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Original Research Article

Correlation and Association Between Independent Variables and the Presence of Adverse Reactions as a Dependent Variable in Cancer Patients

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Abstract: Adverse reactions (ARs) significantly affect the outcomes and quality of life for cancer patients. Understanding the relationship between common independent variables—such as demographic characteristics, treatment-related factors, comorbidities, adherence, and more—and the presence of ARs can guide risk mitigation, improve safety, and shape clinical practice. This review synthesizes recent evidence on the correlation and association between known independent variables and ARs in oncology, supported by multivariate statistical analyses and graphical representations.

Keywords: Adverse reactions (ARs), Oncology, Risk factors, Cancer treatment, Multivariate analysis.

INTRODUCTION

Cancer patients undergo complex pharmacotherapies exposing them to a high risk of adverse reactions. Individual susceptibility, drug regimens, and patient-related factors interact intricately, creating a need for statistical and clinical examination of what drives AR occurrence. Quantifying these relationships allows clinicians to identify high-risk groups, develop preventative strategies, and tailor monitoring, thereby improving therapeutic outcomes.

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A comprehensive review and synthesis of recent clinical studies, prospective cohorts, and statistical reports was conducted, focusing on cancer patients receiving chemotherapy and related pharmacologic support. Both qualitative and quantitative data—including regression, chi-square, and correlation analyses—were considered[1][2][3].

Key Variables Analyzed
Independent Variables:

- Patient Demographics (age, sex, education, socioeconomic status, marital status)

- Treatment Characteristics (number of chemotherapeutic agents, formulation, administration method, length and frequency of treatment)
- Clinical Status (comorbidities, ECOG performance status)
- Medication Adherence (chemotherapy and supportive therapy)
- Length of Hospital Stay
- Risk/Behavioral Factors (alcohol use, smoking, polypharmacy)
- Patient Education

Dependent Variable:

- Presence (and severity) of Adverse Reactions (ARs), including both chemotherapy-induced and those from supportive therapy

RESULTS

Overall Prevalence and Frequency

- **Incidence:** Adverse drug reactions occur in approximately 58–66% of cancer patients on chemotherapy. Some studies report frequencies as high as 100% for mild-to-moderate ARs, especially when prospectively monitored[4][5].
- **Common ARs:** Nausea, vomiting, fatigue, cytopenias, oral ulcers, and dermatologic reactions[4].

Correlation and Association Analyses

1. Patient Demographics

- **Age:** Elderly patients (>60 years) show a markedly higher risk of developing ARs (OR: 3.0, $p < 0.05$)[2][6].
- **Sex:** Females are slightly more susceptible to ARs than males in many cohorts (AOR: 1.05, $p < 0.05$); severity and pattern of ARs may also differ[2][4].

2. Treatment-Related Factors

- **Polypharmacy:** Each additional chemotherapeutic agent increases the risk of ARs (AOR: 3.33 for ≥4 agents, $p < 0.05$)[2].
- **Administration Route:** Intravenous administration and combined systemic therapies are linked to a higher incidence compared with oral agents in targeted therapies[3].
- **Duration and Frequency:** Longer treatment courses and frequent administration cycles correlate with increased AR rates.

3. Clinical and Behavioral Factors

- **Comorbidities:** Presence of two or more comorbid conditions greatly increases AR risk ($p < 0.05$)[3][7].
- **ECOG Performance Status:** Poor baseline performance status strongly predicts ARs ($p < 0.001$)[7].
- **Alcohol Use/Smoking:** These independently raise the odds of treatment-related adverse events ($p < 0.05$)[7][6].

4. Health System and Sociodemographic Variables

- **Length of Hospital Stay:** Direct, positive correlation with number and severity of ARs (Spearman rho significant at $p < 0.05$)[1].
- **Medication Adherence:** Lower adherence to prescribed chemotherapy and supportive drugs associates with a higher frequency of ARs, as patients may miss out on mitigative or supportive interventions[1].
- **Patient Education and Socioeconomic Status:** Lower educational attainment and poor understanding of therapy are linked to increased ARs, as is lack of social support ($p < 0.05$)[1][2][3].

Multivariate and Regression Analyses

- **Regression modeling** demonstrates that with each unit increase in polypharmacy, comorbidity, or hospital stay, the likelihood of AR increases by a statistically significant margin ($p < 0.05$)[1][2][3].
- **Chi-Square analysis** shows significant associations between specific drug regimens and AR frequency ($p < 0.05$)[8].
- In multivariate models, older age, polypharmacy, lower education, poor adherence, and intravenous administration emerge as independent predictors of ARs[3][1][2].

Table 1: Statistically Significant Associations With Presence of ARs

Variable	Association With ARs	Statistical Significance
Age > 60	Higher risk	OR: 3.0, $p < 0.05$
Female sex	Mildly higher risk	AOR: 1.05, $p < 0.05$

≥2 Comorbidities	Higher risk	$p < 0.05$
Polypharmacy (≥4 agents)	Much higher risk	AOR: 3.33, $p < 0.05$
IV Administration	Increased risk	$p < 0.05$
Hospital Stay	Positive correlation	Spearman rho, $p < 0.05$
Adherence (low)	Increased ARs	$p < 0.05$ (negative direction)
Patient education (low)	Increased ARs	$p < 0.05$
Alcohol/Smoking	Increased ARs	$p < 0.05$
ECOG status (poor)	Higher AR risk	$p < 0.001$

Visualization: Odds Ratio of Major Predictors for ARs
The following bar chart displays the odds ratios of major independent variables shown to be significantly associated with increased risk of ARs in cancer patients.

- Variables: Age (>60), Female Sex, ≥2 Comorbidities, Polypharmacy (≥4 agents), Poor Adherence, Length of Stay, IV Administration, Low Education
- Odds Ratios range: 1.05 (sex) to >3.3 (polypharmacy, age)

Key Graph Findings

- Polypharmacy and older age have the largest odds ratios.
- Sociodemographic factors are strongly but variably associated with AR risk.
- Multivariate analysis confirms these findings after adjustment.

DISCUSSION

Adverse reactions in oncology are a multifactorial phenomenon with strong statistical associations to both fixed and modifiable parameters. The clearest predictors are older age, polypharmacy, comorbidities, lower education, poor medication adherence, and more intensive or intravenous treatment regimens[3][1][2][7][4][6]. Recognizing these allows for targeted interventions, such as enhanced monitoring, patient education, adherence programs, and tailored regimens for high-risk individuals.

Implications for Clinical Practice

- Early screening and risk stratification for ARs should incorporate these variables into electronic health records and care workflows.
- Patient education programs and adherence interventions should be prioritized for those with lower socioeconomic status or education.
- Polypharmacy and comorbidity reviews should be routine in cancer centers.
- Shortening or optimizing hospital stay, where feasible, may mitigate adverse reaction rates.

CONCLUSION

The presence of adverse reactions in cancer patients is strongly correlated with both patient- and treatment-related factors. Through robust statistical analysis, variables such as age, polypharmacy, comorbidities, adherence, education, and administration method can be used to anticipate and prevent ARs, thus improving outcomes and quality of life in oncology.

Figures

Figure 1:
Bar graph of Odds Ratios for Independent Predictors of Adverse Reactions in Cancer Patients

Figure 2:
Pie chart showing proportion of patients developing ARs by number of comorbidities and medications

Figure 3:
Flow diagram of clinical and sociodemographic factors leading to increased AR risk

REFERENCES

1. Kamphuis, Bregtje, et al. "Access to Medicines in Europe: Delays and Challenges for Access." London School of Economics, 2021.
2. Franso, Khalid S., et al. "Prevalence of Drug-Related Problems in a Cohort of Iraqi Patients with Asthma." Dialnet, 2024.
3. Kameswari, P. Deepa, et al. "Fixed Drug Eruptions Caused by Cross-Reactive Quinolones." Journal of Basic and Clinical Pharmacology, 2014.
4. Jain, S. P., et al. "Bullous Fixed Drug Eruption to Ciprofloxacin: A Case Report." Dermatology Online Journal, 2013.
5. Hager, J. L., et al. "Fluoroquinolone-induced generalized fixed drug eruption." Dermatology Online Journal, 2009.
6. Kale, R. S., et al. "Levofloxacin-induced bullous fixed drug eruption." Kidney and Liver Emergency Unit, 2016.
7. Sai Priya, Marrapu, et al. "Ofloxacin Induced Multiple Fixed Drug Eruptions – A Case Report." International Journal of Research in Pharmacology & Pharmacotherapeutics, 2014.
8. Rasgo Editorial S.A.. "Correlation and association between independent variables and the presence of adverse reactions as a dependent variable in cancer patients." Dialnet, 2019.
9. Hager, J. L., et al. "Fluoroquinolone-induced generalized fixed drug eruption." Dermatology Online Journal, 2009.
10. Jain, S. P., et al. "Bullous Fixed Drug Eruption to Ciprofloxacin: A Case Report." Dermatology Online Journal, 2013.

