Viscoplastic Medicine Theory (VMT #195): A Dermatology Investigation of the Relationship between the Intensity of 4 Diabetic Skin Fungal Infections Versus 3 Selected Influential Factors of Estimated Daily Average Glucose, Hyperglycemic Tar Score, and Body Weight Using Collected Data of 4 Clinical Cases of A Type 2 Diabetes Patient Based on Gh-Method: Math-Physical Medicine (no. 790)

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Keywords

Introduction

The author has been diagnosed with type 2 diabetes (T2D) for 28 years since 1995. In terms of diabetes-induced complications, he has endured 5 cardiac episodes, kidney disease, bladder infection, foot ulcer, neuropathy, hypothyroidism, diabetic retinopathy, etc. He made a vow in 2010 that within the next 10 years by self-studying and researching subjects related to internal medicine and food nutrition, he will be able to understand his diabetes situation and how it affected his overall health. Thus far, he has written and published 800+ medical papers in those areas. At that time, he thought he had covered a sufficient scope of the medical branches, which are related to his observed diabetes conditions over the past 2 decades.

He recalled that, a decade ago, he used to have some itchy red rashes on his neck area. However, one dermatologist informed him that they were a result of friction from his shirt collar. Another dermatologist mentioned to him that it was due to "dry skin" situation. In 2020, by visiting another dermatologist, he finally realized that he suffered from a diabetic fungal infection all these years. This is an additional complication induced by T2D, which he was not aware of, and did not acquire medical knowledge about this specific skin condition. However, after visiting 4 different dermatologists, he gets more confused about whether his skin infections have been resulted from fungus or whether diabetes has any relationship with his situation or not. Nevertheless, under the assumption that it may have higher probability to be the diabetic fungal infections, he then decides to continue his research toward this direction.

In the first incident of recent 3-4 years, on November 10, 2020, he developed an itchy red rash on his lower abdomen. After visiting a dermatologist in California, he realized that he had a diabetic skin fungal infection (SFI). After applying Ketoconazole cream 2%, it took 20 days for the rash to disappear.

In the second incident, on October 5, 2021, the itchy red rash returned in the same location, except in a smaller size (about 1/3 of his previous case). After applying the same medication cream for 7 days, it disappeared again.

In the third incident, on March 5, 2022, the same itchy red rash returned at about the same location. Again, after applying the same medication cream for 14 days, it disappeared.

The fourth incident, on January 14, 2023, occurred again. He then applied the same medication, Ketoconazole cream 2%, for three weeks until 2/4/2023. However, the situation got to be worse (Figure 3). His dermatologist then changed his medicine to Triamcinolone Acetonide ointment USP, 0.1%, He applied this

Figure 1 data tables

2/19/23 update	Start Dte	End Date	No. of Days	Intensity	days*intensity Infection Score	Sensor eAG	TAR mg/dL	TAR %	mg/dl*% TAR Score	Body Weight
1/18/23										
Period 1	11/10/20	11/29/20	20	9	180	105	192	4.0%	7.67	165
Period 2	10/5/21	10/11/21	7	5	35	105	199	4.0%	7.94	169
Period 3	3/5/22	3/18/22	14	7	98	107	186	3.0%	5.58	169
Period 4	1/14/23	2/18/23	36	10	360	104	193	4.3%	8.18	169
Average			19	8	168	105	192	3.8%	7.34	168
Norm. Factor						120	180	3.8%	6.86	170

2/19/23 update	SFI Score	S. eAG	TAR Score	BW
1/18/23				
Period 1	180	105	7.67	165
Period 2	35	105	7.94	169
Period 3	98	107	5.58	169
Period 4	360	104	8.18	170
Average	168	105	7.34	168
SFI vs. TAR (R)	41%			

1/18/23 — Skin Fungal Infection = SFI

Correlation	100%	-74%	-25%	-31%	/120	/120	/170	Strain Rate	Strain	Stress 1	Stress 2	Stress 3	Height 1	Height 2	Height 3	Area 1	Area 2	Area 3
Skin Fungal	SFI Score	S.eAG	TAR mg/dL	BW	S.eAG	TAR mg/dL	BW	SFI Rate	SFI Score	S.eAG	TAR mg/dL	BW	S.eAG	TAR mg/dL	BW	S.eAG	TAR mg/dL	BW
P0	0	111	190	165	0.93	1.58	0.97	0	0	0	0	0	0	0	0	0	0	0
P1	180	105	192	165	0.88	1.60	0.97	180	180	158	288	175	79	144	87	14256	25886	15714
P2	35	105	199	169	0.88	1.65	0.99	-145	35	-128	-240	35	15	24	105	-2233	-3463	-15171
P3	98	107	186	169	0.89	1.55	0.99	63	98	56	98	97	-36	-71	66	-2253	-4479	4148
P4	360	104	193	170	0.92	1.60	1.00	262	252	241	420	252	149	259	175	38921	67850	45722
Avg	168	105	192	168	0.89	1.60	0.99	90	141	82	141	140	52	89	108	48691	85794	50413
SD-E:															184898	26%	46%	27%

Correlation	100%	-74%	5%	-31%	/120	/6.86	/170	Strain Rate	Strain	Stress 1	Stress 2	Stress 3	Height 1	Height 2	Height 3	Area 1	Area 2	Area 3
Skin Fungal	SFI Score	S.eAG	TAR Score	BW	S.eAG	TAR Score	BW	SFI Rate	SFI Score	S.eAG	TAR Score	BW	S.eAG	TAR Score	BW	S.eAG	TAR Score	BW
P0	0	111	6.99	165	0.93	1.02	0.97	0	0	0	0	0	0	0	0	0	0	0
P1	180	105	7.67	165	0.88	1.12	0.97	180	180	157.5	201.25	174.71	78.75	100.63	87.35	14175	18113	15724
P2	35	105	7.94	169	0.88	1.16	0.99	-145	35	-126.88	-167.83	-144.15	15.31	16.71	15.28	-2220	-2423	-2216
P3	98	107	5.58	169	0.89	0.81	0.99	63	98	56.18	51.24	62.63	-35.35	-58.29	-40.76	-2227	-3672	-2568
P4	360	104	8.18	170	0.87	1.19	1	262	360	227.07	312.41	262	141.62	181.83	162.31	37105	47639	42526
Avg	134.6	106.4	7.27	167.6	0.89	1.06	0.99	72	134.6	63	79	71	40.07	48.18	44.84	46832	59656	53467
R	100%	-69%	43%	42%					213	29%	37%	33%			SD-E:	159955	29%	37%	33%

1/20/23	From	To	Days	TAR #	TAR %	TAR Score	
Pre-P1	10/9/20	11/9/20	32	185.75	1.75%	3.25	42%
P1	11/10/20	11/29/20	20	191.75	4.00%	7.67	
Pre-P2	9/14/21	10/4/21	21	191.00	2.75%	5.25	66%
P2	10/5/21	10/11/21	7	198.50	4.00%	7.94	
Pre-P3	2/4/22	3/4/22	29	199.25	2.50%	4.98	89%
P3	3/5/22	3/19/22	15	186.00	3.00%	5.58	
Pre-P4	12/13/22	1/13/23	32	197.20	4.00%	7.89	117%
P4	1/14/23	2/10/23	28	193.00	3.50%	6.76	
Pre-Period					TAR Sum	21.37	76%
In-Period					TAR Sum	27.95	100%

| 2/19/23	From	To	Days	TAR #	TAR %	TAR Score	
Pre-P1	10/9/20	11/9/20	32	185.75	1.75%	3.25	42%
P1	11/10/20	11/29/20	20	191.75	4.00%	7.67	
Pre-P2	9/14/21	10/4/21	21	191.00	2.75%	5.25	66%
P2	10/5/21	10/11/21	7	198.50	4.00%	7.94	
Pre-P3	2/4/22	3/4/22	29	199.25	2.50%	4.98	89%
P3	3/5/22	3/19/22	15	186.00	3.00%	5.58	
Pre-P4	12/13/22	1/13/23	32	197.20	4.00%	7.89	96%
P4	1/14/23	2/18/23	36	192.50	4.25%	8.18	
Pre-Period					TAR Sum	21.37	73%
In-Period					TAR Sum	29.37	100%

Figure 1: Shows data tables.
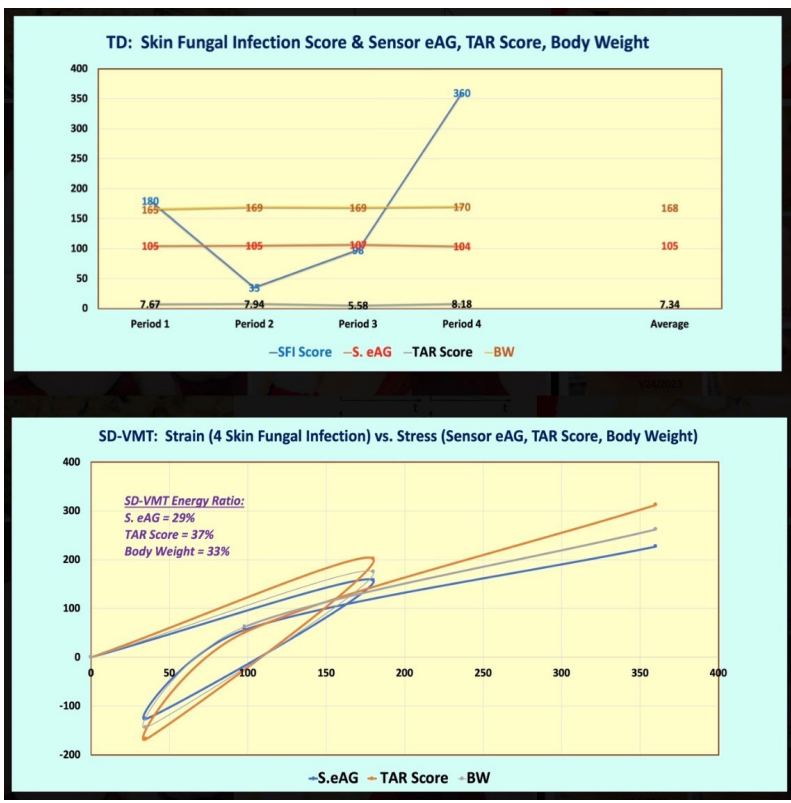
Figure 2: Shows Time-domain and Space-domain charts.

medication for 2 weeks. As of now, 2/18/2023, his skin infection case is under controlled and he stopped using any medication. This 4th infection has lasted 36 days which is the worst case he has suffered thus far. He also consulted with another dermatologist in Hawaii. She said if this medication can clear the infection, then it may not be a fungal infection. By now, the author is really confused. What went wrong with his skin? Was diabetes having anything to do with this?

Nevertheless, the author does understand diabetes and he has collected big data related to T2D and lifestyle (around 3 million data). Therefore, he decides to continue his research by following the same assumption of "diabetic fungal infection".

Overall, it seems that his diabetic skin fungal infection happens once a year. The Ketoconazole cream can eventually stop the uncomfortable itching sensation for the first three cases, but it cannot stop the fourth case and he wonders the same problem will return in the future or not. ***The author is more interested in discovering the causes to prevent it from happening again than different treatment methods of skin infection.***
Over the past 14 years of his medical research work, the author has studied and learned about a variety of diabetic complications, which include quite a few deadly complications. Only in the recent 3 years, he started to experience two additional annoying but not deadly complications, i.e. diabetic constipation and diabetic skin fungal infection.

He decides to conduct a space-domain energy analysis using viscoplastic medicine theory on this particular dermatology problem.

First of all, ***he defines a new variable, the "SFI score" which is the rash duration (the number of days of infection) multiplied by the intensity of infection (a sensational score of seriousness or degree of uncomfortableness) for each one of his SFI experiences.*** *This SFI score is used as the strain (or the output symptom) of his stress-strain energy model. He selects three stress components (3 input causes) which are daily estimated average glucose (eAG), hyperglycemic level (for glucose > 180 mg/dL which is defined as "TAR mg/dL * TAR %"), and body weight (BW).*

After reading 10+ medical articles regarding diabetic fungal infections, he has learned quite a bit of information on its causes, symptoms, treatment, and prevention. In order to control the size of this ***article, he omit the sections of excerpts of other articles, energy theory methodology and references.*** Based on his reading, it is clear that diabetes patients are more susceptible to these types of skin problems, especially yeast or fungal infections. He suddenly remembered when he was a child, he watched his mother always putting sugar powder on the bread she made. When he asked why, his mother explained to him that sugar would help the yeast grow faster and make the bread fluffier. After spending the past 14 years self-studying and researching his diabetes conditions, he can draw a biophysical and biochemical analogy that "the glucose contained inside the blood flow of his micro-vessels would feed the needed

nutrition on fungal growth which exists in our bodies, especially on our skin". This is a similar situation to the sugar and yeast growth in bread.

Figure 3: Shows the author's skin infection of case P4 (1/14/23 - 2/18/23)

The purpose of this article is to document his learned knowledge from four recent cases of skin infections, and his two remaining puzzles:

1) *Why he still gets diabetic fungal infections after his T2D conditions are under control, especially over the past 3 years.*
2) *Can diabetic skin fungal infection conditions be improved or even controlled through managing the hyperglycemic situation and body weight of T2D patients?*

Conclusions

The summary of this study is not to draw some conclusions but rather to offer more quantitative findings regarding tche question in his mind. ***"Can diabetic fungal infection and its intensity be improved through controlling hyperglycemia and overweight or obese of T2D patients?"***

In summary, there are 3 observations from this research work:

1) ***The skin fungal infection scores (SFI Scores = days*intensity) for these 4 incidents are 180, 35, 98, and 360 which fluctuate significantly.*** The fluctuated SFI scores between two adjacent periods, i.e. the strain rate, play an important role in their energy values (i.e. degree of influence or degree of contribution). *Three average input values are 105 mg/dL for his eAG, 7.34 (from 192 mg/dL of TAR multiplying 3.8% of TAR %) for his TAR score,* and *168 lb. (BMI 24.8) for his body weight.* Both eAG and BW are within normal and healthy ranges of eAG <120 mg/dL and BW < 170 lbs (BMI < 25). His daily average glucose and body weight have been under control during the past 3+ years of the SFI infection period. *These time-domain data have not provided any useful information regarding his skin fungal infections, except* ***they he have shown some degree of hyperglycemic situations (3.8% of TAR % with an average TAR rate of 192 mg/dL).***

2) There are two results from the SD-VMT energy analysis. The energy ratio from ***the first case of using average TAR mg/dL values*** are: ***eAG = 26%; TAR mg/dL = 46%; BW = 27%.*** The energy ratio from ***the second case using TAR scores (TAR score is TAR mg/dL*TAR %)*** are: ***eAG = 29%; TAR scores = 37%; BW = 33%. Both cases have shown a similar energy pattern of "TAR > BW > eAG".***

3) From the author's own collected data, ***his pre-SFI period's sum of TAR score is 27% lower than his SFI period's sum of TAR score.*** Using the standard definition of hyperglycemia of 180 mg/dL as an example, a 27% difference means either 131 mg/dL or 229 mg/dL, which are a wide range.

This study indicates that ***the hyperglycemic situation (TAR: for glucose> 180 mg/dL) is indeed the biggest contributor to his diabetic skin fungal infections among those 3 selected influential factors.***