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Functional asymmetry of lower limbs: A study of *Palthi* posture among Khattris of Lucknow

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The way of taking the *Palthi* position (sitting with crossed legs) was investigated in a group of 185 righthanded and 15 lefthanded subjects. According to the author, the tendencies to place the left leg over the right one or vice versa are associated with the functional asymmetry of the celebral cortex.

It has been widely observed, that different parts of human body show a peculiar symmetry. However, in certain parts of the body there are also morphological asymmetries. They are called bilateral variations. The present study was undertaken to examine these variations. It is based on *Palthi* (leg folding) posture, commonly assumed by the Indians while sitting on the floor. Other people however, sometimes adopt this position during meditation, particularly while practising *yoga*. This trait so far remains unstudied, although a few related aspects of behaviour, like hand clasping, arm folding and handedness, [WIENER 1932; BACKMAN, ELSTON 1962; FREIRE-MAIA, de ALMEIDA 1966; MALHOTRA, VIJAI BHUSHEN 1967; TANDON et al. 1974; CHAURASIA, GOSWAMI 1975] have quite often been investigated. Considering the popularity of *Palthi* in the world due to the spread of *yoga* and our knowledge about unilateral dominance in the lower limbs [SINGH 1970; CHAURASIA, GOSWAMI 1975] the author felt prompted to undertake a systematic study on the variability of this posture among the Khattris of Lucknow and to work out its possible correlation with the cerebral dominance.

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Material and method

The data were collected from Lucknow city (Fig. 1). They comprised 185 right handed and 15 left handed healthy, unrelated individuals. The right handed subjects include 91 males and 94 females, while left handed subjects include 9 males and 6 females. The left handedness was

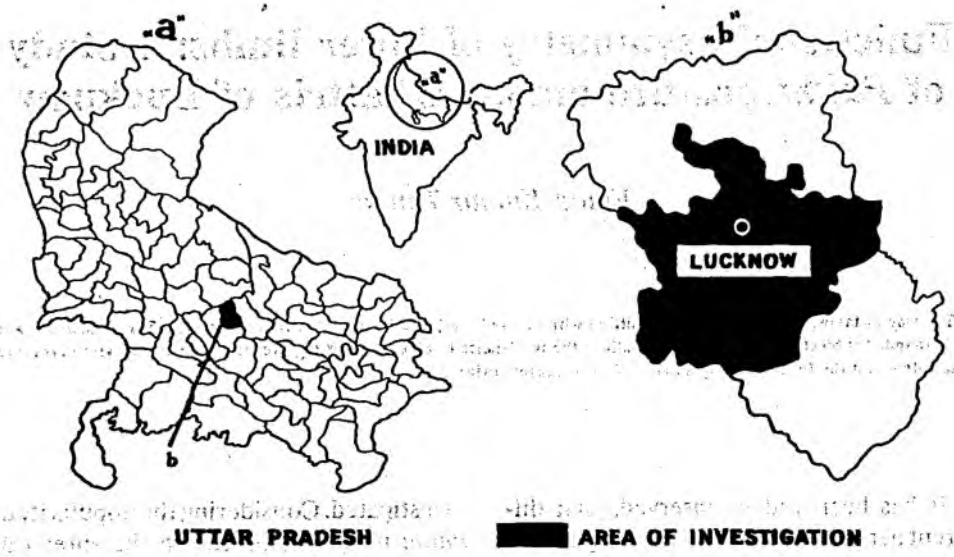

Fig. 1. Area of investigation

determined as suggested by CROMWELL and RIFE [1942].

Anatomically *Palthi* consists of flexion at the knees, flexion, abduction and lateral rotation at the hips and crossing of shins in front of the perineum so that thighs and shins lie in a horizontal plane.

Each subject was asked to assume *Palthi* on a platform. There was no need of prior demonstration because everybody in India is quite familiar with it. The posture was repeated five times at intervals of five minutes, and the upper crossed shin was noted each time. The results were recorded as L-type and R-type depending on whether the upper crossed shin was left or right.

Results

The pattern of *Palthi* posture among Khattris of Lucknow is given in Table 1. Among 185 right handed subjects the *Palthi* of L-type was found in 69.19% and the R-type in 30.81%, while among 15 left handed subjects the frequency of the L-type was 73% and that of the R-type 27%. So in both cases the frequency of L-type was higher than that of the R-type. This similarity is supported by χ^2 test (χ^2 = 0.1140, $0.80 > P > 0.70$).

The preponderance of L-type *Palthi* is strong in both the right handed and left

Table 1. *Palthi* posture among Khattris of Lucknow

Type of *Palthi*	right handed			left handed		
	males	females	total	males	females	total
L-type no.	62	66	128	6	5	11
%	68.1	70.2	69.2	66.7	83.3	73.3
R-type no.	29	28	57	3	1	4
%	31.9	29.8	30.8	33.3	16.7	26.7

Table 2. *Palthi* posture in different age groups of right handed Khattris of Lucknow

Age (years)	males				females				χ^2_{m-f}
	L-type		R-type		L-type		R-type		
	n	%	*n*	%	*n*	%	*n*	%	
5-10	18	29.0	8	27.6	15	22.7	6	21.4	0.0278
11-20	13	21.0	5	17.2	17	25.8	9	32.1	0.2312
21-30	19	30.7	7	24.1	21	31.8	7	25.0	0.0261
31 and above	12	19.4	9	31.0	13	19.7	6	21.4	0.5416

handed males (68.13% and 66.67%) as well as in females (70.21% and 83.35%), showing thus uniform distribution among right and left handed subjects of both sexes. Further support for this comes from the chi-square test, which reveals that the differences in the two sexes are not significant ($\chi^2 = 0.0935$, $0.90 > P > 0.80$).

Table 2 shows the *Palthi* posture in different age groups of right handed Khattris of Lucknow. From the table it would appear that the frequency of L-type is slightly higher in females than in males except for the 5-10 age group. Statistically the difference is not significant, neither for sex nor for R- and L-type.

Discussion

The findings of the present study leads to the following conclusions:

1. The majority of the persons of both sexes adopt L-type *Palthi*.
2. The age, sex and handedness do not have any correlation with the *Palthi*.

The conclusion of the present study that functionally the L-type *Palthi* is the dominant type is in close confirmity with the earlier studies of SINGH [1970], CHAURASIA and GOSWAMI [1975] and TANDON and PANDEY [1979a].

One dominant cerebral hemisphere leads to dominance of the contralateral hand and foot [DE JONG 1958, ADAMS 1966]. However, the results of the present study are not in the line of the above view, because there is no correlation between handedness and *Palthi* pattern. However, there is ample evidence to prove that the left cerebral hemisphere is dominant for verbal skills, and the right hemisphere for many nonverbal skills, and that the two hemispheres interact to sustain particular functions jointly [PIERCY 1967]. According to TANNER [1953], though the preferences for one sided use of hand, foot and eye are considered to be one of the results of the dominance of one cerebral hemisphere over the other, the intriguing examples of mixed preferences are not uncommon. The old concept of cerebral dominance has been revised not only for intellectual function [PIERCY 1967] but also in the motor function of the lower limbs [SINGH 1960]; CHAURASIA, GOSWAMI 1975; TANDON, PANDEY 1979a] and of the face [CHAURASIA, GOSWAMI 1975; TANDON, PANDEY 1979b]. Predominance of L-type *Palthi* suggests that it is mostly controlled by the right cerebral hemisphere. However, a farther going analysis reveals the importance of the joint activity of both cerebral hemispheres for some functions of the body rather than the dominance of one of them.

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Streszczenie

FUNKCJONALNA ASYMETRIA KOŃCZYN DOLNYCH: BADANIA POZYCJI *PALTHI* U KHATTRI Z LUCKNOW (INDIE). Sposób przyjmowania pozycji *Palthi* (skrzyżowanie nóg w pozycji siedzącej - uda silnie odwiedzione, kolana zgięte, podudzia skrzyżowane przed spojeniem łoniowym) zbadano na losowej próbie 185 praworęcznych i 15 leworęcznych mieszkańców miasta Lucknow w stanie Uttar Pradesh (Indie), należących do grupy Khattri. Stwierdzono, że częstość typu L *Palthi* (lewe podudzie założone na prawe) jest znacznie większa niż typu R (prawe podudzie na lewe), zarówno u leworęcznych jak i u praworęcznych Khattri, niezależnie od płci i wieku. Ponieważ przyjmowanie pozycji *Palthi* jest związane z dowolnymi ruchami mięśni, korowa dominacja może mieć istotny udział w opisywanym zjawisku. Wyniki zdają się sugerować, że słuszniej jest mówić o zróżnicowanym udziale obu półkul mózgu w kształtowaniu indywidualnych zachowań ruchowych niż o jednostronnej dominacji.