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INTER-INDIVIDUAL DIFFERENCES IN MORNINGNESS-EVENINGNESS ORIENTATION: INFLUENCE OF GENDER AND SOCIAL HABITS

Fernando Louzada, Anna Ligia Korczak and Nelson A. Lemos

Departamento de Fisiologia, Setor de Ciências Biológicas, Universidade Federal do Paraná

Corresponding author:
Fernando Mazzilli Louzada
Departamento de Fisiologia
Setor de Ciências Biológicas - Universidade Federal do Paraná
Centro Politécnico - Jardim das Américas
81531-990 Caixa Postal – 19031
Curitiba – PR, Brasil
E-mail: flouzada@fpr.br
TEL: 41 3611552
FAX: 41 3611714

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INTRODUCTION

The human circadian timing system generates multiple circadian rhythms. One of the characteristics of a rhythm is the phase. The circadian phase could be defined as the time at which the circadian rhythm of a variable reaches a particular state (Van Dongen, 1998). Substantial inter-individual differences in the circadian phase of several variables have been observed (Foret, 1982; Kerkhof & Van Dongen, 1996; Duffy et al., 1999; Baehr et al., 2000; Mongrain et al., 2004). Individuals with a relatively early circadian phase are

called morning-types (M-types). Those with a relatively late circadian phase are evening-types (E-types). Morning and evening individuals differ in the phase of their endogenous circadian rhythms (Van Dongen, 1998; Waterhouse et al., 2001). M-type individuals exhibit an earlier phase in physiological markers of the endogenous circadian rhythmicity when compared to E-types (Kerkhof, 1985; Duffy et al., 1999; Baehr et al., 2000; Bailey & Heitkemper, 2001). This characteristic is usually evaluated with a questionnaire; the most widely used being the Morningness-Eveningness Questionnaire (MEQ) of Horne and Östberg (1976). Scores on the MEQ vary from 16 to 86. High scores (59-86) identify M-type individuals, low scores (16-41) correspond to E-types, and scores from 42 to 58 refer to an intermediate type. The biological basis of these differences remains unknown. It has been suggested an interaction between morningness-eveningness and gender; women showing higher MEQ scores when compared to men (Motohashi, 1988**;** Baehr et al., 2000; Adan and Natale, 2002). The distribution of MEQ scores is also likely to be biased by several other factors, such as age, latitude and social habits (Benedito-Silva et al., 1998; Smith et al., 2002).

The aim of this study was to analyze the possible influence of gender and latitude/social habits on the MEQ scores of adults living in two Brazilian cities.

MEQ scores (Benedito-Silva et al., 1990) from 1049 adults, from São Paulo ($23^{o}32'51"$ – latitude South), mean age 22,13 (±4,3) and Curitiba ($25^{\circ}25'40"$ – latitude South), mean age 20,5 (± 3,5), were analyzed. Scores were compared by means of a two-way ANOVA, considering gender and City as factors. The study received prior approval from the institutional Ethics Committee. Table 1 shows the results.

Table 1 – MEQ scores (mean ± SD) in Subjects from São Paulo and Curitiba.

City	São Paulo (n = 464)		Curitiba (n = 585)	
Score	50.4 (± 10.4)		47.8 (± 11.5)	
	Men (n = 120)	Women (n = 344)	Men (n = 280)	Women (n = 305)
	49.4 (± 11.1)	50.7 (± 10.4±)	48.5 (± 11.6)	46.9 (± 11.5)

Subjects from São Paulo showed higher scores when compared to subjects from Curitiba. ($p<0,01$). An influence of gender was detected; women showed higher scores when compared to men ($p<0,05$).

In accordance with previous studies, gender and social habits influences on MEQ scores were detected. These results support the idea that the distribution of MEQ scores is biased by age and latitude/social habits. Inter-individual differences in morningness-

eveningness orientation are attributed to differences in the circadian clock (Roenneberg at al., 2003). In animals, the genetic basis of similar phenotypic differences is well established. Future studies aiming at a better understanding of the genetic basis of temporal organization in humans should take into account age and environmental influences on morningness-eveningness orientation.

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