CHARACTERIZATION OF SALMONELLA SEROVARS IN COMPARISON WITH SOME ENTEROBACTERIA BY SDS-PAGE ANALYSIS

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ABSTRACT

Salmonella bacteria causes a wide variety of disease and disease syndrome in different animals, birds including human beings and remains as a serious problem with public health significance throughout the world. A suitable vaccine or suitable immunogen detection system is not yet still available. However, it is interesting to characterize of a common immunodominant surface protein from a wide variety of Salmonella serovars to get the protective measures of Salmonellosis. Salmonella surface protein characterization could be useful for development of protective measures against Salmonellosis and for analysis of the protein profile relationship among the Salmonella serovars. A common and immunodominant surface protein of Salmonella serovars was critically important. SDS-PAGE analysis during the period of January 2004 to December 2004 showed a target surface protein of 37.81 kDa among the 54 Salmonella serovars in comparison to some enterobacters. The protein profiles in SDS-PAGE of Salmonella serovars were not different among all Salmonella serovars examined in this study. In contrast to the protein band of 37.81 kDa in all serovars of Salmonella were compared and recorded with those of Escherichia coli, Enterobacter aerogenes, Klebsiella pneumoniae, and Enterobacter cloacae and were detected as 36.5 kDa. SDS-PAGE analysis showed different size of protein of Salmonella serovars and other tested enterobacters. However, it needs further investigation including Western blotting and 2-D PAGE analysis of the specific band of 37.81 kDa and 36.5 kDa protein.

Key words: Salmonella serovars, characterization, SDS-PAGE

INTRODUCTION

Salmonella enterica (S. enterica) serovar S. typhi cause systemic infection and typhoid fever, whereas other serovars such as S. typhimurium cause gastroenteritis (McClelland et al., 2001). Salmonella infection in calves remains to be a major problem. Substantial economic losses were through mortality and poor growth of infected animals as well as the hazard of transmitting food poisoning to humans. Many outbreaks of Salmonella infection have been reported world wide. The most frequently isolated serovars are S. typhimurium, S. enteritidis, S. dublin, S. anatum, S. newport, S. cerro, S. montevideo and S. agona. These are considered the major host-adapted Salmonella for cattle (Mitz et al., 1981, Konrad et al., 1994, Ritchie et al., 2001 and Veling et al., 2002). SDS-PAGE of only S. typhimurium, S. enteritidis and S. dublin was conducted by Nakajima, (1999) in order to observe the suitability of the technique. But comparative analysis of protein profiles was not performed among the members of Enterobacteriaceae which possess ECA (Erbel et al., 2003, Mier and Mayer 1985). SDS-PAGE with porin proteins or OmpF, OmpC, and OmpD of S. typhimurium was reported by Sing et al. (1995, 1992). SDS-PAGE of S. typhimurium (Udhayakumar and Muthukkaruppan, 1987), S. typhi (Tabaraie et al., 1994), S. typhimurium LT2 (Matsue and Arai, 1989), and S. typhimurium SH5014 (Kuusi et al., 1979) were also reported. However, these studies with the limited number of serovars did not give a conclusive idea regarding a common vaccine candidate against infections of a wide variety of Salmonella serovars.

Therefore, in the present study, SDS-PAGE of a wide variety of 54 Salmonella serovars was performed and compared with that of several Enterobacteria to find out a suitable common immunodominant surface protein regarding the control of Salmonellosis.

MATERIALS AND METHODS

The whole research work was performed in the Animal Health Laboratory, School of Agriculture, Ibaraki University, Ibaraki, Japan during the period of January 2004 to December 2004. To perform this study, a total of fifty four Salmonella serovars (A 1 Agona, A 2 Albany, A 3 Amage, A 4 Anatum, A 5 Bardo, A 6 Bareily, A 7
The present investigation describes the characterization of the immunodominant surface protein from a wide variety of Salmonella serovars and the study of protective potential of that particular protein in order to control Salmonellosis. The protective potential of Salmonella using an outer surface protein was studied by Tabaraei et al. (1994) Muthukumar et al. (1993) Udhayakumar and Muthukkaruppan (1987) Matsui et al. (1989) and Kuusi et al. (1981, 1979) in mice. They used only a limited number of Salmonella (S. typhi and S. typhimurium) strains. Moreover, the previous investigators focused on the outer membrane proteins of S. typhimurium, S. enteritidis and S. dublin which induced the strong humoral antibodies to the Salmonellae. However, Nakajima (1999) used only 3 serovars of Salmonella.
Characterization of Salmonella serovars

The selected Enterobacteria were included due to the presence of ECA among the members of the family Enterobacteriaceae (Erbal et al., 2003, Meier and Mayer, 1985, Ramos et al., 2003.). The common protein of 37.81 kDa was found in all Salmonella serovars, while the 36.5 kDa of Enterobacteria was found through SDS-PAGE studies. Fifty four Salmonella serovars proved that the 37.81 kDa protein of Salmonella serovars was clearly different from the 36.5 kDa protein of Enterobacteria (Fig. 6) although there is a report of ECA present among the members of Enterobacteriaceae (Erbal et al., 2003, Meier and Mayer, 1985, Ramos et al., 2003).

This is a first report for accurate comparasion of 54 Salmonella serovars with several Enterobacteria by using the well-defined SDS-PAGE.

Fig. 1. Comparison of the protein profiles among Salmonella serovars. Lane 1, S. agona A1; Lane 2, S. albany A2; Lane 3, S. amager A3; Lane 4, S. anatum A4; Lane 5, S. bardo A5; Lane 6, S. barely A6; Lane 7, S. blegdam A7; Lane 8, S. blockley A8; Lane 9, S. braenderup A9; Lane 10, S. brandenburg; Lane 11, S. bredeny A11. Arrow indicates 37.81 kDa. M, molecular size markers.

Fig. 2. Comparison of the protein profiles among Salmonella serovars. Lane 1, S. cerro A12; Lane 2, S. choleraesuis A13; Lane 3, S. colorado A14; Lane 4, S. corvalis A15; Lane 5, S. derby A16; Lane 6, S. dublin A17; Lane 7, S. duesseldorf A18; Lane 8, S. enteritidis A19; Lane 9, S. gaminara A20; Lane 10, S. givA21; Lane 11, S. grumpensis A22. Arrow indicates 37.81 kDa. M, molecular size markers.
Fig. 3. Comparison of the protein profiles among *Salmonella* serovars. Lane 1, *S. hadar* A23; Lane 2, *S. havana* A24; Lane 3, *S. heidelberg* A25; Lane 4, *S. infantis* A26; Lane 5, *S. istanbul* A27; Lane 6, *S. johannesburg* A28; Lane 7, *S. kentucky* A29; Lane 8, *S. krefeld* A30; Lane 9, *S. lexington* A31; Lane 10, *S. liverpool* A32; Lane 11, *S. livingstone* A33. Arrow indicates 37.81 kDa. M, molecular size markers.

Fig. 4. Comparison of the protein profiles among *Salmonella* serovars. Lane 1, *S. london* A34; Lane 2, *S. mbandaka* A35; Lane 3, *S. meleagridis* A36; Lane 4, *S. montevideo* A37; Lane 5, *S. muenchen* A38; Lane 6, *S. newport* A39; Lane 7, *S. ohio* A40; Lane 8, *S. oranienburg* A41; Lane 9, *S. orion* A42; Lane 10, *S. ouakam* A43; Lane 11, *S. panama* A44. Arrow indicates 37.81 kDa. M, molecular size markers.
Characterization of Salmonella serovars

**Fig. 5.** Comparison of the protein profiles among *Salmonella* serovars. Lane 1, *S. potsdam* A45; Lane 2, *S. risen* A46; Lane 3, *S. sandiego* A47; Lane 4, *S. senftenberg* A48; Lane 5, *S. taksony* A49; Lane 6, *S. tennessee* A50; Lane 7, *S. thompson* A51; Lane 8, *S. typhimurium* L1338; Lane 9, *S. virchow* A53; Lane 10, *S. worthington* A54. Arrow indicates 37.81 kDa. M, molecular size markers.

**Fig. 6.** Comparison of the protein profiles of three *Salmonella* Serovas and Enterobactria in SDS-PAGE. Lane 1, *S. typhimurium* L1338; Lane 2, *S. cerro* A12; Lane 3, *S. johannesburg* A28; Lane 4, *E. coli* v517; Lane 5, *Ent. aerogenes* ACLD0301; Lane 6, *Klebsiella pneumoniae* ACLT0201; Lane 7, *Ent. cloacae* ACLHa0901; Lane 8, *E. coli* ACLD2201. Arrows indicate 37.81 kDa and 36.5 kDa. M, molecular size markers.
REFERENCES


