Special Dermatoglyphic Features Can Be Used As Screening Tools for Autism and Mental Retardation

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Abstract

Specific dermatoglyphics in patients with autism and mental retardation can be used as screening tools for diagnosis. Dermatoglyphics refers to epidermal ridges present on the palm, sole, fingers, and toes. Dermatoglyphics is correlated with genetic abnormalities and is useful in the diagnosis of congenital malformations and mental retardation such as Autism. In this study of plantar dermatoglyphic traits study from autistic patients, we can find the unique dermatoglyphic features in the sole area of autistic patients. By comparing with the normal group, we can find the combination of the asymmetric dermatoglyphic pattern in the sole area of the foot. The most characteristic pattern combination is Arch pattern (A), fibular Loop (L^d) and tibial Loop (L^t) 、（A＋L^d）、（A＋L^t）and（L^d＋A）. 16 out of 98 autistic patients have three combinations, and the ratio is 16.3% high. However, only 4 out of 100 normal subjects had this phenomenon, the ratio was only 4%. Then, the identification of special patterns of palmar and plantar patterns dermatoglyphics, especially the number of ridge counts between palmar triangle points, including RC (A-B), RC (B-C) and the main line a of palmar triangle point stopping at zone 1 (A→ 1), can completely eliminate the error that may occur in normal group. This finding can be used as a detection tool for autism and help to achieve the role of early screening.

Keywords: Mental retardation、dermatoglyphics、hallucal area, genetic abnormalities

Historical context

The cause of autism is still not determined, the thing that can be determined is: 1、the theory of emotional issues has not been accepted, physiological factors are the cause of autism. 2、There is no single physiological factor that explains all the symptoms of autism, which means that autism is caused by a variety of factors.

At present, most scholars believe that autism is a certain type of damage from the central nervous system, resulting in lifelong developmental disorders. The essential disorder is not a problem of sensory path, but a neuron dysfunction in which the brain is responsible for distributing, focusing and learning, which prevents the sensory receptors from using the correct methods and appropriate sensitivity to select stimuli, a neuronal dysfunction that affects both early brain development and the regulation of learning moods, as well as the central reticular formation and related limbic systems that constitute the regulatory system of brain activity and sensitivity, however this system involves psychological functions such as selective attention, coordination of motion and skills. It also determines the level of activity and effectiveness of the sensory path (Trevarthen, Titken, Papoudi, Robarts, 1996).

Most children with autism have different degrees of intellectual impairment, autism is usually social, language development disorders, and generally have stereotypes, repetitive movements, forced adherence to the same strange behavior, although can be distinguished accordingly, but clinically determined cases belong to autistic people or people with low intelligence (MR) still often cause distress, different medical units often have different decisions about a case. About 20% of the causes of mental retardation stem from infection, poisoning and psychosocial factors, 20% due to mechanical damage to the brain and lack of oxygen, unknown reasons account for about 20%, chromosomal distortion and hereditary syndrome about 15%, other factors during the perinatal period about 10% or more, the rest are special sensory defects and metabolic, nutritional and endocrine abnormal patients, the study pointed out that genetic factors are still one of the main causes of mental retardation.

Autism is a physical disorder, from studies that have found it to be related to genetics and chromosomes, to brain injury and brain insanity, due to extensive research into genetic abnormalities and genetic disorders (Penrose and Loesch, 1969, 1970; Schauman and Alter 1976), the formation of dermatoglyphic patterns was associated with testosterone during pregnancy, while testosterone also affected the development of nerves in the brain (Geschwind and Behan, 1982; Geschwind and Galaburda, 1985), based on the DGF regulated by NGF (Mobley et al., 1977; Large et al., 1986; Levi-Montalcini, 1987), so the dermatoglyphics and genes、dermatoglyphics and brain nervous system are so highly corrugated that they can be

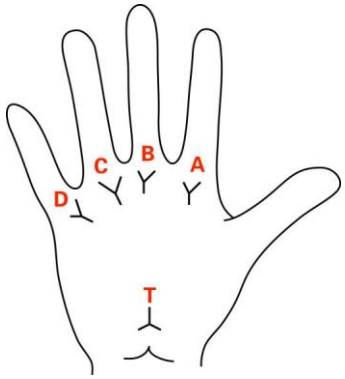
studied to try to identify the specific dermatoglyphic features of autism through the study of the dermatoglyphic pattern characteristics of people with autism. There is less literature in this area (Wolman, 1990; Arrieta, 1999, 1993, 2000; Lien Yu-hsing, 2005), which hopes to establish patterns of early screening for autism, as well as attempts to make neurological assumptions about the possible pathogenesis of autism, in addition to providing follow-up medical research, and attempts to suggest opportunities for effective early treatment. In eugenics and genetics, some scholars are committed to the study of intelligence and dermatoglyphics (Yu Guixuan, 2006, 2007), for the study of the dermatoglyphic patterns of the mentally retarded, Down's disease is the main research object, and mental retardation and the typical correlation between the dermatoglyphic patterns of hands (Yang Tubao, Lin Xiushou, 1994), Fagile X Syndome children with hand dermatoglyphics analysis (Zhang Jing, Mei Qixia, 2002), to carry out the analysis of the dermatoglyphics of the mentally retarded, on the one hand, in the establishment of a dermatoglyphic pattern screening module, on the other hand, it can be compared with the autism dermatoglyphics module to explore the difference between the two dermatoglyphic patterns, and try to find an effective tool to separate the two symptoms.

Methods:

The samples required for the study were provided by the Department of Psychology of Chongqing Children's Hospital with 91 autistic patients, 118 people with low intelligence, 60 normal people, all participants were surveyed on physiological development, and 50 autistic patients and 40 normal people were provided by the Rajanukul Institute for Intellectual Disability of the Ministry of Health of Thailand, and 35 normal cases were reported at the Olympic Experimental Primary School attached to Beijing Normal University. The thirty-five subjects were also surveyed about physiological development. As a result, there were 141 people with autism, of whom 22 were female and 119 were male, all of whom were confirmed by hospital diagnosis; All cases in the experiment were sampled with dermatoglyphics, including fingerprints, palm prints, and footprints, and then patterned and quantified according to Penrose's methodology.

In addition to the general commonly used methods, including dermatoglyphics from 10 fingers、ridge counts and total ridge counts, six regional pattern analysis in palm areas, especially in several parts, such as the pattern of the triangle points (reference Figure 1), especially triangle points C and D, C Vestigial (C-V) see Figure 2, C-MISS See Figure 3, D Vestigial (D-V) See Figure 4, D-MISS See Figure 5; According to The Penrose, Palm Main Line Termination Zone is divided into 13 zones (see Figure 6), and the study focuses on projects with A mainline facing Zone 1 (A-1) . Secondly, the number of ridge counts between triangle points RCa-b and RCb-c (reference Figure 7) is another important point; and for the foot dermatoglyphics has more discussion, the study of foot dermatoglyphics is generally dominated

by the dermatoglyphics at the sole ball area (Hallucal). According to the Alter classification, there are six types of dermatoglyphics that appear in the ball area (see Figure 8), arch fibular A^f, see Figure 8a; arch tibial A^t), see Figure 8b; and arch proximal A^p), see Figure 8c; Loop distal L^d, see Figure 8d; Loop tibial L^t, see Figure 8e; Whorl W, see Figure 8f; and, according to research observations, There are two patterns that can be re-separated, one of which is semi-whorl SW, see Figure 8g, and the other is hooked loop H- L^d, see Figure 8h. In addition to dermatoglyphic patterns at ball area, dermatoglyphic pattern that appeare between the 2nd and 3rd toes (see Figure 9a) and the dermatoglyphic pattern that appear between the 4th toes and the 5th toes (see Figure 9b) belong to the abnormal patterns, which are usually of special significance. The dermatoglyphic patterns listed above are less discussed in the literature except RCa-b.



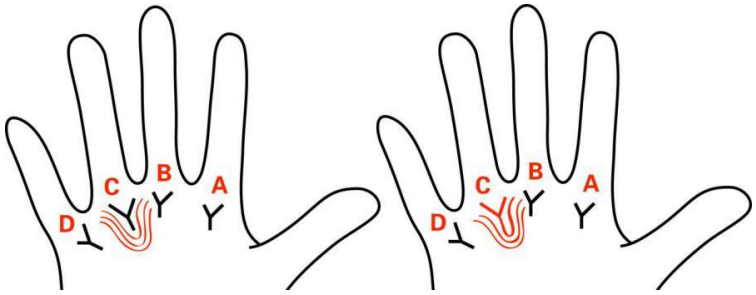
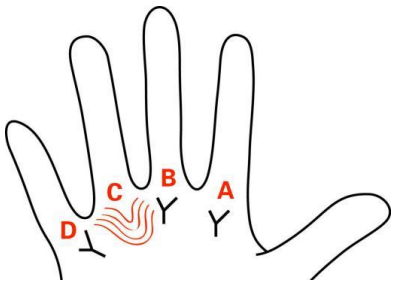


Figure 1 the pattern of triangle points **Figure**

2 C Vestigial（C-V）



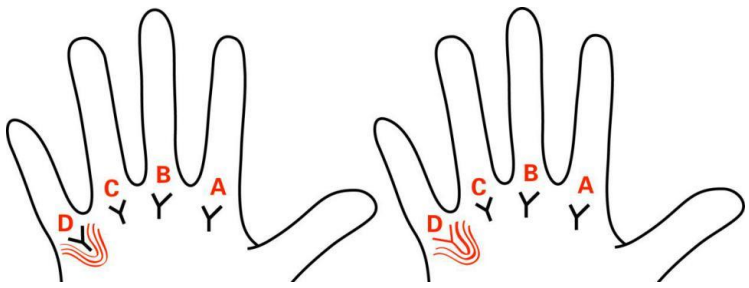


Figure 3 C Missing（C-MISS) **Figure 4 D Vestigial（D-V）**

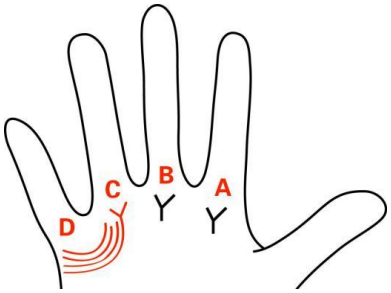


Figure 5　D Missing（D-MISS)

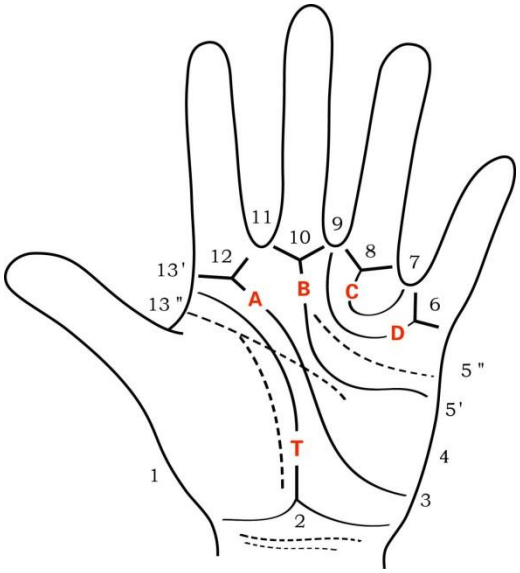


Figure 6 13 zones of Palm Main Line Termination

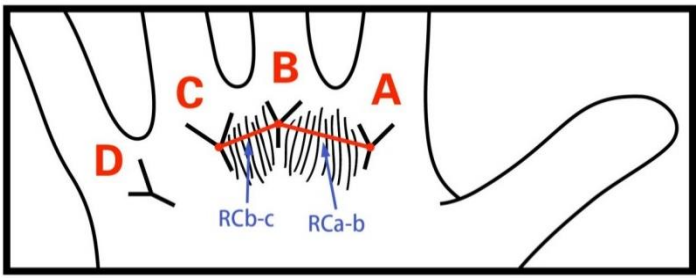


Figure 7　RCa-b and RCb-c

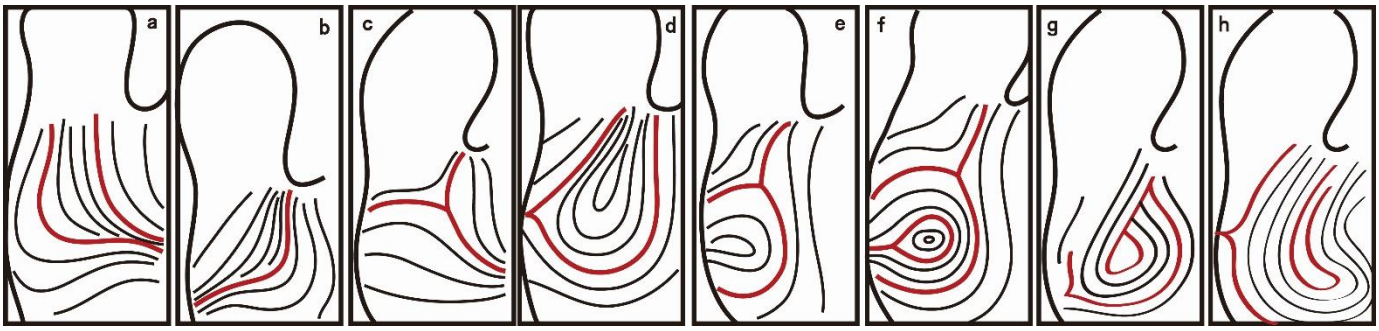


Figure 8 types of dermatoglyphics that appear in the ball area

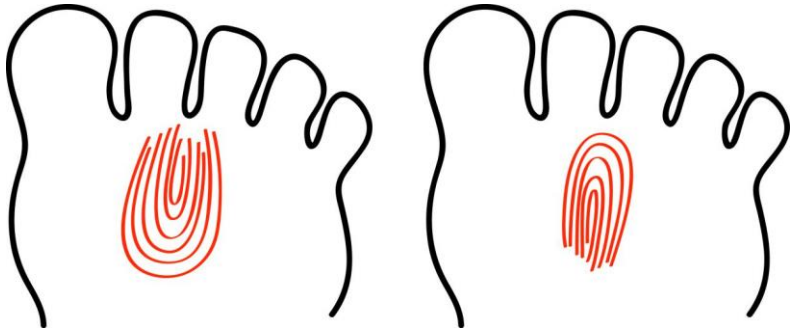


Figure 9a dermatoglyphic patterns appeared between the 2nd and 3rd toes

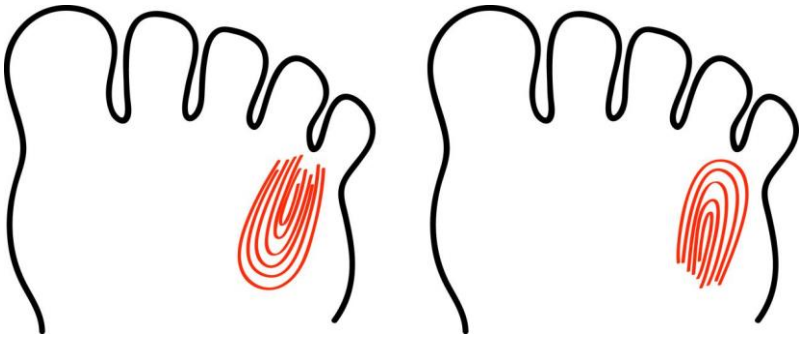


Figure 9b dermatoglyphic patterns appeared between the 4th and 5th toes

Results:

First of all, from the normal group, autism group and MR (low intelligence) group of the hand dermatoglyphics data for statistical analysis, comparing the dermatoglyphic pattern and ridge counts of ten fingers in three groups can be found, in addition to a few items have statistical significance, the difference between the three groups is not large, so if only from statistical results analysis, it is likely that no useful information is found, or can not obtain the results of repeated verification, according to this reasoning, the difference of dermatoglyphics is not large, based on DGF regulated by NGF, The nervous system, which may represent normal people and people with autism, is not very different, so it is often not possible to detect abnormal neural structures in people with autism. However, the trend can still be found from the statistical results, the autistic group in the left index finger has a lower risk of the Whirl pattern ($z = 0.069$), it is pointed out that the middle finger with Whirl pattern is low and statistically significant ($P2 < 0.05$), the right small finger has a higher probability of the Whirl pattern; both left and right index fingers have a higher probability of the Radial Loop (L^r), Statistically significant ($P1 < 0.01$), the left middle finger has a higher probability of Ulnar Loop (L^u), this phenomenon is in line with previous research, some autistic patients in the index finger, middle finger has a lower probability of the Whirl pattern, but has a higher probability of the Ulnar loop and Radial loop pattern（L^u & L^r）, while in the ring finger, as well as the small finger has a higher probability of Whirl pattern. Therefore, a module (Mode 1) is designed to state this condition, the index finger, middle finger non-Whirl pattern, and is composed of Loop pattern （L^u & L^r）and Arch pattern（A & A^t）, and at least one in four fingers (including) more than one finger (ridge count) is less than or equal to half of the maximum ridge counts in the ten fingers, while the ring fingers and small fingers of both hands at least two (including) or more than two (including) appeared as Whirl pattern. Mode 1 showed statistically significant P1 in both the autism group and the mentally retarded group.

The MR (low-intelligence) group in the left middle finger and ring finger has a higher probability of the Whirl pattern, which reach to statistically significant P1, the right index finger, middle finger, ring finger have a lower probability of Ulnar Loop pattern, the right middle finger has a higher probability of Whirl pattern, statistical significance was achieved P 2, at the same time on the left and right index finger also appears a higher probability of Radial Loop (L^r), in line with the statistical significant P1, so another module (Mode 2), the module is defined as the middle finger, ring finger appeared a total of three (including) or more than three (inclusive) of the Whirl pattern. Mode 2 showed statistically significant P1 in the mentally retarded group, and the three groups listed items with differences in dermatoglyphics in Table 1.

	L2(W)	L2(L^r)	L3（L^u）	L3（W）	L4（W）	R2（L^u）	R2（L^r）	R2（W）
N	31	4.4	49.6	28.9	48.1	42.2	3.7	30.4
AU	25.5	8.5 *	56	20.6 **	46.1	38.3	7.1 **	31.2
MR	32.6	14.4 *	45.8	33.9 *	60.2 *	30.5 *	10.2 *	35.6

	R3(L^u)	R3(W）	R4（L^u）	R4（W）	R5（L^u）	R5（W）
N	61.5	23	33.3	58.5	60.7	28.9
AU	60.3	22.7	34	56	55.3	32.6
MR	53.4 **	32.2 *	28.8	56.8	63.6	24.6

Table 1: Dermatoglyphic Morphological proportion among Normal（N）、Autism（AU）and Mental Retardation（MR）group。Unit：％
L2: left index finger，L3：left middle finger，L4：left ring finger，R2: right index finger，R3: right middle finger，R4: right ring finger，R5: right little finger，
W：Whirl，Lu ：Ulnar Loop，Lr：Radial Loop。 *：P1＜0.01；：P2＜0.05**

As for the dermatoglyphics of palm and sole, the statistical data of the normal group are shown in Table 2. The significance of RCa-b and RCb-c is described as following, due to the range of the average value and a standard deviation of RCa-b on the left side is 37.3 ± 4.3, and that of the right side is 36.1 ± 5.2. In order to distinguish the abnormal state, the range of RCa-b is set at 42-30, which is not included in the statistics; the average value of RCb-c on the left side and the range of a standard deviation is 25.4 ± 5.6; and the right RCa-b is 26.1 ± 5.2. Therefore, the range of RCb-c is set at 32-20, and the RCb-c not in the range is included in the statistics.

Except for RCa-b, RCb-c, IV and Hallucal, the percentage of dermatoglyphic ridge counts in thenar area was slightly higher than 10%. The other items could be considered as abnormal condition because of the low proportion. Area IV was normal and not included in the analysis. In addition, hallucal seems to have a higher proportion, in fact, it is concluding all abnormal

patterns from hallucal area, including arch tibial A^t (L: 9%, R: 6%), arch proximal A^p (L: 2.2%, R: 3%), loop tibial L^t (L: 7.5%, R: 9%), loop fibular L^f (L: 0.7%), semi-whorl SW (L: 3.7%), hooked loop (L: 3%, R: 2.2%).

In the autistic group, except RCa-b and hypothenar * 2, most of the items on the palm were higher, especially in the A → 1, left T-SIM, and III areas of the palms are reaching statistical significance P1. The probability of dermatoglyphic in the hallucal area of right foot and left 4-5L was higher, reaching statistical significance P1, and the right 2-3L had a higher probability, also reached statistical significance P2; significantly it should be noted that 20% of mode 1 has reached statistical significance P1. It will be an important factor to evaluate autism. For statistical data of palmar and foot dermatoglyphics, please refer to table 3

In addition to the lower probability of hypothenar 2 in the hypothenar area, the right side of the area even reached statistically significant P2, the rest of the palm and sole areas have a higher probability, in addition to Zone I, Zone II and Thenar area, the left dermatoglyphics of palm has the higher probability are statistically significant, the right side A→1 also reaches statistically significant P1; and the dermatoglyphics of foot have a higher probability and also reached statistically significant on the right side 2-3L, 4-5L and left 4-5L. The mentally retarded group had partial overlap with the autistic group in Mode 1, but Mode 2 had a 39.8% probability and had a statistically significant P1, which would be an important factor in evaluating the mentally retarded group.

	RCa-b	RCb-c	C-V	C-MISS	D-V	A→1	SIM #	T-SIM	Mode1	Mode2
L	12.6	17.8	21.5	9.6	8.9	7.4	5.2	6.7	3.7	29.1
R	20	23	19.3	5.9	1.5	0.7	5.9	8		

	I	II	III	IV	Thenar	Hypothenar #1	Hypothenar#2	Hallucal	2-3L	4-5L
L	3	1.5	1.5	60	11.9	0.7	16.3	25.9	6	2.2
R	0.7	3	24.4	54.8	1.5	2.2	17.8	20	5	6.7

Table 2：statistical data from normal dermatoglyphics of hand and foot.
Unit：％。
SIM#：simian line，including Sydney simian line，T-SIM：Transitional simian line，I:the loop between thumb and index finger,II: the loop between index and middle finger,III: the loop between middle and ring finger,IV: the loop between ring and little finger,Thenar:the loop in thenar area,Hypothenar#1:the loop below triradius T,Hypothenar#2: the loop above triradius T,2-3L:the loop between the 2nd and 3rd toes,4-5L: the loop between the 4nd and 5rd toes.

	RCa-b	RCb-c	C-V	C-MISS	D-V	A→1	SIM #	T-SIM	Mode1	Mode2
L	9.9	22.7	27.7**	12.1	13.5**	14.9*	5	13.5*	20.1*	27.7
R	14.2**	18.4	24.8**	5.7 **	3.5 **	2.8*	7.8	10.6		

	I	II	III	IV	Thenar	Hypothenar#1	Hypothenar#2	Hallucal	2-3L	4-5L
L	1.4	0.7	4.3*	60.3	9.9	4.3*	14.2*	30.5	7.1	6.4 *
R	-	2.8	17	51.1	2.8	5**	9.2 **	31.2 *	9.2 **	9.2

Table 3：statistical data from autism dermatoglyphics. Unit：％。 *：P1＜0.01；**：P2＜0.05

	RCa-b	RCb-c	C-V	C-MISS	D-V	D-EN	A→1	SIM #	T-SIM	Mode1	Mode2
L	25.4 *	28 *	32.2*	5.1 **	13.6**	11.9**	17 *	9.3 **	16.9 *	12.7 *	39.8 *
R	21.2	24.6	18.6	6.8	1.6	4.2	3.4 *	6.8	11.9		

	I	II	III	IV	Thenar	Hypothenar#1	Hypothenar#2	Hallucal	2-3L	4-5L
L	0.8	0.8	5.9*	60.2	15.3	2.5 *	11.9	28	9.3	10.2 *
R	-	2.5	16.1	53.4	2.5	2.5	11.9 **	24.6	11.9 *	11.9 **

Table 4：statistical data from mental retardation dermatoglyphics.
Unit：％。 *：P1＜0.01；**：P2＜0.05

With regard to the results of the Physiological Development Questionnaire, there were 89 effective questionnaires for the autistic group, 118 for the mentally retarded and 95 for the normal group, as shown in Table I. All options in the table showed statistically significant P1 in both the autism group and the mentally retarded group, with items such as skin tactile sensitivity, excessive sensitivity to sound, little or no gaze, inability to track objects, abnormal language development and non-communication with others, sensory function of skin tactile sensitivity and excessive sensitivity to sound to show autism, and small or no gaze, inability to track objects, language development abnormalities, and non-communication with people. The group with low intelligence was more significant in saliva secretion and poor balance. The normal group in each project with serious morning sickness, poor chewing, poor balance, Fine motor incoordination and nothing to climb and other items appear relatively high proportion, after testing, these phenomena also correspond to the case usually have a more specific dermatoglyphic pattern situation, basically these items have less impact on cognitive development, may also be related to the parents' expectations of factors. Obviously, physiological development questionnaire for exceptional child screening, it has a certain reference value.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
N	8.5	3.2	1.1	2.1	2.1	6.4	-	6.4	1.1	5.3	2.1	-	-	12.8	2.1	-

AU	19.1	13.5	10.1	7.9	6.7	21.4	24.7	22.5	18	40.5	16.9	40.5	16.9	39.3	57.3	23.6
MR	17.8	14.4	11.9	17.8	5.9	17	25.4	28.8	4.2	40.7	7.6	20.3	5.1	39	37.3	11

Table 1: Physiological Development Questionnaire

Units: % Items: 1. serious morning sickness, 2. Hypoxia in uterus, 3. Spitting, 4. Excessive saliva secretion, 5. difficulty swallowing, 6. poor chewing, 7. inflexible tongue movement, 8. poor balance, 9. skin tactile allergy, 10. Fine motor incoordination, 11. excessive sensitivity to sound, 12. gaze at few or no eye contact, 13. Unable to trace objects, 14. Climb a little, 15. Abnormal language development, 16.Not communicating with people.

The main purpose of the questionnaire is to identify the dermatoglyphic characteristics of all the same tickers, such as: spitting, difficulty swallowing, skin tactile allergy, excessive sensitivity to sound and inability to trace objects, etc., because the sample number is less than 30 people, not easy to carry out statistical significance survey, but still can provide meaningful information, statistical analysis, the halucall area, 2-3L and 4-5L in all projects are significant, while the left and right symmetrical phenomenon, The proportion of normal groups with special patterns in the halucall area and the same pattern on both sides was 52.9%, in the autistic group 34.9%, in the mentally retarded group 36.4%, in the autistic group and in the mentally retarded group, with relatively low symmetry, and the non-symmetrical specific patterns in the halucall area were another way to evaluate autism. Compared with the statistics of the three groups of dermatoglyphics, the relevant dermatoglyphic data presented in the questionnaire also have the same phenomenon, language development abnormalities, small or no gaze, no communication with people and unable to trace objects and other items in the Mode 1 part reach the statistical significant P1, these items are related to autism; In fact, the mentally retarded group showed a higher proportion in both the questionnaire " eating less" and "partial eclipse", but the two items were not taken into account because they were relatively unclear.

The relevant dermatoglyphic data RCa-b and RCb-c presented in the questionnaire appear mainly on motion-related items, such as poor balance, Fine motor incoordination, less climbing, difficulty swallowing, and inability to track objects. The palm information A→1 also appeared in all questionnaires and achieved statistically significant results, while D-V achieved significant statistically results in all options except for tongue inflexibleness, difficulty swallowing and poor chewing. Human communication and inability to track objects; left-hand area III is significant in language development anomalies and chewing differences; Hypothenar #2 in the hypothenar zone is basically negatively related; Hypothenar #1 in the hypothenar zone, T-SIM was almost all significant except for Hypoxia in uterus and language development

abnormalities; T-L and SIM were not significant in the dermatoglyphic characteristics of the autistic and intellectually retarded groups, but questionnaires showed that T-L was significant in both language development abnormalities and dysphagia, and similarly, SIM was particularly significant in Fine motor incoordination and chewing disorders.

Above the synthesis said all factors, we may draw a conclusion, by using foot dermatoglyphics, we can explore several specific genetic diseases. For example, in the study of Down's disease by using foot dermatoglyphics achieved excellent results (Cummins 1936), each patient with Down's disease in the foot dermatoglyphics of the ball area has a arch tibial A^t, which is a very important dermatoglyphic characteristics. It should be a good assumption that patients have more unique foot dermatoglyphic characteristics for such a particular disease, but replacing autism with a wide range of developmental disorders now shows that the spectrum of autism is quite large, unlike Down's disease, which has a clear cause of disease, so it can be predicted that autism's foot dermatoglyphic characteristics will be more diverse than Down's.

Left and right hallucal (foot) dermatoglyphics appeared (combinations of A and L^t) or (combinations of A and L^d) were less common than normal, A refers to Arch patterns (A^t、A^p、A^f), the study showed a 4.4% chance in the normal group; 18.4% (P1), of which one example is (combination of A and W), 9.3% (P1) for the mentally retarded group; according to the hallucal (foot) dermatoglyphic asymmetric finding appeared with (combination of A and L^t) or (combination of A and L^d), will be a valuable way to evaluate autism. The subject of the arch pattern is derived from the study of the dermatoglyphics, in many cases of Distal Phalangeal Hypoplasia appeared high probability of Arch pattern (Robinnow and Johnson 1972). With regard to the symmetry of dermatoglyphic patterns, according to Geschwind's hypothesis, the excessive amount of testosterone during pregnancy can lead to cerebral lateralization and may also be the cause of autism, and it is well known from the literature that through the study of the dermatoglyphics of dyslexia, we can obtain the characteristics of the dermatoglyphics of people with dyslexia (Jamison 1987, 1990). Therefore, through the dermatoglyphics formed during pregnancy, to explore the autism case between the left and right dermatoglyphics of the symmetry, has a theoretical basis.

It can be inferred from the dermatoglyphic characteristics presented in the questionnaire that foot dermatoglyphics have a great correlation with the brainstem, whether it is chewing, swallowing, tactile sensitivity, crawling state or eye tracking objects, etc. , basically these instincts are closely related to brainstem function, according to the development of cognitive neuroscience can be known, spinal cord and brainstem may complete and function the baby after the baby is born, but the operation of fine motor function must be done by the integration between brainstem and other functional areas of the brain. According to the visual and attention-

oriented experiments have shown that the baby's eyes can track the object smoothly when they are three months old, and gradually can anticipate the direction of the object movement and perform a sequenced scan. So boldly put forward the hypothesis, the brain in the early stages of small differences, especially the brainstem, the mid brain, if the baby miss the critical period of stimulation, which may be very short, may cause difficult to compensate for the consequences, so we need to find ways to explore signs of illness earlier, dermatoglyphics analysis in this condition has a certain degree of screening effect.

The normal group had a 4.4% odds of having a symmetrical (combination of A and L^t) or (combination of A and L^d) in the hallucal area, 3.7% in Mode 1, 29.1% in Mode 2, and no cases with both Mode 1 and Mode 2 at the same time, for further analysis, if you match the specific dermatoglyphic characteristics presented on the palm and foot, considering the symmetry of the left and right dermatoglyphics, it will be possible to effectively exclude the condition of misjudging normal group, such as the normal group 4.4% of the hallucal area, there is no case with 2-3L or 4-5L phenomenon. The proportion of people with both Mode 1 and Mode 2 in the autistic and mentally retarded groups was 2.7%, which can be interpreted as a case in both syndrome. The way to distinguish between the autistic group and the mentally retarded group, except from Mode 1 and Mode 2, the mentally retarded group usually combines information from the SIM and/or Thenar area regions of the palms, while the autistic groups more often combine information from the C-MISS and/or Hypothenar#1 region of the Hypothenar zone. Of course, to improve the correct rate of screening conditions, fine-tuning the parameters of the finger, palm, foot as a whole will be another challenge.

Conclusions:

From the study, it can be seen that the special dermatoglyphics Mode 1 appeared in the autism group at 20.1%, with obvious statistical significance, Mode 2 appeared in the mentally retarded group at 39.8%, but also significant, and through the dermatoglyphic differences of Mode 1 and Mode 2 can be used to distinguish between autism and mental retardation. The emergence of symmetrical (combinations of A and L^t) or (combinations of A and L^d) in the hallucal area of foot, is another method of identifying people with autism and mental retardation, compared with 4.4% in the normal group and 18.4% in the autism group, which, excluding cases with both Mode 1 and special foot dermatoglyphics, can test 33.6% of autism, which is similar to previous experimental results. If we want to exclude the errors that may occur in the normal group, we must refer to the special palm and foot dermatoglyphic characteristics mentioned in this study, not only screen autism and mental retardation by using dermatoglyphics, but also diagnose and distinguish autism and mental retardation, has a substantial and feasible effect, which is worthy of further study and verification.

Because of the diversity of dermatoglyphics, the consideration of a single variable often does not show statistical characteristics, so the purpose of the study is to find a combination of polymorphisms, and has a module of repeated validation. For autism, there is still a lack of appropriate objective screening tools, dermatoglyphics has a simple, direct effect, the focus is to achieve the goal of early screening, through more subsequent research will have more breakthrough findings. The sample size of this experiment is still not enough, and the results obtained by the experiment are still to be verified by follow-up research.

This study combines the results of the physiological development questionnaire with the dermatoglyphics, initially believes that the foot dermatoglyphic pattern is related to the function of the brainstem, also tries to explain why autism is difficult to screen early, difficult to show the reasons for the early efficacy; consistency of fixed behavior, the enhancer is prone to constant automatic conversion behavior, similar to attention deficit hyperactivity disorder, it seems to explain the difference between the two. Continue to design more detailed questionnaires or scales, such as reference attention network operations, will be able to obtain more correlation, because of the dermatoglyphics and brain nervous system correlation, if combined with other brain science, will have special dermatoglyphic characteristics of the case, through brain research to obtain the state of the brain nervous system, so that the establishment of dermatoglyphics and Projection mechanism of brain, so that the relatively simple dermatoglyphic analysis can be expanded the use of this is the direction of future efforts.

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