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The Deputy Assistant for Sport Sciences and Technology,
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The Ministry of Youths and Sports Affairs,
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PROCEEDING



**ASEAN FORUM AND INTERNATIONAL CONFERENCE
ON SPORT SCIENCE AND TECHNOLOGY (AFICSST)**

Bali, Indonesia, 8-11 August 2014

**"Bridging The Gap In The Advancement Of Sport Sciences
And Technology Implementation Among South East Asia
Countries"**

**The Deputy Asistant of Sport Science and Technology Division
Deputy Minister of Elite Sports Enhancement
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Assalamu'alaikum warrahmatullahi wabarakatuh

May we first made our highest praise and thank to Allah SWT, for His bless we able to gathered here on the prestigious occasion Asean Forum And International Conference On Sport Science And Technology (AFICSST) under the theme, "Bridging The Gap In The Advancement Of Sport Sciences And Technology Implementation Among South East Asia Countries". It is expected this event will create a venue for ASEAN sport scientists to learn, and understand each other's heterogeneous level of expertise and special feature in the area of sport sciences theories, their praxis, and in the seriousness level of their implementation.

This conference which hold by The Deputy Assistant of Sport Science and Technology Division Ministry of Youth and Sports, The Republic of Indonesia, it's also expected to become arena for exchange experiences and expertise and at least information regarding the best practices in the area of sport sciences and technology, to learn together from the experience of other advance countries who also gather in the event of conference in the respected sport disciplines, and to initiate a concrete cooperation and synergy between and among university academicians and students in the area of sport sciences and technology researches.

I would like to deliver our highest respect and appreciation to Minister of Youth and Sport of Republic of Indonesia and to all those who have helped bring this event, and it is my great pleasant to express my deep gratitude to our honourable guests, Dr. Bart Crum Retired Professor from the Free University, Amsterdam Netherlands; Mr. Randall L. Wilber, Ph.D., FACSM, Senior Sport Physiologist from USOC; Prof. Gareth Stratton, Ph.D. from Swansea University, United Kingdom; Prof. Martin Lames from Faculty for Sport and Health Science Technical University Munich, Germany; Mr. Kevin Ball, Ph.D. Biomechanist from ISEAL, Victoria University Australia; Prof. Hideaki Soya, Ph.D. from University of Tsukuba Japan; Assoc Prof, Ma Xindong, Ph.D. from Tsinghua University, Beijing, China; Prof. Hyo Jeong Kim, Ph.D. from KNSU, Seoul, Korea; Prof. Suebsai Boonveerabut, Ph.D. from Srinakharinwirot University, Thailand; Assoc Prof. Mohd Salleh Aman, Ph.D. from University of Malaya, Malaysia; and last but not least to Prof. Toho Cholik Mutohir, Ph.D. from State University of Surabaya Indonesia. I really expect that this meeting will be beneficial for all of us and have direct to the development of the sports.

Allow me to express my thank to the participants and audiences from Indonesia and other foreign countries who are enthusiastic to attending this precious conference. I do hope that all audiences will gain important values and colaborate it into our own fields and make crucials changes in the future. Beside that, I also convey thank to all of organizing committes who has gave their outstanding commitment for presenting this International conference.

Wassalamu'alaikum warrahmatullahi wabarakatuh

Sincerely yours,

Prof. Dr. Djoko Pekik Irianto, M.Kes., AIFO.

CONTENS

	1
COVER	2
PREFACE	3
SCIENTIFIC COMMITTEE	4
CONTENTS	
MAIN SPEAKER	
THE SCIENTIZATION OF HIGH-PERFORMANCE SPORT: LOOKING FOR BALANCE BETWEEN TECHNOLOGICAL PROGRESS AND ETHICAL RESPONSIBILITY Dr. Bart Crum, The Netherlands	11
THE ROLE OF COMPUTER SCIENCE IN THE ADVANCEMENT OF HIGH PERFORMANCE SPORT Prof. Dr. Martin Lames, TU München, Germany	19
USE OF SPORT SCIENCE AND TECHNOLOGY IN THE PREPARATION OF TEAM USA ATHLETES Randall L. Wilber, PhD, FACSM, Senior Sport Physiologist, Athlete Performance Lab, United States Olympic Committee, Colorado Springs, Colorado, USA	23
THE EFFECT OF GROWTH AND MATURATION ON PERFORMANCE: MESSAGES FOR TALENT DEVELOPMENT Professor Gareth Stratton, Applied Sports Technology Exercise Medicine (A-STEM) Research Centre, Swansea University: UK	25
CHANGES IN SERUM CARTILAGE OLIGOMERIC MATRIX PROTEIN (COMP), PLASMA CPK AND PLASMA hs-CRP IN RELATION TO RUNNING DISTANCE IN A MARATHON (42.195 KM) AND AN ULTRA-MARATHON (200 KM) RACE Hyo Jeong Kim, Yoon Hee Lee, & Chang Keun Kim, Associate Professor, Director of Aging, Research Center, Korea National Sport University, South Korea	26
SPORT SCIENCES AND TECHNOLOGY: CHALLENGES AND OPPORTUNITIES IN IMPROVING SPORT PERFORMANCE IN INDONESIA Toho Cholik Mutohir, Professor, Faculty of Sport Sciences, State University of Surabaya, Indonesia	32
USING BIOMECHANICS TO IMPROVE PERFORMANCE Kevin Ball, Institute of Sport, Exercise and Active Living (ISEAL) Victoria University, Melbourne Australia	39
POTENTIAL EFFECTS OF MILD EXERCISE ON THE BRAIN AND COGNITIVE PERFORMANCE: TRANSLATIONAL RESEARCH FROM ANIMAL TO HUMAN Hideaki Soya, Ph.D., Chairman, Laboratory of Exercise Biochemistry & Neuroendocrinology University of Tsukuba Faculty of Health & Sport Sciences, Tsukuba, Japan	43
IMPACT OF THE TALENT DEVELOPMENT ENVIRONMENT ON HIGH PERFORMANCE ATHLETES IN CHINA Ma Xindong & Wu Dongyi: Division of Sport Science & Physical Education, Tsinghua University, Beijing & The School of Social Sciences of Tsinghua University, Beijing	51

FORMETRIC MEASUREMENT OF POSTURE AND SPINAL ALIGNMENT FOR SOUTH SULAWESI'S NATIONAL ATHLETES IN INDONESIA Muhammad Nadjib Bustan, Baharuddin Talib, Ians Aprilo, Khairil Anwar, State University of Makassar, Indonesia	274
ANTHROPOMETRIC, PHYSIOLOGICAL AND BIOMOTORIC PROFILES OF MALE JUNIOR SEPAK TAKRAW PLAYERS Nining Widyah Kusnanik, State University of Surabaya, Indonesia	278
EDUCABILITY STUDENT PROFILE MOTOR SKILLS EDUCATION HEALTH AND PHYSICAL RECREATION FACULTY OF SPORT AND HEALTH GANESHA EDUCATION UNIVERSITY I Wayan Artanayasa, Ganesha University of Education, Indonesia	282
DEVELOPING A MODEL OF EXERCISE FOR PERFORMANCE SPORTS QUALITY EVALUATIONS (EMLO) KONI NORTH SUMATRA PROVINCE Imran Akhmad, Suharjo, Rahma Dewi, State University of Medan, Indonesia	287
AUTHENTIC ASSESSMENT INSTRUMENT DEVELOPMENT FOR SKILL IN PHYSICAL EDUCATION, SPORT, AND HEALTH Hariadi, State University of Medan, Indonesia	294
FUNCTIONAL EVALUATION OF SHOULDER BASED ON CONSTANT SCORE ON PORDA JABAR BASEBALL TEAM Leonardo Lubis, Padjajaran University, Indonesia	301
POSTER PRESENTATION	
THE EFFECTIVENESS OF SIDE ARM THROW COMPARED WITH OVERHAND THROW IN SOFTBALL Fajar Awarig Irawan, Semarang State University, Indonesia	307
CAPABILITY OF THE FUNCTIONAL MOVEMENT SCREEN IN PREDICTING INJURIES AMONG ATHLETES: A REVIEW Rex John G. Bawang, Benguet State University	311
THE EFFECT OF 2.5% GLUCOSE ADMINISTRATION TOWARD FUTSAL PLAYERS AEROBIC ENDURANCE IN TUNGGUL HITAM PADANG WEST SUMATERA Anton Komaini, State University of Padang, Indonesia	315
THE EFFECT OF PLYOMETRICS TRAINING TO ENHANCE LEG POWER FOR LAY UP PRACTISING (CASE STUDY IN BASKETBALL EXTRACURRICULLAR SMP NEGERI 1 SINGOSARI) Fuad Noor Heza, State University of Malang, Indonesia	319
STRENGTH AND CONDITIONING FOR 110 METER HURDLES Robin Darwin B. Tuliao	324
EFFECTS OF DYNAMIC AND STATIC STRETCHING ON THE SUBSEQUENT PITCHING PERFORMANCE IN COLLEGIATE BASEBALL PLAYERS Theresa May B. Garin	328
SOLUTION-FOCUSED BRIEF COUNSELING (SFBC) FOR SPORT ACHIEVEMENT MOTIVATION IN SPORTS COACHING EDUCATION Siti Hajar, Tunas Pembangunan University, Indonesia	333
POA-BASED SNAKES AND LADDERS GAME: IMPROVING ELEMENTARY STUDENTS' MULTILATERAL ABILITY Margono, Yogyakarta State University, Indonesia	337

THE PROFILE OF ANTHROPOMETRIC, PHYSIOLOGICAL AND BIOMOTORIC OF MALE JUNIOR SEPAK TAKRAW PLAYERS AT NORTH SUMATERA

Nining Widyah Kusnanik
State University of Surabaya

ABSTRACT

Sepak takraw is one of the team games that are very famous in Indonesia and it is an indigenous sport in Southeast Asia. To prepare the elite sepak takraw athletes, there are some junior team games that are trained in the Centre of Training and Education for Students (PPLP) in Indonesia including North Sumatera. The aim of this study is to evaluate the anthropometric, physiological and biomotoric profiles of junior sepak takraw players. This study was conducted on 15 males junior sepak takraw players at PPLP Medan, North Sumatra. Data was collected by measuring anthropometric of the players including height, body mass, and body mass index. Moreover, testing of physiological including anaerobic performance such as vertical jump, 40m sprint, agility, and leg strength; aerobic performance such as VO_2 max; and testing of biomotoric including flexibility and leg-eyes coordination. Data was analyzed by using mean and standard deviation. The result of this study was found that mean of height, body mass, and body mass index of the players were $167,6 \pm 6,1$ cm, $55,7 \pm 6,8$ kg, and $19,8 \pm 2,0$ $kg \cdot m^2$, respectively. Mean vertical jump of the players was $56,3 \pm 8,2$ cm. Mean 40m sprint of the players was $6,9 \pm 3,5$ seconds. Mean agility of the players was $12,3 \pm 0,7$ seconds. Mean leg strength of the players was $192,0 \pm 50,7$ kg. Mean value for VO_{2max} of the players was $54,6 \pm 7,2$ ml/kg/min. Mean flexibility of the players was $22,1 \pm 4,6$ cm. Mean coordination of right leg, left leg, and both legs of the players were $6,67 \pm 2,58$, $4,87 \pm 2,90$, and $11,53 \pm 4,73$, respectively. It can be concluded that the junior sepak takraw players had a normal anthropometric, good physiological and very good biomotoric.

Keywords: Anthropometric, Physiological, Biomotoric, Sepak Takraw Junior Players, North Sumatera.

INTRODUCTION

Research in sport sciences have been investigated in many interesting area including anthropometric, physiological, and biomotoric of athletes in different categories of sports. Sepak takraw is one of the team games sport that are popular in Indonesia. Sepak takraw players need a good of anthropometric, physiological, biomotoric, and the skill level of individual which are supported by technical and tactical potential of teams during competitions. The Indonesian team won 2 silver and 4 bronze medals in the SEA Games 2013 Myanmar.

Sepak takraw is an indigenous sport in Southeast Asia. The dimensions of the playing court (13.4m by 6.1m) is the size of a badminton court. A 1.55m high net separates the court into two halves. Each half is occupied by a team of three players who are identified by their primary roles: feeder, server, and spiker (Aziz, Teo, and Tan, 2000). Sepak takraw combines ball skills (kicking and juggling) with the agility and acrobatic moves of gymnasts and the instinctive reflexes of competitive badminton players (Jawis et al, 2005).

Anthropometric, physiological, and biomotoric of sepak takraw players in some countries have been reported by some researchers. There are some sports where height is a key determinant of success for example volley ball, basket ball, swimming, and high jump. Characteristics body size and shape is apparent among different sports and in specialist positions within those sports. Aziz, Tan, and Teh (1999) reported that

mean height of 22 Singaporean national sepak takraw male players was 173.2 ± 7.2 cm with a range of 158.0-185.0 cm. They also reported the height of players according to their positions. The mean height of servers ($n=6$), feeders ($n=7$), and spikers ($n=9$) were 179.0 ± 4.3 cm, 167.9 ± 8.1 cm, 173.5 ± 5.0 cm, respectively. It found that servers were significantly taller than feeders, $p < 0.05$. Jawis et al (2005) conducted research on Malaysian sepak takraw male players U15 ($n=12$), U18 ($n=15$), and U23 ($n=12$). They reported that mean height of the players were 161 ± 0.7 cm, 169 ± 0.4 cm, and 169 ± 0.7 cm, respectively. It was found that the height of U23 and U18 players were significantly taller than the U15 players ($p < 0.001$).

In some of sports, body mass is very important not only for supporting athletes' performance but also to category their position in which the competitions depend on body mass of athletes such as martial art, karate, judo, wrestling, weight lifting. Small increases in body size and mass can impact significantly on their performance. Assuming constant body composition, increased body mass increases both the energy demand as well as energy supply in most sports activities. Aziz, Tan, and Teh (1999) reported that mean body mass of 22 Singaporean national sepak takraw male players was 67.8 ± 8.7 kg with a range of 54.8-83.0 kg. They also reported the mean body mass of players according to their positions of servers ($n=6$), feeders ($n=7$), and spikers ($n=9$) were 71.0 ± 6.6 kg, 65.7 ± 10.5 kg, 67.3 ± 8.8 kg, respectively. It found that servers were significantly heavier than feeders, $p < 0.05$. Jawis et al (2005) conducted research on Malaysian sepak takraw male players U15 ($n=12$), U18 ($n=15$), and U23 ($n=12$). They reported that mean body mass of the players were 49.7 ± 7.3 kg, 58.7 ± 10.3 kg, and 61.9 ± 10.6 kg, respectively. It was found that the body mass of U23 players was significantly heavier than the U18 and U15 players ($p < 0.05$).

Body mass index is determined by calculating (body mass/(body height)²). The following ratings have been applied to the body mass index: desirable (20-25), grade 1 obesity (25-29.9), grade 2 obesity (30-40), and morbid obesity (>40) (Jequier, 1987). The body mass index (BMI) is a simple measure of the lean weight and fat weight components. It is used in epidemiologic research and has a moderately high correlation ($r_{xy} \geq 0.69$) with body density (Morrow et al, 2010). Although not always reported in a study of anthropometric of sepak takraw players, body mass index can be calculated from reported values for height and body mass. The mean value of body mass index of sepak takraw players for Singaporean national team was $22.6 \text{ kg} \cdot \text{m}^{-2}$. In addition, the mean body mass index of sepak takraw players according to their positions were $22.2 \text{ kg} \cdot \text{m}^{-2}$ (server), $23.3 \text{ kg} \cdot \text{m}^{-2}$ (feeder), and $22.4 \text{ kg} \cdot \text{m}^{-2}$ (spiker), respectively (Aziz, Tan, and Teh, 1999). Jawis et al (2005) also reported that mean body mass index of male sepak takraw players for Malaysian team were $19.2 \text{ kg} \cdot \text{m}^{-2}$ (U15), $20.6 \text{ kg} \cdot \text{m}^{-2}$ (U18), and $21.7 \text{ kg} \cdot \text{m}^{-2}$ (U23), respectively.

Vertical jump is an established measured of explosive or anaerobic power of the lower limbs and hips that is easy to perform, requires limited equipment, and is common to many power-related sports. The mean value of vertical jump of sepak takraw players for Singaporean national team was 60.9 ± 6.3 cm. In addition, the mean vertical jump of sepak takraw players according to their positions were 59.7 ± 6.8 cm (server), 57.9 ± 3.4 cm (feeder), and 64.0 ± 6.9 cm (spiker), respectively (Aziz, Tan, and Teh, 1999).

VO_2max is defined as the region where oxygen uptake plateaus and shows no further increase or increases only slightly with additional workload (McArdle et al, 2012). VO_2max is one of the longest standing fitness indices established for the measurement of human performance. VO_2max is generally agreed to be the best indicator of maximum aerobic power. Aerobic power is the rate at which oxygen is utilised by tissues during prolonged bouts of exercise. The mean value of VO_2max of sepak takraw players for Singaporean national team was $49.4 \pm 4.7 \text{ ml/kg/men}$. In

addition, the mean VO₂max of sepak takraw players according to their positions were 48.3±6.8 ml/kg/men (server), 49.3±4.2 ml/kg/men (feeder), and 50.1±3.9 ml/kg/men (spiker), respectively (Aziz, Tan, and Teh; 1999). Jawis et al (2005) also reported that mean VO₂max of male sepak takraw players for Malaysian team were 51.5±3.9 ml/kg/men (U15), 53.5±5.5 ml/kg/men (U18), and 51.2±4.5 ml/kg/men (U23), respectively.

Although there are some research regarding anthropometric, physiological and biomotoric of sepak takraw players in some countries, however, detailed analyses of anthropometric, physiological, and biomotoric profile of sepak takraw players in Indonesia are rare. The aim of this study was to evaluate anthropometric, physiological, and biomotoric profile of male junior sepak takraw players.

METHODS

This study was conducted on 15 males junior sepak takraw players who selected as PPLP in Medan North Sumatra. All testing were conducted at the indoor arena and athletic field of PPLP Medan. Measures taken included anthropometric (height, body mass, and body mass index). Height (cm) and body mass (kg) were measured by using a stadiometer. During the measurement, players wore shorts and t-shirt with no shoes. Body mass index was determined by calculating (body mass/(body height)²). Physiological performances were tested using vertical jump, 40m sprint, shuttle run, leg strength for anaerobic testing; and VO₂max for aerobic testing. Vertical jump was tested by using Jump MD. Leg strength was tested using leg dynamometer. Agility was tested using right boomerang run test. VO₂max was estimated by using the Multistage Fitness Test/MFT. Biomotoric abilities were tested using sit and reach for flexibility and leg-eyes coordination. Data was analyzed and reported as Mean±Standard Deviation (X±SD).

RESULTS AND DISCUSSION

The mean age of the players in this study was 16.5±1.0 years with a range of 15-18 years. The mean value for anthropometric (height, body mass, and body mass index) of the male sepak takraw junior players in the present study were 167.6±6.1 cm with a range of 158-180 cm, 55.7±6.8 kg with a range of 47-68 kg, and 19.8±2.0 kg·m² with a range of 17.1±23.8 kg·m², respectively. In addition, the mean value for physiological performance (vertical jump, 40m sprint, agility, leg strength, and VO₂max) were 56.3±8.2 cm with a range of 44-71 cm, 6.95±3.5 seconds with a range of 15.6-5.11 seconds, 12.3±0.7 seconds with a range of 14.0-11.52 seconds, 192.0±50.7 kg with a range of 95-300 kg, and 54.6±7.2 ml/kg/min with a range of 44.2-66.7 ml/kg/men, respectively. The mean value for biomotoric (flexibility and leg-eyes coordination) of the players were 22.1±4.6 cm with a range of 15.6-30.6 cm, 6.67±2.58 (right leg) with a range of 4-10 times, 4.87±2.90 (left leg) with a range of 1-10 times, and 11.53±4.73 (both legs) with a range of 5-20 times.

The mean height of the male sepak takraw junior players in the present study was higher than U15 players of Malaysian team, but shorter than Singaporean team for server and spiker positions (Jawis et al, 2005; Aziz, Tan, and Teh; 1999). It seems to be similar height with feeder of Singaporean team and U18, U22 players of Malaysian team. It is approximately 11 cm shorter than Singaporean team in the literature review. The mean body mass of the male sepak takraw junior players was heavier than U15 players of Malaysian team, but it was lighter than U18, U23 players of Malaysian and Singaporean team including server, feeder, and spiker (Jawis et al, 2005; Aziz, Tan, and Teh; 1999). The mean body mass index of the male sepak takraw junior players in the present study was likely to have similar with U15 and U18 players of Malaysian team, but it was lower than U23 of Malaysian team and Singaporean

team including for server, feeder, and spiker. These players have desirable rating (between 20 – 25) body mass index.

The mean vertical jump of the male sepak takraw junior players was lower than than Singaporean team including server and spiker, but it seems to have similar value with feeder position of Singaporean players (Aziz, Tan, and Teh; 1999). The mean VO_2 max was higher than Singapore national team including server, feeder, and spiker, and U15, U23 of Malaysian players. These players have similar VO_2 max with U18 Malaysian players (Aziz, Tan, and Teh; 1999; Jawis et al, 2005). Sepak takraw is a game which needs long duration (3 sets), requiring players to sustain high level of continues effort.

The sepak takraw players in this study have a good VO_2 max. A high degree of aerobic power is therefore necessary to meet energy demands within a game, whether it directly contributes to energy requirements or aids recovery from anaerobic effort. Aerobic power enables the athletes to play and practice longer and at higher intensities. In addition, the male sepak takraw junior players in this study have a very good flexibility. In a sepak takraw game where there is a great deal of spiking, it is important to have a good range of movement for either effective performance and prevent, or at least reduce the number of sprain and strain injuries.

CONCLUSION

The results of this study have established some new findings data which need to be considered by the male sepak takraw junior players, coaches, physiologists, and other researchers in Indonesia in relation to anthropometric, physiological and biomotoric profiles of the players. The male sepak takraw junior players in this study were found to have shorter and lighter values for height and body mass compare with the national team in Malaysia and Singapore, except U15 players from the literature review. These players have a normal body mass index. But, it was found that the players in the present study were higher value for VO_2 max compare with national team in Malaysia and Singapore. The players were also have a very good flexibility. Although some research have been conducted into anthropometric, physiological and biomotoric profiles of the sepak takraw players in some countries, there has been only limited investigation in Indonesia. Therefore, future research is recommended in anthropometric, physiological, and biomotoric profiles of sepak takraw players in Indonesia.

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