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IMPACT OF LIFESTYLE FACTORS ON PROCREATIVE POTENTIAL WITH ADVANCED PATERNAL AGE

*[1]Huma Ashraf, [2]Rukhshan Khurshid, [3]Sana Asghar, [4]Mansoor Sultan, [5]Qurrat Shoaib, Saqib

[1]Department of Biochemistry, CMH Lahore.
[2]Department of Biochemistry, Akhtar Saeed Medical and Dental College, Lahore.
[3]Department of Social welfare Lahore.
[4]Sani Gorgious Hospital London.
[5]Department of Pharmacy, Akhtar Saeed Medical and Dental College, Lahore.

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***Corresponding author:**

Huma Ashraf
Department of Biochemistry, CMH Lahore.
rakhshan99@yahoo.com

ABSTRACT

Objective: A cross sectional study was designed to find out the impact of lifestyle factors including Mediterranean diet on procreative potential with increase paternal age. **Methods:** A total of 60 male subjects were included in the study. Subjects were divided into 2 groups. Group A consisted of 30 study subjects (age 60-70 years). Group B consisted of 30 control subjects (age 30-50 years). The study was conducted in Gilgit, Baltistan from January 2020 to December 2020**.** Level of blood glucose was measured with an Auto-Analyzer. Levels of Sex hormone binding globulin, testosterone, Bio available testosterone, Luteinizing hormone and follicle stimulating hormone were measured with ELISA. **Results:** Mean age of study subjects was 68.33 years and of controls 40.88 years. BMI/waist circumference, dietary pattern was quite similar in both groups. However group A were physically active. Group B joined gym and had an active life style. Mean level of fasting blood sugar, LH and FSH were increased in study group A as compared to control group B. Levels of SHBG and total testosterone, were quite similar in both groups. Levels of bio available testosterone were decreased in group A as compared to group B. **Conclusion:** Study found good association among active life style and a well nourished diet with procreative potential with increased paternal age.

KEY WORDS: age, male sexual hormones, active life style and well nourished diet.

INTRODUCTION

Aging is a course of permanent changes due to environmental/endogenous factors in body organs and systems. However, spermatogenesis is continuing even in advanced ages permitting men to reproduce. In comparison to women, the reduced capacity of reproduction in males with age is less marked and a man may have the ability to have a child in his whole lifespan.[1] The rate of production of sperm via testes is continuing. However, the seminal vesicles, epididymis and prostate gland lose ability to produce the fluid (carrier of sperm).[2]

Fertility differs from male to male. Age and function of prostate does not affect fertility. Some old men can produce children.[3] However, some men may have decreased libido. This may be linked to reduced level of testosterone and also with social and psychological changes due to illness or medicines.[4]

Lifestyle factors are important in defining reproductive health and can negatively/positively affect fertility. Lifestyle factors may be age of marriage, BMI, dietary pattern, active life style, occupational and environmentalexposures. Besides this, substantial factors that may have negative effect on fertilityare smoking and consumption of caffeine, alcohol and addiction.[5,6]

Lifestyle factors like physical activity and dietary habits have extensively been explored. Well nourished diet, especially, that is characterized by nourishing vegetables, whole grains, fruits, legumes, protein rich food, seafood and olive oil, along with physical activity are related to good semen quality.[7,8,9] This may increase concentration of sperm, normal morphology and motility of sperm in healthy men.[10] Also, a healthy diet and physical activitymay help to improve hypogonadism in males.[11]

Inhabitants living in high polluted areas have poor quality semen as compared to men living in in less polluted places.[7,12] Additionally phytochemical compounds, rich in nourishing diet, may reduce the bad effects of environmental contaminants.[13,14] During aging, the

activity of endocrine organs also changes along with the levels of lipids and glucose. The usual level of fasting glucose rises about 6.0 to 14.0 mg/dL every ten years after age fifty due to reduced insulin sensitivity.[15]

However, the outcomes of aging, on male, procreative potential are the variation in the levels of reproductive hormones like testosterone, ratio of LH/FSH, sex hormone binding globulin, bio available testosterone and spermatogenesis in male is poorly understood. It is proved that rate of fertility is reduced with increasing age along with increased chances of genetic problems that may affect offspring of elderly males.[16] Therefore, impact of aging on male fertility, related to change in the reproductive hormones is an important health issue with grave social outcomes.

It is hence important to find the role of active lifestyle and well nourished diet that may minimize the complications and maximize the outcomes of fertility.

A cross sectional study was designed to find out the impact of a healthy lifestyle (diet and physical activity) on reproductive potential of old age male partners.

MATERIAL AND METHODS

This is a prospective descriptive cross sectional study. A total of 60 male subjects were included in the study. Subjects were divided into 2 groups. Group A (Study subjects):30 males with age range 60-70 years. Group B (Control subjects):30 males with age range 30-50 years. Subjects were healthy and not taking any hormonal therapy. The study was conducted in Gilgit, Baltistan. All subjects were informed of purpose of the study and were required to sign a well-versed consent. The protocol of this study was approved by the Ethical Committee of University of Lahore. History and investigations were recorded in a proforma. Study duration was January 2020 to December 2020**.** Subjects with thyroid problem or with problem of infertility were excluded from the study. Questionnaire, based on dietary pattern and physical activity, was filled by each study subject and control.

Fasting blood sample was taken of both groups A and B. Level of blood glucose was estimated by standard kits using Auto-Analyzer. Levels of testosterone, sex hormone binding globulin (SBGH), Bio available testosterone (BAT), Luteinizing hormone (LH) and follicle stimulating hormone (FSH) were estimated by the technique of ELISA.[17]

Statistical Analysis

Age, BMI, waist circumference and biochemical parameters were expressed as mean±SD. Student ”t” test was applied to compare parameters of study subjects and controls. P< 0.05 was taken as significant.

RESULTS

Mean age of study subjects was 68.33 years and of controls was 40.15 years. BMI and waist circumference was quite similar in both groups. Well nourished dietary pattern was also the same. However group A (old age group) were physically active and involved in all kinds of work common to people of mountainous areas. On the other hand control group B (middle age group) were both physically active and engaged in exercise (Table 1).

Variation in biochemical parameters of male group A (n=30) with age range 60-70 Years and its comparison with control group B (n=30) age 30-50 years is shown that in group table.(Table 2). The mean level of fasting blood sugar, LH and FSH were increased in study group as compared to control group B but significant difference was only observed in the levels of LH (P<0.001) and FSH (P<0.05). Levels of SHBG, total testosterone, free testosterone were quite similar in both groups. On the other hand levels of bioavailable testosterone (BAT) were not significantly decreased in group A as compared to group B.

Table 1: Baseline Characteristics Of Study Subjects And Controls.

Variables	Study Subjects	Controls
Number	30	30
Age (years)	68.33±6.81	40.15±6.43
Body measurements		
BMI (Kg/m^2)	22.87±3.80	23.70±2.40
Life style features		
Well nourished dietary pattern	90%	91%
Physical activity	Only physical activity (90%)	Physical activity with exercise (97%)

Mediterranean dietary pattern is plant-created foods, like whole grains, legumes, vegetables, nuts, seeds, fruits and herbs along with milk and boiled meat.

Table 2: Variations In Biochemical Parameters, Of Study Subjects And Comparison With Control Subjects.
No of cases in parenthesis
Variables expressed as mean±SD

Variables	(Group A)	(Group B)
	Subjects with age 60-70 years	Controls with age 30-50 years
Blood sugar (mg/dl)	103.50±17.72	94.92±10.52
Total testosterone (ng/ml)	4.94±1.87	5.33±2.02
SHBG (nmol/l)	46.78±19.10	47.52±22.04
BAT (ng/dl)	190.97±62.25	215.55±64.80
LH (mIU/ml	6.59±4.0**	4.10±1.62
FSH (mIU/ml	14.1011.94*	6.52±3.33

*P<0.05= Significant
**P<0.001= highly significant

DISCUSSION

Variation in the level of reproductive hormones with age was proved by many studies. Additionally BMI, life style, activity and acute or chronic diseases may have a part in the modification of hypothalamic–pituitary–gonadal axis resulting in impairment of sex hormone.[18,19]

Study was carried out in middle aged men (Controls) to find the level of reproductive hormones. Values of reproductive hormone of controls were compared with old age men with age range 60-70 years. The area of study was mountainous where well nourished diet was used along with meat and milk. Mean age of study subjects was 68.33 years and of controls was 40.15 years. BMI and waist circumference was quite similar in both groups. Well nourished dietary pattern was also the same. However study subjects were physically active and engaged in all kinds of work related to the people living in mountainous areas. On the other hand controls were both physical active and exercised.

According to a study well nourished dietary may contain specific nutrients that the body needs for production of sperm and balance of sexual and other hormones. Well nourished diet provides antioxidants. It is proved that antioxidants were crucial for male fertility as they protect sperms from damage and improve the quality of sperm and its DNA.[20,21] Fish, poultry, fruit, dairy products, cereals, vegetables and olive oil had a positive link with the Fruitful Aging Index.[22,23]

Healthy diet could recover quality of semen and fertility rates in males. Study found that well nourished diet, enriched in antioxidants, omega-3 fatty acids, and vitamins, with small amount of saturated/trans-fatty acids, were negatively related with poor quality of semen parameters.[9] Besides, vegetables, cereals, fruits, fish and dairy products were the foods that were directly related to the quality of sperm.[24] It is reported that well nourishded diet along with physical activity may control aging process.[25]

We observed a non-significant high level of blood glucose in study subjects as compared to controls. However it is reported that non-diabetic men with higher blood sugar levels, are found to have lower sperm number and lower testosterone levels along with higher levels of DNA damage within sperm cells. This may have a negative impact on fertility. It is proposed that metabolism of glucose is important in the process of spermatogenesis, sperm motility, integrity of DNA of sperm and ability of fertilization in mature sperm.[26]

According to our study the levels of LH and FSH were significantly increased in study group or old age subjects as compared to middle age controls. A study found that aging alters the response of LH/FSH to gonadotropin releasing hormone (GnRH), increases the pulsatile LH secretion and decreases the bioactivity of LH in vitro.[27] Another study reported that the variation in the level of LH is lesser in old age men as compared to young males. However studies on fertility proposed that men can uphold their fertility even in old age.[28,1]

We agreed with a study that values of total testosterone were related with SHBG and moderately fall with age.[29] A cohort study was conducted in local Chinese males aged 40–80 years. Study found that total testosterone, and Bio-available testosterone (BAT) had a prominent change in men. The highest increase of total testosterone, and BAT was observed in those who maintained a stable BMI.[30]

Active lifestyle along with well nourished diet may affect reproductive or procreative potential in advanced age in men. A study investigated the effect of exercise on reproductive hormones in older males and reported that exercise affects levels of testosterone and LH in men. Exercise persuades hormonal changes, affecting endocrine and metabolic adaptation in human body[31] According to an analysis in men with low values of testosterone found that diet upgrade and increasing physical activity normalizes the level of testosterone.[32] This may be true

for men who live in mountainous areas like Gilgit, Baltistan. However, some of the sexual hormones like testosterone level are slightly reduced or normal and the level of FSH, LH and SHBG may rise with age.[33,34] It is proposed that the reduction in the level of serum testosterone with age may be due to the reduction in no of the Leydig cells, worsening of testicular perfusion, and disorder in diurnal rhythm of gonadotropin release hormone and secretion of gonadotropin.[35]

A study estimated male hormones at starting time, during the sixth week, and during the twelfth week of conditioning exercise. Study observed increased values of total testosterone and SHBG with reduced BAT at sixth and twelfth weeks of exercise.[36] It is proposed that exercise may have a good effect on the metabolic index via the retrieval of male sex hormones like total testosterone and SHBG.[37] According to a study healthy lifestyle changes are essential for good fitness in terms of reproducing potential. It may be possible that by maintaining healthy lifestyle, the load of the various factors that could affect the quality of sperm fertility (procreative potential) may improve slowly.[38]

CONCLUSION

Study found good association among active life style, healthy diet and reproductive potential in aging male partners. The effects of aging on genitalia of male are fairly complex and are motivatedby environmental and physiological factors. Further studies are required on effects of active life style and a balanced diet in prevention of infertility in men.

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