

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

I Damayanti* and N I Rahayu

Faculty of Sport and Health Education, Universitas Pendidikan Indonesia, Indonesia

*imas_d@upi.edu

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 Roosevelt High School, was forbidden 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 Francisco, 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 determined by kind and thickness of fabric (9,10,11). A study must be conducted to prove the effect of Muslim women's sportswear on body temperature increment 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 metabolic 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. They have same amount of meal and water intake. In an hour before exercise, subjects were emptying their bladders and drank 500 ml water. Before exercise the body temperature was 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 increment, and then subjects collect their urine sample.

Data analysis

Data was analysed 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		
			T	Df	Sig
Means Body Temperature Increment	-0,60±0,233	-0,64±0,280	0,553	38	0,584
Mean Urine Specific Weight	1023,0000±7,32695	1023,7500±5,59017	.364	38	.718

From the table above, it is shown that t value .553 for T-Test equality of means for means body temperature increment, 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 maintained if heat production is in equilibrium with heat release. Body heat production mainly comes from body metabolism. This depends on basal metabolism rate, extra metabolism rate from muscle extra activity, abnormal hormone activity, sympathetic activity, some cell chemistry, food processing

(6). 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 release. 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 needs 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 glands spread all over body surface. In response to heat, these glands will produce sweat. Sebagai respon terhadap panas, kelenjar ini akan memproduksi sejumlah besar keringat. Efek pendinginan Cooling effect will occur when the sweat evaporates. Cool skin will cool other layers inner the skin through passing blood vessels (12).

When body does 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 bodyweight is not seldom happen in the training session. This amount depends 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). Losing a lot of sweat and body fluid shift from blood vessel to the interstitial will cause decreasing blood plasma volume. Dehydration may develop then (7).

Hypohydration, means body fluid under normal border is proved to be decremental to sport performance. Losing 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 is 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 cool 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 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 be 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 increase 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*. Pennsylvania: 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.