

Teachers' awareness and practices on school ergonomics in Karachi, Pakistan

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Received: March 28, 2022

Accepted: June 21, 2022

Published: June 29, 2022

Abstract

Students spend most of the quality hours of the entire day in a school environment. Therefore, their safety and security are priorities of school administration and teachers to keep them secure from injuries and other health issues. Students mostly rely on teachers for their daily academic activities within a classroom environment. Therefore, it is essential to find out teachers' perceptions and awareness about ergonomics risk factors and their practices to reduce these factors for the safety of the children within the classroom environment. A qualitative case study was conducted in a private school of Pakistan, to investigate teachers' perceptions about school ergonomics and their practices which directly or indirectly influence school ergonomics. Five school teachers of primary class 3 were interviewed through a self-developed semi-structured interview protocol. The result indicated that ergonomics is highly valued in school education for students' safety and health. Teachers introduce appropriate physical exercise in the classroom to keep children healthy and active during school hours and provide postural awareness for developing proper body posture. Counselling parents on ergonomics risk factors was suggested, along with ergonomically designed furniture in the classroom and the use of light material backpacks are also recommended.

Keywords: body posture, ergo-design, classroom environment, heavy backpack, postural awareness, ergonomics practices, school ergonomics, teachers' perceptions.

How to Cite:

Jabeen, R. & Hussain, N. (2022). Teachers' awareness and practices on school ergonomics in Karachi, Pakistan. *Journal of Humanities, Social and Management Sciences (JHSMS)*, 3(1), 366-381. <https://doi.org/10.47264/idea.jhsms/3.1.26>

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1. Introduction

The current scenario where schoolchildren carry heavy backpacks diverts the attention of the school stakeholders and teachers toward ergonomics (Legg & Jacobs, 2008). Ergonomics plays a pivotal role in the school environment because students spend long hours sitting in the classroom, affecting their physical and musculoskeletal systems. Therefore, Kumar *et al.* (2020) suggest that ergonomics education must be a part of the school curriculum to provide awareness to teachers, parents and students. Ryabova *et al.* (2020) further elaborate and say that teachers can create an ergo-design classroom environment which signifies the implementation of ergonomics and improve students' interest in studies leaving a positive impact on their health. Students' health and care is a matter of serious concern for teachers and therefore, ascertaining such an educational setting where students can produce maximum outcome is also the responsibility of school administration and teachers (Legg, 2006). However, Farhood (2013) strongly suggests that teachers and parents together can make it workable if they are fully aware of ergonomics.

The study investigated educators' perceptions and practices in one of the schools in Pakistan. According to Naidoo and Petersen (2015), most of school leaders emphasize on the issues of quality content, assessments and evaluation programmes. However, the ergonomics issues related to the safety and health of students may not be seriously investigated, which directly helps in improving the quality of the educational environment (Woodcock, 2007).

In scientific studies according to Soltaninejad (2021) ergonomics education plays an important role in the school environment to improve students' health, physical and emotional development. However, Woodcock (2007) argues that unfortunately, the issues to improve the quality of the education technique are not studied deeply in the light of the ergonomic design to ensure the professional development of trainees particularly in schools at the primary level. Okulova (2020) stress that schools take great risks when they fail to implement ergonomics conditions at the primary level. School authorities are required to provide awareness regarding ergonomics and its related risk factors to teachers, parents and students as well so as to reduce the occurrence and its probability. Balkó *et al.* (2017) also emphasize on the importance of introducing regular exercise as a compulsory feature in daily school activities to reduce risk of bad posture and injuries and musculoskeletal issues amongst students. According to Ryabova *et al.* (2020) establishing proper understanding in parents and teachers towards ergonomics and its related risk factors that cause injuries and health issues amongst students can improve school environment in many respects.

1.1. Context of the study

The four pillars of the 21st Century, (learning to know) where teachers' planning determines students' learning outcome, (learning to do) students are encouraged to put their own ideas into practice, (learning to be) learning does not only confined to the classroom, but children learning takes place during interaction with the environment and helps him developing problem solving attitude and (learning to live together) ability to live with others, being emphatic and considerate are strongly strengthened by following ergonomics guidelines (Bennett & Tien, 2003).

Generally, in school environment, the influencing factors are sitting posture of students which

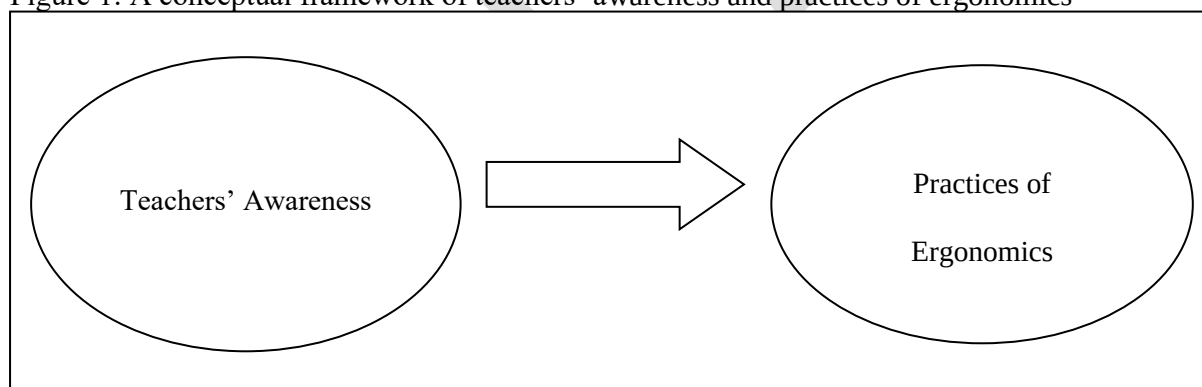
directly affects the anthropometry of school children that is the systematic measurements of the size, shape and composition of the human body and the design and measurement of school's furniture (Jayaratne & Fernando, 2009). Physical ergonomics factors such as school Furniture, seating arrangement as well as placement of computers are directly associated with students' comfort and safety which need to be improved (Okulova, 2018).

School environment plays a pivotal role in determining students' academic success, health, productivity, safety and comfort (Tapia-Fonllem *et al.*, 2020). This is the reason education is considered as a multiplex process encompassing all steps involved right from verbal presentation of material, a provision of adequate conditions for a comfortable environment, proper infrastructure and furniture, adequate lighting and availability of learning tools or equipment, teachers' awareness regarding ergonomics and their practices ultimately completes the teaching learning process and students to accomplish tasks assigned by the teacher, without affecting health of students (Zunjic *et al.*, 2015) as illustrated in the conceptual framework in figure 1 below.

1.2. Conceptual framework

After reviewing the literature in the light of research questions, the following conceptual framework was developed to conduct this qualitative study. The researcher felt that a simple model can be followed to gain an understanding of teachers regarding ergonomics which ultimately leads to their practices being implemented in classrooms.

Figure 1: A conceptual framework of teachers' awareness and practices of ergonomics



1.3. The purpose of the study

The purpose of this study was to collect contextualized evidence from teachers' perspectives regarding the phenomenon of ergonomics by confirming or identifying new dimensions of ergonomics in context of school education at a private school of Karachi, Pakistan. This study has made a valuable contribution in the field of school ergonomics as very scanty literature was available on this subject due to being uncommon. Therefore, it has made a significant addition in the field of school ergonomics. It has provided contextualized evidence to the stakeholder and people involved in school administration.

1.4. The objectives of the study

The objectives of the study which followed the study are as follows:

- To understand teachers' perceptions about the term ergonomics.
- To enquire about practices of ergonomics in the classroom environment.

1.5. The significance of the study

The findings of this study could help to inform principals about the teachers' awareness of the term ergonomics and its practices. It also provides a solution in school education to resolve the issues of students' health such as improper body postures, musculoskeletal disorders, and lower back pain, pain in different parts of their body like shoulder, neck and arms which ultimately improve students' health and learning environment.

1.6. Problem statement

According to Gilani (2021), school leaders and teachers are not fully aware of the depth of the term ergonomics. He further argues that leaders and teachers only focus on school furniture and sitting position of the students. But at the same time, Choppin *et al.* (2018) stress that the schools' heavy backpacks must be taken into account as well, however, classroom environment which includes pedagogy, curriculum content and pattern also the part of ergonomics. Legg and Jacobs (2008) stress that there is limited or insufficient knowledge of the interactions between the school stakeholders and the teachers regarding the fundamental understanding of the term ergonomics and its enactment at the early level of schools. In context to Pakistan, it has been observed that classroom furniture is not ergonomically designed, nor the ergonomics principles are considered with respect to the material used in manufacturing of school bags. Khan *et al.* (2015) support it by elaborating that improper classroom furniture, inappropriate bag material and sizes are among the major causes of musculoskeletal disorders, neck and shoulder pain in school-going children.

1.7. Research questions

- The present study evaluates the following research questions:
- How do teachers perceive the term ergonomics?
- How do teachers practice ergonomics in school education?

2. Literature review

In this section, two areas have been assessed and later integrated to develop a deeper understanding of this study. The first one addresses the awareness of the term ergonomics from the teachers' perception. The second part encompasses the practices of ergonomics in schools at the primary level.

2.1. Ergonomics

The term ergonomics is expressed in different ways such as Zunjic (2017) describes the term ergonomics as a multidisciplinary science, which deals with the workplace, process of work, and aims to improve comfort, safety and efficiency of people considering physiology, psychology, sociology and organizational aspects of humans. Whereas, the International Ergonomics Association (2000) defines ergonomics as a scientific domain that primarily relates humans with the other components of system which directly deal with human well-being.

Ergonomic is a holistic protocol in any organization that considers all factors such as workplace design, peaceful environment, interactions with people, management, policies, working hours, teamwork, resources for the human welfare (Trevelyan & Legg, 2011). Lee *et al.* (2008) state that ergonomics also connects with musculoskeletal issues which occur due to poor body postures. Whereas, Zunjic *et al.* (2015) explain that school ergonomics encompasses almost every single element of school including school building, classroom environment, students' sitting position, exercises they perform, teaching procedure, sports activities and classroom activities all are the of part of school ergonomics (Noro & Imada, 1991).

2.2. Ergonomics in schools

Rabada and Artazcoz (2002) state that school environment has to be safe risk free and comfortable for students. Teachers interact with students and are continuously busy adapting bringing in new ideas in teaching according to the demands of society (Brackett *et al.*, 2011). On the other hand Kovač *et al.* (2013) assert that teachers in school face challenges on daily basis and at the same time focus on a healthy ergonomics system in schools. Where, they interact with people and machines to maintain teaching productivity and teach students innovatively. However, in schools, the ergonomic system incorporates many elements from micro to macro such as school furniture, school bags, equipment used for sports, space in classroom, lockers, computer labs, timings, curriculum, timetable, content and pedagogy (Straker & Pollock, 2003). Kaya and Romanescue (2020) strongly suggest introducing educational ergonomics programmes for students at universities to provide awareness.

2.3. School furniture and body posture

Teachers argue that there is a complete mismatch between students' physique and furniture in the classrooms resultantly students' body postures are affected. García-Acosta and Lange-Morales (2007) agree with the argument and added that the position, dimension, quality and material of the desks and chairs make students uncomfortable. Alibegović *et al.* (2020) and other researchers assert that the mismatched school furniture not only develops poor body postures but also affects the learning process of the learners. The general concern shown by teachers is that the desks and chairs are not according to the sizes of the students which is a great hurdle to produce optimum outcome. Since, on one hand teachers play an integral role in providing direct instructions on sitting positions and correct body postures (Dharmayat & Shrestha, 2017). On the other hand, they focus on students' social and emotional health in classroom environment and deliver quality education (Flook *et al.*, 2013). Casey (1990) explained a role of a teacher as a caring mother, who provides comfort and connection to studies and keep repeating the instructions to maintain correct body postures to protect them from musculoskeletal issues. Teachers' influence on students due to their direct interaction and emotional bonding with students is a universal truth which cannot be denied (Hagenauer *et al.*, 2015). Ryabova *et al.* (2020) suggested that updating teachers' knowledge about following ergonomics practices like creating a leisure corner along with learning area where children play safe and feel relaxed can improve their learning abilities as well as reducing threats to their health. In this regard school administrators and teachers can play a major role in creating safe and school environment (Davydova & Ryabova, 2012). Thomas *et al.* (2022) confirmed that students with poor sitting positions leaning over writing desk or sitting on the edge of the chair develop bad posture and have a prevalence of back pain as compared to children with good posture and sitting positions.

2.4 Heavy backpacks

Heavy school bags are a big issue among students at the primary level (Whittfield *et al.*, 2005). Musculoskeletal issues, lower back pain and shoulder pain are common among the students (Woodcock *et al.*, 2003) which ultimately impact the learning process and badly affect engagement of the students during lesson time (Whittfield *et al.*, 2005). Mackenzie *et al.* (2003) suggested that school administrations need to cut down on the weight of school bags by providing lockers and reduce the burden of bags by adjusting the class timetable. Extra books and other school materials may be allowed to keep in schools (Sheir-Neiss *et al.*, 2003). Another study suggested adopting electronic books or CDs that can be used in place of heavy textbooks to save students from potential health problems (Mohammadi *et al.*, 2017). As mentioned earlier, children walking with heavy backpacks for longer hours can get hurt or injured, raising great concerns among parents and the community.

2.5. Physical exercise

Regularly physical exercises are important (Kovač *et al.*, 2013). Syazwan *et al.* (2011) state that exercises and physical demonstrations for children along with awareness regarding ergonomics risk factors in teachers can help improve the school environment. They further assert that the school stakeholders must train their staff and prepare teachers to practice ergonomics during classes. Teachers making children do stretching after every 40 minutes prove to be a healthy feature in daily routine of students. However, teachers must be properly trained for guiding students and parents. Abubakar (2020) and Choudhary *et al.* (2020) also support and state that parents also to become the part of ergonomic system and help their wards in physical exercises and guide them to improve sitting positions at home. Mohammadi *et al.* (2017) express the importance of morning exercises or morning drill which not only helps to keep students active but also helps in building strong muscles. At the same time Kovač *et al.* (2013) encourage the conduct of sports activities and suggest that gymnastic and swimming to include in sports which help students to maintain their proper body postures (Syazwan *et al.*, 2011). Balkó *et al.* (2017) further elaborate that Students' regular exercises demonstrated in school also leave a positive impact on children's posture and overall health. They further emphasize that regular exercises to be the compulsory component of the school curriculum especially at primary level as a long term investment for children's future. A close coordination between school, parents, sports teachers and medical doctor has to be maintained for wellbeing of children. For which proper training be provided to parents and teachers by the occupational therapists.

3. Research methodology

This study examined teachers' perceptions about school ergonomics and their practices which directly or indirectly support school ergonomics. The main purpose of this study was to find out teachers' perceptions about school ergonomics and to investigate their practices based on ergonomics principles they follow in classroom environment. This section encompasses the process that was used for collecting the data, its organization, and analysis of data. The research is focusing on following key questions:

- How do teachers perceive the ergonomics?
- How do teachers practice ergonomics in classroom environment?

The research was conducted by using qualitative research design through a case study approach. The tool used for data collection was based on self-developed semi structured protocol. Semi-structured interviews are considered to be most widely used procedure for data collection (Dicicco-Bloom & Crabtree, 2006). The respondents were able to express their views in detail, thereby uncovering the information in depth expressing their views and opinion openly. Thematic analysis of data obtained from semi structured interviews were transcribed, the verbatim was member checked to make it more reliable and valid. Codes and themes were categorized as suggested by Corbin and Strauss (2008).

In this research target population was the teachers of grade 3 of private sector schools of Pakistan. However, the accessible population was teachers of a well reputed school of private sector in Karachi, Pakistan. Five school teachers of primary class 3 were selected through non-random, purposive and convenience sampling. Maxwell (2012) suggested purposeful sampling, which is more relevant and appropriate for qualitative study. This research also involved convenience sampling due to the availability of respondents (Patton, 1990). The five teachers who were the respondents participated voluntarily without any pressure by the researcher.

As indicated earlier the technique of data collection was a self-developed semi-structure interview guide. Face to face interviews were collected. Pilot study was also conducted by interviewing two teachers other than the participants to test the accuracy and validity of a tool (self-developed semi-structured interview protocol). It was verified through a pilot study that the interview protocol was well comprehended and easily understood by the pilot study participants. The Interview protocol was organized through broader themes identified from the literature review. The interview guide was mainly focusing on three main research themes, i.e. (i) Role of ergonomics in school, (ii) Teachers' perceptions about school ergonomics (iii) Ergonomics supported classroom environment.

For reliability of the instrument two important measures were taken by the researcher. The first one is to consult two academician/researchers for their expert opinion and amendments were made in the instrument as per experts' feedback and suggestions. Second measure has already been discussed earlier, was to pilot test the study on two teachers other than the research participants to see the accuracy of the interview protocol and the difficulty level of participants understanding towards the interview questions. The pilot study was proved to be extremely helpful in finalizing the themes for interview guide and it has also provided the opportunity to researcher to reframe questions using understandable appropriate language in order to ensure clarity of responses.

The interviews were tape recorded and transcribed. To assess the reliability and credibility of the verbatim, a follow up through a member check was conducted to ensure the credibility of their responses. Research participants/teachers were interviewed during their working hours to avoid extra burden on them of staying back till late hours. The duration of each interview lasted for 35- 45 minutes approximately, where the participants were given full freedom of speech and voice their opinions and views without limiting them to focus on any one aspect of the research.

All interviews were tape-recorded with iPhone 12 Mobile phone- Voice recorder. The recorded data were converted to verbatim by transcribing for analysis by the researcher. The raw data

were coded according to the coding reviewed by five raters and then Kappa online calculator was used to check the inter-coded reliability. Coded data was further reviewed for organizing and refining themes analyzed through thematic analysis (Corbin & Strauss, 2008). When themes were developed then they were again reviewed in the light of research questions and available literature reviewed in the beginning.

4. Findings, analysis, and discussion

It is based on the extensive literature review on the interdependence of ergonomics and education process, imparting knowledge by teachers promoting education & health in primary school setting. Teachers' interaction with students has an impact on students' life (Woodcock & Barlett, 2003). Teachers are considered to be the role model for students. Their actions and behaviour leave long-lasting impact on their students. Teachers' role as a guide in students' life cannot be denied. Teachers' guidance and supervision in students' academic as well as physical activities not only help students improve their performance but refrain them from many health hazards in school environment. According to Ryabova *et al.* (2020) educational ergonomics is simply creating an environment safe and healthy for individuals for their secured life in later years. Kaya and Romanescue (2020) emphasized to include ergonomics as a course in design education in universities curriculum to provide awareness amongst students.

The concept of ergonomics in education is an organized sequence of procedures for conducting educational activities by pupils and teachers in the institutions (Legg, 2006). Ergonomic education focuses on developing insight about reliable, safe and healthy institution to encourage individuals for working in it (Noro & Imada, 1991). For instance, simple instructions by teachers to students in carrying backpacks in appropriate manner can save them from unnecessary strain on their shoulders, lower back, neck and arms. As a result of this qualitative study following themes have emerged. Responses of the respondents under each theme are also described their opinion and point of view as follows:

4.1. Ergonomics and teachers' understanding about safe school environment

As per Trevelyan and Legg (2011), the design of workplace and its effects on the worker has a significance value which is determined by ergonomics principles. Respondent A explained about her perceptions about ergonomics as:

“Although I was not aware of this term, neither I had any idea what are ergonomics practices. However, I would like to add that our children or you can say our students are directly connected with the school environment it means furniture which they need to use during their school timings, teaching gadgets or teaching equipment, carrying of backpacks, sitting arrangement or furniture arrangement selection of activities. All play very important role in educational institutes. As a teacher we need to be trained regarding all ergonomics risk factor so that we practice it in a better way for our students' safety, because students' safety is our prime concern”

Teachers were of an opinion that without adopting safety measures in the classrooms injuries and other health issues like low back pain and musculoskeletal disorders can occur. When teachers state that the students' safety is their primary concern (Flook *et al.*, 2013). It was

discovered from the present study that they adopted such practices like providing proper guidance to students on regular basis without even knowing the guidelines of ergonomics principles to relieve students from additional stress. However, Ryabova *et al.* (2020) suggested that teachers must acquire proper training regarding ergonomics guiding principles and practices. Therefore, the emphasis is laid on the importance of ergonomics education for teachers to reduce children's health hazards or ergonomics risk factors (Okulova, 2020).

4.2. Postural education to students for adopting correct body positioning during academic activities

Deviation from normal posture causes spinal deformities and health issues later, resulting from carrying heavy backpacks in primary schooling years (Dharmayat & Shrestha, 2017). Respondent C shared her views on the importance of providing postural awareness to students in these words:

“In parents teachers meetings parents very frequently show their concern on improper body postures of their wards that they cannot stand straight or walk straight, sit with bent shoulders and crooked back. Although we keep instructing students in the classroom to sit straight to keep them conscious or alert still their postures are not proper. This may be due to the improper size of classroom furniture. But we try our level best to correct their posture.”

Another respondent D expressed her views with respect to postural awareness as following:

“We discourage students, not to lean bodies in a forwarding direction while reading and writing. Encourage to take small steps while walking and make sure to keep the back straight. Students' bones structure are fragile, it affects badly if they are in a habit of sitting in a slouchy way for long hours. And after a certain time they feel pain as well. If we placed correct body posture charts and off and on show small videos to students as consequences of bad posture and benefits of good posture, I think it will leave a good impact on students.”

Teachers and parents often discuss in meeting about the body posture of their wards. Hence, teachers have been very observant of students' sitting, standing, and bending positions while performing academic activities in classrooms. Alibegović *et al.* (2020) further support this statement and link it with better sitting and standing postures to proper sized chairs and adjustable desk as a result of an intervention in Finland; the findings showed less tension in back muscles, reduced pain and showed overall better academic performance among students. Children's proper positioning while sitting on chair and table or desk has a better impact on their body posture (Thomas *et al.*, 2022). Proper seating arrangements and appropriate school furniture can greatly improve students' health and safety in the school environment (Okulova, 2018).

4.3. Healthy physical exercises to keep students active throughout the day

Physical exercises improve students' muscles and nerve coordination and thus enable them to feel active and alert, which improves their posture and overall health. It also enhances their cognitive abilities resultantly they perform better academically. Children's participation in

physical activities is a valuable investment in their future (Balkó *et al.*, 2017). The importance of regular physical exercise is well explained by respondent D:

“Before starting every period simple and easy exercises were made compulsory for the students to make them alert and active. Constantly instructions were given to students to keep the notebooks in a slanted position around 45 degrees. While we started demonstrating physical exercises, a drastic change has been observed. Students seem more active and ready to work.”

Respondent B highlighted the importance of physical exercises in these words:

“By demonstrating physical exercises early morning we found students remain active throughout the day and complain very rare about tiredness.”

Regular exercise is a healthy habit that acts as a booster dose for students' readiness for a class in the morning as they feel active fresh and motivated to spend whole day in school happily. It is suggested that proper medical physical training practitioners to design physical exercises for students' good health and proper postures (Kovac *et al.*, 2013). Balkó *et al.* (2017) suggest students to participate in any physical activity at least three times a week to improve their body posture. The fact that students' good health and proper posture is a result of regular physical exercise and a balanced diet cannot be denied (Balkó *et al.*, 2017). According to Ezhovkina and Ryabova (2015) educators and school administrators should create a school environment which builds a positive relationship between children and their movements. As a result of a survey by Balkó *et al.* (2017) it was discovered that 50-60% of students were suggested to carry out a physical exercise on regular basis to correct their bad posture. Syazwan *et al.* (2011) support it and say that with proper physical exercise, reduced bag weight and training regarding ergonomics risk factor students' body posture can be improved. Gilani (2020) strongly advises school administration to demonstrate physical exercise for 30-35 minutes daily to keep children healthy and physically fit.

4.4. Smart weekly timetable to lessen load of heavy backpack

Provision of lockers in school environments saves students from carrying heavy backpacks daily. Mackenzie *et al.* (2003) suggest that school administrators need to cut down on the weight of school bags by providing lockers and reduce the burden of bags by adjusting the class timetable. Load of extra books and other school materials are allowed to be kept in schools (Sheir-Neiss *et al.*, 2003). The same was responded by respondent E enunciated her experience in these words:

“The proposal was put forward to the school administrators to alleviate the heavy backpacks by executing several things. Such as the teaching of 4 subjects per day, assimilation of contents, agreed on block periods for core-subjects and allowing students to keep their notebooks, textbooks or workbooks in the class cabinets.”

Managing smart weekly timetables also reduces the load of heavy backpack and saves children from injuries and pain. Enabling children to leave books and notebooks at school will also lessen the burden on their tender bones and spine (Mustafa & Ibrahim, 2018). However, school

administration also has to play its role in making a policy decision to reduce the weight of the backpacks by designing smart weekly timetables and providing lockers for keeping student's books (Colgan, 2002). A study by Rontogiannis *et al.* (2017) strongly recommends that teachers guide students to follow timetable and leave extra stationery at home and parents be vigilant about their children's school bag carriage to avoid extra load in it.

4.5. Parents' counselling on ergonomics practices

Forjuoh *et al.* (2003) suggest that a proper educational programme regarding health hazards in students due to heavy backpack be incorporated into curriculum and parents be provided a copy of it for its awareness. Teachers stated that they focused on stretching exercises after every period of 40 minutes and guide students to perform such stretches while sitting on their chairs inside classrooms to release the pressure on different parts of their body. Javadivala *et al.* (2012), fully support it and suggest involving parents as well in helping their wards to perform simple physical exercises and guide them to improve sitting positions at home as well to become the part of ergonomic system. Respondent D elaborated the need to counsel parents and develop their understanding by saying:

Our first concern is the heavy backpacks. We must bound students and parents to set their bags according to the class timetable. Awareness programme introduced for parents to cooperate with the school management and understand the term ergonomics. Most of the time fault lies at the parents end as they send their young children without setting their bags according to timetable, sometimes fancy and heavy bags with trolleys and other attachments are bought to students which unnecessary cause stress on their bodies and ultimately affect students' health. We should inform parents to observe and correct the sitting habits of their wards at home as well to obtain optimum outcomes and save them from bone deformities.

Mackie *et al.* (2003) show their concern regarding unawareness of parents and educationists regarding the negative effect of the heavy backpack on children posture and overall health. It has been noticed that nor the students neither their parents are aware of ergonomics related risks which are the main cause of bad posture for sitting in the same position for long hours (Gladys-Jane *et al.* 2021). Parents need counselling and awareness regarding the schoolbag weight and its consequences on their wards in shape of musculoskeletal disorders and backache (Rontogiannis *et al.*, 2017). It has been a proven fact that parents' involvement in child's education at school is a big support for school administration (Abubakar, 2020). Therefore, parents to be guided to monitor their children's body posture at home as well to avoid ergonomics risk factors (Choudhary *et al.*, 2020). Hence, the role of parents cannot be ignored in changing habits of children for carrying backpack and reducing its load by enabling students to adopt healthy habits.

5. Conclusion

As a result of thematic analysis, interesting themes appeared. Teachers were found more or less aware of ergonomics but not with its guiding principles for a comfortable environment. However, without knowing ergonomics principles the practices they had been following were appropriate and in the right direction for students' safety from injuries, pains or other health

related issues. They expressed great concerns for the well-being of their students, most of them stated that the ill health of students not only affects their academics but their day-to-day activities. They suggested that a proper training programme with respect to ergonomics and its related risk factors must be organized for teachers of all levels. They were aware about postural education and instructing students to follow proper posture. They had planned to place proper body posture charts and used to show videos on postural awareness off and on to develop deep understanding in students to avoid future consequences of bad posture. They strongly suggested that parents need to be properly guided for the awareness of ergonomics risk factors so that they remain cautious and watchful of their children's activities at home. Some of the teachers also advised making ergonomics and its guiding principles a part of school policy which should be translated to all stakeholders like parents, teachers and even students.

6. Recommendations/future directions

Ergonomics is of extreme importance with respect to students' safety, health and improved performance. Therefore, all stakeholders including policymakers school administration, educationists, teachers, parents, and students must be aware of its significance. Following are some recommendations.

- Ergonomics should be included in national curriculum as an important component of it.
- Policy makers should draft a policy based on ergonomics guiding principles to include in National professional standards for teachers in Pakistan.
- School ergonomics to be taught at B.Ed & M.Ed level for prospective teachers' awareness.
- Smart weekly timetable should be designed by school administration to lessen load of heavy backpacks.
- Ergonomics practices must be encouraged by teachers in a classroom environment.
- Parents' bodies should be counselled and provided awareness regarding the significance of ergonomics.
- Teachers should practice healthy physical exercises at the start of the day.
- Teachers can provide postural awareness to students in the classroom during normal teaching.
- Postural awareness charts should be displayed and videos on postural awareness to be shown to students in classrooms.

References

- Abubakar, S. (2020). Influence of parental motivation on students' academic achievement in business studies in junior secondary schools in Kaduna State, Nigeria. *Sokoto Educational Review*, 19(1), 85-96. <https://doi.org/10.35386/ser.v19i1.245>
- Alibegović, A., Mačak Hadžiomerović, A., Pašalić, A., & Domljan, D. (2020). School furniture ergonomics in prevention of pupils' poor sitting posture. *Drvna Industrija*, 71(1), 88-99. <https://doi.org/10.5552/drvind.2020.1920>
- Balkó, S., Balkó, I., Valter, L., & Jelínek, M. (2017). Influence of physical activities on the posture in 10-11 year old schoolchildren. *Journal of Physical Education and Sport*, 17, 101. <https://doi.org/10.7752/jpes.2017.s1016>
- Bennett, C. L., & Tien, D. (2003). Ergonomics for children and educational environments around the world. *IEA 2003, Seoul, South Korea*.
- Brackett, M. A., Reyes, M. R., Rivers, S. E., Elbertson, N. A., & Salovey, P. (2011). classroom emotional climate, teacher affiliation, and student conduct. *The Journal of Classroom Interaction*, 46(1), 27-36. <http://www.jstor.org/stable/23870549>
- Casey, K. (1990). Teacher as mother: Curriculum theorizing in the life histories of contemporary women teachers. *Cambridge Journal of Education*, 20(3), 301-320. <https://doi.org/10.1080/0305764900200310>
- Choppin, J., McDuffie, A. R., Drake, C., & Davis, J. (2018). Curriculum ergonomics: conceptualizing the interactions between curriculum design and use. *International Journal of Educational Research*, 92, 75-85. <https://doi.org/10.1016/j.ijer.2018.09.015>
- Choudhary, M. S., Choudary, A. B., Jamal, S., Kumar, R., & Jamal, S. (2020). The impact of ergonomics on children studying online during COVID-19 lockdown. *Journal of Advances in Sports and Physical Education*. <https://doi.org/10.36348/jaspe.2020.v03i08.001>
- Colgan, C. (2002). Lockers, backpacks, and student health. *The Education Digest*, 68(3), 58.
- Corbin, J., & Strauss, A. (2008). Strategies for qualitative data analysis. *Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory*, 3(10), 4135. <https://dx.doi.org/10.4135/9781452230153.n4>
- Dharmayat, S., & Shrestha, S. (2017). Assessment of posture and musculoskeletal pain in school going girls using backpacks. *IOSR Journal of Nursing and Health Science*, 6(1), 9-12. <https://doi.org/10.9790/1959-0601050912>
- Dicicco-Bloom, B., & Crabtree, B. F. (2006) The qualitative research interview. *Medical Education*, 40, 314-321. <http://dx.doi.org/10.1111/j.1365-2929.2006.02418.x>
- Ezhovkina, E. V., & Ryabova, N. V. (2015). Psychological and pedagogic support of children with health limitations. *International Education Studies*, 8(4), 60-67. <https://eric.ed.gov/?id=EJ1061083>
- Farhood, H. F. (2013). Low back pain in schoolchildren: the role of school bag weight and carrying way. *Journal of Natural Sciences Research*, 3, 156-164.
- Flook, L., Goldberg, S. B., Pinger, L., Bonus, K., & Davidson, R. J. (2013). Mindfulness for teachers: A pilot study to assess effects on stress, burnout, and teaching efficacy. *Mind, Brain, and Education*, 7(3), 182-195. <https://psycnet.apa.org/doi/10.1111/mbe.12035>
- Forjuoh, S. N., Lane, B. L., & Schuchmann, J. A. (2003). Percentage of body weight carried by students in their school backpacks. *American Journal of Physical Medicine &*

- Rehabilitation*, 82(4), 261-266.
<https://doi.org/10.1097/01.PHM.0000057227.35210.50>
- García-Acosta, G., & Lange-Morales, K. (2007). Definition of sizes for the design of school furniture for Bogotá schools based on anthropometric criteria. *Ergonomics*, 50(10), 1626-1642. <https://doi.org/10.1080/00140130701587541>
- Gilani, S. A. (2021). Need of postural awareness in school-going children. *Pakistan Journal of Physical Therapy (PJPT)*, 3(4). <https://doi.org/10.52229/pjpt.v3i4.900>
- Gladys-Jane, V. R., Remolino, A. M. F., & Jeacel Ann, R. (2021). Ergonomic evaluation of student's posture during synchronous class. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*, 60(4), 276-292.
- Hagenauer, G., Hascher, T. & Volet, S.E. (2015). Teacher emotions in the classroom: associations with students' engagement, classroom discipline and the interpersonal teacher-student relationship. *European Journal of Psychology Education*, 30, 385–403. <https://doi.org/10.1007/s10212-015-0250-0>
- International Ergonomics Association (IEA). (2000). Council Meeting Minutes, 29–30 July 2000, Agenda Item 2.1.1, IEA Definitions: *The Discipline of Ergonomics*.
- Javadivala, Z., Allahverdipour, H., Dianat, I., & Bazargan, M. (2012). Awareness of parents about characteristics of a healthy school backpack. *Health Promotion Perspectives*, 2(2), 166–172. <https://doi.org/10.5681/hpp.2012.019>
- Jayarathne, I. L. K., & Fernando, D. N. (2009). Incorporation of ergonomics in school health promotion: The Sri Lankan experience. In *Proceedings of the International Congress IEA 2009*.
- Kaya, Ö. & Romanescu, S. (2020). Ergonomics in design education: The case of Romania and Turkey. *Ergonomi*, 3(2), 74-81. <https://doi.org/10.33439/ergonomi.738469>
- Khan, R., Jabeen, H., & Arshad, H. S. (2016). Neck, shoulder, and back pain with carrying heavy back packs among the spirit school children in Lahore. *International Journal of Science and Research (IJSR)* 5(6), 397-400.
<http://dx.doi.org/10.21275/v5i6.NOV163898>
- Kovač, M., Leskošek, B., Hadžić, V., & Jurak, G. (2013). Injuries among Slovenian physical education teachers: A cross-sectional study. *International Journal of Occupational Safety and Ergonomics*, 19(1), 87-95.
<https://doi.org/10.1080/10803548.2013.11076968>
- Kumar, P. M., Sahitya, S., Penmetsa, G. S., Supraja, S., Kengadaran, S., & Chaitanya, A. (2020). Assessment of knowledge, attitude, and practice related to ergonomics among the students.
- Lee, D. L., McLoone, H., & Dennerlein, J. T. (2008). Observed finger behaviour during computer mouse use. *Applied Ergonomics*, 39(1), 107-113.
<https://doi.org/10.1016/j.apergo.2006.12.008>
- Legg, S. J. (2006, July). Ergonomics in schools. In *IEA2006, 16th World Congress on Ergonomics, Meeting Diversity in Ergonomics, Maastricht, The Netherlands* (pp. 10-14).
- Legg, S., & Jacobs. K. (2008). Ergonomics for Schools. *Work*, 31(4), 489–493.
<https://content.iospress.com/articles/work/wor00834>
- Mackenzie, W. G., Sampath, J. S., Kruse, R. W., & Sheir-Neiss, G. J. (2003). Backpacks in children. *Clinical Orthopaedics and Related Research (1976-2007)*, 409, 78-84.
<https://doi.org/10.1097/01.blo.0000058884.03274.d9>

- Mackie, H. W., Legg, S. J., Beadle, J., & Hedderley, D. (2003). Comparison of four different backpacks intended for school use. *Applied Ergonomics*, 34(3), 257-264. [https://doi.org/10.1016/S0003-6870\(03\)00034-6](https://doi.org/10.1016/S0003-6870(03)00034-6)
- Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* (Vol. 41). Sage publications.
- Mohammadi, S., Mokhtarinia, H., Nejatbakhsh, R., & Scuffham, A. (2017). Ergonomics evaluation of school bags in Tehran female primary school children. *Work*, 56(1), 175-181.
- Mustafa, K. I., & Ibrahim, S. (2018). Influence of the weight of a School Backpack on backache among secondary school students at Koya province, Iraq. 9th International Visible Conference on Educational Studies & Applied Linguistics 2018.
- Naidoo, P., & Petersen, N. (2015). Towards a leadership programme for primary school principals as instructional leaders. *South African Journal of Childhood Education*, 5(3), 1-8. <https://dx.doi.org/10.4102/sajce.v5i3.371>
- Noro, K., & Imada, A. S. (1991). *Participatory ergonomics*. Taylor & Francis.
- Okulova, L. P. (2018). Students and teachers of a modern higher educational establishment ergonomic requirement and satisfaction in learning and work). *Espacios*, 39(40), 13–15.
- Okulova, L. P. (2020). An ergonomic approach to higher education of psychology and pedagogy students. *Revista Espacios*, 41(2), 13–23. <https://tinyurl.com/8uvm88je>
- Patton, M. Q. (1990). *Qualitative evaluation and research methods*. Sage Publications.
- Rabada, I., & Artazcoz, L. (2002). Identificación de los factores de riesgo laboral en docentes: un estudio Delphi. *Archivos de Prevención de Riesgos Laborales*, 5(2), 53-61.
- Rontogiannis, D., Tsaklis, P., Mavromoustakos, S., & Kottaras, S. (2017). Comparison between two different types of school bags and musculoskeletal symptoms in primary school students. *IETI Transactions on Ergonomics and Safety*, 1, 11-21. <http://ietinet/tes/2017V1I2/IETI%20TES%20V1%20I2%2011-21.pdf>
- Ryabova, E. V., Dzhangazieva, A. S., & Gorina, I. V. (2020). Ergonomic conditions of improving educational process quality. *ARPHA Proceedings IFTE-2020*, 2121-2133. <https://doi.org/10.3897/ap.2.e2121>
- Sheir-Neiss, G. I., Kruse, R. W., Rahman, T., Jacobson, L. P., & Pelli, J. A. (2003). The association of backpack use and back pain in adolescents. *Spine*, 28(9), 922-930. <https://doi.org/10.1097/01.BRS.0000058725.18067.F7>
- Soltaninejad, M., Babaei-Pouya A, Poursadeqiyan M, Feiz Arefi M. (2021). Ergonomics factors influencing school education during the COVID-19 pandemic: A literature review. *Work*. 68(1), 69-75. <https://doi.org/10.3233/WOR203355>
- Straker, L., & Pollock, C. (2003). Delivering the power of computers to children, without harming their health. *Proceedings of the XVth Triennial Congress of the International Ergonomics Association, Seoul, Korea*
- Syazwan, A., Azhar, M. M., Anita, A., Azizan, H., Shaharuddin, M., Hanafiah, J. M., Muhaimin, A., Nizar, A., Rafee, B. M., Ibthisham, A. M., & Kasani, A. (2011). Poor sitting posture and a heavy schoolbag as contributors to musculoskeletal pain in children: an ergonomic school education intervention program. *Journal of Pain Research*, 4, 287–296. <https://doi.org/10.2147/JPR.S22281>
- Tapia-Fonllem, C., Fraijo-Sing, B., Corral-Verdugo, V., Garza-Terán, G., & Moreno-Barahona, M. (2020). School environments and elementary school children's well-being in Northwestern Mexico. *Frontiers in psychology*, 11, 510. <https://doi.org/10.3389/fpsyg.2020.00510>

- Thomas, A. S., Abraham, D., & Pillai, S. (2022). Prevalence, associated risk factors of low back pain and its impact on the activities of daily living among college students: A descriptive study. *International Journal of Recent Advances in Multidisciplinary Topics*, 3(2), 117–119. <https://www.journals.resaim.com/ijramt/article/view/1799>
- Trevelyan, F. C., & Legg, S. J. (2011). Risk factors associated with back pain in New Zealand school children. *Ergonomics*, 54(3), 257-262. <https://doi.org/10.1080/00140139.2010.547608>
- Whittfield, J., Legg, S. J., & Hedderley, D. I. (2005). Schoolbag weight and musculoskeletal symptoms in New Zealand secondary schools. *Applied ergonomics*, 36(2), 193-198. <https://doi.org/10.1016/j.apergo.2004.10.004>
- Woodcock, A. (2007). Ergonomics, education and children: a personal view. *Ergonomics*, 50(10), 1547-1560. <https://doi.org/10.1080/00140130701587384>
- Woodcock, A., & Bartlett, R. A. (2003). Enhancing the teaching and learning of ergonomics in schools through the development of web based resources. *Presented at the 15th Triennial Congress of the International Ergonomics Association, Ergonomics in the Digital Age*, South Korea.
- Woodcock, A., Clarke, E., Cole, J., Cooke, J., & Desborough, C. (2003). Teaching ergonomics to 4 to 6 year olds. *Contemporary Ergonomics*, 519-524.
- Zunjic, A., Papic, G., Bojovic, B., Matija, L., Slavkovic, G., Lukic, P. (2015). The role of ergonomics in the improvement of quality of education, *FME Transactions*, 43(1), 82-87. <https://dx.doi.org/10.5937/fmet1501082Z>
- Zunjic, A. (2017). A new definition of ergonomics. *IETI Transactions on Ergonomics and Safety*, 1(1), 1-6. [https://doi.org/10.6722/TES.201703_1\(1\).0001](https://doi.org/10.6722/TES.201703_1(1).0001)