CHAPTER 9
APPRAISAL

9. APPRAISAL

9.1 SUMMARY

The classical texts of *Āyurveda* emphasized the significance of *Nāḍī Parīkṣa* in disease diagnosis and it has been widely practiced by traditional *Āyurvedic* doctors for thousands of years. The traditional practices of *Nāḍī Parīkṣa* were manual and subjective in nature which largerly depends on the skill of the physician. Hence there is a need to study the concepts of *Nāḍī Parīkṣa* defined in classical texts of *Āyurveda* in more scientific way. Evidence based research is well accepted methodology and there is a need for evidence based research in *Nāḍī Parīkṣa* to unravel the hidden secrets of the pulse based diagnosis. We have developed a methodology to perform evidence based research in *Nāḍī Parīkṣa* and studied the physiological significance of *Nāḍī* in more scientific way. We have measured the arterial stifness measured from radial artery across *Tridoṣa* locations using *Nāḍi Taraṅgiṇi* a pulse acquisition system. The significance of arterial stiffness across *Tridoṣa* locations were studied in healthy individuals. The studies in modern medicine have shown significant association of arterial stiffness with diabetes and we have studied the significant variations in arterial stiffness across diabetes and non diabetes groups. The effect of one week Integrated Approach of Yoga Therapy (IAYT) on arterial stiffness across young and older adults with obesity was studied. The stiffness index (SI) and reflection index (RI) were studied to understand their variations across *Tridoṣas* in healthy, diabetic and obese individuals.

9.2 CONCLUSIONS

In conclusion, arterial stiffness parameters SI and RI measured using *Nāḍī Taraṅgiṇi* has shown significant variations across *vāta, pitta and kapha* locations. SI at *pitta* was high compared to *kapha* and *vāta* which can be attributed to the age of the subjects as the average age of the subjects was 50-60 years which is a *pitta* dominant age. SI was closely associated to *kāṭhiṇya* which corresponds to the hardness of artery. SI of males was high compared to females across *Tridoṣa* locations and SI at *kapha* location was significantly high for males. RI was not significantly different across males and females.

Results of diabetes study confirm that arterial stiffness measured from *Tridoṣa* locations was significantly varying across diabetes and non-diabetes groups. SI at *vāta* was high for diabetes compared to non diabetes which is matching with the results of the previous studies based on standard pulse wave velocity measurement techniques. There was a significant negative correlation between SI at *vāta* and fasting plasma glucose in non-diabetes group whereas diabetes group lacks such correlation.

In obesity study one week IAYT intervention has reduced the arterial stiffness significantly in young adults with obesity when compared to older adults. In older adults the arterial stiffness increases with age also and hence it may take longer duration to see the similar effect. The significant reduction of arterial stiffness after one week IAYT program is an important result and IAYT program can be considered for cardiovascular studies.

9.3 STRENGTHS OF THE STUDY

The arterial stiffness is well established pulse parameter in the cardiovascular studies but this is the first time it has been studied in the context of *Āyurveda* and highlighted the significance of arterial stiffness across *Tridośa* locations.

Arterial stiffness is closely associated with *Kaṭhinya* but the physiological significance of arterial stiffness is not well understood in the context of *Āyurveda* . This is the first time the physiological significance of *Kaṭhinya* was studied by comparing it with the physiological behavior of arterial stiffness.

The association of diabetes and obesity with arterial stiffness measured using pulse wave velocity techniques (cfPWV and baPWV) is well established but there were very limited studies on arterial stiffness measured from radial artery. In this report, arterial stiffness was measured for the first time from radial artery and studied across diabetes and obesity.

9.4 LIMITATIONS OF THE STUDY

The effect of diurnal variations of *dośas* was not included in the study as the pulse data was collected in throughout the day from 6AM to 4PM.

In the diabetes study the screening of participants to form diabetes and non-diabetes groups was done based on fasting plasma glucose values and the other diabetes risk factors such as obesity, hypertension, cholesterol, genetics etc., were not considered for screening but included in the study.

The study considered fasting plasma glucose values based on which diabetes and non-diabetes groups were formed but did not include glucose tolerance test in diagnosing diabetes.

The focus of the pilot study on obesity was to investigate the effect of one week IAYT on arterial stiffness measured from radial artery. A relatively small sample size was selected for the study and there is a need to study the effect with larger sample size.

9.5 APPLICATIONS OF THE STUDY

The methodology developed to measure the arterial stiffness across *Tridośa* locations can be used to do extensive interventional studies in *Āyurveda* to prove the underlying concepts of *Tridośas* which in turn can help in disease diagnosis and treatment.

The pulse acquisition from radial artery is simple and convenient compared to other techniques based on carotid-femoral and brachial artery. The pulse acquisition from radial artery becomes much more simple and sophisticated in future as the semiconductor and sensor technologies are advancing further and coming up with precise sensors which can be mounted on wrist with much more ease. Hence there is a need to do in depth studies in future and establish the arterial stiffness measurements from radial artery.

9.6 SCOPE OF THE FUTURE RESEARCH

The present exploratory study has shown new direction to the pulse based research in *Āyurveda* and the pulse parameters such as arterial stiffness and pulse wave velocity need to be studied in depth to prove the concepts of *Tridoṣas* as defined in *Āyurveda* texts.

The association of arterial stiffness with diabetes and obesity was studied and in future the study could be extended to investigate the significance of stiffness and other pulse parameters measured from *Tridoṣas* in diagnosing various other diseases.

There is a scope for extensive studies in future to establish the ranges for balanced and vitiated *vāta*, *pitta* and *kapha dośas*.