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RESEARCH

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Posterior femoral cutaneous nerve sensory conduction study in a sample of apparently healthy Egyptian volunteers

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Abstract

Background: Posterior femoral cutaneous nerve (posterior cutaneous nerve of the thigh) is a sensory nerve arises from the sacral plexus. Its terminal part supplies the skin of the posterior surface of the thigh and popliteal fossa, and it extends for a variable length below the popliteal fossa till the mid-calf region. The aim was to assess the posterior femoral cutaneous nerve antidromic sensory conduction technique and estimate its different sensory nerve action potential parameters' reference values in a sample of apparently healthy Egyptian participants. One hundred and twenty lower limbs of 60 apparently healthy Egyptian volunteers were included. Clinical evaluation and sensory conduction study for the posterior femoral cutaneous nerve were done.

Results: Posterior femoral cutaneous nerve sensory nerve action potential was elicited in 98 lower limbs (81.6%) of 52 individuals (86.7%). The obtained results of different parameters of posterior femoral cutaneous nerve sensory nerve action potential were as the following: onset latency (2.04 ± 0.21 ms), peak latency (2.86 ± 0.25 ms), conduction velocity (59.45 ± 6.36 m/s) and amplitude (6.16 ± 2.29 μV). No significant differences between the two genders were found regarding different parameters of posterior femoral cutaneous nerve sensory nerve action potential except for amplitude which was significantly larger among male participants ($P = 0.030$). No significant differences between the right and left lower limbs were found regarding different parameters of sensory nerve action potential. There was a statistical significant negative correlation between age and posterior femoral cutaneous nerve conduction velocity ($P = 0.008$). There was a statistical significant positive correlation between height and peak latency ($P \leq 0.0001$), as well as, a statistical significant negative correlation between height and conduction velocity ($P \leq 0.0001$). There was a statistical significant negative correlation between body mass index and posterior femoral cutaneous nerve peak latency ($P = 0.008$).

Conclusions: The research provides a reliable electrophysiological antidromic sensory conduction study for the posterior femoral cutaneous nerve and normal cut-off reference values for posterior femoral cutaneous nerve sensory nerve action potential parameters. This is essential for the evaluation of suspected posterior femoral cutaneous nerve lesions.

Keywords: Posterior femoral cutaneous nerve, Posterior cutaneous nerve of the thigh, Lesser sciatic nerve, Sensory conduction study, Antidromic technique, Egyptians

Background

Posterior femoral cutaneous nerve (PFCN) is a sensory nerve arises from the sacral plexus. It is known as posterior cutaneous nerve of the thigh as well as lesser sciatic nerve [1–3]. Its nerve roots are the first, second and third sacral (S) nerve roots and the S2 nerve root is the main

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one [4–6]. To enter the gluteal region, it travels through the greater sciatic foramen. Within the foramen, PFCN is inferior to the piriformis muscle and immediately posteromedial to the sciatic nerve. In the gluteal region, it descends downward deep to the gluteus maximus muscle [2]. It lies superficial to the hamstring muscles within the muscular groove present between the medial and lateral hamstring muscles. The hamstring muscles separate it from the sciatic nerve [4–6]. In the subgluteal region, it gives two cutaneous branches; the gluteal branch and the perineal branch. The gluteal branch (known as inferior cluneal nerve) (S1 and S2 nerve roots) innervates the skin over the gluteal fold of the buttock region [7]. The perineal branch (known as long pudendal nerve or inferior pudendal nerve) (S2 and S3 nerve roots) passes medially to innervate the skin of the lateral aspect of the perineum and proximal aspect of the medial surface of the thigh [2, 3, 8]. The terminal part of the PFCN supplies the skin of the posterior surface of the thigh and popliteal fossa, and it extends for a variable length below the popliteal fossa till the mid-calf region (Figs. 1 and 2) [4–6, 8].

The electrophysiological study of the PFCN is clinically essential. It improves the physicians' awareness regarding PFCN lesions and its role in the evaluation of patients with many neurological problems in the lower limbs. It assesses the functional integrity of the PFCN in a variety of clinical conditions [1, 9–15]. These include clinical situations associated with PFCN neuropathy, as well as, the localization and determination of the extent of neurological lesions [1, 8–28]. It helps in the differentiation between sacral radiculopathy (preganglionic lesion) and sacral plexopathy (post-ganglionic lesion) [16]. Isolated PFCN neuropathy could be due to many etiologies [1, 8, 9, 11, 17–27]. Lesions affecting the PFCN could involve the sciatic nerve due to the close anatomical relationship between PFCN and sciatic nerve in the gluteal and back of the thigh regions [13]. In addition, the electrophysiological study of the PFCN is important in the assessment of the peripheral nervous system of the lower limbs in case of difficulty in assessing the distal routinely assessed nerves [1, 8, 16, 17].

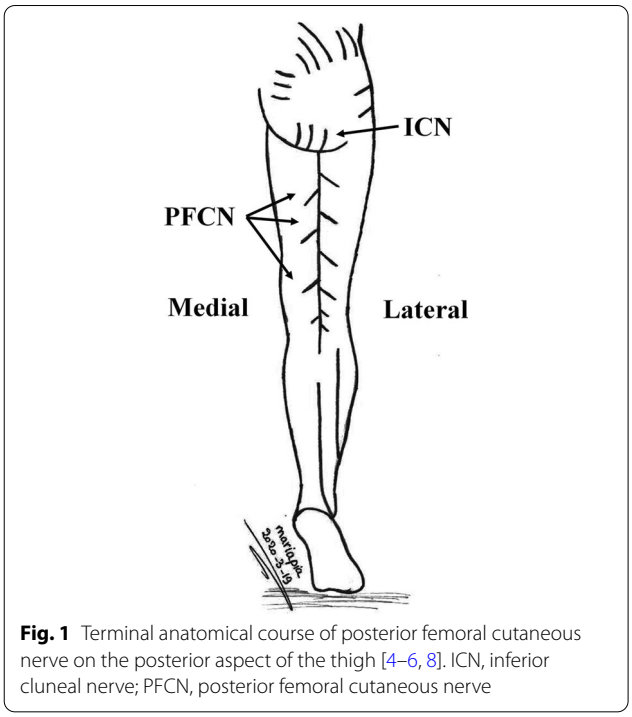


Fig. 1 Terminal anatomical course of posterior femoral cutaneous nerve on the posterior aspect of the thigh [4–6, 8]. ICN, inferior cluneal nerve; PFCN, posterior femoral cutaneous nerve

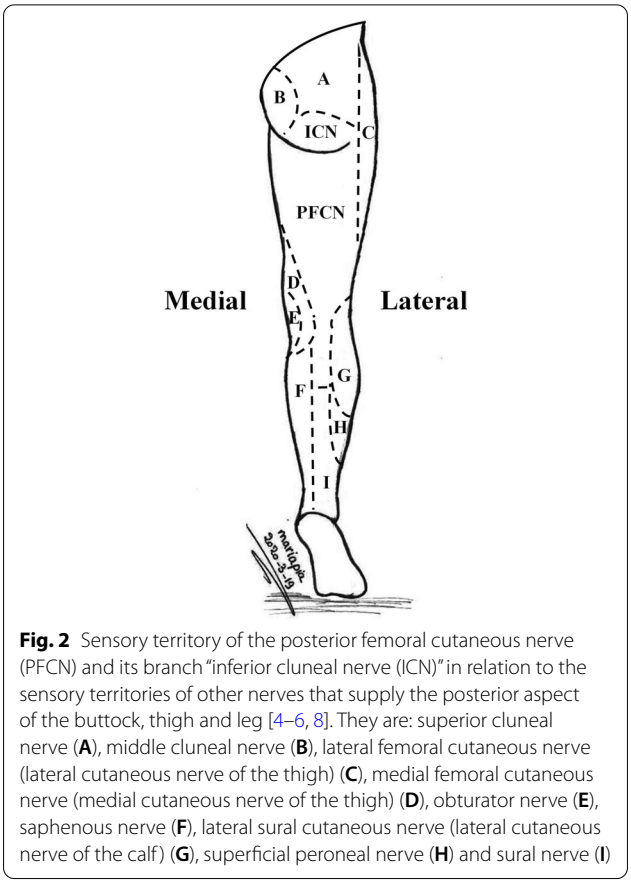


Fig. 2 Sensory territory of the posterior femoral cutaneous nerve (PFCN) and its branch "inferior cluneal nerve (ICN)" in relation to the sensory territories of other nerves that supply the posterior aspect of the buttock, thigh and leg [4–6, 8]. They are: superior cluneal nerve (**A**), middle cluneal nerve (**B**), lateral femoral cutaneous nerve (lateral cutaneous nerve of the thigh) (**C**), medial femoral cutaneous nerve (medial cutaneous nerve of the thigh) (**D**), obturator nerve (**E**), saphenous nerve (**F**), lateral sural cutaneous nerve (lateral cutaneous nerve of the calf) (**G**), superficial peroneal nerve (**H**) and sural nerve (**I**)

There were few previous studies in the literature that assessed the antidromic sensory nerve conduction of PFCN [1, 29, 30]. The aim was to assess the PFCN antidromic sensory conduction technique and estimate its different sensory nerve action potential (SNAP) parameters' reference values in a sample of apparently healthy Egyptian participants.

Methods

One hundred and twenty lower limbs of 60 apparently healthy Egyptian volunteers were included. The volunteers did not have risk factors for neuropathy as diabetes

mellitus, rheumatologic disorders and metabolic disorders. They did not have neurological symptoms. They had normal clinical neurological examination of both lower limbs. The examiner explained the purpose to the participants. An informed consent was obtained from each volunteer. Research Ethics Committee warranted the proposal.

Demographic data in the form of age and gender were collected. Body mass index (BMI) was calculated [31]. Complete clinical examination for the lower limbs was done.

The PFCN antidromic sensory conduction study was performed as the following technique. The active recording surface electrode was placed in the midline of the posterior surface of the thigh at 6 cm proximal to the mid-popliteal region [1, 32]. The reference surface electrode was placed 3 cm distal to the active recording surface electrode in the midline of the posterior surface of the thigh. The electrical stimulation was done by placing the bipolar stimulator 12 cm proximal to the active recording surface electrode on an imaginary line connecting the active recording surface electrode with the ischial tuberosity. The stimulator was placed in the intermuscular groove between the medial and lateral hamstring muscles. This groove was detected manually by palpating the posterior aspect of the thigh, while the volunteer flexed the knee slightly while lying in a prone position [1, 32]. The ground electrode was placed between the active recording surface electrode distally and the stimulation site proximally. During stimulation of the PFCN, the patient should be completely relaxed [1]. Details and illustration of the performed PFCN antidromic sensory conduction study are demonstrated in Fig. 3 [1, 32–36].

Statistical package for the social sciences (version 17) software was used for analyzing data. Analytic tests included Student's *t*-test, paired *t*-test, Chi-square test and Pearson correlation test. Significance was assigned for any *P* value less than 0.05. Cutoff values were estimated by rounding the mean ± two standard deviations (SD).

Results

One hundred and twenty lower limbs of 60 apparently healthy Egyptian volunteers [31 men (51.7%) and 29 women (48.3%)] were engaged in the research. Their age was 37.86 ± 13.42 years (ranged from 18 to 75 years). Their characteristics are illustrated in Table 1. No statistical significant differences were shown between men and women regarding different assessed characteristics (Table 1).

Bilateral study of the PFCN was performed to all participants. The PFCN SNAP was easily elicited bilaterally in the majority of the participated volunteers (Table 2). It was elicited in 98 lower limbs (81.6%) of 52 individuals (86.7%) (Table 2). All of them tolerated the PFCN conduction study. Table 3 demonstrates the cutoff values for different PFCN SNAP parameters. PFCN SNAPs are illustrated in Figs. 4 and 5.

No significant differences between the two genders were appeared regarding different parameters of PFCN SNAP except for SNAP amplitude which was significantly larger among male participants (Table 4).

No significant differences between the right and left lower limbs were found regarding different parameters of PFCN SNAP (Table 5). The intra-subject side-to-side differences of different parameters of PFCN SNAP are tabulated in Table 6.

Correlations between volunteers' age and different anthropometric measures with different parameters of PFCN SNAP are tabulated in Table 7. Significant negative correlation was found between volunteers' age and PFCN conduction velocity (CV); between height and PFCN CV; and between BMI and PFCN peak latency (PL). A significant positive correlation was found between height and PFCN PL (Table 7).

Discussion

In spite of that there are many available neurophysiological techniques for evaluating different sensory and motor nerves of the lower limbs, there is not any well-assessed and standardized neurophysiological study for the evaluation of PFCN [1, 16, 37, 38]. The study aimed to assess the PFCN antidromic sensory conduction technique and to estimate its different SNAP parameters' reference values in a sample of apparently healthy Egyptian participants.

The PFCN SNAP was elicited in only 86.7% of the participants. It was recorded unilaterally in 10% of the participants. This was not similar to previous studies.They recorded the PFCN SNAP in all their participants [1, 29, 30]. The difference between this research and these studies could be explained by the following: (A) the difference in the gender distribution of the participants between different studies. (B) The difference in the race of the included volunteers in different studies [39]. (C) The presence of a volume-conducted motor potential from the hamstring muscles which could be large enough to interfere with the recording of the PFCN SNAP and obscuring it [33, 34]. (D) The presence of anomalous innervation in which there could be agenesis and absence of the PFCN and its replacement by cutaneous branches that could arise from the sciatic nerve in the back of the thigh or any other nearby adjacent cutaneous nerve that innervate part or all of the sensory territory of the PFCN similar to other anomalous innervation that could take place in the peripheral nervous system [40–42]. Meng

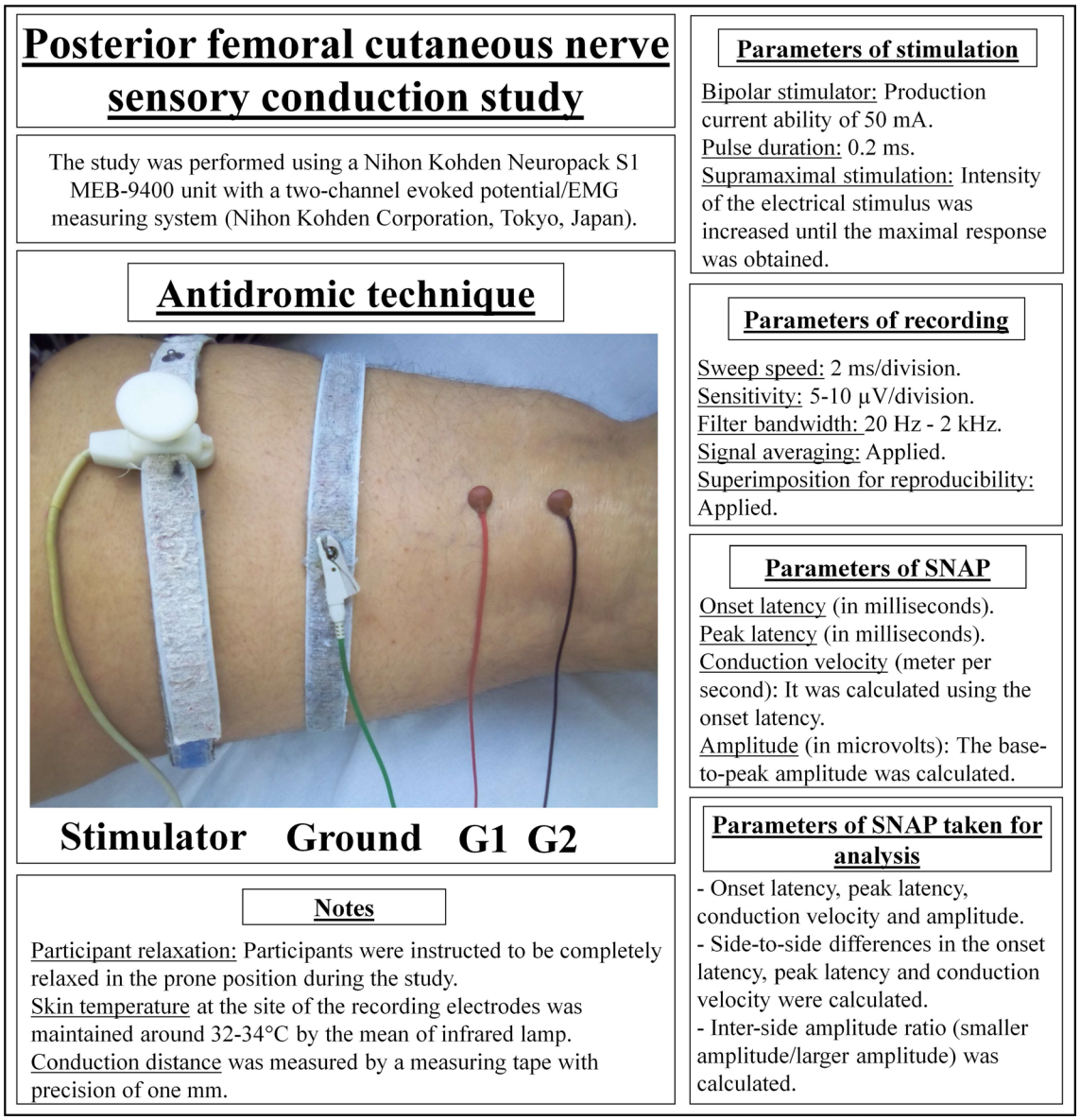


Fig. 3 Details of posterior femoral cutaneous nerve sensory conduction study (antidromic technique) [1, 32–36]. Ground, it refers to the ground electrode; G1, it refers to the active recording surface electrode; G2, it refers to the reference surface electrode; Stimulator, it refers to the electrical bipolar stimulator; SNAP, sensory nerve action potential; mA, milliampere; ms, millisecond; µV, microvolt; Hz, Hertz; kHz, kilohertz; mm, millimeter

et al. reported the absence of the PFCN (i.e. PFCN agenesis) in one lower limb (3.8%) of their assessed lower limbs obtained from cadavers [40]. It was reported that the origin of the PFCN is variable and that its perineal branch was absent in 15% of the assessed lower limbs [43, 44].

Sensory nerve conduction study of the PFCN should be done with caution. A volume-conducted motor potential usually appeared following the PFCN SNAP. It could be large enough to mask the PFCN SNAP wave. This was due to the coincidental co-stimulation of the motor fibers within the sciatic nerve in the thigh with orthodromic spread of excitation impulses, consequently depolarization of the hamstring muscles took place. This appeared with the use of an excessively high electrical stimulus intensity, in spite of that PFCN is separated from the sciatic nerve by the bulk of the medial and lateral hamstring muscles [1]. Rarely, there could be an anomalous innervation in the form of a muscular branch arising from the PFCN and suppling the hamstring muscles. This could contribute to the

Table 1 Characteristic of the participated volunteers

Characteristic	Participants ($n=60$)	Male participants ($n=31$)	Female participants ($n=29$)	Comparison between men and women	
	Mean ± SD	Mean ± SD	Mean ± SD	Test of significance	*P*
Demographic characteristics					
Age (year)	37.86 ± 13.42	39.16 ± 12.75	36.48 ± 14.20	$t=0.769$	0.445
Women[†]	29 (48.3)	NA	NA	NA	NA
Anthropometric characteristics					
Height (cm)	165.81 ± 5.67	166.96 ± 5.39	164.58 ± 5.79	$t=1.649$	0.104
Weight (kg)	69.49 ± 11.05	69.95 ± 9.84	69.00 ± 12.37	$t=0.331$	0.742
BMI (kg/m^2)	25.27 ± 3.84	25.12 ± 3.69	25.42 ± 4.05	$t=-0.304$	0.762
BMI category					
Underweight[†]	2 (3.3)	0 (0)	2 (6.9)	$X^2=3.217$	0.359
Normal weight[†]	27 (45.0)	16 (51.6)	11 (37.9)		
Overweight[†]	26 (43.3)	12 (38.7)	14 (48.3)		
Obesity[†]	5 (8.3)	3 (9.7)	2 (6.9)		

BMI, body mass index; *n*, number of volunteers; SD, standard deviation; *t*, value of Student's *t*-test; NA, not applicable; X^2, value of Chi-square test

[*] Significant when *P* is < 0.05

[†] Results are number (percentage)

Table 2 Elicitability of the posterior femoral cutaneous nerve sensory nerve action potential among the participants

Elicitability of the PFCN SNAP	Participants ($n=60$)	Male participants ($n=31$)	Female participants (n = 29)	Comparison between men and women	
	n (%)	*n* (%)	*n* (%)	Test of significance	*P*
Elicited bilaterally	46 (76.7)	23 (74.2)	23 (79.3)	$X^2=3.103$	0.212
Elicited unilaterally	6 (10.0)	5 (16.1)	1 (3.4)		
Not elicited bilaterally	8 (13.3)	3 (9.7)	5 (17.2)		

PFCN, posterior femoral cutaneous nerve; SNAP, sensory nerve action potential; *n*, number of volunteers; *n*(%) number (percentage); X^2, value of Chi-square test

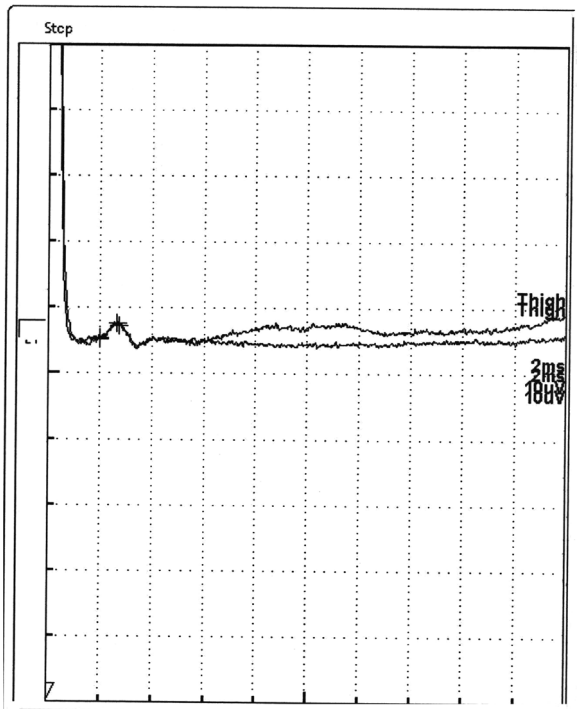
[*] Significant when *P* is < 0.05

Table 3 Cutoff values of the posterior femoral cutaneous nerve sensory nerve action potential parameters

PFCN SNAP parameters	Mean ± SD	Range	NL	Rounded NL
OL (ms)	2.04 ± 0.21	1.60–2.50	2.46	2.5
PL (ms)	2.86 ± 0.25	2.32–3.40	3.36	3.4
CV (m/s)	59.45 ± 6.36	48.40–76.90	46.73	46.7
SNAP amplitude (μV)	6.16 ± 2.29	1.90–10.70	1.58	1.6

PFCN, posterior femoral cutaneous nerve; SNAP, sensory nerve action potential; OL, onset latency; PL, peak latency; CV, conduction velocity; SD, standard deviation; NL, upper (latency) or lower (conduction velocity and amplitude) limit of normal

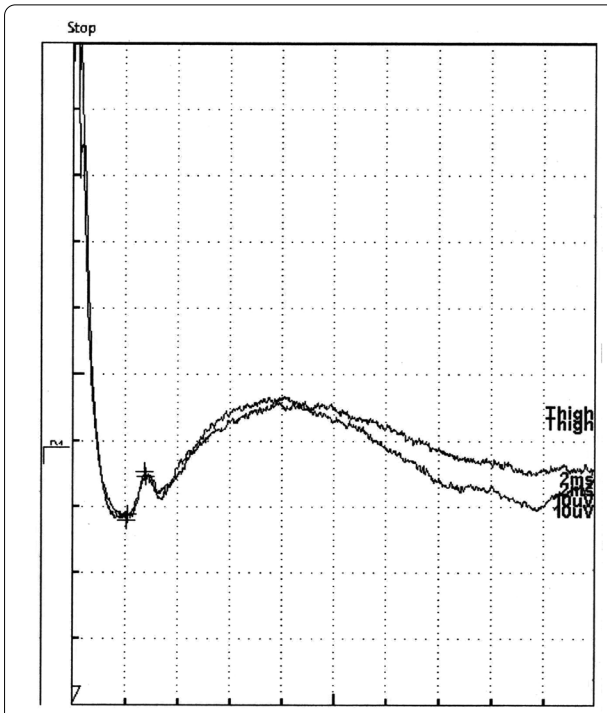
occurrence of the volume-conducted motor potential from the hamstring muscles [3]. In this circumstances, to minimize the appearance of this volume-conducted motor potential, the operator should increase the stimulus intensity slowly, so that supramaximal stimulation of the PFCN could take place with an electrical stimulus insufficient to stimulate the sciatic nerve motor fibers. Subsequently, this could avoid the appearance of the volume-conducted motor potential [1, 16, 33, 34]. The PFCN sensory conduction study is a meticulous study. The relaxation of the thigh muscles during the performance of the technique was essential to easily obtain the PFCN potential. Therefore, proper instruction to the individual to completely relax the thigh was critical for obtaining the PFCN SANP [1]. Sometimes, a local stimulus-induced hamstring muscle contraction could take place in association with higher stimulus intensity [1]. However, Dumitru et al. mentioned that the antidromic sensory conduction technique for PFCN was not associated with volume-conducted motor potential, because the sciatic nerve is deep enough in the thigh [1]. The difference between the present study and Dumitru et al.'s study could be due to differences in the anthropometric characteristics of the studied population and differences in the maneuvering used to obtain the SNAP [1].



No.	Site	Lat.1(ms)	Lat.2(ms)	Amp.
1	Thigh	2.00	2.76	2.000uV
2	Thigh	2.00	2.66	2.400uV

Segment	Dist.(mm)	Interval	NCV(m/s)
1	120	2.00ms	60.0
2	120	2.00ms	60.0

Fig. 4 Posterior femoral cutaneous nerve sensory nerve action potentials of an apparently healthy male participant. It is not followed by volume-conducted motor potential obtained from hamstring muscles. Lat. 1, onset latency; Lat. 2, peak latency; Amp., amplitude; NCV, nerve conduction velocity



No.	Site	Lat.1(ms)	Lat.2(ms)	Amp.
1	Thigh	2.04	2.80	6.700uV
2	Thigh	2.08	2.76	6.500uV

Segment	Dist.(mm)	Interval	NCV(m/s)
1	120	2.04ms	58.8
2	120	2.08ms	57.7

Fig. 5 Posterior femoral cutaneous nerve sensory nerve action potentials of an apparently healthy female participant. It is followed by volume-conducted motor potential obtained from hamstring muscles. Lat. 1, onset latency; Lat. 2, peak latency; Amp., amplitude; NCV, nerve conduction velocity

No significant differences were obtained between both genders regarding different parameters of the PFCN SNAP except for the SNAP amplitude. It was significantly larger among male volunteers. This was coincided with earlier studies in which gender had no effect on SNAP PL and CV [1, 29, 30, 33, 34, 45–47]. However, it was not coincided with other studies in the literature regarding the effect of gender on the SANP amplitude [1, 33, 34, 47]. This could be due to differences in the age, anthropometric characteristics and racial factors of the included volunteers in the current study in comparison to previous studies [1, 33, 34, 39, 47]. In spite of the effect of gender on nerve conduction study, it was unnecessary to apply individual corrections in the assessed SNAP parameters regarding gender [48].

The study was in line with earlier researches regarding the lack of differences of PFCN SNAP parameters between the right and left sides [1, 33, 34, 46, 49].

There was a significant negative correlation between age and CV. This was in harmony with literature [1, 16, 50–52]. This could be secondary to the normal process of sensory neuron loss that could take place with aging. It could be more apparent among geriatric individuals (i.e., individuals aged 65 years or more) [16].

The height had a significant positive correlation with PL and a significant negative correlation with CV. This was like literature [16, 39, 48, 49, 52–56]. This could be due to the following. With increasing individual height, more tapering of the sensory nerve trunk takes place distally with more thinning of the nerve, as well as, lower limbs are cooler distally. It is known that cool temperature slows the nerve CV [16]. These two issues subsequently prolong SNAP PL and slow SNAP CV with increased height [16].

There was a significant negative correlation between BMI and PL. This coincided with literature [52, 57]. This could be due to the inclusion of height in the equation

Table 4 Comparison between the two genders regarding posterior femoral cutaneous nerve sensory nerve action potential parameters

PFCN SNAP parameters	Male participants ($n=51$ lower limbs obtained from 28 males) Mean ± SD	Female participants ($n=47$ lower limbs obtained from 24 females) Mean ± SD	Test of significant†	*P*
OL (ms)	2.06 ± 0.21	2.01 ± 0.21	1.176	0.242
PL (ms)	2.89 ± 0.23	2.81 ± 0.25	1.691	0.094
CV (m/s)	58.64 ± 6.01	60.33 ± 6.67	− 1.320	0.190
SNAP amplitude (μV)	6.64 ± 2.35	5.64 ± 2.11	2.202	0.030*

PFCN, posterior femoral cutaneous nerve; SNAP, sensory nerve action potential; OL, onset latency; PL, peak latency; CV, conduction velocity; *n*, number of lower limbs; SD, standard deviation

* Significant when *P* is < 0.05

† Value of Student's *t*-test

Table 5 Comparison between right lower limbs versus left lower limbs regarding posterior femoral cutaneous nerve sensory nerve action potential parameters (46 participants had elicited posterior femoral cutaneous nerve bilaterally)

PFCN SNAP parameters	Right lower limbs ($n=46$ lower limbs) Mean ± SD	Left lower limbs ($n=46$ lower limbs) Mean ± SD	Test of significant†	*P*
OL (ms)	2.04 ± 0.22	2.04 ± 0.21	0.125	0.901
PL (ms)	2.84 ± 0.23	2.86 ± 0.26	− 0.541	0.591
CV (m/s)	59.49 ± 6.73	59.37 ± 6.28	0.139	0.890
SNAP amplitude (μV)	5.92 ± 2.17	6.27 ± 2.32	− 1.138	0.261

PFCN, posterior femoral cutaneous nerve; SNAP, sensory nerve action potential; OL, onset latency; PL, peak latency; CV, conduction velocity; *n*, number of lower limbs; SD, standard deviation

* Significant when *P* is < 0.05

† Value of paired *t*-test

Table 6 Intra-subject side-to-side differences in the posterior femoral cutaneous nerve sensory nerve action potential parameters (46 participants had elicited posterior femoral cutaneous nerve bilaterally)

PFCN SNAP parameters	Intra-subject side-to-side difference Mean ± SD	NL	Rounded NL
OL (ms)	0.15 ± 0.11	0.37	0.4
PL (ms)	0.16 ± 0.10	0.36	0.4
CV (m/s)	4.52 ± 3.60	11.72	11.7
SNAP inter-side amplitude ratio	0.75 ± 0.17	0.41	0.4

PFCN, posterior femoral cutaneous nerve; SNAP, sensory nerve action potential; OL, onset latency; PL, peak latency; CV, conduction velocity; SD, standard deviation; NL, upper (latency and conduction velocity) or lower (inter-side amplitude ratio) limit of normal for side-to-side difference

of BMI calculation, in which the height had a significant positive correlation with PL [31].

The intra-subject side-to-side differences was not mentioned previously regarding the PFCN SNAP. Regarding the inter-side amplitude ratio, its reference lower limit was 0.4. Subsequently, PFCN involvement should be suspected when the SNAP amplitude decreased to be less than 40% of the contralateral limb. This result was of the same opinion as literature [16, 33, 34].

The results of the study were in line with the results obtained from previous work assessed the PFCN neurophysiological technique (Table 8) [1, 29, 30].

Study boundary was the inclusion of Egyptians from Alexandria governorate and the nearby governorates only. Multi-center study is recommended with the inclusion of volunteers from different Egyptian governorates aiming to represent all Egyptians in the study.

The PFCN is similar to other not routinely assessed nerves as the ulnar palmar cutaneous nerve, dorsal ulnar cutaneous nerve, superficial radial nerve, posterior antebrachial cutaneous nerve and medial calcaneal nerve in which their lesions and their electrophysiological assessment techniques are ignored and not mentioned in many textbooks of clinical neurophysiology [16, 33, 34, 37, 58–60]. This makes the physicians and clinical neurophysiologists unaware of the lesions of the PFCN. Subsequently, PFCN lesions remain undiagnosed. PFCN was only mentioned in the literature as case reports and research articles [11–13, 15, 24]. As a fact, it was reported that PFCN neuropathy is uncommon and rare [9–15, 19, 24]. However, there were many cases supposed to be missed in the

Table 7 Correlation between volunteers' age and anthropometric measures with different posterior femoral cutaneous nerve sensory nerve action potential parameters (98 lower limbs from 52 apparently healthy volunteers)

Age and anthropometric measures	Posterior femoral cutaneous nerve SNAP parameters					
	Peak latency (ms)		Conduction velocity (m/s)		SNAP amplitude (μV)	
	r†	*P*	r†	*P*	r†	*P*
Age (years)	0.198	0.051	− 0.268	0.008*	0.059	0.565
Height (cm)	0.460	≤ 0.0001*	− 0.488	≤ 0.0001*	0.094	0.355
Weight (kg)	− 0.059	0.565	− 0.014	0.889	0.198	0.051
BMI (kg/m^2)	− 0.266	0.008*	0.194	0.056	0.159	0.119

BMI, body mass index; SNAP, sensory nerve action potential

* Significant when *P* is < 0.05

† Value of Pearson correlation test

Table 8 Comparison between the present study and previous researches assessed the posterior femoral cutaneous nerve sensory conduction study [1, 29, 30]

Study	Technique	Number of participants (number of assessed lower limbs)	SNAP onset latency (ms) Mean ± SD	SNAP peak latency (ms) Mean ± SD	SNAP conduction velocity (m/s) Mean ± SD	SNAP amplitude (μV) Mean ± SD
Present study	Antidromic study	60 (120)	2.04 ± 0.21	2.86 ± 0.25	59.45 ± 6.36	6.16 ± 2.29
Dumitru et al. [1]	Antidromic study	40 (80)	NA	2.8 ± 0.2	NA	6.5 ± 1.5
Park et al. [30]	Antidromic study	20 (40)	2.4 ± 0.2	2.9 ± 0.2	NA	7.1 ± 1.7
Brooks et al. [29]	Antidromic study	58 (116)	2.0 ± 0.5	NA	52.0 ± 4.0	7.0 ± 2.1

SNAP, sensory nerve action potential; NA, not applicable; SD, standard deviation

clinical practice due to physicians' lack of knowledge and awareness regarding the presence and existence of PFCN focal neuropathy.

The presence of a valid and well-studied electrophysiological technique for the assessment of the integrity of the PFCN makes the physicians able to detect and diagnose suspicion cases of PFCN lesions [1]. This will help in proper diagnosis and subsequently, proper management of these cases [13]. This assessed and validated technique could increase the clinical awareness of the clinical neurophysiologists for PFCN lesions and make the detection of PFCN mononeuropathy to be reachable.

Conclusions

The research provides a reliable electrophysiological PFCN antidromic sensory conduction study and normal cut-off reference values for PFCN SNAP parameters. This is essential for the evaluation of suspected PFCN lesions.

Abbreviations

BMI: Body mass index; CV: Conduction velocity; PFCN: Posterior femoral cutaneous nerve; PL: Peak latency; S: Sacral; SD: Standard deviations; SNAP: Sensory nerve action potential.

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Author contributions

The author (EKAS) contributed in the concepts, design, definition of intellectual content, literature search, clinical studies, data acquisition and analysis, manuscript preparation, editing and revision. The author read and approved the final manuscript.

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There were no sponsors or funders (other than the named author) played any role in study design, data collection and analysis, decision to publish and preparation of the manuscript.
All research facilities are available in our department with no restrictions.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The local Ethics Committee of Faculty of Medicine, Alexandria University, Egypt (IRB NO:00012098-FWA NO:00018699) approved the study. Date of

approval: 17/12/2020; Serial number: 0304951. A written informed consent was given by each participant.

Consent for publication
Consent for publication was given by each participant.

Competing interests
The author declares that he has no competing interests.

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