Enhancing Knowledge of Neurological Examination Among Nursing Students and Staff Nurses Through Structured Teaching Programme: An Experimental Study.

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ABSTRACT

Neurological examination is a fundamental component of patient assessment, requiring adequate knowledge and clinical competence among nursing professionals. This experimental study was conducted to evaluate the effectiveness of a structured teaching programme in enhancing the knowledge of nursing students and staff nurses regarding neurological examination of patients in Himachal Pradesh. A pre-experimental one-group pre-test and post-test design was adopted, and a total of 15 participants were selected using a simple random sampling. Baseline knowledge was assessed using a structured questionnaire covering key domains such as mental status examination, cranial nerves, motor system, reflexes, coordination, and gait.

The pre-test results revealed inadequate knowledge among participants, with low mean scores and a higher proportion of incorrect responses, particularly in areas related to reflexes and specific neurological tests. Following this, a structured teaching programme was administered. Post-test findings demonstrated a significant improvement in knowledge, with most participants achieving near-perfect scores and minimal variability. The paired t-test analysis showed a highly significant difference between pre-test and post-test scores ($t = -13.229$, $p < 0.001$), indicating the effectiveness of the intervention.

The study concludes that structured teaching programmes are highly effective in improving knowledge of neurological examination among nursing personnel. It is recommended that such educational interventions be regularly incorporated into nursing education and in-service training to enhance clinical competency and improve patient care outcomes.

Keywords: Neurological Examination, Structured Teaching Programme, Nursing Students, Staff Nurses, Knowledge Enhancement, Pre-test and Post-test, Experimental Study, Clinical Competency, Nursing Education, Himachal Pradesh.

INTRODUCTION

Neurological examination is a systematic and comprehensive assessment used to evaluate the functioning of the nervous system. It plays a vital role in identifying abnormalities related to the brain, spinal cord, and peripheral nerves. This examination helps healthcare professionals in diagnosing neurological disorders, localizing lesions, and planning appropriate treatment. (1)

The neurological examination consists of **seven major categories**, including Mental Status Examination, Cranial Nerve Examination, Motor System, Reflexes, Sensory System, Coordination, and Gait. Each component provides essential information about different aspects of nervous system functioning. (2)

Among these, the Mental Status Examination assesses cognitive and behavioural functions such as memory, attention, language, and orientation. Cranial nerve examination evaluates sensory and motor functions of the head and neck, while motor and sensory assessments help in identifying muscle strength, tone, and sensory deficits. (3)

Reflex testing and coordination assessment are important for understanding the integrity of neural pathways, whereas gait analysis provides insight into balance and movement disorders. (4)

Overall, neurological examination is a fundamental clinical skill that enables early detection, accurate diagnosis, and effective management of neurological conditions. It is especially important for nursing students and healthcare professionals to develop competency in performing and interpreting neurological assessments. (5)

METHODOLOGY

Research Title: Enhancing Knowledge of Neurological Examination Among Nursing Students and Staff Nurses Through Structured Teaching Programme: An Experimental Study.

Objectives of the study:

· To assess the pre-test knowledge of nursing students and staff nurses regarding neurological examination.

· To implement a structured teaching programme on neurological examination.

· To evaluate the post-test knowledge of participants after the intervention.

· To compare the pre-test and post-test knowledge scores to determine the effectiveness of the teaching programme.

Aim: To evaluate the effectiveness of a structured teaching programme in enhancing the knowledge of nursing students and staff nurses regarding neurological examination of patients in Himachal Pradesh.

Research Design: Pre-Experimental Research (One Group pre-test post-test only design)

Sample Size: 15 (Students: 8 and Staff Nurse:7)

Sampling Technique: Simple Random Sampling

Research Setting: Indira Gandhi Medical College and Hospital, Shimla

Intervention: Structured Teaching using Power point Presentation and Demonstrations

Timing of intervention: 30 minutes

ANALYSIS AND INTERPRETATION

Section I- Frequency, Mean and SD of Pre-test

Pre-test Questions	f		Mean	SD
1. How many categories are included in neurological examination? 5 6 7 8	**Wrong Answers** **9**	**Right Answers** **6**	0.40	0.507
2. Mental Status Examination (MSE) is used to assess: Only motor function Behavioral and cognitive functioning Reflexes only Sensory system only	10	5	0.33	0.488
3. Which of the following is NOT a component of MSE? Memory Mood and affect Blood pressure Language	10	5	0.33	0.488
4. The Digit Span Test assesses: Motor strength Memory and attention Reflexes Gait	12	3	0.20	0.414
5. Cranial nerves are 10 pairs 11 pairs 12 pairs	10	5	0.33	0.488

14 pairs				
6. **Which of the following is assessed in motor examination**? Muscle tone Muscle strength Coordination All of the above	10	5	0.33	0.488
7. Flaccidity means Increased muscle tone Decreased muscle tone Normal tone Painful muscle	10	5	0.33	0.488
8. The Patellar reflex tests which spinal level? C5–C6 L2–L4 S1–S2 C6–C7	13	2	0.13	0.352
9. Achilles reflex is also called Knee jerk Ankle jerk Biceps reflex Triceps reflex	13	2	0.13	0.352
10. Babinski sign is considered abnormal in: Infants Adults Children only All ages	13	2	0.13	0.352
11. Normal reflex grading is: 0 1 2 4	12	3	0.20	0.414

12. Graphesthesia refers to: Recognizing objects by touch Recognizing writing on skin Pain sensation Vibration sense	11	4	0.27	0.458
13. Romberg test assesses: Muscle strength Coordination Balance and proprioception Reflexes	9	6	0.40	0.507
14. Finger-to-nose test evaluates: Sensory system Coordination Reflexes Gait	10	5	0.33	0.488
15. Parkinsonian gait is characterized by: Wide base walking Shuffling steps High stepping Limping	7	8	0.53	0.516

This table represents: The pre-test data indicate that participants had generally low baseline knowledge regarding neurological examination, as reflected by a higher number of wrong answers compared to correct ones in most questions. Only a few areas, such as Parkinsonian gait (8 correct responses) and Romberg test (6 correct responses), showed relatively better understanding. Several critical topics—including patellar reflex, Achilles reflex, and Babinski sign—had very low correct responses (only 2), highlighting major knowledge gaps in reflex assessment. The mean scores further support this trend, with most values ranging between 0.13 and 0.40, indicating poor performance overall. The standard deviation values suggest moderate variability in responses, meaning participants differed somewhat in their knowledge levels. Questions related to MSE, motor examination, and cranial nerves also showed limited correct responses, emphasizing insufficient conceptual clarity. Overall, the findings reveal inadequate pre-existing knowledge and a clear need for structured educational intervention to improve competency in neurological assessment.

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Section II- Frequency, Mean and SD of Post-test

Post-test Questions	f		Mean	SD
1. How many categories are included in neurological examination? 5 6 7 8	**Wrong answers** 0	**Right Answers** 15	1	0
2. Mental Status Examination (MSE) is used to assess: Only motor function Behavioral and cognitive functioning Reflexes only Sensory system only	0	15	1	0
3. Which of the following is NOT a component of MSE? Memory Mood and affect Blood pressure Language	0	15	1	0
4. 0 The Digit Span Test assesses: Motor strength Memory and attention Reflexes Gait	0	15	1	0
5. Cranial nerves are 10 pairs 11 pairs 12 pairs 14 pairs	0	15	1	0
6. **Which of the following is assessed in motor examination**? Muscle tone	0	15	1	0

Muscle strength Coordination All of the above				
7. Flaccidity means Increased muscle tone Decreased muscle tone Normal tone Painful muscle	0	15	1	0
8. The Patellar reflex tests which spinal level? C5–C6 L2–L4 S1–S2 C6–C7	0	15	1	0
9. Achilles reflex is also called Knee jerk Ankle jerk Biceps reflex Triceps reflex	1	14	0.933	0.258
10. Babinski sign is considered abnormal in: Infants Adults Children only All ages	0	15	1	0
11. Normal reflex grading is: 0 1 2 4	0	15	1	0
12. Graphesthesia refers to: Recognizing objects by touch Recognizing writing on skin Pain sensation	1	14	0.933	0.258

Vibration sense				
13. Romberg test assesses: Muscle strength Coordination Balance and proprioception Reflexes	0	15	1	0
14. Finger-to-nose test evaluates: Sensory system Coordination Reflexes Gait	3	12	0.80	0.414
15. Parkinsonian gait is characterized by: Wide base walking Shuffling steps High stepping Limping	1	14	0.933	0.258

This table represents: The post-test findings show a dramatic improvement in participants' knowledge of neurological examination, with almost all questions having 15 correct responses and zero wrong answers. Most items achieved a perfect mean score of 1.00 with a standard deviation of 0, indicating complete accuracy and uniformity among participants. This reflects excellent understanding of key areas such as Mental Status Examination, cranial nerves, motor system, and reflex assessment after the intervention. A few questions—such as Achilles reflex, graphesthesia, finger-to-nose test, and Parkinsonian gait—had slightly lower correct responses, but still demonstrated high performance with mean scores ranging from 0.80 to 0.933. The minimal standard deviation in these items suggests only slight variation in responses. Compared to the pre-test, there is a clear and substantial gain in knowledge across all domains. Overall, the results confirm that the educational intervention was highly effective in improving participants' competency in neurological assessment.

Section-III Paired t-Test Value

Knowledge Level	**Mean**	**SD**	**Paired t-test value**	**df**	**Sig.(2-tailed)**
Pre-test knowledge	-1.66667	.48795	-13.229	14	.000
Post-test knowledge					

This table represents: The paired t-test results indicate a statistically significant improvement in knowledge after the intervention. The mean difference of -1.66667 shows a substantial increase in post-test scores compared to pre-test scores. The calculated t-value (-13.229) is very high, suggesting a strong effect of the educational program. With a degree of freedom (df) of 14, the significance value ($p = .000$) is far below the standard level of 0.05, confirming that the difference is highly significant and not due to chance. The standard deviation

(0.48795) indicates moderate variability in the difference scores among participants. Overall, these findings clearly demonstrate that the teaching intervention was highly effective in improving participants' knowledge of neurological examination.

RESULTS

The overall findings of the study reveal that participants had inadequate baseline knowledge regarding neurological examination, as indicated by low pre-test mean scores and a higher frequency of incorrect responses. After the educational intervention, there was a remarkable improvement in knowledge, with post-test scores showing near-perfect mean values and minimal variability. Most participants answered all questions correctly in the post-test, reflecting a high level of understanding across all domains, including mental status examination, cranial nerves, motor system, reflexes, and coordination. The **paired t-test result** ($t = -13.229$, $p < 0.001$) confirms that the improvement in knowledge was statistically highly significant. This demonstrates that the intervention had a strong positive impact on participants' learning outcomes.

DISCUSSION

The present study was conducted to evaluate the effectiveness of a structured teaching programme on knowledge regarding neurological examination among nursing students and staff nurses in Himachal Pradesh. The findings demonstrated a significant improvement in participants' knowledge following the educational intervention. The mean post-test scores were substantially higher than the pre-test scores, and the paired t-test revealed a highly significant difference ($t = -13.229$, $p < 0.001$), indicating that the structured teaching programme was effective in enhancing knowledge related to neurological examination.

These findings are consistent with the study conducted by **K. Chitra and Pooja Godiyal (2022)** among 54 B.Sc. Nursing third-year students in Dehradun, Uttarakhand. Their study also employed a pre-experimental one-group pre-test and post-test design to assess the effectiveness of a structured teaching programme on neurological examination. The authors reported an increase in mean knowledge scores from 12.2 in the pre-test to 16.8 in the post-test, with a statistically significant t-value of 5.9, demonstrating the effectiveness of the intervention.

A comparison of both studies reveals similar outcomes, as both reported significant improvements in knowledge following structured teaching. However, the magnitude of improvement observed in the present study was greater, as reflected by the higher t-value (-13.229) compared to the Dehradun study (5.9). This may be attributed to differences in sample characteristics, baseline knowledge levels, educational content, and teaching methods. Additionally, the present study included both nursing students and staff nurses, whereas the Dehradun study focused solely on third-year B.Sc. Nursing students.

Another notable finding of the present study was that participants exhibited poor baseline knowledge, particularly regarding reflex assessment and specialized neurological tests. Similar deficiencies in pre-test knowledge were observed in the Dehradun study, where participants also demonstrated limited understanding of neurological examination before the intervention. These findings suggest a need for strengthening neurological assessment training within nursing curricula and continuing nursing education programmes.

The Dehradun study further reported a significant association between pre-test knowledge and selected demographic variables, whereas the present study primarily focused on evaluating knowledge improvement following the intervention. Despite this difference, both studies concluded that structured teaching programmes are valuable educational strategies for improving nursing knowledge and competence in neurological examination.

Overall, the findings of the present study support existing evidence that structured teaching programmes significantly enhance nurses' and nursing students' knowledge regarding neurological examination. Regular implementation of such educational interventions may contribute to improved clinical assessment skills, early detection of neurological abnormalities, and better patient care outcomes.

CONCLUSION

The study concludes that the educational intervention was highly effective in enhancing knowledge of neurological examination among participants. There was a clear and significant difference between pre-test and post-test scores, indicating successful knowledge acquisition. Initially, participants lacked adequate understanding in key areas, especially reflexes and specific neurological tests. However, post-intervention results showed excellent comprehension and retention of concepts. The statistical analysis further supports that the improvement was not due to chance. Therefore, structured teaching programs play a crucial role in strengthening clinical knowledge. Such interventions should be regularly implemented in nursing education. Continuous training can improve competency and patient care quality. Overall, the study highlights the importance of targeted educational strategies in improving neurological assessment skills.

RECOMMENDATION

The small sample size (N = 15) represents a limitation of the present study; therefore, future research should recruit a larger and more diverse participant population to enhance the validity and applicability of the results.

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APPENDECIES

Pre-Test and Post Test Questionnaire
1. How many categories are included in neurological examination? 5 6 7 8
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3. Which of the following is NOT a component of MSE? Memory Mood and affect Blood pressure Language
4. The Digit Span Test assesses: Motor strength Memory and attention Reflexes

Gait

5. **Cranial nerves are**
   10 pairs
   11 pairs
   12 pairs
   14 pairs

6. **Which of the following is assessed in motor examination**?
   Muscle tone
   Muscle strength
   Coordination
   All of the above

7. **Flaccidity means**
   Increased muscle tone
   Decreased muscle tone
   Normal tone
   Painful muscle

8. **The Patellar reflex tests which spinal level?**
   C5–C6
   L2–L4
   S1–S2
   C6–C7

9. **Achilles reflex is also called**
   Knee jerk
   Ankle jerk
   Biceps reflex
   Triceps reflex

10. **Babinski sign is considered abnormal in:**
    Infants
    Adults
    Children only
    All ages

11. **Normal reflex grading is:**
    0
    1
    2
    4

12. **Graphesthesia refers to:**
    Recognizing objects by touch
    Recognizing writing on skin
    Pain sensation
    Vibration sense

13. **Romberg test assesses:**
    Muscle strength
    Coordination
    Balance and proprioception
    Reflexes

14. Finger-to-nose test evaluates:

Sensory system
Coordination
Reflexes
Gait

15. Parkinsonian gait is characterized by:

Wide base walking
Shuffling steps
High stepping
Limping