1. Introduction

Backpacks are used by most schoolchildren across the world to transport books and other material to school. The daily physical stresses associated with carrying backpacks cause significant forward lean of the head and trunk. The combined effects of heavy backpack, duration carrying the backpack, manipulating and handling of backpack, method of carrying, position of the load on the body of students are determinant factors for musculoskeletal complaints associated with backpack carriage.

Extensive research has been performed on variations of load carriage. Studies have shown that changes in load distribution give rise to alterations in metabolic and biomechanical parameters. Increasing the mass of the load, thus increasing overall workload, consistently results in an increased energy expenditure. A study in India done on MSD due to backpacks in children revealed that pain in the upper back (40%), neck (27%) and shoulder (20%) were the most prevalent body regions followed by forearm and wrist pain (7%) and low back (6%).

The aim of the study was to review the current literature in order to know the various measurement tools used, ergonomic risk factors and other findings related to musculoskeletal pain due to usage of heavy backpacks in school children and preventive strategies recommended.

2. Methods

A systematic review of the published literature was conducted to know about musculoskeletal pain due to usage of heavy backpacks in school children and suggested recommendations. The literature search was done in various search engines including Pubmed, Cochrane Library and Pedro (Physiotherapy Evidence Database). Three reviewers conducted the systematic review based on the PRISMA criteria and any disagreements were resolved through discussion among them. A total of 563 articles were found based on the keywords search using the terms “backpack,” “schoolbags,” “nonspecific low back pain in children,” and “musculoskeletal disorders.” Limits were set for the studies published between the years 1995 to 2013. The following data were extracted from the obtained studies: study design, type of data collection, participants, assessment tools and outcomes obtained in the respective study. Based on the eligibility criteria the articles were finalised and the rest of the articles were excluded from the systematic review. Only studies in English language were considered for the study.

3. Results

A total of 563 articles were found from search engines and other sources. After excluding irrelevant studies, other languages and duplication a total of 172 study was considered for further review. Studies conducted were experimental studies, studies on designing, studies on comparing designs, descriptive studies and systematic reviews. After a thorough review only 25 studies were considered for the final review.

Most of the studies recommended that 10% of the body weight was considered as ideal weight of the backpack, but did not present any corroborating rationale. Carrying backpacks on one shoulder and backpacks without adequate support were considered as common risk factors associated with musculoskeletal pain due to usage of heavy backpacks in school children.

4. Discussion

Studies suggested an association between the female gender and musculoskeletal pain. The prevalence of symptoms were higher in younger age groups than in their older counterparts. Shoulder, upper back, neck and lower back pain was commonly reported among school children carrying heavy backpacks. Excessive
load on the back leading to forward bending of the trunk and neck was found to be the biomechanical cause for the musculoskeletal pain. Recommendations for prevention included improving educational facilities, proper awareness and education, storing most of the books in schools, and better design of backpacks.

References

Denise Helen Bauer, 2007. A recommendation for the backpack load limit of middle school students based on physiological and psychophysical measurements.