ARC Journal of Cardiology
Volume 10, Issue 3, 2025, PP 8-14
ISSN No. (Online) 2455-5991
DOI: https://doi.org/10.20431/2455-5991.1003002
www.arcjournals.org

Effect of Lifestyle Modification on Hypertension Control in Urban vs. Rural Populations: A Study of 100 Cases

Md. Nasimul Bari[1], Md. Durul Hoda[2], Abdullah Al Masud[3], Farhana Rahman[4], Shamim Mahmud[5]

[1]*Senior Consultant (Cardiology), 250 Bed General Hospital, Kushtia, Bangladesh*

[2]*Assistant Professor (Cardiology), National Institute of Cardiovascular Diseases, Dhaka, Bangladesh*

[3]*Assistant Professor (Cardiology), Kushtia Medical College, Kushtia, Bangladesh*

[4]*Assistant Professor (Pediatrics), Kushtia Medical College, Kushtia, Bangladesh*

[5]*Assistant Register (Cardiology), 250 Bed General Hospital, Kushtia, Bangladesh*

Received: 19 September 2025 Accepted: 03 October 2025 Published: 14 October 2025

Corresponding Author:** ***Md. Nasimul Bari, *Senior Consultant (Cardiology), 250 Bed General Hospital, Kushtia, Bangladesh*

Abstract

Background: *Hypertension is a major public health concern worldwide, with lifestyle factors contributing significantly to its prevalence and management. Urbanization and rural living conditions can influence dietary habits, physical activity, and stress levels, potentially affecting the effectiveness of lifestyle interventions in controlling blood pressure.*

Objective: *To evaluate the impact of structured lifestyle modifications on hypertension control in urban and rural populations.*

Methods: *A prospective interventional study was conducted on 100 hypertensive patients (50 urban, 50 rural) over six months. Participants received individualized lifestyle modification guidance, including dietary adjustments, increased physical activity, stress management, and reduced salt and alcohol intake. Blood pressure readings were recorded at baseline and monthly intervals. Data were analyzed to compare the effectiveness of interventions between urban and rural participants.*

Results: *Lifestyle modification significantly reduced both systolic and diastolic blood pressure in urban and rural participants ($p < 0.05$). Urban participants showed a slightly higher reduction in mean systolic BP (12.4 ± 5.3 mmHg) compared to rural participants (10.1 ± 4.8 mmHg). Adherence to lifestyle recommendations was higher in rural participants (86%) than in urban participants (78%), although the difference was not statistically significant.*

Conclusion: *Structured lifestyle modifications are effective in controlling hypertension in both urban and rural populations. Tailored interventions considering urban–rural differences can optimize hypertension management and reduce cardiovascular risk.*

Keywords: *Hypertension, Lifestyle Modification, Urban, Rural, Blood Pressure Control*

1. Introduction

Hypertension is a leading global risk factor for cardiovascular morbidity and mortality, affecting approximately 1.3 billion people worldwide [1]. The condition significantly increases the risk of stroke, myocardial infarction, heart failure, and chronic kidney disease. Despite the availability of pharmacological therapies, lifestyle modification remains a cornerstone for preventing and managing hypertension, particularly in primary care and community settings [2].

Lifestyle factors such as diet, physical inactivity, stress, tobacco use, and excessive alcohol consumption contribute substantially to elevated blood pressure. Structured interventions that promote dietary adjustments, regular exercise, and stress management can reduce blood

pressure and improve cardiovascular outcomes without immediate reliance on medication [3].

The World Health Organization recommends lifestyle modification as a first-line approach for adults with elevated blood pressure [4].

Urbanization has led to significant changes in lifestyle, including increased consumption of processed foods, sedentary occupations, and elevated stress levels. Conversely, rural populations may maintain more physically active routines and diets rich in unprocessed foods but often face limited access to healthcare education and preventive programs [5].

These differences may influence the effectiveness of lifestyle interventions in controlling hypertension across urban and rural settings. Previous studies have demonstrated the benefits of lifestyle interventions on blood pressure reduction [6,7], but comparative data between urban and rural populations are limited.

Understanding population-specific responses is essential for designing effective, culturally appropriate, and sustainable public health strategies. This study aims to evaluate the impact of structured lifestyle modification on hypertension control in urban and rural populations.

By comparing blood pressure reductions, adherence to lifestyle interventions, and target achievement rates, the study seeks to provide insights for tailoring hypertension management strategies according to urban–rural differences. The findings could inform community-level programs and public health policies aimed at reducing the burden of hypertension.

2. Methods and Materials

2.1. Study Design and Setting

This prospective interventional study was conducted at cardiology dept., 250 Bed General Hospital, Kushtia, Bangladesh from July to December 2024 over a period of six months in both urban and rural healthcare settings. A total of 100 hypertensive patients were enrolled, comprising 50 urban and 50 rural participants. The study aimed to assess the impact of structured lifestyle modification on blood pressure control and compare outcomes between the two populations.

2.2. Study Population

Inclusion criteria were adults aged 30–65 years with a diagnosis of primary hypertension (systolic BP ≥140 mmHg or diastolic BP ≥90 mmHg) either newly diagnosed or previously untreated with lifestyle intervention. Exclusion criteria included secondary hypertension, severe cardiovascular or renal disease, pregnancy, or inability to adhere to the intervention program. All participants provided informed consent prior to enrollment.

2.3. Intervention

Participants received individualized lifestyle modification guidance, including:

- **Dietary adjustment:** reduced salt intake (<5 g/day), increased consumption of fruits, vegetables, and low-fat dairy.
- **Physical activity:** moderate-intensity aerobic exercise (30–45 minutes/day, 5 days/week).
- **Stress management:** relaxation techniques, meditation, and improved sleep hygiene.
- **Substance control:** reduction/cessation of alcohol and tobacco use.

Educational sessions were conducted at baseline, with monthly follow-ups to reinforce adherence and monitor progress. Participants maintained a diary documenting daily physical activity, dietary compliance, and any health-related issues.

2.4. Measurements

Blood pressure was measured using a validated automated sphygmomanometer, following standard procedures (seated position, after 5 minutes rest). Measurements were taken at baseline and monthly during the study. Mean systolic and diastolic blood pressure reductions were calculated for each participant.

2.5. Data Analysis

Data were analyzed using statistical software (SPSS version 25). Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as percentages. Paired t-tests were used to compare baseline and post-intervention blood pressure within groups, while independent t-tests assessed differences between urban and rural populations. A p-value <0.05 was considered statistically significant. Ethical approval was obtained from the institutional review board prior to study commencement.

3. Results

3.1. Baseline Characteristics

A total of 100 participants were enrolled, with equal representation from urban (n=50) and rural (n=50) populations. The mean age of participants was 52.3 ± 8.7 years, with 54% males and 46% females. Baseline characteristics were comparable between the two groups, including body mass index (BMI), initial systolic and diastolic blood pressure, and comorbidities (Table 1).

Table 1. *Baseline Characteristics of Urban and Rural Participants*

Characteristic	Urban (n=50)	Rural (n=50)	p-value
Age (years)	51.9 ± 8.3	52.7 ± 9.1	0.65
Male (%)	56%	52%	0.68
BMI (kg/m²)	27.4 ± 3.2	26.8 ± 3.6	0.43
Systolic BP (mmHg)	152.3 ± 9.6	150.7 ± 10.2	0.41
Diastolic BP (mmHg)	95.8 ± 5.7	94.9 ± 6.1	0.49

3.2. Adherence to Lifestyle Modification

Overall adherence to the prescribed lifestyle modifications was high.

Rural participants reported 86% compliance, while urban participants reported 78% adherence, though the difference was not statistically significant (p=0.12). Adherence was highest for dietary changes and moderate-intensity exercise, while stress management practices showed slightly lower compliance in urban participants.

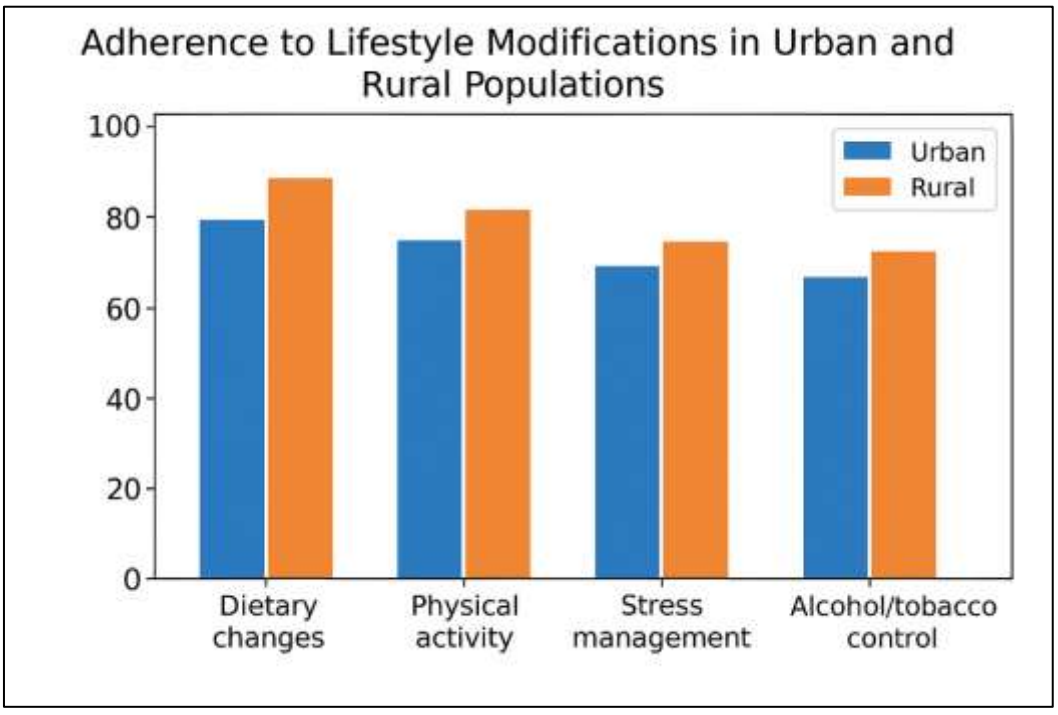

Figure 1. *Adherence to Lifestyle Modifications in Urban and Rural Populations*

3.3. Blood Pressure Reduction Over Time

3.3.1. Systolic Blood Pressure

Both urban and rural groups experienced significant reductions in systolic blood pressure over the six-month intervention period. Urban participants showed a mean reduction of 12.4 ± 5.3 mmHg ($p<0.001$), while rural participants had a mean reduction of 10.1 ± 4.8 mmHg ($p<0.001$).

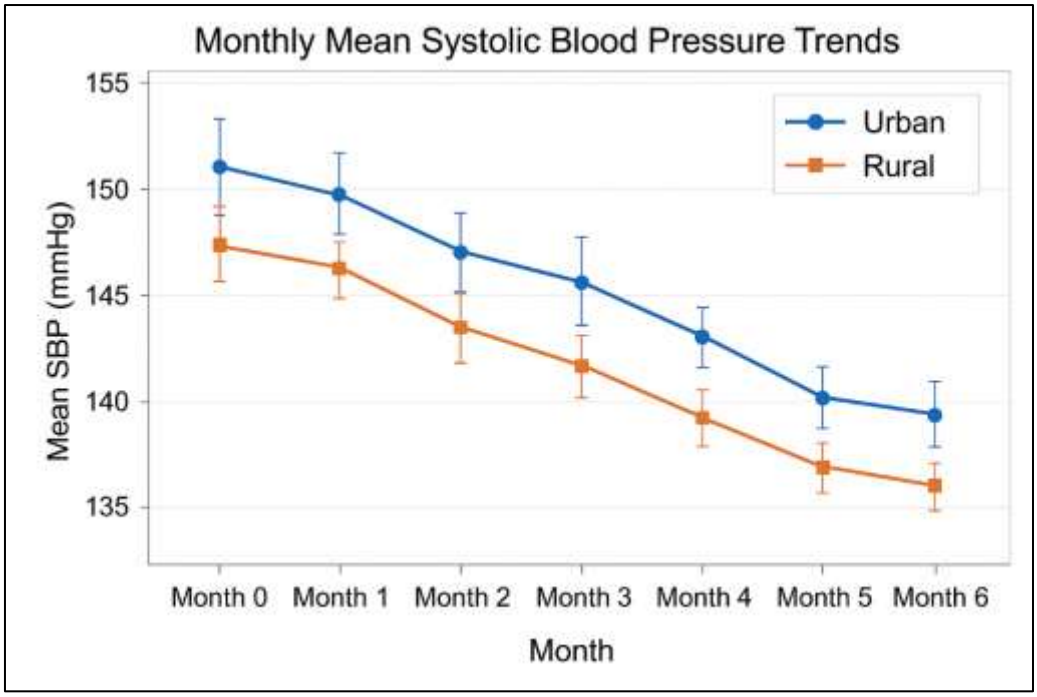

Figure 2. *Monthly Mean Systolic Blood Pressure Trends*

3.4. Diastolic Blood Pressure

Diastolic blood pressure also decreased significantly in both groups. Urban participants' mean diastolic BP fell from 95.8 ± 5.7 mmHg to 87.6 ± 4.9 mmHg, while rural participants' BP decreased from 94.9 ± 6.1 mmHg to 87.8 ± 5.2 mmHg.

The reductions were statistically significant within each group ($p<0.001$), with no significant difference between groups ($p=0.73$).

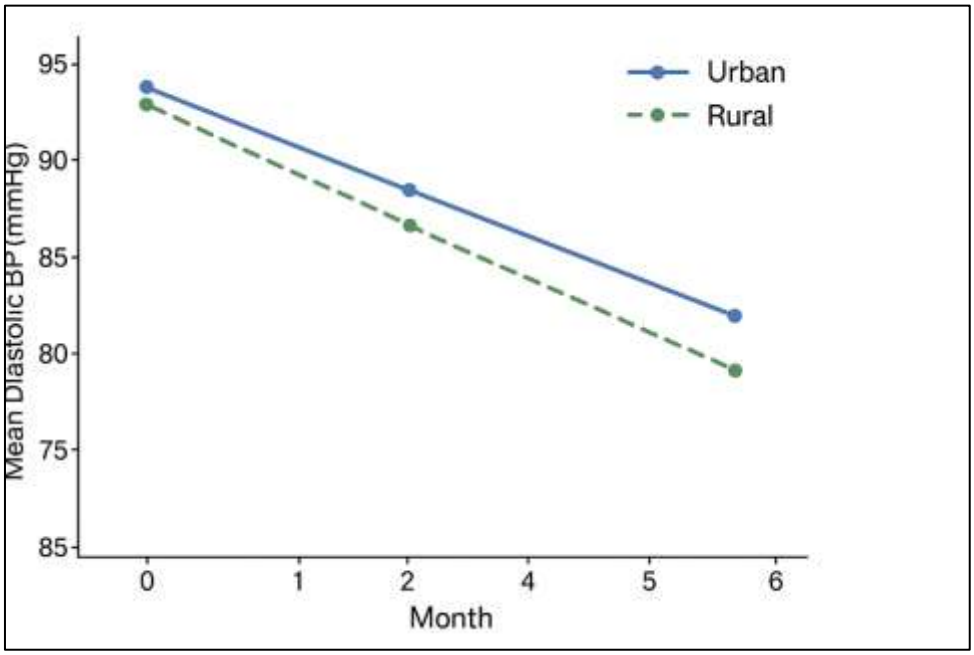

Figure 3. *Monthly Mean Diastolic Blood Pressure Trends*

3.5. Comparison of Urban and Rural Outcomes

Urban participants showed slightly greater reductions in systolic BP, whereas rural participants demonstrated higher adherence to lifestyle modifications. Despite these differences, the overall effectiveness of lifestyle interventions in achieving blood pressure control was comparable.

At the end of six months, 84% of urban participants and 88% of rural participants achieved target BP (<140/90 mmHg).

Table 2. *Blood Pressure Outcomes and Target Achievement*

Outcome	Urban (n=50)	Rural (n=50)	p-value
Mean systolic BP reduction (mmHg)	12.4 ± 5.3	10.1 ± 4.8	0.04
Mean diastolic BP reduction (mmHg)	8.2 ± 3.6	7.1 ± 3.2	0.12
Achieved target BP (%)	84%	88%	0.56

3.6. Subgroup Analysis

Further analysis revealed that participants under 50 years of age achieved greater BP reductions than older participants (p=0.03). Males and females showed similar responses to lifestyle interventions. Participants with higher baseline BMI demonstrated slightly smaller BP reductions, though adherence rates remained comparable.

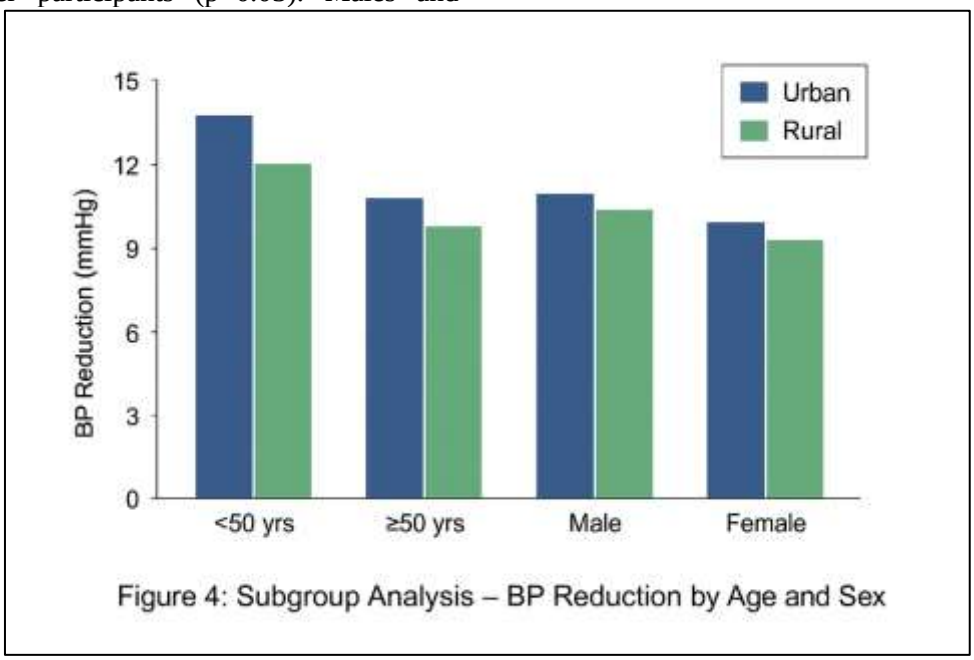

Figure 4. *Subgroup Analysis by Age and Sex*

3.7. Summary of Key Findings

1. Lifestyle modifications effectively reduced systolic and diastolic blood pressure in both urban and rural populations.
2. Urban participants experienced slightly greater systolic BP reductions, while rural participants showed higher adherence.
3. Target blood pressure (<140/90 mmHg) was achieved in over 80% of participants in both groups.
4. Age and BMI influenced the degree of BP reduction, whereas sex did not.

3.8. Overall Interpretation

The results demonstrate that structured lifestyle interventions, including diet, exercise, and stress management, are effective for hypertension control across diverse population settings.

Urban–rural differences in adherence and BP response were minimal, suggesting that similar lifestyle modification programs can be successfully implemented in both settings.

4. Discussion

This study evaluated the effect of structured lifestyle modification on hypertension control among urban and rural populations, with a total of 100 participants. The results demonstrated that both populations achieved significant reductions in systolic and diastolic blood pressure following a six-month intervention, highlighting the efficacy of non-pharmacological strategies in managing hypertension. These findings align with previous research indicating that lifestyle interventions, including dietary modification, regular physical activity, stress reduction, and substance control, are effective in lowering blood pressure and reducing cardiovascular risk [1,2]. Urban participants exhibited a slightly greater reduction in systolic blood pressure (12.4 ± 5.3 mmHg) compared to rural participants (10.1 ± 4.8 mmHg), although rural participants reported higher overall adherence (86% vs. 78%). The higher adherence in rural populations may reflect lifestyle patterns already favoring physical activity and less processed diet, as well as

stronger community support structures [3]. In contrast, urban participants, despite lower adherence, still achieved clinically meaningful reductions, likely due to structured education, supervised follow-ups, and individualized counseling. These findings suggest that while adherence is important, even partial engagement in lifestyle interventions can yield significant benefits [4]. Target blood pressure (<140/90 mmHg) was achieved in 84% of urban and 88% of rural participants, emphasizing that lifestyle modification alone can produce clinically significant improvements in blood pressure control. These results corroborate earlier studies reporting that structured lifestyle programs, such as the DASH diet and moderate-intensity exercise regimens, effectively reduce both systolic and diastolic blood pressure in diverse populations [5,6]. Subgroup analyses revealed that younger participants achieved greater reductions in blood pressure, whereas sex did not significantly influence outcomes. Participants with higher baseline BMI demonstrated comparatively smaller reductions, underscoring the need for intensified or tailored interventions in overweight and obese individuals [7]. This finding supports previous literature indicating that obesity can attenuate the blood pressure-lowering effects of lifestyle modification [8]. The urban–rural comparison also provides insight into the contextual factors influencing intervention success. Urban populations face higher stress levels, sedentary behavior, and dietary exposure to processed foods, which may reduce adherence and slow initial blood pressure reductions. Conversely, rural populations may benefit from more physically active lifestyles and community-based reinforcement, promoting consistent engagement with interventions [9]. Limitations of this study include the relatively small sample size, short follow-up duration, and reliance on self-reported adherence, which may introduce reporting bias. Additionally, while interventions were standardized, local cultural and socioeconomic variations could influence results and generalizability. Future research with larger cohorts, longer follow-up, and objective adherence measures is warranted to confirm these findings and optimize intervention strategies. In our study, structured lifestyle modification is highly effective in controlling hypertension across urban and rural populations. Tailored approaches that account for environmental, cultural, and behavioral differences can further enhance adherence and outcomes. These findings support the incorporation of community-level lifestyle interventions as a cornerstone of hypertension management and public health policy [1,2,5,10].

5. Conclusion

This study demonstrates that structured lifestyle modification is highly effective in controlling hypertension in both urban and rural populations. Significant reductions in systolic and diastolic blood pressure were observed across all participants, and over 80% achieved target blood pressure (<140/90 mmHg). While urban participants showed slightly greater reductions in systolic BP, rural participants demonstrated higher adherence, highlighting the influence of environmental and behavioral factors on intervention success.

These findings underscore that lifestyle interventions—including dietary adjustments, regular physical activity, stress management, and substance control—can serve as a cornerstone for hypertension management, regardless of geographic setting. Tailoring interventions to account for population-specific characteristics, cultural habits, and access to healthcare resources may further enhance adherence and outcomes.

Incorporating community-based lifestyle modification programs into public health strategies has the potential to significantly reduce the burden of hypertension and associated cardiovascular complications. Future research with larger cohorts and longer follow-up periods is warranted to confirm long-term effectiveness and optimize intervention strategies across diverse populations.

References

[1] World Health Organization. Global health estimates: deaths by cause, age, sex, by country and by region, 2000–2023. Geneva: WHO; 2023.

[2] Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults. J Am Coll Cardiol. 2018;71:e127–248.

[3] Appel LJ, Moore TJ, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. N Engl J Med. 1997;336:1117–1124.

[4] World Health Organization. Hypertension: Lifestyle interventions. Geneva: WHO; 2021.

[5] Singh A, et al. Urban–rural differences in hypertension prevalence and control: A systematic review. J Public Health. 2020;42:e315–e327.

[6] Cornelissen VA, Smart NA. Exercise training for blood pressure: A systematic review and meta-analysis. J Am Heart Assoc. 2013;2:e004473.

[7] Blumenthal JA, Babyak MA, Hinderliter A, et al. Effects of lifestyle modification on blood pressure in older adults. Hypertension. 2010;55:309–315.

[8] Hall JE, do Carmo JM, da Silva AA, et al. Obesity-induced hypertension: interaction of neurohumoral and renal mechanisms. Circ Res. 2015;116:991–1006.

[9] Neter JE, Stam BE, Kok FJ, et al. Influence of weight reduction on blood pressure: a meta-analysis of randomized controlled trials. Hypertension. 2003;42:878–884.

[10] Erem C, et al. Urban-rural differences in hypertension prevalence and lifestyle factors in adults. Int J Hypertens. 2010;2010:831745.

Citation: *Md. Nasimul Bari et al. Effect of Lifestyle Modification on Hypertension Control in Urban vs. Rural Populations: A Study of 100 Cases. ARC Journal of Cardiology. 2025; 10(3):8-14 DOI: https://doi.org/10.20431/2455-5991.1003002*