

# A Study to Determine Prevalence of Back Pain and its Association with Backpack Weight among 12 to 16 Year Old Children in Dharwad City

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**Abstract:** Introduction: Back pain is defined as the pain that resulted in the child missing schools, abstaining from after school physical activities, or visiting doctor. Musculoskeletal problems associated with backpack use have become an increasing concern with school children. There are also few reports of other problems associated with backpack i.e. functional scoliosis, rucksack palsy and reduced lung functions. The load carrying in the form of heavy bags may manipulate the normal growth. Material and Methods: Cross sectional study conducted in Schools in Dharwad city, using self generated Questionnaire, 640 children participated in the study. Results: 43.13% children experienced back pain. Most of the children had pain in lower back region (16.72%), then upper back (16.88%) and neck (0.16%) being lowest. The presence or absence of pain was not significantly different across boys and girls. 327 (51.09%) children in our study, were underweight 327 (51.09%) and more pain was reported by them 164 (50.15%). Conclusion: There was association between heavy back pack carriage and back pain. There was weak but positive correlation seen between percentages of bag weight being carried in respect to body weight.

**Keywords:** Back pain in children, Back pack weight, self generated questionnaire.

## 1.Introduction

Recent worldwide attention has focused on the role of backpacks in the development of adolescent nonspecific back pain. There is a widespread belief that repeated carrying of heavy loads, such as school backpacks, place additional stress on rapidly growing adolescent spinal structures, making them prone to postural changes.<sup>1</sup>

A variety of factors have led to heavier backpack loads. As schools attempt to raise academic performance, children are assigned more homework. There may be no availability of lockers or overcrowding may affect locker availability. Also children participating in after school activities like sports and music carry additional equipments, clothing and instruments. This translates into children carrying greater loads of books and school supplies.<sup>2</sup>

It is reported that musculoskeletal symptom in school going children is multifactorial in origin and the carriage of heavy school bag is one of the suspected factors.<sup>3</sup> Moreover, external forces such as load carrying in the form of heavy bags may influence the development of children and adolescents and also maintenance of alignment of their bodies.<sup>3</sup>

For example, the use and carriage of heavy backpacks, asymmetrical transportation, long periods of time in an inadequate posture while sitting, the use of inappropriate furniture, watching television for a long time,<sup>4</sup> body posture when carrying school material and the size of the load carried, (intensive) participation in some sports, anthropometric factors, radiological abnormalities, are risk factors for the development of back pain and posture

problems among young people<sup>5</sup>. Furthermore family history of low back pain, physically demanding occupational activity, smoking, and some psychological traits are risk factors associated with back pain and posture problems.<sup>6</sup>

Musculoskeletal problems associated with backpack use have become an increasing concern with school children. There are also few reports of other problems associated with backpack i.e. functional scoliosis, rucksack palsy and reduced lung functions.<sup>7</sup>

Back pain is defined as the pain that resulted in the child missing schools, abstaining from after school physical activities, or visiting doctor. 12- to 14-year-old age range coincides with a period of rapid growth and increased time spent sitting in class, watching television, and using a computer. In addition, children typically begin competing at more demanding levels of sport around this age. In most cases back pain is reported to result from sprains and strains after participation in athletics, reported a higher incidence of musculoskeletal problems in children who were more physically active during leisure time than in those who did not engage in routine physical activity during leisure time. However, back pain is also reported in children who lead sedentary lifestyles. Researchers have also examined the effects of growth spurts during puberty and have reported a significant increase in the incidence of back pain during these periods. This rapid growth period is characterized by more porous bones and increased activity in long-bone epiphyseal growth plates. During this period bones grow more rapidly and in advance of soft tissues; thus, adolescents may experience decreased flexibility and in turn increased vulnerability of muscles and tendons to injury.<sup>2</sup>

The weight of the backpack being carried by children is the most critical concern of parents, teachers, and health-care professionals. As a guideline, adults are cautioned not to carry loads that exceed 10% to 20% of their body weight.<sup>2</sup>

To decrease injury and improve comfort, experts recommend that children use backpacks that match the size of the child. This constrains the amount of items that can be carried in the backpack and facilitates placement of the backpack over the strongest and largest back muscles. Experts also recommend wide, padded shoulder straps for comfort and greater distribution of weight across the shoulders, padded back for comfort and protection, and multiple compartments for distribution of load. Contoured shoulder straps are another desirable feature because they reduce shoulder strap compression of axillary structures. Otherwise compression of the brachial plexus can cause upper-extremity tingling and numbness. Additional ergonomic features developed for heavier loads and strenuous Backpacking activities include chest and hip belts, compression straps, and rigid internal and external frames. These features stabilize and better distribute the load in the backpack and increase comfort. They are however, more costly and less commonly used by children of School age.<sup>2</sup>

When wearing a backpack, an individual's center of gravity is shifted in the direction of the load. To compensate, the individual typically leans in a direction opposite to the force. For example, to compensate for a heavy backpack worn low over the sacrum, the individual typically moves the head and trunk forward. Another common strategy is lumbar hyperextension accompanied by hand support on the shoulder straps. Such postural deviations can hamper the natural shock absorption abilities of the spine and require greater muscle activity to prevent the individual from falling.

Physical therapists and other health professionals have warned that wearing a backpack that is too heavy or over one shoulder can lead to muscle spasms; neck, shoulder, and back pain; upper-extremity paraesthesia; and postural deformities.<sup>2</sup>

## 2. Material and Methodology

The cross sectional survey conducted in 2 schools in Dharwad. The inclusion criteria were, the school going children from age group 12years to 16years of both genders. Children who carry their schoolbags every day to school and back to home. The children who have the physical and mental ability to answer the questionnaire. The exclusion criteria were, the school going children of ages less than 12years and more than 16years. The children, whose schools provide lockers for daily needed school material like text books, note books etc. the students who have Inflammatory diseases around spine and structural abnormalities (viz. Scoliosis, kyphosis, kyphoscoliosis, and limb length discrepancy.)

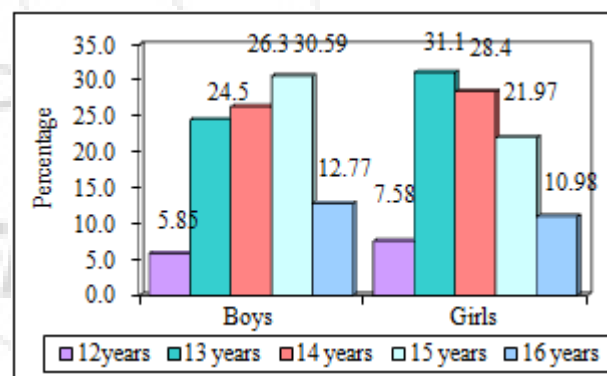
All the students meeting the inclusion and the exclusion criteria were recruited, and their parents were requested to permit their ward to participate in the study. A written consent was signed by the parents for the same. The students

were briefed about the study, were randomly selected and their demographic data, height, weight, and weight of school backpack was recorded. The pre tested Questionnaire, tested for reliability and validity by a pilot study, and the necessary modifications were accordingly done was given to each student, given to fill up. Any doubts regarding the questionnaire was clarified by the therapist. The duly filled questionnaire was collected from the students and scrutinized for its completeness.

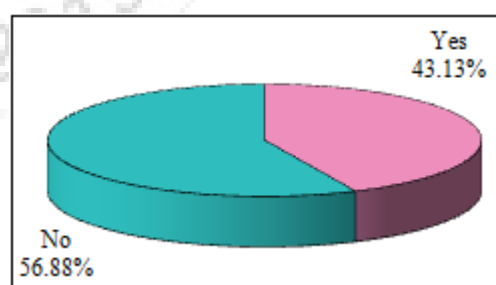
## Data Analysis

The statistical analysis was done using SPSS version 20.0. The investigator firstly evaluated the descriptive statistics using Mean and Standard deviation for the baseline characteristics. Chi square test was used to find prevalence of back pain in school going children in Dharwad city and to test hypothesis. Also it was used to find out association of back pain with various subjective causes. Correlation co-efficient was calculated by using Karl Pearson's correlation co-efficient test to find out the relationship between body mass index of children and weight. Data were presented as mean  $\pm$  standard deviation (SD) and percentage (P). P value  $< 0.05$  was considered as statistically significant

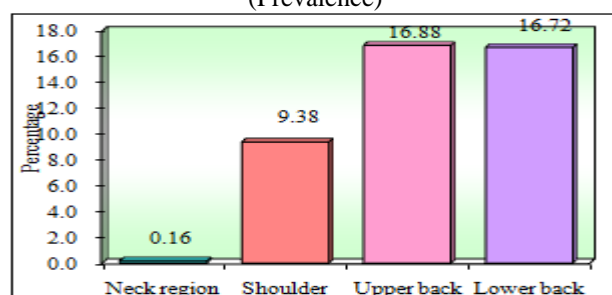
## 3. Results



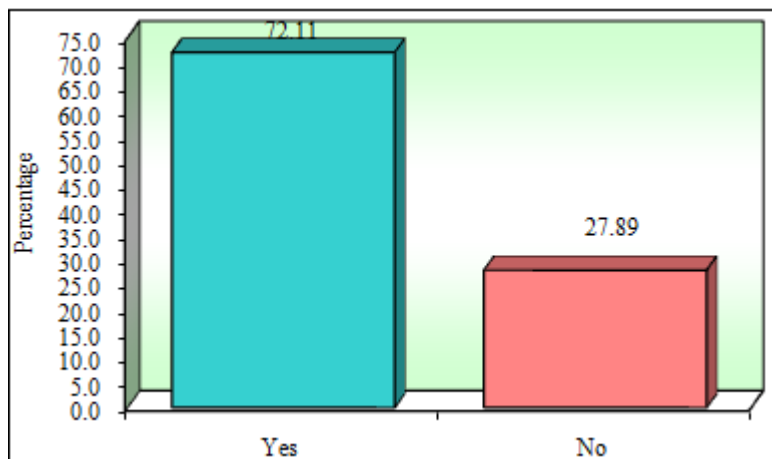
Graph 1: Distribution of children by gender and age



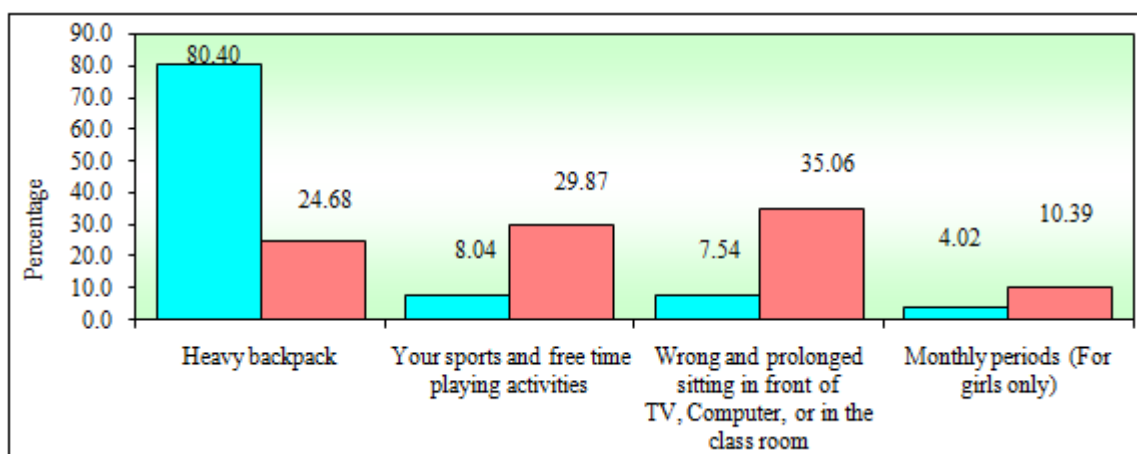
Graph 2: Distribution of children by status of back pain (Prevalence)



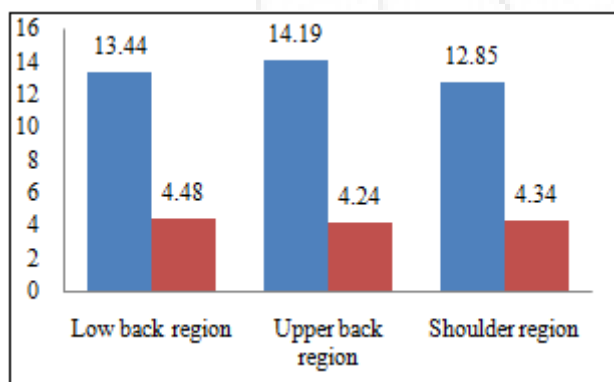
Graph 3: Distribution of children by site of pain



**Graph 4:** Distribution of children based on their subjective opinion of back pain being caused or made worse by backpack.



**Graph 5:** Distribution of children giving subjective causes for back pain



**Graph 6:** Correlation between average of bag weight as percentage of body weight and average pain intensity  
\*Positive correlation present

## 4. Discussion

Graph 2 shows prevalence of back pain in school going children of age 12 to 16 years as being 43.13% and those with no back pain as 56.88%. This result corresponds with other study by Watson KD in 2003 which was done to assess the prevalence of back pain across factors such as, body mass index, school bag weight, part time jobs involving heavy lifting, physical activity, psychosocial factors and mechanical factors, which reported that back pain increased from 12% to 70% depending upon the presence of the factors from 0 to 6 respectively.<sup>45</sup>

In our study, 169 (26.41%) children mentioned pain in the area other than low back pain. Graph 3 shows distribution of children with different sites of pain. The children experiencing pain in the upper back region being highest i.e. 108 (16.88%) and being lowest i.e. 1 (0.16%) in the neck region, while children having pain in the shoulder region were 60 (9.38%). The study conducted in Bangalore, India, by Sharan D in 2012, stated that, the upper back area where most of the children (40%) felt pain, 27% felt in neck region and 20% in shoulder region. This study supported our results which demonstrated a highest prevalence of upper back pain amongst all the possible sites of pain in children.<sup>24</sup>

Graph 4 shows the distribution of children based on their subjective opinion of back pain being caused or made worse by backpack. 199 (72.11%) children reported as backpacks being the cause of pain or worsening of the condition.

Graph 5 shows the distribution of children giving subjective causes for back pain. 179 (64.9%) mentioned heavy backpack as cause for back pain, 39 (14.13%) as sports and free time playing activities, 42 (15.21%) as wrong and prolonged sitting in front of the television, computer or in the classroom and 16 girls mentioned monthly periods being cause for the back pain.

Graph 6 shows the association of average percentage of bag weight being carried in respect to body weight and average pain intensity. Karl pearsons correlation coefficient used and

a weak but positive correlation was found in the lower back pain region. Where significant correlation found in children who had shoulder pain. This result was supported by the study conducted by Skoffer, who stated that, low back pain was prevalent in those children who carried their backpacks on one shoulder. In our study, most of the children carried their backpacks on the both shoulders so they experienced more pain in the shoulder area as compared to low back area<sup>9</sup>. Another study conducted in Bangalore, India by, Dr. Sharan D, also supported our study as he revealed that, all students participated in the study had pressure mark on the shoulder.<sup>24</sup>

## 5. Conclusion

We conclude from our study that, 276 (43.13%) children experienced back pain. Most of the children had pain in lower back region 107 (16.72%), then upper back 108 (16.88%) and neck 1 (0.16%) being lowest. The presence or absence of pain was not significantly different across boys and girls. 327 (51.09%) children in our study, were underweight 327 (51.09%) and more pain was reported by them 164 (50.15%).

There was association between heavy back pack carriage and back pain. There was weak but positive correlation seen between percentages of bag weight being carried in respect to body weight.

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