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The 3rd International Seminar On PE, Sport, And Health 2013

**“Promoting
Investment
in Physical Education
and Sport
Programmes”**

16th November 2013,
Poncowati Hall,
Patrajasa Hotel Semarang



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PROCEEDING



THE 3rd INTERNATIONAL SEMINAR ON PHYSICAL EDUCATION, SPORT AND HEALTH 2013

“Promoting Investment in Physical Education and Sport Programmes”

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PREFACE

Assalamu'alaikum warrahmatullahi wabarakatuh

May we first made our highest praise and thank to Allah swt, for His bless we are able to gather here on the prestigious occasion; the 3rd International Seminar on Physical Education, Sports and Health 2013 with the main theme of "Promoting Investment in Physical Education and Sport Programmes", to share our knowledge and ideas with so much warm and friendship from world wide sports community.

The tendency of the development issues of physical education and sport at the international level was raised in one of the UNESCO conference recently, namely the MINEPS V held in Berlin, Republic of Germany on May 2013. This forum has developed a long and intensive discussion of related issues and policies UNESCO member states in managing the implementation of physical education and sport. The discussions focused on policy issues and the implementation of the three areas with the theme:

- 1 . Access to exercise a fundamental right of all human beings
- 2 . Encourage investment in the program of Physical Education and Sports
- 3 . Maintaining the integrity of sport

Hopefully, the major issues can be understood and can be implemented operationally in the development of physical education and sports in Indonesia through this scientific meeting forum, involving scientists, stakeholders, and observer of sports. Scientific forum in the form of an international seminar held by the Faculty of Sports Science Semarang State University, serves as a platform which allows scholars, professionals, researchers and sport technocrats to share and discuss the latest knowledge and findings with the purpose of transforming a revitalization and rethinking in the effort to encourage investment in the program of Physical Education and Sports as well.

I would like to deliver our highest respect and appreciation to Minister of Youth and Sport of Republic of Indonesia and to the Rector of Semarang State University for their support and appreciation on this seminar, and it is a great pleasure for me to express my deep gratitude to our honourable guests: Prof. Surachai Jewcharoensakul, Ph.D (Dean of Faculty of Education Kasetsart University Thailand), Madame Wu Min, Ph.D (Lecturer in Central China Normal

University, Wuhan China), Madame Rebecca Alcuizar, Ph.D (Senior Lecturer in Mindanao State University-Iligan Institute of Technology, Phillipines), Mr. Rodney Yeo, M.A. (Senior General Manager SportSmart-Skill, Singapore Sport School, Singapore), and Mr Agus Mahendra, M.A. (Senior Lecturer, Indonesia University of Education, Bandung – Indonesia). I really expect that this seminar will be beneficial for all of us and to the development of the Physical Education and Sports.

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

Wassalamu'alaikum warrahmatullahi wabarakatuh

Sincerely yours

Prof. Dr. Tandiyo Rahayu, M.Pd

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The Development of Yoga Asanas, Pranayamas, and Mudras to Increase Exercise Adherence among Diabetes Mellitus Patients

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ABSTRACT

Currently, a few exercise models have been introduced to diabetic patients, however they have relatively low exercise adherence (EA). Yoga provides aerobic, balance and strengthening training which is beneficial to diabetic patients. It also stimulates relaxation which comforts diabetic patients thus potential to increase the EA.

This research aims to develop Yoga model for diabetic patients based on theoretical concept and patient's responses to increase EA. This research consists of three phases including (1) the development of the model, (2) expert validation and (3) patient's responses trial. Twenty five diabetic patients (13 females and 12 males) were invited to join once a week Yoga session for 8 weeks. They were asked to rate the Yoga model based on (1) comfort, (2) aesthetics and (3) safety aspects on the scale of 1 to 10 (10 represents highest satisfactory level). In addition, the participation rate was assessed.

A yoga model had been developed and validated by three experts on exercise therapy, endocrinology and exercise modelling. The percentage of subjects participated in eight weeks session was 95,5%. The average rating for aesthetic, comfort and safety aspects were 8,9, 7,4 and 7,5 respectively. In conclusion, the Yoga model developed in this research is validated by the expert, perceived relatively well by subject and yields on a high participation rate.

Keywords: Yoga, Diabetes Mellitus

INTRODUCTION

Diabetes mellitus (DM) is the condition in which the level of blood sugar is increasing due to the insulin malfunctions (Alberti and Zimmet 1998). Clinically, the increase level of blood sugar stimulates the serious complication in blood vessels (angiopati) and nerves (neuropati) thus DM potentials to disrupt almost all of the organs (Fulop, Tessier et al. 2006)). Statistically, DM has a quite high morbidity and mortality, it is estimated that at 2030 Indonesia will have the highest number of diabetes in the world. This potentially

increase Indonesian burden of diseases (Reusch 2002).

Exercise is one of the integral parts of DM management along with education, diet and pharmacology therapy (Womack, Nagelkirk et al. 2003). Unfortunately many DM patients do not conduct appropriate exercise based on the latest research finding. As the illustration, the model of the diabetes exercise that was developed in Indonesia in the period in the 1990's took the form of *Senam Diabetes Indonesia* only incorporate aerobik technique. Meanwhile, several recent researches shows that the use of the technique aerobik is not sufficient in





controlling the level of blood sugar. The technique should be combined with the strengthening exercise (resistant training) that stimulated the skeletal muscle. The muscle subsequently will produce cytokines (IL 3 and IL 6) that play roles in the increase in the sensitivity of insulin (Womack, Nagelkirk et al. 2003). Furthermore the strengthening exercise increases the muscle mass therefore increase the capacity of glycogen savings which helps regulating blood sugar. Another problem in conducting exercise in DM is that the exercise should be conducted regularly. Therefore the exercise model should interest the subjects and yields a high exercise adherence.

Yoga is the practice of the physical activity that came from India since 4000 years ago (Desikachar 2010). Several kinds of yogas are practiced to increased wellbeing. Among them are asanas (postural), pranayama (control of the breath), dharana (concentration), and mudras (finger gesture) (Bijlani, Vempati et al. 2005). Asanas yoga provides combined aerobik, resistant and balance training therefore potential to control the level of blood sugar (Malhotra, Singh et al. 2005). Pranayamas and mudras are also potential to improve neural and vascular health of DM patients (Sahay 2007). Yoga also provides relaxation which potentials to increase exercise adherence. This research aims to develop yoga exercise model which potential to control blood sugar and yield on the a high exercise adherence among the DM patients.

METHODS

The methods of this research comprised three main stages which were Desaigning, Validating and Reception Test.

1. Desaigning

- a. Based on literature review based on DM patophysiology and exercise physiology.
- b. Based on sosio-psychology aspects which aims to increase exercise adherence
- c. Based on safety aspect to minimize adverse effects.

The desaigning was based also follows Perkeni (Perhimpunan Endrokinologi Indonesia) reccomendation which requires exercise to employ CRIFE principles (*continue, rhythmic, interval, progresive and endurance*)

2. Validation (*Expert Judgment*)

The yoga prototype were validated by three experts on exercise therapy, endrocynologist and exercise trainer.

3. Reception Test (*Secondary Validation*)

The validated yoga model were tested to 25 DM subjects (13 females and 12 males). During this stage, the subjects were invited to attend once a week (supervised) and advised to conduct twice a week (unsupervised) for eight weeks. The percentage of attendance (supervised session) and compliance (unsupervised session) in 8 week represent absolute unsatisfactory while 10 represent absolute satisfactory. At weeks 8, drop out rate



was also calculated by calculating the percentage of subjects who were not attended to the last session.

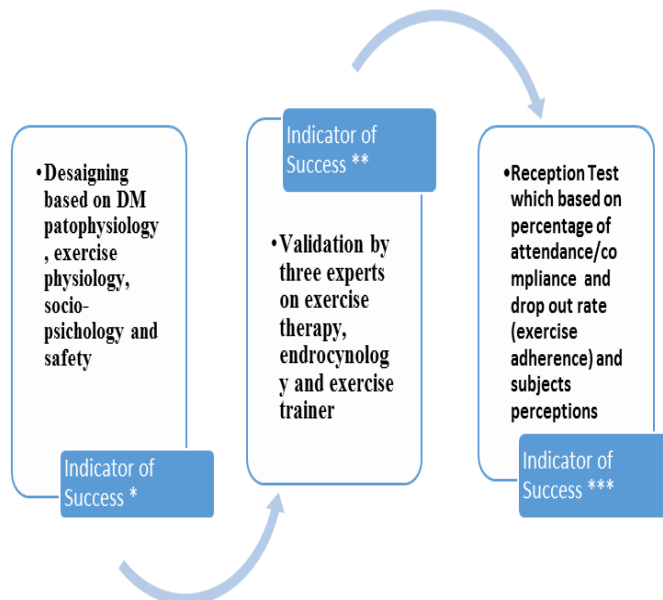


Figure 1. Methods/Frame Works of Research

*= Indikator of success in this stage is the development of yoga prototype based on the DM patophysiology, sociopsichology and safety.

**= Indikator of success in this stage is that the yoga prototype were validated by the panel of the experts.

***= Indikator of success in this stage is that the pyoga model yielded on exercise attendance more than >75% and drop out rate < 25%.

RESULTS

a. Development Phase

(i) Literature review

Based on the literature review several standing, seated and combined poses were identified as the main asanas. Those poses were selected due to their characteristics and potential to provide aerobic, resistant and balance exercise which are needed in diabetes mellitus patients. The main asanas were combined with pranayamas (breathing exercise) to stimulate autonomous nerves. The pranayamas was selected since there are plenty of evidences suggest that pranayama exercise increased parasympathetic and decreased simpathetic activity. With this regards it is assumed that pranayama may decrease glucagon and epinephrin release before exercise as anticipation responses and during exercises which can cause blood sugar elevation. In addition to asanas and pranayamas, several mudras were identified to increase peripheral blood flow so that prevent neuropati and microangiopati.





b. Socio-Psychological Aspects

To increase exercise adherence, the prototype should stimulates "addictive effect" so that it will attract subject to do the exercise regularly. Pranayama components was intended to increase relaxation which stimulates comfort to the diabetes mellitus patients. Another aspect which needed to be consider was the difficulty level of the poses. The poses which were difficult to be conducted were less likely to attract subjects to regularly do the exercise. Therefore, every poses selected in this developmental phase was tested to unexperience subjects. Their response on difficulty level of each poses were rated. The poses which were selected were fell into category very easy and easy, while the poses which fell into difficult and very difficult were omitted.

c. Safety Aspects

The majority of diabetes mellitus patients are old and have already suffered from health complication such as high blood

pressure and neuropathy. They also have relatively low aerobic capacity and stiffed joint. Therefore, several poses which requires high physical capability were not selected. One the examples of those poses are the pose which require large range of movement. Other reasons was the pose which give a high impact on a certain part of the body for instance standing in one leg for a long time or balancing upon small muscle groups such as hand and arm.

(ii) Prototype Development

Based on progression and esthetics, the following prototype were modelled.

a. Warming Up

The basic asana pose in warming up was standing poses. It was started with mountain pose (*tadasana*) which was combined with *pranayama* (breathing exercise) which included three part breath (*dirgha pranayama*). This incorporated (i) prolonged and fine inhalation, (ii) exhalation and (iii) retention. *Mountain pose* (*tadasana*) was combined with arm movement to increase heart rate and neck movements to increase flexibility. Meanwhile the poses also incoroprated mudras to increase peripheral blood flow and to enhance pranayama effect. Several mudras which were





selected in the prototype includes *gyan, rudra, pritvi, shanka, vayu, linga, surabhi and surahi mudras.*

Mountain pose was followed by *five pointed star pose, goddess pose, cressent moon pose, chair pose, stork pose and dancer pose* so that more muscle groups were involved to increase heart rate. The poses were modified with arm and hand movements. The final pose in the warming up was mountain pose which was the initial movement in main exercise.

b. The Main Exercise

The main exercise incorporated surya namaskara especially turiya yoga branches which includes (i) invoke, (ii) intent/inhale, (iii) surrender/exhale, (iv) assume/inhale, (v) align/exhale, (vi) awareness/inhale, (vii) surge upward/exhale, (viii) expand as space/ exhale, (ix) ignite/inhale, (x) void/ exhale, (xi) fullness/inhale and (xii) third eye/ exhale.

Surya namaskara were selected because it provides resistant and balance exercises which were needed by diabetes mellitus patients. The aerobic metabolism can be stimulated with the modulation of intensity and repetition of the surya namaskara cycles. Generally it is suggested

for the first time yoga learner who to complete one cycle in 5 to 10 minutes. After the physical condition allowed the subjects to increase the exercise dosage, it can be conducted more than once. The surya namaskara was finished with mountain position which was followed with surrender as the transition pose to obtain easy pose (sukhasana)

c. Colling Down

The basic pose in the cooling down was seated positions. It was started with easy pose (sukhasana) as the basic pose. It is followed with bound angle pose (baddha kanasana), half lotus pose (ardha padmasana), lotus phase (padmasana), cow face pose (gemukhasana, simple twist (parsva sukhasana), setaed half spinal twist and (ardya matsyendrasana). The seated position was followed with last pose which is child pose.

b. Validation and Revision

The validation was conducted by three expert each on exercise therapy, endocrinology and exercise training. The prototypes were approved by the experts so that it can be used in the reception test to evaluate the exercise adherence related to the prototype and the perception of the subjects upon the comfort, esthetics and the safety aspects of the models.





c. The Reception Test

(i) Exercise Adherence and Drop Out Rate

The first analysis was based on the percentage of subject attendance during once a week yoga session. The average of the

percentage of subjects attendance during the invited session for both sexes was 95.5 % (female and male were 95.1 % and 95.8% respectively). The detail percentage of attendaces from first to eight weeks were illustrated in Figure 2.

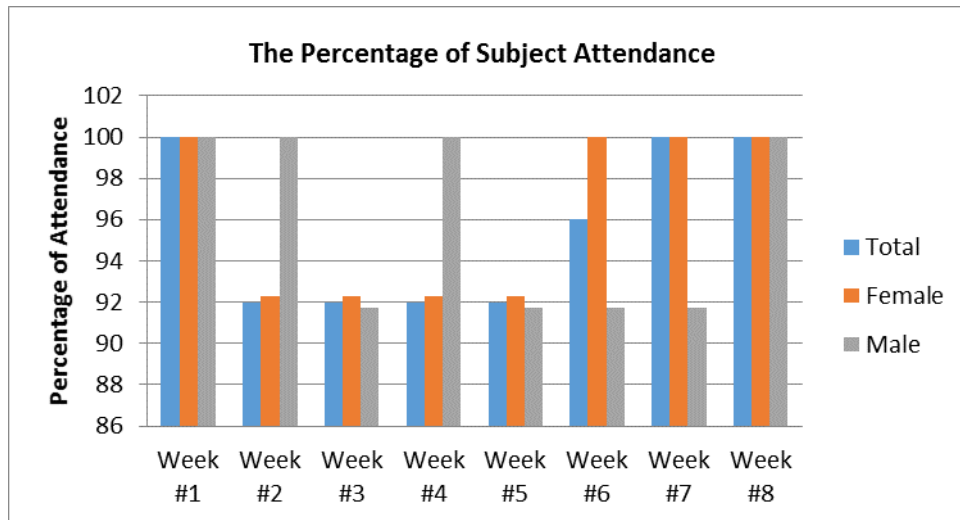


Figure 2. The Percentage of Subject`s Attendace during Invited Yoga Session

It can be observed from the graph that the drop out rate was 0. The percentage of attendaces during first to eight week were between 90 to 100%.

As the subjects were advised to do two more yoga exercise unsupervised at home. During the meeting they were asked to report how many yoga session they did unsupervised. The percentage of

subject did unsupervised yoga exercise during first to eight week were 82,0% in total and 69,79 % and 93,0% for male and female respectevly. The detail percentages of unsupervised exercised from first to eight weeks were illustrated in Figure 3.



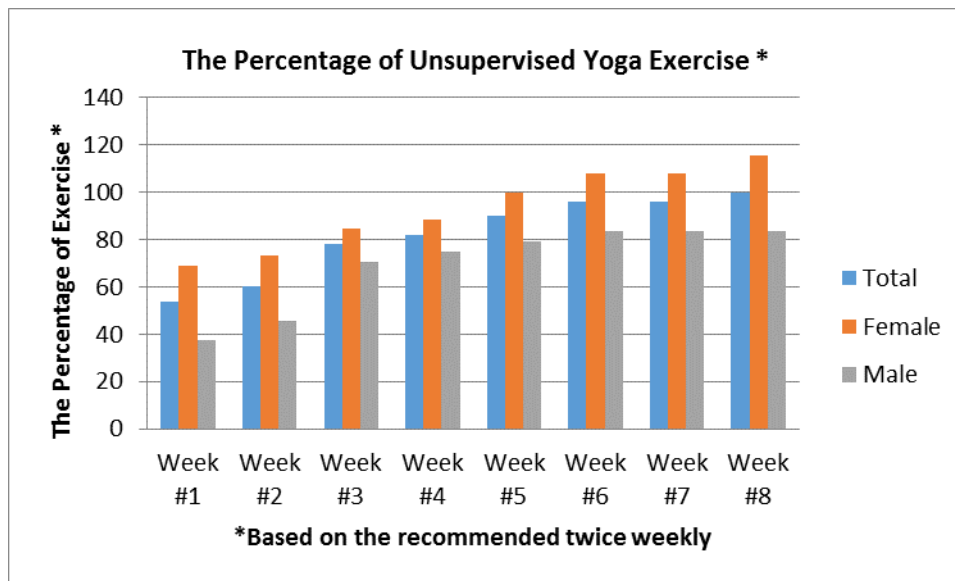


Figure 3. The Percentage of Subject`s Compliance on the Unsupervised Yoga Exercise

(ii) Subjects Perception Upon Yoga Exercise

In the final week, the subjects were asked to rate the yoga model they have done for eight weeks upon esthetics, comfort and safety. The scale was 0 to 10 which 0 represent

unsatisfaction and 10 was the maximum satisfaction. The average satisfactions for estetic, comfort and satisfactory were 7,44; 8,90 and 7,52. The detail responses for both sexes were provided in Figure 4.

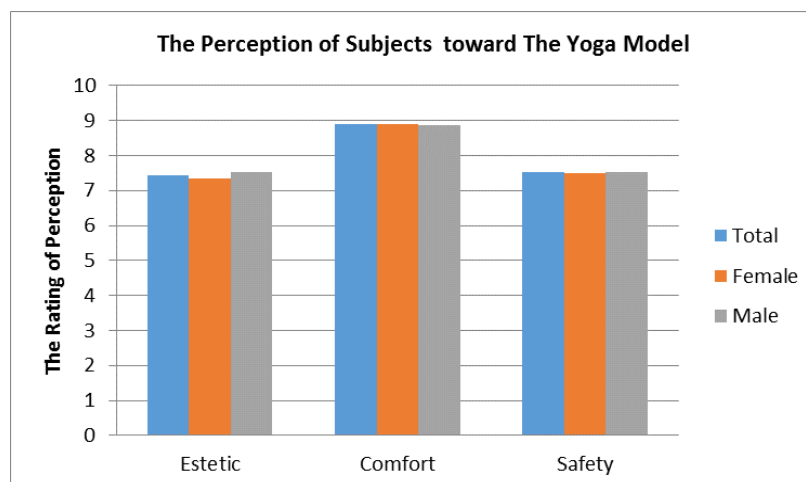


Figure 4. The Perception of Subjects toward The Yoga Model





DISCUSSION

In recent years, yoga has been an exercise basis which is closely related with the improvement of several ailments including diabetes (Kosuri and Sridhar 2009). This research attempt to model yoga exercise which benefit diabetic patients based on the literature review and socially accepted by the subjects.

Based on the literature review, several aspects needs to be consider. Firstly the exercise should accomodate aerobic, balance and resistant training and secondly the exercise should apply CRIPE (continue, rhythmic, interval, progresive and endurance) concept (Sahay 2007). The yoga model develop in this research includes several standing and seated poses and also utilize sun salutation (surya namaskara) poses as those has potential to benefit diabetic patients. The asanas were combined with pranayamas to stimulates autonomic nerves so that the balance between sympatic and parasympatic can be achieved. The mudras were utilized to increase the peripheral blood flow to manage and prevent neuropathy (Skoro-Kondza, Tai et al. 2009).

In order to be accepted and increase patients motivation to conduct the exercise, the exercise models should incorporates the easy but chalenging exercise which allows patients to improve in line with their ability. The level of difficulty of the poses should be arranged to stimulates the feeling of success

so that motivates them to continue the practice (Salmon, Lush et al. 2009). They should enjoy the exercise and look forward to continuing to practice them supervised or unsupervised. Those concepts were applied in this research to increase exercise adherence.

The prototype of the yoga model in this research were validated by the experts of exercise therapy, endrocynologist and exercise trainer to ensure that the models were conceptualize based on diabetes mellitus patophysiology, exercise physiology and estetics. The experts controls the models so that the models will have the maximum benefits in controlling blood sugar level, preventing and managing DM complication and have optimal exercise adherence.

The reception test which was conducted for three weeks on 25 of diabetes mellitus patients (13 females and 12 males) revealed that the average of the percentage of subjects attendance during the invited session for both sexes was 95.5 % (female and male were 95.1 % and 95.8% respectively). This implied that the model yielded on a quite high exercise adherence. It is also found that the drop out rate of the program was 0%. However as the exercise should be conducted more than once a week to obtain maximum benefits, therefore the subjects were advised to conduct unsupervised exercises at mhome at least





twice a week. The percentage of unsupervised exercised (the number of sessions divided by two) was 82% on average and 69,79 % and 93% for male and female respectively. From the Figure 3 it can be seen that more female conducted unsupervised exercises each week. In addition, during the last weeks, there were several female subjects which conducted exercises more than twice a week. It might imply that female subjects were more independent in memorizing the poses and have more motivation to conduct exercise.

On the average, the rating provided by the subjects in esthetics, comfort and safety were 7.44; 8.9 and 7.52 respectively. This means that the prominent features which was valued the greatest by the subject was comfort. Meanwhile for esthetics and safety were aspects which needed to be addressed.

CONCLUSION

Yoga prototype for diabetes mellitus patients was successfully modelled. The model contains (i) several standing, seated and combined asanas, (ii) basic pranayamas and (iii) mudras for controlling blood glucose, balancing autonomic nerve responses and increasing peripheral blood flow. The model has been validated by exercise therapist, endocrinologist and exercise training experts. Upon the reception test, it is revealed that the model yielded quite high exercise adherence and receive relatively high rating for esthetics, comfort and safety.

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