FREE AMINO ACIDS COMPOSITION OF AQUEOUS HUMOR FROM PAKISTANI SUBJECTS WITH SENILE CATARACT

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Abstract

Free amino acids content of aqueous humor in Pakistani subjects with senile cataract is measured and results are compared with previous studies Most of the amino acids showed lower concentration than those reported for European' and American2 subjects (JPMA 37 67, 1987).

NTRODUCTION

Analysis of aqueous humor has been employed as a diagnostic tool in human beings for certain ophthalmic diseases[3,4] Aqueous humor is 'a transudate of plasma and provides the amino acids required for the synthesis of lenticular proteins[5] The free amino acids composition in ocular fluids has been studied in rat, cat, monkey[6], rabbit[7] sheep[8] and human[1,2,5,9,] dIn this study, we report the free amino acid composition of aqueous humor removed during cataract surgery. The results are compared with the previous studies.

METHODS

Aqueous humor samp1es (100-150 jul) were aspirated from anterior chamber of 13 human subjects (average age 65 years) before removal of the lens. All these had senile cataract uncomplicated by any other medical or ocular disorder such as diabetes, hypertension, uremia or glaucoma. Proteins were precipitated by addition of 25 U of 10% w/v sulfosalicylic acid to 100-150Ul of aqueous humor. The mixture was shaken vigorously and kept for 30 minutes at 4 °C. Clear supernatent was separated from precipitated protein by centrifugation (3000xg) The free amino acids content were measured in 50Ul protein free aqueous humor using Biotronik amino acid analyzer LC-6001 (Biotronik-GmbH, Munich, West Germany).

RESULTS AND DISCUSSION

TABLE – I

Free Amino Acid Composition in Aqueous Humor of Pakistani Subjects with Senile Cataract. The Results (mmoles/l) are Mean ± S.E.

Patient	Sex	Age (years)	Thr	Ser	Glu	Pro	Cit	α-Amino butyric acid	Val	Ile	Leu	Tyr
1	F	62	0.093	0.075	0.014	0.033	0.013	0.015	0.126	0.02	0.043	0.027
2	M	65	0.143	0.08	0.014	0.033	0.044	0.012	0.157	0.036	0.052	0.027
3	M	73	0.118	0.068	0.014	0.055	0.004	0.007	0.144	0.021	0.048	0.027
4	F	60	0.087	0.064	0.011	0.055	0.004	0.007	0.157	0.03	0.04	0.022
5	F	65	0.006	0.026	0.007	0.044	Trace	Trace	0.046	0.008	0.017	0.01
6	M	78	0.075	0.042	Trace	Trace	Trace	Trace	0.03	0.022	0.052	Trace
7	F	60	0.062	0.03	Trace	Trace	Trace	Trace	0.057	0.014	0.024	0.016
8	F	70	0.112	0.04	Trace	0.013	0.008	Trace	0.068	0.022	0.084	0.074
9	M	52	0.087	0.12	0.011	0.027	Trace	Trace	0.089	0.026	0.063	0.019
10	M	58	0.162	0.12	Trace	Trace	0.009	Trace	0.157	0.028	0.073	0.027
11	M	70	0.078	0.05	Trace	Trace	Trace	Trace	0.063	0.01	0.029	0.011
12	M	62	0.164	0.112	0.018	Trace	0.007	Trace	0.238	0.042	0.14	0.076
13	M	70	0.094	0.032	Trace	Trace	Trace	0.042	0.042	0.005	0.01	0.011
		Mean	0.098	0.066	0.012	0.037	0.012	0.016	0.105	0.021	0.051	0.028
		± S.E.	±0.011	±0.009	±0.001	±0.005	±0.005	±.0.006	±0.017	±0.002	±0.009	±0.006

Patient	Phenyl alanine	Gly	Ala	Phospho Serine	Tau	Orn	Lys	His
1	0.042	0.015	0.218	0.051	0.037	0.045	0.039	0.056
2	0.052	0.015	0.145	0.022	0.099	0.006	0.04	0.031
3	0.06	0.026	0.187	0.057	0.077	0.012	0.04	0.063
4	0.056	0.026	0.133	0.057	0.061	0.008	0.029	0.026
5	0.058	0.021	0.097	0.051	0.032	0.007	0.017	0.021
6	0.053	0.01	0.116	0.025	0.033	0.008	0.028	0.046
7	0.024	0.015	0.097	0.055	0.033	0.008	0.016	Trace
8	0.017	0.031	0.095	0.025	0.012	0.024	0.032	0.035
9	0.038	0.019	0.116	0.04	0.03	0.026	0.037	0.07
10	0.096	0.015	0.225	0.057	0.05	0.016	0.069	0.157
11	0.04	0.015	0.087	0.051	0.027	0.008	0.017	0.028
12	0.128	0.019	0.2	0.021	0.036	0.02	0.034	0.07
13	0.021	0.01	0.083	0.03	0.022	Trace	0.015	Trace
Mean	0.052	0.018	0.138	0.041	0.042	0.015	0.031	0.054
±S.E.	±0.008	±0.001	±0.014	±0.003	±0.006	±0.003	±0.003	±0.011

The data presented in Table 1 shows free amino acid composition in aqueous humor of the Pakistani patients. Figure 1 shows a comparison of the previous[7] and the present work. In general, most of the amino acids were found to be in lower concentration in the present study except for glycine which was found to be similar (Figure 1).

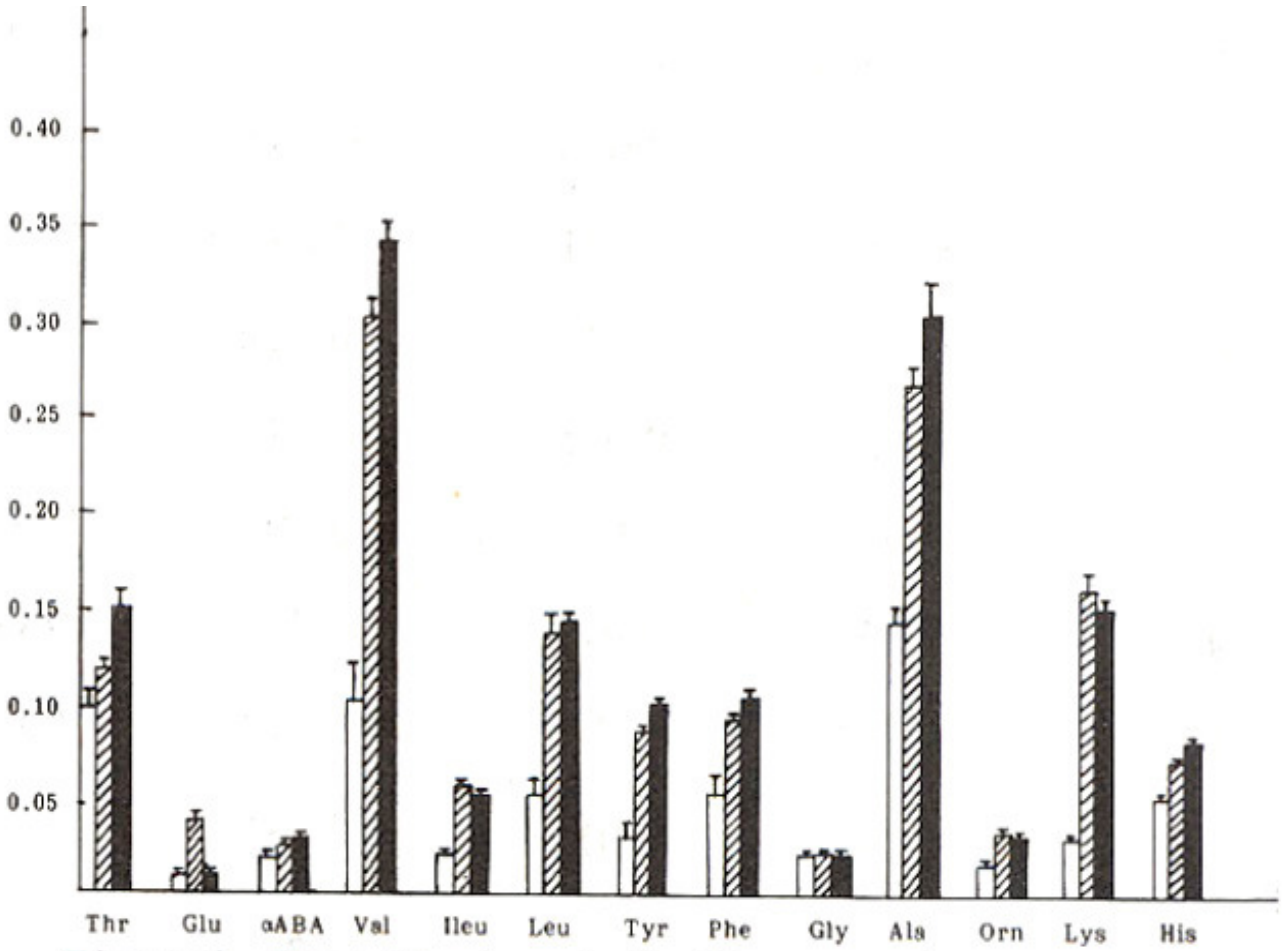

Figure 1. Free (Amino Acids Concentration of aqueous humor in Pakistan ( ), European ( ) and American ( ) subjects with Senile Cataract. All values given are mean; the vertical bar represents standard error.

The levels of proline and citrulline were elevated in Pakistani subjects

TABLE – II

Free Amino Acids in Aqueous Humor of Pakistani, European and American Subjects with Senile Cataract. The Results (mmoles/1) are Mean ± S.E. n represents number of observations.

Amino Acid	Present Study n=13	Hannappel et al.[1] n=24–30	Dickinson et al.[2] n=13
Threonine	0.098 ± 0.011	0.119 ± 0.005	0.15 ± 0.007
Serine	0.006 ± 0.009	0.142 ± 0.005	–
Glutamic acid	0.012 ± 0.001	0.038 ± 0.004	0.01 ± 0.001
Proline	0.037 ± 0.005	–	0.02 ± 0.002
Citrulline	0.012 ± 0.005	–	0.005± 0.001
α–Amino butyric acid	0.016 ± 0.006	0.025 ± 0.001	0.03 ± 0.002
Valine	0.105 ± 0.017	0.292 ± 0.013	0.34 ± 0.008
Isoleucine	0.021 ± 0.002	0.055 ± 0.003	0.05 ± 0.004
Leucine	0.051 ± 0.009	0.135 ± 0.006	0.14 ± 0.005
Tyrosine	0.028 ± 0.006	0.085 ± 0.003	0.11 ± 0.004
Phenyl alanine	0.052 ± 0.008	0.089 ± 0.003	0.11 ± 0.005
Glycine	0.018 ± 0.001	0.019 ± 0.001	0.02 ± 0.003
Alanine	0.138 ± 0.014	0.265 ± 0.012	0.34 ± 0.017
Phospho serine	0.041 ± 0.003	–	–
Taurine	0.042 ± 0.006	–	0.05 ± 0.003
Ornithine	0.015 ± 0.003	0.027 ± 0.002	0.03 ± 0.002
Lysine	0.031 ± 0.003	0.164 ± 0.008	0.15 ± 0.006
Histidine	0.054 ± 0.010	0.067 ± 0.003	0.08 ± 0.004

(Table II) as compared to American[2] subjects. We could not compare these values with that of European[1] data as the results for these were not reported.

It is likely that the variation in the composi-tion reflects the different dietary habits of Pakistani population. The Pakistani food contains relatively low animal protein content. Another possible way to explain this deficit is on account of racial differences and ethnic associated conditions, which need to be examined. Whatever the reason be, it is known that amino acids deficiency leads to cataractogenesis[10,11s] Amino acid deficiency in aqueous humor may initiate, if not cause, the process of

cataract formation. Further studies on amino acid composition of lens and plasma from subjects with cataract are in progress and may help in understanding the earlier onset of cataract in Pakistan.

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