The Effect of Muslim Women’s Sportswear (Jilbab) to Dehydration Level and Thermoregulation After Exercise

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Abstract. The focus of this research was to find out whether Muslim women’s sportswear (hijab) affect dehydration level and thermoregulation after exercise. Respondents of this research were 40 Sport Science Department students, randomly chosen as treatment group or control group. The instruments used were Omron digital thermometer and specific weight urine test kit. In this research, the data was processed and analyzed using inferential statistic independent sample t test. The results showed that there was no dehydration level differences between two groups (p 0.718 > 0.05). There was also no differences in body temperature after exercise (p 0.584 > 0.05).

1. Introduction
Muslim women’s sportswear (jilbab) is cloth which cover one from head to toe, except for face and hand. It is obligated for Muslim women according to The Holy Al Qur’an Surah Al Ahzab verse 59. This cloth is meant to protect Muslim women from men’s harassment as well as Muslim women’s specific identity (1). Until now, Indonesia athletes wearing jilbab were having difficulties to be able to participate in competition, moreover in international event because of the regulation. For those who’s already success were then choosing to quit their athletic career. For example was Raisa Aribatul Hamidah who could not join 2008 Asia Female Junior Basketball Competition in Medan because FIBA’s regulation on the team uniform. It obligates player to wear only t-shirt and short (Republika, 2008). Discrimination on athletes wearing jilbab was not only faced by Indonesian athlete but also across the world. Hagar Outbih was forbidden to participate in the national judo tournament in Winnipeg, Canada. While Juashaunna Kelly, a student of Rosevelt High Schoolidden to join the Montgomery Invitational on 2006 (3). Despite, athletes wearing jilbab who’s fortunately able to participate in international events were showing good and sometime excellent performance. For example Ruqaya Al-Ghasara, a sprinter from Bahrain was becoming the first Muslim Women wearing jilbab who gain Olympiad gold medal in Beijing 2008 (2). From Indonesia, there was Agung Etti Hendrawati, gold medal athlete for speed climbing in ESPN X World Climbing Tournament in San Fransisco, US, in 2000 (4).

Indonesian government was among few countries never to forbid this sportswear, moreover it supports solidarity Olympiad among Muslims country to campaign athlete freedom in wearing jilbab. Indonesia government has also asked OAC to permit jilbab legally used in competition (5). Jilbab prohibition for women athlete always connected to specific sport regulation about clothes. The reason was often irrational and discriminative in religion or political matter. Because heat evaporation, body temperature regulation and sweat production which connected to sport performance is actually more determined by the sport intensity or duration, environment temperature, humidity and skin thickness (6,7). As for clothes, they are
related to the fabric and their ability to release heat effectively (thermal properties) (8). Previous studies conducted on textile showed that comfort was determine by kind and thickness of fabric (9,10,11). A study must be conducted to proof the effect of Muslim women’s sportwear on body temperature incensement and dehydration level after exercise.

2. Methods
The research was conducted using two-group posttest-only randomized experiment.

Subject
The subjects were 40 Sport Science Department students, female, age 19-20, normal body mass index (18.5-24), had no metabolim disease, in healthy state.

Treatment Procedure
The research subjects were divided into two groups of 20 persons. Randomly chosen as treatment group or control group. Treatment group were to wear Muslim women’s sportswear (long pants, full arm shirt and head cover (jilbab), while the other wearing regular sportswear (t-shirt and short). Both sportswear has the same fabric, cotton. 3 hours before exercise subjects were under same preparation. The have same amount of meal and water intake. In an hour before exercise, subjects were emptying their blaa and drank 500 ml water. Before exercise the body temperature were measured. Then they were having a high impact aerobic gym until sub maximal exercise in training zone for at least one hour. And then their body temperature and urine specific weight were measured immediately.

Instrument
The research instruments were Urine specific weight test kit and Omron digital thermometer. Body temperatures were obtained right before and after exercise to calculate the body temperature increasement, and then subjects collect their urine sample.

Data analysis
Data was analyses using descriptive frequencies analysis and independent sample t-test Analysis was conducted using SPSS for windows version 17.0.

3. Results and Discussion

3.1. Result

Table 1. Means Body Temperature Increment and Mean Urine Specific Weight

|                      | Treatment group n=20 | Control Group n=20 | T-Test of Equality of Means |
|----------------------|----------------------|--------------------|-----------------------------|
|                      | Body Temperature     |                    | T  | Df   | Sig  |
| Means Temperature    | -0.60±0.233          | -0.64±0.280        | 0.553 | 38  | 0.584 |
| Increasement         |                      |                    |                |      |      |
| Mean Urine Specific  | 1023,0000±7,32695    | 1023,7500±5,59017  | .364 | 38  | .718  |
| Weight               |                      |                    |                |      |      |

From the table above, it is showed that t value .553 for T-Test equality of means for means body temperature increasement, significance value is .584 >.05. It means there are no significant differences between athlete wearing Muslim women sportswear and athlete who do not regarding body temperature after vigorous exercise. As for mean urine specific weight t-test equality of means t value.364, significance value is .718 >.05. It means there are no significant differences between athlete wearing Muslim women sportswear and athlete who do not regarding dehydration level after vigorous exercise.

3.2. Discussion
Body temperature is maintain if heat produktion in equilibrium with heat release. Body heat production mainly come from body metabolism. This is depend on basal metabolism rate, extra metabolism rate from muscle axtra aktivity, abnormal hormon activity, sympatic activity, some cell chemistry, food processing
Heat release mechanism is very important, moreover in the sport. Theoretical when we exercise, heat production can reach 1-2°F every 5 minutes, which means our body fluid can actually boil if heat does not released. Body can release heat through radiation, conduction, convection and evaporation (12). Radiation means heat release through electromagnetic wave. This does not need direct contact body to other thing. On the contrary, conduction need direct body contact to other thing. While convection means environment temperature takes away the heat. Physiological main way to release body heat is evaporation. There are one until four million sweat gland spread all over body surface. In response to heat, this glands will produce sweat. Sebagai respon terhadap panas, kelenjar ini akan memproduksi sejumlah besar keringat. Efek pending Cooling effect will occur when the sweat evaporated. Cool skin will cooling other layer inner the skin through passing blood vessels (12).

When body do hard physical work, such as high intensity sport exercise, a person can produce 2 liter sweat from body liquid. In endurance athlete, losing 4% of body weight is not seldom happen in the training session. This amount is depend on sport intensity and duration and environment condition. The air humidity is also a very important factor regarding the cooling system through sweat production. When air humidity is high, sweat will drip through skin surface, while in dry air it will fastly evaporate to air and it is highly effective (12, 13). Loosing a lot of sweat and body fluid shift from blood vessel to the interstitial will cause decreasing blood plasma volume. Dehydration may developed then (7).

Hypohydration, means body fluid under normal border is proved to be decremental to sport performance. Loosing 3% of body fluid will cause physiological changes that can be observed. This is seen in many previous research such as declining of anaerobic performance of arm and leg, short length run, and also maximal aerobic power (7). Excessive fluid loss during exercise is also can cause heat injury. Heat cramps is manifested as muscle twitch or seizure that cannot be controlled during or after the exercise. Heat exhaustion will be noticed when heart pulse in weak and fast, low blood pressure, headache, or weakness. Dangerous heat injury during sport is heat stroke, that is when the body is totally unable to coup body overheat, and it can cause death (12, 15, 16, 17, 18, 19).

Clothes can affect sweat production because of its fabric property, such as wool or clothes that is consists of many layers. Athlete can wear proper Muslim women’s sport ware from cotton and use it in one layer so that it will not affect the sweat production or evaporation. Meaning there will no harm to use faith-based kind of clothes while compete in sport.

4. Conclusions

There was no significant difference between subjects wearing Muslim women sportswear and those wearing regular sportswear regarding body temperature increasement nor dehydration level after vigorous exercise. So that there is no valid reason from health nor performance reason to forbid muslim women sportswear in any legal competition all around the world.

References
[1] Quthb, Sayyid. (2004). Tafsir Fi zhilalil Qur’an-Di Bawah Naungan Al Qur’an. Jakarta: Gema Insani Pers.
[2] Republika. (2008). Kemenangan Ruqaya dan Penerimaan itu. Tabloid Republika Dialog Jumat, Dunia Islam edisi Jumat 15 Agustus 2008.
[3] Eramuslim. (2007). Gadis Kecil Itu Menangis, Dilarang Ikut Turnamen Karena Jilbabnya.
[4] Republika, (2004). Agung Etti Hendrawati : Jilbab Bukan Halangan. Kontribusi dari Al Barokah.
[5] Republika. (2008). Indonesia Minta Atlet Diperbolehkan Berjilbab. Republika Newsroom edisi Minggu, 19 Oktober 2008.
[6] Guyton, Arthur G. dan John E Hall. (2007). Textbook of Medical Physiology Eleventh Edition. Philadelphia: Elsevier Saunders.
[7] Puhl, Susan M. dan Elsworth R. Buskirk. (1994). Nutrient Beverages for Exercise and Sport dalam Nutrition In Exercise And Sport 2nd Edition. Florida: Crc Press.
[8] Fan, Jintu. (2008). Effect of Clothing Thermal Properties on the Thermal Comfort Sensation During Active Sports. Textile Research Journal, Vol. 78, No. 2, 111-118 (2008).
[9] Jun, Youngmin. (2009). Thermal Comfort Properties of Wearing Caps from Various Textiles. Textile Research Journal, Vol. 79, No. 2, 179-189 (2009).
[10] E. Öner, A. Okur. (2015) Thermophysiological comfort properties of selected knitted fabrics and design of T-shirts. The Journal of The Textile Institute 106:12, -.
[11] Patrick Morrissey Matthew, Michel Rossi René. (2013) The influence of fabric air permeability on the efficacy of ventilation features. International Journal of Clothing Science and Technology 25:6, -
[12] McArdle, W. D., dkk. (1994). Essentials of Exercise Physiology. Pennysylvania: Lea&Febiger.
[13] Booth J., Marino F., Ward J. J.(1997) Improved running performance in hot humid conditions following whole body precooling. Med. Sci. Sports Exerc. 29:943–949
[14] González-Alonso, J., Mora-Rodríguez, R., Below, P. R. & Coyle, E. F. (1997). Dehydration markedly impairs cardiovascular function in hyperthermic endurance athletes during exercise. Journal of Applied Physiology 82, 1229–1236.
[15] Brooks G. A., Hittleman K. J., Faulkner J. A., Beyer R. A. (1971) Temperature, skeletal muscle mitochondrial functions, and oxygen debt. Am. J. Physiol. 220:1053–1059.
[16] Brooks, G. A., Hittleman, K. J., Faulkner, J. A. & Beyer, R. A. (1971). Temperature, skeletal muscle mitochondrial functions, and oxygen debt. American Journal of Physiology 220, 1053–1059.
[17] Febbraio, M. A., Carey, M. F., Snow, R. J., Stathis, C. G. & Hargreaves, M. (1996). Influence of elevated muscle temperature on metabolism during intense, dynamic exercise. American Journal of Physiology 271, R1251–1255.
[18] González-Alonso, J., Teller, C., Andersen, S. L., Jensen, F. B., Hyldig, T. & Nielsen, B. (1999). Influence of body temperature on the development of fatigue during prolonged exercise in the heat. Journal of Applied Physiology 86, 1032–1039.
[19] Hargreaves, M., Angus, D., Howlett, K., Conus, N. M. & Febbraio, M. (1996a). Effect of heat stress on glucose kinetics during exercise. Journal of Applied Physiology 81, 1594–1597.