Effects of postural education on daily habits in children. Intervention effects from the PEPE study.

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Research Article

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Abstract

Purpose. Reducing the disease burden of unspecific low back pain (LBP) in children is of major public health relevance, due to children with episodes of LBP tend to experience chronic back pain in adulthood.

Methods. The aim of the current randomised controlled trial was to investigate the effects of a 4.5 months postural education program on daily life habits related to LBP in children aged between 10 and 12 years. The study was performed in Majorca (Spain), with 253 primary schoolchildren. The overall strategy for developing the project was based on 1) intervention on classroom teachers, physical education teachers, and school management team; 2) awareness of the educational community (teachers, students, families); 3) teacher training; 4) a continuous intervention throughout the academic year.

Results. Lifetime LBP prevalence rate was 54.9% in the whole study sample. Neither single postural items nor postural habits score mostly did improved after the intervention in experimental group, and also in control group.

Conclusion. This telematic intervention has not managed to improve postural habits in children. Nevertheless, there is a lack of evidence to determine whether it is feasible to carry out telematics intervention that promotes lifestyle changes in children.

Introduction

Low Back Pain (LBP) is the leading cause of disability in the world, and it is on the rise. Reducing the disease burden of unspecific LBP in children is of major public health relevance, due to children with episodes of LBP tend to experience chronic back pain in adulthood. According to current evidence, the prevalence of non-specific LBP is very low among children younger than 7 years old (1%) [1], whereas it is larger among children aged 13–15years old (59.9% in boys and 69.3% in girls) [2]. These data suggest the need to address possible determinants of LBP early, in older primary school children, and thus be able to prevent and/or delay its occurrence.

Low Back Pain is now classified as a bio-psychosocial disorder caused by a combination of physical, psychological, and social factors [3]. For this reason, and from the perspective of LBP prevention, the acquisition of healthy habits in terms of postural education from an early age is considered essential. A habit is a stable mechanism over time, which creates skills or abilities and can be used in various situations of daily life. A set of habits form the customs and forms of behaviour of people in various situations of daily life, and therefore influence long-term behaviour patterns and have an impact on the state of health and well-being [4, 5]. The acquisition of healthy habits should be carried out especially during childhood, and also during adolescence, with the aim that the habits that are acquired from the beginning are healthy [6], due to the fact that it is more advantageous and easier than trying to change already-established unhealthy habits in adulthood [7]. Some aspects to take into account that will facilitate the acquisition of these habits and favour their permanence in the long term are: motivation,

understanding of the benefits, freedom in decision-making on the part of the child, as well as having examples to follow in their close environment, such as the family and the educational community, emphasising that schools perform a fundamental role in promoting the acquisition of healthy habits [5].

In addition to education in healthy habits, health education, such as postural education, is also important. Previous studies have concluded that health education helps students to acquire the knowledge, attitudes and skills necessary to adopt health-enhancing behaviours and to become agents of health promotion in their communities [8].

In accordance with the above, it is considered necessary to carry out postural education interventions in schools to promote healthy postural habits [9]. However, it is currently difficult to carry out a face-to-face intervention in schools, due to the COVID-19 pandemic. While it is certain that other studies on habit change have been carried out telematically (mHealth interventions) [10, 11], to the best of our knowledge, none have been carried out in child population [12], due to the complexity involved in interventions with children, such as the limited use of personal mobile phones, or the need to involve families in the interventions, due to their fundamental role in shaping their children's health choices [13].

At the moment, the results on the positive effects as to acquiring knowledge and postural habits found in the studies are inconclusive [12]. The hypothesis of the present study is that postural education will improve the children's postural habits, and that these improved postural habits will result in a lower prevalence of LBP, preventing its onset at an early age and reducing the intensity and frequency of pain in those cases where LBP is already present. The aim of the current study was to investigate the effects of a postural education program on daily life habits related to LBP in children aged 10–12 year.

Material & Methods

Sample

The present study reports the effect of the intervention on the postural habits of the child population, nested in the PEPE randomised controlled trial (Spain). This interventional study aims to prevent LBP in school children and has been described elsewhere [14]. In brief, the study was performed in Majorca (Spain), with 253 primary schoolchildren. The target group consisted of children aged between 10 and 12 years, who belonged to the fifth and sixth grades. The rationale for choosing this age group was based on the previous literature. Previous research demonstrated that the non-specific LBP prevalence is very low among children younger than 7 years old (1%) [1], whereas it is rather large in 13 to 15 years old children (i.e. 59.9% in boys and 69.3% in girls), according to data from Majorca previously published [15]. These data suggest the need to intervene already in primary school children.

The sample was selected from different clusters (schools) using convenience sampling and randomly distributed into experimental group (5 schools) or control group (5 schools). The study flow is depicted in Fig. 1.

The inclusion criteria were as follows: students must be aged between 10 and 12 years old and attending 5th or 6th grade primary school. Exclusion criteria were as follows: students whose parents or tutors did not return the informed consent form signed and those who did not participate due to illness or disability.

Study design

A 4.5 months intervention program was implemented. Participants were evaluated two times: before the intervention (baseline, Month 0) and after the intervention (post-test, Month 4.5). All participants (students, teachers, and parents) were informed about the purpose of the study and its procedure. Moreover, students' parents or tutors were requested to give their consent for children to participate in the study. An informative session was held with the teachers in order to explain in detail the procedures, aims and characteristics of the intervention program. Written information was also delivered to the teachers and parents, and a webpage (http://gicafe.uibvirtual.es/) was created ad hoc for this study.

The study was approved by the Research Ethics Committee of the University of the Balearic Islands (reference number: 130CER19).

Intervention

The overall strategy for developing the project was based on 1) intervention on classroom teachers, physical education teachers, and school management team; 2) awareness of the educational community (teachers, students, families); 3) teacher training; 4) a continuous intervention throughout the academic year. Therefore, the intervention is not carried out directly on children, but on their school environment. The professionals in charge of carrying out the intervention were sports scientists.

A 16-week intervention programme was carried out between February and June 2021 based on the following components:

1) Online theoretical training in postural education for teachers through recorded videos uploaded in Internet. Following topics were addressed: scientific evidence of LBP, human anatomy and physiology, LBP risk factors, healthy physical exercise, ergonomics, postural hygiene, analysis of the use of schoolbags, healthy habits, back care recommendations for Physical Education subject, and how to develop health promoting school projects.

2) Implementation of active breaks for classroom teachers.

3) Development of a postural education teaching unit for physical education.

4) Information and awareness campaign implemented by the school (i.e., via posters, school website, social networks, etc.)

All these resources are available on the website created for this purpose (http://gicafe.uibvirtual.es/)

Instruments

The study was based on two structured and self-administered questionnaires to investigate the prevalence of LBP and the daily postural habits in a population of children aged between 10 and 12 years. Questionnaires were fulfilled by the children at the two measurement times (baseline and post-test) and were administered at school or home. Teachers gave away the questionnaires at the school's classroom using laptops or provided families with the guide to fill it. The questionnaires were available on Google Forms.

The data related to back pain was obtained using a validated questionnaire [16] that included lifetime prevalence (never/just once/sometimes/ frequently/almost constantly), last 7-days prevalence (yes/no), point prevalence (yes/no), and also included sex (boy/girl) and age (date of birth). In addition, height and weight were included in the questionnaire to determine the body mass index (BMI).

Daily postural habits were assessed using the Back Pain and Body Posture Evaluation Instrument (BackPEI) [17]. The data included sitting position when writing, sitting position on a chair when talking, sitting position when using a computer, position adopted when lifting an object from the floor, type of backpack and how children carry it. Each item was coded as 0 = incorrect and 1 = correct. A sum score was computed from the 6 items, namely daily postural habits score (range from 0 to 6), so that the higher the score the healthier daily habits related to LBP.

Statistical analysis.

The analyses were performed with those participants that had complete data at the tow measurement points (baseline and post-test) using PASW (Predictive Analytics SoftWare, formerly SPSS), version 23.0 SPSS Inc., Chicago, IL, USA. The level of significance was set at < 0.05 for all the analyses. One-way analysis of variance (ANOVA) or Chi-squared tests were performed, as appropriate, to study group differences at baseline, in continuous and nominal variables, respectively. In order to examine the effect of the intervention, Students' t test and McNemar test were used to analyse baseline and post-test group differences in continuous and nominal variables, respectively.

Results

Characteristics of the study sample by study group are shown in Table 1. Participants were 11.02 years old and had 40.7 kg, 147.9 cm and 18.7 kg/m2 of weight, height and body mass index, respectively. Lifetime LBP prevalence rate was 54.9% in the whole study sample. Last week LBP prevalence was 17.4% and LBP point prevalence was 8%. The percentage of children having healthy postural habits is also presented in Table 1.

Participants from both study groups had similar characteristics at baseline, except for body mass index that was lower in the control group (~1.5 kg/m^2, P=0.01). Low back pain prevalence and healthy postural habits did not differ between study groups, except for sitting correctly while talking with friends that was more frequent in the control group (P=0.048). No initial differences were observed in the postural habits score between the study groups (P=0.61)

Figure 2 graphically shows how single postural items mostly did not improved after the intervention in experimental group, and also in control group. In Table 2 percentage of each single postural item is detailed.

Discussion

Due to the high prevalence of LBP in children [18], adolescents [2] and adults [19], as well as disability and costs attributed to LBP [20], it is important to invest time, effort and economic resources on preventing LBP. In this context, much research is still needed to establish the potential of school-based postural education program on incident LBP.

The present results suggest that a postural education programme applied to children should be face-to-face. The present clinical trial was designed to be a face-to-face intervention, but due to the COVID-19 pandemic, modifications had to be made and the intervention was carried out remotely. The results obtained show that there are no differences in the intervention group between the pre-test and the post-test, and no differences between the intervention group and the control group. In fact, the present intervention, carried out at a distance, has not succeeded in improving the postural habits of the 10-12-year-old school population. A telephone-based intervention aimed at modifying lifestyle habits have found similar difficulties, and have not succeeded in changing habits [21].

Our results are not consistent with other investments in children and adolescents to prevent LBP through improving knowledge about back care [22–24]. These interventions were carried out face-to-face in schools, and combined interventions on theoretical knowledge and practical interventions, where physical exercise was performed [22, 25].

As mentioned above, the present intervention has consisted, due to the pandemic situation, in a telematic intervention. On the one hand, it is important to highlight the novelty of the intervention, since to the best of our knowledge, no telematic interventions to promote habit changes in schools have been carried out so far. On the other hand, it is necessary to highlight the difficulty of the intervention to produce improvements in the postural habits of the children, as no significant results were obtained after the intervention, nor when comparing the intervention arms.

Otherwise, there are face-to-face interventions that have not obtained improvements in children's postural habits [26], nor in adult population [27], so more research is needed to clarify which aspects are key to guarantee the success of interventions to prevent and reduce LBP in children and adolescents. According to the literature, it seems that the most beneficial actions for the prevention of LBP are interventions that combine theoretical knowledge with practical interventions on postural hygiene and physical fitness [22, 24, 27]. In this line, the present intervention has complied with these guidelines, going further and involving tutors teachers, physical education teachers, and families, so that the whole environment of the child was involved in the change of habits. Another cause that may explain the lack of results in habit change interventions related to LBP may be the lack of theoretical knowledge offered to the participants [27]. In this sense, the information offered in this intervention was broad and diverse in topics, to address

the prevention of LBP from multiple perspectives: scientific evidence of LBP, human anatomy and physiology, LBP risk factors, healthy physical exercise, ergonomics, postural hygiene, among others. In addition, future research needs to be adapted to the new post-pandemic reality, where telematic interventions have gained a lot of strength, and it will be necessary to determine their viability in child and adolescent populations.

Limitations and strengths

This study has several limitations. The use of self-reported postural behaviour can be a limitation. Future studies should consider the possibility to improve the precision of the measure. Another limitation could be the inexistence of follow-up, that will provide information about how long the effects of an intervention can be retained by the children. A marked strength of this study was the use of a large sample of girls and boys in school age, from 10 different schools, combining schools from different geographical areas, which increases the representativeness of the sample. Furthermore, questionnaires used in this study were previously tested for correct understanding of the children, validity and reliability in a sample of similar characteristics.

Conclusion

The data from this study lead to the conclusion that the present intervention, based on postural education, and carried out telematically, has not managed to improve postural habits in children. There is a lack of evidence to determine whether it is feasible to carry out a telematics intervention that promotes lifestyle changes in children, and if not, how to adapt interventions in children to pandemic situations that do not allow close contact with this population.

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Tables

Table 1. Characteristics of the study sample at baseline by study group.

	Total sample (N=224)		Experimental group (N=97)		Control Group (N=127)		*p
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
Age (years)	11.02	(0.638)	11.35	(0.692)	10.78	(0.467)	<0.001
Weight (kg)	40.68	(9.492)	43.10	(11.15)	38.76	(7.453)	0.002
Height (cm)	147.9	(8.912)	148.9	(9.743)	147.1	(8.114)	0.159
Body mass index	18.73	(3.786)	19.53	(4.528)	18.08	(2.901)	0.013
Postural habits score	2.90	(1.081)	2.86	(1.000)	2.93	(1.142)	0.609
	n	(%)	n	(%)	n	(%)	
Lifetime LBP (ever)	123	(54.9%)	55	(56.7%)	68	(53.5%)	0.638
Last week LBP	39	(17.4%)	15	(15.5%)	24	(18.9%)	0.502
LBP point prevalence (today)	18	(8.0%)	9	(9.3%)	9	(7.1%)	0.550
Adequate type of backpack	217	(96.9%)	93	(95.9%)	124	(97.6%)	0.453
Correctly carrying backpack	199	(88.8%)	86	(88.7%)	113	(89.0%)	0.941
Sitting correctly while writing at school	48	(21.4%)	17	(17.5%)	31	(24.4%)	0.213
Sitting correctly while talking with friends	30	(13.4%)	8	(8.2%)	22	(17.3%)	0.048
Sitting correctly while using a computer	91	(40.6%)	44	(45.4%)	47	(37.0%)	0.207
Stooping correctly	64	(28.6%)	29	(29.9%)	35	(27.6%)	0.701

LBP indicates low back pain.

* One-way analyses of variance and Chi-squared tests were used to analyse group differences in continuous and nominal variables, respectively.

Table 2. Healthy habits score and each single item at baseline and post-test by study group.

	Experimental group (N=97)					Control Group (N=127)				
	Baseline		Post-test		Sign.	Baseline		Post-test		Sign
	Mean	(SD)	Mean	(SD)		Mean	(SD)	Mean	(SD)	
Postural habits score	2.86	(1.000)	2.56	1.108	t = 1.918 p = 0.058	2.93	(1.142)	2.64	(1.067)	t = 2.016 p = 0.046
	n	(%)	n	(%)		n	(%)	n	(%)	
Adequate type of backpack	93	(95.8%)	95	(97.9%)	p = 0.687	124	(97.6%)	124	(97.6%)	p = 1.000
Correctly carrying backpack	86	(88.7%)	83	(85.6%)	p = 0.678	113	(89.0%)	119	(93.7%)	p = 0.238
Sitting correctly while writing at school	17	(17.5%)	15	(15.5%)	p = 0.824	31	(24.4%)	15	(11.8%)	p = 0.020
Sitting correctly while talking with friends	8	(8.2%)	17	(17.5%)	p = 0.078	22	(17.3%)	29	(22.8%)	p = 0.360
Sitting correctly while using a computer	44	(45.4%)	24	(24.7%)	p = 0.008	47	(37.0%)	29	(22.8%)	p = 0.020
Stooping correctly	29	(29.9%)	14	(14.4%)	p = 0.014	35	(27.6%)	19	(15.0%)	p = 0.023

Students' t test and McNemar test were used to analyse baseline and post-test group differences in continuous and nominal variables, respectively

Declarations

STATEMENTS AND DECLARATIONS.

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Figures

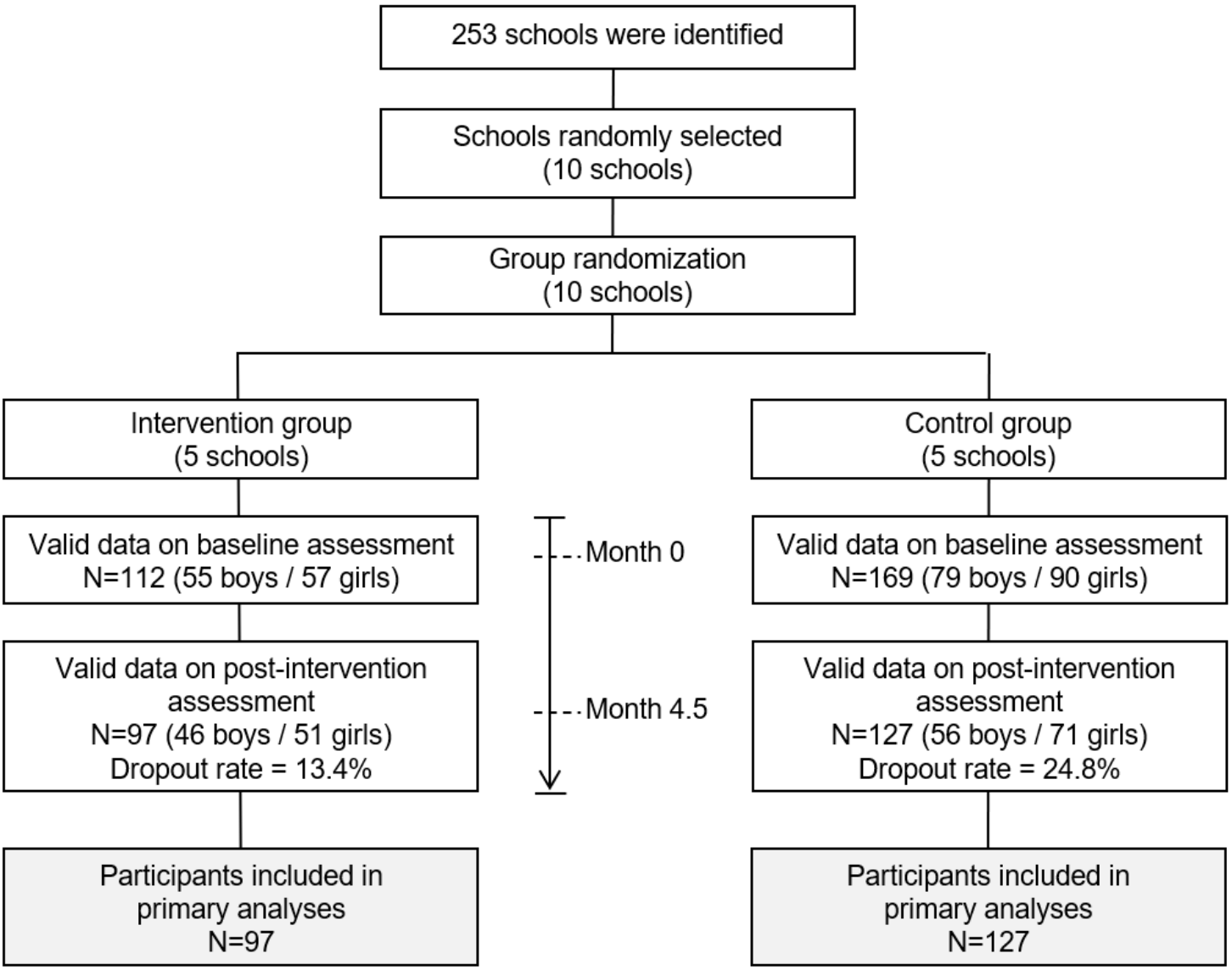

Figure 1

Study flow.

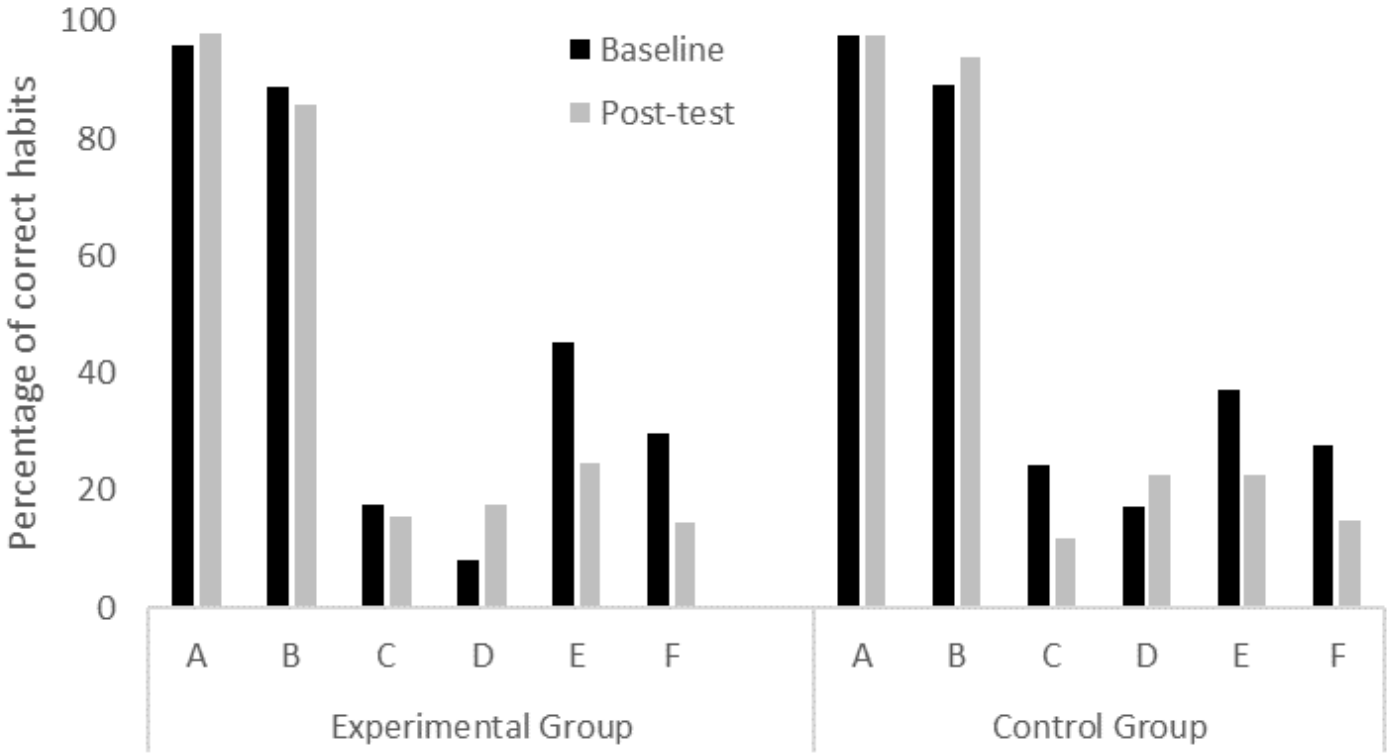

Figure 2

Percentage of participants having correct habits according to study group at baseline and post-test.

A= Adequate type of backpack; B= Correctly carrying backpack; C= Sitting correctly while writing at school; D= Sitting correctly while talking with friends; E= Sitting correctly while using a computer; F= Stooping correctly.