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Association of Occupational Heat Stress and Gonadal Hormone (Testosterone) among Bakery Workers in Khartoum State (2019)

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Abstract

Background: *Heat stress occurs when our body is unable to cool itself enough to maintain a healthy temperature. Normally, the body cools itself by sweating, but sometimes sweating isn't enough and the body temperature keeps rising. The testes of most animals, including humans, are found in the Scrotum outside the main body cavity and are thus 2–8°C below the core body temperature.*

Methods*: This is a descriptive cross-sectional study aimed to evaluate the association between gonadal hormone (Testosterone) and study variables among bakery workers in Khartoum State. Eighty bakery workers will be randomly selected , About 5ml blood were collected from each group and placed in plane containers, and centrifuged for 3min to obtain serum then analyzed by ELISA.*

Results: *serum Testosterone level have insignificant correlation with age, duration and time of exposure (P value 0.098, 0.190, 0.717) respectively. BMI was found to have an adversely relationship with testosterone hormone (p value =0.016).*

Conclusion: *This study concludes that testosterone hormone isn't affected by occupational heat stress.*

Keywords: occupational heat stress, gonadal hormone, bakery workers, Khartoum State, Sudan

INTRODUCTION

In most mammals, including humans, the testis is always maintained at a lower temperature than that in the abdomen, and exposure of the testis to body temperature or above results in increased death of germ cells.(1)

The testis is suspended in a scrotum outside the body in order to keep the temperature lower than core body temperature, which is required for normal spermatogenesis. The testis temperature is between 2 and 8°C below core body temperature. Hyperthermia has a detrimental effect on testicular functions such as inhibiting spermatogenesis. Heat stress also affects the endocrine and biochemical condition of male animals.(2)

Many previous studies found that heat stress effect in spermatogenesis, and subsequently on male fertility. [3,4,5] Therefore present study carried out to demonstrate the association between heat stress and study variables (BMI, age, duration of exposure and type of bakeries) among bakers.

METHODS:

This is a descriptive cross-sectional study aimed to evaluate the association between gonadal hormone (Testosterone) and study variables among bakery workers in Khartoum State. Eighty bakery workers were randomly selected, about 5ml blood were collected under aseptic conditions. Serum Testosterone was measured using sandwich ELISA assay.

RESULTS:

Table (1) shows Age Groups:

	Frequency	Percent
less than 25	49	%61.2
more than 25	31	%38.8
Total	80	%100.0

Figure No (1)

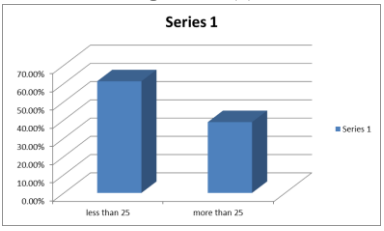

Table No (2) shows BMI:

Answer	Frequency	Percent
Underweight	4	%5.0
Normal	56	%70.0
Overweight	19	%23.8
Obesity	1	%1.2
Total	80	%100.0

Figure No (2)

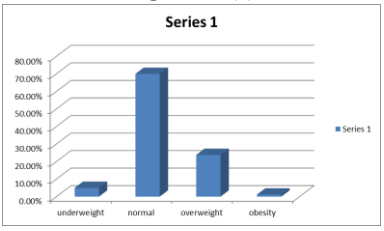

Table No (3) shows duration:

Answer	Frequency	Percent
less than 5	61	%76.2
more than 5	19	%23.8
Total	80	100.0

Figure No (3)

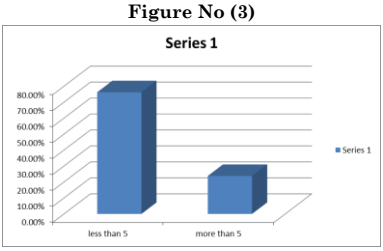

Table No (4) shows frequency of time of exposure:

Answer	Frequency	Percent
exposure less than 8	24	%30.0
exposure more than 8	56	%70.0
Total	80	%100.0

Figure No (4)

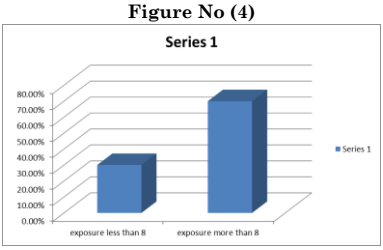

Table No (5) shows Relationship between Age Group and testosterone:

	age	N	Mean	Std. Deviation	P value
testosterone	less than 25	50	5.12	1.691	0.098
	more than 25	30	4.49	1.500	

Table No (6) shows Relationship between duration and testosterone

	duration	N	Mean	Std. Deviation	P value
testosterone	less than5	61	5.05	1.669	0.190
	more than5	19	4.49	1.428	

Table No (7) shows relationship between time of exposure and testosterone

	time of exposure	N	Mean	Std. Deviation	P value
testosterone	less than 8	26	4.9842	1.55319	0.717
	more than 8	54	4.8409	1.69454	

Table No (8) shows relationship between BMI and testosterone

	N	Mean	Std. Deviation	P value
underweight (less than 18)	4	5.1250	2.38939	0.016
normal (18.5-24.9)	56	5.2275	1.59780	
overweight (25-29.9)	19	3.9137	1.25583	
obesity (more than 30)	1	3.4000	.	.
Total	80	4.8875	1.64146	

DISCUSSION:

Occupational heat stress is the combined contributions of metabolic heat environmental factors and clothing worn which results in an increase in heat storage in the body. [44] Workers in many occupations are at high risk for exposure to heat stress. Some of the higher risk occupations include firefighter, bakery worker, factory worker, boiler room worker.[45] The testes of most animals, including humans, are found in the Scrotum outside the main body cavity and are thus 2–8°C below the core body temperature. [46]

In the human male, testosterone is the major circulating androgen and more than 95% is secreted by the testis, which produces approximately 6-7 mg per day. [45]

The aim of this study was to find out an association between gonadal hormone (Testosterone) and study variables among bakery workers.

The analysis of frequency shows that, youngest are more common than adult in our population, indicating that, bakery workers in Sudan started their work before teenage, indeed age of premature testis. Therefore, more time exposure to heat stress, consequently testicular damage. Meanwhile, 2.3 fold of bakery workers exposed more than 8 hour/day to heat stress, indicates that, the exceed the maximum allowed occupational heat stress. On the other hand, out of 80 bakery workers, the majority are normal weight followed by overweight and obese.

In the present provide evidence that, mean testosterone level was significantly decreased in obese and overweight workers than normal weight. Indicating that, obese and overweight are more vulnerable to testicular damage, therefore considered as risk factors in bakery workres. This finding in agreement with previous report that, obesity is associated with reduced fertility in men who exposed to heat stress.[48][49]

Also, the present study showed that, there were insignificant differences when compared mean testosterone level with age group, duration and time of exposure Groupes with (P= 0.098, 0,190, 0.717) respsctively. This results are similar to previous finding that, exposure to heat stress doesn't affect in testosterone hormone.[47] and disagree with study concluded that heat stess effect in spermatogenesis, and subsequently on male fertility.[40,41,42] Contradictions were further attributed to doses, time and duration dependent.

CONCLUSION:

The study concluded that there is insignificant correlation between testosterone hormone in bakery worker and age, duration and time of exposure to occupational heat stress.

REFERANCES:

1. Lue Y-H, SinhaHikim AP, Swerdloff RS, Im P, Taing KS, Bui T, et al. Single Exposure to Heat Induces Stage-Specific Germ Cell Apoptosis in Rats: Role of Intratesticular Testosterone on Stage Specificity. Endocrinology. 1999;140(4):1709-1717.
2. Takahashi M. (2011). Heat stress on reproductive function and fertility in mammals. Reproductive medicine and biology, 11(1), 37–47.
3. Hamerezaee M, Dehghan SF, Golbabaei F, Fathi A, Barzegar L, Heidarnejad N. Assessment of semen quality among workers exposed to heat stress: a cross-sectional study in a steel industry. Safety and health at work. 2018 Jun 1;9(2):232-235.
4. Tina Kold Jensen, Jens Peter Bonde, Michael Joffe, The influence of occupational exposure on male reproductive function, Occupational Medicine, Volume 56, Issue 8, December 2006, Pages 544–553.
5. Bonde JP. Male reproductive organs are at risk from environmental hazards. Asian journal of andrology. 2010 Mar;12(2):152