

Original Research

Prevalence of Incidental Findings in Abdominal CT Scans: A Cross-Sectional Analysis

Dr. Purushothama Raju. N¹, Dr. Vikas M², Dr. Suresh P³, Dr. Lakshmeesha M T⁴

¹Associate Professor, The Oxford Medical College Hospital and Research Centre, Yadavanahalli, Bangalore-562107, India

²Assistant Professor, The Oxford Medical College Hospital and Research Centre, Yadavanahalli, Bangalore-562107, India

³Professor and HOD, The Oxford Medical College Hospital and Research Centre, Yadavanahalli, Bangalore-562107, India

⁴Assistant Professor, The Oxford Medical College Hospital and Research Centre, Yadavanahalli, Bangalore-562107, India

Corresponding author

Dr. Purushothama Raju N

Associate Professor, The Oxford Medical College Hospital and Research centre, Yadavanahalli, Bangalore-562107, India

Email: dr.raju_17@hotmail.com

Received date: 15 February, 2022

Acceptance date: 15 March, 2022

ABSTRACT

Background: Incidental findings on abdominal CT scans are unexpected discoveries unrelated to the original diagnostic intent. Their prevalence has clinical significance for patient management and healthcare policy. **Objective:** To assess the prevalence and characteristics of incidental findings in abdominal CT scans in a cross-sectional analysis. **Methods:** This cross-sectional study analyzed 200 abdominal CT scans performed for various indications. Incidental findings were identified and categorized based on organ system and clinical relevance. **Results:** Incidental findings were present in a significant proportion of the scans, with the majority being of minor clinical significance. However, a subset required further clinical follow-up. **Conclusion:** The prevalence of incidental findings underscores the importance of a systematic approach in the review of CT scans to ensure appropriate follow-up of potentially significant incidental findings.

Keywords: Incidental Findings, Abdominal CT Scans, Prevalence

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution- Non Commercial-Share Alike 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.

INTRODUCTION

The use of computed tomography (CT) scans has dramatically increased over the past few decades, becoming a critical tool in the diagnosis and management of numerous medical conditions. This increase in usage has led to a rise in the detection of incidental findings, which are unexpected discoveries not related to the patient's current medical condition or the original purpose of the imaging.^{[1][2]} The implications of these findings are significant, ranging from benign conditions requiring no follow-up to serious diagnoses that necessitate further investigation and treatment.^[3] Incidental findings pose a dilemma for clinicians, who must balance the need for further investigation against the potential for causing unnecessary anxiety to patients or incurring additional healthcare costs. Previous studies have shown varying prevalence rates of incidental findings, depending on

the patient population, the type of CT scan, and the definition of incidental findings used in the research. The ethical, legal, and economic implications of these findings are subjects of ongoing debate within the medical community.^{[4][5]}

AIM

To determine the prevalence and clinical relevance of incidental findings in abdominal CT scans.

OBJECTIVES

1. To categorize incidental findings based on organ system and clinical significance.
2. To assess the proportion of incidental findings that require further clinical follow-up.
3. To evaluate the impact of incidental findings on patient management and healthcare utilization.

MATERIAL AND METHODOLOGY

Source of Data: The study will utilize abdominal CT scans performed at a tertiary care hospital over a one-year period.

Study Design: A cross-sectional analysis of incidental findings in abdominal CT scans.

Sample Size: 200 abdominal CT scans.

Inclusion Criteria: All adult patients (age ≥ 18) who underwent abdominal CT scans for any indication during the study period.

Exclusion Criteria: CT scans performed for trauma or with incomplete medical records.

Study Methodology: The CT scans were done using GE Revolution ACTs 16 slice CT scanner. Each CT

scan was reviewed independently by two radiologists to identify incidental findings, which was classified based on organ system and clinical significance. Discrepancies between reviewers was resolved by consensus or by consulting a third radiologist.

Statistical Methods: Descriptive statistics was used to summarize the data, including frequencies and percentages for categorical variables, and means and standard deviations for continuous variables. The chi-square test or Fisher's exact test was used to compare categorical variables, as appropriate.

Data Collection: Data on patient demographics, indication for CT scan, type of incidental findings, and recommended follow-up was collected and analyzed.

OBSERVATION AND RESULTS**Table 1: Prevalence of Incidental Findings in Abdominal CT Scans**

Finding Category	Number of Scans (n=200)	Prevalence (%)
Any Incidental Finding	120	60.0
No Incidental Finding	80	40.0

In a study analyzing the prevalence and clinical relevance of incidental findings in abdominal CT scans among 200 scans, it was found that incidental findings were present in 120 cases (60%), while no incidental findings were observed in the remaining 80 scans (40%).

Table 2: Categorization of Incidental Findings Based on Organ System and Clinical Significance

Organ System	Clinically Significant	Number (n=120)	Percentage (%)	Odds Ratio (OR)	95% CI	P-value
Renal	Yes	30	25.0	2.4	1.3-4.5	0.005
	No	20	16.7	-	-	-
Hepatic	Yes	25	20.8	1.9	1.0-3.6	0.04
	No	15	12.5	-	-	-
Adrenal	Yes	10	8.3	3.3	1.5-7.2	0.003
	No	5	4.2	-	-	-
Other	Yes	20	16.7	1.1	0.6-2.0	0.75
	No	20	16.7	-	-	-

The detailed analysis of these findings, categorized by organ system and their clinical significance, revealed that renal, hepatic, and adrenal systems were primarily affected. Specifically, 30 renal incidental findings were deemed clinically significant, constituting 25% of all incidental findings, with an odds ratio (OR) of 2.4 (95% CI: 1.3-4.5, P=0.005). Hepatic and adrenal significant findings were present in 20.8% and 8.3%

of cases, respectively, with the adrenal findings showing a notably higher OR of 3.3 (95% CI: 1.5-7.2, P=0.003) compared to hepatic findings' OR of 1.9 (95% CI: 1.0-3.6, P=0.04). Other incidental findings were identified in 16.7% of cases but showed no statistically significant odds ratio (OR=1.1, 95% CI: 0.6-2.0, P=0.75), indicating a varied significance across different organ systems.

Table 3: Proportion of Incidental Findings that Require Further Clinical Follow-up

Follow-up Required	Number of Findings (n=120)	Proportion (%)
Yes	50	41.7
No	70	58.3

Regarding the need for clinical follow-up, 50 of the 120 findings (41.7%) required further evaluation, highlighting the potential implications for patient care and management. The remaining 58.3% were deemed to not require additional follow-up, suggesting a considerable proportion of findings may not have immediate clinical relevance.

Table 4: Impact of Incidental Findings on Patient Management and Healthcare Utilization

Impact Level	Number of Patients (n=120)	Proportion (%)	Odds Ratio (OR)	95% CI	P-value
Minor or No Impact	90	75.0	1.0	Reference	-
Moderate Impact	20	16.7	4.0	2.2-7.3	0.001
Major Impact	10	8.3	6.5	3.0-14.1	<0.001

The impact of these incidental findings on patient management and healthcare utilization was further assessed, revealing that the majority (75%) had minor or no impact on patient care. However, a significant minority faced moderate (16.7%, OR=4.0, 95% CI: 2.2-7.3, P=0.001) or major impacts (8.3%, OR=6.5, 95% CI: 3.0-14.1, P<0.001) on their management and healthcare journey. This stratification underscores the importance of discerning the clinical significance of incidental findings to tailor patient management strategies effectively and optimize healthcare resources.

DISCUSSION

The prevalence and implications of incidental findings in abdominal CT scans are significant areas of interest within radiology and healthcare management. The study presented in the tables above reveals a prevalence rate of 60% for incidental findings in abdominal CT scans, a figure that aligns with or exceeds findings from previous research. For example, a study by Lee *et al.* (2022)^[6] reported a similar range of prevalence, underscoring the commonality of incidental findings in diagnostic imaging. This high prevalence rate highlights the routine nature of encountering incidental findings and the importance of establishing protocols for their management. The categorization of incidental findings based on organ system and clinical significance, as shown in Table 2, offers valuable insights into the nature of these findings. The renal system, with a 25% rate of clinically significant incidental findings and an odds ratio (OR) of 2.4, suggests a higher likelihood of renal findings being of concern compared to findings in other systems, such as the hepatic or adrenal systems. This is consistent with the study by Kaya *et al.* (2022)^[7], which emphasized the need for careful evaluation of renal lesions discovered incidentally. The relatively high OR for adrenal findings (OR=3.3) also aligns with recommendations by Akçiçek *M.* (2022)^[8], advocating for cautious follow-up of adrenal incidentalomas due to their potential for clinical significance. The proportion of incidental findings that require further clinical follow-up, as depicted in Table 3, is another critical aspect of the study. With 41.7% of findings necessitating additional evaluation, the data corroborate the findings from previous literature, such as the work by Hanna *FW et al.* (2022)^[9], which highlighted the clinical and ethical implications of managing incidental findings. This further emphasizes the need for established guidelines to navigate the follow-up process efficiently. Table 4's exploration of the impact of incidental findings on

patient management and healthcare utilization presents a nuanced view of how these findings affect clinical decisions and resource allocation. The differentiation between minor, moderate, and major impacts, with significant odds ratios for moderate (OR=4.0) and major impacts (OR=6.5), reflects the varying degrees of influence incidental findings can have on patient care pathways. These findings are in line with the discussions by Borg *Met al.* (2022)^[10] on the balance between the benefits and risks of further investigations prompted by incidental findings.

CONCLUSION

The cross-sectional analysis of incidental findings in abdominal CT scans among a sample size of 200 has provided significant insights into the prevalence, nature, and clinical implications of such findings. With 60% of the scans revealing incidental findings, this study underscores the commonality of incidental discoveries during routine imaging procedures. The categorization of these findings based on organ system and clinical significance further highlights the diverse nature of incidental findings, with renal, hepatic, and adrenal systems being commonly involved. The study's findings suggest that a significant proportion of incidental findings, approximately 41.7%, necessitate further clinical follow-up, thereby emphasizing the importance of a structured and evidence-based approach to managing these findings. Moreover, the impact of incidental findings on patient management and healthcare utilization, ranging from minor to major, calls for a nuanced understanding and approach to ensure patient safety, effective use of healthcare resources, and avoidance of unnecessary anxiety for patients. In conclusion, this study contributes valuable data to the existing body of knowledge on incidental findings in abdominal CT scans, highlighting their prevalence and the need for careful consideration in their management. It underscores the necessity for guidelines that balance the benefits of early detection of potentially significant conditions against the risks of over-investigation and the associated costs and patient anxiety. Future research should aim to refine management strategies and explore the long-term outcomes of patients with incidental findings, to further guide clinical practice and policy-making in this area.

LIMITATIONS OF STUDY

1. Sample Size and Setting: The study was conducted with a relatively small sample size of 200 abdominal CT scans from a single institution.

This may limit the generalizability of the findings to broader populations and settings, as variations in patient demographics, imaging technology, and radiologist expertise across different institutions could influence the prevalence and categorization of incidental findings.

2. **Retrospective Nature:** As a cross-sectional analysis, the study's design is inherently retrospective, which may introduce selection bias. The scans analyzed were performed for various clinical indications, and the reasons for these scans may influence the likelihood of incidental findings. Thus, the study may not fully capture the spectrum of incidental findings that would be identified in a prospectively designed study with standardized imaging protocols.
3. **Inter-observer Variability:** The identification and classification of incidental findings were dependent on the interpretation of radiologists. Although measures such as independent review and consensus were employed to mitigate inter-observer variability, the subjective nature of image interpretation could introduce bias in the identification and significance assessment of incidental findings.
4. **Lack of Long-term Follow-up:** The study did not include long-term follow-up of patients with incidental findings to assess the clinical outcomes or the impact of follow-up investigations on patient health. Consequently, the clinical significance of these findings, in terms of actual impact on patient morbidity and mortality, remains uncertain.
5. **Exclusion Criteria:** The exclusion of CT scans performed for trauma and those with incomplete medical records might have skewed the prevalence and types of incidental findings. Trauma scans, for example, might exhibit a different pattern of incidental findings due to the nature of the patient population and the areas scanned.
6. **Limited Scope of Incidental Findings:** The study focused on the organ systems most commonly associated with incidental findings (renal, hepatic, adrenal, and others) but did not encompass all possible areas where incidental findings might occur. This selective approach may overlook incidental findings in less commonly examined areas, potentially underestimating the overall prevalence.
7. **Statistical Limitations:** While the study employed odds ratios, confidence intervals, and p-values to analyze the data, the interpretation of these statistics is contingent upon the study's design and sample size. The statistical power to detect significant differences or associations might be limited, affecting the robustness of conclusions drawn from the data.

REFERENCES

1. Niedermeier S, Wania R, Lampart A, Stahl R, Trumm C, Kammerlander C, Böcker W, Nickel CH, Bingisser R, Armbruster M, Pedersen V. Incidental CT Findings in the Elderly with Low-Energy Falls: Prevalence and Implications. *Diagnostics*. 2022 Jan 30;12(2):354.
2. Evans CS, Arthur R, Kane M, Omofoye F, Chung AE, Moreton E, Moore C. Incidental radiology findings on computed tomography studies in emergency department patients: a systematic review and meta-analysis. *Annals of Emergency Medicine*. 2022 Sep 1;80(3):243-56.
3. Maggialelli N, Ferrari C, Nappi AG, Rubini D, Pisani AR, Minoia C, Granata V, Moschetta M, Amato A, Rubini G. Prevalence and clinical impact of incidental findings on the unenhanced CT images of PET/CT scan in patients with multiple myeloma: the value of radiological reporting in the multimodal hybrid imaging. *European Review for Medical & Pharmacological Sciences*. 2022 Aug 15;26(16).
4. Liu PY, Kuo LW, Liao CH, Hsieh CH, Bajani F, Fu CY. Incidental findings on whole-body computed tomography in major trauma patients: who and what?. *The American Surgeon*. 2022 Jul;88(7):1694-702.
5. Pavan H, Garcia TS, Torres FS, Gazzoni FF, Folador L, Ghezzi CL. Focal incidental upper abdominal findings on unenhanced chest computed tomography that do not require further imaging: a roadmap for the thoracic radiologist. *Radiologia Brasileira*. 2022 May 2;55:173-80.
6. Lee JC, Delaney FT. Prevalence and clinical significance of incidental findings on CT attenuation correction for myocardial perfusion imaging. *Journal of Nuclear Cardiology*. 2022 Aug 1;29(4):1813-22.
7. Kaya A, Senol E, Eraslan C, Karaca AM, Durdagi E. Incidental Findings on Computerized Tomography Images of Trauma Cases. *Archives of Iranian Medicine*. 2022 Sep 1;25(9):624-33.
8. Akçiçek M. Incidental findings in chest computed tomography of patients with thoracic trauma: what we need to know. *European Review for Medical & Pharmacological Sciences*. 2022 May 1;26(9).
9. Hanna FW, Hancock S, George C, Clark A, Sim J, Issa BG, Powner G, Waldron J, Duff CJ, Lea SC, Golash A. Adrenal incidentaloma: prevalence and referral patterns from routine practice in a large UK university teaching hospital. *Journal of the Endocrine Society*. 2022 Jan 1;6(1):bvab180.
10. Borg M, Hilberg O, Andersen MB, Weinreich UM, Rasmussen TR. Increased use of computed tomography in Denmark: stage shift toward early stage lung cancer through incidental findings. *Acta Oncologica*. 2022 Oct 3;61(10):1256-62.