

## False-Indication of Non-Dental Fluorosis in Per See Physical Tests

E Dahi \*

Denmark and Tanzania

**SUMMARY:** On the contrary to dental fluorosis, skeletal and non-skeletal fluorosis are very difficult to diagnose and almost impossible to quantify. This study elaborates on the three physical tests recently proposed by Susheela & Bhatnagar as indicators of non-dental fluorosis: 1) Bending the body to touch the floor. 2) Bending the neck to touch the chest with the chin and 3) Stretching the hands and folding the arms to touch the back of the head.

Twenty-eight severely affected young residents of the highly fluorotic Ngongongare, the Arusha Region that is a part of the Rift Valley, are interviewed and tested using these three physical tests + a new “squatting test”. Furthermore, they were checked for the knock-knees symptom.

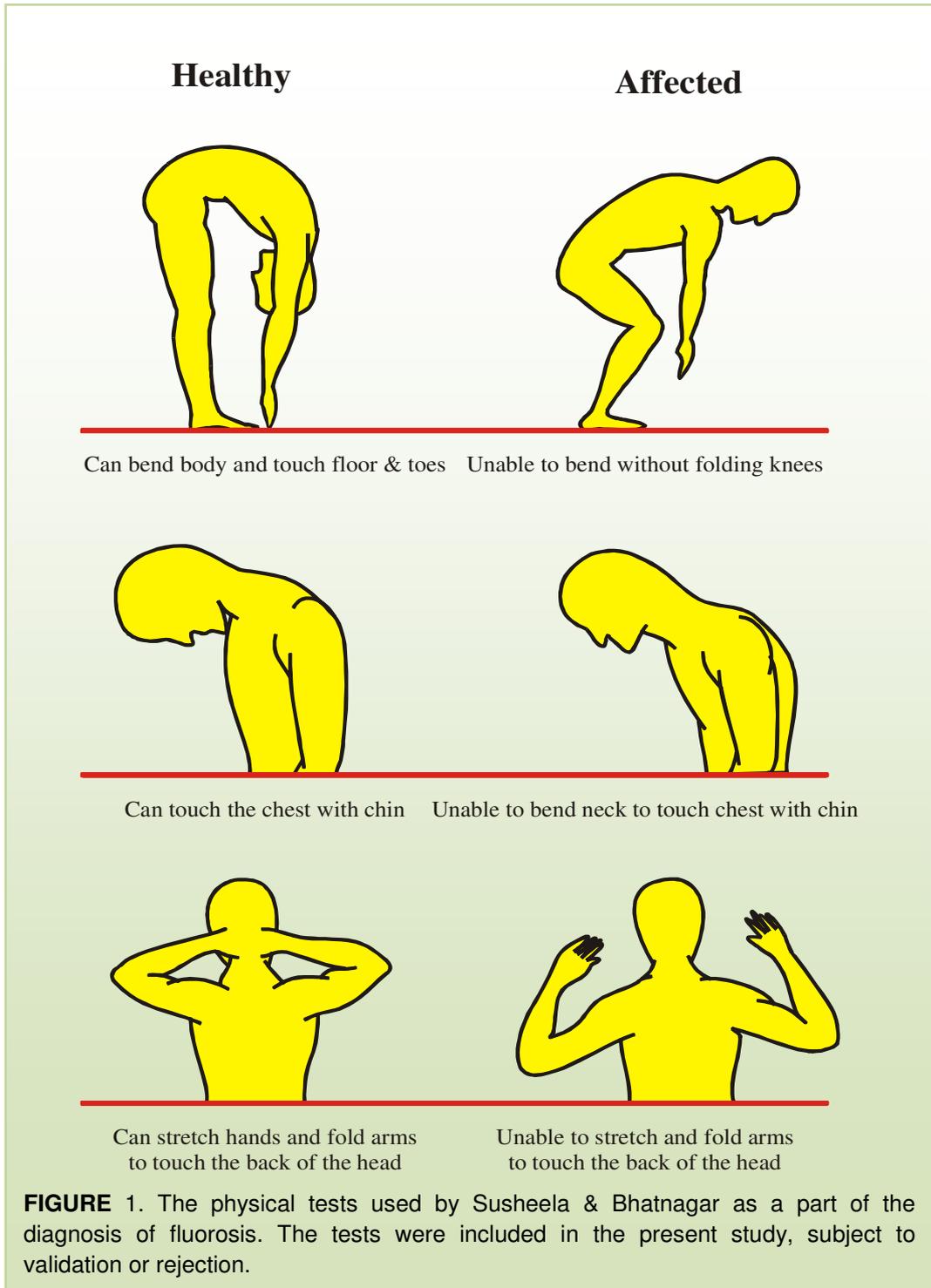
It is concluded that people are very well aware of having dental fluorosis. They are also very conscious about fluoride being the reason of the fluorosis and that it stems from the water. In spite of the fact that the subjects were clearly heavy affected with respect to dental fluorosis, only 30 % of them had pain in their joints or muscles. None of them thought they could get crippled if they continued to consume the same drinking water. The Susheela-Bhatnagar tests classified all patients as “healthy” and the study shows that these tests are of no use and can be directly misleading. Only 10 of the 28 patients could do the squatting test satisfactorily, suggesting some kind of relationship with the non-dental fluorosis. Yet it is concluded that also this test can give false indications. Only 14 % of the study subjects showed no sign of knock-knees; 64 % showed this manifestation clearly and the rest, about 21 % were classified as questionable. It is discussed that knock-knees may well be a trustworthy symptom of the non-dental fluorosis, though it still may involve risk for false-indication.

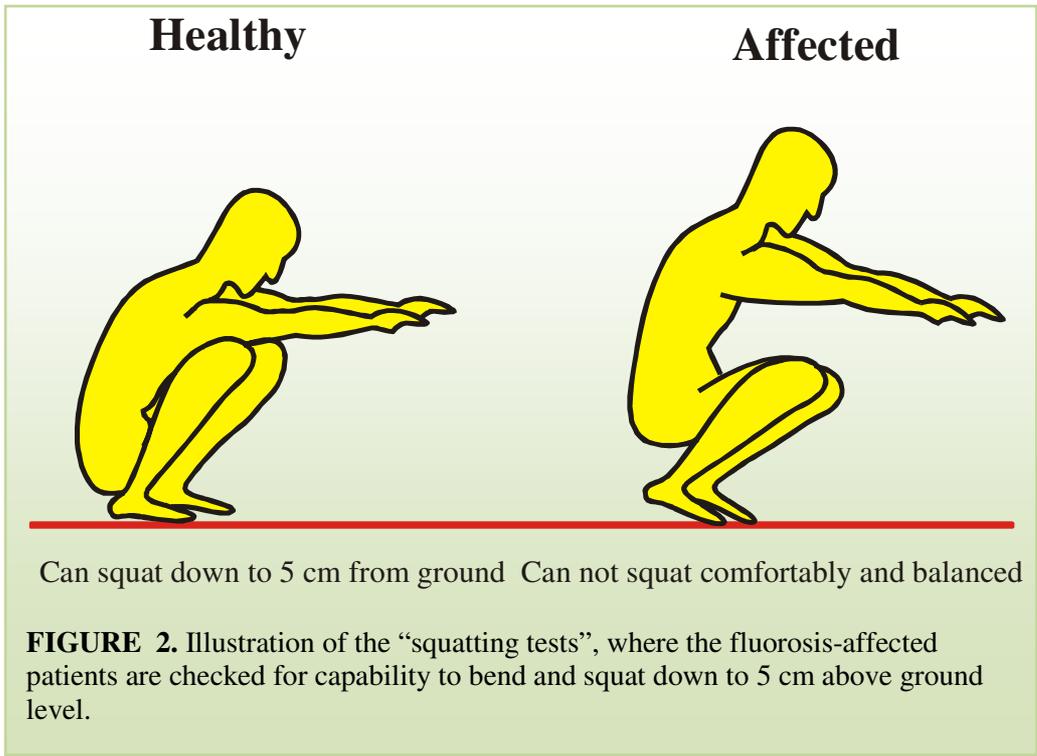
**Key words:** Fluoride symptoms, fluorosis diagnosis, dental fluorosis, skeletal fluorosis, non-skeletal fluorosis, physical test, perception, prevention, knock-knees, indicators.

### INTRODUCTION

Dental fluorosis is often directly visible to naked eyes and easily to detect even to lay people. Skeletal and non-skeletal fluoroses, on the contrary, are difficult to diagnose even to professionals assisted by appropriate equipments. Radiography is often needed to identify manifestations like enlargements in joints or minor deformations in the bones. The other symptoms are diffuse and disperse making it difficult to conduct a clear diagnosis, not to mention a qualified quantitative judgement of the extent of intoxication.

\* *Environmental Development Co-operation, EnDeCo, Denmark & Tanzania.  
Email: elidahi@hotmail.com*





This has led to the present paradox situation. We have now different well-defined and widely used indexes for the dental fluorosis, the Deans Index <sup>1</sup> and the TF-Index <sup>2</sup>, and these indexes are reported in uncountable studies. On the other hand there are very few studies of the skeletal and the non-skeletal fluorosis. There seems to be no well-known and widely accepted method for diagnosis of the earlier stages of these types of fluorosis. This is most unfortunate, because the manifestation of skeletal and non-skeletal is probably subject to a higher degree of biological variation and they are prevailing at a later stage in life. Because of that, it is believed that an early diagnosis of the none-dental fluorosis is crucial for any prevention and any assessment of impact of intervention.

On this background it is of major importance to adopt or to develop simple per see physical tests as indicators of initial fluoride effects on skeleton and joints. The objectives of this study is to elaborate on the usefulness of the simple physical tests recently reported by Susheela and Bhatnagar <sup>3</sup> as far as the reliability for use in the fluoride affected Rift Valley.

**TABLE 1:** Questioners used in the interviews of the study subjects.

Do you know why your teeth are affected?	<input type="checkbox"/> No	<input type="checkbox"/> Yes		
Do you know where the fluoride or “Madini” is coming from?	<input type="checkbox"/> No	<input type="checkbox"/> Water	<input type="checkbox"/> Elsewhere	
Do you feel any pain or “Humma” in your joints or muscles?	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> Sometimes	
Do you know that you may get crippled if you continue dinking the same water?	<input type="checkbox"/> No	<input type="checkbox"/> Yes		

**TABLE 2.** The number of answers obtained from the study subjects in response to the questionnaire in table 1 and the physical tests.

Answer:	Females			Questionable Sometimes Elsewhere	Males		
	No	Yes			No	Yes	Questionable Sometimes Elsewhere
Know that their teeth are affected	0	18	- - -		0	10	- - -
Know where the fluoride or “Madini” coming from.	0	18	0 - -		0	10	0 - -
Feel pain or “Humma” in the joints or muscles.	12	4	- 2 -		8	0	- 2 -
Know that they may get crippled if they continue dinking the same water.	18	0	- - -		10	0	- - -
Can bend body and touch floor and toes.	0	18	- - -		0	10	- - -
Can bend neck to touch chest with chin	0	18	- - -		0	10	- - -
Can stretch hands and fold arms touching the back of the head	0	18	- - -		0	10	- - -
The patients could squat in a balanced and comfortable manner to 5 cm above ground level.	7	2	- - 11		3	4	- - 3
The patients have enlargement of the knees bending inwards (Knock knees)	1	13	- - 4		3	5	- - 2

## MATERIALS AND METHODS

Twenty-eight subjects, 18 females and 10 males, in the age 14-25, all local residents in Ngongongare, were selected, the criteria being a clear manifestation of severe dental fluorosis. Initially their teeth were checked and it was confirmed that *all* their teeth were affected. Then they were interviewed as in table 1.

The subjects were then checked for visible enlargements in their joints and deformations in their arms and legs and requested to carry out the three physical tests proposed by Susheela & Bhatnagar as shown in Figure 1. Furthermore they were asked if they could bend and squat as low as possible and it was checked if they at the bottom could reach down to 5 cm above the ground level, Figure 3.

## RESULTS

The results are summarised as shown in Table 2.

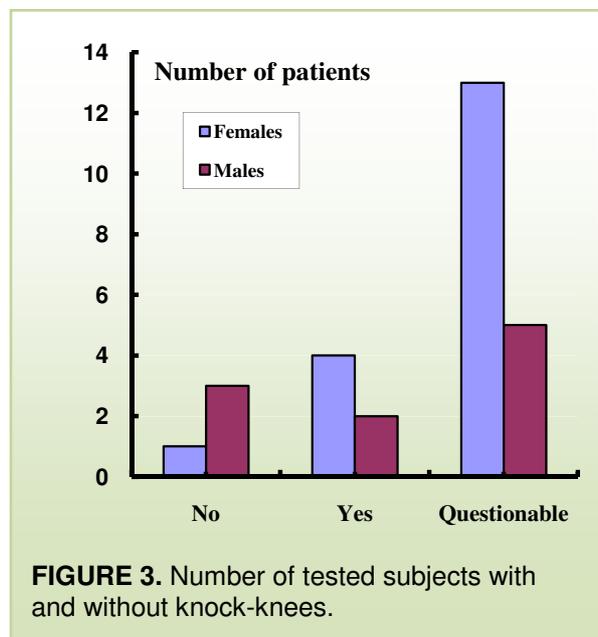
## DISCUSSION

**Perception of fluorosis:** The response to the questionnaire shows that affected young people in Ngungongare are very well aware of having dental fluorosis. They are also very conscious about the fluoride being the reason for the fluorosis and that it stems from the water.

**Pain and prognosis:** In spite of the fact that subjects were clearly heavy affected with respect to dental fluorosis, only 30 % of them answered that they had pain, permanently or occasionally, in their joints or muscles. Furthermore, none of them thought they could get crippled if they continued to consume the same water.

**Physical tests:** Most surprisingly however, is the uniform positive response to the physical tests as, proposed by Susheela and Bhatnagar. According to these

tests all subjects should have been classified as “healthy”, where none of them could possibly be. This study, though of limited volume, shows that these tests are of no use and can be directly misleading, at least for assessment of non-dental fluorosis among



**FIGURE 3.** Number of tested subjects with and without knock-knees.

young subjects in rural Rift Valley. It should be added that most subjects are farmers used to do heavy work in different working positions. Thus both females and males are often doing physical work while bending with stretched legs to reach the ground with the whole of their palms. Also they are used to stretch their back and neck to carry heavy loads on their heads.

**Squatting test:** Only 10 of the 28 patients could do the squatting test satisfactorily, an indication of some relationship with the non-dental fluorosis. However it is well known that squatting is a habit well established in some cultures while not used in others. Thus also this test can give as well false positive as false negative results. Until further investigations can validate this test, it is concluded that it is of little use and can be misleading as an indicator of non-dental fluorosis.

**Knock-knees:** Only 14 % of the study subjects showed no sign of knock knees; 64 % showed this manifestation clearly and the rest, about 21 % were classified as questionable. This is suggesting that knock-knees may well be a reliable indicator of the non-dental fluorosis. Further it is the author's experience that the knock-knees phenomenon, as often observed in the Arusha Region, is closely related to the severity of dental fluorosis and it is thought of as a kind of first stage of fluorotic deformation in the legs. However, as the phenomenon is also known to prevail in non-fluorotic areas, it still has a risk for false-indication of the non-dental fluorosis.

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