Int. J. Morphol.,
33(2):632-637, 2015.

Origin and Antimeric Distribution of the Femoral Nerves in New Zealand Rabbits

Origen y Distribución Antimérica del Nervio Femoral en Conejos Nueva Zelanda

Renata Medeiros-do-Nascimento[*]; Jorge Luiz Alves-Pereira[**]; Oscar Rocha-Barbosa[***] & Marcelo Abidu- Figueiredo[*]

MEDEIROS-DO-NASCIMENTO, R.; ALVES-PEREIRA, J. L.; ROCHA-BARBOSA, O.; ABIDU-FIGUEIREDO, M. Origin and antimeric distribution of the femoral nerves in New Zealand rabbits. ***Int. J. Morphol., 33(2)***:632-637, 2015.

SUMMARY: The origin and distribution of the femoral nerves in both antimeres were studied in 30 New Zealand rabbits (15 males and 15 females). The specimens were collected after natural death and fixed with 10% formaldehyde solution. In males, the femoral nerve originated from the ventral branches of the fourth, sixth and seventh lumbar spinal nerves in seven animals (46.67%), in two animals (13.33%) from the ventral branches of the fifth and sixth lumbar spinal nerves, in one animal (6.67%) from the ventral branch of the fifth lumbar spinal nerve, in three animals (20%) from the ventral branches of the fifth, sixth and seventh lumbar spinal nerves, in one animal (6.67%) from the ventral branches of the fourth and fifth lumbar spinal nerves, and in one animal (6.67%) from the ventral branches of the fifth and seventh lumbar spinal nerves. In females, the femoral nerve originated from the ventral branches of the fourth, sixth and seventh lumbar spinal nerves in four animals (26.67%), in two cases (13.33%) from the ventral branches of the fifth and sixth lumbar spinal nerves, in one animal (6.67%) from the ventral branch of the fifth lumbar spinal nerve, in three animals (20%) from the ventral branches of the sixth and seventh lumbar spinal nerves, in four animals (26.67%) from the ventral branches of the fifth, sixth and seventh lumbar spinal nerves and in one animal (6.67%) from the ventral branches of the fourth and seventhlumbar spinal nerves. In all animals the femoral nerves were distributed in different branches to the major and minor psoas, femoral quadriceps, sartorius and pectinius muscles.

KEY WORDS: New Zealand rabbits; Femoral nerves; Variation; *Oryctolagus cuniculus*; Lagomorpha.

INTRODUCTION

The lumbosacral plexus is formed by the last lumbar spinal nerve and the first two sacral spinal nerves (Dyce *et al*., 2010). The location and distribution of the main nerves must be known to avoid their exposure to unnecessary risks during surgery. Beside this, anesthetic solutions used in locoregional locks, injected close to the selected spinal nerves, have predictable effects on muscle paralysis and loss of sensation in skin areas in a reverse mode, so that paralysis of particular muscles or missing or altered sensitivity of specific skin areas indicates the exact location of injury (Dyce *et al*.).

The spinal nerves are connected to the spinal cord and their number in domestic species differs according to the number of vertebrae, which varies except for the cervical region, where it is constant in all domestic mammals. The lumbosacral region of the spinal cord is prone to injury, especially in rabbits because of their fragile skeleton and powerful, well-developed hind-quarter muscles (Percy & Barthold, 1993). A sudden, unsupported movement of the hind limbs may cause a vertebral fracture, usually at the seventh lumbar vertebra (L7). This often results in damage to the spinal cord, nerve roots, or both (Hrapkiewicz *et al*., 1998).

The lack of an accurate anatomical description compromises the quality of veterinary care of rabbits. A relationship between the palpable and radiographic vertebrae and injury or disease to the nervous system is not currently known. Therefore, it is not possible to give a clear prognosis, therefore the clinician is not be able to determine whether the spinal cord or the spinal nerves have been damaged. Euthanasia, often needlessly, is usually the outcome of such an injury.

It is also important to have an exact topography of the spinal area, because rabbits can be used as models for human spinal cord injury. Rabbits have a low tolerance for

[*] Department of Animal Biology, Animal Anatomy Area, Federal Rural University of Rio de Janeiro, Rio de Janeiro, Brazil.
[**] Institute of Biology Roberto Alcantara Gomes, State University of Rio de Janeiro, Rio de Janeiro, Brazil.
[***] LAZOVERTE - Department of Zoology, Biomedical Center. State University of Rio de Janeiro, Rio de Janeiro, Brazil.

spinal cord damage (Hiraizumi *et al*., 1990), whereas dogs, cats, and rats are much hardier and, as a result, are often active even after injury.

The aim of this study was to characterize the origin and distribution of muscular branches of the femoral nerves in New Zealand rabbits.

MATERIAL AND METHOD

Thirty rabbits (15 males and 15 females) *Oryctolagus cuniculus* (Linnaeus, 1758), weighing an average of 2.5 kg with averagesnout-sacral length of 40.89 cm were used. All animals were part of the practical classes in surgery and were allocated to the animal anatomy area after being euthanized. The cadavers were positioned in the right lateral decubitus position to access the thoracic aorta through an incision made between the sixth and the tenth intercostal space. The artery was cannulated with a urethral probe (variable depending on the diameter of the vessel), which was attached with string to avoid spillovers and maintain intravascular pressure. The fixation was made by injecting a 10% formaldehyde solution through the probe (variable volume as a function of body weight). Then the bodies were immersed in boxes of low density polyethylene with capacity of 500 liters, containing 10% formaldehyde solution for completion of the fixation process.

To obtain knowledge on the origins of the right and left femoral nerve, a horizontal incision at the level of the ventral midline was made from the xiphoid process of the sternum to the caudal margin of the pelvic symphysis and from this two other vertical incisions were made, one on each antimere until reaching the dorsal midline. Following this, the dislocation of the pelvic symphysis was carried out through longitudinal section, thus reaching the pelvic cavity, after which all organs were removed. After removal of the adipose tissue and folding of the psoas muscles, the ventral branches of the lumbar and sacral spinal nerves of both antimeres were observed, which give origin to the right and left femoral nerves.

For analysis of the distributions of the muscular branches of femoral nerves that emerge along each nerve trunk in the respective antimere, we performed a circular incision in the skin of the middle third of the leg and a vertical incision in the skin of the medial side of the thigh, extending from the root of the pelvic limb to the first incision in the leg. In sequence, we circumvented the root of the tail, the anus and the external genitals, and then folded dorsally the entire segment of the skin and subcutaneous fascia in the gluteal regions, thigh and leg. Schematic drawings and photographic documentation (Figs. 1A and 1B) were developed.

Simple absolute and percentage frequencies of the branches that gave rise to the femoral nerve in both sexes and antimeres were calculated as well as the frequency of branches of the femoral nerve that were directed to the muscles of the right and left antimeres in both sexes. The data for the muscular branches of the femoral nerve are presented as mean ± standard error. The Kolmorogov-Smirnov (KS) test was used to evaluate the normality of each variable's distribution. Statistical analysis was performed by the Mann-Whitney test with significance of $p<0.05$ (Figs. 2A, 2B, 2C, 2D and 2E).

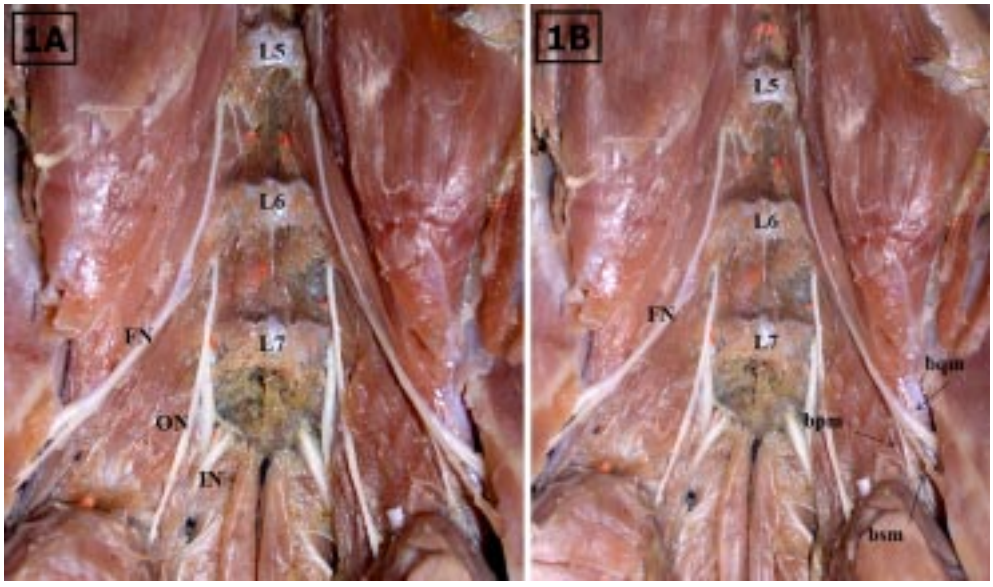

Fig. 1. A). Photograph showing the origin of the femoral nerve. B). Photograph showing the muscular branches of the femoral nerve.
L5= fifth lumbar vertebrae, L6= sixth lumbar vertebrae, L7= seventh lumbar vertebrae, FN= femoral nerve, ON= obturator nerve, IN= ischiatic nerve, bpm= branch to the pectineus muscle, bqm= branch to the quadriceps muscle, bsm= branch to the sartorius muscle.

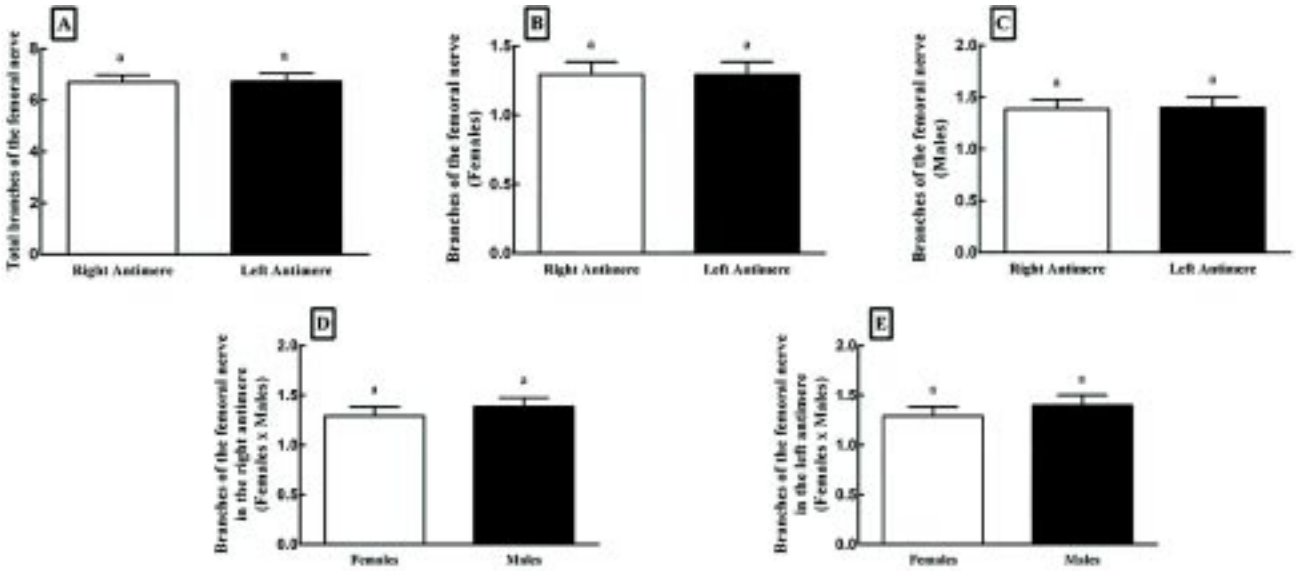

Fig. 2. Values of the distribution of the muscular branches of the femoral nerve in both sexes and in both antimeres. A) total branches of the femoral nerve in females and males in both antimeres, B) branches of the femoral nerve in females in both antimeres, C) branches of the femoral nerve in males in both antimeres, D) branches of the femoral nerve in the right antimere of females and males and E) branches of the femoral nerve in the left antimere of females and males.

To check whether the distribution of observed frequencies for the 30 animals examined was in agreement with the theory, we applied the c2 test (chi-square), at a significance level of 5%, to test the null hypotheses that the sources of nerves do not depend on the sex of the animal or the antimere.

This publication is part of the project entitled "Systemic and Topographical Anatomy of the Rabbit: A study aimed at surgical, radiological and experimental practices", which was approved by the research ethics committee of Rio de Janeiro Federal Rural University (Process number 23083.002379 / 2007- 08).

RESULTS

Origin. In males, the femoral nerve originated from the ventral branches of the fourth, sixth and seventh lumbar spinal nerves in seven animals (46.67%), from the ventral branches of the fifth and sixth lumbar spinal nerves in two animals (13.33%), from the ventral branch of the fifth lumbar spinal nerve in one animal (6.67%), from the ventral branches of the fifth, sixth and seventh lumbar spinal nerves in three animals (20.00%), from the ventral branches of the fourth and fifth lumbar spinal nerves in one animal (6.67%), and from the ventral branches of the fifth and seventh lumbar spinal nerves in one animal (6.67%).

In females, the femoral nerve originated from the ventral branches of the fourth, sixth and seventh lumbar spinal nerves in four animals (26.67%), from the ventral branches of the fifth and sixth lumbar spinal nerves in two animals (13.33%), from the ventral branch of the fifth lumbar spinal nerve in one animal (6.67%), from the ventral branches of the sixth and seventh lumbar spinal nerves in three animals (20.00%), from the ventral branches of the fifth, sixth and seventh lumbar spinal nerves in four animals (26.67%), and from the ventral branches of the fourth and seventh lumbar spinal nerves in one animal (6.67%). No significant differences between the frequencies of the origin of the femoral nerve concerning sex and antimere were observed.

Distribution. The results concerning the distribution of the muscular branches of the femoral nerve in both antimeres and sexes are presented in Tables I and II.

DISCUSSION

Origin of the femoral nerve. According to Getty (1986), the femoral nerve in ruminants is formed by the ventral branch of L5, and may have contributions from L4 and L6. In sheep, usually its fibers are derived from the ventral branches of L5 and L6, and in goats from the ventral branches of L5 with variable participation of L4. These results partially

Table I. Absolute frequency (AF) and simple percentage (SPF-%) of the muscular branches of the femoral nerve in both antimeres in female rabbits. Legend: R= Right, L= Left.

Muscles	**Psoas major**				**Psoas minor**				**Quadriceps**				**Sartorius**				**Pectineus**			
Antimeres	**R**		**L**		**R**		**L**		**R**		**L**		**R**		**L**		**R**		**L**	
Branches	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**
1	9	60.0	7	46.6	7	46.6	6	40.0	6	40.0	4	26.6	15	100	15	100	14	93.3	15	100
2	4	26.6	2	13.3	2	13.3	6	40.0	6	40.00	5	33.3	0	0	0	0	1	6.67	0	0
3	0	0	1	6.6	2	13.3	1	6.67	2	13.3	6	40.0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	6.67	0	0	1	6.67	0	0	0	0	0	0	0	0	0	0
Absent	2	13.3	5	33.3	3	20.0	2	13.3	0	0	0	0	0	0	0	0	0	0	0	0

Table II. Absolute frequency (AF) and simple percentage (SPF-%) of the muscular branches of the femoral nerve in both antimeres in male rabbits. Legend: R= Right, L= Left.

Muscles	**Psoas major**				**Psoas minor**				**Quadriceps**				**Sartorius**				**Pectineus**			
Antimeres	**R**		**L**		**R**		**L**		**R**		**L**		**R**		**L**		**R**		**L**	
Branches	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**	**AF**	**SPF**
1	7	46.6	10	66.6	8	53.3	9	60.0	1	6.6	0	0	15	100	12	80.0	15	100	12	80.0
2	4	26.6	2	13.3	5	33.3	3	20.0	8	53.3	6	40.0	0	0	3	20.0	0	0	0	0
3	1	6.6	0	0	1	6.6	1	6.6	6	40.0	9	60.0	0	0	0	0	0	0	0	0
4	0	0	1	6.67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Absent	3	20.0	2	13.3	1	6.6	2	13.3	0	0	0	0	0	0	0	0	0	0	3	20.0

match those obtained in the present study, in which there were also contributions from the ventral branches of L7.

Silva *et al*. (2011), in a study of the origin of the femoral nerve in crossbreed sheep, found that the femoral nerve originated from the ventral branches of L4 to L6 in both antimeres, from L6 in 3.3% of specimens in the left antimere and 6.6% in the right, from L4 and L5 in 23.3% in both antimeres and from L5 and L6 in 73.3% in the left and 70% in the right. Again, those results are in part similar to that seen in this study regarding the origin of the ventral branches, although we did not observe the origin in L6. Differences were also observed regarding the percentage frequency.

Moraes *et al*. (2008) dissected 30 equine fetuses and observed that the right and left femoral nerves originated from the third, fourth, fifth and sixth lumbar ventral branches, and that in 20 fetuses (66.67%), this nerve originated from the fourth and fifth lumbar ventral branches, in seven (23.33%) from the third, fourth and fifth, in two (6.67%) from the third and fourth and in one (3.33%) from the fourth, fifth and sixth branches. However, in the present study in rabbits the origin was not found from L3, a finding also reported by Silva *et al*. in crossbreed sheep.

Lizardo *et al*. (2009) studied the origin and distribution of the femoral nerve in fetuses of crossbreed zebu cattle and found that the right and left femoral nerves originated from the ventral branches of L4, L5 and L6 in 14 animals (46.7%), from L4 and L5 in 13 cases (43.3%) and L5 and L6 in three cases (10%), similar to that observed in this study in rabbits and to the results obtained by Silva *et al*. in crossbreed sheep concerning the ventral branches, but different in percentage frequencies.

Aydin (2009) observed that in the porcupine (*Hystrix cristata*), the femoral nerve originated mainly from the ventral branches L2 and L3, with contributions from T15 and L1, different from that observed in the present investigation.

Cardoso *et al*. (2013) studied the composition of the lumbosacral plexus of the collared anteater (*Tamandua tetradactyla*) and observed the contribution of lumbar branches (L1-L3) in all studied specimens, and also the participation of T18 in 75% of them in the formation of the femoral nerve. This formation resembles that of the porcupine (T15, L1-L3) (Aydin), and differs from that observed in rabbits of this study.

Oliveira *et al*. (2008) observed that in the cavy (*Galea spixii*), the femoral nerve originated from the ventral roots of L5 and L6, similar to that observed by Tonini *et al*. (2014) in the paca (*Cuniculus paca*) and partly similar to the results found in the present investigation.

Martinez-Pereira & Rickes (2011) observed that in the chinchilla (*Chinchilla lanigera*), the femoral nerve originated from the ventral roots of L4 and L5, in part similar to the results found in the present investigation (only in males).

de Castro *et al*. (2009) found in the fur seal (*Arctocephalus australis*) that this nerve arises from the union of segments L3 and L4, a different arrangement from that found in the present study.

Oliveira *et al*. (2011) observed that the origin of the femoral nerve in the rock cavy (*Kerodon rupestris*) in general changed between the fourth, fifth, sixth and seventh lumbar spinal nerves, presenting symmetry at the source between the right and left antimeres in 80% and asymmetry in 20% of specimens, resembling in part the results obtained in this study.

In a study of the morphology of the lumbosacral plexus of the ocelot (*Leopardus pardalis*), Lopes *et al*. (2012) observed that at the L4 level there was formation of the femoral nerve, resembling in part the results obtained by us.

Souza *et al*. (2013) studied the branches of the femoral nerves in the giant anteater (*Myrmecophaga tridactyla*) and found that the origins in the right and left antimeres occurred from ventral branches of the first, second and third lumbar spinal nerves. However, Cruz *et al*. (2014), also analyzing the giant anteater (*Myrmecophaga tridactyla*), observed participation of thoracic segments (T15, T16) in the formation of the femoral nerve. This arrangement resembles that of the porcupine (Aydin) and the collared anteater (Cardoso *et al*.) but differs from that observed in rabbits here.

Muscular branches. Moraes *et al*. in a research conducted with equine fetuses found that in 100% of fetuses dissected the femoral nerve was distributed in the lateral, medial, intermediate vastus and femoral rectus muscles, resembling in part the results obtained in this study, where the right and left femoral nerves issued varied branches to major and minor psoas, sartorius, pectineus and femoral quadriceps muscles.

In a study with fetuses of crossbreed zebu cattle, Lizardo *et al*. observed that the femoral nerve spread through the psoas major (100%), iliac (100%), pectinal (56.7%), and femoral quadriceps (100%) muscles, and emitted the saphena nerve, which gave branches to the pectinal (43.3%) and sartorius (100%) muscles and continued distally along the saphena artery and vein to divide into the medial face skin of the knee and leg of both antimeres.

In the rock cavy (*Kerodon rupestris*), Oliveira *et al*. (2011) observed that the femoral nerves issued various branches to the iliac, femoral quadriceps, sartorius and pectineus muscles, resembling in part the results obtained in the present investigation regarding branches to the major and minor psoas muscles.

Martinez-Pereira & Rickes observed that in the chinchilla (*Chinchilla lanigera*), the femoral nerves issued varied branches to the major and minor psoas, femoral quadriceps, gracilis, pectineus and sartorius muscles, resembling in part the results obtained in the present investigation, and those obtained by Lopes *et al*. in a study of the morphology of the lumbosacral plexus of the ocelot (*Leopardus pardalis*).

de Castro *et al*. found in the fur seal (*Arctocephalus australis*) that these nerves issued varied branches to major and minor psoas, femoral rectus, external vastus and deep, gracilis and sartorius muscles, similar in part to the results obtained in the present investigation.

Finally, in the giant anteater *(Myrmecophaga tridactyla*), Souza *et al*. observed that the femoral nerves are distributed to the major and minor psoas, lateral and medial iliac, pectineus, magnus adductor, sartorius and femoral quadriceps muscles, similar in part to the results obtained by Oliveira *et al*. (2011) for the rock cavy (Kerodon rupestris) and for the rabbit in this study.

In conclusion, the femoral nerve issued in all animals, with varying branches to the major psoas, minor psoas, femoral quadriceps, sartorius and pectinate muscles. No significant differences between the frequencies of the source and muscular branches of the femoral nerve in relation to sex and antimeres were observed. The topographic knowledge of the femoral nerve provides important information for clinical and surgical practice of laboratory animals used as experimental models, as in the case of the rabbit.

ACKNOWLEDGMENTS. National Council of Technological and Scientific Development (CNPq) and Rio de Janeiro Research Foundation (FAPERJ). Prociência Program/UERJ.

MEDEIROS-DO-NASCIMENTO, R.; ALVES-PEREIRA, J. L.; ROCHA-BARBOSA, O.; ABIDU-FIGUEIREDO, M. Origen y distribución del nervio femoral e antimeres en conejos Nueva Zelanda. ***Int. J. Morphol., 33(2)***:632-637, 2015.

RESUMEN: Se estudió el origen y distribución del nervio femoral de ambos antímeros en 30 conejos neozelandeses, 15 machos y 15 hembras. Los animales fueron recolectados después de su muerte natural y se fijaron en formaldehído al 10%. En los machos, el nervio femoral se originó a partir de los ramos ventrales del cuarto, sexto y séptimo nervios espinales lumbares en siete casos (46,67%); en tres casos (20%) desde los ramos ventrales del quinto,

sexto y séptimo nervios espinales lumbares; en dos casos (13,33%) desde los ramos ventrales del quinto y sexto nervios espinales lumbares, mientras que en tres animales (n=1 respectivamente), desde los ramos ventrales del quinto nervio espinal lumbar (6,67%), los ramos ventrales del cuarto y quinto nervios lumbares espinales (6,67%) y desde los ramos ventrales del quinto y séptimo nervios espinales lumbares. En las hembras, el nervio femoral se originó a partir de los ramos ventrales del cuarto, sexto y séptimo nervios espinales en cuatro casos (26,67%); en otros cuatro casos (26,67%) desde los ramos ventrales del quinto, sexto y séptimo nervios espinales lumbar, en tres casos (20%) desde los ramos ventrales del sexto y séptimo nervios espinales lumbares, en dos casos (13,33%) desde los ramos ventrales del quinto y sexto nervios espinales, y en dos animales (n=1, respectivamente) procedían desde los ramos ventrales del quinto nervio espinal lumbar (6,67%) y de los ramos ventrales del cuarto y séptimo nervios espinales lumbares (6,67%). Los nervios femorales en todos los animales estaban distribuidos en diversos ramos de los músculos psoas mayor y menor, cuádriceps femoral sartorios y pectinatos.

PALABRAS CLAVE: Conejo Nueva Zelanda; Nervio femoral; Variación; *Oryctolagus cuniculus*; Lagomorpha.

REFERENCES

Aydin, A. The dissemination of the pelvic limb nerves originating from the lumbosacral plexus in the porcupine (*Hystrix cristata*). *Vet. Med., 54(7)*:333-9, 2009.

Cardoso, J. R.; Souza, P. R.; Cruz, V. S.; Benetti, E. J.; Brito e Silva, M. S.; Moreira, P. C.; Cardoso, A. A. L.; Martins, A. K.; Abreu, T.; Simões, K. & Guimarães, F. R. Estudo anatômico do plexo lombossacral de *Tamandua tetradactyla*. *Arq. Bras. Med. Vet. Zootec., 65(6)*:1720-8, 2013.

Cruz, V. S.; Cardoso, J. R.; Araujo, L. B. M.; Souza, P. R.; Borges, N. C. & Araújo, E. G. Aspectos anatômicos do plexo lombossacral de *Myrmecophaga tridactyla* (Linnaeus, 1758). *Biosci. J., 30(1)*:235-44, 2014.

de Castro, T. F.; Souza, D. A. S.; da Silva Filho, R. P. & Pereira, M. A. M. The lumbar and sacral innervation of the *Arctocephalus australis. Braz. J. Vet. Res. Anim. Sci., 46(5)*:404-11, 2009.

Dyce, K. M.; Sack, W. O. & Wensing, C. J. G. *Tratado de anatomia veterinária*. 4th ed. Rio de Janeiro, Guanabara Koogan, 2010.

Getty, R. Anatomia dos animais domésticos. 5th ed. Rio de Janeiro, Guanabara Koogan, 1986.

Hiraizumi, Y.; Fujimaki, E. & Tachikawa, T. Long-term morphology of spastic or flaccid muscles in spinal cord-transected rabbits. *Clin. Orthop. Relat. Res., (260)*:287-96, 1990.

Hrapkiewicz, K.; Medina, L. & Holmes, D. D. *Clinical laboratory animal medicine: an introduction.* 2th ed. Ames, Iowa State University Press, 1998.

Lizardo, F. B.; Silva, F. O. C.; Severino, R. S.; Awori, K. O.; Guimarães, E. C.; Santos, L. A.; Eulálio, F. H. F.; Sousa, G. C.; Facury Neto, M. A.; Bernardino Júnior, R. & Cabral, L. G. Origin and distribution of the femoral nerve in fetuses of zebu-crossed bovines. *Braz. J. Morphol. Sci., 26(2)*:91-6, 2009.

Lopes, J. A.; Fé, L. C. M.; Lima, A. R.; Pereira, L. C. & Branco, E. Morfologia do plexo lombossacral da jaguatirica (*Leopardus pardalis*). *Biotemas, 25(4)*:215-20, 2012.

Martinez-Pereira, M. A. & Rickes, E. M. The spinal nerves that constitute the lumbosacral plexus and their distribution in the chinchilla. *J. S. Afr. Vet. Assoc., 82(3)*:150-4, 2011.

Moraes, D. V.; Martins, J. D.; Silva, F. O. C.; Drummond, S. S. & Severino, R. S. Origem e distribuição do nervo femoral em equinos sem raça definida. *Horiz. Cient., 2(2)*:1-10, 2008.

Oliveira, G. B.; Albuquerque, J. F. G.; Oliveira, M. F.; Rodrigues, M. N.; Sousa, R. S.; Sousa, E. S. & Miglino, M. A. Source and distribution of the lumbosacral plexus in spix's yellow-toothed cavy (*Galea spixii spixii*). *Braz. J. Morphol. Sci., 25(1-4)*:1-34, 2008.

Oliveira, G. B.; Albuquerque, J. F. G.; Rodrigues, M. N.; Paiva, A. L. C.; Moura, C. E. B.; Miglino, M. A. & Oliveira, M. F. Origem e distribuição do nervo femoral do mocó, *Kerodon rupestris* (Cavidae). *Pesq. Vet. Bras., 31(1)*:84-8, 2011.

Percy, D. H. & Barthold, S. W. *Pathology of laboratory. Rodents and rabbits.* Ames, Iowa State University Press, 1993.

Silva, F. O. C.; Brito, T. R.; Vasconcelos, B. G.; Canabrava, H. A. N.; Pereira, C. C. H.; Nolasco, R.M. & Honorato, A.G.O. Origens e distribuições dos nervos femorais em ovinos sem raça definida. *Biosci, J., 27(6)*:978-81, 2011.

Souza, T. A. M.; Silva, F. O. C.; Ribeiro, L. A.; Ribeiro, P. R. Q.; Rosa, L. A.; Santos, A. L. Q.; Carvalho-Barros, R. A. & Silva, Z. Origens, distribuições e ramificações dos nervos femorais no tamanduá-bandeira (*Myrmecophaga tridactyla* Linnaeus, 1758). *Biotemas, 26(4)*:161-6, 2013.

Tonini, M. G. O.; Sasahara, T. H. C.; Leal, L. M. & Machado, M. R. F. Origem e distribuição do plexo lombossacral da paca (*Cuniculus paca*, Linnaeus 1766). *Biotemas, 27(2)*:157-62, 2014.

Correspondence to:
Marcelo Abidu-Figueiredo
Laboratory of Anatomy
Department of Animal Biology
Biology Institute Federal Rural University of Rio de Janeiro
BR465, Km 07, CEP 23890-000
Seropédica, Rio de Janeiro
BRAZIL

Email: marceloabidu@gmail.com

Received: 15-12-2014
Accepted: 20-03-2015