ICEH CISA PORTO 2014

3rd INTERNATIONAL CONGRESS ON ENVIRONMENTAL HEALTH 2014

PORTO, 24th to 26th SEPTEMBER 2014

PROCEEDINGS BOOK

EMERGING RISKS AND CHALLENGES ON ENVIRONMENT, HEALTH AND SAFETY

Allied Health Sciences School of Polytechnic Institute of Porto, Portugal

Title:
3th International Congress of Environmental Health: Proceedings Book
3º Congresso Internacional de Saúde Ambiental: Livro de Resumos

Edition:
1st Edition / Book in 1 Volume, 520 pages

Authors / Editors:
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Santos, Joana; Carvalhais, Carlos; Rebelo, Andreia; Freitas, Marisa; Xavier, Ana

Publisher:
(ESTSP-IPP)
Scientific Area of Environmental Health of Allied Health Sciences School of Polytechnic Institute of Porto
Área Científica da Escola Superior de Tecnologia da Saúde do Instituto Politécnico do Porto

Design / Layout:
4CS

Local / Date:
Porto / November 2014

ISBN:
978-989-20-5086-7

Legal Deposit:
384046/14

(ESTSP-IPP)
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Musculoskeletal disorders in the use of backpacks – A review

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INTRODUCTION:
Spine pathologies are not a recent problem. There is evidence that problems related to musculoskeletal disorders (MSDs) in children and adolescents are increasingly (Ebbehoj*et al.*, 2002), and the school environment and related tasks can have influence on it. The school environment is a factor of great influence in the development of postural changes and MSDs, for being the period of development of bone structure. At this period, improper habits in children and adolescents, such as incorrect posture, improper transport of backpacks or excess weight carried in backpacks can also be identified. Therefore, this is the best time to stimulate healthy habits to reduce the probability of occurrence of MSDs, irreversible in adult hood as in this period aspects related to overload and inappropriate postures become determinant to the development of the musculoskeletal system. The incorrect carrying of heavy backpacks can contribute greatly to this problem, which is the focus of this investigation study.

OBJECTIVES:
The aim of this study was to establish the problematic related to the use of backpacks by students. To achieve this issue a literature review was performed.

METHODS:
Research of the scientific publications was conducted on Science Direct and on the Library Knowledge Online (b-on). The keywords used for the papers research were: backpack; injuries; musculoskeletal; disorders; children. Several anatomy books available in municipal libraries were also consulted.

RESULTS AND DISCUSSION:
Usually the backpacks present different kinds of characteristics presenting one or two straps, with or without lumbar belt, with or without padded straps, among others. Therefore, one important step to prevent MSDs in infancy is to select an adequate backpack. To evaluate the most appropriate type of backpack, it is essential to take into account that the weight transported in a backpack transfers the centre of gravity of the body. To compensate this displacement, the body pulls the load towards the front and the centre of gravity moves relatively to the support the base. These changes lead to a rigidity of the spine and abdominal muscles, leading to back pain and injury. Taking this into consideration, it is considered that the most suitable backpack is the one that distributes the weight symmetrically on the shoulders and keeps the load close to the back. However, Oliveira (2013) showed that in most of cases, the backpack used by students is not adequate or it is not used correctly. One of the several identified problems is the overcharging due to excessive load of backpack. Overcharging is defined as a set of forces generated during maintenance of a posture or performing a given movement. When these forces are generated outside the body, are classified as external overload. The transport of excessive weight in backpacks, as a daily practice in the lives of children and adolescents, involves an overcharge on the musculoskeletal system, contributing to the emergence of pain in this population. In fact, there are numerous studies showing that there is an association between the use of backpacks and pains in the spine caused by excess weight (e.g. Bauer & Freivalds, 2009).Therefore, it is important to determine a safe limit related to the weight carried on the backpacks. This limit is defined as the weight from which the risk of MSDs begins to be detected, compromising the health of the individuals. There is no consensus in the literature regarding the acceptable weight in backpacks for children and

teenagers. Although this value varies between 10%-20% of the body weight, most authors suggest that the prevention of possible structural changes in the spine caused by overload should be considered for values below 10%(Bauer & Freivalds, 2009).

CONCLUSION:

This study showed that the use of backpack could be a problem for students. This fact could be related to the type of backpack used, the way that students do the transportation of the backpack and the weight of the backpack. Indeed, transporting overloaded backpacks contributes to increase the pressure on joints and ligaments, which may lead to postural changes. This can contribute to increase the development of musculoskeletal injuries. The literature review noticed that a maximum acceptable weight is always related to a certain group of children having a certain age. Nevertheless it is important to notice that children have different physical characteristics even though belonging to the same interval of age. Therefore, it is necessary to study and determine the ideal weight to carry in the backpacks, but restricting the sample to children with identical body mass index, so it is possible to indicate the maximum acceptable weight according to their personal characteristics and not according to their age.

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