Local allergic rhinitis in children*

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Dear Editor:

Local allergic rhinitis (LAR) is one of the endotypes of rhinitis. Despite much data about epidemiology diagnosis and treatment in adult patients with LAR, there is little information on children [(1)]. Many studies indicate the need for such an assessment of the phenomenon in children, which results in one meta-analysis based on young patients selected from cohorts of patients of different ages [(2)].

This observational study aimed to assess the proportion of patients with LAR within the chronic rhinitis group in children between 5-17 years of age in the Polish population based on a restrictive method of diagnosing this endotype of rhinitis. The study was approved by the local bioethics committees of the Medical University of Silesia in Poland (KNW-1-131/N/9/K).

In the prospective multi-centre trial, nine hundred sixty children were examined. This study was conducted in in specialised allergy or ENT centres between 2020 -2021. Inclusion criteria were: age between 5-17 years, intermittent or persistent rhinitis according to ARIA with documented minimum 12 months treatment and signed informed consent [(3)]. Patients with respiratory infections within four weeks before the initiation of the study were excluded. The sample population was representative of the polish children population according to statistical data from 2021 [(4)]. The characteristics of the study group are presented in Table S1 (online supplementary materials).

The following procedures were performed: a complete ENT- examination, skin prick tests and serum concentration of specific IgE to common inhalant allergens (*D. pteronyssinus*, *D. farinae*, grass pollen, hazel, alder, birch, *Alternaria*, *Cladosporium*, mugwort, dog and cats), nasal provocation tests (NPT) and basophil activation tests (BAT) with a suspected allergen.

NPT was performed using Acoustic Rhinometer A1 (GM Instruments, Kilwinning, UK). These tests were performed according to the Standardization Committee on Acoustic Rhinometry guidelines and the EAACI position paper [(5)]. BAT was performed using blood samples obtained before and one hour after NPT according to the Rentzos protocol [(6)].

Based on performed diagnostic procedures, LAR was confirmed in 23.5% of patients, SAR in 43.5%, DUAL in 9.9% and NAR in

23% of participants. The characteristics of the selected rhinitis endotypes are presented in the Table S1 (online supplementary materials).

Based on NPT results, allergy to HDM was dominant in the LAR group (64%) as grass in the SAR group (41%), and the grass and HDM in the DUAL group (33% and 64%). Details are presented in Figure 1.

The frequency of sensitisation to mites was significantly higher in patients with LAR compared to SAR in both analysed BAT and NPT methods ($p<0.05$). Approximately 5% of false positive NPT results were observed in LAR groups. In these patients, a borderline positive clinical result after NPT was observed, which was not repeated at the next attempt for verification. In these patients, the corresponding BAT result was then often negative. However, these patients are still being monitored towards the LAR. Summarizing, BAT reports both higher sensitivity (100%) and specificity (87%) to diagnose LAR in comparison to lower sensitivity of NPT (89%) and specificity (75%).

This study indicates that children are frequently affected by LAR, and the prevalence is consistent with previous observations (2). Female predominance, common asthma and less frequent atopy in the family distinguish the LAR group from others.

The presented LAR occurrence in children is an underestimated and underdiagnosed problem. BAT seems to be a remarkably reliable method in the diagnosis of LAR.

Authorship contribution

AB: substantial contributions to the conception of the work; methodology; BI: the acquisition and interpretation of data for the work, and supervision; MK: methodology; and acquisition, analysis, validation, and curation of the data for this work; MM: analysis of data .

Conflict of interest

All authors declare no conflict of interests.

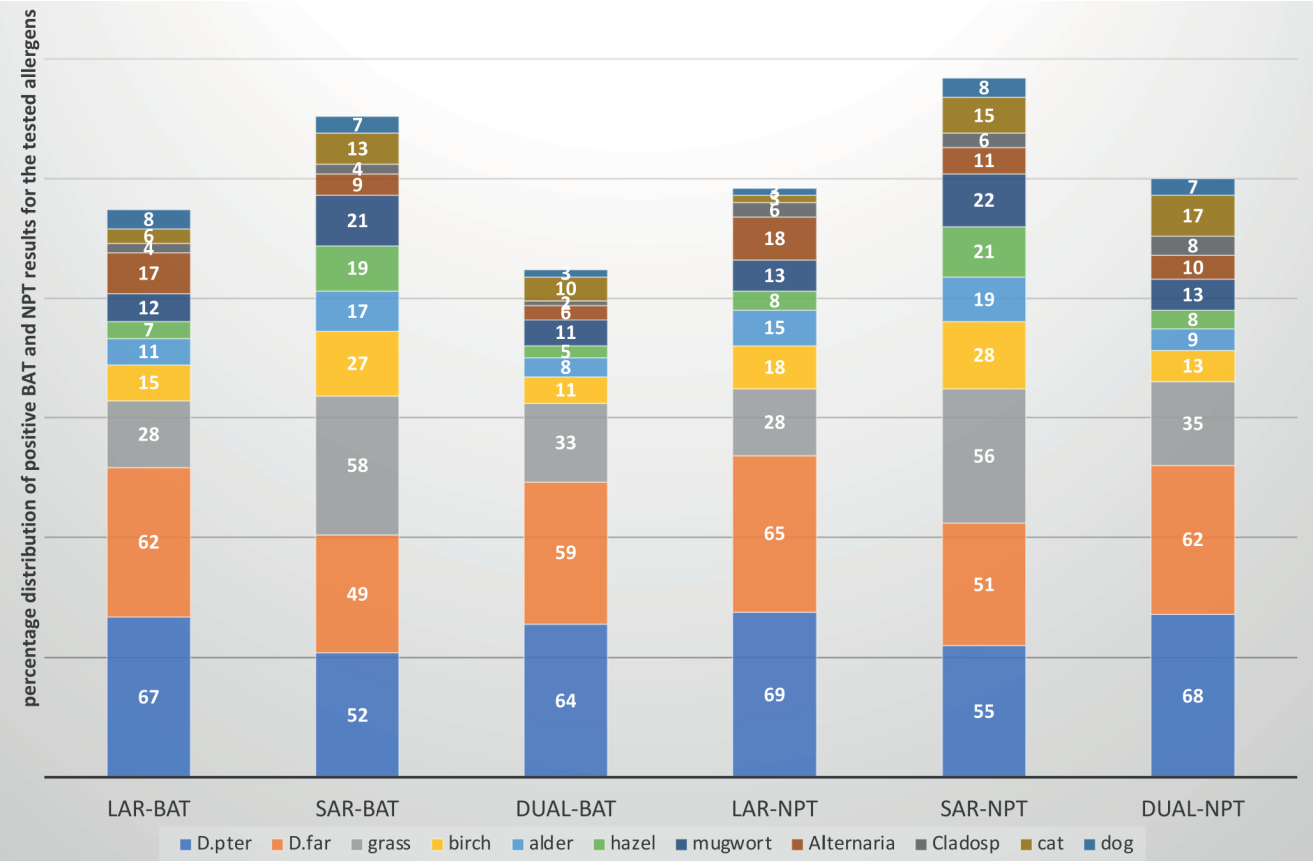

Figure 1. Sensitization profile in tested patients based on BAT and NPT results.

Availability of data

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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This manuscript contains online supplementary material

SUPPLEMENTARY MATERIAL

Table S1. Characteristics of study subgroups.

	LAR (n = 226)	SAR (n = 418)	DUAL (n=95)	NAR (n = 221)
age median with 25%-75% interval, years	9.2 (6.1-13.5)	11.4 (7.3-15.3)	13.2 (10.1-15.4)	8.4 (6.3-12.6)
time of nasal symptoms, median with 25%-75% interval, yrs	4.1 (0.9-5.7)	2.9 (1.6-4.2)	2.5 (1.4-6.4)	4.4 (3-9.7)
severe/moderate rhinitis	158 (70%)	239 (57%)	67 (70%)	150 (68%)
mild rhinitis	68 (30%)	180 (43%)	28 (29%)	71 (32%)
intermittent	84(37%)	171 (41%)	33(35%)	42 (19%)
persistent	142 (63%)	247 (59%)	62(65%)	190 (81%)
female	154 (68%)	217 (52%)	47 (49%)	113 (51%)
asthma	72 (32%)	88 (21%)	22 (23%)	38 (17%)
AD	5 (2%)	33 (8%)	6 (6%)	2 (1%)
positive family history of atopy	61 (27%)	263 (63%)	53 (56%)	33 (15%)
total IgE median with 25%-75% interval, IU/l	21.6 (17.5-40.5)	193.1 (137-233)	204.7 (143-228)	18.9 (10.5-39.4)
NPT, n = positive results: house dust mites trees mugwort grass molds animals	248 134 (54%) 41 (17%) 13 (5%) 28 (11%) 24 (10%) 8 (3%)	292 106 (36%) 68 (23%) 22 (8%) 56 (19%) 17 (6%) 23 (8%)	250 130 (52%) 30 (12%) 13 (5%) 35 (14%) 18 (7%) 24 (10%)	0 -
BAT, n = positive results: house dust mites trees mugwort grass molds animals	237 129 (54%) 33 (14%) 12 (5%) 28 (12%) 21 (9%) 14 (6%)	247 101 (41%) 24 (10%) 21 (9%) 58 (23%) 13 (5%) 30 (12%)	204 116 (57%) 23 (11%) 11 (5%) 33 (16%) 8 (4%) 13 (6%)	0 -

LAR - local allergic rhinitis (positive NPT to allergen testing negative in SPT and sIgE), SAR - systemic allergic rhinitis (positive NPT to allergens testing positive in SPT and sIgE), DUAL - concomitant systemic and local allergic rhinitis (positive NPT to allergen testing positive in SPT and sIgE and positive NPT to at least one allergen testing negative in SPT and sIgE), NAR – non-allergic rhinitis (negative NPT, SPT and sIgE for allergens), AD- atopic dermatitis, NPT – nasal provocation test, SPT- skin prick tests, sIgE-allergen specific IgE, BAT – basophil activation test, mites- *D.pteronyssinus*, *D,farinae*, trees -birch, alder, hazel, molds -*Alternaria*, *Cladosporium*, animals – cat, dog.