An Ergonomic Assessment of Municipal Primary School Teachers of Selected Two Cities of Gujarat State

SYNOPSIS

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INTRODUCTION

School is a prestigious institution in the society, which can be called a place shaping the future citizens that can contribute productively in the Nation's economy (1).Early education in school is the key to creating the right environment for a child's educational success. Children learn habits and patterns that they will retain in later years and if teachers and parents can establish positive learning skills and social interaction skills early on, children will have the right tools to help them achieve success in the future (2).

School system in Gujarat

The education department of the state pays special attention to the improvement of elementary education in Gujarat. The state government has launched the district primary education program for making primary education compulsory and free for all students up to standard - 8. It has also taken up several measures for checking the rate of dropout at schools in Gujarat (3). Gujarat state has more than 32,700 grant-aid primary schools run by municipal corporations. The school have divisions like Pre-primary section (Play section and kinder garten section), Primary section, secondary section, higher secondary section. Primary section includes students studying in standard 1 to standard 8. So the teachers teaching in the standard 1 to standard 8 were called Primary School Teachers.

Schools at Vadodara and Anand city

Vadodara city have many schools; some of them are funded and run by municipal body, some by private body and few by both. The municipal (corporation) primary schools are distributed in wards for easy access of these schools by the children residing in different areas of the city. A pilot survey conducted by the researcher revealed that, 105 schools in Vadodara and 27 schools in Anand are run and funded by Municipal Corporation of Vadodara and Anand respectively. The other schools in Vadodara and Anand are either privately owned and funded fully by the private organizations or some are partially funded by the government body. The total population of Vadodara city numbered 13,05,546 is spared over in 12 wards located in different areas of the Vadodara city. The total population of Anand city is 2,092,745 spread over in 16 wards located in different areas of Anand city.

Education in Primary Schools

The Indian government lays emphasis to primary education up to the age of fourteen years referred to as Elementary Education in India. The 80% of all recognized schools at the Primary Stage are government run or supported, making it the largest provider of education in the Country (4). However, due to shortage of resources and lack of political will, this system suffers from massive gaps including high pupil to teacher ratios, shortage of infrastructure and poor levels of teacher training. Figures released by the Indian government in 2011 show that there were 5,816,673 primary school teachers in India.

Student teacher ratio in schools established in America, Europe and even some parts of Asia is less than 30 students per teacher. According to National University of Educational Planning and Administration **(2009-2010)** that, in India the student teacher ratio for primary education is about 40 students per teacher, which exceeds the standards. The increased value has raised concerns over the quality of education received in the country.There have been several efforts to enhance quality made by the government through launching of their various educational reform programmers focusing on the curriculum and in increasing the number of schools (5). There is an insignificant concern shown by the government school board in improving the work design, work station and the health of the teachers who are the main contributors in upgrading the quality of teaching and learning. Thus, the role of teacher becomes utmost vital.

Importance of Primary School Teacher

Teachers pass on knowledge and values to children, prepare them for further education and for working life and are main contributors to good education. Teachers are one of the main pillars of a sound and progressive society. They bear the weight and responsibility of teaching and apart from parents are the main source of knowledge and values for children (6). Teachers serve as not only educators, but also mentors and role models, especially in the modern world, where values such as respect for elders, sharing, and cooperation among peers are not always taught in the home. Young students look to their teachers when determining how to interact as adults.

A student will become significantly more interested in learning if his or her teacher has invested in teaching the subject matter. If a teacher finds a way to engage his or her students in an interesting yet informative manner then the students certainly develop a thirst for learning and acquiring knowledge. A teacher that can get a student at a young age to realize the value in learning and a solid education is doing a great service not only to that child, but also to society in general (7).

Primary school teachers develop and foster the appropriate skills and social abilities to enable the optimum development of children, according to age, ability and aptitude (8). At this point of time when the role of teacher is so vital, the teacher cannot perform her duties perfectly well if she is suffering from health problem especially associated with Musculoskeletal Pain. These are number of risk factors involved in the prevalence of Musculoskeletal Pain that need to be identified.

Primary School Teacher's Activity during the Day

A teacher is one who prepares the young kids students for a critical role of tomorrow. Teaching is a noble profession a teacher has great status like parents picture protects the future of nation he prepares mall children today for a big task tomorrow without a good teacher one shall never progress in his life.The teacher always makes learning like fun and always understands deeply the needs and issues of student in study and also anchorages and never threatens the students.

A good teacher is the one who cares of his students an ideal teacher is the one who is experienced sincere committed and possesses vast knowledge about his subject. A good Ideal Teacher is good in listening, speaking, communicating and cooperating with the students. A primary school teacher teaches younger children standard 1 to standard 8. In some countries, the common term is elementary school rather than primary. The elementary or primary school program educates children to prepare them for the upper grades of high school. Primary school teachers typically create lesson plans for their grade level based on meeting government standards. Usually a primary school program places an emphasis on well-rounded activities such as reading, mathematics, language, arts and drawing, environment, physical education, craft and science (9).

Musculoskeletal Pain and School Teachers

Teachers have to work for a minimum of five hours a day from Monday to Friday and three and a half hours on Saturday in primary municipal corporation school of Vadodara city. If the strength of students is more, the schools run in two shifts, one in the morning from 7 am to 12:30 pm and other in the afternoon from 12pm to 5:30 pm every day. Some schools have more than one recess then they have a small refreshment break of 15 minutes. If school is providing mid-day meal to all the students then they are having recess time duration of 45 minutes. These recess time varies according to school timings. The teachers have to come 15 minutes early and leave 30 minutes after the school hours.

In a single day a teacher has to perform activities (tasks) like teach specific subject to children, check the note-books of students, maintain class discipline, write on the black board, dictate notes to students and take attendance. Szeto **(2003)** found that in many schools non-adjustable furniture were used which made it more difficult to match the students as well as teachers (who can be in all sizes) leading to poor posture and negative physical health effects that had long term implications on their musculoskeletal growth and health in their future.

Teachers have a full working day; they spend 32 to 34 hrs. per week, as found through the pilot study conducted by the researcher on selected municipal primary schools of Vadodara. Grandjean and Hunting **(1997)** reported that, sometimes, while doing such tasks they feel pain in different body parts. One of the common and frequently occurring illness resulting from abnormal posture over a period of time are Musculoskeletal problems, such as low back pain, pain in the neck/ shoulder, arm, pain in joints, bones and muscles. It is often noticed in many working situations (in schools) that teachers are forced to assume bad working postures due to poor design of workplace (classroom) and tools (furniture and equipments).

The school teachers of Turkey, China, Australia, Brazil, Sweden, USA, Germany, Estonia, Japan, Malaysia, Philippines, France and Greece, have demonstrated relative to other occupational groups, a high prevalence of MSD with prevalence rates of between 40 per cent and 95 per cent (Erick and Smith, **2012**). During the course of their work, teachers may be subjected to conditions that cause physical

health problems. The work of a teacher does not only involve teaching students, but also preparing lessons, assessing students' work and being involved in the extracurricular activities such as sports. Teachers also participate in different school committees. These may cause teachers to suffer adverse mental and physical health issues due to the variety of job functions (Chong and Chan**2010**).

It has been found by Pillastrini, et. al., **(2009)** that Nursery school teachers, also perform a wide variety of tasks combining basic health childcare and teaching duties, and those that require sustained mechanical load and constant trunk flexion. Nursery school teachers have been found to have elevated prevalence of neck, shoulder, arm and low back disorders and lower-extremity MSP due to activities which require sustained periods of kneeling, stooping, squatting or bending.

Chiu and Ku, **2002** from Hong Kong found that, "The academic staff in colleges makes frequent use of computers and their daily work involve repetitive movement such as reading, writing and prolonged static posture." Academic staffs are also required to read for significant amounts of time. Lau, Sham and Wong (**1996**) indicated that subjects with neck pain spent more time in reading. The nature of university academic works is also stressful. This is supported by the SW190 Survey in Britain which found that, teachers, professionals, and other educational and welfare workers were found to be significantly above average in the rates of self-reported stress, depression, and anxiety as stated by Health and Safety Executives, (Health and Safety Statistics, London**1996-1997**).

The stressful working conditions due to large classes, lack of educational resources, and limited reward for their work was the likely cause of the high prevalence rates of self-reported musculoskeletal disorders (MSD) among teachersof Turkey, China, Australia, Brazil, Sweden, USA, Germany, Estonia, Japan, Malaysia, Philippines, France and Greece(Bentley, **2012**). The educated intelligent population of the country are exposed to these occupational hazards from the first day of the work and from the young age from school. This will gradually transform into a major health concern in India soon. Hence, there is a need to find out the reasons for the problem and workout suitable solutions (Neeraja, **2010**).

A study conducted by Thomsen, et. al, in **2007** found that, the force but not repetition and position were related to hand-wrist pain and possible tendonitis in the baseline analyses showing an exposure-response pattern. Odds ratios for the risk of hand pain was 1.7 (95 per cent CI 1.3 to 2.2) and for possible tendonitis 1.9 (95 per cent CI 1.1 to 3.3). In the follow-up analyses force remained a risk factor for hand pain (OR 1.4, 95 per cent CI 1.1 to 1.8) and for possible tendonitis (OR 2.9, 95 per cent CI 1.3 to 6.8). Repetition was also a risk factor for the onset of hand-wrist pain (OR 1.6, 95 per cent CI 1.2 to 2.3).Increasing levels of force were associated with prevalent and incident hand-wrist pain and possible extensor tendonitis.

Despite this, the impact ofMusculoskeletal Pain specifically within the teaching profession has not been given sufficient attention in the literature. Furthermore, comparatively little research has investigated the prevalence of MSP in teaching profession. The aim of this review was therefore, to critically analyse the literature and report on the prevalence of Musculoskeletal Pain (MSP) in teaching profession.

Psychosocial factors have also been associated with Musculoskeletal Pain (MSP) among school teachers and the current review suggests that psychosocial factors such as high workload/demands, high perceived stress level, low social support, low job control, low job satisfaction and monotonous work are mostly associated with Musculoskeletal Pain (MSP) among school teachers of United Kingdom According to data from the Health and Safety Executive, over 175 million working days were lost to the UK economy due to sick leave with one in eight patients diagnosed with Musculoskeletal pain (MSP) symptoms such as neck, back and shoulder pain costing the UK economy between £103-129 billion (12).

Justification of the Study

Teacher's job is not an easy one. They have to spend long hours for imparting quality education to the students. The task of teaching however becomes more difficult especially for the primary school teachers when carried in a traditional work environment in the municipal primary schools as compared to the private modern schools that possess all the modern facilities to carry out the teaching in the classroom.

The work environment of the primary school teachers is their classroom. The teacher is forced to adjust in their existing work environment while teaching. The poorly designed work environment of the classroom might have a direct impact on the productivity of the teacher resulting in their poor health and quality of teaching. At the same time the teacher might also experience discomfort in the posture adopted by them while teaching, leading to several musculoskeletal pain. If this situation is prolonged for longer span of time, it might have its serious consequences for the teacher as an employee and as well as for the students too. The poor output by the teacher due to the poor quality of teaching affected by their poor health will lead to poor perception and understanding by the students. A healthy and intelligent population contributes significantly in the economy of the nation. There is an urgent need to intervene through the research in tackling the health and psychosocial problems of the municipal primary school teachers so as to increase their productivity and thereby the quality of teaching to produce productive human resource at micro level. Thus, the present research is conceptualized.

Whether the poorly designed work environment make the teacher experience health problems resulting in musculoskeletal disorders and poor posture while carrying her teaching activities or not, whether the psychosocial factors have an impact on musculoskeletal disorders experienced by them or not, are some of the queries that will be answered by the findings of the present research.

The review of literature has highlighted that many studies were undertaken on musculoskeletal pain for various professionals and others on population in general (Sim,et, al., **2006**, Lau, et, al., **1996**), Hospital Nurses (Josephson and Vingard, 1998, and Lagerström, et, al., **1998**), Teachers in schools and primary school teachers (Yue ,et, al.,**2012**, Wong, et. al., **2009**, Chiu and Lam, **2007**, and Samad, et, al., **2010**), Nursery children (Erick and Smith, **2011**), Primary school children (Chan and Chong, **2010** and Geldhof and Cardon, **2007**), Academic staff in Institutes (Chiu, et. al. , **2002**), School personnel (Tsuboi, et. al., **2001**), Designing students (Chauhan, **2010**, Datar and Gandotra, **2010**), Garment makers (Vandyck and Fianu, **2012**), Construction workers (Holmstorm,et, al. , **1992**), Secretaries (Kamwendo,et, al., **1991**), Software Professionals (Neeraja, **2010**), Youth computer user (Szeto, **2003**) and Office workers (Janwantanakul, et, al., **2009**) .

Few studies conducted outside India focus more on the musculoskeletal pain related to specific body parts like neck, shoulder, low back, hand wrist and, knee (Yue, **2012**, Sim,et, al., **2006**, Thomsen,et, al., **2007**, Chiu and Lam, **2007**and Tsuboi,et, al., **2001**).The literature reviewed further highlighted that some studies were also carried on the impact of workplace risk factors among the teachers (Samad, et, al,. **2010**, Wong, **2009** and Sim, et, al., **2006**). The researcher come across very few studies conducted in India on the musculoskeletal pain among the primary school teachers. This became the assertion of planning to undertake the present study.

Researches on School teachers of Turkey, China, Australia, Brazil, Sweden, USA, Germany, Estonia, Japan, Malaysia, Philippines, France and Greece have demonstrated the existence of musculoskeletal problem in teaching occupation. It is assumed that the prevalence of musculoskeletal pain among primary school teachers might differ depending on the activities performed by them in different locale. Thus, the researcher became interested to undertake the present study. The findings of the study would be useful for the school authorities to become aware of the impact of poor design of the classrooms and the resulting effect of it on the teachers and students guiding them to make the required changes. The findings will also be useful for the teachers in taking precautionary measures while carrying out their duties with a purpose to reduce or prevent the musculoskeletal pain and postural discomfort experienced by them.

Statement of Problem

The present research aims to assess the Work Environment, Perceived Comfort Level Regarding Existing Facility in the Classroom,Postural Analysis,Identification of Psychosocial Factorsrelated to the Musculoskeletal Pain and Prevalence of the Musculoskeletal Pain experienced by the Municipal Primary School Teachers of Selected Two Cities of Gujarat State.

Objectives of the Study

1. To assess the existing Work Environment of the classroom of the selected municipal primary schools of two cities of Gujarat state.
2. To find out the perceived comfort level of the respondents regarding the Existing Facility in the Classroom while carrying out the related activities in their

profession.

3. To conduct Postural Analysis of the Municipal Primary School Teachers while teaching in the classrooms.

4. To identify the Psychosocial Factors related to the Musculoskeletal Pain among the Municipal Primary School Teachers.

5. To determine the prevalence of Musculoskeletal Pain experienced by the Municipal Primary School Teachers.

6. To develop and execute an Ergonomic Intervention Programme for the Municipal Primary School Teachers and the School Authorities in suggesting healthy

    a. Teacher Friendly Postures,
    b. Work Environment and
    c. Classroom Furniture Designs for the Teachers.

Limitations of the Study

(1) The study was limited to the Municipal Primary School Teachers of Vadodara and Anand city.

(2) This study was limited to the classrooms of the Municipal primary schools of Vadodara city and Anand city. (The similar classroom designs are found for all the primary school classes from standard 1 to 8).

(3) The Ergonomic Intervention Programme was limited to the selected Municipal Primary School Teachers and the Senior Management Personnelin the profession in the schools only.

(4) The selection of the respondents was limited to the normal healthy teachers not suffering from any chronic illness (either by birth or otherwise).

(5) The study was limited to the teachers employed as teachers for a minimum duration of 2 years in the Municipal primary schools.

REVIEW OF LITERATURE

The review of literature was undertaken to become familiar with the subject matter concerning the present research. In order to make the review clear and systematically organized, the review chapter was divided into two parts viz. Theoretical Orientation and Empirical Studies regarding School Teachers.

Theoretical Orientation: The theoretical review of literature covered following topic such as:

- Schools of Gujarat State and City wards
- Primary School Teachers,
- Primary School Teacher's Activity during the Day,
- Musculoskeletal Pain and school Teachers,
- Problems associated with Musculoskeletal Pain and
- Work Place Environment of Teachers.

Empirical Studies regarding School Teachers: Empirical Studies regarding School Teachers consisted of researches conducted in India and Abroad on topic such as:

- Work Environment,
- Psychosocial Factors,
- Work posture,
- Postural Analysis,
- Prevalenceof Musculoskeletal Pain and
- Risk Factors related to Musculoskeletal Pain.

METHODOLOGY

In order to achieve the objectives of the present research, a detailed plan of work and sequential procedure followed have been presented in the chapter of methodology. A brief description is presented here.

Research Design

Descriptive research design was undertaken for the present study.

Operational Definitions

The terms used in the present study was operationally defined as follows:

- **Ergonomic Assessment**for the present study was referred to the assessment of Work Environment of the classroom, Psychosocial Factors, Postural Analysis of the teachers and Prevalence of Musculoskeletal Pain experienced by the Municipal Primary School Teacher.

- **Musculoskeletal Pain** for the present study were the injuries or illnesses to soft body tissue such as Muscles, Nerves, Tendons, Ligaments, Joints, Cartilage and Spinal Discs. The symptoms were in the form of pain, discomfort and inability to perform the task. Theinjuries caused by slips, trips, falls or other similar accidents were not considered as Musculoskeletal Pain. It was measured with the aid of modified Dutch Musculoskeletal Pain tool covering body parts from neck to toes.

- **Primary School Teacher**for the present study was the one who was teaching the classes from standard 1 to 8 in Municipal Primary School.

- **Municipal Primary Schools** for the present study were the schools aided by the government funding and were located in different wards of the city for imparting education without charging any fees as compared to the private schools.

- **Work Environment of the Classroom** for the present study includedthe Physical factors like dimensions of the room, light, ventilation, heat, color,

furniture types (chairs, tables, storage units, black board) and its placements. It was observed by the researcher on the observation sheet.

- **Facility** for the present study included all the available existing items in the class room that was provided by the school authorities. It included lights, fans and furniture like writing table, chair, storage unit, wall cabinet and writing board.

- **Comfort level of the respondents** was assessed based on the perceived comfort level experienced by the respondents on three-pointresponse structure as 'Highly comfortable', 'Fairly comfortable' and 'Not at all comfortable' scored as three, two and one.

- **Postural analysis**was done on the positions of the body with its parts. In this method 4 codes were determined, according to the body postures and movements. The codes show the musculoskeletal risk level of the respondents. The postures were analysed in terms of 'normal' or 'stressful' or 'harmful' or 'very harmful' by using Ovako Working Posture Analysing System (OWAS). It was standardized postural analyses tool developed by Karhu, et. al., (**1977**).

- **Psychosocial Factors**related to musculoskeletal pain among the primary school teachers were identified in general, at the workplace and at the Home. It was judged on a two-pointresponse structurescored as Yes and No. Higher score "2" was assigned to positive statement and lower score "1" to negative statements in the section.

Locale of the Study

The study was conducted in 105 Municipal Primary Schools located in 12 wards of Vadodara city and 27 municipal Primary Schools located in 16 wards of Anand city Gujarat respectively.

Sample and Sample Size

Of the total 650 primary school teachers in all the wards of Vadodara (500)

and Anand City (150), 372 teachers were selected for the present study. Having minimum of two years of work experience, possessing normal health status and not suffering from any chronic disease. The samples were selected by taking prior permission from the Principals of Municipal Primary School and the willingness of the respondent to participate in the present research.

Sample Selection Procedure

The respondents were selected through multistage sampling procedure:

- At the first stage, the researcher collected the list of Municipal Primary Schools from Nagar Prathmik Shikshan Samiti of Vadodara and Anand city.
- Of the total 105 schools of Vadodara and 27 Schools of Anand, the researcher contacted the teachers with the prior permission from the Principal.
- The total number of 372 Municipal Primary School Teachers who willingly gave their consent in filling the interview schedule were selected purposively for the present research.

Tools Used in Collecting Data

- The interview schedule as the tool was developed by reviewing the literature pertaining to the objectives of the study. The interview schedule gathered information on demographic data. The information collected on perceived comfort level of the respondents was made on the psychosocial factors related to the musculoskeletal pain experienced by the teachers, the prevalence of musculoskeletal pain, postures adopted by the respondents at workplace.
- The observation sheet was also used to assess the existing work environment of the classrooms and the existing dimension of the furniture available in the classroom.

Validity of the Tool

The interview schedule developed for the research was submitted to a panel of seven judges possessing expertise in the field of Ergonomics. They were requested to check the clarity and relevance of the content complying to the objectives of the research. A consensus of 80% agreement among the judges was taken as a yardstick for the inclusion of the content in the final tool.

Data Collection of the Study

The data of the present research was collected through the interview schedule method. The observations regarding the existing work environment of the classrooms and the interviews of the respondents were conducted personally by the researcher partly with prior permission from the concerned authorities. During the data collection phase, the COVID-19 Pandemic and lockdown situation occurred. With the permission from the Municipal Primary Education Office (Nagar Prathmic Shikshan Samiti) during COVID-19 Pandemic and lockdown situation, the researcher had adopted the online interview schedule method to collect the needed information.

Data Analysis of the Study

The data was analysed by subjecting it to descriptive statistics. The statistical data analysis will be submitted later.

Ergonomic Intervention Programme

The online Ergonomic Intervention Awareness Programme is planned for the School Authorities and teachers highlighting the findings and suggesting healthy teacher friendly postures, work environment and classroom furniture design for the teacher.

MAJOR FINDINGS OF THE STUDY

The data collected through interview schedule were presented in findings section. A summary of the research results were presented here:

Section 1- Background information of the Municipal Primary School Teachers

- The mean age of the respondents was 44.5 years at the time of data collection.
- The findings on the gender of respondents revealed that the female teachers (78.8 per cent) outnumbered the male teachers (21.2 per cent).
- Majority of the respondents (90.3 per cent) were married.
- The findings on the type of family highlighted that 52.2 per cent of the teachers lived in nuclear family, the remaining (47.8 per cent) were found to be residing in the joint family.
- The data of the family size of respondents reported that most of the respondents (63.2 per cent) had a small sized family having two to four family members.
- The findings highlighted that comparatively a higher percentage of the respondents (33.1 per cent) had their monthly family income ranged from Rs. 75.000/- to Rs. 1, 00,000/- per month.
- The data also revealed that 45.7 per cent of the respondents had their total monthly personal income ranged from Rs. 25,000/- to Rs. 50,000/- per month.
- The mean work experience of the respondents was found to be 21.49 years at the time of data collection.
- Majority of the respondents (76.6 per cent) were using two wheelers as their mode of transportation to their workplace.
- The mean distance from school to home of the respondents was found to be 6.64 kilometers.
- The findings highlighted that the respondents wereteaching subject viz: Gujarati (24.9 per cent)Maths(22.3 per cent) and Social Studies (15.4 per cent).
- It was also highlighted that 59.4 per cent of the respondents were found teaching for duration of five hours a day whereas 23.3 per cent of the

respondents were engaged in teaching six hours a day in municipal primary schools.

- The data further revealed that 26.6 per cent of the respondents were teaching in standing position for at least two hours during a day whereas 30.4 per cent were found teaching in sitting position for one hour every day and 40.9 per cent of the respondents had forward bending and twisting (flexing) posture for one hour during a day while assisting the students in their class work.
- It was also found that most of the respondents (68.8 per cent) enjoyed one recess in a day.
- The minimum recess time of the respondents was reported to be 15 minutes (28.2 per cent) and maximum 45 minutes (25.8 per cent).
- The descriptive analysis on working hours of the respondents highlighted that 39.8 per cent of the respondents were using computer for one to two hours in a day and 11 per cent of the respondents for two to four hours in a day.
- Most of the respondents (60.8 per cent) were found doing exercise for one hour, 5.1 per cent for two hours a day and 33.1 per cent of the respondents reported no physical exercise by them.
- The data on household work done by the respondents highlighted that18.8 per cent of the respondents were doing household work for four hours a day, 11.6 per cent for five hours a day and 17.5 per cent of the respondents for six hours a day respectively.
- The findings on perceived health status of the respondents in general elicited that 19.9 per cent of the respondents reported to have average health whereas 1.6 per cent of the respondents perceived their health as poor.
- The findings also highlighted that 47.0 per cent the respondents were doing “walking” regularly for maintaining their physical fitness. The respondents were walking for an hour daily. Other than walking the respondents were also found doing “Yoga” and “Cycling” daily.

Existing Work Environment of the Municipal Primary School Classroom

- The observation sheet recorded that the Minimum size of classroom was of 90 Sq. Ft. and maximum size as of 700 Sq. Ft. The mean size of the classrooms was 247 Sq. Ft.

- The data revealed that 29.0 per cent of the walls of the school classrooms were painted in Yellow color, 14 per cent had Cream wall paint on their walls and 7.8 per cent of the school classrooms had two coloured wall of light blue on top and dark blue at the bottom part of the walls. The distemper paint was used on the walls of all the classrooms.
- Majority of the ceiling of the schools were painted with white colour.
- The observation data revealed that 20.7 per cent of the existing classrooms had Cement Plaster flooring of gray colour with cracked surface.
- The findings further revealed that15.1 per cent of the classrooms had two doors, made up of wood with two shutters and painted with colored oil paint.
- One third of school classrooms (33.6 per cent) had three windows and one-fifth of school classroom (21.0 per cent) had two windows. The majority of the windows were located on the opposite side of the door wall for cross ventilation.
- The majority of the school classrooms (84.4 per cent)had two tube lights which were placed above the writing board and on the opposite wall. It was also found that 41.4 per cent of the classrooms had two fans fixed on the ceiling. One fan was above the writing table and other fan was placed above the sitting area of the students.
- Majority of the classrooms had one table and one chair for the teacher. The tabletop was made-up of wood and its legs with iron. The chairs were of same dimensions (20”x18”x36”) and made-up of wood in all the classrooms.
- Most of the classrooms (64.2 per cent) had one old Iron storage unit/ cabinet.
- The majority of the school classrooms had Green colored writing board made up of porcelain enamel with steel back with the dimension of 6’-0” x 4’-0” in size.

Section 2 - Perceived Comfort Level of the Teachers regarding the Existing Facility in the Class room

This section covers perceived comfort level of the Teachers regarding the existing facility in the class room.

- The result highlighted that 45.7 per cent of the respondents felt “Fairly Comfortable” regarding the height of the writing board from the ground

whereas very few respondents (5.4 per cent) did not feel comfortable at all with the height of the writing board from the ground.

- Nearly one-tenth of the respondents (9.1 per cent) were not at all comfortable while using the Storage Unit. The 8.3 per cent of the respondents were not at all comfortable in using the drawers of the Storage Unit. The respondents expressed their concern for the redesigning of the storage unit in the classroom so that it can be used more comfortably.
- The data also revealed that 9.4 per cent of the respondents were not at all comfortable with the backrest width of the Chair. Less than one-tenth of the respondents (7.3 per cent) were not at all comfortable with the height of the Chair seat and 9.9 per cent of the respondents were not at all comfortable with the height of the back rest of the Chair. Less than one-tenth of the respondents (8.3 per cent) were not at all comfortable with the width of the arm rest of the chair while using it.
- The result showed that 43 per cent of the respondents reported to be fairly comfortable with the width of the writing table. The height of the Writing table was not at all comfortable for 7.0 per cent of the respondents. The respondents were not happy to work on the surface of the table as it was quiet old and washaving uneven surface. The tables were having wooden top with iron legs.
- Slightly more than one-half of the respondents (55.1 per cent and 55.6 per cent) were fairly comfortable with the effects by Low light and extreme Light in the Classroom respectively.
- The findings highlighted that 15.3 per cent of the respondents were not at all comfortable with the noise in the class room where as 16.9 per cent of the respondents were not at all comfortable with the smell in the class room. The researcher observed that the presence of smell was due to humidity and dirt in the classrooms.

Section 3 -Postural Analysis

The Researcher had used The Ovako Working Posture Analyzing System (OWAS) method for postural analysis. Based on the OWAS score of the

respondents, the finding showed that 33.5 per cent of the respondents were working in stressful posture, 22.3 per cent of the respondents were working in harmfulposture and 14.2 per cent of the respondents were working in very harmful posture.

Anthropometric Data of the Municipal Primary School Teachers

- The mean weight of the respondents was measured as 62.92 kilogram.
- The mean Height (Stature) of the respondents was recorded as 61.05 inches.
- The mean vertical reach of the respondents was measured as 68.14 inches.
- The mean horizontal reach of the respondents was recorded as 57.08 inches.
- The Anthropometric Data was used to design class room furniture for the teachers i.e. table, chair and storage cabinet.

Section 4 –Psychosocial factors related to the musculoskeletal pain

The result highlighted that majority of the respondents (75.0 per cent)were found to have reported psychosocial factors induced Musculoskeletal Pain to a medium extent, 5.1 per cent of the respondents to a lowest extent and 19.9 per cent of the respondents to the highest extent. Thus, an overview of the findings indicated that the respondents were affected by psychosocial factors induced musculoskeletal pain.

Section 5 –Musculoskeletal Pain experienced by the Municipal Primary School Teachers

This section presents the data regarding Musculoskeletal Pain experienced by the Municipal Primary School Teachers while teaching during past 12 months in various parts of their body.

- The data showed that 44.6 per cent of the respondents were experiencing Pain in their Neck, 44 per cent pain in their Upper Back, 46.5 per cent in their Lower Back and 43.9 per cent in their shoulders during last 12 months. The results also reflected that 49.5 per cent of the respondents were experiencing pain in their knees whereas 39.0 per cent were experiencing pain in the foot

during the period of last 12 months.

- The findings further revealed that 24.2 per cent and 21.0 per cent of the respondents experienced radiating back pain to the right and left knee respectively. The respondents also experienced radiating neck pain (11.3 per cent) and shoulder pain (10.2 per cent) till the right and left upper arms during the past 12months.
- An opinion of the respondents was taken regarding the causes of musculoskeletal pain in general by the researcher. The respondents opined that, standing for a long period (22.8 per cent), sitting for a long period (21.2 per cent) and occasionally working in the same postures for a long period(19.4 per cent)caused musculoskeletal pain. And 37.9 per cent respondents stated that musculoskeletal pain was associated with their teaching work.
- An inquiry was made related to the illness of the respondents in their teaching profession. Very few respondents reported to suffer from Vertigo (3.5 per cent), Migraine (4.4 per cent),Upper Back Pain (3.3 per cent),Mid-Back Pain(3.4 per cent),Low Back Pain (9.7 per cent), Swan Neck Deformity (8.7 per cent), Frozen Shoulder (3.8 per cent)and Knee Osteoarthritis (6.8 per cent).

Intervention Programme

An online Ergonomic Educational Programme is planned for the School Authorities and teachers highlighting the findings of the study and suggesting healthy teacher friendly postures, work environment and classroom furniture designs for teacher's table, chair and storage cabinet. The plan, sectional elevation and details of the furniture will be proposed using AutoCAD software.

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