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# Quantitative Analysis of Digitopalmar Dermatoglyphics in Seventy Male Psoriatic Patients

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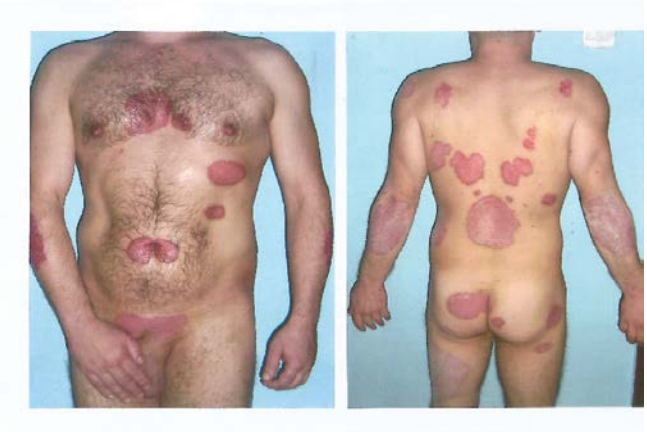
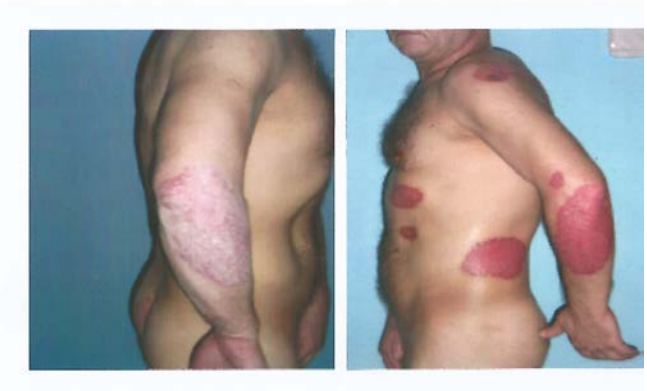
***Abstract****: By the quantitative dermatoglyphic analysis, which is one the genetic method, was performed research in seventy male psoriatic patients to evaluation of genetic factors in the disease. Twenty five variables were determined: ridge count on each of ten fingers, their sum on five and ten fingers, four traits on each palm, i.e. ridge count between a-b, b-c and a-d triradii, their sum on each and both palm and atd angle on both palm and their bilateral sum in degrees. The data thus obtained were compared with digitopalmar prints of 200 phenotypically healthy men in Zagreb area, which are kept at Institute of Anthropology in Zagreb, who served as a control group. The statistically significant differences to control group, by the Student's t-test, were found in sixteen variables. Ridge count was increased on the first, second, third, fourth and fifth finger bilaterally, and their sum on each, and both fists. The atd angle of both palm was reduced and in overall sum. Accordingly, a polygenic system – a few major genes with a lot of modification genes – are identical in some loci in predisposing to male psoriasis patients susceptibility, and might be found responsible for the dermatoglyphic pattern development.*

## 1. Introduction

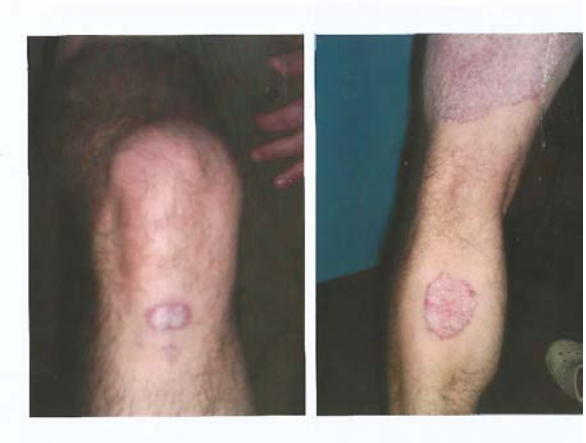
"Es gibt keine psoriasis ohne hereditat" (There is no psoriasis with out of heredity), has written Hoede in his paper 1957 (1). Psoriasis is a common chronic, recurrent, immune mediated disease of the skin and joints, Pictures1-3. It has a strong genetic component but environmental factors, such as infection, can play an important role in the presentation of disease. A



Picture 1
Typical cutaneous manifestations of psoriasis in patient's chest, umbilical, perigenital,dorsal, gluteal and intergluteal areas



Picture 2
Typical manifestation of psoriasis on the extensor side of elbows

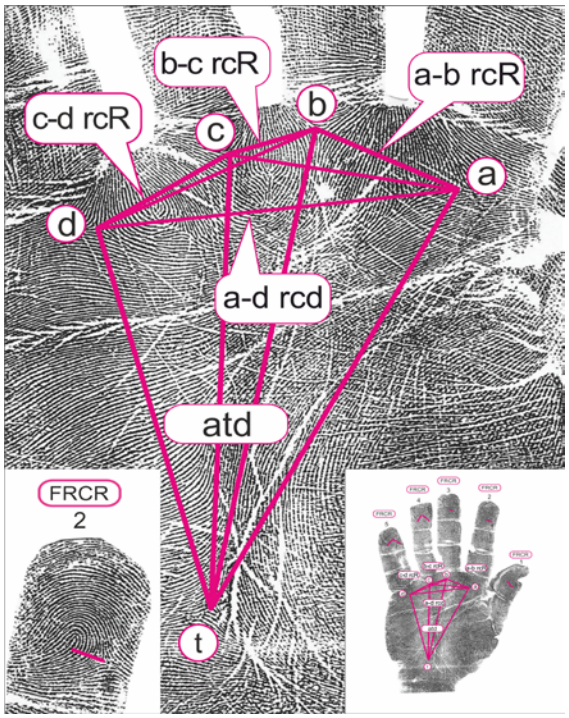


Picture 3
Typical cutaneus manifestation of psoriasis
under and beind leg area

bimodal age onset has been recognized. The mean age of onset for the first presentation of psoriasis can range from 15 to 20 years of age, with a second peak of occurring at 55-60 years. Henseler and Crhistphers reported two clinical presentations of psoriasis, type I and II, distinguished by bimodal age onset. Type I begins on or before age 40; Type II begins after the age of 40 years. Type I disease, accounts for more than 75 % of cases, and patients tended to have more relatives affected and more severe disease than type II psoriasis patients (2). In addition, strong associations have been reported with human leucocyte antigen HLA-Cw6 in patients with an early onset. Multiple genes are involved in susceptibility to psoriasis: at chromosome 6p21 (PSORS1), which is overrepresented in all populations tested, 1p (PSORS7), 1q (PSORS4), 3q (PSORS5), 4q (PSORS3), 17q (PSORS2) and 19p (PSORS6) (3). In her dissertation, Pašić, (2003) analysed the polymorphism of allels and haplotype associations of HLA class I and II genes in various clinical forms of psoriasis. The following risk HLA allele were identified total psoriasis patient population: HLA B13, B57, Cw*06, DRBB1*0701, DQA1*0201 and DQB1*0303. In psoriasis type I, there was significantly higer frequency of HLA B13, B57, Cw*06, DQB1*0701, DQA1*0201 and DQB1*0303. In psoriasis type II, the frequency of allels I and II did not differ significantly from that in the control group. Guttate psorias was found to be differented form the other clinical forms of psoriasis by the significant presence HLA allels B13, Cw*06 and B37 as a specific marker. And results of the study revealed the Croatian population of psoriasis type I patients to be characterized by two videly spread risk haplotypes: B13-Cw*06-DRB1*0701-DQA1*0201-DQB1*0202 and B57-CwDRB1*0701-DQA1*0201-DQB1*030 (4). Kaštelan and al, (2003) detected at a significantly higer frequency in Croatian I type patients haplotype Cw*0602-B57--DRB1*0701-DQB1*0201 (5). Until now, there some 15 new loci have been discovered for psoriasis (6). There are a lot of papers dealing with psoriasis and dermatoglyphic research (7-25), but most of them have been made in the qualitative analysis. Only few partially, are comparable with our (11,17,18,25), because our research has made in quantitative analysis. Dermatoglyphic analysis should be strictly separated according to sex, because of the great impact of sex chromosomes and sex hormones on dermatoglypic traits (26,27). Even significant sex differences have been found within control groups (28).

## 2. Materials and methods

Dermograms of seventy male psoriasis patients were analysed and by clinical and in some, by patohystological examination, the diagnosis is confirmed in all of them. Quantitative analysis has conducted in keeping with instructions by Miličić et al(29). Results were compared with 200 dermograms of phenotypically normal men from the Zagreb area, obatanined from the Institute of Anthroplogy in Zagreb (28). Student's t-test was used to test statistically significant differences in the ridge count between the patient and control group. Palmar prints were taken by use of finely granulated silver-gray powder onto transparent, adhesive tape (30). The following 25 traits were examined by the quantitative analysis, as it has shown on Picture 4.




Picture 4.
The areas of quantitative analysis of digito-palmar dermatoglyphics

1. **FRD1** ridge count on the first finger of the right hand, 2. **FRD2** ridge count on the second finger of the right hand, 3. **FRD3** ridge count on the third finger of right hand, 4. **FRD4** ridge count on the fourth finger of the right hand, 5. **FRD5** ridge count on the fifth finger of the right finger 6. **TFRCD** total ridge count on all five fngers of the right hand. 7. **a-b rcD** ridge count between triradii a-b of the right hand 8. **b-c rcD** ridge count between triradii b-c of the right hand, 9. **c-d rcD** count between triradii c-d of the right hand, 10. **TPR rcD** ridge count between all triradii a-d of the right hand all together,11. **atd D** atd angle on the right palm in degrees, 12. **FRL1** ridge count on the first finger of the left hand, 13. **FRL2** ridge count on the second finger of the left hand, 14. **FRL3** ridge count on the third finger of the left hand, 15. **FRL4** ridge count on the fourth finger of the left hand, 16. **FRL5** ridge count on the fifth finger on the left hand, 17. **TFRCL** total ridge count on all five fingers on the left hand, 18. **a-b rcL** ridge count between triradii a-b on the left hand, 19. **b-c rcL** ridge count between triradii b-c on the left hand, 20**. c-d rcL** ridge count between triradii c-d on the left hand, 21. TPR **rcL** ridge count between triradii a-d all together on the left hand, 22. **atd L** atd angle on the left hand in degrees, 23. **TFRC** total ridge count on all ten fingers of the palms, 24. **TPRC** bilateral ridge count between all triradii of the palms, 25. **ATDDL** bilateral sum of palmar atd angle.

## 3. Results

Results are tabularly presented in Tables 1-3. Statistically significant differences were found in sixteen variables, in the sense of increasing number of epidermal ridges on the fingers, and decreasing in atd angle of the left and right palm and on the both palm in degrees. Ridge count on the first, second, third, fourth, fifth and all five fingers was significantly greater in psoriasis vulgaris patients compared to control at the risk level of 0,001. This is presented by FRD1, FRD2, FRD3, FRD4, FRD5 and TFRCD variables in table 1. Ridge count on the first, second, third, fourth, fifth and all five fingers of the left hand was significantly greater in psoriasis vulgaris compared to control at the risk level 0,001. This is presented by FRL1, FRL2, FRL3, FRL4, FRL5 and TFRCL variables in Table 2. Ridge count on all ten fingers was significantly greater compared to control at the risk level 0,001. The reduced degrees of atd angles on right and left palm then both palm was found at the risk level 0,001. This is presented by atd R, atd L and ATTD variables in Table 1-3.

## 4. Discussion

We have made research in 100 psoriasis and psoriatic arthritis patients 1990, and we found statistically significant differences to control in four variables in quantitative analysis: the increased ridge count on the first finger on the right hand (FRD1) and on the fifth finger on the lefth hand (FRL5). The reduced degrees of atd angles were found on both palm (atd D and atd L) (31). In the next our research 1997, by the quantitative analysis, we have found in 140 psoriatics (70 males and 70 females) statistically significant differences in 12 variables in increasing of epidermal ridges on first, second and third finger bilaterally, (FRD1, FRD2, FRD3 and FRL1, FRL2,

Table 1. Quantitative properties of right hand digito-palmar dermatoglyphics in pateints and controls

| Variable | Patient group | | | Control group | | | Risk |
|---|---|---|---|---|---|---|---|
| | n | x | SD | n | x | SD | p |
| FRD1 | 70 | 22,9 | 4,99 | 200 | 19,4 | 5,63 | 0,001 |
| FRD2 | 70 | 16,3 | 5,50 | 200 | 11,4 | 7,27 | 0,001 |
| FRD3 | 70 | 16,5 | 4,92 | 200 | 12,0 | 6,58 | 0,001 |
| FRD4 | 70 | 20,1 | 4,07 | 200 | 16,2 | 6,15 | 0,001 |
| FRD5 | 70 | 17,1 | 3,64 | 200 | 13,6 | 5,16 | 0,001 |
| TFRCD | 70 | 92,9 | 15,42 | 200 | 72,6 | 24,65 | 0,001 |
| a-b rcD | 70 | 37,7 | 5,68 | 200 | 37,9 | 5,98 | 0,776 |
| b-c rcD | 70 | 28,2 | 5,70 | 200 | 28,6 | 5,78 | 0,807 |
| c-d rcD | 70 | 40,9 | 6,07 | 200 | 41,9 | 6,86 | 9,723 |
| TPR rcD | 70 | 106,08 | 12,57 | 200 | 108,4 | 13,23 | 0,629 |
| Atd D | 70 | 43,7 | 8,34 | 200 | 47,4 | 8,27 | 0,001 |

Table 2. Quantitative properties of left hand digito-palmar dermatoglyphics in patients and controls

| Variable | Patient group | | | Control group | | | Risk |
|---|---|---|---|---|---|---|---|
| | n | x | SD | n | x | SD | p |
| FRL1 | 70 | 20,8 | 5,28 | 200 | 16,2 | 6,14 | 0,001 |
| FRL2 | 70 | 16,2 | 5,39 | 200 | 10,8 | 6,78 | 0.001 |
| FRL3 | 70 | 16,8 | 4,57 | 200 | 11,8 | 6,37 | 0,001 |
| FRL4 | 70 | 19,6 | 4,14 | 200 | 16,2 | 6,17 | 0,001 |
| FRL5 | 70 | 16,4 | 3,48 | 200 | 13,5 | 4,60 | 0.001 |
| TFRCL | 70 | 89,7 | 15,70 | 200 | 68,5 | 23,88 | 0.001 |
| a-b rcL | 70 | 36,7 | 6,00 | 200 | 36,6 | 6,84 | 0,287 |
| b-c rcL | 70 | 27,9 | 5,31 | 200 | 28,7 | 5,72 | 0,387 |
| c-d rcL | 70 | 42,5 | 5,90 | 200 | 43,6 | 7,05 | 0,186 |
| TPR cL | 70 | 107,0 | 12,56 | 200 | 108,9 | 14,52 | 0,119 |
| Atd L | 70 | 44,5 | 8,67 | 200 | 47,9 | 7,70 | 0,001 |

Tsble 3. Qunatitative properties of digitopalmar comlex on both hands in patients and controls

| Variable | Patient group | | | Control group | | | Risk |
|---|---|---|---|---|---|---|---|
| | n | x | SD | n | x | SD | p |
| TFRC | 70 | 182,6 | 29,30 | 200 | 141,0 | 47,44 | 0,001 |
| TPRC | 70 | 213,8 | 24,27 | 200 | 217,3 | 26,82 | 0,298 |
| ATDDL | 70 | 88,2 | 15,82 | 200 | 95,3 | 14,30 | 0.001 |

FRL3), on the fifth finger bilarerally (FRD5 and FRL5), and their sum on each , TFRCD and TFRCL and then both fists TFRC. The atd angle of left palm has been been reduced on left palm (atd L) and on both palm (ATDDL) in degrees (32). There is only one paper , (1984), dealing with psoriasis vulgaris patients in Croatia (19), in which the authors didn't find anything at all, in 35 male patients . Jilek, (1972), has found statistically significant differences in increased total ridge count in 55 male patients (11) and Singh (1983), in 50 male patients too (18), what is just the same as in our research. This is especialy important because of almost the same number of ridges of their control group and our. Zhongzhi, 1988, in 180 patients also has found increased finger ridge count in both sexe (33). Verbov, (9), in his paper dealing among the others with psoriasis, wrote: "The total finger ridge count is the most consistent and reliable measurement for familial investigations and is an inherited metrical characteristics in which a number of perfectly additive genes are concerned and in which environment plays a comparatively small part " Interestingly, Lal has cited this statement in his paper about psoriasis in 140 males (13), and recommended "it may be worth while to study the total finger ridge count in psoriatics", but both, unfortunaly, didn't present that analysis in their papers. On the contrary, Verma (1980), only one, has found decreased total ridge count in 32 male patients (15). This disagreement could be explained in a such way: Cvjetičanin in his doctoral thesis (400 patients and 100 their relatives, 260 psoriatic arthritis /130 males and 130 females/ and 140 psoriatics /70 males and 70 females/ found in three of five subgroups of male psoriatic arthritis patients (oligo, rheumatoid-like or poly-articular, symmetrical type and spondylitis group) statistically significant differences in decreased finger ridge count to control 2014 (35). It is very lakely that some of 32 Verma's psoriasis patients, had psoriatic arthritis too: if it is a truth, that could be good explanation n for above mentioned difference. Dehankar 2014, has found decreased atd angles in male psoriatics just as we do (25).

## 5. Conclusion

It may be assumed that polygenetic system responsible for development of dermatoglyphics is identical in some loci with polygenetic system for liability to psoriasis. This very simple, inexpensive and non aggressive method in the genetic research may be used to diagnostic, preventive and even prognostic purposes in many other diseases, for example in rheumatology and cerebral palsy patients, (37-42)

## 6. Ethics

There is not any danger for the patients from this kind of research. Dermatoglyphic analysis, which is one of genetic method, is without any harmful consequence for sick persons. The procedures are in accordance with ethical standards in scientific research at Croatian Medical Association'c Codex of Medical Ethic and Deontology, and Helsinki Declaration of World Medical Association, Edinburgh (2000).

## 7. Conflicts of interest

There is no conflicts of interest among the authors.

## 9. Acknowledgment

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