

# “A Pilot Study on Lifestyle Factors Associated With Early Biological Ageing and Awareness about Reverse Ageing among Indian Adults”

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DOI: <https://doi.org/10.51244/IJRSI.2026.1303000218>

Received: 26 March 2025; Accepted: 31 March 2025; Published: 17 April 2026

## ABSTRACT

Biological Ageing refers to the progressive decline in physiological function and is influenced by genetic, environmental, and lifestyle factors. In recent years, the concept of biological age has gained importance as a more accurate indicator of health status than chronological age. Lifestyle behaviours such as physical activity, sleep quality, diet, and stress management play a significant role in determining biological Ageing and the risk of lifestyle-related diseases. The present study investigates lifestyle factors associated with early biological Ageing and examines awareness and willingness among Indian adults to adopt lifestyle modifications for healthy Ageing.

The study used a cross-sectional survey design with a sample of 25 participants selected through convenience sampling. Data were collected using a structured questionnaire covering physical activity, sleep duration, stress levels, dietary habits, awareness about reverse Ageing, and willingness to adopt lifestyle changes. Descriptive statistics were used to summarize the data.

The findings indicate that a large proportion of participants reported low physical activity, moderate to high stress levels, inadequate sleep, and frequent consumption of junk food. However, awareness about lifestyle influence on Ageing and willingness to adopt healthier habits were high among participants.

Although the study is limited by small sample size and self-reported data, it highlights important lifestyle risk factors associated with early biological Ageing and emphasizes the need for preventive health strategies and lifestyle intervention programs. Future studies should include larger sample sizes, objective biological markers, and longitudinal designs to establish causal relationships.

**Keywords:** Biological Ageing, Lifestyle Factors, Preventive Health, Stress, Sleep, Physical Activity, Reverse Ageing, Indian Adults

## INTRODUCTION

Ageing is a complex biological process involving progressive decline in cellular repair, metabolic efficiency, immune response, and physiological function. Traditionally, Ageing has been measured using chronological age; however, chronological age does not necessarily reflect an individual's physiological condition. Biological age, on the other hand, represents the functional state of the body and is influenced by lifestyle, environmental exposure, stress, nutrition, and physical activity.

India is currently experiencing a rapid epidemiological transition characterized by increasing prevalence of non-communicable diseases such as diabetes, hypertension, obesity, and cardiovascular diseases at younger ages. This trend suggests the possibility of accelerated biological Ageing influenced by lifestyle-related risk factors.

Research shows that physical inactivity, poor diet, chronic stress, and inadequate sleep contribute to inflammation, oxidative stress, hormonal imbalance, and metabolic disorders, which are major contributors to early biological Ageing. Conversely, lifestyle interventions such as regular exercise, balanced nutrition, stress management, and proper sleep can slow biological Ageing and improve health span.

## Research Gap

Most existing studies focus on biological markers of Ageing, but limited research has been conducted on **lifestyle behaviour patterns and awareness about reverse Ageing among Indian adults**, especially at the community level.

## Research Questions

1. What lifestyle factors are associated with early biological Ageing risk?
2. What is the level of awareness regarding reverse Ageing among adults?
3. Are adults willing to adopt lifestyle changes for healthy Ageing?

## Hypothesis

H1: Unhealthy lifestyle behaviours (low physical activity, poor sleep, high stress, junk food consumption) are associated with higher risk of early biological Ageing.

H2: Awareness about lifestyle and Ageing is positively associated with willingness to adopt lifestyle changes.

## REVIEW OF LITERATURE

Previous research indicates that biological Ageing is influenced by both genetic and environmental factors; however, lifestyle plays a major role in determining the rate of Ageing. Studies on epigenetic Ageing show that lifestyle interventions such as diet, exercise, and stress reduction can influence gene expression and slow biological Ageing (Levine et al., 2018).

Physical activity improves mitochondrial function, cardiovascular health, and metabolic regulation, thereby reducing Ageing-related diseases (Ornish et al., 2013). Sleep plays an essential role in hormonal regulation, immune function, and cellular repair, while chronic sleep deprivation is associated with inflammation and metabolic disorders (Irwin, 2015).

Chronic stress increases cortisol levels and oxidative stress, which accelerates cellular Ageing and increases risk of chronic diseases. Dietary patterns also influence biological Ageing, as high consumption of processed food increases inflammation and metabolic disorders.

Limited research exists on awareness and behavioural readiness for lifestyle modification related to reverse Ageing in Indian populations. Therefore, this study attempts to address this gap.

## Objectives of the Study

1. To analyze physical activity patterns among adults.
2. To examine sleep duration patterns.
3. To assess stress levels among adults.
4. To analyze dietary habits.
5. To examine awareness about reverse Ageing.
6. To study willingness to adopt lifestyle changes.
7. To identify lifestyle risk factors associated with early biological Ageing.

## RESEARCH METHODOLOGY

### Research Design

The study used a cross-sectional descriptive research design to assess lifestyle risk factors associated with early biological Ageing and awareness regarding reverse Ageing.

### Sample Size and Sampling

The study included 25 participants selected using convenience sampling. Due to limited time and resource constraints, a pilot-scale exploratory study was conducted. The study should be considered as preliminary research rather than a generalizable population study.

### Variables Studied

- Physical activity
- Sleep duration
- Stress level
- Junk food consumption
- Awareness about reverse Ageing
- Willingness to adopt lifestyle changes

### Data Collection Tool

A structured questionnaire was developed based on lifestyle risk indicators. The questionnaire included:

- Exercise frequency per week
- Average sleep duration
- Self-perceived stress level
- Junk food consumption frequency
- Awareness about lifestyle and Ageing
- Willingness to change lifestyle

### Data Analysis

Data were analysed using:

- Percentage distribution
- Frequency tables
- Risk factor interpretation

Future studies should include:

- Inferential statistics
- Correlation analysis

- Regression models
- Confidence intervals
- Multivariable analysis

## Data Analysis and Interpretation

### Physical Activity

Table: 1

Exercise Days per Week	Participants	Percentage
0–1 days	8	32%
2–3 days	8	32%
4–5 days	5	20%
6–7 days	4	16%
Total	25	100%

#### Interpretation:

The data shows that 64% of participants exercise less than three days per week, indicating low physical activity. Only 36% participants engage in regular physical activity. Low physical activity is a major risk factor for obesity, diabetes, and early biological Ageing.

### Sleep Duration

Table:2

Sleep Duration	Participants	Percentage
5–6 hours	8	32%
7–8 hours	14	56%
More than 8 hours	3	12%
Total	25	100%

#### Interpretation:

The table shows that 32% participants sleep less than 6 hours, which is below recommended sleep duration. Inadequate sleep leads to fatigue, stress, hormonal imbalance, and accelerates biological Ageing.

### Stress Levels

Table: 3

Stress Level	Participants	Percentage
Always	1	4%

Often	5	20%
Sometimes	14	56%
Rarely	5	20%

**Interpretation:**

The data shows that 80% participants experience stress (sometimes, often, or always). Chronic stress is a major factor that accelerates biological Ageing.

**Junk Food Consumption**

Table: 4

Junk Food Consumption	Participants	Percentage
3–4 times/week	3	12%
Once a week	18	72%
Rarely	4	16%
Total	25	100%

**Interpretation:**

84% participants consume junk food at least once per week. Junk food increases inflammation and metabolic disorders, which accelerates Ageing.

**Awareness About Reverse Ageing**

Table: 5

Question	Yes	No	Percentage Yes
Lifestyle can slow Ageing	23	2	92%
Willing to change lifestyle	24	1	96%

**Interpretation:**

Most participants are aware that lifestyle affects Ageing and are willing to adopt lifestyle changes.

**Results of the Study**

The results indicate that a significant proportion of participants reported lifestyle behaviours associated with increased risk of early biological Ageing.

- 64% participants reported low physical activity.
- 32% participants reported sleeping less than recommended duration.
- 80% participants reported experiencing stress frequently.
- 84% participants reported consuming junk food weekly.

- **92%** participants were aware that lifestyle affects Ageing.
- **96%** participants were willing to adopt lifestyle changes.

These findings indicate that while awareness is high, lifestyle risk factors are still prevalent among adults.

## DISCUSSION

The findings of the study suggest that lifestyle-related risk factors such as physical inactivity, poor sleep, stress, and unhealthy diet are common among adults and may contribute to early biological Ageing. These findings are consistent with previous research showing that lifestyle behaviours influence metabolic health, inflammation, and cellular Ageing.

One important observation from this study is the gap between awareness and behaviour. Although most participants were aware that lifestyle influences Ageing and expressed willingness to adopt healthy habits, unhealthy lifestyle practices were still prevalent. This indicates that awareness alone is not sufficient; structured intervention programs are required to promote behaviour change.

The study also highlights the importance of preventive healthcare. Lifestyle modification programs focusing on physical activity, stress management, sleep hygiene, and healthy diet can significantly reduce the risk of lifestyle diseases and early biological Ageing.

However, due to small sample size and descriptive analysis, the study cannot establish causal relationships. Future research should include larger sample sizes, biological markers, and longitudinal study designs.

## CONCLUSION

The study concludes that lifestyle factors such as physical inactivity, inadequate sleep, high stress levels, and unhealthy dietary habits are common risk factors associated with early biological Ageing. The study also found high levels of awareness and willingness to adopt lifestyle changes, indicating strong potential for preventive health interventions.

Early biological Ageing should be viewed as a **modifiable lifestyle-related health outcome** rather than an unavoidable consequence of chronological Ageing. Preventive health strategies focusing on lifestyle modification can play a significant role in improving health span and reducing the burden of lifestyle diseases in India.

Although the study is limited by small sample size, convenience sampling, and self-reported data, it provides preliminary evidence that lifestyle factors play a critical role in early biological Ageing. Future research should focus on larger population studies, objective biomarkers, wearable health tracking, and longitudinal intervention studies to establish causal relationships between lifestyle and biological Ageing.

## RECOMMENDATIONS

1. Individuals should engage in regular physical activity.
2. Sleep duration should be at least 7–8 hours per day.
3. Stress management techniques such as yoga and meditation should be practiced.
4. Junk food consumption should be reduced.
5. Awareness programs on lifestyle and Ageing should be conducted.
6. Preventive healthcare programs should be promoted.

## Limitations of the Study

1. Small sample size limits generalizability.
2. Convenience sampling may introduce selection bias.
3. Self-reported data may lead to reporting bias.
4. Lack of biological markers.
5. Lack of inferential statistical analysis.
6. Cross-sectional design cannot establish causality

## Suggestions for Future Research

1. Larger and more representative sample.
2. Use of validated scales (Perceived Stress Scale, Sleep Quality Index).
3. Use of biological markers (BMI, blood pressure, glucose level).
4. Wearable-based physical activity tracking.
5. Longitudinal and intervention-based research design.
6. Multivariable statistical analysis.

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