

**MISCONCEPTIONS ABOUT HUMAN EXCRETION HELD BY JUNIOR  
HIGH SCHOOL STUDENTS IDENTIFIED USING A FOUR-TIER  
DIAGNOSTIC TEST**

**RESEARCH PAPER**

Submitted as Requirement to Obtain Degree of *Sarjana Pendidikan* in  
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**INTERNATIONAL PROGRAM ON SCIENCE EDUCATION  
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UNIVERSITAS PENDIDIKAN INDONESIA**

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# **Misconceptions About Human Excretion Held by Junior High School Students Identified Using a Four-Tier Diagnostic Test**

Oleh  
Sri Rahma Abdulloh

Skripsi ini diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan pada Program Studi International Program on Science Education (IPSE) Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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**APPROVAL SHEET**

**MISCONCEPTIONS ABOUT HUMAN EXCRETION HELD BY JUNIOR  
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## DECLARATION

I do hereby declare that every aspect written in this research paper entitled **“Misconceptions About Human Excretion Held by Junior High School Students Identified Using a Four-Tier Diagnostic Test”** authentically results from my ideas, efforts, and work without copying or plagiarizing from other papers. The theories, finding of experts, opinions, and others that are covered in this paper have been quoted or referenced based on the scientific code from UPI and under scientific ethics that apply in scholarly society. This declaration is created truthfully and consciously. Unless it is eventually considered to be a violation of scientific ethics, or whether there is a claim of any others towards the authenticity of this research paper, hence I am willing to take responsibility and accept academic sanctions corresponding to the rules.

Bandung, August 2023

Declarant,



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# MISCONCEPTIONS ABOUT HUMAN EXCRETION HELD BY JUNIOR HIGH SCHOOL STUDENTS IDENTIFIED USING A FOUR-TIER DIAGNOSTIC TEST

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## ABSTRACT

Human excretion is one of biology topic that is challenging for students to learn; this can lead to misconceptions. Previous research at the middle school level has been developed through two-tier and three-tier multiple-choice tests. However, there is limited research using a four-level multiple-choice test on this topic. This study aims to map students' conceptions and analyze common misconceptions that occur among middle school students regarding the human excretion. The study employs quantitative research using a survey (cross-sectional research design) design. The sample consists of 127 eighth-grade students from a middle schools in Bogor; selected through convenience sampling technique. Data were collected from a four-tier multiple-choice test and interviews. The research results show that students' conceptions of the human excretion topic falls into several categories: misconception (M) 29.7%, lack of knowledge (LK) 27.4%, scientific knowledge (SK) 23.3%, false positive (FP) 11.8%, and false negative (FN) 7.8%. The findings reveal that students experience misconceptions in all subtopics related to the human excretion, with nine out of ten tested concepts showing significant misconceptions ( $> 10\%$ ). Most students hold misconceptions about sweating and body thermoregulation (70.0%) and the structure and function of skin in excretory system (48.8%). Therefore, this implies the need for improved teaching methodologies and actively involving students in discussions about common misconceptions related to human excretion during the learning process to assist students in constructing a more comprehensive scientific understanding while eliminating misconceptions related to the topic of human excretion.

**Keywords:** Four-tier Test, Human Excretion, Misconceptions, Students' Conceptions



# MISKONSEPSI MENGENAI SISTEM EKSKRESI MANUSIA PADA SISWA SEKOLAH MENENGAH PERTAMA DIIDENTIFIKASI MENGGUNAKAN TES DIAGNOSTIK EMPAT TINGKAT

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## ABSTRAK

Ekskresi pada manusia merupakan salah satu materi biologi yang cukup memiliki tingkat kesulitan tinggi, hal ini memungkinkan terjadinya miskonsepsi pada siswa dalam mempelajarinya. Penelitian mengenai materi ini pada jenjang smp sebelumnya telah dikembangkan menggunakan tes pilihan ganda dua tingkat dan tiga tingkat. Namun, penelitian menggunakan tes pilihan ganda empat tingkat mengenai topik ini pada jenjang smp masih jarang dilakukan. Penelitian ini bertujuan untuk memetakan pemahaman siswa dan menganalisis miskonsepsi umum yang terjadi pada siswa smp mengenai materi sistem ekskresi pada manusia. Penelitian ini merupakan penelitian kuantitatif dengan jenis survei (*cross-sectional research design*). Sampel penelitian ini yaitu 127 siswa kelas VIII SMP di Bogor yang ditentukan menggunakan teknik *convenience sampling*. Data dikumpulkan melalui tes dalam bentuk pilihan ganda dengan empat tingkat dan wawancara. Hasil penelitian menunjukkan bahwa pemahaman siswa pada materi sistem ekskresi manusia termasuk ke dalam kategori *misconception* (M) sebanyak 29,7%, *lack of knowledge* (LK) sebanyak 27,4%, *scientific knowledge* (SK) sebanyak 23,3%, *false positive* (FP) sebanyak 11,8%, dan *false negative* (FN) sebanyak 7,8%. Temuan penelitian menunjukkan bahwa siswa mengalami miskonsepsi pada semua sub bab sistem ekskresi manusia, dengan sembilan dari sepuluh konsep yang diujikan mengalami miskonsepsi yang signifikan ( $> 10\%$ ). Siswa kebanyakan mengalami miskonsepsi pada konsep berkeringat guna termoregulasi tubuh (70,0%) dan struktur dan fungsi kulit dalam sistem ekskresi (48,8%). Hal ini menunjukkan perlunya meningkatkan metodologi pengajaran dan secara aktif melibatkan siswa dalam diskusi tentang kesalahpahaman umum mengenai ekskresi manusia selama proses belajar untuk membantu siswa membangun pemahaman ilmiah yang lebih komprehensif sekaligus menghilangkan kesalahpahaman terkait topik ekskresi manusia.

**Kata Kunci:** Ekskresi Pada Manusia, Konsepsi Siswa, Miskonsepsi, Tes Pilihan Ganda Empat Tingkat

## TABLE OF CONTENTS

APPROVAL SHEET .....	i
DECLARATION .....	ii
ACKNOWLEDGEMENTS .....	iii
ABSTRACT.....	vi
TABLE OF CONTENTS .....	viii
LIST OF TABLES .....	x
LIST OF FIGURES.....	xi
LIST OF APPENDICES .....	xii
CHAPTER I INTRODUCTION .....	1
1.1 Research Background.....	1
1.2 Research Problem.....	4
1.3 Operational Definition.....	5
1.4 Limitation of Problem .....	5
1.5 Research Objective .....	6
1.6 Research Benefit.....	6
1.7 Organizational of Research Paper .....	6
CHAPTER II LITERATURE REVIEW .....	8
2.1 Students' Understanding of Scientific Concept .....	8
2.2 Students' Misconceptions.....	9
2.3 Four-Tier Diagnostic Test .....	11
2.4 Content Analysis of Human Excretion.....	13
CHAPTER III RESEARCH METHODOLOGY .....	24
3.1 Research Design .....	24
3.2 Participant.....	24
3.3 Research Instrument .....	25
3.3.1 Validity Test .....	27
3.3.2 Reliability Test.....	33
3.3.3 Discriminating Power .....	33
3.3.4 Difficulty Level.....	35
3.3.5 Interviews.....	37

3.4 Research Procedure .....	37
3.5 Data Analysis.....	40
CHAPTER IV RESULT AND DISCUSSION.....	42
4.1 Profile of Students’ Conceptions of Human Excretion.....	42
4.2 Common Students’ Misconceptions on Human Excretion Topics.....	50
4.2.1 Common Students’ Misconceptions About Structure and Function of Human Excretory System Subtopic.....	51
4.2.2 Common Students’ Misconceptions About Diseases and Disorders of the Human Excretory System Subtopic .....	54
4.2.3 Common Students’ Misconceptions About Lifestyle to Maintain the Health of the Excretory System Subtopic.....	57
CHAPTER V CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS .....	60
5.1 Conclusions .....	60
5.2 Implications .....	60
5.3 Recommendations .....	61
REFERENCES.....	62
APPENDICES.....	77
AUTOBIOGRAPHY .....	123

## LIST OF TABLES

Table 2.1	Students' Conceptions Level .....	9
Table 2.2	Curriculum Analysis on Human Excretion Topic .....	13
Table 2.3	Diseases and Disorders of Excretory Organs .....	23
Table 3.1	First Draft Question Distribution of Human Excretion Topics .....	27
Table 3.2	Validity Index Rating Scale.....	28
Table 3.3	Recapitulation of Content Validity Test Results.....	29
Table 3.4	Recapitulation Result of Validity Construct Test .....	30
Table 3.5	False Positive and False Negative Validity Analysis .....	32
Table 3.6	The Result of Reliability Test.....	33
Table 3.7	The Discriminating Power Classification .....	34
Table 3.8	Discriminating Power Result Analysis.....	34
Table 3.9	The Difficulty Level Classification.....	36
Table 3.10	Difficulty Level Result Analysis .....	36
Table 3.11	Combination Response and Decision of Four-Tier Test .....	40
Table 4.1	Percentages of Students' Conceptions About Structure and Function of Human Excretory System Subtopic.....	44
Table 4.2	Percentages of Students' Conceptions About Diseases and Disorders of the Human Excretory System Subtopic.....	45
Table 4.3	Percentages of Students' Conceptions About Lifestyle to Maintain the Health of the Excretory System Subtopic .....	48

## LIST OF FIGURES

Figure 2.1 Waste Substances in the Human Body and Organs Involved in the Excretion Process .....	15
Figure 2.2 Structure of Kidney .....	16
Figure 2.3 Structure of Nephron.....	17
Figure 2.4 Malpighian Body Structure and Filtration Process .....	18
Figure 2.5 Reabsorption Process .....	19
Figure 2.6 The Exchange of Gas in Alveolus .....	20
Figure 2.7 The Structure of Human Liver .....	21
Figure 2.8 Red Blood Cells Breakdown Process Chart.....	21
Figure 2.9 Illustration of Human Skin.....	22
Figure 3.1 Research Procedure Flowchart.....	39
Figure 4.1 The Average Percentages of Students' Conceptions Levels About Human Excretion from All Questions Investigated .....	42
Figure 4.2 Question Number 9 .....	47
Figure 4.3 Question Number 15 .....	47
Figure 4.4 Percentages of Students' Misconceptions for Each Concept.....	50
Figure 4.5 Question Number 7 .....	51
Figure 4.6 Question Number 8 .....	52
Figure 4.7 Question Number 6 .....	53
Figure 4.8 Question Number 16 .....	54
Figure 4.9 Question Number 14 .....	56
Figure 4.10 Question Number 10 .....	57

## LIST OF APPENDICES

Appendix A.1	Final Instrument of Four-Tier Test on Human Excretion Topic	78
Appendix A.2	Critical Values of the Product Moment Correlation Coefficient	93
Appendix A.3	Expert Judgement Form	94
Appendix A.4	Validity Test Result	97
Appendix A.5	Reliability Test Result	99
Appendix B.1	Online Instrument	101
Appendix B.2	Documentation of Data Collection	102
Appendix C.1	Permission Letter from Faculty	104
Appendix C.2	Completion Letter of Research from School	106
Appendix C.3	Approval from Supervisor	107
Appendix C.4	Proof of Journal Submission	108
Appendix D.1	Recapitulation of Students' Answers of Four-Tier Test	110
Appendix D.2	Recapitulation of Students' Answers Code	113
Appendix D.3	Recapitulation of Students Category	116
Appendix D.4	The Analysis of Common Misconceptions Regarding All Questions	119

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