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The assessment of EBV and CMV infection in nurses providing invasive and conservative treatment.

SUMMARY

Introduction

Undoubtedly, harmful biological factors constitute one of the most outstanding component of workplace contamination which may contribute to the occurrence of infectious or invasive diseases caused by viruses, bacteria and fungi in the personnel. The scope and nature of nurses' work is associated with the risk of exposure to harmful biological factors and the resultant risk of transmission of both CMV and EBV viruses. It is connected with the provision of healthcare and nursing care services by nurses, mainly involving a direct contact with patients, their blood, body fluids, secretions and excretions. Currently, healthcare professionals do not undergo routine diagnostics as regards CMV and EBV infections. It is due to the fact that the observance of appropriate prophylactic measures, occupational safety and hygiene regulations, using gloves, washing and disinfecting hands seem to be accepted preventive methods of CMV and EBV infection transmission. However, it may be responsible for decreased awareness and the resultant underestimation of an existing risk of exposure to those pathogens at the workplace. Furthermore, it was demonstrated by several authors that healthcare workers have difficulty observing the rules of proper hand hygiene. The causes of such negligence may be due to work intensity, time pressure and personnel reduction. Moreover, other factors increase the burden in the nursing profession, such as the disruption of the circadian rhythm, experiencing permanent stress and tension, overworking, which may significantly disrupt immune function and make nurses more prone to infections. Currently, no data are available as regards the evaluation of the incidence of CMV and EBV infections in Polish nurses.

Objective

The present study aimed at the determination of differences concerning the incidence of cytomegalovirus and Epstein-Barr virus in the perspective of healthcare area in the nursing profession.

Materials and Methods

Sample material included venous blood collected from 120 individuals: 90 professionally active nurses (study group) and 30 persons whose profession was not connected with the provision of healthcare services (control group). Nonprobability sampling was used when forming the study group. The participants were selected according to the area of medical activity. The study concentrated on those areas of healthcare which are significantly different as regards the scope of healthcare services provided (including nursing care), clinical status and age of patients. When selecting the areas of medical activity it was assumed that a higher risk of contracting CMV and EBV was associated with work at pediatric (small children) and transplantology departments (patients with reduced immunity) than in the General Practice or specialist outpatient healthcare.

The sample material for serological tests included the serum. The following antibodies were labelled: EBV VCA IgM; EBV VCA IgG; EBV EBNA-1 IgG and CMV IgM and IgG. The plasma was used to label PCR EBV and PCR CMV.

Results

A positive result of CMV PCR was obtained in two persons, one of whom worked at a pediatric department (study group – pediatric subgroup) and the other at a transplantology department (study group - transplantology subgroup). The genetic material of EBV was found in 5 study group nurses. Three of those nurses worked at Pediatrics, one at Transplantology and one - General Practice (study group – GP subgroup). The DNA of CMV/EBV was not reported in any of control group participants.

Labelling of specific IgG CMV antibodies showed the seroprevalence at the level of almost 88% (n=79) in the study group. No statistically significant differences were noted between the groups of nurses and the control group as regards IgG CMV seroprevalence.

The quantitative comparative analysis of the titers of IgG CMV (AU/mL) did not reveal any statistically significant differences between the groups. The analyses demonstrated a linear correlation between the titer of IgG CMV and the age ($p=0.023$) and job seniority ($p=0.002$) in the pediatric subgroup (moderately strong).

Specific (VCA) IgG EBV antibodies were found in all the study group and control group individuals. A similar percentage of Epstein-Barr nuclear antigen EBNA-1 IgG occurred in each of the study subgroups and in the control group. Statistical analysis showed no significant correlation between persons with a positive or negative result for IgG EBNA-1 and being a participant of a specific group.

The quantitative comparative analysis of the titers of EBV VCA- IgG (S/CO) and EBV EBNA-1 IgG (S/CO) did not reveal statistically significant differences between the groups. The analysis demonstrated a moderately strong correlation between the age and the level of EBV VCA IgG antibodies in the pediatric subgroup (0.002). A statistically significant positive correlation was observed between job seniority and the level of EBV VCA- IgG in the pediatric personnel ($p=0.006$), GP subgroup ($p=0.046$) and in the study group as a whole ($p=0.014$). Moreover, a higher level of EBV EBNA-1 IgG was associated with a longer work experience in pediatric personnel ($p=0.045$).

Conclusions

1. No statistically significant differences were noted between the subgroups of nurses and the control group as regards IgG CMV, VCA IgG EBV and EBNA-1 IgG EBV seroprevalence.
2. The values of the titer of selected antibodies against CMV and EBV did not differ between the subgroups and between the study and control groups.
3. Nurses with a positive IgG CMV result were significantly older and their work experience was distinctly longer.
4. A positive correlation was reported between the titer of IgG CMV/VCA IgG EBV antibodies and the age and job seniority in the subgroup of pediatric nurses.
A positive correlation was reported between the titer of VCA IgG EBV antibodies and the age and job seniority in the subgroup of General Practice personnel.
5. The DNA of CMV/EBV was reported only in the study group. It was not found in any of control group participants.
6. A positive EBV PCR result was observed in significantly older nurses with longer work experience.