



# The prevalence of dysplasia and associated factors in patients with atypical melanocytic nevus

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## ABSTRACT

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Melanocytic nevi or moles, are benign proliferations of melanocytes that can appear anywhere on the skin. While most atypical melanocytic nevi are harmless, some may develop dysplastic changes. This cross-sectional study assessed the frequency of dysplasia and related factors in patients with atypical melanocytic nevi. Seventy-one patients clinically suspected of having atypical nevi underwent biopsy. Diagnoses were confirmed by a dermatologist, and histopathological assessments were performed by a pathologist. Demographic and clinical data, including lesion location, were documented. The mean patient age was  $42.47 \pm 15.27$  years; 42 patients were female. Sixty-five cases (91.5%) were confirmed as melanocytic nevi, while 6 cases (8.5%) were non-melanocytic. Dysplasia was found in 2 female patients (3.1%). Lesion distribution was predominantly on the head and face (63.1%), followed by the trunk (26.2%). These findings indicate that most clinically suspected atypical melanocytic nevi are benign, with a low rate of dysplasia in this sample.

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## 1. Introduction

Melanocytic nevi or moles are benign proliferations of melanocytes, the pigment-producing cells located within the epidermis and dermis [1]. Atypical melanocytic nevi, however, display histopathological features that suggest an increased risk of progression to malignant melanoma, a potentially life-threatening form of skin cancer [2,3]. As skin diseases and malignancies represent a significant global health burden, early detection and appropriate screening of atypical lesions are critical for effective prevention and timely intervention [4–8]. The prevalence of dysplastic changes in melanocytic nevi varies considerably across populations and is influenced by the diagnostic criteria applied. This prevalence tends to be higher among older individuals, those with a family history of melanoma, people with numerous nevi, and those with lighter skin phototypes [9–11].

The etiology of dysplasia in melanocytic nevi is multifactorial, involving both genetic and environmental factors. Ultraviolet (UV) radiation is a well-established environmental risk factor that induces DNA damage in melanocytes, promoting atypical changes. Genetic mutations may disrupt cell cycle regulation, contributing to melanocyte proliferation and cytologic atypia [10,12]. Diagnosis of dysplastic nevi relies on both clinical and histopathological evaluation. Clinically, dermatologists apply the ABCDE criteria—Asymmetry, Border irregularity, Color variation, Diameter >6 mm, and Evolution—to identify suspicious lesions [13,14]. Dermoscopy, a non-invasive technique, improves visualization of pigment structures and nevus patterns. However, histopathological examination remains the gold standard for definitive diagnosis [15].

Pathologically, dysplastic nevi are characterized by an irregular and asymmetric architectural growth pattern, poorly defined borders, bridging of rete ridges, and cytologic atypia, including variability in melanocyte size, shape, and pigmentation, with enlarged hyperchromatic nuclei and irregular nuclear contours [16,17].

Given the risk of malignant transformation, long-term monitoring of atypical melanocytic nevi is essential. Although most nevi remain benign, changes such as hyperpigmentation, enlargement, hair growth, keratosis, or secondary infection are generally considered non-malignant [1,18]. Evaluating demographic and histopathological features may aid in early detection and help reduce associated morbidity and mortality [19,20]. Therefore, this study investigated the frequency of

dysplasia and related factors in patients with atypical melanocytic nevi in a tertiary care hospital in northern Iran.

## 2. Materials and Methods

### 2.1 Study design

This cross-sectional study was conducted on 71 patients with clinically suspected atypical melanocytic nevi who underwent biopsy at Razi Educational and Medical Center in Rasht, northern Iran. Participants were recruited using a convenience sampling method, and written informed consent was obtained from all individuals. The study protocol was approved by the Ethics Committee of Guilan University of Medical Sciences [IR.GUMS.REC.1401.401]. Demographic and clinical information, including age, sex, lesion location, and any personal or family history of atypical melanocytic nevi or melanoma, were recorded. All biopsies were performed by a dermatologist and histopathologically evaluated by a pathologist for the presence of melanocytes and dysplastic changes.

### 2.2 Statistical analysis

Data for categorical variables were reported as frequencies and percentages, while continuous variables were presented as mean  $\pm$  standard deviation (SD) or median with interquartile range (IQR), as appropriate. Statistical analyses were conducted using IBM SPSS Statistics, version 22.0 (IBM Corp., Armonk, NY, USA).

## 3. Results

Of the 71 biopsied lesions suspected to be atypical melanocytic nevi, 65 (91.5%) were confirmed as atypical melanocytic nevi and 6 (8.5%) as non-melanocytic nevi. Among the 65 patients with atypical melanocytic nevi, dysplasia was identified in 2 cases (3.1%).

The mean age of the patients was  $42.47 \pm 15.27$  years (range: 13–67 years) (Table 1). Females accounted for 46.6% ( $n = 42$ ) of patients with atypical melanocytic nevi, and both cases of dysplasia occurred in female patients (4.8%); no dysplasia was observed among males. One patient with dysplasia reported a previous history of dysplastic nevi, and another reported a family history of melanoma in a first-degree relative.

**Table 1.** Frequency of dysplasia in melanocytic nevi biopsy according to the mean age of patients.

Melanocytic nevi	Numbers of patients	Age (year) Mean $\pm$ SD	Age (year) Median (IQR)	Age (year) Minimum	Age (year) Maximum
Dysplasia	2	32.7 $\pm$ 0.07	32 (27, 37)	27	37
No dysplasia	63	42.15 $\pm$ 81.38	41 (32, 55)	13	67
Total	65	42.15 $\pm$ 47.27	41 (32, 55)	13	67

Regarding lesion location, atypical melanocytic nevi without dysplasia were most commonly found on the head and face ( $n=41$ , 63.1%), followed by the trunk ( $n=17$ , 26.2%), upper limbs ( $n=4$ , 6.2%), and lower limbs ( $n=3$ , 4.6%). Dysplasia was not observed in lesions located on the head, face, or lower limbs. Of the 17 trunk lesions, 1 (5.9%) showed dysplasia, and among 4 lesions on the upper limbs, 1 (25%) showed dysplastic changes.

#### 4. Discussion

Melanocytic nevi arise from the proliferation of melanocytes located at the junction of the epidermis and dermis. These moles may be congenital or acquired during childhood, although they most commonly appear after birth and are prevalent worldwide. They represent a biological spectrum ranging from common benign nevi to melanoma, sharing overlapping morphological and molecular characteristics with both [1,21].

Despite the lack of a universally accepted definition, dysplastic melanocytic nevi are clinically significant due to their association with an increased risk of melanoma development.

In this study, we investigated the frequency of melanocytic nevi, the presence of dysplasia, and associated factors in patients with clinically suspected atypical melanocytic nevi. Our findings showed a dysplasia prevalence of 3.1% among the examined lesions. In comparison, Dessinioti et al. reported that 51%–65% of nevi in nevus-associated melanoma cases were dysplastic, with dysplastic nevi present in 56% of invasive melanoma and 71% of melanoma *in situ* cases [11]. Similarly, Avcı et al. found that approximately half of their cases exhibited low-grade dysplastic nevi, while no dysplasia was reported in some [22]. In a study by Amirnia et al. on patients with congenital melanocytic nevi, 5.6% of lesions were suspicious for malignancy, of which 1.9% progressed to melanoma [23].

In our study, most patients were middle-aged females. Dysplasia was observed exclusively in younger female patients. Erfan et al. similarly reported that scalp melanocytic nevi occurred at a younger mean age, without significant gender predominance [24]. Other evidence suggests a higher prevalence of *de novo* melanoma, compared to nevus-associated melanoma, among females and older individuals [25]. Additionally, previous reports have demonstrated age-related trends in nevus count, with a peak incidence between ages 21–30, followed by a gradual decline [26].

Anatomical distribution also varies by sex. For example, one study reported that most melanocytic nevi in females were found on the lower limbs, whereas in males, nevi were more commonly located on the trunk [26]. Yalçınkaya İyidal et al. found higher nevus prevalence among males, with more lesions located on the scalp, face, and trunk [27].

In our study, atypical melanocytic nevi were predominantly located on the head and face, while

dysplasia was only identified in lesions on the trunk and upper limbs. Whiteman et al. reported that while nevus location did not differ significantly between one-year-old boys and girls, by age three, boys tended to have more nevi on the face, ears, and neck, while girls had more on their limbs [28].

This study has limitations, including its relatively small sample size and single-center design, which may restrict the generalizability of the results. Moreover, because of retrospective nature of study, we did not assess other potential risk factors, such as nevus size and number, sun exposure, sunscreen use, or behavioral factors, which could influence the risk of dysplasia.

This study demonstrated that atypical melanocytic nevi were most commonly located on the head and face, while dysplasia was uncommon and observed only in female patients. Dysplastic changes were found exclusively in lesions on the trunk and upper limbs. These findings highlight the importance of careful monitoring, particularly among females and for nevi located on the trunk and upper limbs, to enable early detection of dysplastic changes and reduce melanoma risk.

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#### Authors' contributions

Study concept, design and supervision: RR, KGN. Acquisition, analysis, or interpretation of data: NP, RR, KGN. Drafting and critical revision of the manuscript: RR, NP, KGN. All authors read and approved the final version of manuscript.

#### Conflict of interest

No potential conflict of interest was reported by the authors.

#### Ethical declarations

The study design was approved by the local Ethic Committee of the Guilan University of Medical Sciences (IR.GUMS.REC.1401.401). Also, informed consent obtained from all participants in this study.

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