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NOTE

Standardisation of Pancaguna Taila†

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The title investigation is in continuation of our earlier works on the standardisation of pancaguna taila used in panchakarma therapy. The physical constants of tila taila, murchhita tila taila, eucalyptus taila, turpentine taila, kejoputi taila and pancaguna taila have been determined, the effect of packing and adulteration have also been studied.

Taila possesses specific physical and chemical characteristics i.e. sp. gravity, refractive index, acid number, etc. which are expected to be altered when taila becomes medicated. It has been reported that the therapeutic principles are in very small quantity, the physical and chemical parameters of the medicated taila are not significantly altered but reflect only the characteristics of the sneha dravyas[1]. The preparation of the Ayurveda tailas is very complicated, so physical constant parameters are found not correct by the instrumental methods. The methods, which are adopted, are elegant, sensitive, simple and offers unique advantage of the determination of physical constants of Ayurveda tailas.

The adulterations of pancaguna taila have been measured by Abbe's refractometer. The effects of packing of pancaguna taila have also been studied.

The values of tila taila, murchhita tila taila, eucalyptus taila, turpentine taila, kèjoputi taila and pancaguna taila have been taken from literature[2]. The prepared pancaguna taila is packed in glass bottle and the alkalinity of the glass bottle has been tested[3]. All the chemicals used were standard products and were used without further purification.

Acid number, saponification number, Iodine number, and rancidity have been determined as usual methods. The refractive index and specific gravity have been determined by Abbe's refractometer and specific gravity bottle, respectively[4].

Pancaguna taila is prepared by using 16 ingredients, so its physical constants i.e. sp. gravity, refractive index, heat of combustion etc. are not

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found correct by the instruments. Due to this reasons, few equations have been used for determination of these constant values.

The sp. gravity of both fatty acids and glycerides is greater, the lower their molecular weight and the higher their unsaturation. Eqn. (1) has been developed of the sp. gravity of liquid tailas:

$$\text{Sp. gravity} = 0.8475 + 0.00030\ (S) + 0.00014\ (I) \quad (1)$$

The calculated sp. gravity values are given in Table 1. of different tailas. Over the range of tempratures to which tailas are ordinarily heated in processing, that is, about decreasing approximately 0.00064 for each increment in temperature of 1.0°C. The specific gravity values have been determined by sp. gravity bottle and calculated by the eqn. 1, are found differences. Those values are determined by sp. gravity bottle, they are not reliable, because the effect of temperatures, changes the physical properties i.e. semi solid, translucent etc. So, the calculated method is good for the determination of sp. gravity of the Ayurveda tailas.

The refractive index has been measured by Abbe's refractometer of different tailas, Table 1. Eqn. 2 has been used to calculate the refractive indices of the tailas:

$$nD = 1.4643 - 0.000066\ (S) - 0.0096\ (A)/(S) + 0.0001171\ (I) \quad (2)$$

nD = refractive index, S = Saponification number, A = Acid number and I = Iodine number.

The calculated values of refractive index give satisfactory results for the Ayurveda tailas, because in the preparation of Ayurveda tails, many ingredients are used and after filteration many sediments are present, so the instrumental method is not good for determination of refractive indices of Ayurveda tailas. Effect of temperature takes part in the refractive index, so the temperature should remain the constant for the determination of the values of saponification, iodine and acid number[5]. The refractive index values, which were determined by Abbe's refractometer and calculated by Eqn. 2, they have too much dissimilarity of different tailas (Table 1).

The heat of combustion of saturated fatty acids increases with increase in the chain length of the acids. The unsaturated acids are sparse and purity of the fatty acids is not always, good, therefore the results given from them should be accepted with reservation. The values of the unsatured acids are slightly lower than the saturated acids of the same chain length. Triglycerides have substantially the same heats of combustion as the fatty acids of which they are composed, hence the heat of combustion of a variety of the fatty tailas is expressed closely be Eqn. 3:

$$\text{Heat of combustion} = 11{,}380 - (I) - 9.15\ (S) \quad (3)$$

The heat of combustion is less of murchhita tila taila than tila taila, this indicates that the unsaturated acids are formed. This heat of combustion of different tailas is found as murchhita tila taila > eucalyptus taila > tila

TABLE 1

PHYSICAL CONSTANTS OF TAILAS USED IN THE PREPARATION OF PANCAGUNA TAILS

Taila	Acid number 25°	Saponification number 25°	Iodine number 25°	Sp. gravity		nD		Heat of combustion cal/gm 25°
				Direct	Calculated 25°	Direct	Calculated 25°	
Tila taila	04.680	181.63	104.80	—	0.9167	1.4695^{40}	1.4643	09613.29
Murchhita tila taila	05.770	198.70	094.92	—	0.9204	1.4682^{40}	1.4620	09466.98
Eucalptus taila	07.130	198.20	090.22	—	0.9196	1.4655^{25}	1.4614	09476.25
Turpentine taila	01.180	033.43	121.73	0.8900^{20}	0.8746	1.4770^{20}	1.4760	10952.39
Kejoputi taila	09.430	022.83	014.14	0.9260^{20}	0.8563	1.4740^{20}	1.4605	11156.56
Pancaguna taila	16.290	155.90	107.50	0.9350^{20}	0.9105	1.4750^{40}	1.4654	09809.42

TABLE 2

PHYSICAL CONSTANTS OF PANCAGUNA TAILA

Month	Iodine number 25°	Saponfication number 25°	Acid number 25°	Refractive index		Sp. gravity 25°	Heat of combustion cal/gm 25°	Rancidity
				Direct 40°	Calculated			
Pure	107.50	159.9	16.29	1.4750	1.4654	0.9105	09809.42	+ve
1.	097.80	144.3	16.60	1.4725	1.4651	0.9045	09961.86	+ve
2.	097.50	143.2	16.80	1.4725	1.4651	0.9041	09972.22	+ve
3.	095.30	142.0	17.16	1.4725	1.4649	0.9035	09985.40	+ve
4.	093.20	142.0	17.25	1.4735	1.4647	0.9032	09987.50	+ve
5.	080.00	140.0	17.28	1.4735	1.4633	0.9007	10019.00	+ve
6.	060.00	132.5	17.30	1.4735	1.4613	0.8957	10107.63	+ve

taila > pancaguna taila > turpentine taila > kejoputi taila (Table 1).

The effect of packing of pancaguna taila has been studied, the values of iodine number, saponification number, acid number, refractive index and rancidity are given in Table 2. Eqn. 1, 2 & 3 have been used for the determination of the values of refractive index, sp. gravity and heat of combustion. The calculated values of refractive index and sp. gravity have been decreased as the saponification number and iodine number decrease; this clearly indicates that refractive index and sp. gravity values are directly corelated to the iodine number and saponification number. The values of heat of combustion have been increased as the time and acid number increase, this shows that heat of combustion is directly dependent upon the acid number. Pancaguna taila gives positive Kreis test; the rancidity may not be possible because of the presence of higher acid values and resin[6].

The refractive index values of the solutions have been plotted against pancaguna taila volumes (Fig. 1). In tila taila, a subsequent increase in

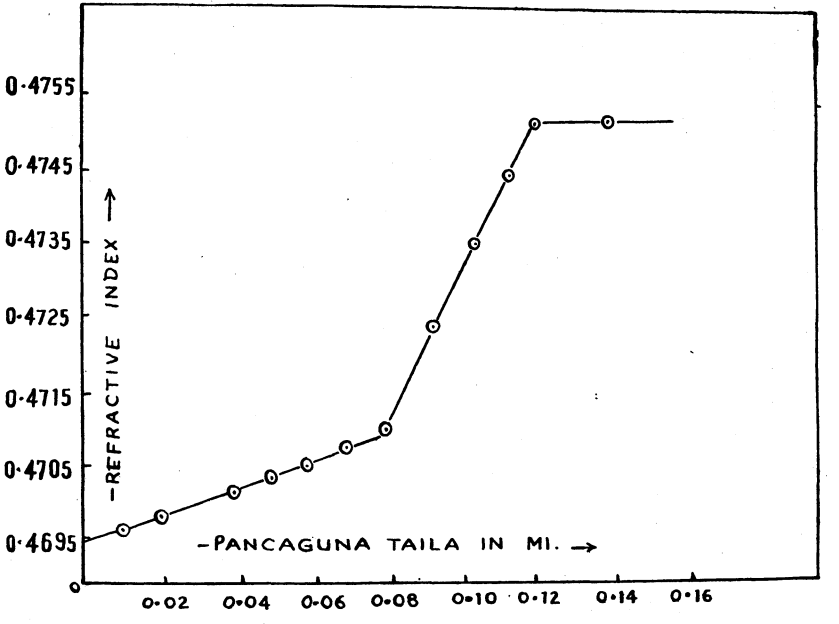

Fig. 1 Graph plotted between pancaguna taila and refractive index

the refractive index is obtained by the addition of pancaguna taila (0.08 ml) which then suddenly jumps (0.12 ml) and afterwards remains constant. The mixed tila taila system curve shows that in the case of primary complex curve there is a lowering of refractive index indicating that primary complex formation is completed upto refractive index ~ 1.4710. Afterwards, the values suddenly jumped upto refractive index ~ 1.4750;

this shows that compositions of pancaguna taila have been broken or they have not formed the homogenous taila due to mole fractions of tila taila and pancaguna taila. The values of refractive index, after 1.4750, were found constant; this clearly shows that no effect of the pancaguna taila is found on tila taila (Table 3).

TABLE 3

MEASUREMENTS OF REFRACTIVE INDEX OF TILA TAILA IN DIFFERENT ml. OF PANCAGUNA TAILA

Sl. No.	Tila taila ml.	Pancaguna taila ml.	Refractive index at 40°C
01	Pure	—	1.4695
02	—	Pure	1.4760
03	1.00	0.01	1.4698
04	1.00	0.02	1.4700
05	1.00	0.04	1.4701
06	1.00	0.05	1.4703
07	1.00	0.06	1.4705
08	1.00	0.07	1.4708
09	1.00	0.08	1.4710
10	1.00	0.09	1.4723
11	1.00	0.10	1.4735
12	1.00	0.11	1.4744
13	1.00	0.12	1.4750
14	1.00	0.14	1.4750
15	1.00	0.16	1.4750

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