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Prevalence and Descriptive Epidemiology of Atopic Dermatitis and Its Impact on Quality of Life in Singapore

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Competing Interests

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: all authors had financial support from the Saw Swee Hock School of Public Health, National University of Singapore for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Ethics Statement

The study was designed and carried out in accordance with the ethical principles set forth in the Declaration of Helsinki. The research plan was reviewed and approved by an research ethics committee convened by the Saw Swee Hock School of Public Health, National University of Singapore. Informed consent was sought from all participants before their inclusion in the study. No identifying information of study participants was collected at any point in time.

Atopic dermatitis (AD) is a common, chronic, pruritic skin condition that is known to negatively impact the quality of life (QOL) of patients^{1,2}. Due to its increasing prevalence, AD can impose a substantial economic burden on a country's healthcare system.³ A study in 2002 found a prevalence of 20.8% of AD in Singapore schoolchildren aged between 7 and 12 years⁴. However, more recent studies done in other developed countries have shown a higher prevalence of AD.^{5,6,7} The aim of

our study was to determine the prevalence and descriptive epidemiology of AD, other forms of eczema (asteatotic, seborrheic, discoid and stasis) and related conditions (ichthyosis vulgaris, keratosis pilaris, pityriasis alba) in Singaporean adults and children, and to investigate the impact of these conditions on QOL.

We performed a community-based, cross-sectional survey of Singaporeans and permanent residents between the ages of 1 and 80 years. Subjects were recruited from 20 randomly selected housing blocks across Singapore and were assessed in their homes by 30 trained medical students. The UK Working Party Diagnostic Criteria for Atopic Dermatitis was employed to determine a diagnosis of AD. The European Quality of Life 5-Dimension (EQ-5D), Dermatology Life Quality Index (DLQI) and Children's DLQI were used to assess the impact on QOL. A physical examination was offered to all participants and the Investigator's Global Assessment (IGA) score was used to determine severity of AD. Informed consent was obtained from all subjects and their parents or legal guardians if they were less than 21 years of age.

Of 2023 households approached, 845 (41.8%) responded. Of these, 794 were eligible and 546 (68.8%) consented to participate in this study. There were a total of 1110 eligible subjects who completed the questionnaire and 681 individuals agreed to be physically examined. These 681 subjects formed our study sample. There were 379 (55.7%) females and 302 (44.3%) males. There were 531 (78.0%) Chinese, 63 (9.3%) Malay, 70 (10.3%) Indian and 17 (2.5%) from other races, reflecting the overall racial distribution of Singapore. Subjects 18 years of age or younger (children) made up 20.7% of our cohort while 79.3% were above 18 years of age (adults). The overall prevalence of AD was 13.1% (89/681), with a higher prevalence in children (20.6%) as compared to adults (11.1%). 57.3% of the cases had onset of AD before 20 years of age. The most common sites of

involvement were cubital fossae (51.7%), popliteal fossae (41.6%) and neck (33.7%). The most common aggravating factors reported were hot weather (67.4%), exposure to dusty environments (48.3%), and physical exercise (30.3%). A personal history of allergic rhinitis and asthma was reported by 56.2% of the cases. A family history of atopy was reported by 46.1% of the cases. Two most common treatments were topical corticosteroids (56.2%) and moisturizers (48.3%). 15% of the cases were not on any form of treatment. The severity of AD at the time of examination was clear in 44.9%, almost clear in 32.6%, mild in 13.5% and moderate in 9.0%. The prevalence of other skin conditions evaluated in our study, including discoid eczema (1.0%), seborrheic dermatitis (0.9%), asteatotic eczema (0.3%), stasis eczema (1.9%), keratosis pilaris (1.0%), pityriasis alba (1.3%) and ichthyosis vulgaris (1.8%), was low.

With regard to the impact of AD on QOL, 29.5% of participants with AD reported one or more problems with the EQ-5D health descriptive system, compared to 22.6% without AD ($p=0.169$); while 88.6% of AD participants and 77.4% of non-AD participants reported suboptimal global health with the EQ-5D visual analogue scale ($p=0.016$) (Table I). We observed that 68% of participants with 'clear' skin at examination, 55.6% of participants with 'almost clear' skin, 77.8% of participants with 'mild AD' and 100% of participants with 'moderate AD' reported negative DLQI scores.

This study confirmed the high prevalence of AD in the Singapore population, with higher prevalence in children compared to adults. Similar to other studies⁴, we found that dust and heat were reported as common aggravators for AD. These findings suggest that policy measures to improve ventilation facilities in schools or workplaces may help reduce AD flares in our hot tropical climate. We found a relatively high number of participants with AD who were not on

treatment. Proper education on regular treatments in AD should be instituted, in addition to finding better moisturisers to suit Singapore's hot and humid environment.

In conclusion, our community-based study has shown a high prevalence of AD in Singapore, especially amongst children. The prevalence of other associated skin conditions such as stasis eczema or discoid eczema is low. Individuals with AD experience a lower QOL as compared to those without AD. Future studies that establish the long-term health and economic burden of AD and its associated conditions, would be of value.

Contributors

M J A K initiated the study, designed data collection tools, monitored data collection for the whole trial, and drafted and revised the paper. He is guarantor. F Y, S C, J Y S M, R L, N L and S R designed data collection tools, undertook data collection, monitored data collection for the whole trial, wrote the statistical analysis plan, cleaned and analysed the data, and drafted and revised the paper.

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Table I: The association between skin conditions and quality of life

Skin Condition	Presence	Suboptimal /%(n)	Optimal /%(n)	Odds Ratio [95% Confidence Interval]	P-value
EQ-5D weighted score	Yes (n=89)	29.21 (26)	70.79 (63)	1.41 [0.86 – 2.32]	0.169
Atopic Eczema (AE)					
	No (n=589)	22.58 (133)	77.42 (456)	1	
Other skin conditions	Yes (n=51)	35.29 (18)	64.71 (33)	1.88 [1.03 – 3.44]	0.038
	No (n=627)	22.49 (141)	77.51 (486)	1	
EQ-5D health score					
Atopic Eczema (AE)	Yes (n=88)	88.64 (78)	11.36 (10)	2.28 [1.15 – 4.53]	0.016

	No (n=588)	77.38 (455)	22.62 (133)	1	
Other skin conditions	Yes (n=51)	86.27 (44)	13.73 (7)	1.75 [0.77 – 3.97]	0.177
	No (n=625)	78.24 (489)	21.76 (136)	1	
Comparison of the two age groups					
18 and below (n=138)		64.49 (89)	35.51 (49)	1	<0.010
Above 18 (n=538)		82.53 (444)	17.47 (94)	2.60 [1.72 – 3.93]	
For 18 and below (n=138)					
Atopic Ec/Z<Xzema (AE)	Yes (n=28)	71.43 (20)	28.57 (8)	1.49 [0.60 – 3.68]	0.390
	No (n=110)	62.73 (69)	37.27 (41)		

				1	
Above 18 (n=538)					
Atopic Eczema (AE)	Yes (n=60)	96.67 (58)	3.33 (2)	6.91 [1.66 – 28.82]	0.002
	No (n=478)	80.75 (386)	19.25 (92)	1	