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Behavioral Disorders: A Nutritional Checklist for the Educational Practitioner

Ronald F. Bobner
Youngstown State University

Louisa M. Marchionda
Youngstown State University

Carolyn Ridenour
University of Dayton, cridenour1@udayton.edu

Isadore Newman
Florida International University

Mary J. Beaubien
Youngstown State University

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BEHAVIORAL DISORDERS: A Nutritional Checklist

Ronald F. Bobner
Louisa M. Marchionda
Carolyn R. Benz
Isadore Newman
Mary J. Beaubien

Millions of dollars are spent annually on special educational programs for children whose severe behavior disorders prevent them from participating in the regular school setting despite average or above average intellectual capacity. A growing body of research indicates that some of these behavior disorders are related to nutritional problems. (Pfeiffer and Iliev 1972; Kittler 1973; Mayron 1979; and Buckley 1977), and many clinicians support the view that no matter what the etiology of behavioral disorders, nutritional programs can improve the baseline data on medical, social and intellectual achievement, and on personality measures (Palmer 1978). Our purpose here is to present a checklist of physical symptoms associated with dietary problems related to nonadaptive behavior in order to help teachers determine if a medical-nutritional referral is appropriate.

State of the Research

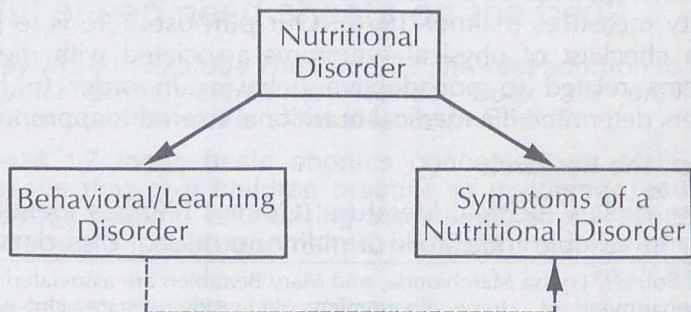
The dietary-medical literature (Grant 1979) has identified valid and reliable indicators of many nutritional disorders. In Ronald Bobner, Louisa Marchionda, and Mary Beaubien are associated with the Department of Home Economics, Youngstown State University, Youngstown, Ohio 44555. Carolyn Benz and Isadore Newman are associated with the College of Education, The University of Akron, Akron, Ohio 44325. This research was supported by Grant #8014-199, Ohio Department of Mental Health.

general, the literature can be classified into three groups: studies of excesses and toxicities, of allergies and sensitivities, and of deficiencies. By contrast, much of the work on behavior disorders/learning disabilities and nutrition is anecdotal. Only a small portion is experimental, and virtually none directly addresses the question of the proportion of variance in these conditions or the percentage of the population accounted for by certain attribute variables. The relative effects of allergies and toxicities on learning disabilities, for example, has not been shown. The diagnostic value of attribute variables such as age, race, sex, and I.Q. are often related to a particular measure of learning but nutritional characteristics and their symptoms have not been usually related to the symptoms of learning or behavioral disorders.

Certain topics such as food allergies/sensitivities have received a disproportionate emphasis, while others such as malnutrition have been relatively neglected in the literature. In addition, it appears that much of the published experimental work is aimed at supporting or negating a particular treatment regimen or diagnostic tool rather than elucidating the underlying mechanisms.

The current research in behavior/learning disorders is just beginning to relate these problems to nutritional abnormalities. Figure 1 illustrates the link between these two conditions.

Figure 1



An example illustrated by this model is provided by lead in the tissues of the body. A toxic reaction to lead (nutritional disorder) produces deposits in the hair (symptom of nutritional disorder). This nutritional intake also is correlated with auditory problems (the behavioral/learning disorder). The presence of the behavioral disorder might lead one to check the hair in order to plan optimal remediation (the dotted line, a potential link).

Recognizing the potential value of such links between physical symptoms and behavioral disorders that stem from nutritional etiology suggested development of the checklist.

Criteria for Inclusion of a Substance

We set two prerequisites for the inclusion of a particular substance in the checklist. At a very minimum a strong tie between a substance and behavioral/learning disorders had to be supported by a variety of anecdotal records of a number of physicians and researchers. In addition, the nutritional disorder caused by the offending substance had to present physical symptoms that are well established in the dietary clinical and/or medical literature. The reference list presented in Table 1 includes those studies which we selected as being representative of the research on a particular substance. (See Table 1.)

Organization of the Checklist

Since, as we mentioned, our review of the nutritional literature relating to severe behavior handicaps and learning disabilities indicated that most studies could be classified as dealing with excesses/toxicities, deficiencies, or allergies/sensitivities, we organized our checklist using this framework. After reviewing the literature we constructed a matrix indicating the physical and behavioral symptoms included in the final checklist. (See Table 2.)

Limitations

Because of the second criterion for inclusion, the existence of well-established clinical symptoms for the associated nutritional disorder, nutritional disorders related to behavioral/

learning disorders which do not present physical clinical symptoms are not represented in the checklist. Furthermore, the instrument does not take into account subclinical excesses/toxicities, deficiencies, or allergies/sensitivities which at more exaggerated levels might evidence clinical symptoms.

Validity

As currently constituted, the checklist has face and content validity. Face validity is assumed when an instrument looks to a respondent as though it is an accurate reflection of the data being collected. "On the face of it" it is acceptable. Content validity has been established by the literature research base. The correlations between the nutritional disorders and their clinical signs have been well established. However, the strength of the association between the specific substances included and their behavioral sequelae vary. It is important to note that one needs to approach different parts of the instrument with varying degrees of confidence. This is evident due to varying amounts of documented evidence for each nutritional symptom. Some disorders, e.g., lead toxicity, may have much more supportive evidence than others at this point in time.

The checklist might be used in known group validity studies to suggest areas of potential research concerning underlying etiologies of behavior/learning disorders. It might also be used in random selection studies to describe the occurrence of these disorders in various populations. Ultimately, such studies would allow an estimate of the percent of variance accounted for in behavior/learning disorders by nutritional phenomena. Correlating experimental results from a pilot study with retrospective case histories will provide a way to test out interpretations of the results.

Table 1 (Substance, Author, Question Matrix), Table 2 (Substance, Physical Symptom, Question Matrix) and Checklist of Clinical Symptoms Related to Severe Behavior Handicaps and/or Learning Disorders are on following pages.

TABLE 1
Substance, Author, Question Matrix
I. EXCESSES/TOXICITIES

Question No.	Checklist	Author, Title
1		Arnold, Christopher, Huestes & Smeltzer MEGAVITAMINS FOR MINIMAL BRAIN DYSFUNCTION
2		Brenner TRACER MINERAL LEVELS IN HYPERACTIVE CHILDREN RESPONDING TO THE FEINGOLD DIET
3		ORTHOMOLECULAR APPROACH TO THE TREATMENT OF LEARNING DISABILITIES
4		Kraus FEINGOLD DIET
5		Rapp ALLERGIES AND THE HYPERACTIVE CHILD
6		Rimland AN ORTHOMOLECULAR STUDY OF PSYCHOTIC CHILDREN
7		Sodeman TRACE ELEMENTS
8		Service HYPOGLYCEMIA
9		Sieben CONTROVERSIAL MEDICAL TREATMENTS OF LEARNING DISABILITIES
10		Thompson BRAIN FUNCTION & VIOLENCE
11		Prasad METABOLISM OF ZINC & ITS DEFICIENCY IN HUMAN SUBJECTS
12		Stevens & Ekvall MAGNESIUM DEFICIENCY & TOXICITY
13		Kalisz, Ekvall & Palmer PICA
14		Myron ALLERGY, LEARNING & BEHAVIOR PROBLEMS
15		Salzman ALLERGY, TESTING, PSYCHOLOGICAL ASSESSMENT AND DIETARY TREATMENT OF THE HYPERACTIVE CHILD SYNDROME

A. Lead
 B. Sucrose
 C. Mercury
 D. Iron
 E. Cadmium
 F. Zinc
 G. Copper
 H. Calcium
 I. Magnesium
 J. Pica

TABLE 1 (Continued)
I. EXCESSES/TOXICITIES

Question #	A. Lead	B. Sucrose	C. Mercury	D. Iron	E. Cadmium	F. Zinc	G. Copper	H. Calcium	I. Magnesium	J. Pica	
16		X									Huges, Dettinger, Leon, Fordyce and Gotkchalk CASE REPORT: A CHEMICALLY DEFINED DIET IN DIAGNOSIS AND MANAGEMENT OF FOOD SENSITIVITY IN MINIMAL BRAIN DYSFUNCTION
17											Levy & Forbes HYPERKINESIS & DIET: A REPLICATION STUDY
18						X					Mayron ECOLOGICAL FACTORS IN LEARNING DISABILITIES
19			X								Silver, Kempe & Bruyn HANDBOOK OF PEDIATRICS
20											Webb IRON DEFICIENCY ANEMIA AND SCHOLASTIC ACHIEVEMENT IN YOUNG ADOLESCENTS
21			X								Needleman LEAD POISONING IN CHILDREN: NEUROLOGICAL IMPLICATIONS OF WIDESPREAD SUBCLINICAL INTOXICATION
22			X		X						Pihl & Parkes HAIR ELEMENT CONTENT IN LEARNING DISABLED CHILDREN
23				X							Maugh HAIR: A DIAGNOSTIC TOOL TO COMPLEMENT BLOOD SERUM AND URINE
24											Kalisz & Ekvall FOOD ALLERGY IN CHILDREN
25											Thiesen & Mills THE USE OF MEGAVITAMIN TREATMENT IN CHILDREN WITH LEARNING DISABILITIES
26											Hamilton & Whitney NUTRITION CONCEPTS AND CONTROVERSIES

TABLE 1 (Continued)
II. DEFICIENCIES

A. Ascorbic Acid (Vitamin C)	Arnold, Christopher, Huestes & Smeltzer MEGAVITAMINS FOR MINIMAL BRAIN DYSFUNCTION
B. Thiamin (Vitamin B1)	Brenner TRACER MINERAL LEVELS IN HYPERACTIVE CHILDREN RESPONDING TO THE FEINGOLD DIET
C. Riboflavin (Vitamin B2)	ORTHOMOLECULAR APPROACH TO THE TREATMENT OF LEARNING DISABILITIES
D. Niacin (Vitamin B3)	Kraus FEINGOLD DIET
E. Pyridoxine (Vitamin B6)	Rapp ALLERGIES & THE HYPERACTIVE CHILD
F. Pantothenic Acid (Vitamin B5)	Rimland AN ORTHOMOLECULAR STUDY OF PSYCHOTIC CHILDREN
G. Biotin	Sodeman TRACE ELEMENTS
H. Cyanocobalamin (Vitamin B12)	Service HYPOGLYCEMIA
I. Folic Acid	Sieben CONTROVERSIAL MEDICAL TREATMENTS OF LEARNING DISABILITIES
J. Vitamin D	Thompson BRAIN FUNCTION & VIOLENCE
K. Zinc	Prasad METABOLISM OF ZINC & ITS DEFICIENCY IN HUMAN SUBJECTS
L. Copper	Stevens & Ekvall MAGNESIUM DEFICIENCY AND TOXICITY
M. Manganese	Kalisz, Ekvall & Palmer PICA
N. Vitamin E	Myron ALLERGY, LEARNING & BEHAVIOR PROBLEMS
O. Iron	Salzman ALLERGY, TESTING, PSYCHOLOGICAL ASSESSMENT AND DIETARY TREATMENT OF THE HYPERACTIVE CHILD SYNDROME
P. Calcium	
Q. Magnesium	
R. Lithium	
Question #	

TABLE 1 (Continued)
III. SENSITIVITIES

A. Milk		Arnold, Christopher, Huestes & Smeltzer MEGAVITAMINS FOR MINIMAL BRAIN DYSFUNCTION
B. Wheat		Brenner TRACER MINERAL LEVELS IN HYPERACTIVE CHILDREN RESPONDING TO THE FEIN-GOLD DIET
C. Chocolate		ORTHOMOLECULAR APPROACH TO THE TREATMENT OF LEARNING DISABILITIES
D. Cola		Kraus FEINGOLD DIET
E. Corn		Rapp ALLERGIES & THE HYPERACTIVE CHILD
F. Citrus Fruit		Rimland AN ORTHOMOLECULAR STUDY OF PSYCHOTIC CHILDREN
G. Eggs		Sodeman TRACE ELEMENTS
H. Seafood		Service HYPOGLYCEMIA
I. Nuts		Sieben CONTROVERSIAL MEDICAL TREATMENTS OF LEARNING DISABILITIES
J. Berries		Thompson BRAIN FUNCTION & VIOLENCE
K. Cereal		Prasad METABOLISM OF ZINC & ITS DEFICIENCY IN HUMAN SUBJECTS
L. Beer		Stevans & Ekvall MAGNESIUM DEFICIENCY & TOXICITY
M. White Potatoes		Kalisz, Ekvall & Palmer PICA
N. Pork		Myron ALLERGY, LEARNING & BEHAVIOR PROBLEMS
O. Chicken		Salzman ALLERGY, TESTING, PSYCHOLOGICAL ASSESSMENT & DIETARY TREATMENT OF THE HYPERACTIVE CHILD SYNDROME
P. Food dyes	X	
Q. Bakers' Yeast		
R. Beans, Kidney		
S. Peas		
T. Tomatoes		
U. Additives (Pres.)		
V. Salicylates		
Question #	1	2
	3	4
	5	6
	7	8
	9	10
	11	12
	13	14
	15	

TABLE 2
Substance, Physical Symptom, Question Matrix
I. EXCESSES/TOXICITIES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A. Lead	X	X	X	X	X	X										X	X			X
B. Sucrose	X					X			X	X			X			X	X			X
C. Mercury																				
D. Iron	X																			
E. Cadmium							X													
F. Zinc															X					
G. Copper						X														
H. Calcium							X		X							X				
I. Magnesium																X				
J. Pica									X											
Question #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

TABLE 2 (Continued)
I. EXCESSES/TOXICITIES

A. Lead		loss of coordination of the muscles, especially of the extremities (ataxia)
B. Sucrose		inflammation of nose or its mucous membranes (allergic rhinitis)
C. Mercury		inflammation of ear (serous otitis media)
D. Iron		inflammation of the membrane lining of the windpipe and bronchial tubes (bronchitis)
E. Cadmium		labored breathing, a constriction in chest with coughing (asthma)
F. Zinc		inflammation of lip (cheilitis)
G. Copper		inflammation of mouth (stomatitis)
H. Calcium		ulcerous sores, especially in the mouth (canker sores)
I. Magnesium		inflammation of skin with itching and exudation of serous matter (eczema)
J. Pica		hives (urticaria)
Question #	21	
	22	
	23	
	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	
	32	X
	33	X
	34	
	35	
	36	

TABLE 2 (Continued)
I. EXCESSES/TOXICITIES

	A. Lead	B. Sucrose	C. Mercury	D. Iron	E. Cadmium	F. Zinc	G. Copper	H. Calcium	I. Magnesium	J. Pica
Question #	37									
	38									
	39									
	40									
	41									
	42									
	43									
	44									
	45									
	46									
	47									
	48									
	49									

widespread thickening of skin at knees, elbows, ankles, and possibly knuckles. Skin may also be wrinkled and cracked.

increased secretion of sebaceous glands around nose (nasolabial seborrhea)

eyelid linings, inner surfaces of cheeks pale (pale conjunctiva)

corners of eyes become cracked and red (angular palpebritis)

bilateral cracks, redness and flaking at corners of mouth (angular stomatitis)

vertical cracks on lips (cheilosis)

purplish-red tongue (magenta tongue)

atrophied taste buds. Tongue appears smooth, pale and slick (atrophic filiform papillae)

tongue is red, painful and taste buds atrophied. Burning and taste changes present (glossitis)

hyperpigmented areas bilaterally on cheeks, forearms, neck, etc. (pellaground dermatosis)

loss of ankle jerks

loss of knee jerks

darkened or brown pigmentation over cheeks and under eyes (malar and supraorbital pigmentation)

TABLE 2 (Continued)
I. EXCESSES/TOXICITIES

Question #	A. Lead	B. Sucrose	C. Mercury	D. Iron	E. Cadmium	F. Zinc	G. Copper	H. Calcium	I. Magnesium	J. Iota
50		X								
51			X							
52										
53										
54										
55										
56										
57										
58										
59										
60										
61										
62										
63										
64										
65										
66										
67						X				

TABLE 2 (Continued)
II. DEFICIENCIES

		inflammation of nose or its mucous membranes (allergic rhinitis)
23		inflammation of ear (serous otitis media)
24		inflammation of the membrane lining of the windpipe and bronchial tubes (bronchitis)
25		labored breathing, a constriction in chest with coughing (asthma)
26		inflammation of lip (cheilitis)
27		inflammation of mouth (stomatitis)
28		ulcerous sores, especially in the mouth (canker sores)
29		inflammation of skin with itching and exudation of serous matter (eczema)
30		hives (urticaria)
31		itching (pruritis)
32		obesity
33		underweight
34	X	ring of fine blood vessels around colored part of eye (circumcorneal infection)
35	X	taste buds look red or pink (hyperaemic papillae of tongue)
36	X	tongue looks granular (hypertrophic papillae of tongue)
37	X	widespread thickening of skin at knees, elbows, ankles, and possibly knuckles. Skin may also be wrinkled and cracked.
38	X	increased secretion of sebaceous glands around nose (nasolabial seborrhea)

A. Vitamin C
 B. Thiamin
 C. Riboflavin
 D. Niacin
 E. Pyridoxine
 F. Pantothenic Acid
 G. Biotin
 H. Cyanocobalamin
 I. Folic Acid
 J. Vitamin D
 K. Zinc
 L. Copper
 M. Manganese
 N. Vitamin E
 O. Iron
 P. Calcium
 Q. Magnesium
 R. Lithium
 Question #

TABLE 2 (Continued)
III. SENSITIVITIES

		loss of coordination of the muscles especially of the extremities (ataxia)
21		
22	X	inflammation of nose or its mucous membranes (allergic rhinitis)
23	X	inflammation of ear (serous otitis media)
24	X	inflammation of the membrane lining of the windpipe and bronchial tubes (bronchitis)
25	X	labored breathing, a constriction in chest with coughing (asthma)
26	X	inflammation of lip (cheilitis)
27	X	inflammation of mouth (stomatitis)
28	X	ulcerous sores, especially in the mouth (canker sores)
29	X	inflammation of skin with itching and exudation of serous matter (eczema)
30	X	hives (urticaria)
31	X	itching (pruritis)
32		obesity
33	X	underweight
34		ring of fine blood vessels around colored part of eye (circumcorneal infection)
35		taste buds look red or pink (hyperaemic papillae of tongue)
36		tongue looks granular (hypertrophic papillae of tongue)
37		widespread thickening of skin at knees, elbows, ankles, and possibly knuckles. Skin may also be wrinkled and cracked.
38		increased secretion of sebaceous glands around nose (nasolabial seborrhea)
Question #		
	A. Milk	
	B. Wheat	
	C. Chocolate	
	D. Cola	
	E. Corn	
	F. Citrus Fruit	
	G. Eggs	
	H. Seafood	
	I. Nuts	
	J. Berries	
	K. Cereal	
	L. Beer	
	M. White Potatoes	
	N. Pork	
	O. Chicken	
	P. Food dyes	
	Q. Baker's Yeast	
	R. Beans	
	S. Peas	
	T. Tomatoes	
	U. Additives	
	V. Salicylates	

**CHECKLIST OF CLINICAL SYMPTOMS
OF NUTRITIONAL DISORDERS[©] RELATED TO
SEVERE BEHAVIOR HANDICAPS
AND/OR LEARNING DISORDERS**

SYMPTOM	SYMPTOM		
	ABSENT	POSSIBLY PRESENT	DEFINITELY PRESENT
1. Waxy pallor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Translucent appearance of skin, particularly around the ears.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Very pale mucous membranes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Lusterless, thin, brittle, flattened and spoon-shaped fingernails and toenails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Coldness and abnormal sensation, such as prickling and itching on hands and feet.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Convulsions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Headaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Abdominal pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Stupor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Breath odor (acetone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Decreased or diminished sense of taste (hypogeusia)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Diminished sense of smell (hyposmia)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Sluggishness, tiredness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Colic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Tendency to drool	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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SYMPTOM	SYMPTOM		
	ABSENT	POSSIBLY PRESENT	DEFINITELY PRESENT
16. Short attention span	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Sweating (excessive)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Limpness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Abnormally rapid heart action	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Loss of muscle coordination, especially in the extremities (ataxia)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Inflammation of nose or its mucous membranes (allergic rhinitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Inflammation of ear (serous otitis media)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Inflammation of the membrane lining of the windpipe and bronchial tubes (bronchitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Labored breathing, constriction in chest with coughing (asthma)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Inflammation of the lip (chelitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Inflammation of the mouth (stomatitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Ulcerous sores, especially in the mouth (canker sores)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Inflammation of skin with itching and exudation of serous matter (eczema)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Hives (urticaria)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Itching (pruritis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Obesity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Underweight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SYMPTOM	SYMPTOM SYMPTOM		
	SYMPTOM ABSENT	POSSIBLY PRESENT	DEFINITELY PRESENT
34. Ring of fine blood vessels around colored part of eye (circum-corneal injection)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Taste buds look red or pink (hyperaemic papillae of tongue)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Tongue looks granular (hyper-tropic papillae of tongue)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Widespread thickening of skin on knees, elbows, ankles and possibly knuckles. Skin may also be wrinkled and cracked.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Increased secretion of sebaceous glands around nose (nasolabial seborrhea)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Redness and cracking in corners of eyes (angular palpebritis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Bilateral cracks, redness and flaking at corners of mouth (angular stomatitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42. Vertical cracks on lips (cheilosis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Purplish-red tongue (magenta tongue)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Atrophied taste buds. Tongue appears smooth, pale and slick (atrophic filiform papillae).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Tongue is red and painful with atrophied taste buds. Taste changes (glossitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Hyperpigmented areas bilaterally on cheeks, forearms, neck, etc. (pellagrous dermatosis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Loss of ankle jerk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Loss of knee jerk.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SYMPTOM	SYMPTOM		
	ABSENT	POSSIBLY PRESENT	DEFINITELY PRESENT
49. Darkened or brown pigmentation over cheeks and under eyes (malar and supraorbital pigmentation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50. Skin diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Ulceration of gums and mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Inflammation of stomach and intestinal tract (gastroenteritis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Extreme thirst	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54. Extreme warmth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Hypersensitivity to light	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Burning sensation of feet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Muscle twitching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Cramps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. Lack of muscle tone (hypotonia)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Body temperature below normal (hypothermia)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Loss of pigment in skin and hair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Dermatitis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Vertical ridging on fingernails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64. Tremors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65. Tetany	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66. Dark circles under eyes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67. Vomiting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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