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Research Article

Arsoa Wellness Fasting and Changes of Mood Detected by POMS, with Special Reference to Mineral Concentration

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Abstract

Although the health benefits of fasting have been reported in various reports, there are no studies on what factors contribute to the improvement in mood by wellness fasting. We used the Profile on Mood State (POMS) questionnaire to study the relationship between biological indicators and inflammatory markers in participants in the Arsoa Fasting Randomized Case-Control Intervention Study. Eighteen factors were correlated with total mood disturbance (TMD) values on the POMS, including blood pressure, glucose, protein, lipid metabolic parameters, and inflammatory markers. In particular, minerals such as Na, K, Cu, Mn, and Mo had an positive effects, and toxic minerals such as Pb and Cd had a negative effects. The fasting group showed a decrease in adverse factors and an increase in Vigor-Activity (VA) one month after fasting.

Keywords: Fasting; RCT; POMS; Mineral; Mood Change; Lifestyle

Introduction

Metabolic syndrome in middle age is a source of lifestyle-related diseases, and as people age, their various functions deteriorate, putting them at high risk for cardiovascular disease, osteoporosis, impaired immunity, frailty, and dementia. In addition to the decline in the quality of life of the elderly, soaring medical costs and the burden of nursing care for hospital visits have become social problems. Fasting is also incorporated into macrobiotic medicine, and by correcting the intestinal tract function, it may be possible to prevent all of these problems at once, and to acquire a way of life aimed at curing pre-symptomatic diseases.

In doing so, one's feelings are important. The POMS does not assess personality traits, but rather measures moods and emotions that change temporarily under certain conditions. Scoring is done quickly and easily on the spot, and the total score for each factor is used to make a decision. Since its publication in 1994, the Japanese version of the POMS has been used in a variety of clinical, workplace, and school settings for 10 years [1-3]. The relationship between diet and mood has not been well studied. In addition, the relationship with fasting is an untouched field. In our series of studies, we have found that fasting improves the intestinal environment and the gut-kidney and gut-brain connections [4,5]. The Arsoa fasting program to date has resulted in improvements in glucose and lipid metabolism, weight loss, and bowel movements, as well as improved quality of life. In this study, we analyzed the relationship between various biomarkers and POMS, with special reference to trace minerals. This method may keep patient adherence high and clarified the behavioral science aspects.

Methods

The study was conducted with members of the general public who applied through the Arsoa Lifestyle Academy and other organizations. Sixty people who gave consent to participate were randomly divided into three groups: a fasting group (FS), a supplement group (S), and a no-treatment control group (C).

The fasting group fasted for four days and three nights at a training facility in Kobuchizawa, while the control and supplement groups lived an everyday life at home. The S group took the same supplements [Arsoa Koso (enzyme solution), Cell energy, and Lyforidin minerals] as the F group, and physical measurements and blood samples were taken at the clinic on designated days. Details of interventions were shown in the previous paper [6].

On the first day, FS Group completed a questionnaire, interview, and body composition assessment, which served as baseline data. At the start of the study, participants were instructed on diet and exercise therapy, followed by a fasting period during which they recorded their intake, bowel movements, etc. for four days. At the end

and one month later, the same examinations as the initial evaluation were performed.

At baseline (Pre), four days later (Post), and one month later (1mos), moods at each site were surveyed using the POMS questionnaire (short version), and changes over time by the group were analyzed.

Lyforidine minerals given during fasting and for one month included magnesium, calcium, zinc, selenium, vitamin D, potassium, iodine, phosphorus, iron, manganese, and other minerals [7]. Daily calcium intake was 377 mg, potassium 420 mg, magnesium 336 mg, phosphate 31.4 mg, iron 2.5mg, manganese 0.45 mg, zinc 14.24 mg, selenium 20 ug, and iodine 29 ug. They received roughly one-third of the amount of DRI. Tea is freely available during this period.

Efficacy measures were evaluated at three-time points: baseline, day four at the end of fasting, and one month later, and test results at each time point were compared.

Since there were only 20 subjects per group, the analysis was a Pro-Post study, and the results were tested with a paired t-test. If parameters (continuous variables) were not normally distributed, they were compared using the Wilcoxon signed-rank test at baseline and the end of the study. Correlations were evaluated using Spearman's rank correlation coefficient or Pearson's product ratio correlation coefficient, depending on the presence or absence of a normal distribution assumption. Statistically significant differences were shown by * ($p < 0.05$) and ** ($p < 0.01$). We used the SPSS and R for statistical analysis.

Biochemical analyses were carried out by Serum Research Laboratory (SRL). In addition to the serum minerals, OligoScan measured almost all minerals non-invasively using an optical measurement method on the palm. The data is analyzed via the Internet based on the Luxembourg developer's extensive database and reported on the spot [7]. We measured 21 non-toxic metals, such as Li, Na, K, Mg, Ca, V, Cr, Mo, Mn, Fe, Co, Cu, Zn, B, Si, Ge, P, S, Se, F, I, and 16 toxic metals, such as Be, Ba, Ni, Pt, Ag, Cd, Hg, Al, Tl, Sn, Pb, As, Sb, Bi, Th, and Gd.

POMS tests were carried out for every participant at baseline (pre), after the fasting (post), and one month later, by using POMS2 ® (Profle of Mood States 2nd Edition) [8,9]. The individual's unique perceptions and interpretations influence the responses, causing measurement errors in the form of response bias. POMS 2 scores are higher when the number of negative and positive mood states experienced is greater or when the intensity of the mood state experienced is stronger, although the POMS 2 rating scale is constant (0=not at all, 1=a little, 2=a fair amount, 3=a great deal, 4=substantially much, 5=very much), the number of items varies from scale to scale. Since the elementary scores of POMS2 are based on different measurement criteria, comparing scales cannot be made properly with the elementary scores. In order to interpret the T-score and percentile rank test results appropriately, the POMS2 elementary scores are converted to standardized scores, i.e., T-scores. A standardized score has a mean of 50 and a standard deviation of 10.

The distribution of T scores between 30-39 are 2-15 percentile, 40-59 are 16-83 percentile, 60-69 are 84-97 percentile, and 70 and above are ≥98 percentile. For TMD (Total Mood Disturbance) scores and negative mood states (AH [Anger - Hostility], CB [Confusion - Bewilderment], DD [Depression - Depression], FI [Fatigue - Apathy], TA [Tension - Anxiety]), the higher the T score on the POMS2, the more likely the respondent was to have negative feelings, or to have a negative mood disorder. The higher the T score on the POMS2, the more strongly respondents reported negative emotions or emotions related to mood disorders. Conversely, higher scores are better for positive emotional states in VA and F.

Results

Our research findings confirm a clear correlation between TMD and age, with younger individuals demonstrating a tendency towards more negative moods (Figure 1). This reaffirms the importance of age in understanding mood variations.

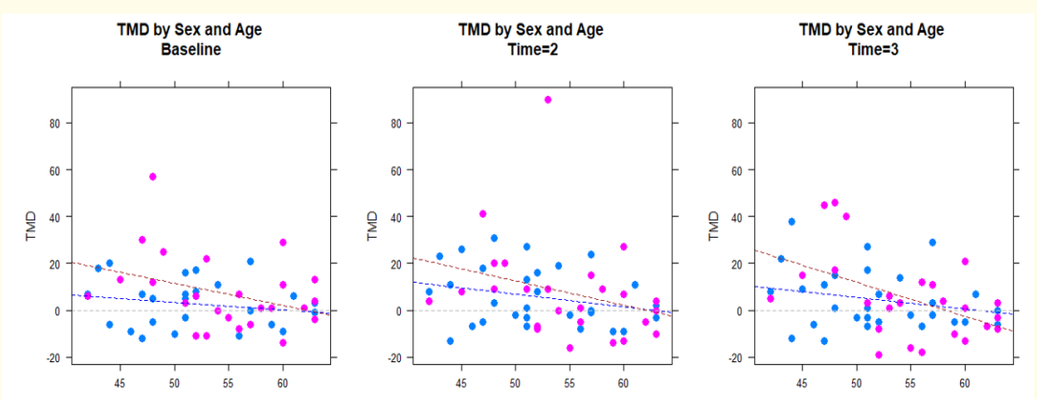

Figure 1: TMD score by sex and age.

The scores tended to be more varied among females (Figure 2). For evaluating the mood changes by the group, TMD was convenient, and then each mood difference among groups could be compared.

The overall TPOMS scores did not change significantly in each group or period, but AH decreased, and VA increased after fasting in the FS group (Table 1). CB, FI, TA, etc., also decreased in the FS group after one month, while VA remained high (Figure 3). The rader chart for the FS group shows a decrease in AH and an increase in VA after fasting compared to baseline (Figure 4). CB, DD, and FI decreased after one month, while VA remained high.

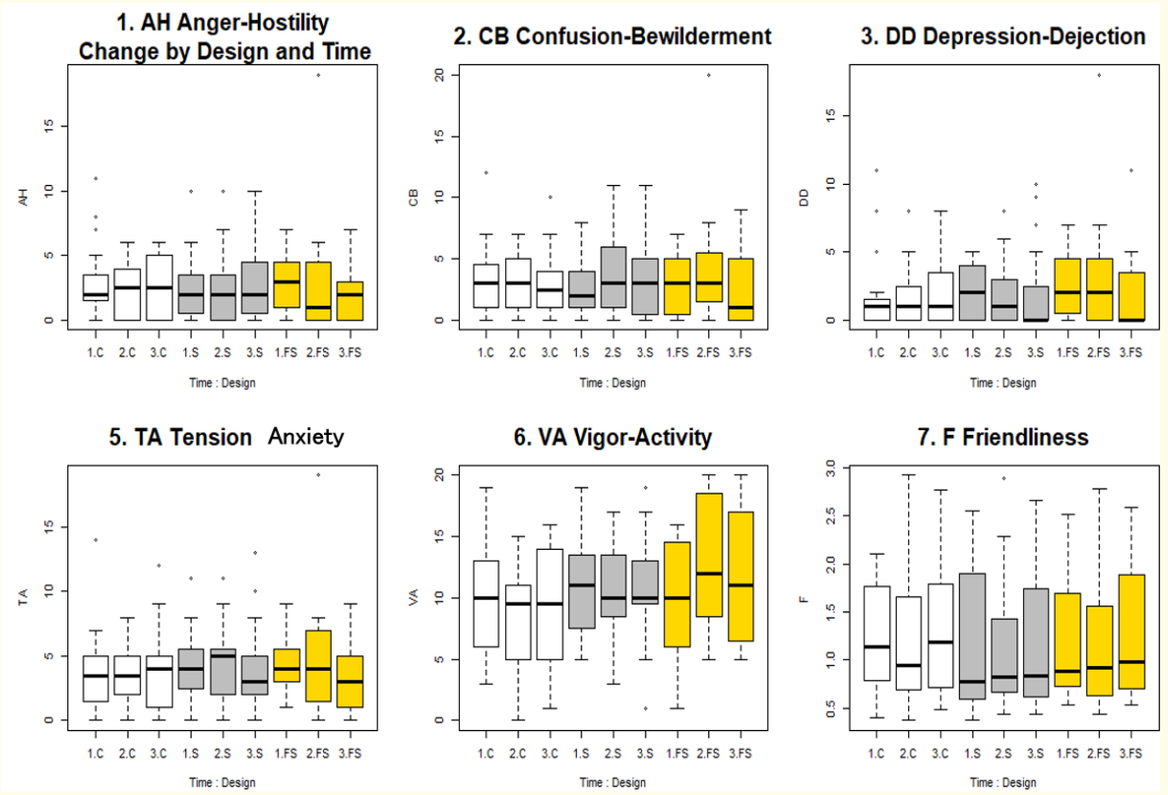

Figure 2: Changes of TMD by the group and time by each POMS factor.

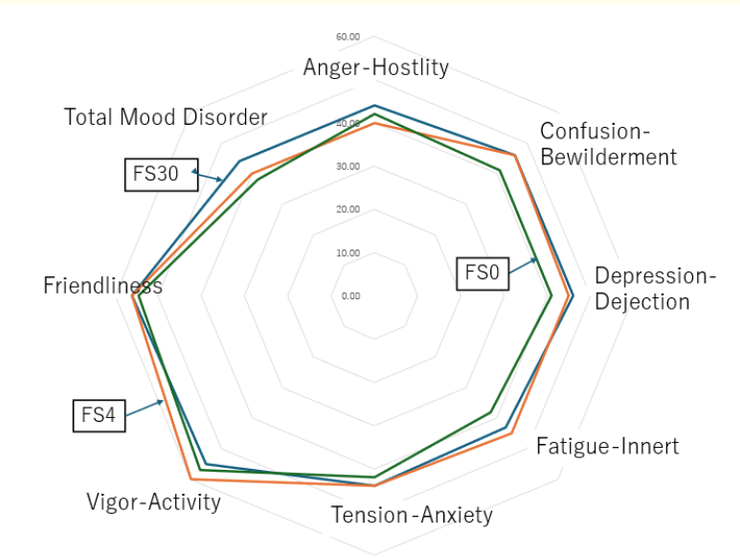

Figure 3: Changes of TMD by time in FS group. Rader chart graph. Decreased Anger-Hostlity and Increased Vigor-Activity are noted.

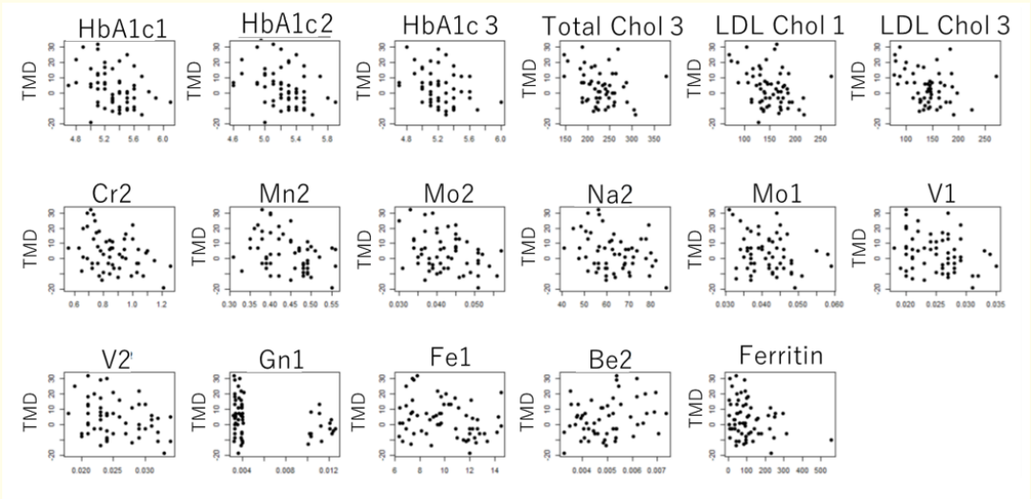

Figure 4: Distribution of TMD by biological factors.

		Pre			Post			1 months later		
		C	FS	S	C	FS	S	C	FS	S
Anger-Hostility	AH	42.0	44.0	42.0	43.0	40*	42.0	43.0	42.0	42.0
Confusion-Bewilderment	CB	46.0	46.0	44.0	46.0	46.0	46.0	45.0	41*	46.0
Depression-Dejection	DD	44.0	46.0	45.0	44.0	45.0	44.0	43.0	41.0	41.0
Fatigue-Inertia	FI	40.0	43.0	41.0	42.5	45.0	42.0	43.5	38*	43.0
Tension-Anziety	TA	43.0	44.0	44.0	43.0	44.0	46.0	44.0	42*	42.0
Vigor-Activity	VA	55.0	55.0	57.0	54.5	60*	55.0	54.5	57*	56.0
Friendliness	F	54.0	56.0	61.0	52.0	56.0	56*	52.0	54.5	58.0
Total Summary	TMD	41.5	44.0	40.0	43.5	40.0	42.0	42.0	38.0	41.0

Table 1: Changes of TPOMS score by groups at different times (Pre, Post, 1 month later).

Next, to determine what factors influence POMS, we examined the correlation between biomarkers and each mood, such as Anger/Hostility, Confusion/Bewilderment, Depression/Dejection, Fatigue/Inert, Tension/Anxiety, Vigor/Activity, Friendliness, and Overall Mood State. Equation: lm(yj ~ sex+age+xi); sex age-adjusted Multiple regression analysis was available to extract coefficient and p-value of xi yj (j=1,...,8) AH, CB,...,TMD. xi (i=6,7,...,). Mark in red for extracting the explanatory variables, such as height, weight,..., when p-value < 0.05.

Since we are focusing on mood in this study, the correlation between all items and TMD was examined, and significant differences ($p < 0.05$) were picked up. Items are; HbA1c1., HbA1c.2, HbA1c. 3, Total Chol3, LDL.cholesterol1, LDL3, Cr2, Mn2, Mo2, Na2, Mo1, V1, V2, Gd1, Fe1, Be2, ferritin1 showed significant correlation (Table 2). The Numbers after each item are time (Pre, Post, and 1 month later). The relationship with HbA1c was the first to attract attention. Many items were mentioned about metals. Only Be was positively correlated, others were negatively correlated. The distribution in the trace correlation diagram is shown below.

The graphs show the distribution of each factor and TMD (Figure). The relationship with HbA1c received the most attention.

Blood pressure, red blood cell markers, sugar, protein, and lipids were found to affect each mood category. Inflammatory markers CRP, IL6, and leukocytes also affected negative moods.

Surprisingly, a wide variety of minerals influenced POMS: Na correlated with CB, DD, TA, etc., and also affected TMD. High Na after fasting decreased VA.

The implications of our study findings are significant. For instance, we found that high K levels lowered TA, while Pb raised it. Pb was correlated with AH and TMD; Cu was correlated with CB and TA; Mn and Mo were positively correlated with VA; and Gd was positively correlated with VA, although in small amounts. These findings have the potential to significantly impact our understanding and Management of blood pressure and related health issues.

	AH		CB		DD		FI		TA		VA		F		TMD	
	Anger-Hostility		Confusion-Bewilder		Depression-Dejection		Fatigue-Inertia		Tension-Anxiety		Vgor-Activity		Friendliness		Total Mood Point	
	CC	p.value	CC	p.value	CC	p.value	CC	p.value	CC	p.value	CC	p.value	CC	p.value	CC	p.value
Height	0.013	0.806	-0.021	0.687	0.005	0.921	-0.135	0.042	0.012	0.838	0.022	0.823	0.031	0.699	-0.149	0.603
Systolic BP1	0.135	0.006	0.072	0.148	0.030	0.388	0.056	0.301	0.055	0.290	-0.091	0.358	-0.060	0.447	0.438	0.082
Systolic BP2	0.194	0.017	0.037	0.597	0.001	0.988	0.085	0.113	0.118	0.135	-0.149	0.316	-0.052	0.497	0.584	0.107
Systolic BP3	0.187	0.023	0.100	0.263	0.062	0.234	0.071	0.399	0.116	0.216	-0.038	0.827	-0.067	0.590	0.574	0.196
Hb	0.731	0.035	0.220	0.521	-0.117	0.728	0.189	0.669	0.104	0.781	0.685	0.288	0.038	0.942	0.442	0.813
Ht	0.239	0.025	0.036	0.737	-0.038	0.716	-0.033	0.809	-0.057	0.620	0.127	0.526	-0.029	0.860	0.020	0.972
MCV	0.092	0.244	0.187	0.013	0.122	0.103	-0.050	0.613	0.140	0.091	0.208	0.150	0.133	0.263	0.283	0.500
MCV2	0.152	0.088	0.232	0.006	0.131	0.124	-0.007	0.947	0.171	0.066	0.259	0.105	0.163	0.213	0.418	0.377
MCV3	0.199	0.030	0.238	0.006	0.153	0.075	-0.019	0.865	0.196	0.034	0.194	0.225	0.149	0.273	0.573	0.217
MCH	0.139	0.479	0.440	0.019	0.255	0.171	0.097	0.696	0.468	0.021	0.565	0.114	0.349	0.235	0.835	0.422
MCH2	0.135	0.559	0.476	0.030	0.259	0.238	0.097	0.737	0.458	0.055	0.673	0.102	0.438	0.192	0.753	0.537
MCH3	0.376	0.119	0.553	0.015	0.359	0.108	0.099	0.730	0.636	0.007	0.618	0.137	0.407	0.249	1.405	0.245
MCHC	-0.221	0.605	0.396	0.340	0.070	0.864	0.965	0.067	0.943	0.033	0.838	0.282	0.470	0.462	1.314	0.561
glucose1	0.016	0.382	0.006	0.750	0.001	0.967	0.065	0.004	0.019	0.338	-0.059	0.075	-0.037	0.176	0.165	0.087
glucoalbumin2	-0.875	0.034	-0.470	0.246	-0.298	0.457	-0.394	0.454	-0.254	0.565	0.557	0.461	0.693	0.259	-2.847	0.196
HbA1c.1	-0.870	0.465	-2.350	0.039	-3.178	0.004	-2.334	0.115	-1.699	0.174	1.856	0.395	1.630	0.361	-12.289	0.048
HbA1c.3	-1.626	0.277	-1.773	0.213	-2.830	0.038	-3.183	0.066	-1.931	0.198	4.014	0.115	2.815	0.194	-15.357	0.036
insulin3	0.048	0.181	-0.007	0.836	-0.018	0.609	0.129	0.003	0.019	0.614	-0.113	0.082	-0.097	0.068	0.283	0.132
insulin2	0.062	0.050	0.016	0.599	-0.006	0.848	0.016	0.680	-0.014	0.656	-0.035	0.527	0.015	0.746	0.109	0.498
BUN3	0.026	0.783	0.069	0.439	0.132	0.123	0.169	0.117	0.063	0.499	-0.272	0.085	-0.348	0.008	0.729	0.112
Total protein3	0.174	0.828	0.498	0.524	-0.044	0.954	1.032	0.304	0.059	0.944	4.070	0.004	2.324	0.050	-2.350	0.580
Total protein2	-0.083	0.922	-0.570	0.479	-0.312	0.691	0.975	0.322	-0.460	0.589	2.931	0.039	1.971	0.105	-3.382	0.421
Albumin1	-1.209	0.342	-0.866	0.485	-0.948	0.436	-1.340	0.401	-0.937	0.486	5.439	0.017	2.151	0.259	-10.739	0.108
T.Cholesterol3	-0.007	0.393	0.002	0.770	-0.006	0.489	-0.022	0.038	-0.002	0.842	0.022	0.165	0.020	0.107	-0.056	0.215
T.Cholesterol2	-0.008	tio	-0.003	0.731	-0.008	0.375	-0.030	0.005	-0.006	0.525	0.021	0.186	0.019	0.170	-0.075	0.104
LDL cholesterol3	-0.005	0.632	0.000	0.990	-0.006	0.492	-0.023	0.046	-0.005	0.611	0.029	0.098	0.017	0.230	-0.068	0.174
LDL cholesterol2	0.000	0.966	-0.001	0.957	-0.004	0.653	-0.025	0.027	-0.002	0.833	0.027	0.114	0.008	0.583	-0.059	0.231
EPA3	-0.026	0.126	-0.019	0.229	-0.018	0.239	-0.030	0.121	-0.033	0.045	0.026	0.361	0.058	0.015	-0.153	0.064
EPA.AAra3	-4.291	0.160	-3.160	0.281	-2.969	0.297	-4.438	0.216	-5.515	0.071	3.648	0.490	9.561	0.029	-24.021	0.114
CRP3	-1.139	0.364	2.475	0.035	3.171	0.005	-0.550	0.709	0.707	0.576	-3.119	0.145	-1.874	0.304	7.783	0.212
IL.61	0.696	0.037	0.458	0.162	0.192	0.554	0.795	0.058	0.317	0.376	-0.576	0.354	-0.439	0.388	3.033	0.088
IL.63	-0.104	0.819	0.695	0.105	0.510	0.225	1.277	0.014	0.584	0.199	-0.518	0.507	-0.512	0.439	3.480	0.121
WBC2	0.000	0.160	0.000	0.048	0.000	0.092	0.000	0.878	0.000	0.413	-0.001	0.140	0.000	0.494	0.002	0.101

Table 2: Correlation between various biomarkers and POMS factors.

Table 4 shows the concentrations of each mineral. Fasting decreased the concentration of Mg, but supplementation did not change the concentrations of other minerals (Table 4). Mnl increased in both FS and S groups one month after fasting, possibly due to the effect of supplementation.

No detox effect was observed for toxic metals such as Pb, Cd, and As.

Discussion

The distribution of TMD scores showed that female scores were broader than male scores, with six females having negative scores of 20 or more. Still, higher positive scores (VA, F; Vitality, Vigor, Validity) were present among females. Women seemed to be more easily influenced by mood.

	AH		CB		DD		FI		TA		VA		F2		TMD	
	CC	p	CC	p	CC	p	CC	p	CC	p	CC	p	CC	p	CC	p
Na1	0.017	0.943	0.459	0.039	0.543	0.012	0.060	0.837	0.593	0.013	-0.736	0.081	-0.733	0.032	2.409	0.047
Na2	0.158	0.438	0.253	0.197	0.275	0.155	0.082	0.750	0.264	0.214	-0.803	0.025	-0.311	0.298	1.835	0.085
K1	0.588	0.334	-0.350	0.554	-0.545	0.347	-0.533	0.485	-1.338	0.034	0.607	0.587	0.166	0.856	-2.787	0.386
K2	0.498	0.360	-0.841	0.107	-0.618	0.232	-1.290	0.054	-1.228	0.028	0.327	0.739	-0.166	0.836	-3.807	0.182
Cu.1	0.031	0.183	0.049	0.030	0.019	0.397	0.021	0.472	0.022	0.385	0.009	0.833	-0.022	0.533	0.134	0.285
Cu.2	0.021	0.314	0.044	0.025	0.031	0.119	0.007	0.787	0.047	0.027	-0.003	0.943	-0.008	0.801	0.153	0.161
Mn1	-5.553	0.244	-9.334	0.041	-6.435	0.156	-0.245	0.967	-4.542	0.368	14.780	0.088	5.288	0.461	-40.888	0.103
Mn2	-4.995	0.387	-6.665	0.231	-8.635	0.114	-13.676	0.055	-8.517	0.157	25.020	0.013	13.627	0.104	-67.507	0.024
Mo1	-23.021	0.692	3.647	0.948	-43.565	0.430	-87.707	0.225	-74.885	0.218	209.156	0.045	122.325	0.156	-434.687	0.153
Mo2	-34.686	0.552	-13.965	0.805	-45.078	0.417	-65.165	0.370	-24.109	0.693	204.450	0.047	138.329	0.101	-387.453	0.205
Cd1	133.942	0.190	53.039	0.596	-17.669	0.857	265.554	0.036	171.999	0.109	-190.533	0.310	-170.360	0.267	797.398	0.139
Pb1	458.272	0.047	246.730	0.276	274.648	0.216	280.708	0.337	516.653	0.033	-798.456	0.059	-636.524	0.066	2575.468	0.034
Gd1	111.236	0.298	2.156	0.984	-117.190	0.249	-15.206	0.910	-194.691	0.081	397.210	0.039	180.694	0.258	-610.905	0.279

Table 3: Correlation between minerals and POMS factors.

	C	C	C	FS	FS	FS	S	S	S
	Pre	Post	1 month	Pre	Post	2 month	Pre	Post	3 month
Ca +377 mg	510.8	520.95	501.75	495.3	507.2	495.1	504.5	480.3	503.2
Mg ＋336 mg	30.8	31.45	29.1	35.8	28.1	29.1	33	28.6	31.8
P ＋31.4 mg	156.2	143.05	144.35	145.2	150.4	145.4	146.7	166.1	158.9
Si	12.05	11.7	12.1	12.3	12	11.7	12	11.9	11.5
Na	61.85	64.75	62.65	58.1	59.3	56.5	60.3	63.1	63.1
K ＋420 mg	17.95	17.05	17.95	17.1	17.4	15.7	17.7	18.3	18.7
Cu	18	19.2	17.1	17.7	17.8	16.1	17.7	17.7	18.7
Zn ＋15.24 mg	142.1	141.2	137.7	136.4	133.9	132.9	140.4	143	144.2
Fe ＋2.5 mg	9.65	9.95	10.15	9.6	10.3	9.6	10.5	10.1	11.2
Mn ＋0.45 mg	0.4	0.435	0.435	0.41	0.4	0.4	0.43	0.45	0.46
Cr	0.795	0.84	0.82	0.82	0.84	0.76	0.86	0.84	0.86
V	0.026	0.0245	0.025	0.025	0.025	0.023	0.026	0.024	0.025
B	2.285	2.275	2.28	2.24	2.32	2.15	2.19	2.14	2.09
Co	0.0305	0.031	0.0305	0.03	0.03	0.031	0.032	0.032	0.033
Mo	0.0425	0.0425	0.042	0.041	0.042	0.039	0.042	0.041	0.042
I	0.335	0.39	0.34	0.35	0.37	0.35	0.34	0.36	0.33
Li	0.0685	0.0675	0.068	0.076	0.069	0.071	0.068	0.062	0.061
Ge	0.0205	0.021	0.0205	0.022	0.021	0.021	0.019	0.019	0.021
Se＋20 ug	1.54	1.585	1.635	1.68	1.59	1.66	1.58	1.59	1.64
S	51.1	49.85	49.8	49.7	49.8	49.6	49.8	51.2	51.2
F	1.14	0.94	1.19	0.88	0.92	0.98	0.78	0.82	0.83
Al	0.01149	0.01284	0.01268	0.01231	0.01218	0.01177	0.0131	0.01207	0.01196
Al	0.00219	0.002085	0.00218	0.00226	0.00225	0.00248	0.00213	0.00218	0.00205
Ag	0.01041	0.010565	0.009955	0.01034	0.01002	0.01034	0.0106	0.01056	0.01116
As	0.004465	0.00417	0.004365	0.00452	0.0045	0.00502	0.00427	0.00463	0.00416
Ba	0.00643	0.006125	0.006125	0.00604	0.00603	0.00658	0.00593	0.00641	0.00579
Be	0.00509	0.00467	0.004705	0.00512	0.00507	0.00556	0.00492	0.00488	0.00469
Bi	0.00778	0.007635	0.007525	0.0078	0.00778	0.00827	0.00768	0.0081	0.00755
Cd	0.01059	0.01005	0.01015	0.0106	0.01008	0.0112	0.01011	0.00969	0.01062
Hg	0.01153	0.01225	0.01229	0.01126	0.01177	0.01097	0.01073	0.01101	0.01039
Ni	0.00375	0.003785	0.00378	0.00364	0.00352	0.00381	0.00394	0.00373	0.00405
Pt	0.002315	0.002295	0.00226	0.00229	0.00228	0.00234	0.00241	0.0024	0.00242
Pb	0.00808	0.00682	0.008635	0.0073	0.00689	0.00783	0.00815	0.00737	0.0079
Tl	0.00156	0.001485	0.001485	0.00146	0.00146	0.00159	0.00144	0.00155	0.0014
Th	0.00096	0.00092	0.00092	0.0009	0.0009	0.00098	0.00089	0.00096	0.00087
Gd	0.00399	0.00393	0.003695	0.00393	0.00395	0.00394	0.00374	0.00362	0.00389
Sn	0.00748	0.006485	0.007455	0.00627	0.0062	0.00669	0.00791	0.00784	0.00793

Table 4: Concentration of minerals by Oligoscan. Added (+) doses in the first column are additional intake dose by supplement.

Common female complaints include both mental and physical symptoms. Mental complaints include anxiety and irritability, while physical complaints include generalized lethargy, pain, stiffness, numbness, itching, dizziness, palpitations, constipation, diarrhea, and insomnia. Hospital treatment of complaints includes medical examinations and psychosomatic treatment. Medications and counseling are prescribed, and herbal medicines may also be used. Fasting shows integrated effects on these complaints [4-6].

Men may also experience complaints and abnormalities in male hormones, and the autonomic nervous system and stress-related illnesses are also considered. Self-satisfaction and a sense of self-achievement would be the psychological benefits, along with the physical fasting benefits, such as obesity and blood pressure reduction.

Ketone bodies produced by decreased glucose levels may have benefits for mental disorders [10-14].

POMS is advantageous because it is relatively easy to measure mood changes. The relationship between blood pressure and AH, hemoglobin, hematocrit, and red blood cell status have adverse effects on AH, CB, and TA; HbA1c and glucohemoglobin reduce AH, CB, and DD; insulin correlates with AH and FI, and glucose is also associated with FI, and the patient's anxiety and glucose are also related to FI, which may have implications for clinical practice in the future. Protein and albumin correlate with VA and FI, which may also be meaningful for preventing frailty. In lipid metabolism, cholesterol was associated with FI and EPA with TA. Regarding inflammation markers, CRP was associated with CB and DD, IL6 with AH and FI, and the relationship with clinical symptoms such as embarrassment, depression, and fatigue could be quantified.

The effect of minerals on psychological mood was unexpected: Na was associated with many psychological factors and lowered VA and F. Conversely, potassium lowered tension. Toxic metals such as Cd and Pb were correlated with FI, AH, and TA. Although many of these relationships can be inferred in the clinical setting, it is helpful to understand them easily and centrally with OligoScan.

The OligoScan, as demonstrated in this study, emerges as a pivotal tool. It facilitates the centralized and comprehensive understanding of the intricate relationships between physiological factors and psychological mood. This underscores its potential to significantly impact clinical practice in the future [15].

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