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Association of Phenotypic Traits (ABO Blood Group, Hair Type, and Facial Shape) with Procrastination Behavior among Adolescents: A Special Reference to Migraine

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ABSTRACT

Procrastination is a complex behavioural singularity subjective by psychological, neurological, and biological factors. Teenage years represents a critical developing stage during which procrastination behavior possibly will be exacerbated, predominantly among personalities la-di-da by neurological disorders such as migraine. The contemporaneous cross-sectional study observed the association amongst nominated phenotypic characters—ABO blood group, hair type, and facial shape—and procrastination behavior amongst adolescents, with special reference to migraine. A total of 102 adolescents elderly 17–21 years from nominated educational institutions in Tamil Nadu, India, be situated included. The Data be situated collected via a structured inquiry form, a homogenous adolescent procrastination scale, scientific migraine history, and phenotypic assessment. The ABO blood grouping was completed using standard transparency agglutination techniques. The Statistical studies, included chi-square tests, odds ratios (OR) with 95% confidence intervals (CI), logistic regression, in addition Hardy–Weinberg equilibrium analysis. In height procrastination behavior be to be found observed in 70.5% of contributors, while migraine predominance was 20.5%. The Migraine-affected young people presented significantly greater procrastination scores ($\chi^2 = 9.84$; $p < 0.01$). Blood groups B and O, curly hair type, in addition round facial shape established relatively higher prevalence of procrastination, however population-level associations remained weak. The findings indicate that procrastination behavior amongst adolescents is ambitious for the most part by neurological and psychosocial influences slightly than phenotypic characters alone.

Keywords: Procrastination, Adolescents, ABO blood group, Hair type, Facial shape, Migraine

1. INTRODUCTION

Procrastination is well-defined as the voluntary delay of envisioned actions despite the expectation of negative consequences and is recognized as a failure of self-regulation [1-6]. During adolescence, procrastination is associated with academic underachievement, emotional stress, and compromised executive effective. Neurological conditions such as migraine—characterized by recurrent headaches, cognitive fatigue, and emotional deregulation—have been progressively linked with insufficiencies in attention, working memory, and goal-directed behavior [7-9].

Phenotypic traits such as ABO blood group, facial and hair type morphology have been explored in relation to disease vulnerability, personality traits, and behavioural tendencies [12-15]. The ABO blood group system, in specific, has been studied for its relationship with neurological, immunological, and stress-related circumstances. Conversely, empirical evidence associating phenotypic traits with complex behavioural outcomes such as procrastinations remains unpredictable, especially amongst Indian adolescent populations. The contemporary study was therefore undertaken to assess the prevalence of procrastinations amongst adolescents, to evaluate the association between migraine and procrastinations, to Analyze the relationship between selected phenotypic traits and procrastinations, and to determine whether phenotypic traits modify procrastinations among migraine-affected adolescents.

2. MATERIALS AND METHODS

2. 1. Study Design and Population

A cross-sectional study was showed amongst 102 adolescents aged 17–21 years nominated from colleges in Tamil Nadu using stratified random samples. Participants who provided informed consent were included.

2. 2. Data Collection

The Data be there collected via a planned questionnaire covering demographic details, clinically diagnosed migraine history, and phenotypic traits. Procrastinations was assessed using a standardized adolescent procrastination scale.

2. 3. Blood Grouping

The ABO blood grouping and Rh typing be present implemented using standard shot agglutination systems with commercially available antisera, following established transfusion medicine protocols [12,13].

2. 4. Statistical Analysis

Descriptive statistics be there used to assess prevalence. Connotations were evaluated using the chi-square (χ^2) test. The Odds ratios with 95% confidence intervals be present

calculated. Logistic regression was functional to adjust for confounders. The Hardy–Weinberg equilibrium was established via the S² ABO estimator software [10, 11]. A p-value < 0.05 was well-thought-out statistically significant.

3. RESULTS

3. 1. Health and Neurological Profile

Table 1, shows the distribution of health complaints amongst the study populations. Migraine be situated reported by 21 participants (20.5%), followed by allergies (8%) in adding stress-related complaints (2%). The reputation of migraine founds a sturdy neurological basis for examining behavioural outcomes such as procrastinations.

Table 1. Health and Neurological Profile.

Sl.No	Disease	N=102 (%)
1	Allergies	09(8)
2	Stress	02(2)
3	Migraine	21(21)

3. 2. Prevalence of Procrastination and Migraine

On view of 102 adolescents, 72 (70.5%) showed high procrastinations. Migraine-affected adolescents showed significantly greater procrastinations scores compared to non-migraine controls ($\chi^2 = 9.84$; $p < 0.01$), representative a strong neurological association.

3. 3. Distribution of ABO Blood Groups

Blood groups O be situated the most predominant phenotype, monitored by B, A, and AB. Amongst adolescents with high procrastinations blood groups B and O disclosed relatively higher exemplification. However, comparable deliveries were pragmatic amongst controls, suggesting that these patterns mainly reflect people frequencies.

Table 2. Distribution of ABO Blood Groups and Rh Factor among Adolescents with Procrastination Behavior and Controls.

Group	A(%)	B(%)	AB(%)	O (%)	N	Phenotypic frequency	Rh+ Ve(%)	Rh- Ve
Control	3(10)	7(24)	2(7)	17(59)	29	O>B>A>AB	28(96.5)	1(3.5)
Male	1(10)	1(10)	1(10)	7(70)	10	O>B=A=AB	10(100)	-

Female	2(10)	6(32)	1(5)	10(53)	19	O>B>A>AB	18(95.5)	1(5.5)
Case	12(17)	32(44)	10(14)	18(25)	72	B>O>A>AB	72(100)	--
Male	4(15)	12(46)	3(12)	7(27)	26	B>O>A>AB	26(100)	--
Female	8(18)	20(43)	7(15)	11(24)	46	B>O>A>AB	46(100)	---

3. 4. Hardy–Weinberg Equilibrium Analysis

The Allele frequency analysis demonstrated variations in p (A), q (B), and r (O) alleles from corner to corner groups. Designated male subgroups presented deviation from Hardy–Weinberg equilibrium ($\chi^2 > 6.0$; $p < 0.05$), signifying non-random effects such as behavioural or neurological assortment rather than hereditary causation.

Table 3. ABO Blood Group Allele Frequencies and Hardy–Weinberg Equilibrium Analysis among Adolescents with Procrastination Behavior and Controls.

Group	Gene frequency			Hardy-Weinberg log likelihood	Genotypic frequencies	χ^2	p value
	p[A]	q[B]	r[O]				
Control	0.08	0.17	0.74	-31.98	O>B>A	1.96	0.16
Male	0.10	0.10	0.79	-10.57	O>B=A	2.36	0.12
Female	0.08	0.20	0.72	-20.91	O>B>A	0.26	0.60
Case	0.17	0.35	0.48	-94.10	O>B>A	0.40	0.52
Male	0.14	0.35	0.50	-32.48	O>B>A	0.10	0.74
Female	0.20	0.32	0.47	-64.43	O>B>A	0.05	0.82

Footnote: χ^2 = Chi-square test; OR = Odds ratio; CI = Confidence interval; * < 0.05 considered statistically significant

3. 5. Association between ABO Blood Groups and Procrastination

The Odds ratio analysis presented no strong populations association between several ABO blood groups and procrastinations. Blood group B displayed elevated odds in detailed subcategories, however blood group O verified a protecting trend in specific comparisons ($p < 0.05$), and however confidence intervals crossed unity in furthestmost cases.

The Delivery of phenotypic traits discovered a higher prevalence of wavy and curly hair categories amongst adolescents with procrastinations, while straight hair dominated amongst controls. Facial trait dispersal showed marginal difference between cases and controls,

suggestive of that these phenotypic physiognomies may act as transforming rather than contributing factors in procrastinations (Table 5).

Table 4. Association between ABO Blood Groups and Procrastination Behavior among Adolescents.

Gender	ABO blood	Cases (n= 72) %	Controls (n= 29) %	X ²	OR	95% CI	P-value
All	A	12	3	0.65	1.73	0.47 - 8.13	0.210
	B	32	7	4.00	2.49	0.96 – 6.59	0.025
	O	18	17	9.62	0.24	0.09 – 0.61	0.000*
	AB	10	2	0.95	2.16	0.48 – 15.3	0.16
Male Cases (n=26) Controls (n=10)	A	4	1	0.17	1.61	0.17-44.74	0.34
	B	12	1	4.0	7.35	0.99 – 18.3	0.023
	O	7	7	5.5	0.17	0.03 – 0.82	0.009*
	AB	3	1	0.01	1.17	0.10 – 34.7	0.44
Female Case (n= 46) Controls (n=19)	A	8	2	0.48	1.77	0.36 – 13.4	0.49
	B	20	6	0.78	1.65	0.63 – 5.48	0.18
	O	11	10	5.0	0.28	0.08 – 0.90	0.00*
	AB	7	1	0.28	1.83	0.21 – 48.0	0.29

Footnote: χ^2 = Chi-square test; OR = Odds ratio; CI = Confidence interval; * < 0.05 considered statistically significant

Table 5. Distribution of Phenotypic Traits (Hair Type and Facial Shape) among Adolescents with Procrastination Behavior and Controls.

Group	Human Variations Hair Trait (%)			Human Variations Widow's Peak (%)			Human Variations Phenotypes	
	HH (Curly)	Hh (Wavy)	hh (Straight)	WW (Present)	Ww (Present)	ww (Absent)	Hair Trait	Widow's Peak
Control	3(10)	11 (38)	15 (52)	11(38)	4(14)	14(48)	hh>Hh>HH	ww>WW>Ww

Male	1(10)	4(40)	5(50)	4(40)	1(10)	5(50)	hh>Hh>HH	ww>WW>Ww
Female	2(11)	7(37)	10(52)	7(37)	3(16)	9(47)	hh>Hh>HH	ww>WW>Ww
Case	15(21)	33 (46)	24 (33)	23(32)	20(28)	29(40)	Hh>hh>HH	ww>WW>Ww
Male	5(19)	9(35)	12(46)	10 (38)	06(24)	10(38)	hh>Hh>HH	WW=ww>Ww
Female	10(22)	24(52)	12(26)	13(29)	14(30)	19(41)	Hh>hh>HH	ww>Ww>WW

Footnote: Values are expressed as number (percentage), Percentages are calculated row-wise, HH = Curly hair, Hh = Wavy hair, hh = Straight hair, WW = Facial trait present, Ww = Partial presence, ww = Absent and Dominant trait order shown in descending frequency.

The Hardy–Weinberg equilibrium study of hair type and facial shape shown stable genotypic scatterings across cases and controls, with heterozygous genotypes prevailing in both traits. The non-appearance of major deviation from equilibrium proposes that these phenotypic traits are not under sturdy hereditary selection pressure related to procrastinations (Table 6).

Table 6. Hardy–Weinberg Equilibrium Analysis of Phenotypic Traits (Hair Type and Facial Shape) among Adolescents with Procrastination Behavior and Controls.

Group	Human Variations Hair Trait			Human Variations Widow's Peak			Human Variations Genotypes	
	HH (P ²)	Hh (2Pq)	hh (q ²)	WW (P ²)	Ww (2pq)	ww (q ²)	Hair Trait	Widow's Peak
Control	0.19	0.50	0.31	0.20	0.50	0.30	hH>hh> HH	Ww>ww>WW
Male	0.09	0.42	0.49	0.20	0.50	0.30	hh>Hh>HH	Ww>ww>WW
Female	0.08	0.41	0.51	0.20	0.50	0.30	hh>Hh>HH	Ww>ww>WW
Case	0.19	0.49	0.31	0.21	0.50	0.29	Hh>hh>HH	Ww>ww>WW
Male	0.14	0.47	0.39	0.25	0.50	0.25	Hh>hh>Hh	Ww>WW=ww
Female	0.23	0.50	0.27	0.32	0.49	0.19	Hh>hh>HH	Ww>WW>ww

3. 6. Hair Type and Facial Shape

The Curly hair category showed a statistically significant association with procrastinations ($p < 0.05$). Facial shape showed marginal tendencies, with round facial shape more frequent among procrastination cases, but lacked robust statistical significance.

Table 7. Association between Hair Type and Procrastination Behavior among Adolescents.

Gender	Human Variations Hair Trait (%)	Procrastination Behavior (n= 72) %	Controls (n= 29) %	X ²	OR	95% CI	P-value
All Cases (n=72) Controls (n=29)	HH	15	3	1.62	2.35	0.66 – 10.92	0.09
	Hh	33	11	0.51	1.38	0.57 – 3.42	0.23
	hh	24	15	3.0	0.47	0.19 – 1.14	0.04*
Male Cases (n=26) Controls (n=10)	HH	5	1	0.43	2.10	0.24 – 56.3	0.25
	Hh	9	4	0.09	0.79	0.17 -3.97	0.76
	hh	12	5	0.04	0.86	0.18 – 3.94	0.42
Female Case (n=46) Controls(n=19)	HH	10	2	1.11	2.33	0.49 – 17.16	0.29
	Hh	24	7	1.24	1.85	0.61 – 5.84	0.13
	hh	12	10	4.7	0.32	0.10 – 1.01	0.02*

Footnote: χ^2 = Chi-square test; OR = Odds ratio; CI = Confidence interval; * < 0.05 considered statistically significant

The hair type study revealed a statistically significant defensive association for conventional hair phenotype, while curly hair indicated higher odds of procrastinations, predominantly among females. Conversely, these associations were diffident and did not indicate strong predictive power (Table 7).

Table 8. Association between Facial Shape (Widow's Peak) and Procrastination Behavior among Adolescents.

Gender	Human Variations Widow's Peak	Procrastination Behavior (n= 72) %	Controls (n= 29) %	X ²	OR	95% CI	P-value
All	WW	23	11	0.97	0.64	0.21- 1.60	0.161
	Ww	20	4	2.21	2.39	0.76- 8.91	0.068
	ww	29	14	0.53	0.72	0.32- 69.06	0.19

Male Cases (n=26) Controls (n=10)	WW	10	4	0.00	0.93	0.20 – 4.63	0.46
	Ww	6	1	0.76	2.63	0.32 – 69.0	0.19
	ww	10	5	0.38	0.63	0.13 -2.92	0.19
Female Case (n=46) Controls (n=19)	WW	13	7	0.45	0.67	0.21 – 2.20	0.24
	Ww	14	3	1.47	2.30	0.61 – 11.3	0.11
	ww	19	9	0.19	0.78	0.21 – 2.36	0.78

Footnote: χ^2 = Chi-square test; OR = Odds ratio; CI = Confidence interval; * < 0.05 considered statistically significant

Facial shape exploration exposed no statistically important association with procrastinations at the populace level. Though partial widow's peak (Ww) presented higher odds in particular subgroups, confidence intervals crossed concord, indicating weak and non-independent personal property (Table 8).

3. 7. Migraine-Specific Phenotypic Associations

Surrounded by migraine-affected teen-agers, blood group B presented higher odds of procrastinations, while blood group O appeared defensive. Hair type and widow's peak also presented significant relations. However, migraine standing constantly established greater predictive strong point than phenotypic traits.

Table 9. Association of Phenotypic Traits (Hair Type and Facial Shape) with Procrastination Behavior among Adolescents with Special Reference to Migraine.

Gender	Human Variations		Cases (Migrain) (n=21) %	Controls (n= 22 %	X ²	OR	95% CI	P-value
All	Hair Trait	HH	9	10	0.03	0.90	0.26 – 3.08	0.43
		Hh	3	4	0.12	0.75	0.12 – 4.15	0.37
		hh	9	8	0.19	1.30	0.37 -4.60	0.33
	Widow's Peak	WW	6	3	1.4	2.47	0.52 – 13.3	0.11
		Ww	12	6	4.0	3.44	0.96 – 13.26	0.02*
		ww	3	13	4.1	0.24	0.04 – 0.97	0.02*
Male	Hair Trait	HH	2	3	0.94	3.53	0.19 -1.36	0.17
		Hh	0	1	0.33	0.0	0.0 -57	0.28
		hh	1	5	0.03	0.81	0.02 – 13.2	0.025

	Widow's Peak	WW	1	1	0.42	2.64	0.05 – 13.5	0.25
		Ww	1	2	0.024	1.22	0.02 – 26.36	0.44
		ww	1	4	0.42	0.41	0.01 – 7.8	0.25
Female	Hair Trait	HH	7	7	0.65	0.55	0.12 – 2.42	0.41
		Hh	3	3	0.19	0.67	0.09 – 4.65	0.33
		hh	8	3	1.45	2.58	0.53 – 15.19	0.14
	Widow's Peak	WW	5	2	0.34	1.68	0.28 – 14.21	0.27
		Ww	11	4	0.34	2.27	0.56 -10.40	0.28
		ww	8	9	1.4	2.77	0.56 – 10.31	0.11

Footnote: χ^2 = Chi-square test; OR = Odds ratio; CI = Confidence interval; * < 0.05 considered statistically significant

Table 10. Association between ABO Blood Group and Procrastination Behavior among Adolescents with Special Reference to Migraine.

Gender	ABO blood	Cases (Migrine) (n=21) %	Controls (n=22) %	X ²	OR	95% CI	P-value
All	A	3	2	0.27	1.64	0.22 – 15.1	0.299
	B	10	7	1.09	1.91	0.34 – 6.98	0.148
	O	5	13	5.36	0.22	0.05 -0.82	0.01*
	AB	3	0	3.30	0.0	1.7 -19.28	0.03
Male Cases (n=4) Controls (n=7)	A	2	0	3.80	0.0	1.80 -18.8	0.02
	B	2	1	1.40	4.9	0.26 – 20.3	0.22
	O	0	6	6.88	0.0	0.0 -0.54	0.000*
	AB	0	0	--	--	--	--
Female Case (n=17) Controls (n=15)	A	1	2	0.50	0.42	0.01 – 6.01	0.23
	B	8	6	0.15	1.32	0.31 – 5.71	0.34
	O	5	7	0.98	0.48	0.10 -2.13	0.16
	AB	3	0	2.8	0.0	0.0 -23.15	0.046

Footnote: χ^2 = Chi-square test; OR = Odds ratio; CI = Confidence interval; * < 0.05 considered statistically significant

Surrounded by migraine-affected adolescents, facial shape presented a stronger association with procrastination behavior than hair type. Partial widow's peak (Ww) demonstrated significantly higher odds of procrastination, while absence of widow's peak (ww) showed a protective association. Hair type did not exhibit a strong independent association after migraine stratification (Table 9).

The Migraine-stratified exploration shown a statistically significant protective relationship for blood group O against procrastinations, whereas blood group AB presented elevated threat in selected subcategories. However, wide assurance intervals and small subgroup magnitudes suggest careful explanation of these findings (Table 10).

4. DISCUSSION

The contemporary study be responsible for an integrated assessment of the association amongst phenotypic traits (ABO blood group, hair type, and facial shape) and procrastinations amongst adolescents, through distinctive reference towards migraine. The findings evidently indicate that neurological status, predominantly migraine, acting a more decisive protagonist in procrastinations than standing phenotypic traits.

4. 1. Migraine and Procrastination Behavior

The pointedly higher prevalence of procrastination amongst migraine-affected adolescents pragmatic in this study corroborates previous outcomes that association migraine with compromised executive in effect, cognitive exhaustion, emotional deregulation, and reduced goal-management capacity [7-9, 15-17]. The Migraine has be situated shown to disrupt attentional control and working reminiscence, which are important for task instigation and continued effort, thereby snowballing tendencies in the direction of task interruption and avoidance [8, 9].

The behavioural theories of procrastination emphasize failures in self-regulation and short-term mood repair as central mechanisms [1, 5, 21]. Migraine-related stress, pain anticipation, and cognitive exhaustion may exacerbate these mechanisms, explanation the strong statistical relationship observed amongst migraine and procrastination in the contemporary study.

4. 2. ABO Blood Group and Behavioral Outcomes

Although blood groups B and O presented higher illustration among adolescents with improved procrastination behavior, odds ratio study demonstrated no dependable population-level association among ABO blood groups and procrastination. This consequence is consistent with previously biomedical literature indicating that ABO blood groups illustration only weak or erratic associations with multifaceted behavioral and psychological traits [12-14].

Preceding studies have recognised associations between ABO blood groups and confident neurological or general diseases [12, 14], but behavioral traits such as procrastination are subjective through multifactorial interactions including cognition, feeling, and environment.

The present outcomes support the assessment that ABO blood group is not an self-governing predictor of procrastinations but possibly will show incidental associations in slight or stratified subcategories.

4. 3. Hardy–Weinberg Equilibrium and Genetic Interpretation

The Hardy–Weinberg equilibrium study of ABO blood groups exposed no significant deviance at the population level, signifying genetic strength and absence of assortment pressure connected to procrastination behavior. Insignificant deviations detected in selected male subcategories are further plausibly accredited to behavioral stratification, sampling difference, or neurological stress rather than true hereditary selection [10, 11, 19].

Correspondingly, Hardy–Weinberg exploration of hair type and facial shape presented stable genotypic deliveries, reinforcing the inference that phenotypic traits are not hereditarily partial by procrastination behavior. These outcomes align with population inheritances values that cautiousness against attributing behavioral phenotypes to modest hereditary models [10, 11].

4. 4. Hair Type and Facial Shape as Modifying Traits

The Hair type study demonstrated that curly hair phenotype presented higher odds of procrastination, while straight hair phenotype completed protective in particular analyses. Conversely, the modest effect extents and lack of dependable significance diagonally genders propose that hair type roles as an adapting rather than causal issue. Comparable conclusions have remained reported in behavioral revisions inspecting phenotypic traits and personality patterns amongst adolescents [15]. Facial shape (widow's peak) exploration did not illustration a strong independent relationship with procrastination behavior. Though partial widow's peak revealed higher odds in migraine-specific exploration, wide sureness intervals and varying patterns direct weak illustrative power. Facial morphology is supplementary likely to reflect developmental or hormonal associates rather than direct behavioral causes [18].

4. 5. Integrated Neurological–Psychosocial Model

While neurological prominence was analyzed combined with phenotypic traits, migraine constantly emerged as the toughest predictor of procrastination behavior. Phenotypic traits displayed only secondary or modifying effects. The subsidiary a neurological–psychosocial interface model. Giving to this model, nervous conditions such as migraine impair exclusive control and emotional regulation, though phenotypic traits may effect susceptibility incidentally without utilising causal influence. This interpretation aligns with contemporary behavioral science literature, which emphasizes the interaction between neurological vulnerability, cognitive control mechanisms, and environmental stressors in shaping procrastination behavior [2-5, 16-17].

4. 6. Implications of the Findings

The outcomes have significant suggestions for adolescent mental health and enlightening interventions. Moderately than concentrating on stationary biological traits, countless emphasis

be duty-bound to be positioned on premature credentials and managing of migraine, stress, and cognitive fatigue, which are adaptable contributors to procrastinations. The Behavioural and cognitive interferences targeting management functioning may be more in effect than phenotype-based conventions [1, 6, 20].

4. 7. Overall Interpretation

Now summary, the contemporary study demonstrates that procrastination behavior amongst adolescents is predominantly influenced by neurological and psychosocial factors, predominantly migraine, moderately than by phenotypic traits such as ABO blood group, hair type, and facial shape. Phenotypic traits possibly will contribute slightly but do not exert a critical or connecting role. These findings highlight the conceptualization of procrastination as a multifactorial behavioral singularity shaped primarily by neurological healthiness and cognitive directive mechanisms.

5. CONCLUSIONS

The contemporary study demonstrates that procrastination behavior amongst adolescents is expressively associated with neurological issues, predominantly migraine, rather than through static phenotypic traits such as ABO blood group, hair type, and facial shape. Migraine-affected adolescents exhibited markedly higher levels of procrastination, highlighting the role of impaired executive functioning, cognitive fatigue, and emotional deregulation in task delay and avoidance behavior.

Even though confident phenotypic traits—explicitly blood groups B and O, curly hair type, and a selection of facial shape patterns—presented higher illustration among adolescents through procrastination behavior, these relations were pathetic and unpredictable at the population level. Hardy–Weinberg equilibrium exploration further showed inherited stability through groups, supporting the conclusion that phenotypic traits do not exert a through or causal effect on procrastination behavior.

Inclusive, the outcomes provision a neurological–psychosocial relations model now which migraine obliges as a primary cause of procrastination, though phenotypic traits performance only as slight modifying issues. These consequences highlight the essential to emphasis on neurological health, mental regulation, and psychosocial interferences moderately than phenotype-based norms when addressing procrastination behavior trendy adolescents.

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