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A fundamental and applied study of sudation therapy with body constitution in the winter season

Mydeen Sadik[♦], Allam Ramakrishna, Arun Prakash, Amit Upasani* and V.M Sreekanth*

Sri Sairam Ayurveda Medical College and Research Centre, Chennai-600044, Tamilnadu, India

*Parul Institute of Ayurveda, Parul University, Waghodia, Vadodara-391760, Gujarat, India

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Abstract

Different body constitutions predominant individuals have a different range of sweating. Body constitution is defined as the innate constitution of the individual to his humours predominance which is determined at the time of conception, *i.e.*, during the time of sperm and ovum union and which cannot be changed from birth till death. Sweating varies from individual-to-individual based on the body's constitution. The main aim of our study is to analyse whether there is any relation between the time taken for sweating on the forehead during the winter season in persons with different body constitutions. There is a significant relation between the time taken for sweating and different body constitutions because of qualities that naturally reside in humours and five physical elements.

1. Introduction

Ayurveda is a science that not only deals with the treatment of diseases, but at the same time, advocates different methods for the maintenance of health along with the prevention of diseases (Nagaiah, 2022). There are different types of food and behavioural regimens mentioned in ayurvedic classics, if followed properly can prevent lifestyle disorders (Sreekanth *et al.*, 2017). A genuine example of the significance of Ayurveda in present-day life to prevent these types of disorders is the five purificatory therapies (panchakarma) which means the five methods used for the purification of the body. Properly doing five purificatory therapies, will help to maintain the healthy nature of the body and also will prevent the occurrence of different diseases (Vagbhata, 2014; Srinivasan and Murali, 2022). Before doing these purificatory therapies, there are certain other preparatory methods (purvakarma) should be done that will help the body to prepare, making the vitiated humour (dosha) fit to be eliminated by taking them to minute channels (srotas) with the help of five purificatory therapies (Trikamji, 2016). So, to make the vitiated humour reach the alimentary tract (koshta) first, preparatory methods like oleation (snehana) and sudation (swedana) should be administered before and after five purificatory therapies. Oleation (snehana) and sudation (swedana) should be done considering proper quantity (matra) and time (kaala) for the proper elimination of the vitiated humours (Trikamji, 2016).

In the present study, sudation has been selected, but a detailed study of each sudation in a limited period is hardly possible; hence, only a steam bath (bashpa sweda) was taken. According to Ayurveda, we must follow some dietary and behavioural regimens based on the various seasons (ritus). These are known as seasonal regimens (ritucharya), to maintain a healthy state (swasthya) of both body and mind (shareera and manas) (Shashirekha and Sushant, 2022). The exterior environment in which we live will vary with the seasons, and this will have an impact on our bodies. As a result, the body needs to adjust to these altering surroundings without affecting the natural harmony. The fundamental principle of Ayurveda is prevention, which is attained by appropriately adhering to the regimens prescribed by our classic texts (Vinay, 2021). Winter season (shishira ritu) dietary and behavioural regimens differ in certain aspects. The non-pathological status of the individual which is inherent from birth till death is the body's constitution (Sadik *et al.*, 2017). There are variations in both the physical and the mental characters which are based on the body's constitution (Sharma and Bhagwan, 2009). Different types of variations are seen with height, weight, build of the body, intelligence of the person, *etc.* It also varies in the case of sweating (swedagama) from person to person, mainly based on the body's constitution.

2. Materials and Methods

The survey was conducted on 120 healthy volunteers from Parul Institute of Ayurveda, Vadodara, after getting Institutional Ethics Committee (IEC) approval Ref. No. PU/PIA/IECHR/SAMHITA/01 dated 22/10/16, the study was started. This study was registered in the Clinical Trial Registry of India (CTRI; www.ctri.nic.in) vide CTRI/2017/07/008982.

Corresponding author: Dr. Mydeen Sadik

Associate Professor, Sri Sairam Ayurveda Medical College and Research Centre, Chennai-600044, Tamilnadu, India

E-mail: sadikmydeen1@gmail.com

Tel.: +91-9840808451

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2.1 Study design

The survey was conducted on 120 healthy student volunteers from Parul Institute of Ayurveda, Vadodara, with the age group of 18-30 years. The study was done in four groups containing 30 students each group was selected randomly based on the standard questionnaire which was prepared for the body constitution (prakruti) as shown

Table 1: Showing the grouping of healthy student volunteers

Group	Body constitution	No. of students	Intervention
Group-I	Vata predominant pitta associated (vata pradhana pitta prakruti)	30	Steam bath (Bashpa sweda)
Group-II	Kapha predominant pitta associated (kapha pradhana pitta prakruti)	30	Steam bath (Bashpa sweda)
Group-III	Vata predominant kapha associated (vata pradhana kapha prakruti)	30	Steam bath (Bashpa sweda)
Group-IV	Kapha predominant vata associated (kapha pradhana vata prakruti)	30	Steam bath (Bashpa sweda)

2.2 Inclusion criteria

- Both sexes
- Age group between 18 and 30 years

2.3 Exclusion criteria

- Volunteers younger than 18 years and older than 30 years of age.
- People who are contraindicated for sudation as per classics.
- People with systemic diseases like carcinoma, H.I.V., etc.

2.4 Assessment criteria

- Time required for sweating on the forehead.
- Room temperature before sudation assessed by digital thermo-humidity meter.
- Oral temperature before, during, and after sudation.
- Forehead temperature before, during, and after sudation.
- Body temperature before, during, and after sudation.

in Table 1. There after time taken for sweating (swedagama) during winter season (shishira ritu) was analysed in these body constitutions (prakruti) with the help of sudation (swedana), *i.e.*, by a steam bath (bashpa sweda). The temperature was also analysed before, during, and after with the help of an infrared thermometer and was properly noted in the concerned questionnaire.

2.5 Statistical analysis

The assessment parameters are analysed before, during, and after sudation, and the data is subjected to statistical analysis by using descriptive and inferential statistics using the cross-tabulation along with the Chi-square test and Cramer's V correlation and software used in the analysis was SPSS 23.0 version and $p < 0.05$ is considered as the level of significance.

3. Results

3.1 Correlation of time taken for sweating and body constitution

For analysing the distribution of frequency of time taken for sweating and different body constitutions among the four groups, the Chi-square test was performed. It was observed that there is a significant relation between time taken for sweating and body constitution at the p -value of 0.000. The p -value shows that there is a significant relation between the time taken for sweating and body constitution with p -value < 0.05 (Table 2; Table 3).

Table 2: Body constitution and time taken for sweating cross-tabulation

Cross-tabulation			Time taken for sweating			Total
			1-4/min	4-7/min	7-10/min	
Body constitution	Group-1 (Vata-Pitta)	Count	27	3	0	30
	Group-2 (Vata-Kapha)	Count	15	9	6	30
	Group-3 (Kapha-Vata)	Count	9	18	3	30
	Group-4 (Kapha-Pitta)	Count	21	9	0	30
Total			72	39	9	120

Table 3: Chi-square values of time taken for sweating and body constitution

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	1.825	0.177
Pearson Chi-square	6	32.769	0.000
Likelihood ratio	6	36.037	0.000
N of valid cases		120	

3.2 Correlation of time taken for sweating and room temperature before sudation

It was found that there is a significant relation between the time taken for sweating with room temperature before the sudation at the

p -value of 0.004. The p -value shows that there is a significant relation between time taken for sweating and room temperature before the sudation with p -value < 0.05 (Figure 1, Table 4).

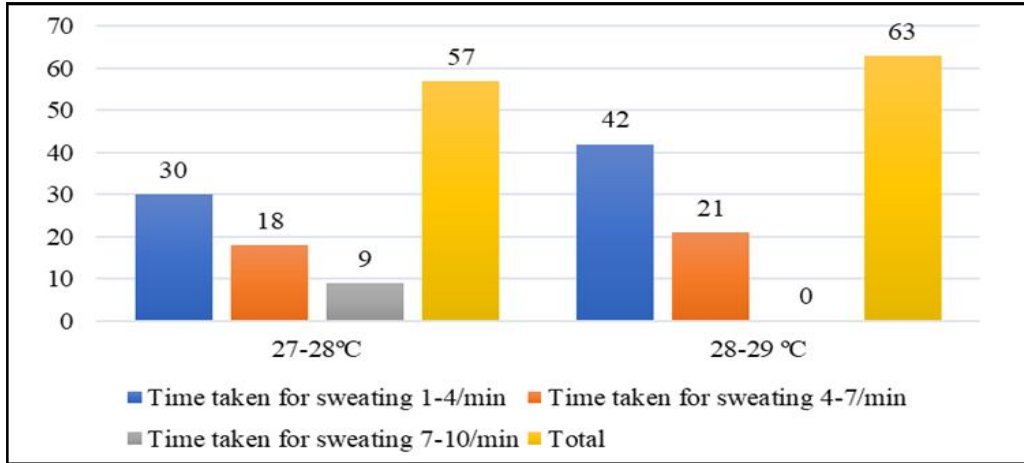


Figure 1: Time taken for sweating and room temperature before sudation.

Table 4: Chi-square value of time taken for sweating and room temperature before sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	6.609	0.010
Pearson Chi-square	2	10.958	0.004
Likelihood ratio	2	14.417	0.001
N of valid cases		120	

3.3 Correlation of time taken for sweating with oral temperature before, during, and after sudation

It was observed that there is no significant relation between the time taken for sweating with oral temperature before the sudation at the p -value of 0.509. The p -value shows that there is no significant relation between the time taken for sweating and oral temperature before the sudation with p -value < 0.05 (Figure 2, Table 5). There is a significant relation between the time taken for sweating and oral

temperature during the sudation at the p -value of 0.000. The p -value shows that there is a significant relation between the time taken for sweating and oral temperature during the sudation with p -value < 0.05 (Figure 3, Table 6) and there is no significant relation of time taken for sweating and oral temperature after the sudation at the p -value of 0.048. The p -value shows that there is no significant relation of time taken for sweating and oral temperature after the sudation with p -value < 0.05 (Figure 4, Table 7).

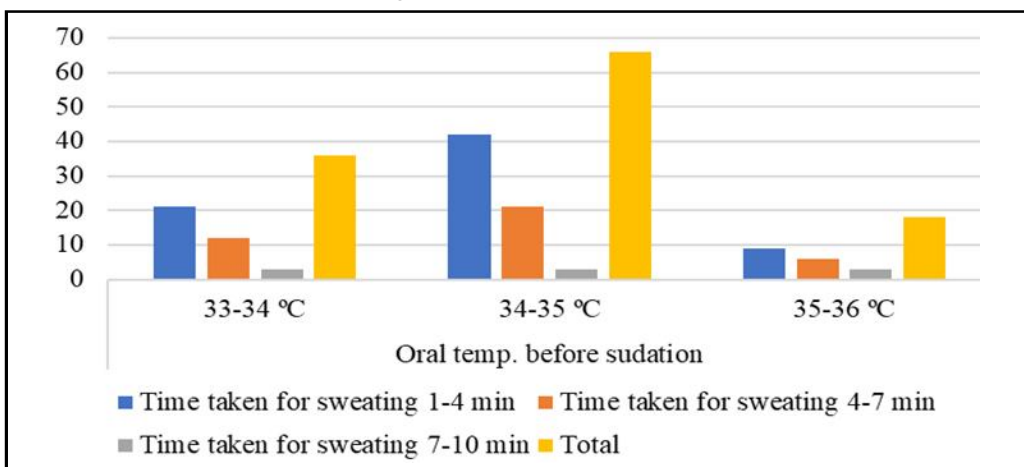
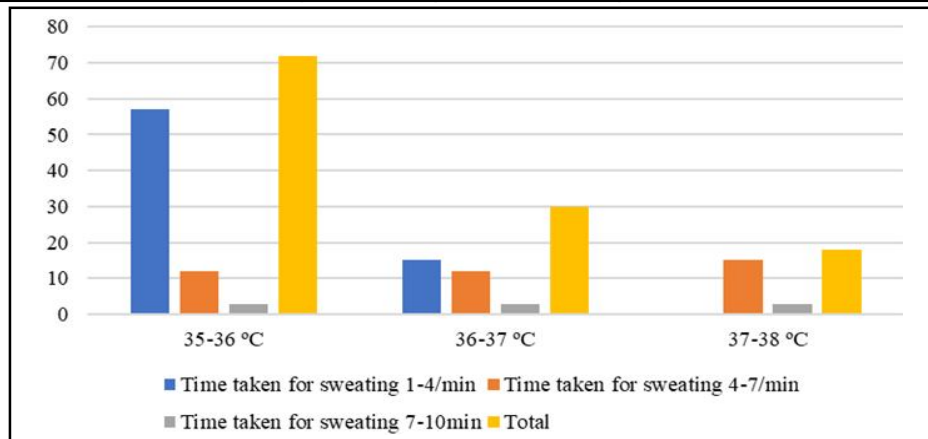


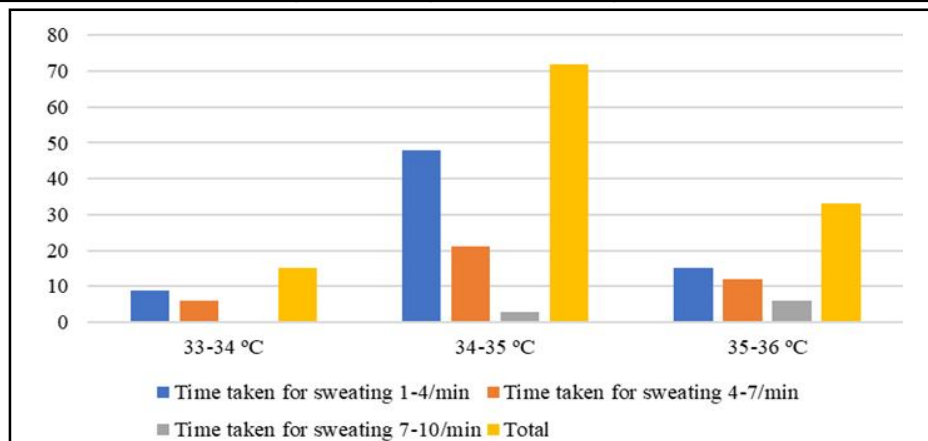
Figure 2: Time taken for sweating and oral temperature before the sudation.

Table 5: Chi-square value of time taken for sweating and oral temperature before the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	0.315	0.575
Pearson Chi-square	4	3.301	0.509
Likelihood ratio	4	2.917	0.572
N of valid cases		120	

**Figure 3: Time taken for sweating and oral temperature during the sudation.****Table 6: Chi-square value of time taken for sweating and oral temperature during the sudation**

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	31.022	0.000
Pearson Chi-square	4	39.426	0.000
Likelihood ratio	4	46.326	0.000
N of valid cases		120	

**Figure 4: Time taken for sweating and oral temperature after the sudation.****Table 7: Chi-square value of time taken for sweating and oral temperature after the sudation**

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	4.895	0.027
Pearson Chi-square	4	9.566	0.048
Likelihood ratio	4	9.528	0.049
N of valid cases		120	

3.4 Correlation of time taken for sweating with forehead temperature before, during, and after sudation

It was found that there is a significant relation between time taken for sweating and forehead temperature before, and during the sudation

at the *p*-value of 0.000 and after the sudation at the *p*-value of 0.003. The *p*-value shows that there is a significant relation between time taken for sweating and forehead temperature before (Figure 5, Table 8), during (Figure 6, Table 9), and after (Figure 7, Table 10), the sudation with *p*-value < 0.05.

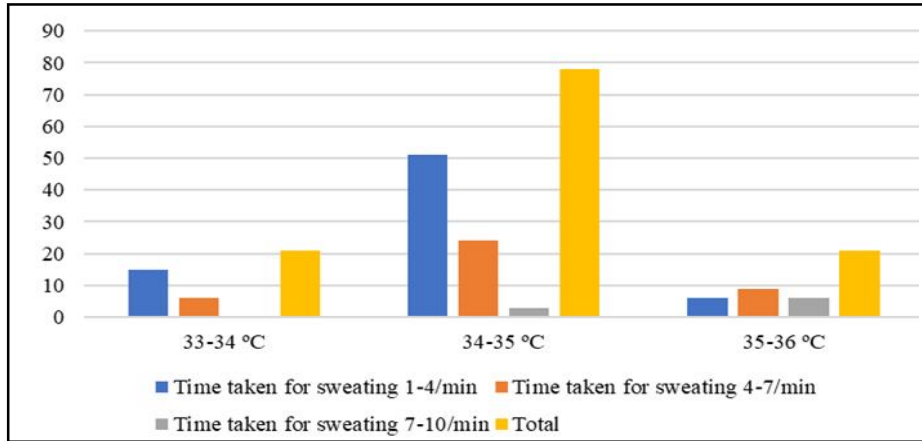


Figure 5: Time taken for sweating and forehead temperature before the sudation.

Table 8: Chi-square value of time taken for sweating and forehead temperature before the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	13.302	0.000
Pearson Chi-square	4	20.552	0.000
Likelihood Ratio	4	17.943	0.001
N of valid cases		120	

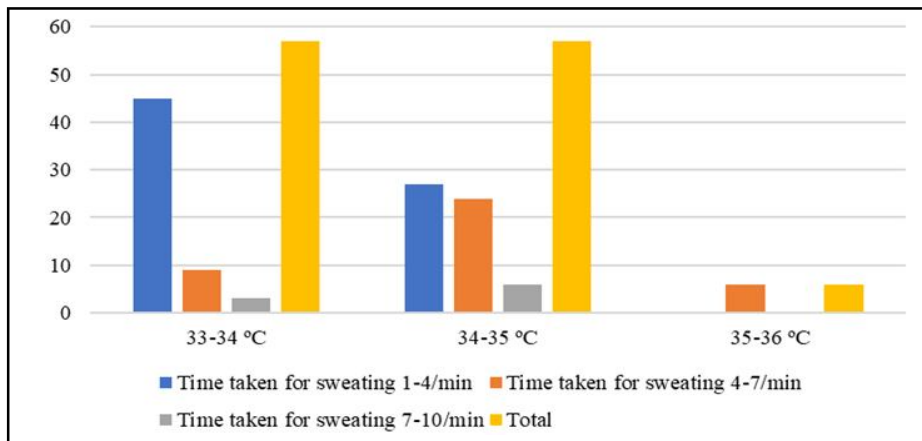


Figure 6: Time taken for sweating and forehead temperature during the sudation.

Table 9: Chi-square value of time taken for sweating and forehead temperature during the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	13.928	0.000
Pearson Chi-square	4	24.980	0.000
Likelihood ratio	4	26.799	0.000
N of valid cases		120	

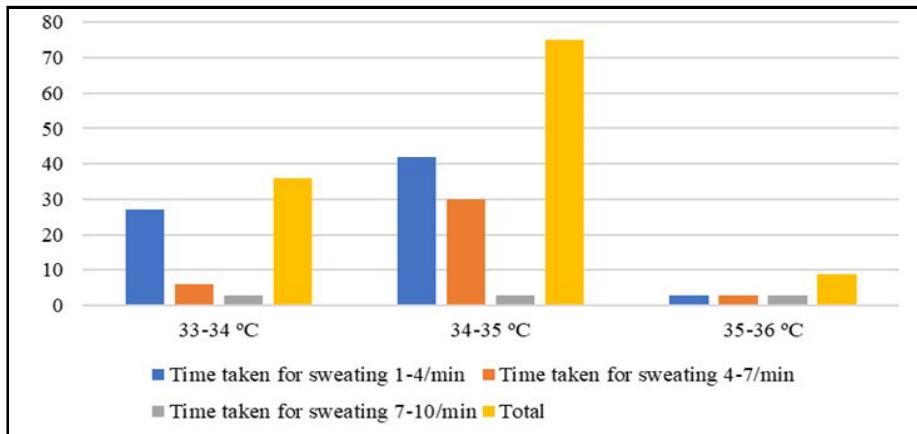


Figure 7: Time taken for sweating and forehead temperature after the sudation.

Table 10: Chi-square value of time taken for sweating and forehead temperature after the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	6.158	0.013
Pearson Chi-square	4	15.960	0.003
Likelihood ratio	4	13.134	0.011
N of valid cases		120	

3.5 Correlation of time taken for sweating with body temperature before, during, and after sudation

It was observed that there is no significant relation between time taken for sweating and body temperature before and after sudation at the *p*-value of 0.312 and 0.563, respectively. The *p*-value shows that there is no significant relation between time taken for sweating

and body temperature before (Figure 8, Table 11) and after (Figure 10, Table 13) the sudation with *p*-value < 0.05 and there is a significant relation between time taken for sweating and body temperature during the sudation at the *p*-value of 0.000. The *p*-value shows that there is a significant relation between time taken for sweating and body during the sudation temperature with *p*-value < 0.05 (Figure 9, Table 12).

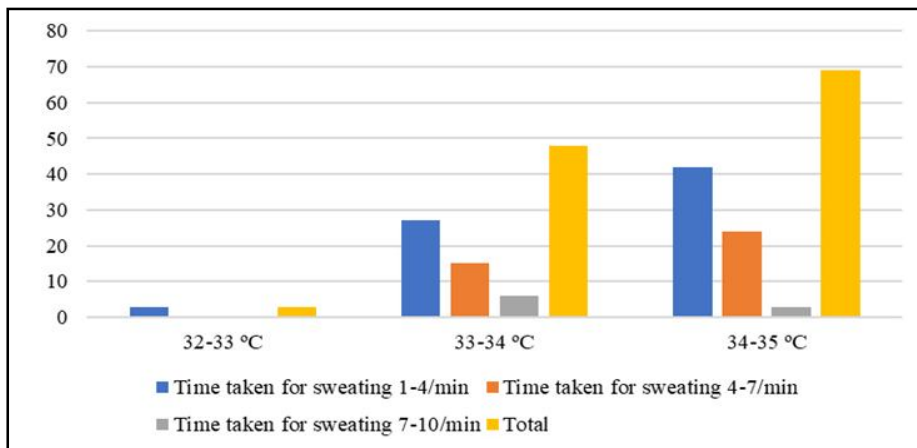


Figure 8: Time taken for sweating and body temperature before the sudation.

Table 11: Chi-square value of time taken for sweating and body temperature before the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	0.127	0.722
Pearson Chi-square	4	4.769	0.312
Likelihood ratio	4	5.729	0.220
N of valid cases		120	

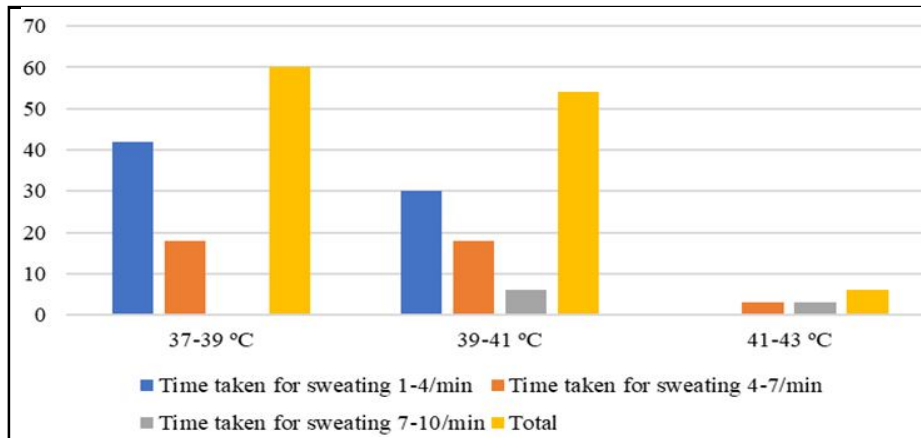


Figure 9: Time taken for sweating and body temperature during the sudation.

Table 12: Chi-square value of time taken for sweating and body temperature during the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	16.507	0.000
Pearson Chi-square	4	25.359	0.000
Likelihood ratio	4	25.045	0.000
N of valid cases		120	

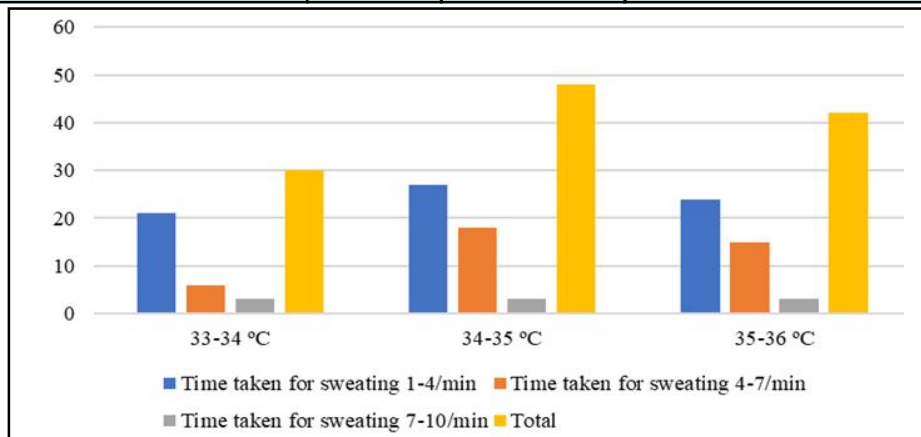


Figure 10: Time taken for sweating and body temperature after the sudation.

Table 13: Chi-square value of time taken for sweating and body temperature after the sudation

Chi-square test	df	Value	Asymptotic significance (2-sided)
Linear-by-Linear association	1	0.382	0.537
Pearson Chi-square	4	2.972	0.563
Likelihood ratio	4	3.142	0.534
N of valid cases		120	

4. Discussion

Ayurveda is a science that addresses both the prevention and treatment of illnesses, and it also promotes health maintenance through various techniques (Maroti *et al.*, 2022; Mehrotra, 2021). The five purificatory therapies, which are the five ways used for the

purification of the body, are a true example of the usefulness of Ayurveda in modern life to prevent these types of problems. Certain other preliminary measures should be carried out before beginning these purificatory therapies. Thus, preparatory techniques like oleation and sudation should be used both before and after those five purificatory therapies to allow the vitiated humour to enter the

alimentary canal first. Ayurveda states that to preserve a healthy condition of mind and body, we must adhere to seasonal regimens, or dietary and behavioural guidelines, that correspond to the various seasons.

The term “body constitution” refers to an individual’s innate constitution concerning his humour’s preponderance, which is fixed at conception (*i.e.*, during the union of sperm and ovum) and unchangeable from birth until death. This study focused on the basic and practical features of sudation therapy with body constitution during the winter. Since it is difficult to thoroughly examine every sudation method in a constrained amount of time, only steam baths (bashpa sweda) were used.

The study was conducted on 120 healthy volunteers at Parul Institute of Ayurveda, Vadodara. They are divided into four groups based on their body constitution as described in Table 1. Later each volunteer is made to undergo a steam bath until he gets sweating; the time taken for sweating on the forehead is noted with the help of a watch. The room temperature before sudation was noted for each volunteer using a digital thermometer. Oral, forehead, and body temperature are measured before, during, and after sudation using an infrared thermometer.

Among the different group’s-based body constitution, Group-I (vata-pitta) takes less time for sweating which may be due to minute (sukshma), fast (sheegra), movable (chala) of vata dosha (humour) with sharp (teekshna), hot (ushna) and liquid (drava) properties of pitta dosha (humour) (Vagbhata, 2014a). Later by Group-II (kapha-pitta) may be due to stable (sthira), sluggish (manda) of kapha dosha (humour) and sharp (teekshna), hot (ushna) and liquid (drava) properties of pitta dosha (humour) and followed by Group-III (vata-kapha) may be due to minute (sukshma), fast (sheegra), movable (chala) of vata dosha (humour) and to stable (sthira), sluggish (manda) properties of kapha dosha (humour). Among the different body constitutions, Group-IV (kapha-vata) takes more time for sweating, may be due to the stable (sthira), sluggish (manda) of kapha dosha (humour) and minute (sukshma), fast (sheegra), movable (chala) properties of vata dosha (humour) (Vagbhata, 2014b).

The outcome demonstrates a significant relationship (p -value < 0.05) between the duration of time required to sweat and the room temperature before the process. The duration of time required for sweating and oral temperature just before the sudation did not significantly correlate. The duration of time required for sweating and the temperature of the oral cavity both during and after the process are significantly correlated. It turned out that there is a strong relationship between the duration of time required for sweating and the temperature of the forehead before, during, and after the process (p -values of 0.000 and 0.003, respectively). At the p -value of 0.000, there is a strong correlation between the duration of time required for sweating and body temperature during the sudation, and

there is no significant relation between the duration of time required for sweating and body temperature before and after sudation.

The results show a significant relationship between body constitution (prakruti) and time required sweating (swedagama).

5. Conclusion

The study re-establishes the relationship between body constitution (prakruti) and time required for sweating (swedagama). There is an identical significant relation between the time required for sweating and different body constitutions because of quality which naturally resides in dosha (humours) and five physical elements (mahabhuta) that alter the time required sweating in different body constitutions.

Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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