

COMPARATIVE ANATOMICAL STUDY OF THE THIGH MUSCLES OF *Sapajus spp.* (PRIMATES, CEBIDAE)

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ABSTRACT

The muscles form the outline morphological characteristic of each species and are the active parts of the movement. In the muscular system the anatomical characteristics of each muscle, show a direct relationship with the character of their action and the force performed by it, the morphology of the muscles provides relevant information on dietary habits, strength and behavior of animals. The comparative anatomical study of primates is important to present it proprius as a chance to fill the gaps as the understanding of evolutionary and behavioral aspects. The objective of this work makes a comparative anatomical study of the thigh muscles of monkeys *Sapajus spp.*, associate this study the behavioral posture aspects, and compare the results with the literature about the anatomy of baboons, chimpanzees and modern *humans*. Were analyzed 16 antimeres of 8 specimens of adult capuchin monkeys (*Sapajus spp.*), which are 7 males and 1 female. For the fixing, was injected by the femoral vein, a solution of 10% formaldehyde 5% glycerin. No animal was euthanized for purposes of this study: four of them suffered accidental deaths in their natural habitat and were donated to the Laboratory of Anatomy, Biochemistry, Neuroscience and Behavior Primates (LABI NECOP) of the Federal University Goiás, Campus Catalão, the remaining were donated by the Brazilian Institute for Environment and Renewable Natural Resources (IBAMA). Were observed the origin and insertion of muscles: tensor fasciae latae, Sartorius, rectus femoris, Vastus Lateralis, vastus lateralis, vastus intermedial, adductor magnus, adductor longus, Adductor brevis, pectineus, biceps femoris, abductor cruris caudalis, semitendinosus, proprius Semimembranosus and accessory. The Thigh Musculature *Sapajus spp.*, in general, is more similar to baboons, presumably because both are quadrupeds, show tail, semi-bipedal and arboreal behavior.

KEYWORDS: Capuchin monkey, comparative anatomy, morphology,, Platyrrhini

ANATOMIA COMPARATIVA DOS MÚSCULOS DA COXA DE *Sapajus* SPP. (PRIMATES, CEBIDAE)

RESUMO

Os músculos formam o contorno morfológico característico de cada espécie e são os órgãos ativos do movimento. No sistema muscular as características anatômicas de cada músculo apresentam relação direta com caráter de sua ação e a força por ele executada, a morfologia dos músculos fornece informações relevantes sobre os hábitos alimentares, força e comportamento dos animais. O estudo anatômico comparativo de primatas é importante por se apresentar como uma possibilidade de preencher as lacunas como a compreensão de aspectos evolutivos e comportamentais. Objetivou-se neste trabalho fazer um estudo anatômico comparativo dos músculos da coxa de macacos *Sapajus spp.*, associar este estudo a aspectos comportamentais relacionados a comportamentos posturais, e comparar os resultados com a literatura sobre a anatomia de babuíños, chimpanzés e humanos modernos. Foram analisados 16 antímeros de 8 espécimes adultos de macacos-prego (*Sapajus spp.*), sendo sete machos e uma fêmea. Para fixação injetou-se pela veia femoral, uma solução de 10% de formaldeído com 5% de glicerina. Nenhum animal foi eutanasiado para os fins deste estudo: quatro deles sofreram mortes acidentais em seu habitat natural e foram doados ao Laboratório de Anatomia, Bioquímica, Neurociência e Comportamento de primatas (LABINECOP) da Universidade Federal de Goiás, Campus Catalão, o restante foram doados pelo Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis IBAMA). Foram observadas a origem e inserção dos músculos: tensor da fáscia lata, sartório, reto femoral, vasto lateral, vasto medial, vasto intermédio, adutor magno, adutor longo, adutor curto, pectíneo, grácil, bíceps femoral, abdutor crural caudal, semitendinoso, semimembranoso próprio e acessório. A musculatura da coxa de *Sapajus spp.*, em termos gerais, são mais semelhantes aos babuíños, supostamente por ambos serem quadrúpedes, apresentarem cauda, comportamento semi-bípede e arborícola.

PALAVRAS-CHAVE: anatomia comparativa, macaco-prego, morfologia, Platyrrhini

INTRODUCTION

The Platyrrhini infraorder covers the new world monkeys (neotropical) representing the taxon with the highest number of species among primates (IUGHETTI, 2008, VIEIRA 2013). The monkeys of the genus *Sapajus* are neotropical belonging to the Cebidae family, these animals show a quite confusing species rating and over time has shown changes (RYLANDS et al. 2000, VIEIRA 2013).

In the old taxonomical classification, the neotropical species of primates that receive the popular name of capuchin monkeys and cairaras belonged to a single genus, the *Cebus* (CAMARGO 2012). Recently reviews (LYNCH ALFARO et al. 2012a, LYNCH ALFARO et al. 2012b, TOKUDA 2012, RYLANDS et al., 2013), grouped the species of capuchin monkey into a new genus, the *Sapajus* while species in the genus cairaras continued at the gender *Cebus*. The main Morphoanatomic characteristics that allow the two genus are the presence of tuff and a stronger body anatomy in the genus *Sapajus*. Besides the molecular anatomical

differences, studies were performed to confirm the division between two genus which occurred about 6.2 million years (LYNCH ALFARO et al. 2012a, TOKUDA 2012, GUIMARÃES 2012).

The *Sapajus* genus shows longer legs than arms, the fingers have medium size and are slightly different, the tail shows a third distal prehensile, which facilitates the arboreal locomotion and helps to support the body when the animal is in a semi-biped position (NAVES et al. 2006), this way, the tail anchors the body and free the hands. The tail also provides leverage strength while the animal is sitting or "stood up" doing strong extractive actions (such as lifting and hitting, in case of breach of fruits with stones as "hammers") (GARBER & REGH 1999, FRAGASZY et al., 2004, FALÓTICO 2006, BIONDI 2010). The use of tools is one example of flexibility behavior (FRAGASZY et al., 2004; AGUIAR et al. 2014, AVERSI-FERREIRA 2014a). The tail's size is smaller than the other world primates (ANKEL-SIMONS 2000). The Bipedalism happens sometimes (DEMES 2011, AVERSI-FERREIRA 2014b), as in other species of quadruped primate, when the animals carry objects in the forelimbs (NAKATSUKASA et al., 2004).

These animals are often in the trees canopy, using forelimbs to grab and pelvic limbs to push, occasionally go down to the ground to forage (AVERSI-FERREIRA et al. 2005, PEREIRA-DE-PAULA et al., 2010). The locomotor pattern showed by *Sapajus*, hiking and four-legged races, yet combined with frequent jumps and climbs, fit the pattern of displacement, to a high cost (BIONDI 2010). According FRAGASZY et al. (2004), energy outlay in posture, locomotion and other strenuous postures, are part of a high energy budget for genus *Sapajus*.

The feeding habits of *Sapajus* are predominantly composed by fruits, but in times of scarcity, they resort to some alternative sources such as leaves, nectar and insects rarely (PERES 1994, SABBATIN et al., 2008, VIEIRA & OLIVEIRA 2014). The ability to manipulate food is an advantage so that they can explore other nutritional sources that are not accessible to other primate species (SABBATIN et al. 2008).

AVERSI-FERREIRA et al. (2011) reported that anatomical studies are important at the veterinary medicine because the data can aid procedures, and knowledge of the primate anatomy may be an important factor when preserving and protecting these animals are taken to veterinary clinics after accidents, or even requiring surgery or medical treatment, because these animals are easy targets for accidents (KINDLOVITS 1999, AVERSI-FERREIRA et al. 2011a) since they are often found living in urbanized environments.

The limited information about the anatomy of this group, particularly for the member pelvic-thigh, the Brazilian and international scientific literature justify the importance of this study, we aimed to study the origin and insertion of the thigh *Sapajus spp.* muscles, associating this study to behavioral aspects related to postural behaves, and compare the results to the literature on the anatomy of baboons, chimpanzees and modern humans.

MATERIAL AND METHODS

Were used 16 members of 8 adult specimens of capuchin monkey (*Sapajus spp.*), 7 males and 1 female, weighing 1-3 kg. No animal was euthanized for this study: Four of them suffered accidental deaths in their natural habitat and were purchased from the Laboratory of Anatomy, Biochemistry, Neuroscience and Behavior of Primates (LABINECOP), of the Federal University of Goiás, Campus Catalão anatomical collection. The rest of them belonged to the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and were donated to the Federal University of Goiás in the 1970s. This study was approved by the Institutional Ethics Committee of the Federal University of Goiás (UFG-COEP 81/2008, the authorization of IBAMA number 15275).

All procedures involving animals were conducted according to the guidelines of the Brazilian Society of Animal Experimentation (COBEA). After shaving with a razor, the animals were incubated in water at room temperature for 10-12 hours, and then received perfusion through the femoral vein, a 10% solution of formaldehyde with 5% glycerol for fixation. The animals were kept in 10% formaldehyde, covered with opaque wells to prevent light penetration and evaporation of formaldehyde.

When finished the dissection step, was made the muscles description of and the documentation with digital camera (Sony, 14 mega pixels). The name of the structures was based on the description of humans (GRAY 2000, STANDRING 2010) and other primates (SWINDLER & WOOD 1973). Whenever possible, and by analogy, to the muscles were given the same names as those described for humans and other previously studied primates, whose the bibliographic reference was consulted. The Nominal Anatomical Human (2001) and Veterinary Anatomical Nominal (2012), were also found to conform to the nomenclature used with the international standards and norms.

RESULTS

At the thigh of *Sapajus* were the muscles Sartorius, Tensor fasciae latae, Rectus femoris, vastus lateralis, vastus intermedius, vastus medialis, biceps femoris, Abductor cruris caudalis, semitendinosus, semimembranosus proprius and accessory, Pectineus, Adductor longus, Adductor magnus, Adductor brevis e Gracilis (Table 1).

TABLE 1 – Origin and insertion of the thigh muscles of *Sapajus libidinosus*.

Muscle	Origin	Insertion
Sartorius	Spina iliaca ventralis cranialis	Aponeurosis that covers the third leg medial proximal, below the tuberositas tibiae
Tensor Fasciae Latae	Aspina iliaca ventralis caudalis	Iliotibial tractus
Rectus Femoris	Straight head: below the spina iliaca ventralis caudalis Reflex head: fossa acetabuli	Base of the patella, quadriceps tendon
Vastus Lateralis	Trochanter major, crista intertrochanterica	Lateral face of the patella, quadriceps tendon
Vastus Intermedius	2/3 distal from the femur body	Superomedial to the condylus, proximal to the patella and near the epicondylus medialis of the tibia
Vastus Medialis	Linea intertrochanterica, trochanter minor	Medial face of the patella, quadriceps tendon
Biceps Femoris	Tuber ischiadicum, at the side portion of the common to the semitendinosus tendon	In a wide aponeurosis at 1/3 of the tibia proximal
Abductor Cruris Caudalis	Lateral process between the tail vertebrae 1 and 2	Wide aponeurosis 2/3 leg proximal
Semimembranosus	Proprius and Accessorium: superior edge of the tuber ischiadicum	Accessorium: labium mediale of the facies aspera Proprius: condyles medialis of the tibia in a distal portion
Semitendinosus	Medial edge of the tuber ischiadicum	Condyles medialis of the tibia in a distal portion
Pectineus	Pectineus pubis line	Pectineus femur line
Adductor Longus	Medial third of symphysis pubica	Labium mediale of the facies aspera
Adductor Magnus	Lower branch of the pubis and tuber ischiadicum	Condyles medialis of the femur
Adductor Brevis	Lower branch of the pubis	Pectineus femur line and third proximal of the labium mediale of the facies aspera
Gracilis	Lower branch of the pubis and at the upper margin of the ramus caudalis	Sartorius tendon, near the tibia medial proximal

The muscle Sartorius was originated at the Iliac spine anterosuperior. The Sartorius is a long muscle that presents the strip and falls obliquely on the thigh to below the medial portion of the patella. The muscle inserts it proprius into an aponeurosis covering the third medial proximal of the leg, below the tuberosity of the tibia (Figure 1).

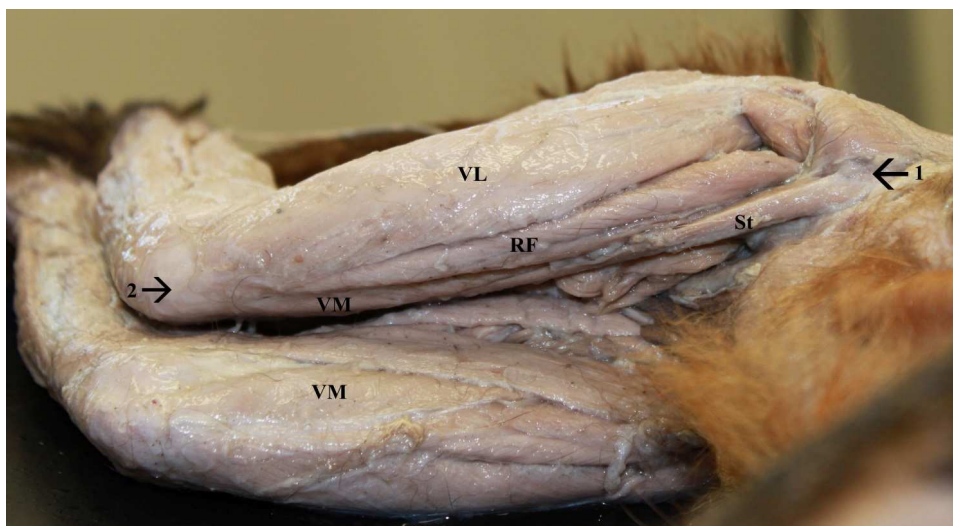


FIGURE 1 - Photograph of the anterior thigh of *Sapajus* spp: Vastus Lateralis (VL); Rectus femoris (RF); Sartorius (St); Vastus lateral (VM); Arrows: Sartorius origin (1); Quadriceps tendon (2)

The Tensor fasciae latae muscle has its origin on the Iliac Spine ântero-inferior. This muscle at its origin is closely linked to the gluteus maximus, both covered by a common fascia. The Tensor fasciae latae inserts into the fasciae latae on the lateral face of the thigh third medial proximal (Fig. 2A).

The rectus femoris muscle has two heads on the rise, straight head originated in the distal portion of the iliacal antero-inferior spine and a reflex head originated in acetabular groove. The reflex head is strongly attached to the capsule of the hip joint and fixed in the muscle with a long tendon on the posterior side to the third proximal of the muscle (Fig. 2A). It exchanges fibers with the Vastus Lateralis in the distal portion, proximal to the patella. The insertion is at the base of the patella tendon of quadriceps (Fig. 1).

The Vastus Lateralis is originated on the greater trochanter of the femur and at the intertrochanteric crest. The origin tendon covers the greater trochanter. It is a broad and strong muscle fibers exchange in the distal portion, cranial and patella with the rectus femoris. Its insertion occurs at lateral tibial tuberosity, forming the lateral portion of the quadriceps tendon (Figure 1 and 2). The vastus lateral is originated on the intertrochanteric crest and smaller trochanter. The insertion is medial to the tibial tubercle, forming a medium portion of the quadriceps tendon (Figure 1).

The vastus intermedius muscle is originated in the distal two-thirds of the front face and side of the femur body and enters the supero medial to the condyls, proximal to the patella and cranial to the medial epicondyle. It presents muscle fibers attached on the lateral and medial lip of the rough linea of the femur (Fig. 2B).

The vastus lateral is muscle is originated on the intertrochanteric crest and at the smaller trochanter of the femur and is inserted in the medial face of the patella tendon of the quadriceps.

The *Sapajus* presents the biceps femoral muscle with only the long head originated on the ischial tuberosity on the lateral portion by a common tendon to the semitendinosus. The insertion occurs in a broad aponeurosis in the third proximal of the tibia and contains a tendon that goes to the lateral malleolus. In this *Sapajus* biceps muscle is not bicipital. It is a highly developed muscle, occupying a large part of the lateral aspect of the thigh (fig. 2A and 3A).

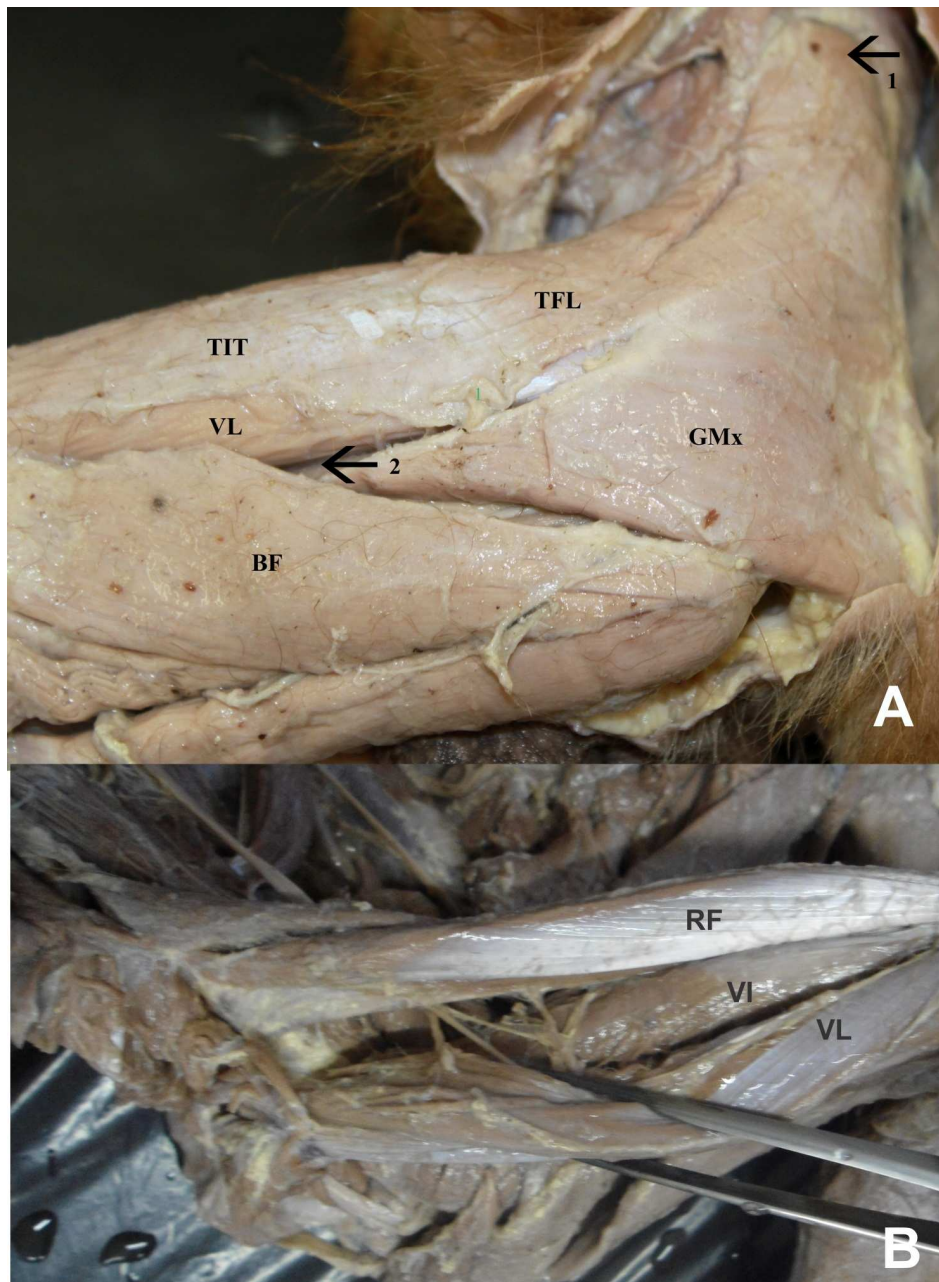


FIGURE 2 - Photograph of the lateral aspect of the thigh of *Sapajus* spp. Rectus femoris (RF); tensor fasciae latae (TFL); iliotibial tactus (TIT); gluteos superficialis (GMx); biceps femoris (BF); vastus intermedius (VI); vastus lateralis (VL); semitendinosus (Smt); fasciae latae (*).

The abductor cruris caudalis muscle, was originated in the process between the first side and second caudal vertebrae. It inserts it proprius into a broad aponeurosis at the third proximal of the leg. This muscle is side posterior to the biceps femoris muscle and has a very thin tendon at its origin.

The Semimembranosus is composed of two parts, and other ancillary in its own origin at the upper border of the ischial tuberosity. The accessory Semimembranosus inserts it proprius on the medial lip of the rough line, and the own Semimembranosus inserts it proprius in the medial condyle of the tibia is a distal portion.

The semitendinosus muscle is formed at the lateral portion of the ischial tuberosity. It is inserted on the medial condyle of the tibia at the distal portion. It is easily identifiable by having a long tendon at its insertion. It is originated by a common tendon to the biceps femoris (Fig. 3A). Subsequently medially crosses the lateral thigh.

The pectineus is a flat quadrangular muscle originated from the pectineus line of the pubis, and descends from the postero lateral entering the pectineus line of the femur.

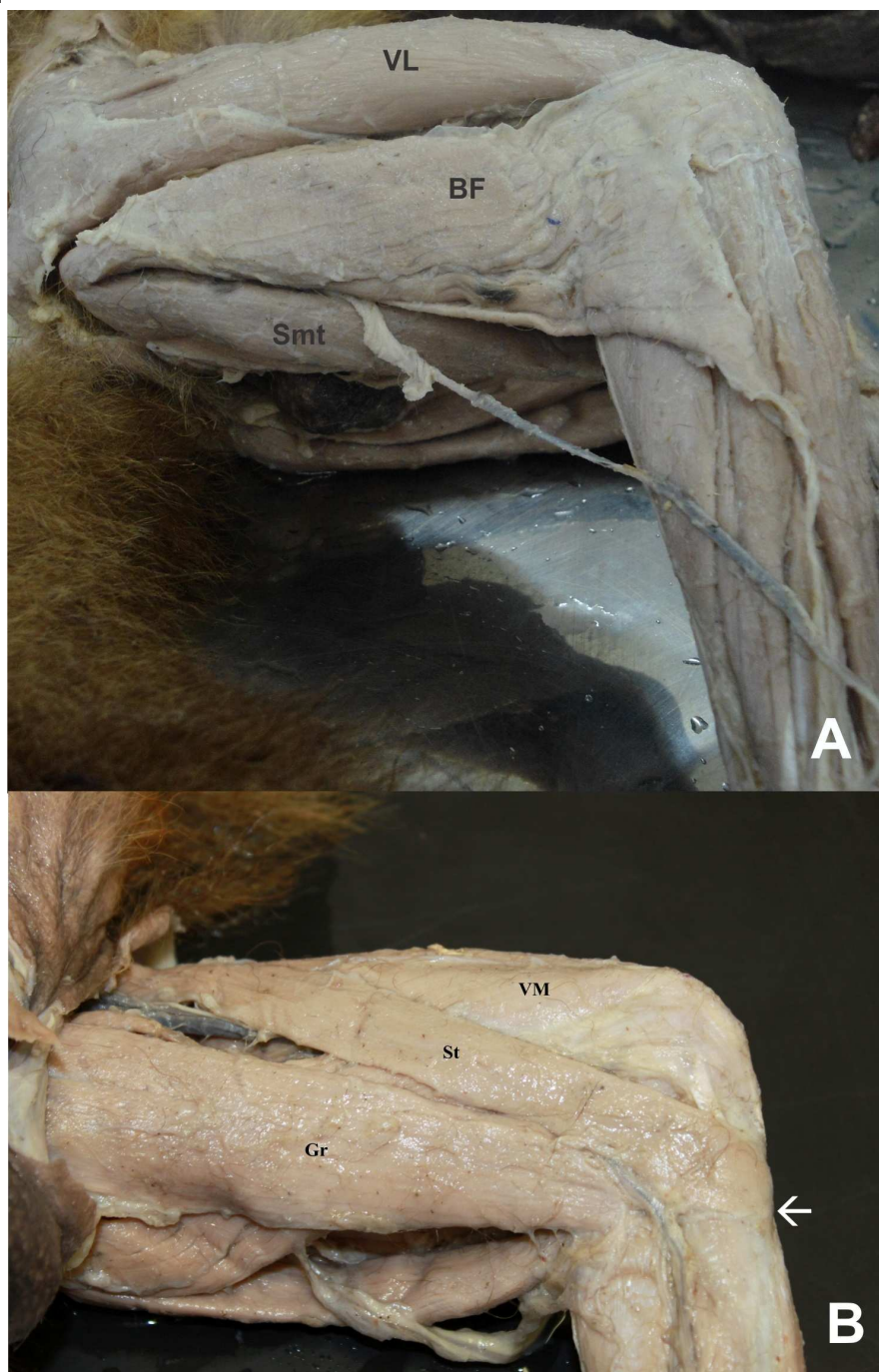


FIGURE 3 - Photograph of the lateral (A) and medial (B) aspect of the thigh of a Sapajus. Vastus lateralis (VL); vastus medialis (VM); biceps femoris (BF); semitendinosus (Smt); sartorius (St) and gracilis (Gr). Arrow: insertion of the sartorius.

The adductor longus muscle is originated from the middle third of the pubic symphysis posterior to the gracilis. Inserts it proprius on the medial lip of the rough line of the femur. It is a broad fan-shaped muscle. The adductor muscle has its origin in the lower branch of the pubis and ischial tuberosity, and the insertion at the medial condyle femoral. The short adutor is originated in the lower branch of the pubis bone. It inserts the pectinea and the proximal third of the femur rough line medial lip.

The Gracilis in its origin is fixed by an aponeurosis on the medial margin of the inferior branch of the pubic bone and the upper branch of the ischial, it is a broad ribbon-shaped muscle that narrows proximal to its insertion where it joins the tendon of the Sartorius muscle and inserts near the medial to the tibia (Fig. 3B).

DISCUSSION

In *Sapajus* the Sartorius muscle originates it proprius from the anterior superior iliaca spine, similar to humans (STANDRING 2010), and differs from that described by SWINDLER & WOOD (1973), in chimpanzees and baboons, at these ones, the origin occurs caudal to the iliaca crest along the acetabular edge of the ilium. In humans, chimpanzees, baboons and *Sapajus*, it is the longest muscle, has a ribbon shape and crosses lateral medially the thigh, at its insertion a thin flat tendon replaces the muscle fibers and forward obliquely curves, expanding into a broad aponeurosis inserted in front of the Gracilis, semitendinosus and to the medial surface of the tibia (TESTUT & LATARGET 1959, SWINDLER & WOOD, 1973, GRAY 2000, STANDRING 2010).

The Tensor fasciae latae in *Sapajus* has its origin in the anterior inferior iliac spine. Different from that described in baboons and chimpanzees, at these ones, it is originated in an aponeurosis of the acetabular edge of the ilium, and human where the origin occurs in the previous 5cm of the outer lip of the iliac crest, the lateral side of the anterosuperior iliac spine and notch in the caudal part to it (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010). This muscle in *Sapajus* in its origin is closely linked to the gluteus maximus, thus two muscles are covered by a common fascia, which was also observed in baboons by SWINDLER & WOOD (1973), who defined this as a feature rarely observed in humans and apes. The insertion is similar in all species, it occurs in the fasciae latae, where it merges with the middle and upper third of the thigh (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

The rectus femoris muscle in *Sapajus* is similar to that described in baboons, chimpanzees and humans which is fusiforme, it's originated at the anteroinferior iliac spine (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010), as described in humans we observed some similarity about the origin tendons, which are two, forming a straight head, attached to the anteroinferior iliac spine, and a reflection tendon fixed in the groove above the acetabulus and the fibrous capsule of the hip joint (GRAY 2000; STANDRING 2010). SWINDLER & WOOD (1973) reported that baboons and chimpanzees have only one tendon. In *Sapajus*, the rectus femoris is a narrow muscle, different from the reported in humans. About the insertion at the four genus have similarities, occurs in a broad and thick aponeurosis which occupies the distal third of the posterior surface and gradually narrows into a flattened tendon that attaches to the base of the patella (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

The Vastus Lateralis muscle in the compared genus shows no change in the

origin that occurs in the femur greater trochanter (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010), and insertion into the lateral portion, in a patellar aponeurosis, where it fits the femoral quadriceps, the tendon inserts into the tibia tuberosity. In *Sapajus*, it exchanges fibers at the distal position with rectus femoris. A main difference between the man and *Sapajus* involves the size of the Vastus Lateralis, the strength of this muscle can be related to a jumper behavior. ARCKEMANN (2003) observed this characteristic in other jumper primates such as *Saimiri*.

The vastus intermedius showed difference in genders compared in the *Sapajus* muscle originated in the lower two-thirds of the femur body, in other species the origin occurs in the upper two thirds of the femur on the anterior surface of the body and lateral femur, the insertion occurs similarly in all, in the deep part of the quadriceps tendon at the base of the patella (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

In *Sapajus* the vastus medialis presents similar origin to the SWINDLER & WOOD (1973) description, mentioning that in baboons and chimpanzees the vastus medialis muscle is originated at the intertrochanteric line and lesser trochanter of the femur when compared to humans diverge as it is originated at the lower part of the intertrochanteric line, spiral line, medial lip of the rough linea, proximal portion of the medial supracondylar linea, and tendons of the long adductor magnus and the medial intermuscular septum (GRAY 2000, STANDRING 2010). The insertion is similar in all four genus, occurs on the medial border of the patella tendon of the quadriceps (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

On *Sapajus* the pectineus is a flat quadrangular muscle, it is originated from the pectineus line of the pubis, and descends laterally to the posterior pectineus line of the femur, similar to that described in humans, baboons and chimpanzees both in origin and in pectineus line insertion of the femur (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

The adductor longus muscle in *Sapajus* has a lateral origin to the pubic symphysis and insertion in the medial lip of the rough line. Different from that described by SWINDLER & WOOD (1973) in baboons and chimpanzees that originates it proprius in the upper branch of the pubic bone, in human it originates in this angle between the crest and sinfese. But as regards the insertion all genus compared present similarity, happens in the medial lip of the rough line of the femur (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

The short adductor muscle in humans according to STANDRING (2010) has its origin in the lower branch of the pubic bone, in *Sapajus* the origin is similar. SWINDLER & WOOD (1973), mention different origin in baboons and chimpanzees, these occur in the superior branch of the pubis bone, chimpanzees have two heads of origin and occasionally may have three. The four genus according to what was described and seen in our study have similarities at the insertion, which occurs in the pectineus line and the proximal third of the medial lip of the rough line of the femur (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

The adductor magnus muscle in the studied genus shows similarity in its origin, at the lower pubic branch and at the ischial tuberosity, but there are differences in the insertion, in *Sapajus* occurs in the medial condylus of the femur in baboons, chimpanzees and humans at the gluteal tuberosity, rough linea, and popliteal surface of the femur (SWINDLER & WOOD 1973, GRAY 2000,

STANDRING 2010).

In humans, according to GRAY (2000), this muscle is thin and flat, broad proximally and distally narrow. SWINDLER & WOOD (1973), mentioned that in baboons, chimpanzees and humans the Gracilis muscle, is originated at the medial margin of the lower branch of the pubis and at the upper margin of the ischio lower branch, showing similarity to what we observed in *Sapajus*. But in *Sapajus* was found a large muscle that binds to the Sartorius where it inserts into an aponeurosis at the proximal third of the tibia, this insertion is medially tendinosus along the insertion biceps femoris and abductor cruris caudalis laterally, limits the knee extension keeping it in a semi biped position. In all genus the insertion was located near the medial tibia (SWINDLER & WOOD 1973, GRAY 2000).

In *Sapajus* the biceps femoris muscle, is similar to baboons shows only the long head, not being bicipital, its origin occurs in the tuberosity ischial in the compared genus. In humans and chimpanzees, the biceps femoris presents a short head, and has the same origin in the half side of the rough line of the femur. The insertion of the long head *Sapajus* and baboons occurs in a wide proximal aponeurosis at the tibia in humans at the fibular head, the short head inserts in humans at the side condyle of the tibia, in chimpanzees near the articular surface of the fibular head (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010).

The arboreal quadrupeds usually move around with their pelvic muscles mainly for impulsion during the jumps. The biceps femoris as the knee flexor, pushes forward in quadrupedal movement and leaps (ACKERMANN 2003), the biceps is as vigorous in *Sapajus*, because of the fact that these animals use the pelvic member frequently to drive them when they are at the arboreal activity. The insertion of the tendon fibers in the Sartorius and the gracilis, together to the biceps femoris tendon insertion of the m limits the extension and the flexion, thereby keeping the knee in a restricted movement, which keeps the semi-standing position. ACKERMANN (2003) describes that the limitation of flexion and extension in jumping primates allows movement with more control during the takeoff and landing of powerful jumps.

The Semimembranosus muscle in *Sapajus* consists of two parts, one proper and incidental, showing similarity to baboons, in both the Semimembranosus originates itproprius from the upper edge of the ischial tuberosity, the Semimembranosus accessory is originated in the caudal portion of the ischial tuberosity (SWINDLER & WOOD 1973). Chimpanzees and humans have similarity to each other and different to *Sapajus* according to their origin which has a single head on the ischial tuberosity. The insertion in *Sapajus* and baboons is similar, the insertion of Semimembranosus occurs in the medial posterior condyle of the tibia and accessory occurs in the medial lip of the rough line of the femur. In chimpanzees and humans the insertion shows similarity, occurs in the medial posterior condyle of the tibia. According ACKERMANN (2003), which describes this muscle in *Rhesus*, this muscle has two parts of the insertion may be required for more efficient bending than only one insertion a large muscle.

The semitendinosus muscle in *Sapajus* is originated at the tuberosity ischial insertion and near the medial tibia, showing similarities to baboons, chimpanzees and humans (SWINDLER & WOOD 1973, GRAY 2000, STANDRING 2010). The crural abductor caudal muscle is not described in the researched literature for comparison in this work.

CONCLUSION

The thigh muscles of *Sapajus* monkey described were: Sartorius, Tensor fasciae latae, Rectus femoris, Vastus Lateralis, vastus lateralis, vasto intermedial, biceps femoris, abductor cruris caudalis, owned and accessory Semitendinosus, semimembranosus, pectineus, adductor longus, adductor magnus, adductor brevis and gracilis, the thigh muscles of *Sapajus*, are more similar to baboons, presumably because both are quadrupeds, present semi-bipedal and arboreal behavior.

The observation results answer to the behavioral data related to the posture of semi bipedal jumper, mainly observed in the biceps femoris insertion and abductor cruris caudalis, gracilis, Sartorius and semintendinosus.

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