

MULTI-DIMENSIONAL FATIGUE INVENTORY: A TOOL TO ASSESS SHRAMA

Patil Suma¹ Ashok² Katti Anand³ Shreevathsa⁴

ABSTRACT:

Assessment of human being (Purusha) is the basic essential pre-requisite in Ayurveda. To fulfill both goals of Ayurveda that is, swasthya rakshana and vikara prashamana after proper assessment of person health promoting measure should be applied. Treatment of disease will be possible after proper analysis of disease and diseased. Shrama is defined as tiredness. The drugs and regimen that removes shrama are known as shramahara. Acharya charaka enumerates ten drugs in shramahara dashemani. As of today there are no inventories or scales to quantify shrama and measure shramahara karma in humans. Shrama arbitrarily holds equal with the concept of Fatigue of contemporary science. The similarity is observed in physiological and pathological platforms. Fatigue is a subjective feeling of tiredness that can be assessed by various scales. Multidimensional fatigue inventory is a novel tool developed to assess fatigue. This article proposes that Multi-Dimensional Fatigue Inventory can be used as an assessment tool for shrama and shramahara karma.

Key Words: Shrama, Fatigue, Multi-Dimensional Fatigue Inventory.

INTRODUCTION:

The time honored *Ayurvedic* science has proposed many concepts and principles for the overall wellbeing of mankind. Most of the information available in the *Samhitas* are in coded language, and deciphering codes is key for understanding the concept. *Shrama* is one such concept that requires critical analysis and interpretation in comparison with contemporary science. Hence there is a need to understand *Shrama* and find out tool to measure it.

SHRAMA

Shrama is defined as incompetence of *karmendriya* (motor organs) for their respective function after excessive physical activities. *Swedagama*, *Shwasavrudhi* are the features of *Shrama*. Monier williams, translates *Shrama* as Fatigue, weariness, tired, exhausted, exertion, effort either bodily or mentally, military exercise.^[1] Synonyms of *Shrama* are *Klama*, *Klesha*, *Parishrama*, *Prayasa*, *Ayasa*, *Vyayama*, *Glani* etc are mentioned in *Shabdakalpa druma*.^[2] The synonyms with their meaning are given in table 1

Table 1: Synonyms of Shrama with its meaning

<i>Klama</i>	Condition exerted due to the slight <i>Ayasa</i>
<i>Klesha</i>	Termed as <i>peeda</i> i.e. discomfort
<i>Parishrama</i>	Defined as the <i>balahani</i> of <i>sharira</i> i.e. loss of strength
<i>Prayasa</i>	Defined as the <i>prayatna</i> i.e. effort of either bodily or mental
<i>Ayasa</i>	Defined as the bodily exhausting activity.
<i>Vyayama</i>	Defined as the <i>sharira Ayasa janaka karma</i> i.e. the physical activity which

leads exhaustion.

Analysis of all definitions depict that *shrama* is physical tiredness, where as mental tiredness is represented as *Glani*. *Glani* is defined as lack of desire for physical work. *Acharya charaka* considered *Glani* as tiredness of *manas* and *Jnanendriya*. *Indu* opines *Glani* is a condition of depletion of *Harsha*.

Shrama can be seen in *swastha* and *atura avastha*. *Shrama* produced after *vyayama*, because of suppression of *pipasa*, *nishwasa vega* are seen in healthy persons. *Shrama* caused by underlying pathology can be seen in diseased. *Shrama* is seen as a *nidana* in *Vata kopana*, *Kusta*, and as *purvarupa* (Premonitory symptom) in *Jwara*, *Pandu* etc, and as *lakshana* in *Vatajajwara*, *asthikshaya* etc.

FATIGUE

Fatigue is a subjective feeling of tiredness which is distinct from weakness, and has a gradual onset. Fatigue can have physical or mental causes, caused by various diseases, present day life style and Stress. Fatigue is common feature of physical and neurological disease as well as psychiatric disorders, often reported

^{1,2}PG Scholar, ³Lecturer, ⁴Professor (I/C) and HOD, Dept. of PG Studies in Ayurveda Siddhantha and Samhita. Govt. Ayurvedic Medical College, Mysore.

Corresponding author email address: dr.sumapatil@gmail.com

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Received on: 22/05/15, Revised on: 07/07/15, Accepted on: 07/07/15

amongst patients most severe and distressing symptoms. Fatigue is a feeling of tiredness that can be alleviated by periods of rest. Prolonged fatigue is a self-reported, persistent (constant) fatigue lasting at least one month. Chronic fatigue is a self-reported fatigue lasting at least six consecutive months. Chronic fatigue may be either persistent or relapsing. Chronic fatigue is a symptom of many diseases and conditions.

CLASSIFICATION OF FATIGUE

Physical and Mental Fatigue

Physical fatigue

It is the transient inability of a muscle to maintain optimal physical performance, and is made more severe by intense physical exercise. Physical fatigue caused by over exercises or heavy movement of muscle for a long time and it can effect in deterioration of physical performance.

Mental fatigue

It is a transient decrease in maximal cognitive performance resulting from prolonged periods of cognitive activity. Mental fatigue caused by sleep deprivation or mental Stress.

Central, Neuromuscular and Peripheral muscle fatigue

Central fatigue

The central fatigue is generally described in terms of a reduction in the neural drive or nerve-based motor command to working muscles that result in a decline in the force output.

Neuromuscular fatigue

Nerves control the contraction of muscles by determining the number, sequence, and force of muscular contraction. When a nerve experiences synaptic fatigue it becomes unable to stimulate the muscle that it innervates.

Peripheral muscle fatigue

Peripheral muscle fatigue during physical work is considered as an inability for the body to supply sufficient energy or other metabolites to the contracting muscles to meet the increased energy demand. This causes contractile dysfunction that manifests in the eventual reduction or lack of ability of a single muscle or local group of muscles to do work.^[3]

Theories of Fatigue:

The “**exhaustion theory**” suggests that during exercise, many energy sources, such as glucose and liver glycogen, will be exhausted, thus leading to physical fatigue. Several reports showed that post-exercise nutrition through the administration of proteins,

peptides or amino acids can facilitate recovery from fatigue (Wang et al., 2008).

The “**clogging theory**”, the over accumulation of serum lactic acid (LA) and blood urea nitrogen (BUN) will also result in metabolic disorders leading to fatigue.

The “**free radical theory**” suggests that intense exercise can produce an imbalance between the body’s oxidation system and its anti-oxidation system. The accumulation of reactive free radicals will put the body in a state of oxidative Stress and bring injury to the body by attacking large molecules and cell organs (Wang et al., 2008).

Scales to assess fatigue:

Efforts to measure fatigue are carried out since long. Subsequently few scales and inventories are developed by many researchers. Few notable scales are-

- Piper Fatigue Scale
- Multi-Dimensional Fatigue inventory
- Functional Assessment of Cancer Therapy-Fatigue Scale
- Fatigue Impact Scale/Fisk Fatigue Severity Score
- Christensen-Kehlet Ordinal Fatigue Scale
- Checklist Individual Strength
- Maastricht Questionnaire (vital exhaustion)
- Brief Fatigue Inventory
- Visual Analogue-Fatigue
- Fatigue Symptom Inventory

DISCUSSION:

Shrama vis-a-vis Fatigue

Shrama is determined by *Swedagama, karmendriya akshamatva* etc features, Fatigue is a subjective feeling of tiredness that can be alleviated by periods of rest. Based on the physiology, pathology and treatment, *Shrama* is co related to fatigue. Their similarities are as follows,

Table 2. Showing similarity between Shrama and Fatigue.

Shrama	Fatigue
<i>Akshamatva/ failure of karmendriyas to perform their actions</i>	Fatigue is temporary failure to maintain the required or expected force or power output
Excessive <i>Shrama</i> leads to many diseases by vitiations <i>vata</i> .	Excessive Fatigue leads to many diseases due to oxidative Stress.
Many natural herbs are	Anti oxidants are beneficial

used in <i>Ayurveda</i> to relieve <i>Shrama</i>	in fatigue
<i>Shrama</i> is relieved by <i>vishrama</i> i.e. rest	Fatigue is reversed by a periods of rest
<i>Shramahara Gana</i> contains mainly fruits;they are readily gives energy and relieve <i>Shrama</i> .	Fatigue is ameliorated by administration of nutraceutical suppliments.

By observing the above table, *shrama* and fatigue can be considered as one and the same and it is very important to assess and quantify *shrama* or fatigue clinically.

The Multidimensional Fatigue Inventory

There are numerous scales available to assess and quantify fatigue. As it is concluded that *shrama* and fatigue are same, scales that are being used to assess fatigue can be used to assess and quantify *shrama*.

Out of all the scales available for assessment of fatigue, the Multi Dimensional Fatigue Inventory has is more relevant. Reason being, its reliability and validity and most importantly its wider application i.e it can be used in different disease conditions, where as the other scales for fatigue assessment are disease or condition specific and have limited applicability.

One of the challenges in assessing fatigue is the lack of a widely accepted definition and with that,

differentiating its many dimensions. Its multidimensionality is believed to result from a complex interplay between the underlying disease process, peripheral control systems (i.e. muscle fatigability), central control systems (i.e. subjective sense of fatigue) and environmental factors. This complexity may be reflected in the large number of self-report questionnaires that are currently available to measure fatigue as either a multidimensional or a unidimensional assessment in diseases.

The Multidimensional Fatigue Inventory was originally developed and validated in the Dutch language in patients with cancer and patients with chronic fatigue syndrome^[4] and was translated and validated in English in patients with cancer^[5]. The MFI is a self-report questionnaire that assesses the impact of fatigue and comprises five dimensions such as General fatigue, Physical fatigue reduced activity, mental fatigue, reduced motivation (GF, PF, RA, MF and RM). Each subscale contains four items, with two items formulated in a positive (e.g. I feel fit) and two formulated in a negative direction (e.g. I feel fatigued). The addressed recall period is 'lately'. All items are scored on a five-point Likert scale ranging from 1 (yes, that is true) to 5 (no,that is not true). The negative formulated items must be recoded before adding up scores. The obtainable score within each subscale ranges from 4 (absence of fatigue) to 20 (maximum fatigue).

Multi-Dimensional Fatigue Inventory

The next questions are about how you have been feeling lately. Please place one "X" for each statement.

The more you agree with the statement, the more you should place an "X" in the direction of "yes, that is true." The more you disagree with the statement, the more you should place an X in the direction of "no, that is not true."

Take for example the statement: "I FEEL RELAXED."

If you think that this statement is entirely true, that you have been feeling relaxed lately, you would place an "X" in the box labeled "1."

yes, that is true no, that is not true
1 2 3 4 5

1. I feel fit. yes, that is true no, that is not true
1 2 3 4 5

2. Physically I feel only able to do a little. yes, that is true no, that is not true
1 2 3 4 5

3. I feel very active. yes, that is true no, that is not true
1 2 3 4 5

4. I feel like doing all sorts of nice things. yes, that is true no, that is not true
1 2 3 4 5

5. I feel tired. yes, that is true no, that is not true
1 2 3 4 5

6. I think I do a lot in a day. yes, that is true no, that is not true
1 2 3 4 5

7. When I am doing something, I can keep my thoughts on it.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
8. Physically I can take on a lot.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
9. I dread having to do things.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
10. I think I do very little in a day.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
11. I can concentrate well.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
12. I am rested.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
13. It takes a lot of effort to concentrate on things.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
14. Physically I feel I am in a bad condition.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
15. I have a lot of plans.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
16. I tire easily.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
17. I get little done.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
18. I don't feel like doing anything.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
19. My thoughts easily wander.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true
20. Physically I feel I am in an excellent condition.	yes, that is true	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <small>1 2 3 4 5</small>	no, that is not true

MFI general fatigue

- I feel fit (item 1)
- I feel tired (item 5)
- I feel rested (item 12)
- I tired easily (item 16)

MFI physical fatigue

- Physically I feel I am in an excellent condition (item 20)
- Physically I feel I am in a bad condition (item 14)
- Physically I can take on a lot (item 8)
- Physically I feel only able to do a little (item 2)

MFI reduced activity

- I think I do very little in a day (item 10)
- I think I do a lot in a day (item 6)

- I get little done (item 17)

- I feel very active (item 3)

MFI mental fatigue

- When I am doing something, I can keep my thoughts on it (item 7)
- I can concentrate well (item 11)
- My thoughts easily wander (item 19)
- It takes a lot of effort to concentrate on things (item 13)

MFI reduced motivation

- I have a lot of plans (item 1)
- I feel like doing all sorts of nice things (item 4)
- I dread having to do things (item 9)
- I don't feel like doing anything (item 18) ^[6]

The multi-dimensional fatigue inventory has five components among them as General fatigue, Physical fatigue reduced activity represent Physical fatigue and mental fatigue, reduced motivation represent psychological fatigue. As *shrama* can also be narrowed down to *sharirika* and *manasika* types, the inventory can be used to quantify *shrama*.

CONCLUSION:

Shrama and fatigue are strikingly similar. Hence the Multi-dimensional fatigue inventory can be used to assess *shrama*. The Multi dimensional Fatigue Inventory can also be used as an objective assessment tool to carry out researches on *shramahara karma* of many *ayurvedic* formulations.

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Cite this article as: Patil Suma, Ashok, Katti Anand, Shreevathsa. Multi-Dimensional Fatigue Inventory: A Tool to Assess Shrama, *J of Ayurveda and Hol Med (JAHM)*.2015;3(3):32-36.

Source of support: Nil, Conflict of interest: None Declared.