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TITLE

Wound Exudates and its Analogies – A Prognostic Indicator

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ABSTRACT

Background: Gaining of knowledge about the unknown by the virtue of its similar known object is one of the tools for knowledge perception, i.e., *Upamana*. Since ancient period, analogies were utilised for medical purposes along with their other poetic, literary applications. Depth based wound exudates and its analogies are an exceptional contribution of Ayurvedic Surgical treatises. **Aim:** To review the analogies cited for wound from Ayurveda and contemporary sciences text and to review the prognostic aspect of wound exudates and its analogies. **Materials & Methods:** The study incorporated screening and analysing of the classical texts of Ayurveda and contemporary sciences with regards to mentioning of wounds and its analogies. **Observations:** Eight levels of affliction of wound has been identified in Ayurvedic text and wound discharge at each level is described with simile of some known object. Number of analogies, cited for various types of wound exudates aids the medico in enhancing better understanding of the subject and to a clinician in prognosis of the condition. **Conclusion:** Analogies are one of the key diagnostic and prognostic indicators of the wound. The analogies mentioned in Ayurveda are still relevant in current clinical practice. However for the wider clinical application and validation of the same, critical scientific appraisal of the concept is the need of the time.

Keywords: *Ayurveda, Analogy, Wound exudate, Upamana*

Introduction

Wound exudates are considered as liquid biopsy that reflects the metabolic condition of the wound. Wound exudates are so distressing and have a significant negative impact on the quality of life of an individual.^[1-4] Off late Wound exudates are finding its significance, yet many unexplored details about it have to be explored. One such unexplored factor is application of analogies cited for wound exudates in various medical systems. Wound exudates are evaluated mainly for its nature, quantity and microscopic findings. In the present era, wound Prognosis and management are largely dependent of laboratory advancements. Naked eye examination or evaluations of physical appearance of wound with the analogy cited in most of medical treatises have been ignored. Clinical examination of wound and its attributes like exudates are prerequisite for diagnosis and laboratory investigations must aid and support the clinical findings, yet few studies claim clinical examination of wound as unreliable.^[5] It is so odd; the first step of diagnosis, clinical evaluation itself is going through decay. Wounds are classified based on appearance and quantity of exudates.^[6] The present study was aimed at reviewing the analogies cited for wound from Ayurveda and contemporary sciences text and also to review the prognostic aspect of wound exudates and its analogies.

Materials & Methods

The classical texts of Ayurveda and contemporary sciences were screened and analysed. The classical texts screened include Sushruta Samhita, Charaka Samhita and Ashtanga Samgraha with Sanskrit commentaries. In contemporary sciences, Bailey and Love Text book of Surgery, Text book of Surgery written by S Das and internet source were screened.

Observation

Analogies cited for each type of wound is unique and assist the medico for better understanding of the subject.

Ancient Indian Surgeon, Sushruta has dealt the applications of analogies in prognosis of a condition especially in wounds. Ayurveda considers 8 levels of affliction based on depth of a wound, and the systematic observation of wound exudates will ensure the physician on deciding the prognosis of the wound.^[7]

A number of analogies are traceable in treatises of Ayurveda, the science which believes *Upamana* or science of simile as one of the key method for knowledge perception.^[8-10] Exudates based on *Doshic* (bodily humor) involvement and based on level of affliction are described (Table 1).^[11-12]

Table no.1: Depicting the exudates based on level of affliction:

Level	Discharges	Description	Analogy
<i>Twak</i> [Skin]	<i>Salila Prakasha</i> [Watery discharge], <i>Kinchit Visra</i> [Slightly straw colored], <i>Peetavabhasa</i> [Yellowish]	Watery, straw yellow coloured	Watery discharge
<i>Mamsa</i> [Muscle]	<i>Sarpi Prakasha</i> [similar to ghee], <i>Sandra</i> [thick], <i>Shweta</i> [white], <i>Picchila</i> [sticky]	Slimy, thick white and similar to ghee.	Similar to Ghee ^[15]
<i>Sira</i> [Vessel]	Bloody discharge in traumatic wounds	-	Pattern of flow is similar to water flow from pipe
	Pattern of flow of pus is similar to water from pipe	Thin, slimy, brown colour or frosty hue.	
<i>Snayu</i> [Tendon]	<i>Snigdha</i> , <i>Ghana</i> , <i>Singhanaka Pratima</i> , <i>Sarakta</i>	Oily, thick and similar to expectorated mucous secretion and mixed with blood	<i>Singhanaka</i> [Nasal Secretion]
<i>Asthi</i> [Bone]	<i>Majjamishra</i> , <i>Sarudhira</i> , <i>Snigdha</i>	Discharge contains internal marrow. It assumes the colour of oyster shell and mixed with blood	Colour of Oyster shell
<i>Sandhi</i> [Joint]	<i>Peedyamano Na Pravartate</i> <i>Picchila</i> , <i>Avalambi</i> , <i>Saphena Puya</i> , <i>Rudhira</i>	Exudates when affected limb or part is flexed, extended or moved Slimy, frothy blood streaked pus	Frothy discharge
<i>Koshta</i> [Abdominal Viscera]	-	Discharge mixed with urine, faecal matter, pus or blood or serous fluid	No analogy

Dosha precipitates dissimilar wound exudates at each level of affliction. The choice of similes for each type of wound is distinctive and the analogies depict the nature actual wound exudates.^[13-14]

Ayurveda believes the individualized treatment based on *Doshic* or bodily humoral evaluation.^[16-18] The fundamental principle of this science directs to evaluate the each and every condition on the basis of *Dosha* and determines future course of action. With this core opinion, certain analogies are cited for each *Doshic* type of wound which is described in below mentioned tables 2-5 ^[19-20] and the analogies cited by modern medicine in table 6.

Table no.2: Depicting Wound Analogies cited for diagnosing *Vataja* Wound

Level	Discharges	Description	Analogy
<i>Twak</i> [Skin]	<i>Parusha</i> / Dry, Rough in texture	Coarse, rough in consistency	No analogy
<i>Mamsa</i> [Muscle]	<i>Shyava</i> [Greyish]	Brown	No analogy
<i>Sira</i> [Vessel]	<i>Avashyaya</i> [Dew like]	Grey	Dew /Fog like
<i>Snayu</i> [Tendon]	<i>Dadhimastu</i> ^[21] [Supernatant part of Curds]	Transparent	Whey or Supernatant water over curds
<i>Asthi</i> [Bone]	<i>Ksharodaka</i> [Alkali water] ^[22-23]	Brownish/ash Colour	Alkali solution
<i>Sandhi</i> [Joint]	<i>Mamsadhavana</i> [Meat washed water]	Blackish red colour	Colour of Washing of meat
<i>Koshta</i>	<i>Pulakodaka</i> ^[24] [Rice washed water]	Colour of rice washed water	washing of paddy husk

Table no.3: Depicting Analogies cited for diagnosing *Pittaja* Wound

Level	Discharges	Description	Analogy
<i>Twak</i> [Skin]	<i>Gomedha</i> [Hessonite] ^[25]	Clear yellow colour	Hessonite
<i>Mamsa</i> [Muscle]	<i>Gomutra</i> [Cow's urine] ^[26-27]	Transparent yellow colour	Cow's urine
<i>Sira</i> [Vessel]	<i>Bhasma</i> [Ash]	Ash colour	Ash
<i>Snayu</i> [Tendon]	<i>Shanka</i> [Conch] ^[28]	Off white	Conch colour
<i>Asthi</i> [Bone]	<i>Kashayodaka</i> [Decoction coloured]	Brownish colour	Decoction
<i>Sandhi</i> [Joint]	<i>Maadhvika</i> ^[29]	A fermented preparation of honey	A type of Honey prepared by fermentation
<i>Koshta</i>	Colour of <i>Taila</i> [oil] ^[30-31]	Light yellow colour and unctuousness	Oil
	Colour of <i>Kimshukodaka</i> ^[32]	Yellowish red colour	<i>Butea monosperma</i> decoction

Table no.4: Depicting Analogies cited for diagnosing *Kaphaja* Wound

Level	Discharges	Description	Analogy
<i>Twak</i> [Skin]	<i>Navanita</i> ^[33] [Butter]	Thick and white	Butter
<i>Mamsa</i> [Muscle]	<i>Kaasisa</i> ^[34] [Ferrous Sulphate]	Yellowish White	<i>Kaasisa</i> / Ferrous Sulphate
<i>Sira</i> [Vessel]	Colour of Bone marrow	Reddish yellow colour	Bone marrow colour
<i>Snayu</i> [Tendon]	Paste of <i>Tila</i> ^[35] [sesame seed]	Pale colour	Sesame seeds paste
<i>Asthi</i> [Bone]	<i>Narikelodaka</i> ^[36] [Colour of tender coconut water]	Clear white colour	Colour of tender coconut water
<i>Sandhi</i> [Joint]	<i>Ervaruka</i> ^[37] [Colour of fruit of <i>Cucumis melo</i> Var]	Similar to fruit of <i>Cucumis melo</i> Var	Colour of Fruit of <i>Cucumis melo</i> Var
<i>Koshta</i>	Colour of <i>Vasa</i> [Unctuous extraction of meat]	Straw yellow colour	Colour of <i>Vasa</i> [Unctuous extraction of meat]

Table no.5: Depicting Analogies cited for diagnosing *Sannipataja* Wound

Level	Discharges	Description	Analogy
<i>Twak</i> [Skin]	<i>Tila</i> [Colour of Sesame seed]	Paste of <i>Tila</i> [sesame seed]	Pale colour
<i>Mamsa</i> [Muscle]	<i>Narikelodaka</i> ^[38] [Colour of tender coconut water]	Clear white colour	Colour of tender coconut water
<i>Sira</i> [Vessel]	<i>Ervaruka Rasa</i> [Colour of <i>Cucumis utilisissimus</i> Roxb]	Greenish white	Colour of fruit juice of <i>Ervaruka</i> [<i>Cucumis utilisissimus</i> Roxb] ^[39]
<i>Snayu</i> [Tendon]	<i>Kaanjika Prasada</i> ^[40] [Colour of Sour gruel]	Reddish white colour	Colour of <i>Kanji</i> [Sour gruel]
<i>Asthi</i> [Bone]	<i>Priyangu Phala</i> [Colour of fruit of <i>Callicarpa macrophylla</i>]	White colour	Colour of <i>Priyangu Phala</i> [Fruit of <i>Callicarpa macrophylla</i>] ^[41]
<i>Sandhi</i> [Joint]	<i>Yakrut</i> [Colour of Liver]	Brown to reddish Brown	<i>Yakrut</i> [Liver] ^[42]
<i>Koshta</i>	<i>Mudga Yusha</i> ^[43] [Colour of green gram soup]	Greenish yellow colour	Colour of <i>Mudga</i> [Green gram] soup
Colour of discharge from <i>Sannipaataja</i> type of wound	Colour of <i>Alukodaka</i> [colour of decoction of fruit of <i>Prunus domestica</i> L]	Blackish red colour	Colour of discharge from <i>Sannipaataja</i> type of wound

Table no. 6: Analogies cited in Contemporary sciences for wound exudates

Wound exudates	Description	Analogy
Straw colour	Modest amounts of thin, pale yellow or straw-coloured exudate in an acute healing wound is considered normal.	Straw color ^[44-46]
Cream of Coffee Pus	Seropurulent Murky, yellow, cream-coffee Thicker, creamy Infection	Cream coffee colour ^[47]
Cloudy white ^[48]	Abdominal drainage following Appendectomy and cholecystectomy	Cloudy white
Anchovy sauce pus	Liver abscess	Anchovy sauce ^[49]
Chocolate pus	Entamoeba histolytica and Giardia lamblia infections Necrotizing renal papillitis ^[53] Lung abscess ^[54]	Chocolate colour ^[50-52]
Milky white discharge	Urethral trichomoniasis	Milky white ^[55]
Milky creamy discharge	Bacterial vaginosis	Milky creamy ^[56]
Thick creamy pus	Pyogenic Psoas abscess	Creamy ^[57]
Oily discharge	Panniculitis	Oily ^[58]
Thin curdy discharge	vulvovaginal candidiasis, Mycotic Vulvovaginitis.	Curdy ^[59-61]
Coffee ground pus	Bacillus welchii panophthalmitis.	Coffee colour ^[62]
Cheesy pus	Herpes Zoster, Tuberculosis	Cheesy ^[63-65]
Golden yellow	Traumatic rupture of bile duct ^[66]	Golden yellow colour
Amber coloured	Tenosynovitis	Amber colour ^[67-68]
Sulfur granules	Empyema Necessitatis ^[69]	Sulphur colour
Sponge exudates	inflammatory exudates ^[70]	Sponge like ^[71]
Caramel like exudates	Bovine Melioidosis ^[72]	Caramel like
Prune juice	Pancreatic necrosis ^[73] Haemorrhagic Pancreatitis ^[74] Wound infection with Fiedlander bacillus ^[75]	Prune juice like
Cream of Tomato soup	Methyl salicylate poisoning – Stomach exudates ^[76]	Cream of Tomato soup
Honey coloured crust	Healing blisters in case of impetigo ^[77]	Honey colour
Sulphur granules discharge	Actinomyces ^[78]	Sulphur granules
Dishwater/putrid exudates	Necrotizing fasciitis ^[79]	Dishwater
Bubbly pus	Infected Gunshot wounds ^[80]	Bubbly
Reddish bloody pus	Generalized Blastomycosis ^[81]	Bloody

Discussion

Though the utility of analogies for medical education and also for diagnosis purpose has become scarce, it is the need of the hour to bring the lost glory of this unique way of teaching a subject through the simile or analogy. Analogies are best tools explained in various medical texts for easing the clinical examination and aid in diagnosing the condition. These analogies aid in medical education, it facilitates both learning and teaching tasks.^[82] The art of clinical examination and utility of analogies are getting extinct due to lethargic attitude towards clinical examination and over dependence on technological and laboratory support systems. Analogies cited for wounds in Ayurvedic system of Medicine not only assist in diagnosing the condition but also support for arriving a decision on prognosis.^[83-84] The analogical descriptions based on level of affliction of wound is unique contribution of Ayurveda to wound science. By tracing the analogical view of wound exudates the level of affliction and prognosis of the wound is determined. A wound with exudates similar to the colour of oyster shell and mixed with blood is from the bone depth wound, this information facilitate in assessing the prognosis of the wound. A proper implementation of analogies elaborated for wound exudates in various texts will help in diagnosing and also prognosis of the wounds.

Conclusion

Analogies are the best tools for education yet its value is unrecognized by the technology driven, technology dependant world. The comprehensive analogy based analysis of Wound exudates with respect to its colour, appearance, texture, odour, quantity, pattern of flow etc. will yield appropriate prognosis of the condition along with the depth of involvement.

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