges that transcend disciplines, work in the confluence of multiple disciplines and develop different researches that do not align to standard disciplinary path. Mansilla and Duraising (2007, p219) define interdisciplinary model as the capacity to integrate knowledge and modes of thinking in two or more discipline or established areas of expertise to produce a

cognitive advancement such as explaining a phenomenon, solving a problem in a way that would hence been impossible through a single means.

With interdisciplinary integration approach proposed by Drake and Burns (2004) child development and the ways in which school prepares a child to be a productive of the community. This is because children's interest is in their environment is not subject specific. It rather crosses many disciplines which can be catered by interdisciplinary approach.

The Main Objectives **of** Interdisciplinary Subjects

On completion of an interdisciplinary subject, students should have interdisciplinary skills, understandings and attitudes and should:

i. be able to occupy and understand different disciplinary perspectives;
ii. be able to critically evaluate knowledge from a broad range of disciplines;
iii. be able to engage in interdisciplinary inquiry and problem-solving, employing multiple ways of knowing;
iv. have a meta-disciplinary understanding of the nature of knowledge and the disciplines;
v. be able to integrate, synthesise, balance and accommodate knowledge from multiple disciplines in order to produce something greater than would be possible from any one disciplinary perspective.

There are there interdisciplinary teaching models namely connected, shared and partnership.

The connected model: With this connected model, the main skills, topics and concepts of a particular subject like physical education curriculum are the primary focus of the learning experiences and content of other subject areas like physics or biology is used to enhance or complement the learning.

This model is more effectively used when a teacher wants to introduce new topic, skills or new concepts, when the teacher wants to stimulate learners' interest and wants to demonstrate content relevance to students or to reinforce a skill, or concepts interconnectivity.

The Shared Model: It is one in which two or more two or more subjects such as food and nutrition, physical education and biology are integrated through a similar skill, topic or concept that is part of the content of these subjects. The model agrees that the teachers should come out with a time line to research on the topic and present thematically in one lesson or in each subject area within the same time proposed week for reinforcement of understanding.

These models encourage collaboration of teachers for quality teaching, to reinforce the understanding of a selected theme or concepts from related subjects' areas and finally lead to interconnected teaching and learning emphasizing on teamwork.

The Partnership Model: It is defined by equal representation of two or more subjects areas in **a** curricular efforts. With this models, the topic or skill are blended together and learning takes place simultaneously in all subjects' areas. Teachers teach at the same time in the same classroom based on their area of strength.

The model enhances the understanding the relationship relationships between two or more subjects areas, give teachers the opportunity to restructure curricular content to provide students with the chance to learn through new lens and it fosters integration of events for effective management of time.

Conclusion

This paper has discussed the role of the classroom teachers and the subject teachers in the primary in relations to quality teaching and learning as well as the way forward. Interdisplinary approach as an alternative has its own flaws such as time wasting in planning a unit lesson by group of teachers, conflicts may arise among the team teaching the planned lesson and others. The approach also needs thorough content and pedagogical skills and knowledge based on subject specialization for success. It therefore confirms that the success of quality teaching in the primary schools is based on teachers' content and pedagogical knowledge through subject specialization.

Finally, no matter which educational policy is implemented, the provision of the needed infrastructure, logistics, in-service training as well as supervision are the keys to the successful implementation of the programme.

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Body Composition of Kwara State Basketball Players - Implications for Peak Performance

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Abstract

This study was carried out to evaluate the body composition of Basketball players in Kwara State, Nigeria. Physical characteristics of age, height and weight, the percentage body fat, fat mass, fat free mass and muscle mass were measured using standardized methods. Purposive sampling technique was used to select the participants made up of twelve (12) junior and fifteen (15) senior male basketball players. Portable Bathroom-type Hanson, scale (model B1801) was used to measure weight in kilogrammes, Holtain Stadiometre for height in centimetres and Slim-guide Skinfold callipers (model MI 48170, U.S.A). One-way ANOVA was used to analyse the difference in physical characteristics of the participants; t-test was used to determine difference in the body composition of the senior and junior basketball players. Significant difference was found in the body composition. The senior team had significantly higher fat free muscle mass and less fat and percentage body fat (4.69) that was too low for continuous vigorous intensity workout. However, there were no significant

differences in the fat mass and fat free mass; while significant difference was found in percent body fat, BMI and muscle mass of both the senior and junior teams. This implies that the senior team has better musculature than the junior team. It was concluded that there is need for nutritional intervention and carbohydrate loading prior to performance to meet up the energy demand for daily training programme and during performance in order to improve performance ability of the senior basketball players.

Key words-, Body fat, Muscle mass, Lean body mass, Nutrition, Performance.

Introduction

Basketball is one of the most popular sports in the world and is a game played by both males and females across many age groups and levels of participation, from recreational to professional sports in Nigeria. Sports performance is typically determined by the ability to execute skills and assignments at a planned effort level (Plisk, 2011). The ability to shoot in the sport of basketball is a 'key skill' in the game; therefore an ability to shoot successfully from variety of distances would naturally be desirable and must be pursued in order to excel close this gap (Walters, Hudson and Bird, 1990). Players' ability to control the trajectory of the ball is directly dependent upon their ability to control the acceleration forces generated by their own body, indicating that the size, body shape or proportions of a player will impose constraints upon his/her capacity for sport performance (Oladunni & Sanusi, 2013; Folasire, Akomolafe, & Sanusi, 2015; Abdullahi et al, 2017). Most elite basketball players have tall muscular, well balanced physiques (Smith & Thomas, 1991; Asha, Kasturiba, Naik, & Malagi, 2009), but have varying anthropometric variables depending on the player's playing position (Chan, 2004). Understanding the components of the body physique is important for better monitoring of training and dietary programmes (Gerodimus, Manou, Kellis & Kellis, 2005). Williams et al (1992) explained that excess weight associated with fatness tends to have negative influence on aerobic capacity and on test batteries in which the body must be lifted or moved rapidly. This indicates that basketball players must not carry unnecessary fat to avoid hindrances in their movement and performance. Commenting on body fat, Folasire, et al (2015) noted that higher percent body fat was found to be significantly related with poor performance in endurance, speed and agility sporting events, of which Basketball is one. In addition, there is a close relationship between nutritional practices and athletic performance (Salarkia, Kimiagar & Aminpour, 2004), regarding fuel supply for physical activity and body composition where the proportion of fat to muscle mass is considered.

The body is typically made up of fat free mass (FFM) and available amount of fat (fat mass). Body composition includes muscles, bones, and nerve fibres coverings, as well as essential fats which the body must possess for cell wall construction, and other structures stressing the importance of balanced diet. Pradhan and Behera (2013) regarded FFM as lean body mass (LBM) and defined it as the total body weight minus the weight of the stored fat. Gutin (1980) explained that LBM is relatively constant and that body composition changes due mainly to fat deposition. Amusa, Igbanugo and Toriola, (1998) emphasized that lean body weight is a qualitative measure of LBM expressed in kilograms (kg) or pounds (lb). Therefore for effective participation in sports, the desirable body composition needs to be sought (Toriola, 1999). The more the lean body mass, the better. The size of muscle accounts for increased strength and performance in power activities such as jumping to rebound, or shooting in basketball, or the running up and down for the 40 minutes stopping time game. Therefore, the right body composition is very crucial to excellence in basketball. Body composition testing is not just about measuring fat it is a very effective tool for planning, monitoring progress, and improving current athletic status, part of a rehabilitation protocol, offering encouragement, and finding irregularities in behaviour (Weatherwax-Fall, 2012).

Many studies have only focused on the nutritional deficiencies and health of athletes (Mathew, 2003; Oladunni & Sanusi, 2013; Trakman, Forsyth, Devlin & Belski, 2016; Penggalih, Juffire, Sudargo & Sofro, 2017). Recently, research identified low energy availability as the hazard in sports that require weight reduction, and quantified its dose-dependent effects on metabolic and reproductive function (Academy of Nutrition and Dietetics [AND], Dietitians of Canada [DC] & American College of Sports Medicine [ACSM], 2016). This is more significant during training and competition in sports of high intensity and long duration. During times of high-intensity training like basketball, adequate energy needs to be consumed to maintain body weight, maximize the training effects, and maintain health. Body weight influences

an athlete's speed, endurance, and power, while composition affects an athlete's strength, agility, and appearance. Most athletes require a high strength-to-weight ratio to achieve optimal athletic performance, and because body fat adds to weight without adding to strength, low body fat percentages are often emphasized within many sports (Position of the American Dietetic Association and the Canadian Dietetic Association, 1993). On the other hand, too little body fat results in deterioration of health and performance especially in sports like basketball where strength and agility is emphasized.

The Kwara State basketball teams have been observed to consistently lead in most of their matches during the first three quarters but perform poorly in few minutes towards the end of the last quarter, which have led to their losing out in crucial competitions. In some competitions, for example, Milo Nestle Nigeria Secondary Schools Sports, National Sports Festival, both teams have been observed to struggle with weak passes, poor shooting percentage towards the end of their games. Having a certain the ratio of muscle to fat mass, is related to athletic performance, a correct proportion increases strength, power and agility (Spaniol, 2002). Furthermore, gaining lean muscle is not just about the exercise protocol but depends on nutritional intake and timing (Biolo, Williams, Fleming & Wolfe, 1999; Rasmussen, Tipton, Miller, Wolf, & Wolfe, 2000; Weatherwax-Fall, 2012). Therefore, we assumed that rapid depletion of energy supply to the working muscle or exhaustion was responsible for poor performance of the Kwara State basketball teams during the fourth quarter of matches. Most studies have attributed poor performance to physical abilities such as physical fitness and conditioning, which may not apply to all situations especially during competition. Furthermore, it has been found that three out of four student athletes may be having poor nutrition and thus affecting the performance of the entire team. However, several studies regarding athletes and nutrition (Laughlin & Yen, 1996, 1997; Williams & Rollo, 2015), did not compare junior and senior basketball players' body composition to find out if nutrition could be a factor for

having good performance at the beginning of a match and ending it poorly. Based on the study of Dominic (2006), the senior basketball players were found to have better musculature but little %body fat (4.67%) and led to this follow-up study to compare the junior players with the senior players if the same result would be found. Therefore, the purpose of this study was to evaluate the differences in fat mass and fat-free mass; percent body fat and body mass index (BMI); and the muscle mass between junior and senior Kwara State basketball players and suggest ways that will enable them maintain consistent ability to sustain optimal performance throughout a match.

Materials and Methods

Participants - The participants for the study were twelve players from the junior team and fifteen players from the senior team of the Kwara State, Nigeria male basketball players who volunteered, gave informed consent and completed the measurements. The junior players have represented Kwara State in Nigeria Secondary School Sports competitions and Under 21 championships. The senior team have represented the state at the National Sports Festival, National division 1 League and Nigerian University Games (NUGA). The age of the junior players ranged between 15 and 21 years, while that of the senior players was 21and 39 years.

Procedure - The physical characteristics of the players were taken and they included age given by the players (taken to the nearest 0.1 year), a portable Bathroom-type Hanson scale, model B1801 was used to measure weight in kilogrammes. A Holtain Stadiometre was used to measure height in centimetres. The Slim-guide Skinfold callipers (model MI 48170, U.S.A) was used to measure 8 sites skin folds to determine the percentage body fat (%BF), fat mass and muscle mass. The measurements were taken in the indoor Sport Hall of the Kwara State Sports Complex before evening training with the help of research assistants. The technique and the equation of Durnin and Womersley (1974) was used to

calculate body density while %sBF was calculated using the Brozek. et al. (1963) formula:

Fat mass (Kg) = body mass x %BF (expressed in decimal);

BMI =. Weight □height^2;

Fat Free Mass; (Lean body weight) = (Body mass in kg) – (fat mass in kg).

This technique has a reliability coefficient of 0.8. In addition, muscle mass was determined based on the equation of Martin and Drinkwater (1991):

Muscle mass (g) = s (0.0553 CGT (sq) + 0.0987 FG (sq) + 0.0331 CGC (sq) – 2444.

Where: S = stature; CTG = corrected mid-thigh girth; FG = forearm girth and CCG = corrected calf girth.

$$\text{CTG} = \frac{\text{TG} - \text{mid-thigh skin fold}}{10}$$

$$\text{CCG} = \frac{\text{CG-calf skinfold}}{10}$$

Three measurements were taken for all the variables and the mean was recorded (ISAK, 1999).

Analysis of Data- For the analysis of the physical characteristics of the participants (Table 1), Mean and Standard deviation were used to describe the data while One-way ANOVA was used to determine the differences between the guards, forwards and centres in both junior and senior teams. For the correlation of body composition variables, (Table 2), student's t-test was used to test significant difference between fat mass, fat free mass, lean body mass, %BF and BMI of the junior and senior basketball teams at an alpha level of 0.05 significance. The SPSS application package version 20.0 was used for statistical analysis.

Results

Table 1: Physical Characteristics of the Kwara State Male Basketball Teams

Variable	Group	N	Mean	S.D.	Guard	Forward	Centre	F
Age (yrs)	Junior	12	17.92	1.56	-	-	-	-
	Senior	15	24.27	3.2	-	-	-	-
Height (cm)	Junior	12	176.17	9.04	160.33(3)	177(7)	194.0(2)	12.34*
	Senior	15	183.2	9.04	176.21(7)	189.5(5)	189.9(5)	7.66*
Weight (kg)	Junior	12	67.92	13.22	55.33(3)	69.86(7)	80.0(2)	3.16
	Senior	15	79.89	9.37	73.27(7)	83.8 (5)	88.69(5)	5.98*

*sig.: 0.05

One-way ANOVA of the participants' physical characteristics of was presented in table 1. Expectedly there was significant variability between the senior players who were older (24.27 ± 3.2 years vs. 17.92 ± 1.56 years), taller (183.2 ± 9.04 cm vs. 176.17 ± 9.04 cm) and heavier (79.89 ± 9.37 kg vs. 67.92 ± 13.22 kg) than the junior players (F = 12.34). There was significant difference among the players in the junior team (F = 7.66), the guards were the shortest (160.33 ± 3.0 cm), they were smaller than the forwards (177.7 ± 7.0 cm), while the centre players were the tallest (194.0 ± 2.0 cm) and heaviest (guards = 53.33 ± 3.0 kg; forwards = 69.86 ± 7.0 kg; centres = 80.0 ± 2.0 kg). There was also significant difference in the senior team (F = 5.98), the guards were the smallest and shortest (guards = 176.21 cm) of all, while there was no significant difference between the forwards and centre (189.5 ± 5.0 cm vs. 189.5 ± 5.0 cm; F = 3.16) players considering the height and weight (guards = 73.27; forwards = 83.8 ± 5.0 kg; centres = 88.69 ± 5.0 kg).

Table 2: Independent Sample t-test Analysis for Body Composition of Kwara State Senior and Junior Teams

	VARIABLE	TEAM	N	Mean ± S.D	MD	't'
1	Fat Mass (Kg)	Junior	12	44.4±16.62	7.30±1.31	1.30
		Senior	15	37.10±17.51		
2	Fat Free Mass (Kg)	Junior	12	43.73±11.62	29.86±5.68	1.29
		Senior	15	73.59±17.30		
3	Muscle Mass (kg)	Junior	12	33.19±13.59	15.37±5.37	-3.54*
		Senior	15	48.56±7.86		
4	%Body Fat	Junior	12	6.70±2.03	2.01±0.18	2.44*
		Senior	15	4.69±2.21		
5	BMI	Junior	12	21.78±2.53	2.01±0.41	-2.21*
		Senior	15	23.79±2.12		

*Sig. 0.05

Table 2 show independent sample t-test comparison of body composition of senior and junior basketball teams of Kwara State.

There was no significant difference found between the junior and senior male Kwara State players in fat mass (44.4 ± 16.62 kg vs. 37.10 ± 17.51; MD = 7.30 ± 1.31; t = 1.30; $p > 0.05$) and fat free mass (43.73 ± 11.62 kg vs. 73.59 ± 17.30 kg; MD = 29.86 ± 5.68 kg; t = 1.29; $p > 0.05$). The junior team had significantly higher %BF (6.70 ± 2.03% vs. 4.69 ± 2.21%; MD = 2.01 ± 0.18%, t = -3.54, $p < 0.05$) and lower BMI (21.78 ± 2.53 kg/m^2 vs. 23.79 ± 2.12 kg/m^2; MD = 2.01 ± 0.41kg/m^2; t = -2.21; $p < 0.05$) than the senior team. The junior team had significantly lower muscle mass (33.19±13.59 kg vs. 48.56 ±7.86 kg; MD = 15.37±5.37; t = 3.54; $p < 0.05$ than the senior team.

Discussion

Height appears to be a critical component of potential performance which is most relevant for the centre and forward positions. These differences may be explained by the fact that adequate weight is necessary for stability with balance in motion, starting and stopping in addition to speed of arms and hands (Oranugo, 1997). The increase in body size results in stronger players (Montegory, 2006). The guard position generally requires greater emphasis on ball handling skills including passing and shooting specifically (Miller & Bartlett, 1996; Chan, 2004). Furthermore, in comparison of the Kwara State teams to national and international players studied (Carter, 1970; Carter, et. al 1982; Pollock et al, 1982; and Oranugo, 1997; and Chan, 2004) the senior players were not inferior in height and weight, especially the forwards and centres to the average height range of 186.9 -189.4cm and weight range of 76.7 -90.9kg of the studied players, which is comparable with the world standard.

In the body composition, the junior players carry more fat mass (44.67kg) and less free fat mass (43.78kg) than the senior basketball players, indicating a better lean body weight by the senior players. Hoeger's (1989) study explained that the alterations in body composition most often attributed to aerobic exercise are a decrease in fat weight and maintenance or slight increase in fat free

mass due to the burning of calories and loosing of body fat. This is an indication of the significance of athletes' weight monitoring and nutrition. Metabolic rate is also directly proportional to leans body mass.

Considering percent body fat and BMI, the junior players had significantly high %BF and lower BMI than that of the senior players. However, both are too low compared to the study of (Durnin & Womersley, 1974) who reported that elite basketball male players had 13.1 %BF while Wilmore (1983) reported 8.9 % in his own study. Furthermore, as reported by Oranugo (1997), study of professional basketball players showed a mean %BF of 9.6% and of University basketball players by Oranugo (1984) to be 9.8%. This connotes that though the senior and junior Kwara State players are carrying less fats adequate for health and wellness as indicated in the normative table (Fahey, Insel, & Roth, 2001); it was too little for their weight, height as basketball players and too low for optimal performance.

Though Chan (2004) reported that basketball as a sport requires speed and explosive power, excess fat is undesirable as it will be detrimental to performance, so also the development in size, strength, and speed has both positive and negative consequences (Montgomery, 2006) especially with less than required fat mass. However, there is still a need to possess a threshold of fat needed to generate energy (Chan, 2004). Fahey, Insel and Roth (2001) added that though low %BF is not a prevalent problem, having too little %BF is also dangerous (5% in men; 8% in women) and that too much or too little can have negative effects on health, performance and even self-image. This puts the senior team in the danger zone, especially with participation in vigorous and demanding sports like basketball. The risk for diseases and disorders caused by too little body fats are associated with malnutrition Heyward 1998; Oladunni & Sanusi, 2013. The senior team with less than 5%BF fat is in this risk zone and, therefore, need nutritional intervention. Fahey et al. (2001) highlighted that both moderate to intensive exercises and

endurance training on frequent bases burn significant number of calories and increases resting metabolic rate (RMR); and that for athletes, 40% of energy comes from fuel derived from fat during recovery. Combinations of low levels of eating, high physical performance and disordered eating habits are associated also with stress fractures and other injuries. Team sports athletes need to follow sound nutrition principles to optimize their body composition, recover daily after training (Asha, Kasturiba, Naik, & Malagi, 2009). Therefore, senior Kwara State basketball players needs to develop good nutritional habits.

The superiority of the senior basketball players of Kwara State demonstrated by high muscle mass (48.562.kg) as against that of the junior players (33.194kg) provides a better advantage to be stronger. Lean body mass is considered to be one of the best predictors of athletes' success (O'shea, 2000). However, according to Fahey, Insel and Roth (1994), the more muscle mass the higher metabolic rate, thus indicating that the senior players require more calories than junior team to meet up with their energy needs. Furthermore, following a hard workout, if the muscle glycogen is not replaced adequately through nutrition intervention, there might not be enough fuel to sustain the intensity of subsequent workouts.

Rosato (1994) reported that muscles expended calories much more than fat and that those who involve in intense exercise increase their fat-free mass, associated with higher metabolic rate, due to burning of calorie, thus raising the total energy expenditure, which increases the need for caloric intake. This study supports the assertion of O'Shea (2000) that athletes can develop lean muscle mass and strength without assuming the medical risks involved through the correct balance of nutrition, rest and exercise, to achieve maximum peak athletic performance. Similarly, Montgomery (2006) found that nutrition is a factor contributing to larger players and that during games and workouts players are discovered to consume specialized beverages and products that facilitate their recovery. In addition, Juhn (2004), reported that in recent years, some players have used supplements like creatine that

result in a small weight gain, but it is an individual's choice and requires caution and monitoring by sport nutrition experts in order to prevent its adverse effects of kidney damage, muscle strain and tears (Mayhew, Mayhew, Ware, 2002); Kreider, Melton, Rasmussen et al, 2003; Groeneveld et al., 2005).

The result of the collaborative study carried out by the American Dietetic Association (ADA), Dietitians of Canada (DC), and the American College of Sports Medicine (ACSM) (2009) deduced that physical activity, athletic performance, and recovery from exercise are enhanced by optimal nutrition. They therefore, recommended appropriate selection of foods and fluids, timing of intake, and supplement choices for optimal health and exercise performance. As such, sports beverages containing carbohydrates and electrolytes may be consumed before, during, and after exercise to help maintain blood glucose concentration, provide fuel for muscles, and decrease risk of dehydration and hyponatremia (ADA, ACSM & DC, 2008). The senior players can take advantage of these findings for maximal performance, since nerves and muscles cannot function without steady supply of glycogen.

Athletes like the basketball players, need to consume adequate energy during periods of high-intensity and/or long-duration training to maintain body weight and health and maximize training effects. Low energy intakes can result in loss of muscle mass; loss of or failure to gain bone density; an increased risk of fatigue, injury, and illness; and a prolonged recovery process (ADA, ACSM & DC, 2009). More so, athletes often desire to change their body composition to help them succeed in sport. Some sports promote leanness as part of the success factor, which in turn likely promotes dieting behaviours (Watson & Buell, 2009). Nevertheless, basketball players require adequate nutrients to sustain their performance during workout and match.

Conclusion

The senior players are significantly different from the junior basketball players in terms of weight, height, and higher

muscle mass, lower %BF though below the threshold. This calls for serious attention of the players and coaches if optimal performance is expected in future outings. Also in the %BF, there is a need for nutritional intervention due to too little body fat, in order to meet up with their body energy needs, as a result of greater fat free mass and muscle mass. This demands from the body, more calories and restoration of glycogen depleted as a result of extensive daily hard workout in basketball training sessions. The low body fat has been established to have negative effect on health, and performance. A balance between meeting the body glycogen demands for fuel and consistent training and harmonized or synchronized performance of the senior players is imperative.

Recommendations

Therefore it is recommended that the team coaches need to monitor the body composition of the basketball players to prevent loss of body muscle mass and fat weight to the detriment of health and performance of the players especially the senior team. Special carbohydrate loading could be administered to the players prior to the competition. This might enhance enough glycogen reserve that will be sufficient for energy supply throughout the four quarters of basketball match.

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