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Further Contribution on Correlation Coefficients among Gene Markers of Some Blood Proteins in Fertile Purebred Arabian Mares

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Abstract: The presnt study aimed to investigate the correlations coefficient among gene markers that affect the fertility status in purebred Arabian mares. Study was carried out on 64 Arabian mares kept at AL-Zahraa stud, AinShams, Cairo, Egypt. Results revealed significant,($P<0.05$), high significant,($P<0.01$)and very high significant, ($P<0.001$) correlation. Very high significant were found among the following gene markers: Al^F with AP^S, $Al^J$with AP^F,$Tf^D$with (ptf^R,$F\alpha_2^B$ and Gc^F),TF^O with (ptf^N, $F\alpha_2^A$ and Gc^S), ptf^R with both ($F\alpha_2^B$ and Gc^F), $F\alpha_2^A$ with Gc^S, AP^F with Gc^S and AP^S with Gc^F.

Key words: Correlation coefficient · Gene marker · Arabian mares

INTRODUCTION

During the last decade individual genes with great effects on reproduction of Arabian horse have been identified and studied, these genes increase our understanding of the control of reproduction and also reproductive rates [1-3].

The genetic characteristics of the horse are classified into quantitative characters, controlled by multiple minor genes and qualitative characters controlled by single major genes [4]. One of the most important goal of reproduction in equine is to detect the origin of provenance of species parentage, especially purebred ones and the most effective polymorphic, which can reach this goal are Pr and Tf loci [5]. Correlations between reproductive parameters and genetic markers have been previously reported [2,3, 6-10].

The current work is a further investigations on correlations among gene markers of some blood proteins in fertile purebred Arabian mares

MATERIALS AND METHODS

Experimental Animals: The present study was carried out on 64 purebred Arabian mares including 14 fertile non-pregnant during estrus -15 non pregnant during diestrus -13 early pregnant -12 mid pregnant and 10 late pregnant.

Reproductive Parameters: Including detection of estrus -clinical examination. Fertility Index as well as Genetic Analyses (polyacrylamide gel electrophoresis - Genetic markers of blood protein loci - Distribution of genotypes and estimation of gene frequencies) were previously performed [3].

Statistical Analysis of the Data: The obtained results were statistically analyzed according to Spiegel [11]

RESULTS

Results of the present study is shown in Table 1. this table reveales very highly significant correlations ($P>0.001$) among studied alleles as follows:

- $Pr^N$with Pal^D, $Ptf^R$and Gc^D
- $Pr^S$with Pal^S, $Ptf^N$and Gc^S
- Al^F with Ap^S and Pal^S
- Al^J with Ap^F and Pal^D
- Tf^D with Ptf^R, $F\alpha^B{}_2$ and Gc^S
- Tf^O with Ptf^N, Gc^S and $F\alpha^A{}_2$
- Ptf^R with $F\alpha^B{}_2$, Ap^S and Gc^D
- Ptf^N with $F\alpha^A{}_2$, Ap^FandGc^S
- $F\alpha^A{}_2$ with$Gc^S$and Es^H
- $F\alpha^B{}_2$ with$Gc^D$and Es^G
- Ap^F with Gc^S
- Ap^S with Gc^D

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Table 1: Correlation coefficient among gene frequencies in Arabian mares

	Pr^N	Pr^S	Al^F	Al^J	Pal^D	Pal^S	Tf^D	Tf^O	Ptf^R	Ptf^N	$F\alpha_2^A$	$F\alpha_2^B$	Es^G	Es^H	Ap^F	Ap^S	Gc^D	Gc^S
Pr^N	1***	-1***	-0.36***	0.36***	0.58***	-0.58***	0.13	-0.13	0.48***	-0.48***	-0.34**	0.34**	-0.20	0.20	-0.21	0.21	0.64***	-0.64***
Pr^S	-1***	1***	0.36***	-0.36***	-0.58***	0.58***	-0.13	0.13	-.48***	0.48***	0.34**	-0.34**	0.20	-0.20	0.21	-0.21	-0.64***	0.64***
Al^F			1***	-1***	-0.41***	0.41***	-0.07	0.07	-0.20	0.20	0.20	-0.20	-0.11	0.11	-0.53***	0.53***	0.08	-0.08
Al^J			-1***	1***	0.41***	-0.41***	0.07	-0.07	0.20	-0.20	-0.20	0.20	0.11	-0.11	0.53***	-0.53***	-0.08	0.08
Pal^D					1***	-1***	-.28*	0.28*	0.08	-0.08	0.26	-0.26	-0.05	0.05	-0.30	0.30	0.06	-0.06
Pal^S					-1***	1***	0.28*	-0.28*	-0.08	0.08	-0.26	0.26	0.05	-0.05	0.30	-0.30	-0.06	0.06
Tf^D							1***	-1***	0.87***	-0.87***	-0.55***	0.55***	-0.27*	0.27*	-0.24*	0.24*	0.55***	-0.55***
Tf^O							-1***	1***	-.87***	0.87***	0.55***	-0.55***	0.27*	-0.27*	0.24*	-0.24*	-0.55***	0.55***
Ptf^R									1***	-1***	-0.60***	0.60***	0.27*	-0.27*	-0.38***	0.38***	0.72***	-0.72***
Ptf^N									-1***	1***	0.60***	-0.60***	-0.27*	0.27*	0.38***	-0.38***	-0.72***	0.72***
$F\alpha_2^A$											1***	-1***	-0.45***	0.45***	-0.02	0.02	0.74***	-0.74***
$F\alpha_2^B$											-1***	1***	0.45***	-0.45***	0.02	-0.02	-0.74***	0.74***
Es^G													1***	-1***	0.15	-0.15	0.08	-0.08
Es^H													-1***	1***	-0.15	0.15	-0.08	0.08
Ap^F															1***	-1***	-0.56***	0.56***
Ap^S															-1***	1***	0.56***	-0.56***
Gc^D																	-1***	1***
Gc^S																	1***	-1***

*Significant correlation $P<0.05$

**Highly Significant correlation $P<0.01$

*** Very highly Significant correlation $P<0.001$

DISCUSSION

The main goal of the current study was to investigate the possible correlations among the different gene markers known to affect fertility status in pure bred Arabian mares in Egypt. Ahmed *et al.* [3] studied seven blood protein loci and reported that the most predominant gene markers related to fertile mare were Al^J,Ptf^R,$F\alpha^A_2$, Es^G and Gc^F. The previous results indicated that Tf^O was positively correlated with the fertility index, while Pal^D was dominant in mares having high progesterone level. These findings explain the genetic control of fertility in Arabian mares and this fact was confirmed by different researches [6,12-14]. Alexander and Ivrine [15] reported that mares with inactive ovaries have been characterized by high frequency of Pr^N and $F\alpha^B_2$ and they suggested that the cause may be attributed to the polygenic effect. The results of the present study recorded three levels of correlations among seven genetic loci (about l4 genetic alleles) first level significant correlation ($P<0.05$) and ^{2nd} high significant ($P<0.01$) and ^{3rd} level very highly significant correlations($P<0.001$). The very highly significant correlations among different gene markers give evidence that not only one gene affect one trait, but may be different genes affect one trait “polygenic effect” and the condition may be due to closely connection of these genes on the same chromosome [16,17] or may be attributed to the association between genetic constitution and physiological function asin case of Pr as the only function of Pr is thyroxin binding and transport [18] or due to protein coding loci [19]. In this respect, Shalaby *et al*. [17] reported that the relationship between blood proteins and steroid hormones is based on their great effect by plasma concentration of binding protein receptors. Ovarian steroid hormone stimulate RNA and protein synthesis indicating that those hormones act at gene level through a receptor mediated mechanism. It was concluded that

It could be concluded that the fertility status in Arabian mares is controlled by different genetic markers , and the correlations between these genetic markers need more and more researches to find out the final map of genetic control of fertility in Arabian mares.

REFERENCES

1. Budzynski, M., J. Kamieniak, M. Budzyska, M. Sepula, Z. Slomka and L. Soitys, 2000. Estimation of the relations between reproduction indexes and inbred of full English Blood mares at the horse stud at Rzeczma. Annales universtatiscurieklodouska section EE Zootechnical, 18: 133-139.
2. Zaabal, M.M., W.M. Ahmed, E.F. Abu Atia and E.M. Hanafi, 2012. Relationship Between Ovarian Inactivity and Genetic Polymorphism in Purebred Arabian Mares.Journal of Reproduction and Infertility, 3(2): 22-25.
3. Ahmed, W.M., M.M. Zaabal, E.M. Hanafi, H.F. AbuAtia, H.S. Elhadrawy and K.A. El-Battawy, 2013. Relationship Between lmmunogenetic markers and some Reproductive Parameters in Purbred Arabian Mares Global Veterinaria, 10(6): 702-707.

4. Yoshizane, M. and H. Tsutomu, 1995. The recent studies on DNA analysis in the horse J. Equine Sci., 6: 31-53.
5. Braend, M. and A. Storset, 1978. Blood polymorphism of Nowegian horses In Abstr, XVLintern. Conf. Anim. Bood groups Biochem: Polymorph. Leningrad, pp: 8.
6. Bowling, A.T., A. Del Valle and M. Bowling, 2000. Apedigree based study of mitochondrial D-loop DNA sequence variation among Arabian Horses. Anim. genet., 31: 1-7.
7. Albrecht, B.A., J.N. Macleod and P.F. Daels, 2001. Expression of 3beta-hydroxy steroid dehydrogenase, cytochrome P45017 alph-dehydrogenase, 17,20-lyase and cytochrome P450 aromatase enzyme in corpora luteal of diestrous and early pregnant mares. Theriogenology, 55: 551-561.
8. Vale, M. Acijauskiene, Ruta S. Veistiene and Virginija J. Atkauskiene, 2009. Peculiarities and differences of Zemaitukai and large-type Zemaitukai horse genotypes BIOLOGIKA, 55(3-4): 57-63.
9. James, D. Murray, 2002. Horse genomics and reproduction Theriogeology, 58: 281-293.
10. Othman, E. Othman, Wahid M. Ahmed, Esraa A. Baladel, M.M. Zaabal, H.H. Elkadrawy and Emtenan M. Hanafi, 2014. Genetic Polmorphism of Cyp 19 Gene and its Association with Ovarian Activity in Egyptian Buffaloes.Global Veterinaria, 12(6): 768-773.
11. Spigal, M.R., 1987. Theory and problems of probaility and Statistics SI (Metric) Edition Schaumis outline series Mc Grow-Hill Book Company.
12. Cilek, S., 2008. Environmental factors affecting fertiliy traits of throughbred and halfbred horses reared in Turkey. Indian J. Anim Sci., 78(12).
13. Han, S.K., H.D. Byun, D.R. Kim, N.G. Kim and S.K. Choi, 1998b. Genetic analysis of the Cheju native horses. Animal Genetic, 29: 16.
14. Zaabal, M.M. and W.M. Ahmed, 2010. Correlation between semen characeristics and gene markers in purebred Arabian stallions J. Reprod and Fertiliy, 1(2): 45-49.
15. Alexander, S.L. and G.H.G. Iveine, 1986. Effect of graded doses of gonadtropin releasing hormone on serum LH concentration in mares in various reproductive states: Comparison with endogenously generated pulses. J. Endocrinol., 110: 19.
16. Garalak, B., C. Niemczewski, M. Lukasweicz, G. Zieba and J. Kuyl, 2000. An attempt at localizing the CA EA2C4 loci in the horse genome. Animal Science Papers and Reports, 18(4): 237-244.
17. Shalaby, S.L., W.M. Ahmed, M.M. Zaabal and H.A. Sabra, 1997. Studies on metabolic profile tests and plasma prasma protein genotypes in normal cycling buffalo-cows as affected by body condition scres. J. Agric. Mansoura Univ, 22(4): 2821-2832.
18. Kenko, J. Jerry, 1997. Clinical Biochemistry of Domestic Animals 5th ed. Academic press USA, pp: 117-617.
19. Barker, J.S.F., S.G. Tan, O.S. Selvaraj and T.K. Mukherjee, 1997. Genetic vaition within and relationahips among populations of Asian wate buffalo (Bubalusbalius) J. Anim. Gen., 28: 1-13.