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Prevalence, behavioral manifestations and associated individual and climatic factors of seasonality in the Korean general population

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Abstract

Backgrounds: Seasonality, an individual trait of seasonal variations in mood and behavior, has received clinical attention for its association with mood disorders. This study aimed to explore the prevalence, specific manifestation, and associated individual and climatic factors of seasonality in the non-elderly adult population.

Methods: Five hundred fifty-two participants [male n = 220; female n = 332; mean age 34.92 years, standard deviation (SD) 10.18] with no psychiatric history were recruited from the Seoul metropolitan area (37°33′58.87″N 126°58′40.63″E). Seasonality was evaluated using the Seasonal Pattern Assessment Questionnaire. Climatic variables used in analyses were averaged over recent 5 years (from 2008 to 2013) on a monthly basis.

Results: The mean global seasonality score (GSS) was 5.53 (SD 3.91), and 16.2% (n = 89) of participants had seasonal affective disorder (SAD) or sub-SAD. The "feeling worst" month in most of the participants with significant seasonality were winter (41.6%) or summer (38.2%). Socio-demographic factors including age and sex were not related to the seasonality. Decreased sunlight amount and diurnal temperature range in a given and previous month, and increased humidity in a previous month showed significant associations with the percentage of participants with the worst mood. The most frequently reported symptom related to seasonality was 'changes in energy level'. Specific manifestations were not significantly different between the winter type and the summer type.

Conclusion: The summer and winter type seasonality in the non-clinical adult population did not differ in terms of behavioral manifestations. Decreased sunlight amount, diurnal temperature range, and increased humidity appeared to be major climatic factors associated with seasonality.

1. Introduction

A regular pattern of seasonal change is observed in a wide range of human biological functions, and is related to the occurrence and aggravation of various physical and mental illnesses [1–3]. Seasonality, which is defined as changes in mood and behavior across seasons [4,5] has been known as an important risk or associated factor of mood disorders [6–8]. Therefore, identification of the biological and environmental factors related to seasonality could contribute to the understanding of the pathophysiology of mood disorders [9,10].

Seasonality as a lifetime trait in a general population is thought to be normally distributed [4,11,12] and to have some genetic basis [13,14]. Not all, but several studies reported the effects of female gender and younger age on greater seasonality [15–18]. Psychosocial factors were also suggested to have an impact on seasonality [19,20]. Among geographic factors, latitude has been most widely studied, although recent studies consistently reported that it might have a minimal effect on the seasonality [17,21,22].

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Given that season is defined by specific characteristics of the weather, climatic factors should be essentially considered in exploring the biological mechanism of seasonality. Considering that depressive mood develops more frequently in fall/winter [23–25] and that light therapy is effective in patients with fall/winter depression [26], external light is expected to be the strongest contributing factor [27]. Most studies that investigated climatic factors considered external light, and reported a significant effect of hours of sunshine ([17]; Mersch et al., 2004). Mercsh et al. (2004) suggested that humidity was another contributing factor, in addition to the day length. Temperature [18,28,29] and global radiation [28] were also reported as factors associated with seasonality. However, to the best of our knowledge, the effect of climatic factors has never been studied in a comprehensive way. Furthermore, most studies focused on the depressive mood of winter (winter type). Given that summer type seasonality (depressive mood in summer) is not infrequent, especially in Asian countries [16,29–31], cumulative and integrated analyses of climatic factors from diverse regions are necessary.

This study aimed to investigate the prevalence and specific behavioral manifestations of seasonality, and to determine socio-demographic factors and climatic factors associated with seasonality in a non-elderly adult, non-clinical population.

Table 1
Demographic characteristics and its effect on the seasonality; results from linear regression analyses (dependent variable: global seasonality score) (N = 552) and multinomial logistic regression analyses (dependent variable: presence or absence of the significant seasonality) (n = 89).

	Descriptive values	B	SE	β	t	p
Age, mean (SD)	34.92 (10.18)	−0.008	0.024	−0.020	−0.321	0.749
Sex, female, n (%)	332 (60.1)	0.392	0.339	0.049	1.159	0.247
College graduated, n (%)	421 (76.3)	−0.626	0.395	−0.068	−1.584	0.114
Currently married, n (%)	262 (47.5)	0.853	0.473	0.109	1.805	0.072

Presence of the significant seasonality			
	OR	95% CI	p-value
Age	1.00	0.97, 1.03	0.866
Sex (female)	0.72	0.45, 1.17	0.182
College graduated	1.27	0.75, 2.15	0.370
Currently married	0.67	0.35, 1.31	0.245

Abbreviations: SD, standard deviation; OR, odds ratio; CI, confidence interval.
Separated were regarded as married; divorced were categorized as unmarried.
The significant seasonality was defined by having either seasonal affective disorder or subsyndromal seasonal affective disorder by the definition from Kasper et al. [5].

2. Methods

2.1. Participants

A total of 552 community participants between 18 and 60 years who lived in the Seoul capital area (37°33′58.87″N 126°58′40.63″E) were recruited. We visited several local communities and companies and recruited anyone who was interested in participation. We also posted advertisement on internal network of Samsung biomedical research center. Mean age of participants was 34.92 (standard deviation = 10.18) and 60.1% (n = 332) was female (Table 1). Participants who participated in our prior study as healthy controls (n = 270) on seasonality and premenstrual symptoms [6], were also included in this study. Those with any history of psychiatric illness, mental retardation, substance abuse, or medical illness and long-term use of hormonal agents known to affect mood were excluded. Written informed consent was obtained from all participants after a complete explanation of the study. This study was approved by the Institutional Review Board of Samsung Medical Center.

2.2. The questionnaire

The Seasonal Pattern Assessment Questionnaire (SPAQ) [27] was used to evaluate the seasonality. The SPAQ is a self-report rating scale containing 6 items measuring seasonal variation in sleep, social activity, mood, weight, appetite, and energy level. Individual items were rated on a 5-point (0–4) scale and the sum of 6 individual items, which represented the global seasonality score (GSS), indicated the global severity of their seasonality. Based on the SPAQ, Kasper et al. [5] defined seasonal affective disorder (SAD; a GSS of >11 in addition to a subjective rating of having at least "moderate" difficulty with seasonal changes) and subsyndromal SAD (S-SAD: a GSS of ≥11 and experiencing no or mild problem with seasonal changes; a GSS of 9 or 10 and experiencing at least mild problem with seasonal changes). We adopted the criteria of SAD and subSAD by Kasper et al. [5] to determine individuals who experienced significant seasonality. Among participants with SAD or sub-SAD, Kasper et al. [5] defined winter type seasonality as feeling worst in January and/or February (with or without any other affected months), and a summer type seasonality as feeling worst in July and/or August (with or without any other affected months). In Seoul metropolitan area, climates start to change dramatically from June (summer) and November (winter) (Fig. 1). Since we were interested in the effects of climates that changed over seasons, winter-type seasonality was defined as "feeling worst" during one of the winter months (November, December, January and February). Summer-type seasonality was defined as "feeling worst" in one of the summer months (June, July, and August). The participants "feeling worst" in both summer and winter months were excluded from summer/winter-type classification [17].

The SPAQ was translated into Korean with the permission of the original author [27]. The translation including back-translation process was refined through an