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EVALUATE THE EFFECTIVENESS OF HEALTH EDUCATION ON KNOWLEDGE REGARDING SCLERODERMA AND ITS PREVENTIVE MEASURES AMONG MARBLE MINES WORKERS OF SELECTED MARBLE MINES IN UDAIPUR DISTRICT, RAJASTHAN

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ABSTRACT

Scleroderma is a chronic occupational health problem commonly seen among workers exposed to silica dust, especially marble mine workers. Prolonged exposure to marble dust adversely affects the skin, lungs, and other organs, leading to reduced quality of life and work productivity. Health education plays a vital role in improving workers' knowledge and promoting preventive practices to reduce occupational hazards.

The present study was undertaken to evaluate the effectiveness of health education on knowledge regarding scleroderma and its preventive measures among marble mine workers of selected marble mines in Udaipur District, Rajasthan. A pre-experimental one group pre-test post-test research design was adopted for the study. A total of 60 marble mine workers were selected using non-probability convenient sampling technique.

Data were collected using a structured knowledge questionnaire on scleroderma and its preventive measures. After the pre-test, a planned health education programme was administered, which included information on causes, signs and symptoms, complications, preventive measures, and use of personal protective equipment. Post-test was conducted after seven days using the same tool.

The findings revealed that the mean post-test knowledge score was significantly higher than the mean pre-test score, indicating that the health education programme was effective in improving the knowledge of marble mine workers. A significant association was also found between post-test knowledge scores and selected demographic variables such as age, education, and years of work experience.

The study concluded that health education is an effective intervention to enhance knowledge regarding scleroderma and its prevention among marble mine workers. Regular health education programmes and occupational safety measures are recommended to prevent scleroderma and improve workers' health status.

Materials and methods: A quantitative research approach was used for this study. The study was carried out in 3 Marble Mines of Udaipur district Rajasthan. The sample comprised of 60 marble mines workers. Sample was selected by convenient sampling technique. The data collection was done from 27/05/2025 to 02/06/2025. Formal written permission was obtained from the authorities to conduct the study and informal consent was

obtained from the marble mines workers prior to the data collection process. A structured knowledge questionnaire was used for data collection. The data was analyzed using descriptive and inferential statistics.

Results: *Reveals that* there was significant difference between pre and post-test knowledge scores regarding scleroderma and its preventive measures among marble mines workers. The mean post-test knowledge score (13.2) was greater than the mean pre-test score (11.35). The mean difference between pre-test and post test score mean percentage was (56.75%) and (66.00%) with the mean difference was (1.85). This indicates that the health education was effective in increasing the knowledge of marble mines workers regarding scleroderma and its preventive measures. There was no significant association between pre-test knowledge score with any of the selected socio demographic variables. Hence research hypotheses H2 was rejected.

Conclusion: The study concluded that there was improvement in the level of knowledge of marble mines workers which indicated that the health education was effective. The demographic variables of marble mines workers non significantly associated with the pre-test knowledge score.

Key Words*:* Knowledge, health education, marble mines workers. Scleroderma and its preventive measures

INTRODUCTION

In the modern world there are lots of occupations which are growing to improve the economic status of the people. As the occupations are growing the new diseases are also emerging in the workers who are involving in the particular occupations.

Among many occupational disorder, Scleroderma is one which causes morbidity & mortality among the workers of mining industries. Scleroderma is classified as an autoimmune disease. It is a chronic connective tissue disease. The word scleroderma comes from the Greek words "Sclera" meaning hard and derma meaning skin. Change to the skin blood vessels muscles and internal organ. Scleroderma is not contagious, it is not infectious, it is not cancerous or malignant and it is not usually hereditary.[1]

The safety measure can be helpful to prevent scleroderma by using mask and gloves, water therapy i.e. spraying water then minimizes the dust while cutting marble and granite is a common measure. The factory act is helpful to keep the health of factory worker; factory act is related to the welfare of the labors. Systemic sclerosis (SSc) is a rare, systemic autoimmune disease characterized by skin fibrosis and vasculopathy. Multiple systems (e.g., musculoskeletal, cardiovascular, pulmonary, and gastrointestinal) are involved, resulting in a broad range of symptoms. Depending on the skin's involvement, one can distinguish between limited cutaneous SSc (lcSSc), which manifests with only partial skin and minor systemic involvement; diffuse cutaneous SSc (dcSSc), which includes extensive skin and systemic involvement; and SSc sine, with no evident skin involvement.[2]

Generally, SSc is associated with significant morbidity, including pain, disability, depression, and reduced quality of life. Moreover, reduced physical activity (PA) and physical capacity in performing daily life activities has been also observed. In fact, SSc may lead to muscle weakening and impairment in oxygen transport and consumption, contributing significantly to reduced physical performances and poor health-related quality of life (HRQL).[5]

Localized scleroderma primarily affects the skin and subcutaneous tissue, leading to patches of thickened skin that, on biopsy, reveal dermal fibrosis similar to the histo-pathological changes seen in the thickened skin in systemic sclerosis.6 However, it is not associated with the Raynaud phenomenon, digital ischemic events, or internal organ involvement. Antinuclear antibodies may be present in up to 50% of cases of localized scleroderma; however, more specific auto antibodies such as anti-centromere, anti-Scl-70, and anti-RNA polymerase III are absent in this condition.[10]

Scleroderma most commonly affects the skin, gastrointestinal tract, lungs, kidneys, skeletal muscle, and pericardium among affected organs. The manifestations of scleroderma may overlap extensively with those of other rheumatologic or immunological diseases. The severity of the presentation may also vary depending on the timing of the systemic sclerosis diagnosis.[3]

Silica exists in crystalline and non-crystalline forms. The most common natural form of crystalline silica is quartz. Quartz is a colorless, odorless, non-combustible solid that widely exists in rocks, sand, and soil.

Quartz causes silicosis via occupational respiratory exposure to the mineral dust form. Miners, Sandblasters, foundry workers, tunnel drillers, quarry workers, stone carvers, ceramic workers, and silica flour production workers are at a potential risk of exposure to crystalline silica.[4]

A recent review on environmental factors that affect autoimmune disease reported epidemiological evidence that exposure to crystalline silica contributes to the occurrence of diseases such as rheumatoid arthritis, systemic sclerosis, systemic lupus erythematosus, and antineutrophil cytoplasm antibody related vasculitis. [13]

Systemic Sclerosis (scleroderma, SSc) is a complex autoimmune disease characterized by fibrosis of the internal organs and skin, autoimmunity with distinct autoantibodies, and vascular abnormalities.[5]

MATERIALS AND METHODS

Statement of the Problem

Evaluate the effectiveness of health education on knowledge regarding scleroderma and its preventive measures among marble mines workers of selected marble mines in Udaipur District, Rajasthan.

Objectives

- To assess the pre and post-test knowledge score regarding scleroderma and its preventive measures among marble mines workers.
- To evaluate the effectiveness of Health education on knowledge regarding scleroderma and its preventive measures among marble mines workers.
- To find out the association between pre-test knowledge score with socio- demographic variables.

Hypothesis

H_{01}:- There is no significant difference between pre and post-test knowledge score of the marble mine workers regarding scleroderma and its preventive measures.

H_{02}:- There is no significant association between pre-test knowledge score and selected socio demographic variables.

Research Approach

Research approach is a systematic, objective method of discovery with empirical evidence and rigorous control. The research approach spells out the basic strategic that the researcher adopts to develop information that is accurate and interpretable. The control is achieved by holding condition constant and varying only the phenomena under study.

Research Design

Research design is the overall plan or strategy formulated for obtaining answers to the research questions and for dealing with possible challenges that may arise during the research process. It provides a structured framework for the selection of subjects, manipulation of the experimental variable, control of extraneous variables, procedure of data collection, and the type of statistical analysis to be employed for interpreting the findings.

The research design used for the present study was Quasi experimental one group pre-test post-test design used to measure the effectiveness of health education on knowledge regarding scleroderma and its preventive measures among marble mines workers of selected marble mines in Udaipur District, Rajasthan.

Research Setting

The selection of an appropriate setting is important because the setting can influence the way people behave, feel and how they respond. The researcher needs to decide where the intervention will be implemented and where the data will be collected.

Research setting is the more specific place where data collection occurs based on the nature of the research question and the type of information needed to address it. It refers to the physical location and condition in which data collection takes place in the study. The present study has been conducted in O.P. Marble Mines and Minerals, Amberi, Udaipur and Prem Marbles Pvt. Ltd., Udaipur.

Criteria For Sample Collection

Inclusion criteria

- Workers who were able to understand and speak Hindi and local language.
- Workers who were present at the time of data collection.

Exclusion criteria

- Workers who were not present at the time of study.

RESULTS

Data Collection Tool

Section –A : Structured questionnaire for demographic profile

A structured interview schedule was used to collect information regarding demographic data such as age in years, gender, educational status, area of residence, working experience, any previous information and source of information regarding scleroderma and its preventive measures. No score was given in this section and it was used for descriptive analysis.

Section- B : It consists of self-structured questionnaires to assess the level of knowledge regarding scleroderma and its preventive measures among marble mines workers.

The tool consisted of 26 multiple choice questions to measure the level of knowledge regarding scleroderma and its preventive measures among marble mines workers. All the items had four response options; 1 correct and 3 wrong answers. The correct answer was given a score of 1 and wrong answer was given a score of 0. The total possible score was 26.

Scoring Interpretation

The interpretation of the total score was :

- Inadequate knowledge: less than 50%
- Moderate knowledge: 50%-75%
- Adequate knowledge: greater than 75%.

Validity and Reliability of the Tool

Demographic variables, structured questionnaire on knowledge regarding scleroderma and its preventive measures were tested by implementing the tool on marble mines workers working in selected marble mines at Udaipur. "cronbach's alpha" was used to test the reliability of the tool and tool was found to be reliable (r = 0.89) and valid.

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Procedure for Data Collection

The main study was conducted from 27th May 2025 to 02nd June 2025 at Prem Marble and O.P Marble Mines & Minerals Udaipur district Rajasthan. Prior written permission was obtained from the supervisor of marble mines on 26th May 2025.

Sampling was carried out using a non-probability convenient sampling technique. Consent forms were distributed to the selected marble mines workers to obtain permission on the same day.

On 27th May 2025 at Prem Marble and O.P Marble Mines & Minerals Udaipur district Rajasthan. Consent form were collected and the pre-test was conducted using the structured knowledge questionnaire followed by health education on the same day.

After a gap of 7 days, the post-test was conducted using the same structured knowledge questionnaire on 2nd June 2025 at Prem Marble and O.P Marble Mines & Minerals Udaipur district Rajasthan.

The language of tool was found to be clear and the item were easily comprehended by the respondents. The interventions was delivered for about 40 to 45 minutes to each group and post-test was helped in assessing the effectiveness of health education.

Plan for Data Analysis

Statistical analysis helps researcher make sense of quantitative information. Statistical procedure enable researcher to summarize, organize, evaluate, interpret and communicate numeric information.

The data collected was organized, tabulated, summarized, analyzed and presented in the forms of tables, bar diagrams and pie diagrams on the basis of objectives of the study using descriptive and inferential analysis**.**

Descriptive and inferential statistics was used for data analysis

Descriptive statistics

- Description of demographic characteristics.
- Mean, Median, standard deviation (SD) and Mean percentage are used to describe the area wise pre-test and post-test knowledge score of participants on scleroderma and its preventive measures.

Inferential statistics

- Paired "t"-test is used to find the effectiveness of health education by comparing pre-test and post-test knowledge score of the participants.
- Chi-square is used to find the association between pre-test knowledge score of the participants and certain demographic variables.

Table 1: Finding related to association between pre-test knowledge and selected socio-demographic variables of respondents

Socio demographic variables	Below median	Above median	Total	df	Chi square	P value	Inference
Age in years							
18-26	11	14	25	3	3.987	0.001	S
27-36	3	3	6				
37-46	9	2	11				
46 and Above	12	6	18				
Total	**35**	**25**	**60**				
Gender							
Male	19	15	34	1	3.568	0.005	S
Female	13	13	26				
Total	**32**	**28**	**60**				
Educational status							
No Formal Education	12	16	28	3	4.308	0.008	NS
Primary Education	9	8	17				
Secondary Education	3	4	7				
Graduation and Above	5	3	8				
Total	**29**	**31**	**60**				
Area of residence							
Rural	23	19	42	1	4.502	0.05	S
Urban	13	5	18				
Total	**36**	**24**	**60**				
Working experience							
Below 1 Year	6	4	10	3	2.126	0.001	S
1-5 Year	5	9	14				
6-10 Year	9	5	14				
Above 10 Year	12	10	22				
Total	**32**	**28**	**60**				
Any previous information							
Yes	6	8	14	1	4.165	0.008	NS
No	8	28	36				
Total	**24**	**36**	**60**				
Source of information about scleroderma							
By Mass Media	2	1	3	3	9.451	0.009	NS
By Health Personnels	1	2	3				
By Friends And Relatives	3	2	5				
By Others	2	1	3				

Socio demographic variables	Below median	Above median	Total	df	Chi square	P value	Inference
Total	**8**	**6**	**14**				

The present study analyzed the association between various socio-demographic variables and the median distribution of the study outcome among 60 participants.

With respect to **age**, most participants belonged to the age group of 18–26 years (n = 25), followed by those aged 46 years and above (n = 18), 37–46 years (n = 11), and 27–36 years (n = 6). Among those below the median, the majority (12) were aged 46 years and above, whereas among those above the median, most (14) were in the 18–26 years category. The association between age and the study variable was found to be **statistically significant** ($\chi^2 = 3.987$, df = 3, p = 0.001), indicating that age significantly influenced the distribution of scores.

Regarding **gender**, 34 participants (56.7%) were male and 26 (43.3%) were female. Among males, 19 were below and 15 above the median, while among females, the distribution was almost equal (13 each). The chi-square analysis showed a **significant association** ($\chi^2 = 3.568$, df = 1, p = 0.005), revealing that gender had a meaningful relationship with the study variable.

In terms of **educational status**, 28 participants (46.7%) had no formal education, 17 (28.3%) had completed primary education, 7 (11.7%) had secondary education, and 8 (13.3%) were graduates or above. The computed chi-square value ($\chi^2 = 4.308$, df = 3, p = 0.008) indicated that the association between education and the median score was **not statistically significant**, suggesting that education level did not play a major role in influencing the study outcome.

With regard to the **area of residence**, the majority of participants (70%) were from rural areas, while 30% resided in urban areas. A significant association ($\chi^2 = 4.502$, df = 1, p = 0.05) was observed, indicating that participants from rural areas were more likely to fall below the median level compared to their urban counterparts.

Analysis of **working experience** revealed that 10 participants (16.7%) had less than one year of experience, 14 (23.3%) had 1–5 years, another 14 (23.3%) had 6–10 years, and 22 (36.7%) had more than 10 years of experience. The chi-square value ($\chi^2 = 2.126$, df = 3, p = 0.001) demonstrated a **significant association**, suggesting that professional experience influenced the outcome variable.

Considering **previous information about scleroderma**, only 14 participants (23.3%) had prior knowledge, while the majority (60%) reported having none. The association between previous information and the median level was **not significant** ($\chi^2 = 4.165$, df = 1, p = 0.008), implying that prior awareness had no meaningful effect on the results. Similarly, in evaluating the **source of information about scleroderma**, responses included mass media (3 participants), health personnel (3), friends and relatives (5), and others (3). The chi-square value ($\chi^2 = 9.451$, df = 3, p = 0.009) showed **no significant association**, suggesting that the source of information did not significantly influence the participants' median scores.

Overall, the analysis revealed that **age, gender, area of residence, and working experience** were significantly associated with the study variable, while **educational status, previous information, and source of information** were not. These findings emphasize that demographic and occupational factors such as age, sex, residence, and experience play a substantial role in shaping participants' outcomes, whereas educational attainment and prior knowledge have comparatively lesser influence.

Thus it can be concluded that there is a partial association between pre –test knowledge score and selected socio demographic variables hence the research hypothesis H_{02} was partial accepted , indicating that some socio demographic variables have a significant influence on the pre-test knowledge score of marble mines workers regarding scleroderma and its preventive measures.

Table 9: Area wise pre-test knowledge score of respondents on scleroderma

N=60

Area	Maximum score	Mean	SD
Introduction	4	1.58	0.94
Incidence	5	2.35	1.02
Risk factors	3	1.85	1.08
Sign and symptoms	1	1.06	0.70
Diagnostic evaluation	1	0.8	0.65
Preventive measures	9	3.7	1.4 8

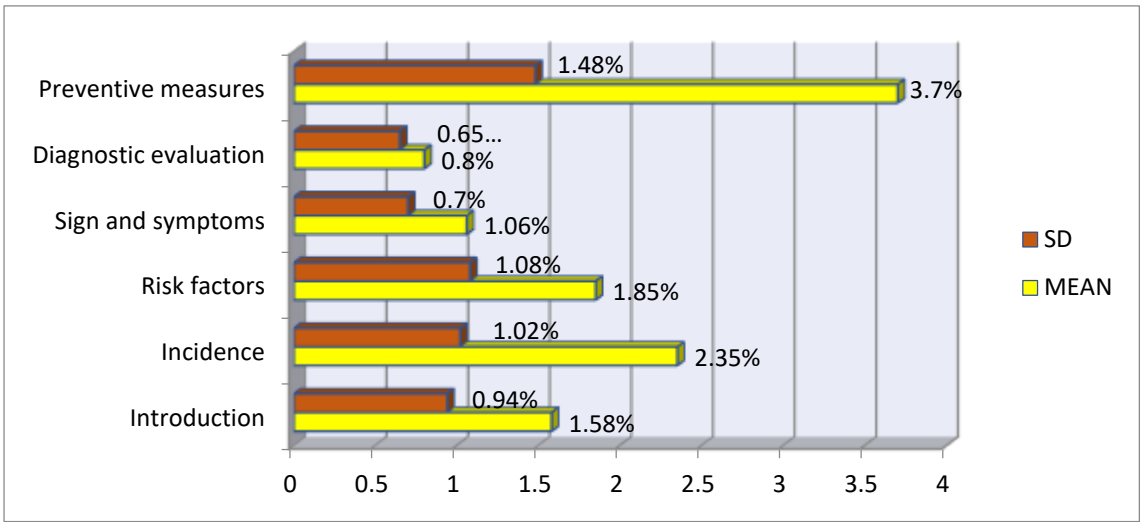

Figure 10: Area wise pre-test knowledge score of respondents on scleroderma

Table 10: Area wise post-test knowledge score of respondents on scleroderma & its preventive measures

N=60

Area	Maximum score	Mean	SD
Introduction	4	2.93	0.97
Incidence	5	3.48	0.96
Risk factors	3	2.78	0.97
Sign and symptoms	1	1.61	0.62
Diagnostic evaluation	1	1.65	0.97
Preventive measures	9	6.55	1.48

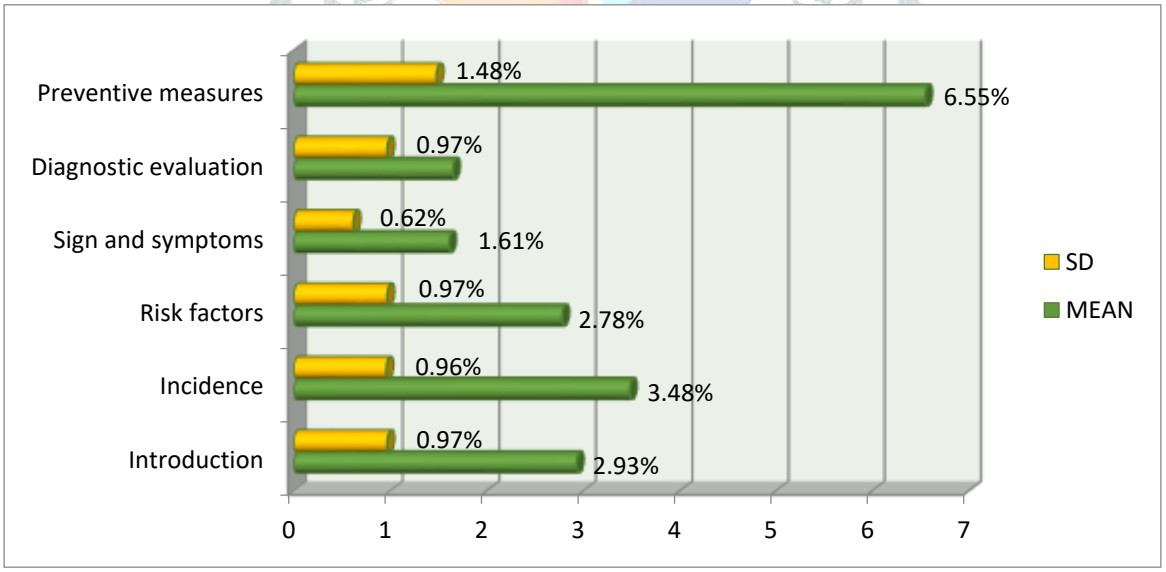

Figure 11: Area wise post-test knowledge score of respondents on scleroderma & its preventive measures

Table 11 : Effectiveness of health education by comparison of pre-test and post-test knowledge scores

Test Type	Mean Score	Mean (%)	SD (±)	Mean Difference	*t*-value	*df*	*p*-value	*Inference*
Pre-Test	11.35	56.75	2.77	1.85	14.07	59	0.05	S*
Post-Test	13.2	66.0	4.24					

S* = Significant at p < 0.05 level of significance

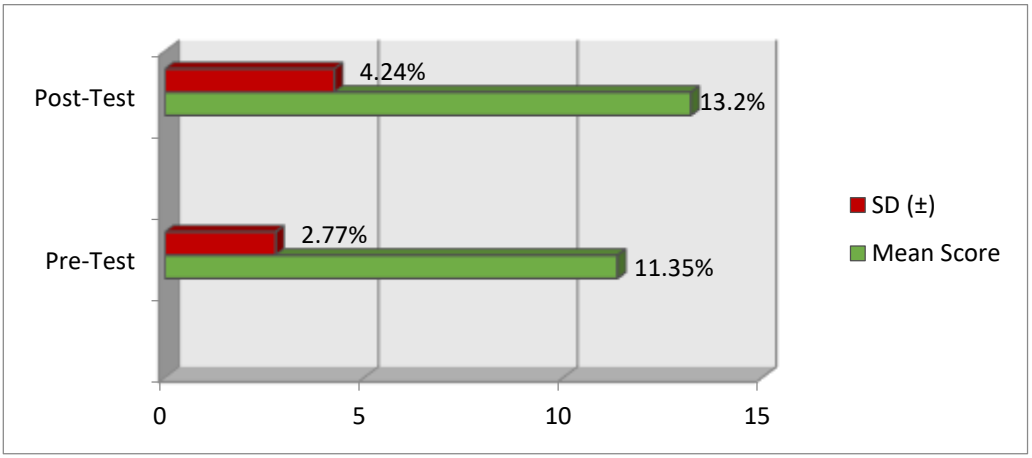

Figure 12 : Effectiveness of health education by comparison of pre-test and post-test knowledge scores

Table 12: Distribution of respondents by level of knowledge scores

N=60

		Frequency		Percentage (%)	
Level of knowledge	**Scores**	**Pre test**	**Post test**	**Pre test**	**Post test**
Adequate Knowledge	**19-26**	6	44	10	73
Moderate Knowledge	**10-18**	44	16	73	27
Inadequate Knowledge	**Below 10**	10	0	17	0
Total	–	60	60	100	100

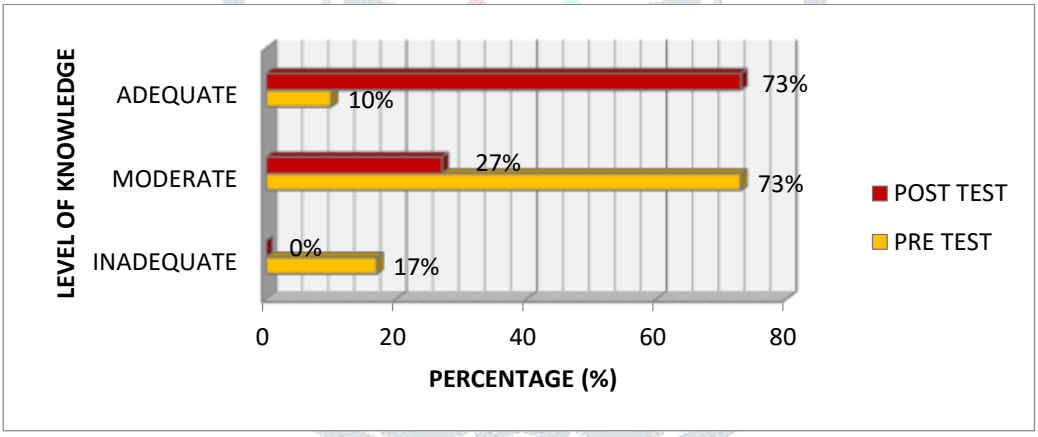

Figure 13: Distribution of respondents by level of knowledge

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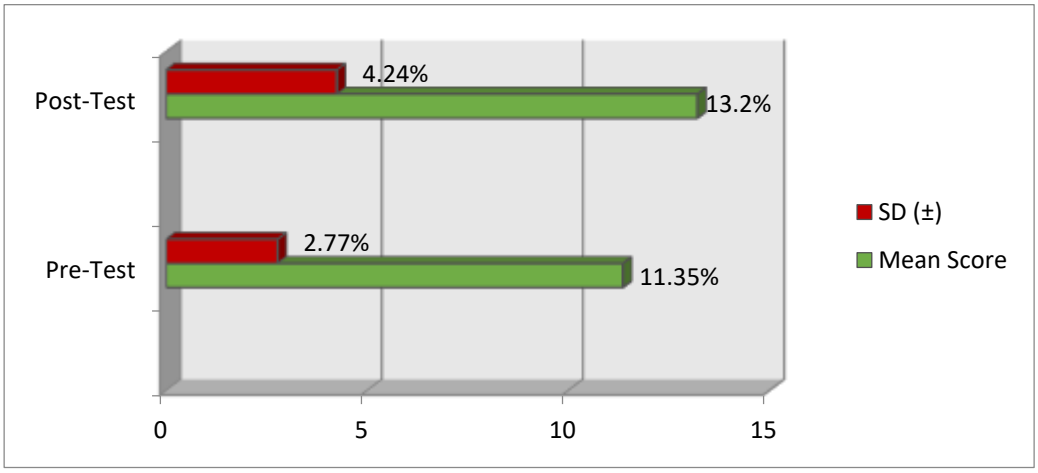

Figure 12 : Effectiveness of health education by comparison of pre-test and post-test knowledge scores

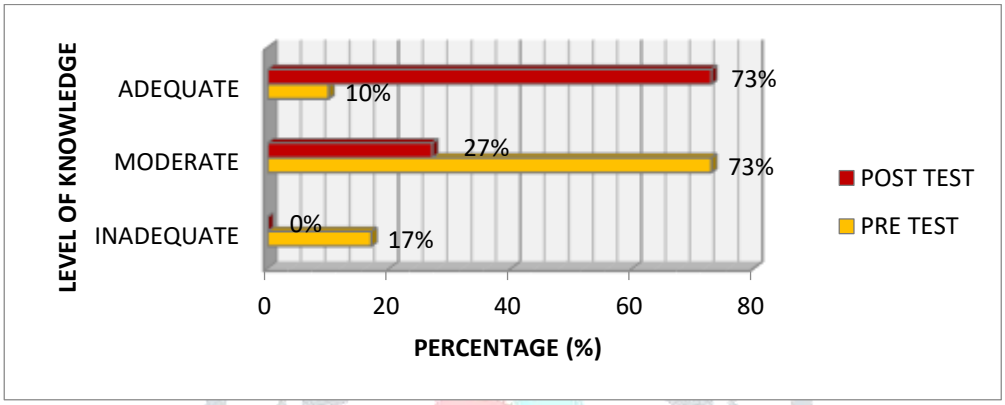

Figure 13: Distribution of respondents by level of knowledge

CONCLUSION

Overall, the study concluded that the implementation of a structured health education program significantly enhanced the knowledge of marble mine workers regarding scleroderma and its preventive measures. The results highlight the importance of continuous occupational health education, regular awareness programs, and strict adherence to preventive practices such as use of protective equipment and dust control measures to reduce the incidence of scleroderma and other occupational diseases among marble mines workers.

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