

## ABSTRACT

**Background and Aims:** Several studies have found that diet is critical during a female's pregnancy. The nutritional condition of pregnant women can have long-term consequences for their children, particularly the growth of the reproductive system. However, previous studies have various opinions regarding whether or not the nutritional status of the maternal correlates with seminiferous tubule diameter and the Sertoli cell amount of their offspring. This study aims to observe the effect of low protein diet on pregnant mice towards the offspring's seminiferous tubule diameter, Sertoli cell, and vacuole.

**Method:** Fifteen female ddY mice were split into three groups and given two months of treatment with either a normal protein diet (14%) or a low protein diet (10%) or low calorie diet (70% calorie intake need). The mice were mated to produce offspring after treatment. Each group had five male progenies that were raised until they were three months old before being terminated to retrieve their testicles. Hematoxylin-eosin staining was used for histological analysis of the testicle sample. Testicles samples were observed for seminiferous tubule, Sertoli cell, and vacuole. Data was presented as mean $\pm$ standard deviation. ANOVA and the Mann-Whitney U test was used to analyze the data. Statistical significance was accepted at  $p < 0.05$ . All offspring from low calorie diet group died during the research and thus it could not be sampled.

**Results:** There were no statistical differences between the offspring's regular seminiferous tubule diameter and Sertoli cell count in the normal protein diet group and the low protein diet group ( $6.28 \pm 1.79$  vs  $6.47 \pm 0.79$ ;  $4.72 \pm 3.13$  vs  $4.84 \pm 2.81$ ). Furthermore, there were also no statistical difference between the offspring's Sertoli cell count in irregular seminiferous tubule in the normal protein diet group and the low protein diet group ( $6.24 \pm 2.57$  vs  $4.88 \pm 2.98$ ). On the contrary, the low protein diet group has a higher vacuole amount than the normal protein diet group both in regular and irregular seminiferous tubule ( $6.76 \pm 4.59$  vs  $3.64 \pm 3.07$ ;  $P = 0.004$ ;  $3.76 \pm 1.98$  vs  $9.96 \pm 3.32$ ;  $P < 0.05$ ).

**Conclusion:** A maternal low-protein diet did not affect the Sertoli cell population or the length of the child's seminiferous tubules but led to a significant increase in vacuoles.

**Keywords:** Mice, Low protein diet, Sertoli cell, Seminiferous tubule, Vacuole

## INTISARI

**Latar Belakang dan Tujuan:** Beberapa penelitian menemukan bahwa pola makan sangat penting selama kehamilan wanita. Kondisi gizi ibu hamil dapat menimbulkan dampak jangka panjang bagi anaknya, khususnya pertumbuhan sistem reproduksi. Namun penelitian sebelumnya mempunyai pendapat berbeda mengenai ada tidaknya hubungan status gizi ibu dengan diameter tubulus seminiferus dan jumlah sel sertoli keturunannya. Penelitian ini bertujuan untuk mengetahui pengaruh diet rendah protein pada mencit bunting terhadap diameter tubulus seminiferus, sel Sertoli, dan vakuola keturunannya.

**Metode:** Lima belas ekor mencit ddY betina dibagi menjadi tiga kelompok dan diberi perlakuan selama dua bulan dengan diet protein normal (14%) atau diet rendah protein (10%) atau diet rendah kalori (kebutuhan asupan kalori 70%). Tikus dikawinkan untuk menghasilkan keturunan setelah perlakuan. Setiap kelompok memiliki lima keturunan jantan yang dibesarkan hingga mereka berusia tiga bulan sebelum dihentikan untuk diambil testisnya. Pewarnaan hematoksilin-eosin digunakan untuk analisis histologis sampel testis. Sampel testis diamati tubulus seminiferus, sel Sertoli, dan vakuola. Data disajikan sebagai mean $\pm$ standar deviasi. ANOVA dan uji Mann-Whitney U digunakan untuk menganalisis data. Signifikansi statistik diterima pada  $p < 0,05$ . Seluruh keturunan kelompok diet rendah kalori meninggal selama penelitian sehingga tidak dapat dijadikan sampel.

**Hasil:** Tidak ada perbedaan statistik antara diameter tubulus seminiferus reguler keturunan dan jumlah sel Sertoli pada kelompok diet protein normal dan kelompok diet rendah protein ( $6,28 \pm 1,79$  vs  $6,47 \pm 0,79$ ;  $4,72 \pm 3,13$  vs  $4,84 \pm 2,81$ ). Selain itu, juga tidak terdapat perbedaan statistik antara jumlah sel Sertoli keturunan pada tubulus seminiferus ireguler pada kelompok diet protein normal dan kelompok diet rendah protein ( $6,24 \pm 2,57$  vs  $4,88 \pm 2,98$ ). Sebaliknya kelompok diet rendah protein memiliki jumlah vakuola yang lebih tinggi dibandingkan kelompok diet protein normal baik pada tubulus seminiferus beraturan maupun tidak beraturan ( $6,76 \pm 4,59$  vs  $3,64 \pm 3,07$ ;  $P = 0,004$ ;  $3,76 \pm 1,98$  vs  $9,96 \pm 3,32$ ;  $P < 0,05$ ).

**Kesimpulan:** Diet rendah protein pada ibu tidak mempengaruhi populasi sel Sertoli atau panjang tubulus seminiferus anak tetapi menyebabkan peningkatan vakuola yang signifikan.

**Kata Kunci:** Mencit, Diet rendah protein, Sel Sertoli, Tubulus seminiferus, Vakuola