

Assessing the impact of polypharmacy on medication adherence among elderly hypertensive: evidence from primary healthcare setting

Irma Susanti^{1,2}, Yunita Nita^{3*}, Abdul Rahem³

¹Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia. ²Department of Clinical and Community Pharmacy, Bachelor of Pharmacy Program Faculty of Health Science, Universitas Muhammadiyah Lamongan, Lamongan, Indonesia. ³Department of Pharmacy Practice, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia.

Correspondence: Yunita Nita, Department of Pharmacy Practice, Faculty of Pharmacy, Universitas Airlangga, Indonesia. yunita-n@ff.unair.ac.id

Received: 14 November 2025; **Revised:** 28 February 2026; **Accepted:** 28 February 2026

ABSTRACT

The aging population has led to more elderly with hypertension and multiple comorbidities. These patients often require several medications, resulting in polypharmacy, which can cause adverse outcomes and poor adherence. This study aimed to assess the impact of polypharmacy on medication adherence among elderly patients with hypertension. This study employed a cross-sectional design and was conducted at two primary healthcare centers, in East Java, Indonesia, from February to June 2024. Participants were patients aged ≥ 60 years who had received antihypertensive therapy for at least three months. Medication adherence was assessed using pill counts, while polypharmacy was categorized as minor (1–3 drugs), moderate (4–5 drugs), and major (>5 drugs). Data were analyzed using Spearman's rank correlation. Among the 212 respondents, most were female 159 (75%) and aged 60–69 years 169 (80%). Diabetes mellitus 97 (45.75%) and dyslipidemia 16 (7.55%) were the most common comorbidities. Amlodipine was the most frequently prescribed drug. More than half of the patients 109 (51.42%) received 4–5 medications, and 45 (21.23%) were non-adherent. Spearman's analysis revealed a significant correlation between polypharmacy and adherence ($p=0.019$). Polypharmacy was highly prevalent among elderly hypertensive patients and showed a significant association with poor adherence, emphasizing the importance of optimizing prescribing practices, reducing unnecessary medication use, and promoting single-pill combinations to improve adherence and clinical outcomes in primary care settings.

Keywords: Adherence, Elderly, Hypertension, Pill count, Polypharmacy

Introduction

Global aging trends indicate that by 2030, one in six people of the world's population will be aged 60 years or older. The size of this demographic, estimated at 1 billion in 2020, is projected

to rise to 1.4 billion to 2.1 billion in 2050. Furthermore, the subgroup of adults aged 80 years and above is predicted to triple within the same timeframe, amounting to approximately 426 million individuals [1]. US National Health and Nutrition Examination Survey (NHANES) showed that 70% of older adults over 65 years of age have hypertension [2]. Compared to younger hypertensive patients, elderly exhibit a markedly greater susceptibility to stroke, heart failure, coronary artery disease, peripheral arterial disease, and chronic kidney disease at equivalent blood pressure levels [3]. Maintaining a healthy blood pressure level is crucial especially in elderly [4].

Elderly with multimorbidity require long-term treatment. Multiple medications are often prescribed simultaneously to these patients, leading to polypharmacy. Polypharmacy is usually

Access this article online

Website: www.japer.in

E-ISSN: 2249-3379

How to cite this article: Susanti I, Nita Y, Rahem A. Assessing the impact of polypharmacy on medication adherence among elderly hypertensive: evidence from primary healthcare setting. *J Adv Pharm Educ Res.* 2026;16(1):156-61. <https://doi.org/10.51847/tXniKNLz4>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

defined as taking five or more medications simultaneously [5, 6]. The World Health Organization (WHO) defines polypharmacy as “the administration of many drugs at the same time or the administration of an excessive number of drugs“ [7, 8]. Polypharmacy is associated with adverse outcomes including mortality, falls, adverse drug reactions, increased length of stay in hospital and readmission to hospital soon after discharge. The risk of adverse effects and harm increases with increasing numbers of medications. Harm can result due to a multitude of factors including drug-drug interactions and drug-disease interactions [9-16]. Older patients are at even greater risk of adverse effects due to decreased renal and hepatic function, lower lean body mass, reduced hearing, vision, cognition and mobility [17].

Current evidence on polypharmacy is largely dominated by hospital-based studies, which may not accurately reflect prescribing practices in routine primary healthcare [18-22]. Conversely, research from primary healthcare centers remains markedly limited, primarily due to the small and underrepresented outpatient samples [23-25]. Research examining the impact of polypharmacy on medication adherence remains limited; however, several studies have investigated polypharmacy in relation to other variables, such as risk of adverse drug reaction [21], Risk of Falls in the Elderly [25] and the use of potentially inappropriate medications [26].

Medication adherence for elderly prescribed polypharmacy can be particularly challenging. Poor medication adherence severely compromises the effectiveness of treatments, contributing to increased morbidity, mortality, and healthcare costs [27]. Medication adherence occurs when a patient takes their medications according to the prescribed dosage, time, frequency, and direction [28]. In Indonesia proportion of patients aged ≥ 18 years who regularly take antihypertensive medication is 54.40%, not regularly taking medicine 32.37% and do not take medication 13.33% [29]. This is show that in Indonesia have a large proportion of patients with hypertension remain non-adherent to their prescribed antihypertensive medications.

Based on the aforementioned background, this study aimed to investigate the impact of polypharmacy and medication adherence among elderly patients with hypertension. The novelty of this research lies in its focus on an aging population, where evidence on polypharmacy and adherence remains limited especially in primary healthcare centers.

Materials and Methods

The study was approved by the Faculty of Nursing, Airlangga University with number 3092-KEPK in February 2024. This study employed a cross-sectional design, with data collection conducted at the Babat and Lamongan Primary Healthcare Centers in East Java, Indonesia, from February to June 2024. The study sample consisted of patients aged 60 years and older who were undergoing hypertension therapy and had been on medication for at least three months [30-39].

Medication adherence was assessed using pill count method. Adherence was considered adequate if the compliance value exceeded $>80\%$. Pill count was calculated by subtracting the remaining number of pills from the initial amount, divided by the number of medications taken per day, multiplied by the number of days between the start and end of the evaluation period, and then multiplied by 100 [40]. Polypharmacy is classified into minor (1-3 drugs), moderate (4-5 drugs), major (more than 5 drugs) [17]. Data analysis was performed using Spearman’s Rank Correlation to examine the association between polypharmacy and medication adherence.

Results and Discussion

In this study we took data from 212 patients who met the criteria, patient characteristic data can be seen in **Table 1**. Most participant were female $n=159$ (75%), age 60-69 years $n=169$ (80%). The most common comorbidities were diabetes mellitus $n=97$ (45.75%) followed by dyslipidemia 16 (7.55%). The most frequently antihypertension consumed by patients is amlodipine 5 mg, the largest number of drugs received by patients is 4-5 drugs $n=109$ (51.42%), and blood pressure majority $\geq 140/\geq 90$ mmHg $n=117$ (55.19%).

Table 1. Baseline Characteristics of Respondents

No	Demography	Categories	n (%)
1	Gender	Male	53 (25)
		Female	159 (75)
		60-69	169 (80)
2	Age (Year)	70-79	39 (18)
		≥ 80	4 (2)
3	Comorbidity	Diabetes mellitus	97 (45.75)
		Dyslipidemia	16 (7.55)
		Asthma	2 (0.94)
		Anemia	1 (0.47)
		GERD	1 (0.47)
		Hypertensive heart disease	1 (0.47)
		Congestive heart failure and Myalgia	1 (0.47)
		Dyslipidemia and Diabetes mellitus	7 (3.30)
		Coronary heart disease dan Diabetes mellitus	2 (0.94)
		Dyslipidemia dan Gerd	1 (0.47)
4	Blood Pressure	Dyslipidemia and Tuberculosis	1 (0.47)
		without comorbidities	82 (38.68)
		$<120/<80$ mmHg	12 (5.66)
		120-129/ <80 mmHg	27 (12.74)
		130-139/80-99 mmHg	56 (26.41)
$\geq 140/\geq 90$ mmHg	117 (55.19)		

In this study, the majority of patients (51.42%) received 4-5 types of drugs. Polypharmacy is common among the elderly who often present with multiple comorbidities [41]. The prevalence of polypharmacy has increased worldwide and is associated with factors such as duration of treatment, comorbidities, chronic illness and advanced age [42]. Patients with multimorbidity and polypharmacy have increased healthcare utilisation, have more frequent hospital admissions, experience longer hospital stays, and have higher rates of falls, cognitive impairment, and mortality [43].

Table 2. Antihypertensive Agent

Categories	Antihypertensive agent	n (%)
Types of Antihypertensive Drugs Administered *	Amlodipin 5 mg	106
	Amlodipin 10 mg	94
	Bisoprolol 2,5mg	5
	Bisoprolol 5 mg	7
	Candesartan 8 mg	44
	Candesartan 16 mg	2
	Captopril 25 mg	3
	Furosemid 20 mg	4
	Lisinopril 5 mg	3
	Lisinopril 10 mg	5
	Nifedipin 5 mg	2
	Nifedipin 30 mg	1
	Spiroolakton 25 mg	4
Number of Medication the Patient Receives**	1-3 Drugs	68 (32.08)
	4-5 Drugs	109 (51.42)
	>5 Drugs***	35 (16.51)

Amlodipine is the medication that patients are most often prescribed, with 106 individuals using it. In this study, the majority of patients (51.42%) received 4-5 types of drugs (Table 2). Polypharmacy has a negative impact, both clinically and economically. Polypharmacy leads to the following notable effects: increased risk of using inappropriate medications, underuse of appropriate medications, harmful drug interactions, functional or cognitive decline, lower physical performance, more frequent side effects, increasing hospitalization rates because of adverse drug reactions, increasing short-term hospitalization rates, non-adherence to treatment, increased risk of frailty, and higher mortality [44].

Total of 45 patients (21.23%) were classified as non-adherent to their prescribed medications. The detailed distribution of adherence status for all participants is shown in Table 3.

Table 3. Medication Adherence

Medication Adherence	n (%)
Adherence	167 (78.77)
Non adherence	45 (21.23)

Non-adherence to taking the medication regimen was a major barrier in the treatment of chronic diseases. The degenerative process experienced by the elderly further exacerbates the problem of medication adherence [45]. Low adherence has been associated to several issues including a high cardiovascular disease incidence and mortality, a higher rate of hospitalization, and high health care expenditures. Regular medication review, simplified treatment strategies, and multidisciplinary support are essential to sustaining adherence and improving hypertension outcomes in the elderly population [3].

The relationship between polypharmacy and patient adherence was analyzed using Spearman's rank correlation analysis shows $p=0.019$, showed that there was significant relationship between polypharmacy and patient adherence. The data can be seen in Table 4.

Table 4. Spearman's Rank Correlation Analysis

Variable	n	sig.(2tailed)
Polypharmacy	212	0.019
Medication Adherence	212	

The relationship between polypharmacy and patient adherence analyzed using Spearman's rank correlation analysis shows p value= 0.019 , which means that there was significant relationship between polypharmacy and patient adherence. The recent European Society of Hypertension addresses this issue and recommends single pill combinations to improve adherence [46]. A meta analysis ($n=2.967.952$) identified that polypharmacy (≥ 5 drugs) increases the risk of death by 1,28 times, and hyper polypharmacy (≥ 10 drugs) increases the risk of death by 1,44 times [7]. Polypharmacy was an independent predictor of potentially inappropriate medication, with an adjusted OR of 1.6, p -value = 0.001 [26, 47-51]. Individuals practicing polypharmacy have a higher risk OR of 1.86 of experiencing a medication related problem than those taking fewer medications [52].

This study has several limitations. Its cross-sectional design prevents the establishment of causal relationships. Medication adherence was measured using self-reported data, which may lead to recall bias [53-60]. In addition, several potential confounding factors were not fully controlled including therapy duration, family support, cognitive status, functional ability, and health literacy. These factors can independently influence an elderly patients capacity to manage complex regimens and consequently their overall adherence. This study demonstrates substantial strengths by utilizing real-world data from primary healthcare centers, focusing on a clinically vulnerable elderly hypertensive population, and rigorously evaluating both polypharmacy and medication adherence. The findings enrich the limited evidence available in low- and middle-income settings and provide a robust foundation for developing targeted strategies to optimize prescribing practices and enhance adherence in primary care.

Conclusion

This study underlines the important influence of polypharmacy on medication adherence among elderly hypertensive outpatients in primary healthcare settings. The findings suggest that strengthening prescribing practices through regular medication review, careful deprescribing when appropriate, and the use of single-pill combinations may contribute to better adherence and improved patient outcomes.

Acknowledgments: The authors would like to express our gratitude to Babat and Lamongan primary healthcare center for their kind support during data collection.

Conflict of interest: None

Financial support: None

Ethics statement: The study was approved by the Faculty of Nursing, Airlangga University with number 3092-KEPK in February 2024.

References

1. World Health Organization. Ageing and health [Internet]. 2025 [cited 2025 Sep 25]. Available from: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
2. Leszczak J, Czenczek-Lewandowska E, Asif M, Baran J, Mazur A, Wyszynska J. Risk factors and prevalence of hypertension in older adults from south-eastern Poland: An observational study. *Sci Rep.* 2024;14(1):1-9. doi:10.1038/s41598-024-52009-3
3. Burnier M, Polychronopoulou E, Wuerzner G. Hypertension and drug adherence in the elderly. *Front Cardiovasc Med.* 2020;7:49. doi:10.3389/fcvm.2020.00049
4. Liberty IA, Pariyana, Roflin E, Waris L. Determinan kepatuhan berobat pasien hipertensi pada fasilitas kesehatan tingkat I berdasarkan anjuran Joint National. *J Penelit dan Pengemb Pelayanan Kesehat.* 2017;1:58-65.
5. Liu J, Yu Y, Yan S, Zeng Y, Su S, He T, et al. Risk factors for self-reported medication adherence in community-dwelling older patients with multimorbidity and polypharmacy: A multicenter cross-sectional study. *BMC Geriatr.* 2023;23(1):1-10. doi:10.1186/s12877-023-03768-7
6. Satish S, Rose AJ, Shabaraya AR. A study to assess the impact of comorbidities and polypharmacy in nonadherence to antihypertensives. *Int J Res Rev.* 2021;8(2):222-7.
7. Delara M, Murray L, Jafari B, Bahji A, Goodarzi Z, Kirkham J, et al. Prevalence and factors associated with polypharmacy: A systematic review and meta-analysis. *BMC Geriatr.* 2022;22(1):1-12. doi:10.1186/s12877-022-03279-x
8. Taghy N, Cambon L, Cohen JM, Dussart C. Failure to reach a consensus in polypharmacy definition: An obstacle to measuring risks and impacts—results of a literature review. *Ther Clin Risk Manag.* 2020;16:57-73. doi:10.2147/TCRM.S214187
9. Awasthi A, Bigoniya P, Gupta B. Phytochemical characterization and pharmacological potential of *Moringa oleifera* extract. *Spec J Pharmacogn Phytochem Biotechnol.* 2024;4:1-8. doi:10.51847/VEJJO91vAT
10. Ganea M, Horvath T, Nagy C, Morna AA, Pasc P, Szilagyi A, et al. Rapid method for microencapsulation of *Magnolia officinalis* oil and its medical applications. *Spec J Pharmacogn Phytochem Biotechnol.* 2024;4:29-38. doi:10.51847/UllqQHbfeC
11. Syam S, Maheswari U. Incidental maxillary sinus findings in CBCT scans: A retrospective analysis. *Interdiscip Res Med Sci Spec.* 2023;3(2):25-30. doi:10.51847/EvXEF16qHk
12. Fritea L, Sipponen M, Antonescu A, Groza FM, Chirla R, Vesa C, et al. Impact of pre-existing conditions on inflammatory response in COVID-19 patients. *Interdiscip Res Med Sci Spec.* 2023;3(1):11-9. doi:10.51847/ylgQeUPVMb
13. Ku JK, Um IW, Jun MK, Kim IH. Clinical management of external apical root resorption using amnion membrane matrix and biodentine. *J Curr Res Oral Surg.* 2023;3:1-5. doi:10.51847/IOSwt6Qzpv
14. Yang J, Tang Z, Shan Z, Leung YY. Integrating rapid maxillary expansion and Le Fort osteotomy for esthetic rehabilitation: A clinical case report. *J Curr Res Oral Surg.* 2023;3:22-6. doi:10.51847/E00EwI52jo
15. Essah A, Igboemeka C, Hailemeskel B. Exploring gabapentin as a treatment for pruritus: A survey of student perspectives. *Ann Pharm Educ Saf Public Health Advocacy.* 2024;4:1-6. doi:10.51847/h8xgEJE3NE
16. Souza JS, Reis EA, Godman B, Campbell SM, Meyer JC, Sena LWP, et al. Designing a healthcare utilization index to enable worldwide patient comparisons: A cross-sectional study. *Ann Pharm Educ Saf Public Health Advocacy.* 2024;4:7-15. doi:10.51847/EeWktBkVgK
17. Masnoon N, Shakib S, Kalisch-Ellett L, Caughey GE. What is polypharmacy? A systematic review of definitions. *BMC Geriatr.* 2017;17(1):1-10. doi:10.1186/s12877-017-0621-2
18. Soejono CH, Rizka A. Polypharmacy and drug use pattern among Indonesian elderly patients visiting emergency unit. *Acta Med Indones.* 2018;53(1):60-76.
19. Lita ES, Sormin IP. Evaluation of polypharmacy and excessive polypharmacy in geriatric. 2024;5(10):815-27.
20. Faisal S, Zairina E, Nathishuwan S, Khotib J, Kristina SA, Nugraheni G. Prevalence and predictors of excessive polypharmacy in geriatric inpatients: A retrospective cross-sectional study in Indonesia. *J Prim Care Community Health.* 2023;14(10). doi:10.1177/21501319231178595

21. Jamal AK, Hardi H, Widyastuti R. Polypharmacy and the risk of adverse drug reactions in the elderly at a tertiary referral hospital in Indonesia: Assessing the applicability of the GerontoNet score. *Acta Med Indones.* 2025;57(1):74-80.
22. Rahma N, Nasution D, Budi A, Sari N. Screening of polypharmacy prescriptions in hypertensive patients at Royal Prima Hospital. *Bul Kedokteran Kesehatan Prima.* 2024;3(1):21-4. doi:10.34012/bkbp.v3i1.5288
23. Afiani N, Nurmala I, Mahmudah, Haryuni S. Medication adherence in hypertensive patients with polypharmacy in Malang, East Java, Indonesia. *Proceeding J Health Res.* 2024;38(1). doi:10.56808/2586-940x.1091
24. Kumaat LT. Hubungan dukungan informatif dan emosional keluarga dengan kepatuhan minum obat pada lansia hipertensi di Puskesmas Ranomuut Kota Manado. *J Kep.* 2017;5.
25. Majid A, Harisa A, Yodang, Rahmatullah MP. Pengaruh polypharmacy terhadap risiko jatuh pada lansia di Puskesmas Kota Makassar. *J Kesehat Panrita Husada.* 2025;10(1):1-13.
26. Abdulah R, Insani WN, Destiani DP, Rohmaniasari N, Mohenathas ND, Barliana MI. Polypharmacy leads to increased prevalence of potentially inappropriate medication in the Indonesian geriatric population visiting primary care facilities. *Ther Clin Risk Manag.* 2018;14:1591-7. doi:10.2147/TCRM.S170475
27. Franchi C, Ludergnani M, Merlino L, Nobili A, Fortino I, Leoni O, et al. Multiple medication adherence and related outcomes in community-dwelling older people on chronic polypharmacy: A retrospective cohort study on administrative claims data. *Int J Environ Res Public Health.* 2022;19(9). doi:10.3390/ijerph19095692
28. Poorcheraghi H, Negarandeh R, Pashaeypoor S, Jorian J. Effect of using a mobile drug management application on medication adherence and hospital readmission among elderly patients with polypharmacy: A randomized controlled trial. *BMC Health Serv Res.* 2023;23(1):1-10. doi:10.1186/s12913-023-10177-4
29. Kementerian Kesehatan Republik Indonesia. Laporan Nasional Riskesdas 2018 [Internet]. 2018 [cited 2026 Jan 19]. Available from: http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
30. Roger J, Dupuis C, Muller L. Understanding organizational citizenship behavior: the mediating role of impression management and the moderating role of power distance. *Asian J Indiv Organ Behav.* 2023;3:89-98. doi:10.51847/oNFM50mCjK
31. Jeung DY, Chang SJ. The role of emotional labor as a mediator in the relationship between organizational climate and employee burnout. *Asian J Indiv Organ Behav.* 2023;3:1-8. doi:10.51847/OQDI5r3KKA
32. Ernst P, Weber T. Impact of flexible work arrangements on the engagement levels of younger employees. *Ann Organ Cult Leadersh Extern Engagem J.* 2024;5:72-86. doi:10.51847/njhaTa39mx
33. Holmes R, Norris D. Empowering leadership and employee performance: the mediating role of work engagement in Ethio-Telecom. *Ann Organ Cult Leadersh Extern Engagem J.* 2024;5:147-58. doi:10.51847/R6TQ0Y2j4W
34. Szklener K, Nieoczym K, Niedziela K, Światłowski Ł, Mańdziuk S. Exceptional survival with lorlatinib in ALK-rearranged lung cancer: A case report. *Asian J Curr Res Clin Cancer.* 2023;3(1):1-5. doi:10.51847/DxGARc9jsQ
35. Iqbal B, Kumar H, Vishwanathan V, Zaheer M, Gore C. Primary squamous cell carcinoma of the urinary bladder: A case report and comprehensive literature review. *Asian J Curr Res Clin Cancer.* 2023;3(2):15-8. doi:10.51847/FcXT9SREu1
36. Jin LW, Tahir NAM, Islahudin F, Chuen LS. Exploring treatment adherence and quality of life among patients with transfusion-dependent thalassemia. *Ann Pharm Pract Pharmacother.* 2024;4:8-16. doi:10.51847/B8R85qakUv
37. Qiao J, Luo B, Ming J, Zhou S, Chen Y, Zhang X. Prevalence and implications of non-prescription antibiotic dispensing in Baghdad community pharmacies. *Ann Pharm Pract Pharmacother.* 2024;4:34-41. doi:10.51847/5SuGTfpren
38. Lv X, Yang L, Fan Z, Bao X. Synthesis and biological assessment of novel quinazolinone–piperazine hybrid derivatives as antimicrobial agents. *Pharm Sci Drug Des.* 2024;4:16-25. doi:10.51847/OCT1Q8Fm7d
39. Park K. Advances in controlled drug release systems: current trends and future prospects. *Pharm Sci Drug Des.* 2024;4:26-34. doi:10.51847/m708A2Qw3b
40. Fitria N, Lailaturrahmi L, Sari YO, Anata FT, Husnia K. Adherence assessment on hypertension therapy using the pill count method in Lubuk Kilangan Health Center, Indonesia. *J Sains Farm Klin.* 2023;10(1):28-34. doi:10.25077/jsfk.10.1.28-34.2023
41. Guillot J, Maumus-Robert S, Bezin J. Polypharmacy: A general review of definitions, descriptions and determinants. *Therapies.* 2020;75(5):407-16. doi:10.1016/j.therap.2019.10.001
42. Yazie TS, Mengistu WE, Yimer YS, Dagnew SB, Dagnew FN, Moges TA, et al. Clinical factors associated with multimorbidity, polypharmacy and medication regimen complexity among adults with hypertension: A multicentre cross-sectional study. *BMJ Open.* 2025;15(4):1-10. doi:10.1136/bmjopen-2024-091997
43. Güven AT, Hocann N, Ambarkütükoğlu AE, Kaplan C, Çaylayık T, Ardebili YA, et al. Effects of multimorbidity and polypharmacy on blood pressure target attainment in patients with hypertension. *Turk J Intern Med.* 2024;6(3):128-34. doi:10.46310/tjim.1482744
44. Diaconu CC, Cozma MA, Dobrică EC, Gheorghe G, Jichitu A, Ionescu VA, et al. Polypharmacy in the management of arterial hypertension—friend or foe?

- Medicina. 2021;57(12):1-15. doi:10.3390/medicina57121288
45. Afiani N, Nurmala I, Mahmudah. A systematic review on the determinants of medication adherence in older adults with hypertension. *J Public Health Afr.* 2023;14(S2). doi:10.4081/jphia.2023.2578
46. Mancia G, Kreutz R, Brunström M, Burnier M, Grassi G, Januszewicz A, et al. 2023 ESH guidelines for the management of arterial hypertension: the Task Force for the management of arterial hypertension of the European Society of Hypertension, endorsed by the International Society of Hypertension and the European Renal Association. *J Hypertens.* 2023;41(12):1874-2071. doi:10.1097/HJH.0000000000003480
47. Costa LA, Eiro N, Vaca A, Vizoso FJ. Advanced microscopy and cell culture techniques in regenerative endodontics. *Asian J Periodontics Orthod.* 2022;2:42-6. doi:10.51847/ExCWvexPbC
48. Ashokkumar P, Giri GVV, Pandya K. Parotid abscess-associated facial palsy in hemodialysis patients: clinical and surgical considerations. *Asian J Periodontics Orthod.* 2022;2:47-50. doi:10.51847/naDu2XfBBQ
49. Mei L, Jiang L. Factors influencing post-treatment relapse in diastema closure. *Asian J Periodontics Orthod.* 2022;2:51-5. doi:10.51847/5BKHDdH8UU
50. Badrov M, Perisin AS. A web-based survey in Croatia on knowledge and attitude of non-orthodontic specialists toward orthodontic treatment. *Asian J Periodontics Orthod.* 2022;2(1):67-73. doi:10.51847/cCt4tZqiCt
51. Bona C, Owusu A. Assessment of periodontal outcomes in anterior teeth following intrasulcular restorations using the BAIR technique. *Asian J Periodontics Orthod.* 2022;2(1):74-82. doi:10.51847/ZuMxBVFttu
52. Almodóvar AS. Associations between chronic disease, polypharmacy, and medication-related problems among Medicare beneficiaries. *J Manag Care Spec Pharm.* 2019;25(5):573-7.
53. Cinar F, Aslan FE. Impact of prolonged COVID-19 symptoms on patient quality of life. *Int J Soc Psychol Asp Healthc.* 2023;3(1):1-7. doi:10.51847/rYq0gZIX7G
54. Delcea C, Rad D, Gyorgy M, Runcan R, Breaz A, Gavrilă-Ardelean M, et al. Exploring Romanian resilience: A network analysis of coping mechanisms during the COVID-19 pandemic. *Int J Soc Psychol Asp Healthc.* 2023;3(1):13-20. doi:10.51847/HgPIOyOclr
55. Nebotova LV, Gasanov EAO, Makhsubova SH, Abdullayeva ZA, Shabaev SS, Kadiev IA. Current approaches and advances in the treatment of hemangiomas. *J Med Sci Interdiscip Res.* 2023;3(1):1-8. doi:10.51847/0kweYaHVIP
56. Guigoz Y, Vellas B. Nutritional status assessment in elderly using different screening tools. *J Med Sci Interdiscip Res.* 2023;3(1):9-19. doi:10.51847/JZjGw02xal
57. Tâlván E, Budişan L, Mohor CI, Grecu V, Berindan-Neagoe I, Cristea V, et al. Interconnected dynamics among inflammation, immunity, and cancer—from tumor suppression to tumor onset, promotion, and progression. *Arch Int J Cancer Allied Sci.* 2023;3(1):25-8. doi:10.51847/nbSWsJHJMZ
58. Kim S, Bae H, Kim H. A diagnostic and therapeutic dilemma: giant multifocal retroperitoneal dedifferentiated liposarcoma with dual heterologous components. *Arch Int J Cancer Allied Sci.* 2024;4(2):1-5. doi:10.51847/5JnC3jAkZz
59. Su Z, Qin M, Hu D. Impact of lecture versus group discussion-based ethics training on nurses' moral reasoning, distress, and sensitivity: A randomized clinical trial. *Asian J Ethics Health Med.* 2024;4:81-96. doi:10.51847/iBvPMrJSLE
60. Welman A, Chima MD. Respecting autonomy in African communities: traditional beliefs and challenges for informed consent in South Africa. *Asian J Ethics Health Med.* 2023;3(1):1-16. doi:10.51847/KmUs6uzoc1