

ILLEGIBLE HANDWRITING AND PRELIMINARY EXAM TEST SCORES IN MEDICAL UNDERGRADUATES

Anjalee Chiwhane¹, Anuj Verma^{2*}, Swarupa Chakole³

¹Professor, Dept. of Medicine Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi Wardha Maharashtra-442001

²Assistant Professor, Dept. of Medicine Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi Wardha Maharashtra-442001

³Professor, Dept. of Community Medicine Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi Wardha Maharashtra-442001
Email: *anjuk.9c@gmail.com

Received: 08.05.2020

Revised: 06.06.2020

Accepted: 30.06.2020

Abstract

Introduction: It is an observation by examiners evaluating written test papers that it is difficult to decipher the meaning of written answers if the handwriting is illegible. Hence formative assessment of written answer sheets show that the students having illegible handwriting score poorly. However it is extremely essential to understand whether an illegible handwriting does invite poor test scores. **Aim and Objective:** To observe the effect of illegible handwriting on test scores in written preliminary examination. Reading and assessing test papers for illegible handwriting. Comparing answer sheets with illegible handwriting with that of the test scores and of written and practical exam test scores with that of legible and illegible handwriting. **Study Methods:** 170 out of 200 medical undergraduates from medicine teaching institute underwent this cross sectional study for assessment of handwriting and co relation of handwriting legibility with written and practical test scores. **Results:** Its a common belief by evaluators that medical undergraduates score poorly in examinations due to the illegible handwriting and the students have been advised to improve their handwriting in order to score more in examinations. This study however brought out some different observations contrary to the popular belief. All the students with illegible handwriting performed the same as those students with legible handwriting with no difference in the test scores. Only correlation was those who scored poorly in written and practical examinations were low achievers. **Conclusion:** This study concludes that legibility of the handwriting is not the only factor affecting test scores and there may be other reasons for poor performance in examination by medical undergraduates.

Keywords--illegible handwriting, Medical graduate, means score

© 2020 by Advance Scientific Research. This is an open-access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)
DOI: <http://dx.doi.org/10.31838/jcr.07.08.220>

INTRODUCTION

It is an observation by examiners evaluating written test papers that it is difficult to decipher the meaning of written answers if the handwriting is illegible. Hence formative assessment of written answer sheets show that the students having illegible handwriting score poorly. However it is extremely essential to understand whether an illegible handwriting does invite poor test scores. If so then there is need to inculcate good handwriting practices in those with illegible handwriting. According to Professor Dinehart from Florida University, the academic achievement by those with better penmanship is seen both reading and math and reflects on test scores.

There is very few relevant literature on handwriting and test scores. An extensive search on the google search or pub med showed that there were no studies on illegible handwriting and test scores in medical students as participants. An article in the newspaper 'The Guardian' Monday 22nd August 2016 stated Poor handwriting 'may hinder students' chances of exam success'. This was commented by examiners who screened written examination sheets of students who appeared for GCSE. According to another article by Independent UK, the Cambridge University is considering scrapping of written exams due to deteriorating handwriting in students. An article in Telegraph 16th March 2018, stated that Pupils 'losing marks in exams due to poor handwriting'.

The study of Medicine is an extremely difficult, challenging and rewarding education dealing directly with human lives. The traditional pattern of examination since long has been written

and practical examinations as the methods of assessment. Whether the assessment of written answers is affected by the legibility of the students handwriting is a matter of curiosity. There have been exam guideline policies on handwriting for example by Queen Mary University London. Numerous studies are available on motor function and handwriting in pediatric age group (1,2). However there are many studies conducted on handwriting and test scores in school going children or IELTS scores (3,4) but not a single study on handwriting affecting test scores in medical undergraduates.

In the Indian Medical universities all over India there never was any issue raised on poor handwriting by the examiners. However it may be in the interests of the students to keep the handwriting clear in the written examinations. Although there have been many complaints in the past on poor handwriting amongst doctors writing prescriptions leading to difficulty in honoring prescriptions by the pharmacists, demanding intervention by regulatory authority. This led to the measures adopted by the Medical Council of India asking doctors to type the prescription in capital letters in order to maintain clarity of the prescription. Thus due to the paucity of any available studies on test scores being affected by legibility of handwriting amongst undergraduate students, this study was conducted in the medical undergraduates in this institute.

AIM

To observe the effect of illegible handwriting on test scores in written preliminary examination.

Objectives

- 1) Reading and assessing test papers for illegible handwriting.
- 2) Comparing answer sheets with illegible handwriting with that of the test scores.
- 3) Comparison of written and practical exam test scores with that of legible and illegible handwriting.

MATERIAL AND METHOD

Study design: Cross sectional
 Study setting: Jawaharlal Nehru Medical College MCI NODAL CENTRE and examination cell of DMIMS, Sawangi Wardha.
 Study duration: 6 MONTHS. October -March 2017- prelim exams
 Study participants: final year MBBS students
 Inclusion: All third year MBBS students who have appeared for preliminary examinations.
 Exclusion: Repeater and absentee students of the same batch.
 Sample size:150
 Sampling method: Convenient
 Ethical consideration: Student and examination cell authority and institution ethics committee.
 Operational definitions: As defined by oxford dictionary handwriting is using hand to write with pencil,pen or any other instrument. Illegible means not clear enough to be read.

DATA COLLECTION METHOD

How the answer sheets were evaluated.

Paper setting is online by appointed senior faculty from department of medicine who are given a secure password to open the paper setting site online and the paper setting is carried out under supervision of examination cell authority as well as is under security camera. There is stored question bank from which the questions are selected and paper is set according to requirement of primary and secondary template.

There are two papers, paper 1 and 2 in medicine covering all topics. All questions are formatted under must know, desired to know and nice to know and there are level 1 and level 2 questions.

There is an answer Bank that helps to know if the answers are correct.

The format of answer sheet is divided in following: Section A having MCQ. There are marks for the correct answer chosen.

Section B has Basic answer questions (BAQ) with marks according to the number of correct answers expected. Short answer questions (SAQ) are evaluated for the correct answers appropriate for the question asked.

Observations and Results

Table 1. Distribution of students according to type of handwriting(n=170)

Type of handwriting	No of students	Percentage(%)
legible	77	45.29
illegible	93	54.71
Total	170	100

There are almost equal number of students with legible and illegible handwriting.

Table 2. Distribution of written and practical marks according to type of handwriting

	Written Average	Practical Average
Legible Handwriting	133.25±21.23 (55%)	121.40±15.06 (50%)
Illegible Handwriting	127.41±23.86 (52%)	125.51±15.66 (52%)
t-value	1.66	1.73
p-value	0.097,NS	0.085,NS

The distribution of marks was same for both types of handwriting with insignificant p value.

Section C has long answer question(LAQ) where marks are allotted for each sub question. The correct answers are scored accordingly. The written paper and practical assessment carries total of 480 marks.

Definition of Achievers according to scores

High achievers are with scores in the 76 to 100%.
 Mid achievers are with scores between 50 to 75%.
 Low achievers are those who scored below 50%

How the verifiers assess for illegible handwriting

Senior faculty from department of medicine was appointed to verify the answer sheets. None of the verifiers had set the question paper. The principle investigator did not verify the answer sheets.

A written permission was sought by principal investigator from concerned authority of examination cell to get the answer sheets of paper 1 and paper 2 of subject of medicine written by Third year MBBS students who had appeared for the written preliminary examination. Each verifier was notified and appointed separately to assess the answer sheets for illegible handwriting which was done at the examination cell under supervision of the authority.

The examiner was blinded to name and roll number of the student. The answer sheet scores for each and every answer that was noted was hidden to avoid bias.

All the evaluated theory answer sheets of both paper 1 and paper 2 of subject of medicine written preliminary examinations was assessed by each verifier.

Each verifier had assessed the answer sheets individually for illegible handwriting and pencil marked the sheet for later identification by the principal investigator. The principal investigator then would identify the roll numbers of the students verified for illegible handwriting and entered the names and roll number of these students and their test scores in the data collection form.

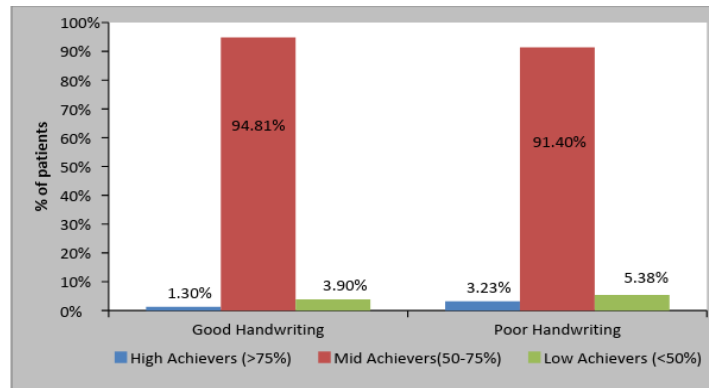
The verifiers were not the examiners for subsequently held practical examinations.

The principal investigator entered the practical scores of the students with illegible handwriting in data collection form.

Table 3. Distribution of students according to grade of scores

	High Achievers (>76%)	Mid Achievers (50-75%)	Low Achievers (<50%)
Legible Handwriting	1(1.30%)	73(94.81%)	3(3.90%)
Illegible Handwriting	3(3.23%)	85(91.40%)	5(5.38%)
Total	4(2.35%)	158(92.94%)	8(4.71%)
χ^2 -value	0.91,p-value=0.63,NS,p>0.05		

The table shows that the students with both the legible and illegible handwriting were mid achievers.



Graph 1. Distribution of students according to grade of scores

Table 4. Mean written scores of students with legible and those with illegible handwriting.

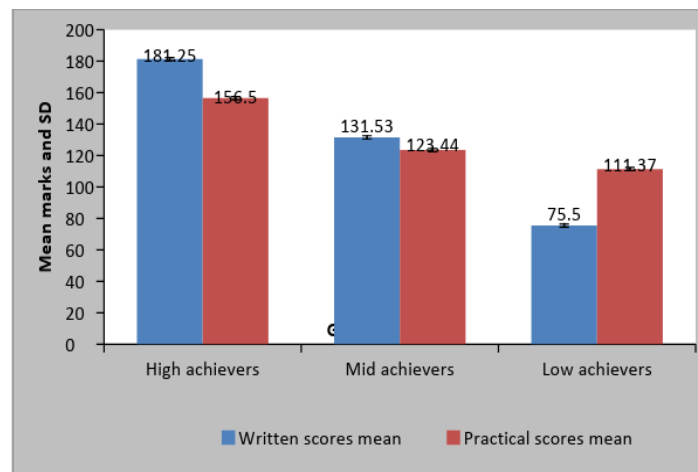
Type of handwriting	No of students	Mean of written and practical scores	t-value
Legible handwriting	77	285.77±28.61(59%)	0.04 p=0.96,NS
Illegible handwriting	93	285.58±33.98(59%)	

The above table shows that mean written and practical scores were the same in both legible and illegible handwriting.

Table 5. Mean written and practical scores according to grades

Grade of scores	Written scores mean	Practical scores mean
High achievers	181.25±6.34	156.50±5.06
Mid achievers	131.53±17.55	123.44±14.85
Low achievers	75.50±26.60	111.37±6.69
F-value	54.09	13.18
p-value	0.0001,S	0.0001,S

This table shows that high and mid achievers had better mean written and practical scores.



Graph 2. Scores according to written and practical marks

DISCUSSION

There has been great concern on poor performance of medical undergraduates in examinations one of the reasons being illegible handwriting as one of the cause affecting the performance. Globally there has been concern on handwriting affecting test scores in graduate examinations. The inability to screen a written answer sheet with illegible handwriting has raised concern amongst the universities in UK and USA. This has however not been so far observed by any university in India. The medical education in India is undergoing change and Medical education technology has made remarkable changes in medical education. Though traditional teaching goes hand in hand with modern teaching methods there have been many changes in assessment of the undergraduates. In this study conducted on medical undergraduates having appeared for final year MBBS preliminary examinations it was observed that there were less number of students with legible handwriting (45%). There were more number of students having scored between 50 to 75% and there was however no difference in either the written or practical scores when compared legible or illegible handwriting. This observation has proved that only handwriting has not influenced the test scores. However a statistically significant variation was seen amongst the different grades and written and practical scores. This study concluded that the in medical undergraduate students scores in preliminary exams were unaffected by handwriting.

CONCLUSION

There is no effect of handwriting on test scores as is observed in this study. The reason could be that assessment of undergraduates is a manifold process involving many factors and not just that based on the handwriting. There are practical assessment marks that also influence the test scores. However students can be advised to maintain clarity of handwriting during written examinations.

ANNEXURES 1

Informed consent form

Informed Consent Form DEPARTMENT OF MEDICINE JNMC, DMIMS Sawangi Meghe, Wardha Students Effect of illegible handwriting on test scores in the written preliminary Final MBBS examinations.

Students initials: Principal investigator: Dr. Anjalee Chiwhane. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s) I confirm that I have understood the information given to me for the above study and have had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my rights being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose. I agree to take part in the above study.

ANNEXURE 2

Master chart

NAME	VERIFIER1	VERIFIER2	VERIFIER3	WRITTEN	WRITTEN	PRACTICAL	vv
1	Y	y		144		117	30
3				152		115	30
4						A	
6	Y		Y	129	27	101	30
7				139		117	30
8	Y	y		107		102	25
9				109	52	111	35
10				183		150	35
11				152		140	30
12				127		115	25
13	Y	y	Y	158		107	25
14				168		141	28
15	Y	y		177		136	30
16	Y			145		114	30
18	Y		Y	121		107	25
19	Y		Y	94		108	25
20				124		116	30
21				133		111	30
23	Y	y		181		129	35

LIMITATIONS

The study was done in medical undergraduates appearing for preliminary examinations during which the students may not take these examination seriously. Also the small sample size was another limitation. The need for protocol for verification of handwriting on a scale of zero to ten could have helped in better assessment.

ACKNOWLEDGEMENTS

I would at the outset wish to thank Dr Mrs Vagha for offering us guidance. I also wish to thank Dr Tripti Waghmare my guide to have been there for her valuable guidance and being there during completion of this project. I am grateful to Dr Babar for giving his valuable time in helping in the statistics and Mrs Pakhan from examination cell, for allowing me to access the written examination papers. Lastly I thank all the faculty from SHPER JNMC, sawangi for giving me this opportunity to be part of the Advanced course in medical education.

REFERENCES

1. Alhusaini AA, Melam GR, Buragadda S. Short-term sensorimotor-based intervention for handwriting performance in elementary school children. *Pediatr Int.* 2016 Nov;58(11):1118-1123. doi: 10.1111/ped.13004. Epub 2016 Jul 7.
2. Burger DK, McCluskey A. Australian norms for handwriting years. *Speed in healthy adults aged 60-99 Aust Occup Ther J.* 2011 Oct; 58(5):355-63. doi: 10.1111/j.1440-1630.2011.00955.x
3. Stephen G. Rich CORRELATION OF TEST-SCORES IN CHEMISTRY AND HANDWRITING First published: June 1923 DOI: 10.1111/j.1949-8594.1923.tb07335.x

ILLEGIBLE HANDWRITING AND PRELIMINARY EXAM TEST SCORES IN MEDICAL UNDERGRADUATES

24	Y			118		107	30
25	Y			138		111	30
27				174		161	35
28	Y	y		132		137	30
29				148		108	30
30	Y		Y	A		A	
31				149		120	30
32	Y		Y	123		104	30
33	Y		Y	A		A	A
34				112		105	35
35	Y		Y	147		122	30
36	Y	y		128		152	35
37	Y	y		125		132	30
38				111		112	30
39	Y	y		135		110	30
40	Y	y		123		118	30
41	Y	y		122		105	30
42				132		121	30
43	Y		Y	145		113	30
44	Y		Y	133		105	30
45	Y		Y	129		124	30
46	Y	y		115		132	30
47	Y	y		147		126	30
48	Y	y		46		125	30
49				125		120	32
50	Y	y		120		115	30
51	Y	y		124		110	32
52	Y	y		135		110	30
53				179		160	35
54	Y		Y	143		110	32
55	Y		Y	114		110	30
56	Y	y	Y	123		139	30
57	Y	y		135		138	30
58	Y	y	Y	130		110	30
59	Y	y	Y	152		128	32
60				148		109	30
61	Y	y	Y	A		A	A
62		y	Y	136		117	30
63	Y	y	Y	146		130	32
65				123		112	32
66	Y		Y	132		113	32
67				103		115	30
68				125		136	32
69	Y		Y	131		140	32
70				36		110	30
72				92		127	30
73	Y			189		155	30
74	Y			A		A	A
75	Y			155		126	35
76				127		158	35
77				107		114	30
78		Y	Y	111		A	A
79				153		120	35
80		Y	Y	151		162	30
81				125		113	35
82		Y	Y	85		110	35
83		Y		112		114	35
84		Y	Y	87		118	35
87	Y			A		A	A
88				A		A	A
89				134		122	35
90				102		146	35
91		Y	Y	157		140	35
92				162		124	35
93				152		147	35
94		Y	Y	133		161	35
97				123		110	35

ILLEGIBLE HANDWRITING AND PRELIMINARY EXAM TEST SCORES IN MEDICAL UNDERGRADUATES

99				139		122	35
100				116		102	35
101				132		141	35
103				110		110	36
104				122		115	30
105				122		131	32
106				127		109	32
107				111		132	32
108				114		113	33
109	Y		Y	145		145	35
110				91		116	30
111				129		141	35
112				A		A	A
114				154		170	35
114				110		122	35
115				123		145	35
116				124		114	35
117				121		110	30
118				105		122	30
119				105		122	30
120				93		110	35
121				128		149	35
122	Y	y	Y	126		115	30
123				130		157	35
124	Y	y	Y	139		147	35
125				122		130	35
126				124		120	35
127				131		131	35
128				111		117	35
129	Y	y		109		155	35
130				107		120	35
132				107		111	35
133				109		124	35
134	Y	y		122		101	35
135				A		A	A
136	Y	y		95		130	30
137				133		141	30
138	Y	Y		136		139	30
139				139		126	30
140	Y			131		105	30
141	Y	y		137		140	30
142	Y	y		127		123	30
143				127		123	30
144				139		116	30
145				133		120	30
146	Y	Y		140		114	30
147				100		129	30
148				147		157	35
149				67		A	
150				123		136	35
151				131		131	35
152	Y	Y	Y	121		127	30
153				116		116	35
154				133		121	35
155				141		120	30
156				127		120	30
157				131		123	30
158	Y		Y	150		146	30
159				126		145	32
160	Y		Y	99		156	30
161				165		125	34
162				130		118	35
163				155		133	34
164				175		121	35
165				139		115	30
166				141		117	32
167				A		A	A

168				139		123	35
169				148		111	30
170				A		A	A
171	Y	Y	Y	111		115	30
172	Y	Y		125		104	32
173	Y	Y		A		A	A
174	Y	Y		128		102	30
175	Y	Y		133		107	32
176	Y			132		108	30
177	Y	Y	Y	138		113	30
178	Y	Y	Y	142		110	30
179		Y	Y	135		112	30
180	Y			162		120	30
181				52		110	30
182	Y			101		139	30
183	Y			A		A	A
184	Y			112		122	30
186	Y			131		112	30
187		Y	Y	118		150	30
188	Y	Y	Y	158		127	30
189	Y	Y	Y	138		100	30
190	Y			132		100	35
191	Y	Y		151		118	35
192	Y	Y		148		125	35
193	Y	Y		138		106	35
194	Y	Y		156		132	35
195	Y	Y	Y	144		120	35
196	Y	Y	Y	152		131	35
197	Y	Y	Y	100		130	35
198	Y	Y	Y	158		150	35
199	Y	Y	Y	129		116	35
200	Y	Y		174		120	35

ANNEXURE 3. Sample of Handwriting legible

If the allergen is unknown, then efforts must be made to find out the allergen and eliminate it to prevent exacerbations

modification of risk factors i.e cessation of smoking, avoiding passive smoke, eliminating occupational hazards

desensitisation of the patient is done by injecting subcutaneously small doses of the allergen

Drugs :- corticosteroids i.e prednisolone
 Short Acting β adrenoceptor agonists i.e salbutamol
 Long Acting methylxanthines i.e theophylline
 chromones i.e sodium cromoglycate
 anticholinergics i.e atropine
 leukotriene inhibitors i.e montelukast
 miscellaneous i.e omalizumab

Illegible