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Standard Operating Procedure (Sop) Of Tuvaraka OilPrepared By Two Different Methods

Hardik J Solanki*[1], Dr. Kruti Vyas[2], Dr. Bharti Umretia[3], Dr. Bharat Kalsariya[4]

[1] *PG Scholar, Upgraded Department of Rasashastra & Bhaishajya Kalpana, GovernmentAyurved College, Vadodara, Gujarat*
[2] *Lecturer, Upgraded Department of Rasashastra & Bhaishajya Kalpana, GovernmentAyurved College, Vadodara, Gujarat*
[3] *Reader & Head, Upgraded Department of Rasashastra & Bhaishajya Kalpana, GovernmentAyurved College, Vadodara, Gujarat*
[4] *Professor & Principal, Upgraded Department of Rasashastra & Bhaishajya Kalpana,Government Ayurved College, Vadodara, Gujarat*

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ABSTRACT

Introduction: Tuvaraka is botanically identified as Hydnocarpus laurifolia (Dessnt). Sleumer, belongs to Flacourtiaceae family. It is also known as scooty oil tree. Taila preparation, in which an oleaginous material are processed with Kalka (paste) and Drava Dravya (liquid media) in specific proportions by subjecting them to a specified heating pattern and duration. Acharya Sushruta has described Pidana (oil expulsion with expeller) and Sravana (skimming) methods for Tuvaraka oil preparation. Extracted oil from Tuvaraka seeds which is available in market, seems costly. Lower cost of Tuvaraka oil is prepared by general Taila Kalpana in which Tila oil as base and Khadira Kwatha used as liquid media, will facilitate large scale production. **Aim:** To develop a standard operating procedure of Tuvaraka oil prepared by two different methods. **Materials and Methods:** Three batches of Tuvaraka oil with modification were prepared as per the reference of Sharangadhara Samhita for preparation method and Sushruta Samhita for proportion. Three batches of Tuvaraka oil were prepared by classical method (Pidana method) as per the reference of Sushruta Samhita. **Result:** Average yield of Tuvaraka oil prepared by modified method and Pidana method was 97.3% and 48.5% respectively. **Conclusion:** The yield of Tuvaraka oil prepared by modified method was significant higher in comparison of Tuvaraka oil extracted by Pidana method.

KEYWORDS: Hydnocarpus laurifolia (Dessnt). Sleumer, Oil expulsion, SOP, Tuvaraka.

I. INTRODUCTION

Quality products of Standard Operating Procedure (SOP) with batch uniformity are needed to maintain quality assurance, which allow the patient to make safe use of them.[1] Vast work is needed yet to develop globally accepted standards in the manufacturing process of Ayurvedic formulations. Tuvaraka is botanically identified as Hydnocarpus laurifolia (Dessnt). Sleumer, belongs to Flacourtiaceae family. It is also known as scooty oil tree. Taila Kalpana is an oleaginous medicament in which the substances such as Kalka (paste), Drava Dravya (liquid media) and Taila (oil) are processed in specific proportions by subjecting them to a specified heating pattern and duration.[2] This is general method for all Taila preparations in Ayurveda. Classics also describes oil extraction from Sneha Dravya like Tila (Sesamum indicum Linn.), Bhallataka (Semecarpus anacardium Linn.), Karanja (Pongamia pinnata), Ingudi (Balanites aegyptiaca Linn.), Eranda (Ricinus communis Linn.), Tuvaraka[Hydnocarpus laurifolia (Dessnt). Sleumer] etc.[3] Acharya Sushruta has described different extraction methods of Tuvaraka oil i.e., by Pidana (oil expulsion with expeller) and Sravana (skimming).[4] Acharya mentioned that Tuvaraka oil obtained by Pidana and Sravana should be processed with Khadira Kwatha.[5] In present era, many pharmaceutical companies are manufacturing Tuvaraka oil by this method which is costlier. So here in second method Tuvaraka oil is prepared by modification in which Tuavraka taken as a Kalka Dravya, Tila Taila as a Sneha Dravya and Khadira Kwatha taken as a Drava Dravya. This method may

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lower the cost and that will facilitate large scale production. Considering this, an attempt has been made to develop Standard Operating Procedure (SOP) of Tuvaraka oil prepared by classical method (Pidana method) and Tuvaraka oil prepared by modified method (Snehapaka method).

AIM

To develop Standard Operating Procedure (SOP) of Tuvaraka oil prepared by modified method and Tuvaraka oil prepared by Pidana method.

II. MATERIAL AND METHODS

The whole pharmaceutical process was arranged in the following two steps i.e.

1. Procurement and authentication of raw material
2. Preparation of drug.

1. Procurement and authentication of the raw material

Tila Taila and Khadira Twak were procured from the Government Ayurved Pharmacy, Rajpipala, Gujarat. Tuvaraka seed were procured from the local traders of Mumbai, Maharashtra in November 2022**.** The samples of Tuvaraka seed and Khadira Twak were identified and authenticated in pharmacognosy study in Upgraded department of Dravyaguna, Government Ayurved College, Vadodara, Gujarat.

2. Preparation of drugs

The whole pharmaceutical procedure was carried out in following headings;

- Preparation of Khadira Twak Kwatha
- Preparation of Tuvaraka oil prepared by modified method (TOM).
- Preparation of Tuvaraka oil prepared by Pidana method (TOP)

All the samples of Tuvaraka oil prepared by modified method (Snehapaka method) and Tuvaraka oil prepared by classical method (Pidana method) were prepared in pharmaceutical laboratory of Upgraded department of Rasashastra and Bhaishajya Kalpana, Vadodara, Gujarat.
Initially, pilot batch was prepared and findings were obtained. From that pilot batch; main batches were prepared by the adopting the same method to attain the reproducibility of that method. (Equipment specification for TOM was given in Table No.10 and for TOP was given in Table No.11)

Preparation of Khadira Twak Kwatha

Table No.1: Proportion and quantity of ingredients for Khadira Twak Kwatha

No.	Name of ingredients	Latin Name	Part used	Ratio	Batch-1	Batch-2	Batch-3
1	Khadira Twak Yavakuta	Acaciacatechu Willd	Stem bark	1 part	1500 g	1500 g	1500 g
2	Jala	Potable water	-	16 parts	24000 ml	24000 ml	24000 ml

Khadira Twak Kwatha was prepared as pre-process of TOM preparation. Khadira Twak Yavakuta was taken in a clean stainless-steel vessel and soaked in 16 times of potable water for overnight. Next day, the mixture was heated on constant mild heat with intermediate stirring and reduced water until its ¼ th part remained. After desirable reduction in volume, it was filtered through cotton cloth. This filtrate was taken as Khadira Twak Kwatha and used for further process. (Figure.1)

Preparation of Tuvaraka oil prepared by modified method (TOM)

The pharmaceutical process for TOM preparation was conducted as per modified method.

Table No.2: Name and quantity of ingredients with their part used for TOM

No.	Name of	Latin/English	Part	Ratio	Quantity		
	ingredients	Name	used		Batch-1	Batch-2	Batch-3

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1	TuvarakaKalka	Hydnocarpus laurifolia (Dessnt). Sleumer	Seed	1	333.33g	333.33g	333.33g
2	Tila Taila	Sesamum indicum L.	Seed	6	2000 ml	2000 ml	2000 ml
3	Khadira Kwatha	Decoction of Acacia catechu Willd.	Stem bark	18	6000 ml	6000 ml	6000 ml

Tila Taila was taken in a s.s vessel and heated over mild heat (92 ^{0}C) till complete evaporation of moisture content. After slight cooling (at 80^{0}C), the bolus of Tuvaraka seed Kalka was added in Tila Taila followed by Khadira Twak Kwatha. The whole mixture was again heated with intermittent stirring. The heating duration was adjusted so that Taila Paka was completed in two days as per the reference of Sharangadhara Samhita.[6] The heating was carried out till attainment of Siddhi Lakshana of Madhyama Paka as per the reference of Sharangadhara Samhita[7] i.e. (1) Shabdahina Agni Nikshipta (no sound produced if a part of Kalka is put into the fire) (2) Phenodgama (foam appears) and (3) Vartivat Sneha Kalka (rolling of wick). The finally prepared TOM was filtered with cotton cloth, collected, weighed and stored in airtight container under sterile conditions. Total three batches TOM were prepared to ensure SOP by following similar process. (Figure.2)

Tuvaraka oil prepared by Pidana method (TOP)
The pharmaceutical process for TOP preparation was conducted as per Pidana method.[8].

Table No.3: Name and quantity of ingredient with their part used for TOP

No.	Name of ingredient	Latin/English Name	Part used	Quantity(g) (for each batch)
				Batch-1 to 3
1	Tuvaraka	Hydnocarpus laurifolia (Dessnt). Sleumer	Seed	2000

Tuvaraka seed were cut into small pieces with the help of knife and added in oil expeller hoper and started the machine. After 10 minutes, oil came out from the cold press part of oil expeller and collected in s.s. vessel. Residual part came from front part (heat coil) of oil expeller. extracted oil was kept for 1 day to settle down of solid content. Next day, supernatant oil was heated on 105 °C temperature for 10 min and filtrate through cotton cloth. Then TOP was stored in airtight container. (Figure.3)

III. OBSERVATIONS AND RESULTS

Observations of Khadira Twak Kwatha

Khadira Twak Yavakuta was floating on the surface of water initially after soaking. Frothing was appeared after 30 to 40 min of boiling and the colour of mixture changed to brownish. Evaporation was started at 72ºC, which was aggravated on stirring. Average temperature was found of the liquid in between 90º-97º C. The brownish colour of mixture turned to dark brown at the end. The characteristic smell of Khadira was felt. At the end of procedure, Yavakuta Churna became soft and swollen. Results obtained during Khadira Twak Kwatha are mentioned in table no.4.

Table No.4: Result of Khadira Twak Kwatha

Parameters	Results Batch-1 Batch-2 Batch-3 Average			

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Khadira Twak Yavakuta (g)	1500	1500	1500	**1500**
Initial quantity of water (L)	24	24	24	**24**
Final quantity of Kwatha (L)	06	06	06	**06**
Final yield (%)	25	25	25	**25**
Total loss (L)	18	18	18	**18**
Total loss (%)	75	75	75	**75**
Reason of loss	Due to evaporation of water			
Quantity of residue (g)	3310	3300	3332	**3314**
Total duration required(hr:min)	5:00	5:10	5:20	5:15

Observations of TOM

Characteristic smell of Tila Taila was felt, when heated over gas stove. Cracking sound heard after addition of Kalka. On addition of Kalka and Kwatha the colour of mixture turned to brownish to dark brown. Characteristic smell of Tuvaraka was felt throughout process. The consistency of mixture was increased, later on as the Kalka started accumulating at the centre of the vessel and the colour turned to brown. At the end of Paka, Taila was separated from Kalka and at the same time when Kalka was rubbed with fingers and thumbs, Varti (wick) could be rolled and it did not stick to ladle. Phenodgama was also observed at last stage of Paka. (Table No.8) The colour of Tuvaraka oil was mustard yellow with a characteristic smell was felt**.**

Table No.5: Result of Tuvaraka oil (TOM)

Parameters	**Results**			
	Batch-1	**Batch-2**	**Batch-3**	**Average**
Initial quantity of Tila Taila (ml)	2000	2000	2000	**2000**
Obtained quantity of Tuvaraka oil (ml)	1960	1948	1930	**1946**
Obtained quantity of Tuvaraka oil (%)	98	97.4	96.5	**97.3**
Quantity of residue (g)	924	865	901	**896**
Loss (ml)	40	52	70	**54**
Loss (%)	02	2.6	3.5	**2.7**
Reason of Loss	Due to sticking in vessel and filtration process			

Table No.6: Temperature of flame and media at different intervals

Day	**Time (hrs:min)**	**Temperature (℃)**					
		Flame	**Liquid media**	**Flame**	**Liquid media**	**Flame**	**Liquid media**
		Batch-1		**Batch-2**		**Batch-3**	
	00:00	85	38	80	32	89	38
	00:30	200	58	230	65	192	58

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1	01:00	210	62	215	93	190	76
	01:30	214	70	198	92	190	78
	02:00	205	90	192	91	192	85
	02:30	208	94	185	90	195	88
	03:00	215	95	182	91	198	86
	03:30	201	93	185	88	202	89
	04:00	205	95	188	91	203	91
	04:30	215	92	190	92	180	75
2	05:00	175	65	185	52	182	80
	05:30	203	75	192	59	198	86
	06:00	199	78	195	91	203	91
	06:30	217	97	193	93	205	95
	07:00	195	95	204	89	204	96
	07:30	194	94	198	90	205	94
	08:00	200	93	195	91	200	93
	08:30	202	96	189	93	202	92
	09:00	208	95	191	92	210	95
	09:30	204	95	193	90	208	95
	10:00	210	97	205	93	208	97
	10:30	215	95	210	89	205	96
	11:00	210	95	207	88	206	94
	11:30	212	94	208	90	204	96
	12:00	210	96	205	92	205	93
	12:30	205	98	202	96	205	96
	13:00	202	96	203	96	200	98

Table No.7: Temperature and time at Sneha Siddhi Lakshana in TOM.

No.	**Sneha Siddhi Lakshana**	**Temp. (°C)**	**Time (hrs:min)**	**Temp. (°C)**	**Time (hrs:min)**	**Temp. (°C)**	**Time (hrs:min)**
		Batch-1		**Batch-2**		**Batch-3**	
1	Vartivat Sneha Kalka	95	12:42	93	12:47	90	12:26
2	Phenodgama	93	12:32	92	12:39	91	12:10
3	Shabdahina Agni Nikshipta	96	12:58	96	13:00	95	12:49

Observations of TOP

Screw press part of oil expeller machine became hot after 10 minutes. A typical smell of Tuvaraka was felt during process. Initially drop wise oil came out from machine then dribbling was observed. Brown coloured thin crisp dried residue

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was obtained after extraction of oil from the seeds. The colour of Tuvaraka oil was pale yellow with a characteristic smell was felt**.**

Table No.8: Result of Tuvaraka oil (TOP)

Parameters	**Results**			
	Batch-1	**Batch-2**	**Batch-3**	**Average**
Initial quantity of Tuvaraka seed (g)	2000	2000	2000	**2000**
Obtained quantity of Tuvaraka oil (ml)	965	958	990	**971**
Obtained quantity of Tuvaraka oil (%)	48.2	47.9	49.5	**48.5**
Quantity of residue (g)	986	970	966	**973**
Total time taken for the preparation (hr:min)	1:49	1:45	1:47	**1:47**

IV. DISCUSSION

In the era of globalization, Ayurvedic pharmaceutical industries follows certain standards to ensure the quality, safety and efficacy of drug. It deals with standardization at raw material, process and finished product. Initially the raw materials was authenticated and analysed before processing as the good quality products mainly depend upon genuine raw materials.[9]

In present era, many pharmaceutical companies are manufacturing Tuvaraka oil prepared by Pidana method which is quite costlier. So here in second method Tuvaraka oil is prepared by modification in which Tuavraka taken as a Kalka Dravya, Tila Taila as a Sneha Dravya and Khadira Kwatha taken as a Drava Dravya. This method may lower the cost and that will facilitate large scale production.

Before preparation of Tuvaraka Oil, pilot batches were prepared to find out the possible difficulties in preparation and to maintain the uniformity in the process. To develop SOP, three batches of TOM and three batches of TOP were prepared. Preparation of Tuvaraka oil, were prepared as per the reference of Sharangadhara Samhita with modification of proportion as per the reference of Sushruta Samhita. Khadira Twak Kwatha was filtered at slightly hot condition and squeezed to get maximum yield. Specific smell of Khadira Twak Kwatha was felt and the color of Kwatha was dark brown. As the liquid media used for Taila preparation is Kwatha, Taila Paka was completed in two days as per classical guidelines.[10] Probably, nature of Kwatha material to impart chemical constituents may take this much longer period.[11] The mild heat given up to Madhyama Paka stage, probably during this stage the drug activity will be at optimum level. Overheating (up to next Khara Paka stage) is not recommended to avoid burning of active constituents and it may produce burning sensation in stomach on therapeutic administration.[12] Sneha Siddhi Lakshana observed during TOM preparations are mentioned in table no. 8. Average 97.3% TOM was obtained after filtration.

Preparation of Tuvaraka oil as per classical method (Pidana method) was designed as per reference of Sushruta Samhita Chikitsa Sthana-13/22-23**.** Due to small size of screw press part and hopper, Tuvaraka seed has been cut into small pieces. Pressure involved in expeller creates heat in the range of 60-100 ^{0}C which afterward forms the seed into hardened press cake.[13] So that, the machine was started 10 minutes prior of adding seed into the hopper. After that oil came out from the cold press part of oil expeller and collected in s. s. vessel. Residual part came out from front part (heat coil) of oil expeller. Extracted oil was kept for 1 day to settle down. Next day, supernatant oil was heated on 105 °C temperature for 10 min to remove turbidity and average 48.5% TOP was obtained after filtration through cotton cloth.

Average duration for preparation of TOM and TOP was 13 hrs and 1:47 hrs respectively. The approximate cost of TOM and TOP are Rs. 790 and Rs. 1784 respectively (Table no.14&15). So, the cost of TOM is 2.25 times lower than TOP.

Organoleptic characters of TOM and TOP (mustard

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yellow and pale yellow in color respectively) were tabulated below.

Table no. 9: Organoleptic characters of TOP and TOM

Sr. No.	Organoleptic characters	TOP	TOM
1	Colour	Pale Yellow	Mustard Yellow
2	Odour	Characteristic	Characteristic
3	Taste	Kashaya, Madhura, Tikta	Kashaya, Tikta
4	Texture	Unctuous	Unctuous
5	Appearance	Liquid	Liquid

V. CONCLUSION

In this study; an average yield of Tuvaraka oil prepared by modified method and Tuvaraka oil prepared by classical method (Pidana method) are 97.3% and 48.5% respectively. Thus, the cost of Tuvaraka oil prepared by modified method was significantly lower in comparison of Tuvaraka oil prepared by classical method (Pidana method). This work can be used for the preparation of Tuvaraka oil by modified method (Snehapaka method) and Tuvaraka oil by classical method (Pidana method), these observations of present study also used for further researches.

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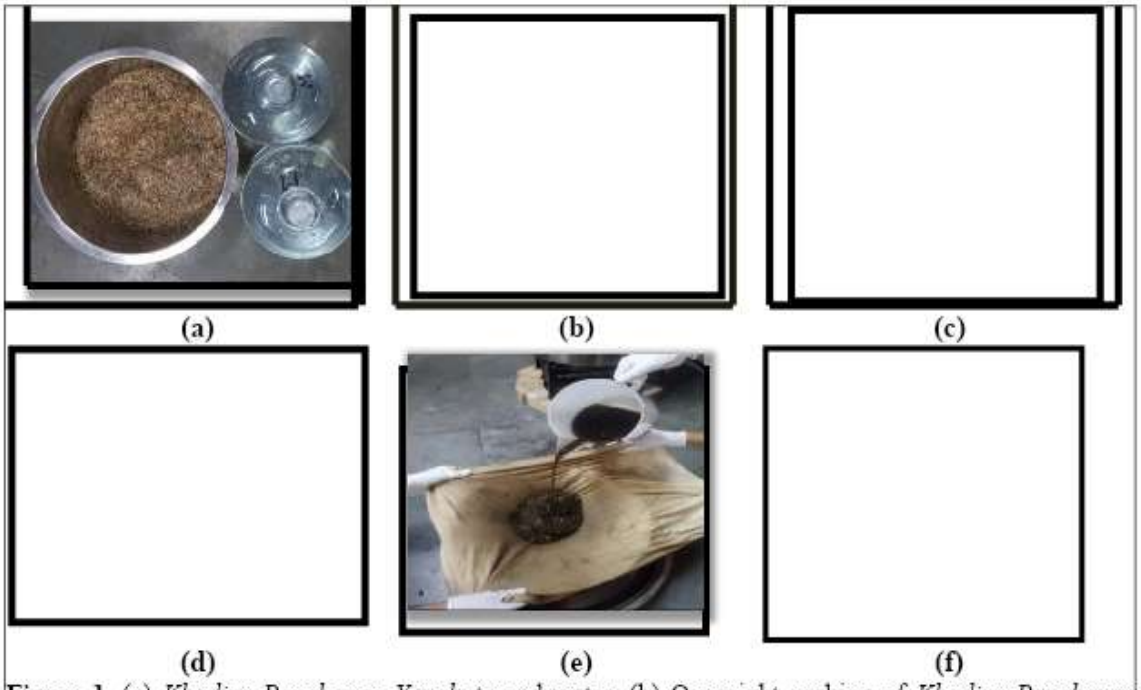

Figure 1. (a) *Khadira Panchanga Yavakuta* and water. (b) Overnight soaking of *Khadira Panchanga Yavakuta* in water. (c) Heating of *Kwatha* material. (d) Boiling of *Kwatha* material. (e) Filtering of *Kwatha* material. (f) *Khadira Twak Kwatha*.

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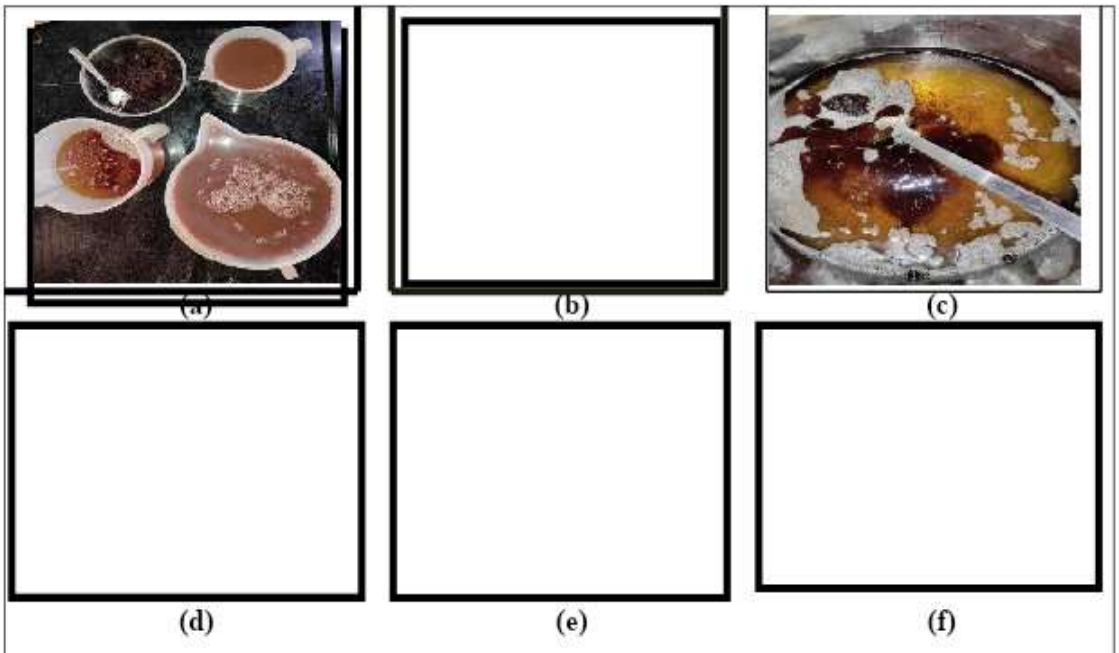

Figure 2. (a) Ingredients of TOM (b) Heating of *Tila Taila* (c) Addition of *Kalka* (d) Addition of *Khadira Twak Kwatha* (e) Filtration of TOM (f) *Tuvaraka* oil prepared by modified method

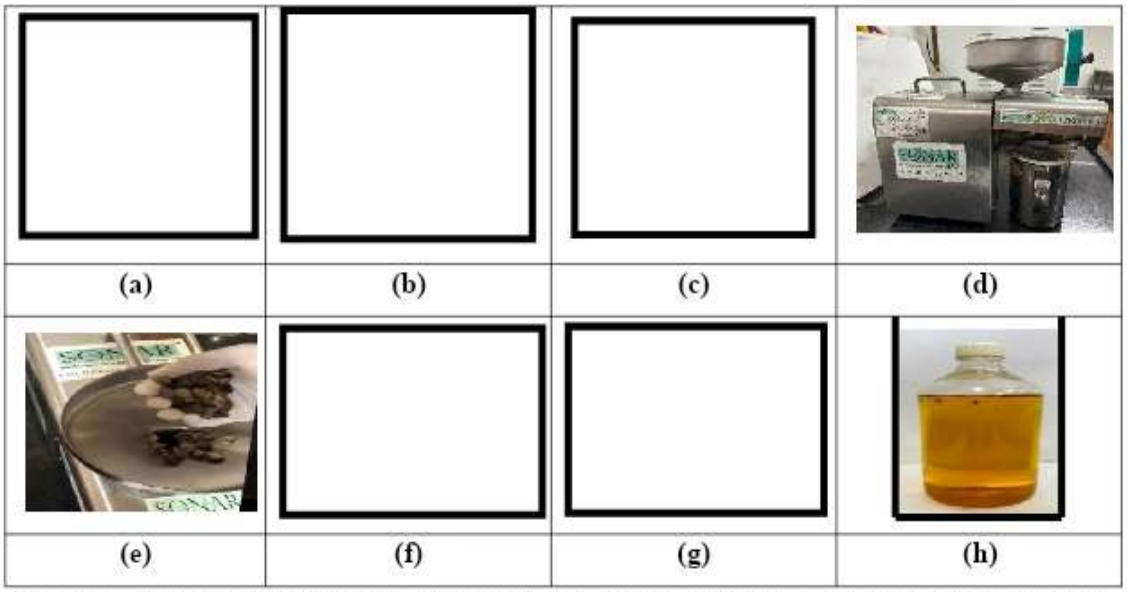

Figure 3. (a) Raw *Tuvaraka* seeds (b) *Tuvaraka* seeds after removal of cover (c) Small pieces of *Tuvarak* seeds (d) Oil expeller machine (e) Addition of seeds into hopper part of oil expeller machine (f) Drippling of oil (g) Residue of *Tuvaraka* seed (h)*Tuvaraka* oil prepared by *Pidana* method

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Equipment specification:

Table No.10: Equipment with their specification.

Sr. no.	Equipment	Specification
1	Electric weighing machine	Swisser Capacity-Max.- 10 Kg, Min. – 1g
2	Vessel	Material- S.S.,Depth -15 cm, Diameter- 27 cm, Capacity - 6 L
3	Spatula	Material- S.S.,length 26 cm Width 6 cm
4	Gas stove	Prestige Gas cook tops, Model no.: Gas TopGTM-01 Ignition mode- Electro Burner Size-Supply by LPG Gas line
5	Mixer grinder	Sumeet traditional hotel kingVoltage- 1250 W R.P.M.- no load- 18000
6	Infrared thermometer	Fluke 64 max-30℃ to 600℃
7	Cotton cloth	Material- Cotton Size- 1 x 1 meter
8	Measuring jar	Material- Plastic Capacity- 250 ml, 1000 ml, 2000 ml

Equipment specification

Table No.11: Equipment with their specification of TOP;

Sr. no.	Equipment	Specification
1	Vessel	Material- S.S.,Depth -15 cm, Diameter- 27 cm, Capacity - 6 L
2	Ladle	Material- S.S.,length 26 cm Width 6 cm
3	Heating device	Prestige Gas cook tops, Model no.: Gas TopGTM-01 Ignition mode- Electro Burner Size-Supply by LPG Gas line
4	Weighing machine	Swisser Max.- 10 Kg, Min. – 1g
6	Infrared thermometer	Fluke 64 max -30℃ to 600℃
7	Beaker	Material- Plastic Capacity- 250 ml, 1000 ml, 2000 ml
8	Cotton cloth	Material- Cotton Size- 1 x 1 meter
9	Oil expeller machine	Capacity: - 4-8 kg/hrs. (According to the material) Voltage: - 220V/110V Motor Power: - 600WWeight: - 11.5 Kg Material: - 304# food grade Stainless Steel Machine Dimension: - 400x160x360mm

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COST ESTIMATION

Table No.12: Cost of TOP

Batch size		2 Kg		
Obtained yield		971 ml		
Sr.No.	**Parameter**	**Quantity/kg-L**	**Rs/kg-L rate**	**Total cost for 2 kg Batch (Rs)**
A	**Raw material cost per kg-L / Rs**			
1.	Tuvaraka seed	2	646	1293
Total raw materials cost/Rs.				
B	**Other charges**			
1.	Oil expeller machine charge	1 L	50	50
2.	Electricity charge	3.2 unit	7 Rs /unit	22.4
3.	Labor charge	1 day	300 Rs /day	300
Total other charges/Rs.				372.4
C	**Packing charges**			
1.	100 ml PET bottle	10	6	60
Total cost of obtained yield (A+ B + C)/Rs				1725.4
D	Rs / L	$\frac{1*1725.4}{971}$		1784.2/-
Round off				1784/-

Table No.13: Cost of TOM

Batch size		2 L		
Obtained yield		1946 ml		
Sr.No.	**Parameter**	**Quantity/kg-L.**	**Rs/kg-L rate**	**Total cost for 2 kg Batch (Rs)**
A	**Raw material cost per kg-L / Rs**			
1.	Tuvaraka seed	0.334	626	210
2.	Khadira Twak	1.5	30	45
3.	Tila Taila	2	236	472
Total raw materials cost/Rs.				727

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B	**Other charges**			
1.	Electricity charge	0.4 unit	7 Rs /unit	2.8
2.	Gas charge	2 days	44 Rs/day	88
3.	Labour charge	2 days	300 Rs /day	600
Total other charges/Rs.				690.8
C	**Packing charges**			
1.	100 ml PET bottle	20	6	120
Total cost of obtained yield (A+ B + C)/Rs				1537.8
D	Rs / L	1*1537.8 / 1946		790.2/-
Round off				790/-

REFERENCE

[1]. PK Prajapati, BJ patigiri, Rohit sharma, Amruta A.standard manufacturing procedure of Kumkumadi Ghrita :An Ayurvedic Formulation;wjpr;vol.3;issue.9;2014.

[2]. Sharangadhar Samhita of Acharya Sharangadhar, along with Dipika Tika of Acharya Adhmalla & Gudharthdipika Tika of Pandit Kashiram edited by Vidhyasagar Pandit Parshuram Shashtri. Madhyam Khanda Ch.9 Ver. 1-2, Varanasi: Chaukhamba Surbharti Prakashan; print 2018. p.212

[3]. Sushruta, Sushruta Samhita of Acharya Sushruta,edited by Shastri Ambikadatta ,Chikitsasthana ch31: ver.5, Chaukhambha Sanskrita Samsthana, Varanasi, reprint 2017,p.165

[4]. Sushruta, Sushruta Samhita of Acharya Sushruta,edited by Shastri Ambikadatta ,Chikitsasthana ch13: ver.22., Chaukhambha Sanskrita Samsthana, Varanasi, reprint 2017,p.84

[5]. i.b.i.d. Chikitsasthana ch31; ver.5, p.165

[6]. i.b.i.d.9/19

[7]. i.b.i.d.9/17-18

[8]. Sushruta, Sushruta Samhita of Acharya Sushruta,edited by Shastri Ambikadatta ,Chikitsasthana ch13: ver.34., Chaukhambha Sanskrita Samsthana, Varanasi, reprint 2017,p.85

[9]. Sharma R, Amin H, Shukla VJ, Kartar D, Galib R, Prajapati PK. Quality control evaluation of Guduchi Satva (solid aqueous extract of Tinospora cordifolia (Willd.) Miers): An herbal formulation. Int J Green Pharm. 2013; 7:258-63.

[10]. Shastri P, editor. Sharangadhara Samhita of Sharangadhara, Madhyama Khanda, Ch. 9, Ver. 2-14, 7th edition, Varanasi: Chaukhamba Orientalia Prakashan, 2006; 432.

[11]. Goyal M, Patgiri BJ, Ravishankar B, Prajapati PK. Role of different media in Karpanpatru Taila preparation. AYU. 2010; 31(1):15-18.

[12]. Arati TS. Pharmaceutical standardization of Ksheerbala Taila w.s.r. to concept of Taila Murcchana and its shelf-life study. MD dissertation. Jamnagar: I.P.G.T. and R.A, Gujarat Ayurved University. 2005

[13]. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://en.m.wikipedia.org/wiki/E

[14]. xpeller_pressing