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Higher offspring survival among Tibetan women with high oxygen saturation genotypes residing at 4,000 m

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objectifs

Here we test the hypothesis that high-altitude native resident Tibetan women with genotypes for high oxygen saturation of hemoglobin, and thus less physiological hypoxic stress, have higher Darwinian fitness than women with low oxygen saturation genotypes.

méthodes

Oxygen saturation and genealogical data were collected from residents of 905 households in 14 villages at altitudes of 3,800–4,200 m in the Tibet Autonomous Region along with fertility histories from 1,749 women.

Segregation analysis confirmed a major gene locus with an autosomal dominant mode of inheritance for high oxygen saturation levels, associated with a 10% higher mean.

Oxygen saturation genotypic probability estimators were then used to calculate the effect of the inferred oxygen saturation locus on measures of fertility, in a subsample of 691 women (20–59 years of age and still married to their first husbands, those with the highest exposure to the risk of pregnancy).

résultats

Table 6. Estimates of fertility measures for three oxygen saturation genotypes

Variable	Mean ± SD [minimum, maximum, *n*]	Genotypic mean AA	Genotypic mean AB	Genotypic mean BB	Multiple regression R^2	Multiple regression *P* to test Ho: AA = AB/BB	Permutation *P* to test Ho: AA = AB/BB
Number of pregnancies	4.62 ± 2.79 [1,15 *n* = 689]	4.59	4.90	4.77	0.96*†‡§	0.828	0.826
Number of live births	4.49 ± 2.72 [0,15, *n* = 685]	4.45	4.76	4.62	0.96*†‡§	0.820	0.823
Number of children now alive	4.09 ± 2.33 [0, 13, *n* = 664]	1.64	3.58	3.79	0.95*†¶‖**	0.046	0.039
Number of children who died	0.54 ± 0.10 [0,8, *n* = 664]	2.53	0.77	0.48	0.38†‡§**	0.007	0.009
Number of infant deaths	0.36 ± 0.74 [0.7 *n* = 681]	1.69	0.62	0.32	0.28†¶	0.011	0.014
Proportion of livebirths now alive	0.90 ± 0.17 [0,1, *n* = 664]	0.40	0.88	0.91	0.97**††	0.004	0.006
Proportion of livebirths that died during infancy	0.07 ± 0.15 [0,1, *n* = 654]	0.40	0.10	0.06	0.20**	0.015	0.023
Proportion of livebirths that died between 1 and 15 years of age	0.02 ± 0.07 [0,0.5, *n* = 653]	0.01	0.01	0.02	0.08††	0.763	0.755
Proportion of livebirths that died before 15 years of age	0.09 ± 0.16 [0,1, *n* = 653]	0.43	0.11	0.08	0.26**††	0.036	0.042

*Age at first pregnancy.
†Age at first birth.
‡Age at last pregnancy.
§Altitude.
¶Age at last birth.
‖Marital type.
**Currently using family planning.
††Maternal age.