

The presence of accessory soleus muscle in humans

Estudo da presença do músculo sóleo acessório em humanos

Flavio Belmont Del Nero¹, Cristiane Regina Ruiz¹, Roberto Aliaga Junior¹

ABSTRACT

Objective: To verify the prevalence of the accessory soleus muscle in humans and according to gender. **Methods:** A total of 154 magnetic resonance images of the ankle were assessed in T1 weighted sagittal, coronal and axial planes. **Results:** An incidence of 11.6% of accessory soleus muscle in humans was observed; in that, 7.8% in males and 15.6% in females. **Conclusion:** The accessory soleus muscle incidence was 11.6% in the samples studied and it was more often present in females.

Keywords: Muscle, skeletal/abnormalities; Diagnostic imaging; Ankle; Magnetic resonance spectroscopy

RESUMO

Objetivo: Verificar a prevalência do músculo sóleo acessório em humanos e em relação ao gênero. **Métodos:** Foram observadas 154 imagens de ressonância magnética do tornozelo em cortes sagitais, coronais e axiais ponderadas em T1. **Resultados:** Observamos a incidência de 11,6% do músculo sóleo acessório em humanos – 7,8% em indivíduos do gênero masculino e 15,6% em indivíduos do gênero feminino. **Conclusão:** O músculo sóleo acessório teve incidência de 11,6% nas amostras estudadas e sua presença foi maior em indivíduos do gênero feminino.

Descritores: Músculo esquelético/anormalidades; Diagnóstico por imagem; Tornozelo; Espectroscopia de ressonância magnética

INTRODUCTION

The accessory soleus muscle (ASM) is at the posterior aspect of the ankle⁽¹⁾, is innervated by the posterior tibial nerve and blood supply fed by the tibial artery. According to anatomical studies, it is present in 0.7 to 5.5% of humans⁽²⁾. It is a rare anatomical variation that can present as a soft tissue tumor in this region.

A congenital muscle anomaly is more frequent in the upper limbs and is rarely seen in the lower limbs. It is seldom mentioned in the pediatric literature. During embryogenesis the soleus muscle separates into two parts, and this supernumerary muscle has its own blood supply and innervation⁽³⁾.

The ASM was first described in literature by Fue Cruvelhier, in 1834. Since then, hundreds of cases have been published highlighting the crucial relevance of a possible soft tissue tumor. This benign disease can cause pain related to physical activity, especially in adults⁽³⁾.

This supernumerary muscle is located under the gastrocnemius muscle, in the posterior upper third of the fibula, in the oblique soleus line, between the fibular head and the posterior part of the tibia. From its origin, the ASM runs anteriorly and medially until it reaches the Achilles tendon.

Five ASM types were described based on their insertion characteristics, including the Achilles tendon, the muscle insertion in the upper calcaneus region, the tendon insertion in the upper calcaneus, the muscle insertion in the medial calcaneus region, and finally the tendon insertion in the medial part of the calcaneus⁽²⁾.

The study of anatomic variations is very important to morphology researchers and healthcare professionals both for diagnosis and rehabilitation. With this study we hope to contribute with updated data on ASM prevalence in human beings and as to gender distribution, thus assisting these professionals in their work.

OBJECTIVE

To verify the prevalence of the accessory soleus muscle in humans and according to gender.

Study carried out at Centro Universitário São Camilo – São Paulo (SP), Brazil.

¹ Centro Universitário São Camilo – São Paulo (SP), Brazil.

Corresponding author: Cristiane Regina Ruiz – Centro Universitário São Camilo – Avenida Nazaré, 1501 – Ipiranga – Zip code: 04263-200 – São Paulo (SP) Brazil – Phone.: (11) 2069-4000 – E-mail: crisruiz@saocamilo-sp.br

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METHODS

A total of 154 patients were randomly selected - 77 females and 77 males - and studied by means of MRI sequences of the ankle, T1-weighted sagittal, coronal, and axial planes. MRI was chosen for showing soft tissue characteristics and enabling observation of the precise muscle contour. Images were studied using the Onis 2.2 Free Edition software. Inclusion and description criteria were to assess only ASM reaching the calcaneus tendon insertion at the calcaneus bone and the soleus muscles that were directly inserted in the calcaneus bone (Figures 1 – 4). Soleus muscles inserted in the distal part of the calcaneus tendon were excluded.



Figure 1. Accessory soleus muscle inserted in the calcaneus bone (white arrow)



Figure 2. Accessory soleus muscle inserted in the calcaneus tendon close to the calcaneus bone MRI coronal plane (white arrow)

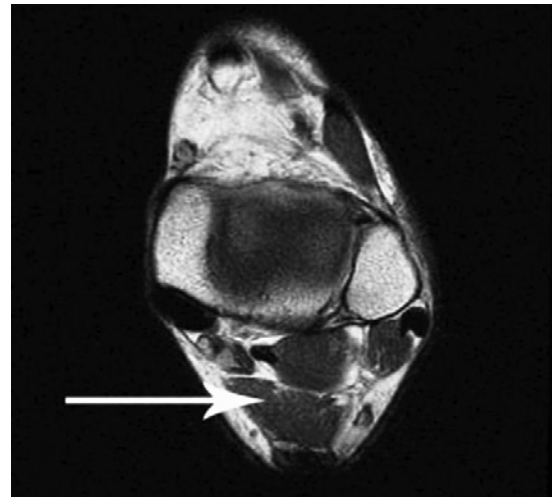


Figure 3. Accessory soleus muscle inserted in MRI axial plane (white arrow)



Figure 4. Accessory soleus muscle inserted in the calcaneus bone in sagittal MRI (white arrow)

RESULTS

There were statistical difference in the prevalence of ASM even when samples were paired according to gender. Out of 154 patients assessed, ASM was found in 18 (11.6%) individuals, 6 were male (7.8%) and 12, female (15.6%) (Table 1).

Table 1. Incidence of accessory soleus muscle in humans assessed by magnetic resonance imaging

Sample	Incidence of accessory soleus muscle	%
77 males	6	7.8
77 females	12	15.6
154 patients	18	11.6

DISCUSSION

The ASM is usually observed during the second or third decade of life and more often in males, at a 2:1 rate⁽²⁻¹³⁾. To analyze, compare and discuss our findings it was chosen to study the ASM prevalence. This is a rare condition and its general prevalence has not been established yet⁽¹⁴⁾.

Statistical analysis shows that ASM is more frequently a unilateral finding⁽²⁾. According to our data it was more prevalent in females (15.6%) when compared to males (7.8%), thus differing from most scientific studies reporting greater incidence in males⁽²⁻¹³⁾.

In our study we found that ASM prevalence in humans was of 11.6%. This result corroborates some studies reporting ASM as present in up to 10% of humans^(9,14,15). Moreover, most reports in the literature stated a 0.7 to 5.5% presence of ASM in human beings^(2,3,5,11,13,16-19). Some investigators reported a prevalence ranging from 1 to 6% in human beings^(6,20).

Sometimes it is impossible to precisely identify the ASM origin and insertion, since the MRI fails to show details, depending on the slices. Results may be discrepant according to the ASM variations taken into account by the investigators and the sample that, coincidentally, may include more subjects with ASM.

Our data also showed higher prevalence in females. This could be explained by women's more intense lifestyle and higher physical activity, thus causing ASM symptoms requiring diagnosis and treatment. Currently women have job position they had not before, which require more effort and physical work.

CONCLUSION

According to literature ASM prevalence is higher in males. Its presence varies between 0.7 and 10.6%. Our study reported a prevalence of 11.6% in humans and higher prevalence among females than among males.

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